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**REGULATIONS
FOR
ARMY ORDNANCE SERVICES
PART II**

PAMPHLET No. 5

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**DETONATORS, FUZES, GAINES, PERCUSSION
PRIMERS AND CAPS, TUBES, ETC.**

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REGULATIONS FOR ARMY ORDNANCE SERVICES, PART II

PAMPHLET No. 5

EXAMINATION AND PROOF OF DETONATORS, FUZES, GAINES, PERCUSSION PRIMERS AND CAPS, TUBES, ETC.

SECTION I

GENERAL INSTRUCTIONS

1.—(1) Stores of all natures will be subject to inspection annually.

(2) Normally, stores under two years old (from date of manufacture or filling), or any that have been proved since the last inspection will, however, not be subjected either to examination or proof, *except where otherwise specified herein, or as ordered by the competent authority.*

(3) Fuzes, gaines, primers and tubes in gun or howitzer ammunition *issued specially for practice* or set aside for expenditure at practice will **not** be subjected to proof by I.O.Os. unless they have been held for more than two years from the date of their last proof.

2. Examination.

- (a) At the annual inspection, five per cent. of all packages, hermetically sealed tinned-plate cylinders or boxes and "exposed" stores will be visually examined as a guide to the probable general condition of the remainder of the stock on charge.

Note.—"Exposed" stores are those contained in tinned-plate cylinders and/or boxes, which are not hermetically sealed, stores issued in papier mâché cylinders or boxes, primers or caps in cartridges, and fuzes in shell or packet loose in M.L. cases or other similar packages.

- (b) Should any defect (*e.g.* damp or rust) be found of common occurrence at this examination, a further five per cent. examination will be made.

3. Poor external appearance of the stores or their packages, or any other relevant detail such as bad packing, unsatisfactory material or chemical action, must be brought to notice in the report of inspection.

4. Proof selection at Home stations.

- (a) I.O.Os. will be informed by the Chief Inspector of Armaments, Woolwich, which lots or dates of detonators, fuzes, gaines, primers and tubes held on charge in their respective areas are to be selected for *first proof* at annual inspection. *Second proof* of such stores when necessary, will, however, be selected locally by I.O.Os.
- (b) The proof selection of all other natures of stores will be carried out locally by I.O.Os.

5. Proof selection at stations abroad.—At all stations abroad I.O.Os. will be responsible for the selection of stores for proof, in accordance with the instructions herein and in R.A.O.S., Part II, Pamphlet No. 11.

6.—(1) Where for any reason a departure is made from the percentages laid down for proof, the reason must be stated in the report of inspection.

(2) Where *special inspections* have been ordered (*i.e.* inspection in circumstances not ordinarily required by these regulations), the normal percentages for proof will apply unless otherwise ordered.

7. All stores are to be proved by nature, Mark, filler, lot and date of filling (*i.e.* month and year) separately, except in the case of "grouped" stores (*see* para. 12).

8.—(1) When stores of a particular nature, Mark, filler, lot and date of filling are held on charge at more than one station in the area over which an I.O.O.'s jurisdiction extends, a summary of all portions of the lot will be made for purposes of the annual proof, and samples will be taken from as many portions of the lot as the required proof percentage will admit.

(2) When, however, for any reason the I.O.O. considers that a separate proof from a particular portion of the lot is desirable, he will exercise his discretion in the matter, giving reasons on the report of inspection.

9. When some portions of a lot or group are in sealed cylinders or boxes and other portions "exposed," they will be bracketed together on the Army Forms for recording purposes, but samples for **first proof will in all cases be selected from the "exposed" stores** (*see also* para. 16).

10.—(1) Provided the total quantity of the lot or group justifies it, stores for proof will normally be selected by whole cylinders or boxes. Where practicable several packages should be opened in order to obtain the required number of cylinders or boxes, *but the same package must not be opened at successive inspections.*

(2) Where, however, the quantity on charge is small, whilst the prescribed proof percentage must always be taken, every effort must be made to prevent the ultimate retention of partially filled cylinders, etc., by taking completed cylinders (or boxes) of "grouped" stores.

(3) **Sealed cylinders and boxes are not on any account to be opened unless the contents are actually required for proof or current use.**

11. Stores selected for proof must be thoroughly examined in detail before proof is carried out, and defects, if any, reported on the Army Forms.

12. Grouping.

- (a) When the quantity of a particular nature of store held on charge consists of small lots of various Marks, fillers and dates of filling, economy in the numbers taken for proof is to be effected by "grouping" together several of the lots.
- (b) *When stores are grouped it is of the utmost importance that all the lots should have the same "filler."*
- (c) The dates of filling of the different lots grouped together should not, as a rule, cover a period of more than six months.
- (d) Normally a group should include only stores of one particular "Mark," but, where the lots are all of the same filler and closely allied in "date of filling," more than one Mark of store may be included, *provided that there are no radical differences of design and that the proof requirements are the same throughout.*
- (e) For fuzes and tubes, 300 is normally a suitable number for a "group," but, where there are several lots (of the same filler) with ten or less in each lot, such lots may be made up into groups of about 100, and the lot numbers shown as "various" on the Army Forms.
- (f) Where, however, as in the case of detonators in soldered cylinders, the expenditure at proof of the contents of a complete cylinder would considerably exceed the normal percentage required, the I.O.O. should exercise his discretion and may

group quantities up to a limit of 800 in all ; this should, however, not be done where there is a reasonable prospect of the unexpended contents of a cylinder exposed at proof being used up within a short time.

13. Grouped stores. (*See also para. 16.*)

- (a) The number selected for first proof from a group of stores will all be taken from one particular lot in the group ; if proof is successful, the whole of the group will be sentenced serviceable.
- (b) If, however, the proof (including reproof where indicated) is a failure, *the lot in which the failures actually occurred* will be sentenced unserviceable and discarded from the group.
- (c) The residual group thus formed will then be treated on its merits and proof taken as at (a) and (b) above, and so forth.

This process of elimination by re-grouping is designed so as to prevent the rejection of potentially serviceable lots in a group owing to the failure of an isolated lot. It is essential, therefore, that the I.O.O. should exercise his judgment and discretion, particularly where lots vary considerably in quantity, by selecting for first proof the lot which is smallest numerically, and continuing this process should further proofs be necessary.

14. In the case of proof of a group containing " various " lots, or, where for any reason the full particulars of a lot cannot be ascertained, the *actual markings* found on the stores proved will be entered on the appropriate Army Form.

15. Fuzes.

- (a) If fuzes are ordered to be removed from fuzed ammunition for any reason other than proof (*e.g.* defuzing and plugging shell), they must be subjected to proof as soon as practicable. Such fuzes, if sentenced serviceable at proof, must have all traces of luting removed from them prior to packing into cylinders.
- (b) All fuzes which have been returned from service in the field should, as soon as possible, be examined and proved.

16. Exposed stores.—Where stores for first proof are taken from the " exposed " portion of a lot or group (para. 9), action after proof will be as follows :—

- (a) If proof is successful, *all* stores in the lot or group will be sentenced serviceable.

(b) If *any* failure occurs :—

- (i) The “exposed” stores in the lot which failed will be sentenced unserviceable and set aside.
- (ii) Should there be available any stores of the same lot in soldered cylinders or boxes, they will be removed from the group and proved *as a separate lot*.
- (c) If, after the elimination of a lot or lots from an original group, the number of stores left justifies it, subsequent proof and sentencing of the remainder will be on lines similar to those given above, *i.e.* treat as a new group, or re-group with other stores if available, and begin afresh.

17. All first proofs must be shown on the Army Forms in black ink, second and subsequent proofs in red ink.

18. Special examination or proof.

- (a) *Stores due for proof* which, for any reason, cannot be proved locally by the I.O.O. will be forwarded to the C.O.O., Woolwich Arsenal, the reason for forwarding the stores, *i.e.* “For Proof,” being clearly indicated and the authority (*i.e.* this Pamphlet), quoted on packages and vouchers in order to facilitate identification.

The prescribed Army Forms in duplicate will at the same time be forwarded as laid down in R.A.O.S., Part II, Pamphlet No. 11.

- (b) *Stores having electrical means of ignition, e.g.* tubes, fuzes or detonators which fail to fire either on service or at proof or whose resistance at test falls outside the prescribed limits will also be forwarded to Woolwich, the packages, etc., being marked “For special examination.”

In this case no Army Forms are required but a report is to be rendered by the I.O.O. giving full details as to the history of the stores and any particulars that may have a bearing on the cause of failure.

- (c) No examination or testing of the aforementioned stores need be carried out by the I.O.O. other than that necessary to ascertain that they are safe for storage and transport.
- (d) Stores which fail to fire *due to damage through rough handling or usage* will **not** be forwarded for “special examination” but will, after confirmation of sentence, be disposed of as directed in these regulations.

19. Packing stores.—All tinned-plate cylinders and boxes containing stores opened for examination, and/or proof, if their contents have not been entirely expended, also any opened boxes or cylinders containing stores for return to R.A.O.C. will be re-closed by a tape band shellacked on.

After re-closing, the label on the lid of the package is to be marked, in the space provided for this purpose, with the number of stores remaining in the package, and the date of re-closing.

The labels, after affixing and marking where necessary, will be varnished over with shellac varnish.

20. Painting.—Should it be found necessary to re-paint and re-label cylinders or boxes, such packages must first be scraped and cleaned so as to furnish a good surface for the paint. *Tinned-plate cylinders or boxes containing detonators must, however, not be scraped.*

These operations must not be carried out where the remaining "life" of the contents is less than two years, in the case of stores for which a definite life is laid down (*see text*).

Paint prepared for use, and varnish will be demanded from R.A.O.C. as required.

21. The following table gives the colours for tinned-plate cylinders and boxes :—

<i>Store contained</i>	<i>Colour of body</i>	<i>Colour of tip of tear-off band</i>
Detonating fuzes	Yellow	Red.
Non-detonating fuzes with gaines		
Time or time and percussion fuzes for 2-in. fuze-hole ...	Green	Red.
Non-detonating percussion fuzes		
Tubes and primers	Black	Red.
Safety fuze and igniters ...		
Detonators, electric, No. 9 ...	Upper half yellow Lower half red	Red.
Detonators, electric, No. 13		
Fuzes, electric, No. 14	Upper half white Lower half red	Red.
Fuze, instantaneous detonat- ing		
	White	Red.
	Yellow	—

22. Marking.—When stores are transferred from one package to another all markings which appear on the original package will be repeated on the fresh package.

DISPOSAL OF STORES

Unserviceable Stores

23. Stores sentenced "unserviceable" on results of examination and/or proof will not be disposed of, nor replaced by serviceable stores (*except in the case of emergency*), **until after receipt of confirmation of sentences.**

In the interim, condemned stores will be kept apart from serviceable stores in order to avoid any subsequent confusion.

24.—(1) When sentences are confirmed, replacement of the unserviceable stores (if replacement is necessary) will be effected as early as possible, and finally the unserviceable stores will be disposed of as follows :—

- (a) Tubes (all natures), *if not required for drying vents or for instructional purposes*, will, unless otherwise directed, be burnt out by firing as for proof and then boiled out (*see para. 29*).
- (b) Unless otherwise directed, other filled stores will be returned intact to the C.O.O., Woolwich Arsenal.
- (c) *Unserviceable detonators* (except as directed in para. 18) *will invariably be destroyed locally.*

If any of the stores are ordered to be freed from explosives prior to their return, they should be burnt out by firing as for proof and then treated as in para. 29.

(2) Small quantities of filled stores sentenced unserviceable at stations overseas, will not at once be returned as above, unless specially ordered, but will be retained in R.A.O.C. charge until a quantity is accumulated sufficient to justify the expense of return, when transport is available. In such case the stores must be examined periodically to ascertain that they are in safe condition for storage and transport.

25. Destruction by burning.—Where destruction by burning is directed, the operation will be carried out in the following manner :—

A fire will be made in a brazier or suitable receptacle and a screen of steel or iron plate thick enough for the purpose, and suitably supported, will be interposed between the fire and the operator. The stores to be destroyed will then be dropped over the screen, one by one, by means of tongs or similar implement, into the fire. *Care is to be taken that the operator is completely protected by the screen.* (*See also para. 28.*)

26. Destruction by dumping in deep water.—Where unserviceable stores are to be disposed of by dropping them into deep water, they must be suitably packed in a weighted

package provided with holes to allow ingress of water; the position selected for dumping should be such that there is very little probability of the stores being dredged up, washed up by the tide or otherwise recovered.

27. Destruction by guncotton.—Where missfired or unserviceable stores are to be destroyed by means of a guncotton primer the operation will be carried out as follows:—

Select a situation where there is cover for the operator. Place the store to be destroyed on the ground—preferably on sand, and erect a shield between the store and the cover. Fit a No. 8 detonator with 3 ft. of "fuze, safety, No. 11," rectify the hole in a dry guncotton primer 1-oz., and carefully insert the detonator therein. Place the primer thus prepared over the magazine portion of the store, ignite the safety fuze by means of a fuzee and retire to cover. (*See also para. 28.*)

28. Special precautions.—In all proof operations and destruction of missfires, etc., adequate protection must be provided against injury to persons or property. Small pieces of metal from detonators are projected at a high velocity, and may cause serious injury at a distance of 100 ft. The explosion of larger stores, *e.g.* detonating fuzes and gaines, is comparable with the explosion of a heavy grenade and, therefore, the greatest care is necessary in the provision of cover for the operators, and the exclusion of all other persons from the area in which the operations are to take place. Whenever possible proof operations are to be carried out in a walled enclosure.

Burnt-out or Emptied Fuzes, Tubes, etc.

29. The bodies of fuzes, tubes and primers, etc., which have been fired at proof, etc., or from which the explosive has been removed by other means will, *as soon as possible*, be cleaned by boiling in water for 30 min., repeating a second time after changing the water.

30. To ensure complete removal of all explosive from any store which may not have fired correctly, it will be necessary to dismantle before boiling. If any set screws cannot be removed with the usual tools or implements, they are to be carefully drilled out. If a fuze cap should be immovable by ordinary means, cut flats on it and remove with a spanner.

31. After cleaning by boiling, stores will be thoroughly dried, examined for freedom from explosive, packed and returned as laid down for filled stores (para. 24). Packages

containing burnt-out fuzes, tubes, etc., will be marked "certified free from explosive," with date and monogram of station.

32. A certificate to the effect that the items are free from explosive will be furnished on each copy of the voucher, inspection form or examination order, by the inspecting ordnance or other officer, or responsible official of the ordnance factories supervising the emptying of the items, to the ordnance officer on whose charge the items are held. A copy, duly certified, of the form applicable will accompany the items when returned to store, in order that the storeholder or foreman concerned may be fully cognizant of their condition. The certificate must show the rank and name of the officer or official, the unit or department to which he belongs and the date of examination and station.

This certificate will be the authority of the ordnance officer, as consignor, for certifying as free from explosive matter burnt-out fuzes, tubes, etc., consigned to another depot, factory or to a contractor.

SECTION II

DETONATORS

A. GENERAL INSTRUCTIONS

33. Examination.

- (a) If at visual examination the condition of packages is unsatisfactory, five per cent. of each type of detonator will be examined for signs of deterioration.
- (b) All detonators which are loose, or not packed in their proper service package, or which are in service packages not properly closed, will be examined.

34. Great care is to be exercised in the handling of detonators, and rough handling must not on any account be allowed. When detonators are made up with safety fuze, the fuze must not be bent sharply in a manner which may cause movement of that part which is held in the tube containing the detonating composition.

35. No implements are to be used in the examination or proof of detonators other than those required for their preparation for proof.

36. Defects.—If visual examination reveals any of the following defects, viz :—

- (a) dampness, or presence of verdigris ;
- (b) looseness of, or mildew on, safety fuze, when fitted ;
- (c) exposed fulminate ;
- (d) blistered paint or lacquer ;

the detonators, except those defective as at (c), will be sentenced unserviceable and a report rendered. Defect as at (c) is only likely to appear in damaged detonators and such should be immersed at once in water ; then, after the loose fulminate has been washed off, the detonators will be destroyed in pairs by placing them under the guncotton primer when proving other detonators.

37. Detonators manufactured prior to May, 1923.—Irrespective of the condition of the packages, five per cent. of cylinders will be opened and their contents examined for defects as above. In addition, those which are painted red on the portion containing the detonating composition will be examined for discoloration of the red paint, and/or for the presence of metallic deposit. If the paint has become brown or bronze in appearance, or if signs of a metallic deposit are observed on the detonator tubes in any cylinder opened, the contents of the cylinder will be sentenced unserviceable.

A visual examination of all detonators of the same make, Mark, and date held on charge will be carried out, and the contents of all cylinders in which similarly defective detonators are found will be sentenced unserviceable.

Detonators exhibiting the defects referred to in this paragraph are *liable to be in an extra sensitive condition and must be handled with special care.*

38. Age limit.—The following types of detonator will, on reaching the age limits quoted, be sentenced " Unserviceable—over age." No proof of over-age stores is necessary and examination will be confined to ascertaining if they are safe for storage.

<i>Store</i>				<i>Age limit</i>
Detonator, No. 8	...	...	...	7 years.*
" electric, No. 9	...	...	...	10 years.
" " No. 13	...	...	...	15 years.
" No. 36M grenade	...	...	...	7 years.*
" H.E. bomb, 3-in. mortar	...	...	...	7 years.*

* These limits are temporarily in abeyance.

39. Proof selection.

- (a) At home stations I.O.Os. will be informed which lots and quantities of detonators are to be selected for first proof.
- (b) At all other stations the I.O.O. will select for first proof *three* per cent. of every lot or group, provided that :—
 - (i) no lot under two years of age from date of filling is taken ;
 - (ii) no lot is proved at two successive annual inspections.
- (c) Where no opened packages exist and the expenditure of a complete cylinder or box would exceed three per cent., the detonators should be "grouped" for proof.
- (d) In all cases where a second proof is required, the same number as at first proof is to be taken.
- (e) Where facilities are not available locally for carrying out detonator proof by the methods described hereafter, the proof selection will be dealt with as laid down in para. 18. If such proof cannot be sent to Woolwich, inspection will be confined to an examination as to safety for storage.

40. Judgment of detonation.—The volume of sound and the complete disappearance of the guncotton primer, or C.E. pellet, will indicate if complete detonation has occurred. The presence of pieces of, or dust from, the primer or pellet on the ground after firing indicates that the detonator has fired without completely detonating the primer or pellet.

41. Special precautions (see also para. 28).

- (a) *Proof of detonators must always be carried out with the greatest care. A shield must be interposed between the operator and the prepared detonator suitable to intercept fragments, and the operator must retire at least 100 ft. beyond the shield to avoid concussion effects, and the area of operations must be kept clear of all unauthorized persons.*
- (b) *Proof of detonators will be carried out by one ammunition examiner only, under the immediate supervision of an officer.*
- (c) *Where proof is carried out on the ground, sandy soil free from stones should be chosen.*
- (d) *Where safety fuze has to be inserted into a detonator, extreme care must be exercised. The fuze must not be forced hard against the detonating composition ; the end of the fuze should be just clear of the composition.*

B. PROOF PROCEDURE

Detonator No. 8

42. Stores required.

- (a) Fuze, safety, No. 11.
- (b) Guncotton, dry, primer, field, 1-oz.
- (c) Rectifier, guncotton primers.

43. Preparation.

- (a) *For detonators supplied without safety fuze attached.*
Cut off an 18-in. length of serviceable safety fuze, using a sharp knife and making an oblique cut at one end so that the powder train is not masked; carefully insert the square-cut end of the fuze into the detonator, holding it so that the portion of the detonator tube containing the composition is not directly under the hand, and secure it by pinching the detonator tube, close to the mouth, with the pliers.
- (b) Rectify a guncotton primer by means of the rectifier and carefully insert the detonator into the hole in the primer.

44. **Firing.**—Ignite the safety fuze by means of a fuzee match or portfire and retire to cover.

45. **Sentencing.** See para. 52.

Detonators, Electric, Nos. 9 and 13 (Plate I)

46. Stores required.

- (a) Ammeter, 3-amp., with rheostat.
- (b) Cable, electric, E1, Mk. II.
- (c) Cells, inert, A (three).
- (d) Galvanometer, detector, 3-ohms.
- (e) Guncotton, dry, primer, field, 1-oz.
- (f) Rectifier, guncotton primers.
- (g) Cell Daniell "B."

47. Preparation.

- (a) Insert the detonator into a previously rectified guncotton primer.
- (b) Arrange the remaining stores as shown in Fig. 1 of Appendix I, care being taken that sufficient cable is used for the leads to the firing key on the ammeter to ensure the safety of the operator.

Note.—Both of the wires must remain disconnected from the battery while the ends farthest therefrom are being connected to the detonator.

48. Resistance test and firing.

- (a) The resistance limits of detonator bridges and the firing currents required are :—

	<i>Store</i>	<i>Bridge resistance</i>	<i>Firing current</i>
Detonator, electric—			
No. 9		1.5 to 1.8 ohms.	1.0 amp.
No. 13		0.95 to 1.1 ohms.	0.8 amp.

- (b) Using these limits as applicable, test the detonators first for resistance and then fire them, using the method described in Appendix I, Section 1.
- (c) The Nos. 9 and 13 detonators should fire practically instantaneously.

49. Sentencing. See para. 52.**Detonators, Nos. 36M Grenade, and 3-in. Mortar Bomb**

50.—(1) Proof of the above-mentioned types of detonator will be carried out locally *only when* the "Apparatus proving detonators, bursters, igniters, and primers for mortar bombs and grenades" is available, in which case instructions for proof will be obtained from the Chief Inspector of Armaments, Royal Arsenal, Woolwich.

(2) Otherwise, the prescribed percentage selected for proof will be dealt with as laid down in para. 18.

C. SENTENCING AND DISPOSAL

51. **Failures.**—The following will be regarded as failures at proof :—

- (a) (Electric type detonators only.) Detonator firing whilst under bridge resistance test or resistance of bridge outside the stated limits.
- (b) Detonator failing to fire.
- (c) Detonator failing to detonate the guncotton primer.

52. Sentencing.

- (a) If no failures occur at first proof, the detonators will be sentenced serviceable.
- (b) If ten per cent. or less of failures occur at first proof, a second proof will be taken.
- (c) If more than ten per cent. of failures occur at first proof or any failures at second proof, the lot represented will be sentenced unserviceable.
- (d) In the case of "grouped" and/or "exposed" stores the conditions laid down in paras. 13 and 16 will be applied.

53. Disposal of detonators, unserviceable through age or other causes.

- (a) Unserviceable detonators, except those which have failed at proof, will be retained in their service packages, handled with great care and destroyed at the earliest opportunity in order to prevent an accumulation.
- (b) Either of the following methods may be employed to destroy detonators :—
 - (i) Drop singly into deep water (*see* para. 26).
 - (ii) Tie a bundle of not more than 30 detonators as close as possible round a No. 8 detonator fitted with a 2-ft. length of safety fuze. Place the bundle thus formed in an empty 8-in. shell with the safety fuze projecting, or alternatively place it in a pit in the ground about 18 in. deep by 12 in. diameter and fill the pit in with sand or earth free from stones, leaving the safety fuze protruding. Ignite the safety fuze and retire to cover.
- (c) Electric detonators which fail to fire at proof, or whose resistance at test is outside the prescribed limits, will be returned to Woolwich for special examination as laid down in para. 18.

SECTION III

FUZES AND GAINES

54. Proof selection.

- (a) At home stations I.O.Os. will be informed which lots and quantities of fuzes and gaines are to be taken for first proof.
- (b) At all other stations, the I.O.O. will select annually for first proof three, six or nine fuzes or gaines (*whichever most nearly represents one per cent. of the bulk*) from each lot or group, provided that :—
 - (i) no lot under three years of age from date of filling is taken ;
 - (ii) no lot is proved at two successive annual inspections (*but see* para. 141 regarding time fuzes),

- (c) In all cases where a second proof is required, the same number as at first proof is to be taken.
- (d) In the case of "grouped" and/or "exposed" stores, the conditions laid down in paras. 13 and 16 will be applied.

A. DETONATING PERCUSSION FUZES

55. Proof apparatus.

- (a) These fuzes will be proved in the "Apparatus proving D.A. and percussion fuzes and gaines" (see Appendix II, Section 1).
- (b) The specific adapters, weights, plungers, jigs, etc., to be employed in the proof of the various fuzes are detailed in the appropriate paragraphs relating to "stores required."
- (c) The apparatus must be regularly cleaned and periodically dismantled for examination.
- (d) Whenever possible a mirror should be so arranged that the operator can, whilst under cover, observe the block and the effects of detonation.

56. Shuttered fuzes and gaines.—In preparing shuttered stores for proof by pinning open the shutter, an examination should be made for the presence of any loose C.E. dust in the shutter recess; if any is found a note to that effect should be recorded on the Army Form.

Fuze, Percussion, D.A.I., No. 18 (*Plate II*)

57. Stores required.

- (a) Apparatus proving D.A. and percussion fuzes and gaines, consisting of block with blast block, liners, plug, guide weight and safety pin.
- (b) Adapter, F.
- (c) Plunger, A.
- (d) Weight, 12-lb.

58. Preparation.

- (a) Raise the weight up the guide, insert the safety pin and see that the weight rests securely on it.
- (b) Place adapter F in position in the block, remove the securing pin and safety cap from the fuze and place it in the adapter.
- (c) Screw the plug into the block until it bears on the adapter, close the escape hole in the base of the block, and slide the block centrally under the guide.

- (d) Insert plunger A into the central hole of the plug until it rests *lightly* on the needle disc of the fuze, see that all is clear and retire to cover.

59. Firing.—Raise the weight in the guide to a height of 6 ft. above the plunger, withdraw the safety pin by means of the line attached to it, and allow the weight to fall.

60. Sentencing and missfires. See paras. 86–90.

Fuze, Percussion, D.A., No. 44 (Plate III)

61. Stores required.—As in para. 57, except that “weight, 3½-lb.” is used instead of “weight, 12-lb.,” and in addition “Jig, No. 2, Mk. I” and a “Drill, stock, hand” are required for preparation of the fuze.

62. Preparation.

- (a) Remove the securing pin and cap with safety pin; place Jig No. 2 over the fuze with the centring holes over the punch stabs and remove the punch stabs by drilling, using a ¼-in. twist drill.
- (b) Using a locally made key,* remove the screwed collar, needle with disc, and holder.
- (c) Remove the shutter spring and peg the shutter in the open position with a wooden peg.
- (d) Re-assemble the holder, needle with disc and screwed collar, and screw the latter home.

63. Preparation for firing.—Proceed as described in para. 58.

64. Firing.—Raise the 3½-lb. weight to a height of 25 in. above the plunger, withdraw the safety pin and allow the weight to fall.

65. Sentencing and missfires. See paras. 86–90.

Fuze, Percussion, No. 44/80

66. Stores required.

- (a) Apparatus proving D.A. and percussion fuzes and gaines, consisting of block with blast block, liners and plug.
- (b) Adapter, F.
- (c) Drill, stock, hand.
- (d) Fuze, safety, No. 11.
- (e) Jig, No. 2, Mk. I.

* If difficulty is encountered in making a suitable key, reference should be made to the Chief Inspector of Armaments, Royal Arsenal, Woolwich.

- (f) Gunpowder, R.F.G., or G. 12.
- (g) Magazine, firing.
- (h) Paper disc (white, fine, paper).

67. Preparation.

- (a) Prepare the fuze as described in para. 62, place adapter F in its seating in the block and insert the fuze into the adapter.
- (b) Prepare the magazine firing as follows :—
 - (i) Secure the paper disc with shellac over the hole in the bottom recess in the body, reverse the body and fill the hole and magazine recess with gunpowder.
 - (ii) Screw the screwed plug into the body of the magazine and pour a small quantity of powder into the communicating channel at the bottom of the recess in the stem of the plug.
 - (iii) Insert a length of safety fuze (about 18 in. long) into the recess in the plug stem until it bears on the powder at the bottom.
- (c) Place the prepared magazine in the block over the fuze.
- (d) Thread the safety fuze through the central hole in the plug and screw the plug into the block until it bears hard down on the magazine firing.

68. Firing.—Ignite the safety fuze and retire to cover.

69. Sentencing and missfires. See paras. 86–91.

Fuze, Percussion, D.A.I., No. 45 (*Plate IV*)

70. Stores required.—As in para. 57.

71. Preparation.

- (a) Remove the securing pins, safety cap with pin, and set-screw securing the holder; remove the holder complete with screw collar, hammer, shearing wire and detonator, care being taken to maintain the holder upright, as, should the shearing wire fall out, the detonator may fire.
- (b) Remove the shutter spring, fix the shutter in the open position by means of a wooden peg and re-assemble the holder, collar, etc., and secure by the set-screw.

72. Preparation and firing.—Proceed as in paras. 58 and 59.

73. Sentencing and missfires. See paras. 86–90.

Fuze, Percussion, D.A., No. 106

74. *The tape with weight and half collars must not on any account be removed from under the hammer head of fuzes of the No. 106 type until after the fuze has been placed in the block.*

75. Stores required.

- (a) Apparatus proving D.A. and percussion fuzes and gaines, consisting of block with blast block, liners, plug, guide weight and safety pin.
- (b) Adapter, G.
- (c) Plunger, C.
- (d) Weight, 12-lb.

76. Preparation.

- (a) Raise the weight in the guide, insert the safety pin and see that the weight rests securely on it.
- (b) Remove the sealing wire, safety cap and cap washer from the fuze; screw adapter G to the safety cap threads on the fuze.
- (c) Insert the adapter with fuze into the block so that the adapter rests on the tapered seating at the bottom of the screwed hole.
- (d) *Carefully* remove the tape with weight and half collars from under the hammer head of the fuze, insert the plug and screw it home until it bears against the shoulder of the fuze.
- (e) Close the escape hole in the base of the block and slide the block centrally under the guide.
- (f) *Carefully* insert plunger C into the central hole of the plug until it rests lightly on the hammer head.
On no account must pressure be placed on the plunger during this operation.
- (g) Ascertain that all is clear and retire to cover.

77. Firing.—Raise the weight in the guide to a height of 5 ft. above the plunger, withdraw the safety pin and allow the weight to fall.

78. Sentencing and missfires. See paras. 86–90.

Fuzes, Percussion, D.A., Nos. 106E and 117

(Plates V and VI)

79.—(1) Proof of these types of fuze will be carried out locally *only when* the “Apparatus removing magazines, bottom caps, and gaines from 2-in. percussion fuzes” is available for

use in their preparation. In this case instructions for preparation and proof will be obtained from the Chief Inspector of Armaments, Royal Arsenal, Woolwich.

(2) Otherwise, the percentage of fuzes selected for proof will be dealt with as laid down in para. 18.

Fuze, Percussion, D.A., No. 139

80. Stores required.

- (a) Apparatus proving D.A. and percussion fuzes and gaines, consisting of block with blast block, liners, plug, guide weight and safety pin.
- (b) Adapter, M.
- (c) Piece, retaining, No. 1.
- (d) Plunger, F.
- (e) Weight, $3\frac{1}{2}$ lb.

81. Preparation.

- (a) Raise the weight in the guide, insert the safety pin and see that the weight rests securely on it.
- (b) Withdraw the safety pin from the fuze and remove the fuze cap.
- (c) Place adapter M in the coned seating in the block, and insert the fuze into the adapter with the retaining piece on top of the fuze.
- (d) Screw the plug home into the block, securing the retaining piece and fuze, close the escape hole and slide the block centrally under the guide weight.
- (e) Insert plunger F into the plug until it rests lightly on the head of the fuze, ascertain that all is clear and retire to cover.

82. Firing.—Raise the weight to a height of 30 in. above the plunger, withdraw the safety pin and allow the weight to fall.

83. Sentencing and missfires. See paras. 86–90.

Fuze, Percussion, D.A., No. 230

84. This fuze will *not* be proved locally, but will be dealt with as laid down in para. 18.

Fuzes, Percussion, Base, Nos. 346, 480, 500 and 501

85. Proof of these types of fuze will *not* be carried out locally; fuzes selected for proof will be dealt with as laid down in para. 18.

Missfire Procedure, Destruction and Sentencing

86. Missfires.—Missfires may be due either to a definite failure of the fuze to detonate, or to some defect in the method and apparatus for firing; observation in the mirror should give a clear indication as to whether the fuze under proof has failed to fire completely or partially.

Whenever a missfire occurs :—

- (a) Wait two minutes under cover.
- (b)—(i) In the case of fuzes fired by dropping a weight, raise the weight and repeat the firing procedure, the operator still remaining under cover. (Should a fuze fire *other than at the first attempt* the fact should be recorded on the Army Form.)
- (ii) In the case of the No. 44/80 fuze, if the "magazine firing" has failed to fire, replace it by a fresh magazine and repeat the firing procedure.
- (c) Should the fuze again missfire, wait a further two minutes, keeping the block under observation in the mirror. Then approach the apparatus and, where a weight and plunger are being used, raise the weight and secure it by the safety pin, and then carefully remove the plunger by means of a pair of "tongs." (**Do not stand over the block during this process.**)
- (d) Remove the block intact to a safe place and carefully unscrew the plug from the block.
- (e) Gently turn the block over (from behind cover), allowing the fuze and adapter to roll out. Where possible the adapter, magazine, etc., may be removed, but *the fuze must not on any account be handled*. Then destroy the fuze *in situ*.

87. Destruction of missfired fuzes.

- (a) Insert 2 ft. of "fuze, safety, No. 11," into a No. 8 detonator and place the detonator in a previously rectified guncotton primer.
- (b) Place the guncotton primer as close as possible to the base of the fuze.
- (c) Ignite the safety fuze by means of a fuzee match or portfire and retire to cover.

88. Sentencing detonating percussion fuzes (except No. 44/80).

- (a) For a serviceable sentence at proof, all fuzes must detonate correctly. Whether complete detonation has or has not taken place can be judged by—
 - (i) the volume of sound on firing;
 - (ii) the condition of the fuze after firing.

If the fuze has detonated the lower part of the fuze should be completely broken up; if on the other hand the lower part is found to be intact or merely split open, the fuze has failed to detonate.

- (b) Occasionally it may be found that the C.E. pellet is blown out and partially detonates *outside* without breaking up the lower portion of the fuze to any very great extent; as a solitary case this should not be considered sufficient cause to condemn a lot of fuzes, since the result in a filled projectile would probably be detonation.

89. Failures.—The following will be regarded as failures at proof :—

- (a) Detonator fails to fire.
- (b) Detonator fires, and C.E. is blown out, but fails to detonate or explode.
- (c) Detonator fires, but C.E. is not detonated or blown out.
- (d) Detonator fires and C.E. explodes, but does not detonate.

90. Acceptance and rejection.

- (a) *At first proof*, if two-thirds of the number taken are failures under categories (a), (b) or (c), or all are failures under category (d) of para. 89, the lot represented will be sentenced unserviceable.
- (b) If any failure occurs under (a), (b) or (c), or two-thirds are failures under (d), a second proof will be carried out.
- (c) *At second proof*, if any failure occurs under (a), (b) or (c), or two-thirds are failures under (d) the lot will be sentenced unserviceable.
- (d) In the case of "grouped" and/or "exposed" stores, the conditions laid down in paras. 13 and 16 will be applied.

91. Sentencing Fuze No. 44/80.—See under "Gaines," para. 126.

B. NON-DETONATING PERCUSSION FUZES

Fuze, Percussion, D.A.I., No. 13 (*Plate VII*)

92. Stores required.

- (a) Apparatus proving D.A. and percussion fuzes and gaines, consisting of block with blast block, liners, plug, guide weight and pin, safety.

- (b) Adapter, F.
- (c) Plunger, A.
- (d) Weight, 12-lb.

93. Preparation.

- (a) Raise the weight in the guide, insert the safety pin and see that the weight rests securely on it.
- (b) Place adapter F in position in the block, remove the securing pins and cap from the fuze under proof and place it in the adapter.
- (c) Screw the plug into the block until it bears on the adapter, close the escape hole in the base of the block and slide the block centrally under the guide weight.
- (d) Carefully insert plunger A into the plug until it rests lightly on the head of the fuze, ascertain that all is clear and retire to cover.

94. Firing.—Raise the weight to a height of 10 ft. above the plunger, withdraw the safety pin and allow the weight to fall.

95. Missfires and sentencing.—See paras. 98 and 123.

Fuze, Percussion, D.A.I., No. 45P (Plate IV)

96. Proof.—After preparation of the fuze as described in para. 71, proceed as for the No. 13 Fuze, paras. 92–95.

Fuze, Percussion, D.A., No. 132 (Plate VIII)

96. Proof.

- (a) This fuze requires no preparation before proof.
- (b) Proceed as for Fuze, No. 13 (paras. 92–95) except that the weight is to be dropped on to the plunger from a height of 8 ft. instead of 10 ft.

98. D.A.I. fuzes, missfire procedure.

- (a) If a fuze missfires at the first attempt wait two minutes, then repeat the operation of dropping the weight on to it. (Should a fuze fire *other than at the first attempt* the fact should be recorded on the Army Form.)
- (b) Should the fuze still fail to fire, it should be destroyed or otherwise disposed of as under.

99. Disposal of missfired fuzes.

- (a) Fuzes which missfire at proof will be carefully removed from the apparatus, and, where practicable, disposed of by dropping into deep water.

(b) Where dropping into deep water is not practicable, fuzes will be disposed of as follows :—

- (i) The Nos. 45P and 132 Fuzes will be destroyed by means of a detonator and guncotton primer.
- (ii) The No. 13 Fuze will be broken down and emptied as follows :—

Place the fuze horizontally in a vice, with the magazine pointing away from the operator, and file off the burr securing the disc in the base, taking care to remove just sufficient metal to allow the brass die to be extracted by a metal pricker ; remove the fuze from the vice and empty the powder from the magazine into a bucket of water.

Then “ boil out ” the fuze and arrange for return as directed in paras. 29 and 31.

Fuze, Percussion, Base, Hotchkiss (Plate IX)

100. Apparatus.—This fuze will be proved in the “ Apparatus, proving percussion caps and primers and detonators of fuzes,” as described in Appendix II, Section 2.

Note.—Fuze, Percussion, Base, Hotchkiss, Tracer, No. 280 will *not* be proved locally.

101. Stores required.—(Apparatus proving percussion caps and primers, and detonators of fuzes.)

- (a) Anvil, G.
- (b) Lever.
- (c) Stand, Mk. III.
- (d) Weight, O.

102. Preparation.

- (a) Adjust the apparatus for verticality by means of the lever and four screws in the base plate of the stand and bring the open portion of the shield opposite the operator.
- (b) Unscrew from the fuze under proof the cap, which contains the detonator and screwed plug, and place the cap, screwed plug uppermost, in the anvil G.
- (c) Secure the weight O at a height of 18 in. and revolve the shield so as to give protection to the operator.

103. Firing.—Withdraw the pin and allow the weight to fall.

104. Missfire procedure.

- (a) If the fuze detonator fails to fire at the first attempt wait two minutes, then drop the weight a second time from 18 in. (Should a fuze fire *other than at the first attempt* the fact should be recorded on the Army Form.)
- (b) If the detonator again fails, raise the weight and secure it, carefully remove the cap from the anvil and destroy the detonator by burning or dropping into deep water.

105. Sentencing.—See para. 123.**Fuze, Percussion, Base, Large, No. 11, Mks. I* to IV**

(Plate X)

106. Stores required.—(Apparatus proving percussion caps and primers, and detonators of fuzes.)

- (a) Anvil, K, Mk. II* or Mk. III.
- (b) Lever.
- (c) Stand.
- (d) Weight, O.

107. Preparation.

- (a) Adjust the apparatus and shield (para. 102 (a)).
- (b) Remove the set screw and screwed cap complete with detonator and powder pellet from the body of the fuze.
- (c) Place the screwed cap, detonator uppermost, in the anvil K, secure the weight O at a height of 18 in. and revolve the shield.

108. Firing and missfires.—Proceed as in paras. 103 and 104.**109. Sentencing.**—See para. 123.**Fuze, Percussion, Base, Large, No. 11, Mks. V and VI**

(Plate X)

110. Stores required.—(Apparatus proving percussion caps and primers, and detonators of fuzes.)

- (a) Block, F.
- (b) Cap, F, Mk. I** or III.
- (c) Lever.
- (d) Needle, B.
- (e) Stand.
- (f) Weight, O.

111. Preparation.

- (a) Adjust the apparatus and shield.
- (b) Remove the set screw, screwed cap and creep spring from the fuze.
- (c) By means of a hammer and punch, punch the pressure plate of the fuze into the armed position.
- (d) Hold the fuze horizontally with the pressure plate underneath; this causes the centrifugal bolt to move outwards and the retaining bolt to position itself in the recessed portion of the pressure plate spindle, thus uncovering the fire channel.
- (e) Tilt the fuze, nose downwards, so allowing the detonator pellet to move forward and be locked in position by the locking pellet engaging in its recess in the fuze body.
- (f) Remove the screw plug in side of fuze body, extract the retaining bolt for pea ball with its spring, and remove the pea ball.
- (g) Replace the retaining bolt with spring, and screw in the screw plug.
- (h) Screw cap F on to the fuze and place the fuze in block F.
- (i) Gently insert needle B into the hole in the cap until it rests lightly on the fuze detonator.
- (j) Secure weight O (turned upside-down) at a height of 18 in. in the guides and revolve the shield.

112. Firing.—Release the weight, allowing it to fall on the needle.

113. Missfire procedure.

- (a) If the fuze fails to fire at the first attempt, wait two minutes, then raise the weight under precautions and drop it again from a height of 18 in. (Should the fuze fire *other than at the first attempt* the fact should be recorded on the Army Form.)
- (b) If the fuze again fails to fire, raise the weight and secure it; by means of a pair of pliers and working from behind cover, carefully remove needle B and unscrew cap F from the fuze.
- (c) The fuze will then be broken down and the detonator disposed of either by dropping into deep water or by burning.

114. Sentencing.—See para. 123.

Fuze, Percussion, Base, Medium, No. 12, Mks. I to V
(Plate XI)

115. Proof.—Proceed as for Fuze, percussion, base, large, No. 11, Mks. I* to IV, paras. 106–109.

Fuze, Percussion, Base, Medium, No. 12, Mks. VI to XI
(Plate XI)

116. Stores required.—(Apparatus proving percussion caps and primers and detonators of fuzes.)

- (a) Block, B.
- (b) { Cap, C, Mk. I*** or IV, for Mks. VII to X fuzes.
Cap, D, Mk. I* or II, for Mk. XI fuze.
- (c) Lever.
- (d) Needle, B.
- (e) Stand.
- (f) Weight, O.

Note.—*The Mk. VI fuze will not be proved locally.*

117. Proof.—Proceed as for “Fuze, percussion, base, large, No. 11, Mks. V and VI,” paras. 110–114.

Fuze, Percussion, Base, Large, No. 15, Mks. I and II
(Plate X)

118. Proof.—Proceed as for “Fuze, percussion, base, large, No. 11, Mks. I* to IV,” paras. 106–109.

**Fuze, Percussion, Base, Large, No. 15, Mks. III to VI,
and No. 15C, Mks. I to III** (Plate X)

119. Proof.—Proceed as for “Fuze, percussion, base, large, No. 11, Mks. V and VI,” paras. 110–114.

Note.—Cap, G, Mk. I** or III is required for the No. 15 fuze, Mk. VI, instead of cap F.

**Fuze, Percussion, Base, Large, No. 16, Mks. I to IV,
and No. 16D, Mks. I to IV** (Plate XII)

120. Stores required.—(Apparatus proving percussion caps and primers and detonators of fuzes.)

- (a) Block, F.
- (b) { Cap, F, Mk. I** or III, for Mks. I to III fuzes.
Cap, G, Mk. I** or III for Mk. IV fuze.
- (c) Lever.
- (d) Needle, B.
- (e) Stand.
- (f) Weight, O.

121. Proof.—Proceed as for “Fuze, percussion, base, large, No. 11, Mks. V and VI,” paras. 110–114.

Fuze, Percussion, Spigot, No. 146 (Plate XIII)

122. This type of fuze will *not* be proved locally; the proof selection will be dealt with as laid down in para. 18.

Sentencing

123.—(1) The following will be regarded as failures at proof:—

- (a) Detonator fails to fire.
- (b) Detonator fizzles or gives a weak flash.
- (c) Detonator fires, but fails to fire magazine.
- (2)—(a) *At first proof*, if more than one-third of the selections fail, the lot represented will be sentenced unserviceable.
- (b) If one-third or less fail at first proof, a second proof will be taken.
- (c) *At second proof*, if any failure occurs, the lot will be sentenced unserviceable.
- (3) In the case of “grouped” and/or “exposed” stores, the conditions laid down in paras. 13 and 16 will be applied.

C. GAINES

Gaine, No. 8 (Plate XIV)

124. Proof.—Proceed as for “Fuze, percussion, No. 44/80,” paras. 66–69.

125. Sentencing No. 8 Gaine (and Fuze No. 44/80).

- (a) *At first proof*, if one-third or less of explosions only or any blind occurs, a second proof will be taken.
- (b) If at first proof more than one-third give explosions only, or if more than one blind occurs, the lot represented will be sentenced unserviceable.
- (c) *At second proof*, if any failure occurs, the lot will be sentenced unserviceable.
- (d) In the case of “grouped” and/or “exposed” stores the conditions of paras. 13 and 16 will be applied.

Gaine, No. 9 (Plate XV)

126. Preparation of gaine—stores required.

- (a) Drill, stock, hand.
- (b) Jig, No. 1, Mk. I.
- (c) Pinion wire, 0.125-in. diameter.
- (d) Vice, with lead clamps.

127. Preparation.

- (a) Place the gaine in the lead clamps in the vice and tighten up the vice.
- (b) Place the jig with centring holes over the punch stabs and carefully remove the punch stabs by drilling, using a $\frac{1}{8}$ -in. twist drill. Remove the jig and unscrew the securing ring of the gaine using a locally made key.*
- (c) Carefully remove the needle and needle disc from the gaine.
- (d) Set back the detent by passing the pinion wire through the hole in the needle.
- (e) Remove the needle holder and peg the shutter in the "open" position by means of a wooden wedge.
- (f) *Check that the needle is not protruding through the needle holder*, then replace the needle holder with the needle and the needle disc.
- (g) Carefully screw the securing ring into position using the key and wrench, and remove the prepared gaine from the vice.

128. Proof of gaine—stores required.

- (a) Apparatus proving D.A. and percussion fuzes and gaines, consisting of block with blast block, liners, plug, guide weight, and pin, safety.
- (b) Adapter, U.
- (c) Plunger, D.
- (d) Tommy, Mk. I (for tightening plug).
- (e) Tongs, Mk. I.
- (f) Weight, $3\frac{1}{2}$ -lb.

129. Preparation for firing.

- (a) Raise the weight in the guide, insert the safety pin and see that the weight rests securely on it.
- (b) Carefully screw the prepared gaine into adapter U, and place it in position in the block. Screw the plug into the block until it bears hard down on the adapter.
- (c) Close the escape hole in the base of the block and slide the block centrally under the guide.
- (d) Gently lower plunger D through the plug until it rests lightly on the needle disc of the gaine, ascertain that all is clear and retire to cover.

* If difficulty is encountered in making a suitable key, reference should be made to the Chief Inspector of Armaments, Royal Arsenal, Woolwich.

130. Firing.—Raise the weight to a height of 25 in. above the plunger, withdraw the safety pin and allow the weight to fall.

131. Missfire procedure.

- (a) If the gaine fails to fire, wait two minutes.
- (b) Raise the weight, secure it by the safety pin and drop the weight from the prescribed height as detailed above. (Should the gaine fire *other than at the first attempt* the fact should be recorded on the Army Form.)
- (c) If the gaine again missfires, after a further pause of two minutes, raise the weight and secure it.
- (d) Slide the block from under the guide weight (using a drag rope), and, by means of a pair of gas pliers, carefully remove the plunger from the plug.
- (e) Remove the block to a place of safety under cover and remove the plug.
- (f) Still remaining behind cover, turn the block over on its side, allowing the gaine and adapter to roll gently to the ground.
- (g) Insert a length of about 18 in. of safety fuze into a guncotton primer (previously rectified) and place the primer as close as possible to the magazine of the gaine.
- (h) Ignite the safety fuze and retire to cover.

132. Sentencing.

- (a) *At first proof*, if one-third or less of explosions only, or any blind occurs, a second proof will be taken.
- (b) If at first proof, more than one-third give explosions only or more than one blind occurs, the lot represented will be sentenced unserviceable.
- (c) *At second proof*, if any failure occurs the lot will be sentenced unserviceable.
- (d) In the case of "grouped" and/or "exposed" stores, the conditions of paras. 13 and 16 will be applied.

D. FUZES WITH GAINES

Fuzes, Percussion, Nos. 101B and 101E, with Gaines

(Plate XVI)

133. Preparation of fuze.—(1) Stores required :—

- (a) Apparatus, removing gaines, 2-in. fuzes.
- (b) Key, No. 79.

(2) The fuze with adapter and gaine will be broken down and prepared for proof by the method detailed in Appendix II, Section 3.

134. Proof of fuze—stores required.

- (a) Apparatus proving No. 101 type fuzes with gaine.
- (b) Gauge, needle.
- (c) Guard.
- (d) Lanyard with hook.
- (e) Lifting band with trunnions (to support shell).
- (f) Needle.
- (g) Pin, release.
- (h) Shearing pins.*
- (j) Shell, empty, 8-in. (with 1-in. hole through base).
- (k) Weight, 12-oz.

135. Preparation. (See Appendix II, Section 3, Fig. 5.)

- (a) The empty shell is to be suspended nose upwards by means of the lifting band with trunnions, mounted on a locally improvised stand. See that the hole in the base of the shell is clear, as otherwise the shell may become damaged when the gaine fires.
- (b) The shell and the "Apparatus proving No. 101 type fuzes with gaine" must be erected in a place giving adequate cover to the operator should any fragments blow out.
- (c) Clean the hole in the base of the apparatus by means of a "Tool cleaning—Brush, Mk. II" (V.A.O.S., Sect. B.3). Clean the needle and gauge it for length, using the "gauge, needle."
- (d) Screw the prepared fuze with gaine into the nose of the empty shell and the apparatus into the top of the fuze, ensuring that the apparatus is screwed well home into the fuze, *by means of the knurled portion at the base.*
- (e) Raise the weight and secure it by means of the pin release, taking care that the loop of the pin is in a position convenient for withdrawal from behind cover.
- (f) Pass a shearing pin through the hole in the needle and carefully place the latter, with shearing pin in position, in the centre hole in the base of the apparatus.
- (g) Place the guard over the apparatus, hook the lanyard to the pin release, ascertain that all is clear and retire to cover.

* Local manufacture from soft copper wire, 22 S.W.G., cut into 1½-in. lengths.

Notes.—The hole in the base of the apparatus must be frequently cleaned out by means of the brush.

After each round the needle must have all deposit cleaned off, and periodically it should be gauged for length. Any needle low to gauge must be discarded.

136. Firing.—Give the lanyard a smart pull, thus allowing the weight to fall by withdrawing the release pin. The blow of the needle should cause the fuze to fire and the gaine to detonate.

137. Missfires.

(a) If the detonator of the fuze fails to fire :—

(i) Wait two minutes, then raise the weight under precautions and secure it but **do not touch the needle**. Drop the weight again.

(ii) If the fuze detonator again fails to fire, wait a further two minutes, raise the weight and secure it, remove the needle under precautions by means of a pair of gas pliers, taking care that the needle does not slip back on to the detonator.

(iii) Place the fuze in a bucket of water ready for destruction.

(b) If the fuze detonator fires, but the gaine fails to fire :—

(i) Wait five minutes.

(ii) Raise the weight, secure it and remove the needle under precautions using pliers.

(iii) Unscrew the apparatus from the fuze, using a tommy if necessary to ensure that the fuze does not unscrew out of the shell.

(iv) Carefully unscrew the fuze with gaine from the shell and place aside in a bucket of water pending destruction.

138. Failures.—The following will count as failures at proof :—

(a) Fuze detonator does not fire.

(b) Fuze detonator fires but gaine fails to fire.*

(c) Gaine does not detonate completely, *i.e.* is not broken up into small fragments.

* It must be ascertained that the shutter was correctly in the open position before a fuze is accounted as a failure should the gaine not fire.

139. Sentencing.

- (a) *At first proof*, if more than one-third of failures occur the lot represented will be sentenced unserviceable.
- (b) If one-third or less fail at first proof, a second proof will be taken.
- (c) *At second proof*, if any failure occurs, the lot or group will be sentenced unserviceable.
- (d) In the case of "grouped" and/or "exposed" stores the conditions of paras. 13 and 16 will be applied.

140. Disposal of missfired and unserviceable fuzes with gaines.

- (a) *Unserviceable* fuzes with gaines will be disposed of by dropping into deep water; where this is impracticable, they will be destroyed by guncotton as under:—
- (b) *Missfired* fuzes and gaines will be disposed of by dropping into deep water; failing this:—
 - (i) Place the fuze and gaine carefully on the ground in a place where there can be no danger from flying fragments.*
 - (ii) Place blocks of wood on each side of the gaine and a guncotton primer (previously rectified) above and in immediate contact with the gaine.
 - (iii) Insert a No. 8 detonator, provided with 2 ft. of safety fuze, in the guncotton primer.
 - (iv) Ignite the safety fuze and retire to cover.
 - (v) In the event of a missfire, wait five minutes, then repeat the above processes.

E. TIME FUZES AND TIME AND PERCUSSION FUZES**General Instructions****141. Proof selection.**

- (a) At home stations I.O.OS. will be informed which lots and quantities of fuzes are to be taken for first proof at the annual inspection.
- (b)—(i) At all other stations, the numbers to be selected annually by I.O.Os. for first proof from each lot or group will be *one per cent. of the bulk, with a minimum of three and a maximum of ten*, provided

* Not more than four gaines at a time should be dealt with in this process of destruction.

that (1) no lot under two years of age from date of filling is taken and (2) no lot is proved at two successive annual inspections.

- (ii) After reaching eight years of age, all fuzes will be proved *annually*.
- (c) In all cases where a second proof is required the same number as at first proof will be selected.
- (d) Where several lots are formed into a "group" for proof purposes, the group so formed should not normally be less than 300 in number; it is essential that all fuzes in the group should be of the same "filler" and Mark, and, save in exceptional circumstances, the "dates of filling" of the several lots should not cover a period of time longer than six months.

142. Method of proof.—Proof of Time fuzes and Time and Percussion fuzes consists essentially of firing the "time" portion of the fuze at rest and recording the individual time of burning. The necessity apparatus and general method of use is described in Appendix II, Section 4.

143.—(a) Times of burning must in all cases be recorded by the best available means, *i.e.* "Instrument, time of flight" or "Instrument, electro-magnetic, operating stop watch."

- (b) Failing these a hand-operated stop watch should be used.

144. Checking time-recording instruments.

- (a) Stop watches and time of flight instruments should be overhauled and adjusted at intervals of not longer than two years by a qualified artificer.
- (b) Always before proof is begun, and occasionally during the proceedings, the stop watch or time of flight instrument should be checked against a "standard" clock, or, if this is not available, against a watch or clock which is known to be a good time-keeper.
- (c) In checking the watch or other timing instrument, temperature and other conditions should be as nearly as possible those which are likely to obtain at the actual time of proof, and the check against the standard should be for a period of not less than 30 minutes.

145. "Mean time" of burning.—The "mean time" of burning is obtained by adding together all the individual

times given by the fuzes in the lot or group concerned and dividing the total by the number of fuzes fired in that lot or group, *rejecting, however*, from the calculation any fuze that fails (*see* para. 166).

146. Corrected mean time.—The time limits laid down for the burning of a fuze (*see* para. 165) are based on a "standard" atmospheric pressure of 30 in. of mercury. During proof therefore the reading of a barometer should be noted and, if the atmospheric pressure is not "standard," the "mean time" must be "corrected" by means of the following formula:—

Corrected mean time = mean time + [mean time $\times$ corrector fraction $\times$ ($-30 +$ barometer reading in in.)].

The corrector fractions are:—

0.023 for Fuzes Nos. 80, 80B, 80/44, 80B/44, 180, 180B, 183 and 197.

0.0166 for Fuzes Nos. 88, 88R and 188.

147. Mean difference.—The "mean difference" is obtained by adding together the differences between the individual times of burning and the "mean time," and dividing the total by the number of fuzes fired, under the same conditions as for "mean time."

148. Proof report.—Proof of fuzes should, whenever possible, be carried out only when the barometric pressure lies within $\frac{1}{2}$ in. of "standard," but in any case the actual barometer reading must always be recorded, together with the other details of proof, on the Army Form.

Proof Procedure

Fuze, Time, No. 79 (*Plate XVII*)

149. Preparation.

- (a) Remove the paper disc from the flash hole in the base of the fuze and about half the powder from the magazine.
- (b) Plug the hole in the base disc with a pellet of paper, set the fuze "full" and puncture the time ring with the borer supplied with the fuze.

150. Proof.—Proceed as laid down in Appendix II, Section 4, taking care to remove the safety pin *after* the fuze has been screwed into the gad.

Fuzes, Time and Percussion, Nos. 80 and 80B*(Plate XVIII)***151. Stores required.**

- (a) Brass pricker.
- (b) Key, removing base plug.
- (c) Key, removing top cap.
- (d) Screwdriver (small).
- (e) Vice, bench, with lead clamps.

152. Preparation.

- (a) Remove the fuze cover (if fitted), and, with the pricker scrape the varnish from the surface and outer edge of the escape hole discs, taking care not to remove the discs themselves.
- (b) Place the fuze in the lead clumps in the vice and unscrew the base plug. Empty the powder charge from the magazine.
- (c) Take off the cap retaining the percussion mechanism and remove the percussion pellet, stirrup spring, ferrule and creep spring.
- (d) Replace the percussion mechanism cap, return about half the powder into the magazine and screw home the base plug.
- (e) Remove the top cap set screw, unscrew the top cap and take out the time detonator pellet and its stirrup spring. (*N.B.*—If the set screw is difficult to extract by means of a screwdriver, it may be drilled out.)
- (f) Set the fuze "full" and carefully replace the detonator pellet without its stirrup spring. Screw on the top cap and secure it by a set screw, *keeping the fuze horizontal* and making sure that the top cap has been screwed well home.
- (g) Remove the prepared fuze from the vice and put it in a place of safety, nose downwards, ready for proof.
- (h) Fuzes found with corroded magazines during preparation for proof must NOT be re-assembled. Such fuzes should be dealt with as laid down in para. 170.

153. Proof.—Proceed as detailed in Appendix II, Section 4.**Fuzes, Time, Nos. 80/44, 80B/44, 180 and 180B***(Plate XVIII)*

154. These types of fuze are similar mechanically to the No. 80 type time and percussion fuze, but have no percussion mechanism.

Proof will be carried out as for the No. 80 fuze, paras. 151-153, as applicable to the "time" portion.

Fuzes, Time and Percussion, Nos. 88 and 88R
(Plate XIX)

155. Stores required.

- (a) Brass pricker.
- (b) Key, removing base plug.
- (c) Key, removing top cap.
- (d) Screwdriver (small).
- (e) Vice, bench, with lead clamps.

156. Preparation.

- (a) Remove the fuze cover (if fitted), and, with the pricker scrape the varnish from the surface and edges of the escape hole discs, taking care not to remove the discs themselves.
- (b) Place the fuze in the lead clamps in the vice, unscrew the base plug and empty the powder charge from the magazine.
- (c) Unscrew the screw plug and remove the percussion detonator pellet, srirrup spring, ferrule, creep spring and steel (or brass) ball.
- (d) Replace the screw plug, return about half the powder into the magazine and screw home the base plug.
- (e) Remove the top cap set screw (if fitted), unscrew the top cap. In some Marks of this fuze, the time detonator pellet is fixed and the time needle moveable, in others the reverse is the case.
- (f) According to the Mark of fuze, remove the time pellet (or needle), complete with its creep spring, discard the creep spring and re-assemble the time pellet and needle.

Note.—Throughout this and successive operations up to the time of firing the fuze must be maintained in a horizontal position.

- (g) Set the fuze "full," replace the top cap, screw it home (securing by set screw if fitted), remove it from the vice, and lay it aside ready for proof.

157. Proof.—Proceed as detailed in Appendix II, Section 4.

Fuzes, Time, Nos. 183 and 188 (Plate XIX)

158. Proof.—These fuzes are similar mechanically to the No. 88 type time and percussion fuze, but have no percussion mechanism. The method of proof is as in paras. 155-157 so far as applicable to the "time" portion.

Fuze, Time, No. 197 (Plate XX)

160.—(1) Fuze, time, No. 197, Mk. I, is similar mechanically to the No. 88 type, but has no percussion mechanism.

(2) The Mk. II fuze is a conversion of the No. 80/44 time fuze.

161. Proof.

- (a) Mk. I fuzes. Proceed as detailed for "Fuze, time and percussion, No. 88," paras. 155-157, so far as applicable to the "time" portion.
- (b) Mk. II fuzes. Proceed as detailed for "Fuze, time No. 80/44," para. 154.

Fuze, Time, No. 199 (Plate XXI)**162. Preparation of fuze—stores required.**

- (a) Apparatus proving fuzes—Spring, spiral, No. 1.
- (b) Brass pricker.
- (c) Key, removing base plug.
- (d) Screwdriver (small).
- (e) Vice, bench, with lead clamps.

163. Preparation.

- (a) Place the fuze in lead clamps in the vice, base upwards, and unscrew the base plug.
- (b) Remove the fuze from the vice, take out the ring and empty the powder from the magazine.
- (c) Fill the magazine recess with paper or other suitable material, leaving, however, sufficient space for the insertion of approximately 20 grains of powder at the communicating hole; cover the whole with a disc of paper cut to shape and screw home the base plug. (*Note.*—The paper must be tightly pressed into the magazine recess so that it does not revolve when the base plug is being screwed home.)
- (d) Remove the set screw and screw off the securing ring and dome complete.
- (e) Unscrew the "plug, mechanism hole," remove the detonator holder, spring and needle and set aside the spring.
- (f) Re-assemble the firing mechanism, using the "spring, spiral, No. 1" in place of the original spring.
- (g) Re-assemble the securing ring and dome, tightening the ring down and securing it by means of the set screw; set the fuze "full."

164. Proof.—Screw the fuze into the adapter-gad, maintaining it in a horizontal position, and proceed then as detailed in Appendix II, Section 4.

Sentencing Time Fuzes and Time and Percussion Fuzes

165. Time of burning.—The following table gives the permissible limits at burning for “corrected mean time” and “mean difference” :—

Fuze No.	Mean time must be within the limits		Mean difference must not exceed	Remarks	
	From	To			
79	Seconds 20.5	Seconds 23.5	Seconds 0.60	No barometer correction necessary.	
80	} 21.0	23.0	} 0.30	When in sealed cylinders.	
80B				} 0.40	When removed from shell.*
80/44			} 47.5		49.5
80B/44					
88	} 21.0	23.0	} 0.30	When in sealed cylinders.	
88R				} 0.40	When removed from shell.*
180	29.0	31.0	0.45		
180B	47.5	49.5	0.50		
183	} 21.0	23.0	} 0.30	When in sealed cylinders.	
188				} 0.40	When removed from shell.*
197			Data not yet available		
199					

* “From shell” implies from any type of package other than a soldered cylinder.

166. Failures.—The following defects will count as failures at proof :—

- (a) Detonator fails to fire.
- (b) Detonator fires, but fails to ignite the time ring composition.
- (c) Time ring composition “flashes round.”
- (d) Time ring composition fails to burn completely.
- (e) Magazine does not fire correctly (*the preparation of fuze and proof conditions having been correctly carried out*).
- (f) Corrected “mean time” of burning and “mean difference” both outside the stated limits.
- (g) “Mean difference” outside the limit.

Note.—If the slag from the top ring escape hole causes ignition of the lower ring, such will *not* count as a failure, and the individual time of burning of the fuze must not be included in the calculation of the corrected “mean time” and “mean differences.”

167. *When the barometrical pressure differs from 30 in. by more than $1\frac{1}{2}$ in., fuzes will be sentenced on their “mean difference” only, no account being taken of the corrected “mean time” other than to record it on the proof report.*

168. *If the “mean difference” lies within the prescribed limit, and the corrected “mean time” is not more than 0.5 second outside the limits, the fuzes will be considered serviceable provided there are no other defects.*

169. Sentencing.

- (a) *At first proof*, if two or more failures occur, the lot represented will be sentenced unserviceable.
- (b) *If at first proof only one failure occurs*, a second proof will be taken.
- (c) *At second proof*, if any failure occurs, the lot will be sentenced unserviceable.
- (d) *In the case of “grouped” and/or “exposed” stores* the conditions of paras. 13 and 16 will be applied.

170. Disposal of missfired fuzes.

- (a) *Detonator pellets* will be removed from the fuzes and destroyed, one at a time, by burning. *No attempt is to be made to remove the detonators from their pellets.*
- (b) *Magazines* of fuzes will be completely emptied and the powder destroyed by stirring it into a bucket of water.
- (c) *Powder pellets* in the fuze body will be removed by tapping the fuze on a wood block (*having first removed the detonator*) and subsequently destroyed by immersion in water. If the pellets cannot be removed in this manner, they must be removed by boiling water.
- (d) *Time ring composition* will be destroyed either by boiling the rings in water until all traces of composition have been removed or by burning. Where the “burning” method is employed the rings will be laid out in a train of two layers, composition inwards, and so arranged that each ring in the top layer is in contact with the composition of two adjoining rings in the bottom layer.

A continuous train of composition is thus formed and will be fired at one end by means of a portfire.

SECTION IV

MISCELLANEOUS STORES

FUZE, ELECTRIC, No. 14
 FUZE, INSTANTANEOUS, DETONATING
 FUZE, SAFETY FUZE, PERCUSSION
 IGNITER, SAFETY FUZE, PERCUSSION
 QUICKMATCH AND SLOWMATCH

Fuze, Electric, No. 14

171. This fuze is analogous in its construction and use to the "Detonator, electric, No. 13," and proof selection will be as for that detonator (para. 39).

172. Proof.

- (a) The method of proof will be as for "Detonator, electric, No. 13" (paras. 46-59), except that no guncotton primer is required. The fuze should be placed in an iron box or cylinder during test and firing.
- (b) The proof requirements, sentencing, etc., are as for the No. 13 detonator.

Fuze, Instantaneous, Detonating (T.N.T.), Mk. III

173. Selection of proof.

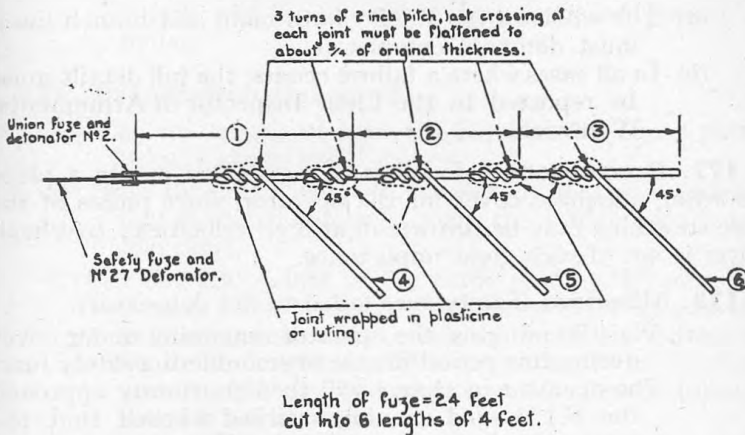
- (a) This fuze will not be proved until two years after the date of manufacture; thereafter proof will be taken annually.
- (b) Two lengths, each 24 ft., will be selected for proof from each nature, make and date of manufacture on charge in the station or I.O.O's. area, and each length will be prepared and proved as under.

174. Stores required.

- (a) Detonator, No. 27.
- (b) Union, fuze and detonator, No. 2.
- (c) Fuze, safety, No. 11.
- (d) Matches, fuzee, safety.
- (e) Luting, Mk. IV, or plasticine (if luting is not available).
- (f) Pliers, parallel jaws (or tongs).
- (h) Covered box.
- (j) Tape, measuring.
- (k) Sharp knife.
- (l) Steel plate of convenient size 2 to 3 inches thick (see para. 175 (f)).

175. Preparation.

- (a) One continuous length of 24 ft. will be cut into six equal lengths using a sharp knife. Three 4-ft. lengths will be joined together by means of twisted joints; this forms the main line (*see diagram*). The three other 4-ft. lengths will be attached to the mid points of the three lengths forming the main line, to form branch lines at an angle of 45 degrees from the main line in the direction of the detonation wave (particular care will be taken that the free ends of the twisted joints are at an angle of 45 degrees from the main line). Each of the five joints in the completed proof length should be arranged to give three complete turns of about 2-in. pitch.



- (b) The last point of contact on each joint should be flattened carefully to three quarters of its original thickness with a pair of parallel pliers or tongs, *i.e.* the last point of contact in the direction in which the detonating wave will travel.
- (c) Make up five pads of luting or plasticine, each pad 6 in. long and weighing not less than $\frac{1}{2}$ lb. formed into shape, so that at one end the quantity is double the amount of that at the other end. Carefully place a pad under each joint, the large end of the pad being used for covering thickly the last point of contact with the main line. This is essential, as the efficiency of the test depends on the last point of contact on each joint being surrounded with at least a half-inch thickness of luting or plasticine.

- (d) A detonator, No. 27, fitted with 2 ft. of safety fuze, will be assembled to a union, fuze and detonator, No. 2, and connected to that end of the main line which is further away from the free end of the branch lines.
- (e) The cut in the instantaneous fuze against which the outer edges of the detonator is placed must be clean and the explosive filling unbroken; the end of the detonator must be in contact with the ends of the sheath of the instantaneous fuze.
- (f) The prepared fuze will be laid out on a steel plate, or on suitable ground of sandy nature free from stones, and the safety fuze ignited with a match fuze. The operator will then retire to cover.

176. Sentencing.

- (a) The whole of the F.I.D., both main and branch lines, must detonate completely.
- (b) In all cases where a failure occurs, the full details must be reported to the Chief Inspector of Armaments, Woolwich.

177. Precautions.—Proof must be carried out in a place affording adequate cover for the operator, since pieces of the fuze sheathing may be thrown off at high velocities; overhead cover is not of such great importance.

178. Missfires (Safety fuze failed to fire detonator).

- (a) Wait 30 minutes, the operator remaining under cover during this period in case of smouldering safety fuze.
- (b) The operator in charge will then cautiously approach the F.I.D. and, having satisfied himself that the safety fuze is not smouldering, will carefully remove the detonator and burnt safety fuze from the connector and place them in a covered box to await destruction.
- (c) Prepare a fresh detonator with 2 ft. of safety fuze and proceed as before.

179. Sentencing.—Each 30-ft. length of fuze should detonate correctly and its regularity of burning should be such that the fracture of the lead plate occurs *not more than 4 in. from the mid-way line*. Considering the two 30-ft. lengths:—

- (a) *At first proof*, if both fractures are not more than 4 in. from the mid-way line, the bulk represented will be sentenced serviceable.
- (b) If the fractures are both outside the 4-in. limit, the fuze will be sentenced unserviceable.

- (c) If one fracture is within and one outside the limit, a reproof will be taken.
- (d) *At reproof*, any case of a fracture outside the limit will condemn the lot.

HAMMER-JOINT TEST *applicable to fuze manufactured in 1933 or later*

180. Selection for proof.

- (a) No proof will be taken until two years after the date of manufacture; thereafter proof is to be taken annually.
- (b) Two lengths, each of 24 ft., will be selected for proof from each nature, make and date of manufacture on charge in the station or I.O.O.'s area, and each length will be separately prepared and proved as under.

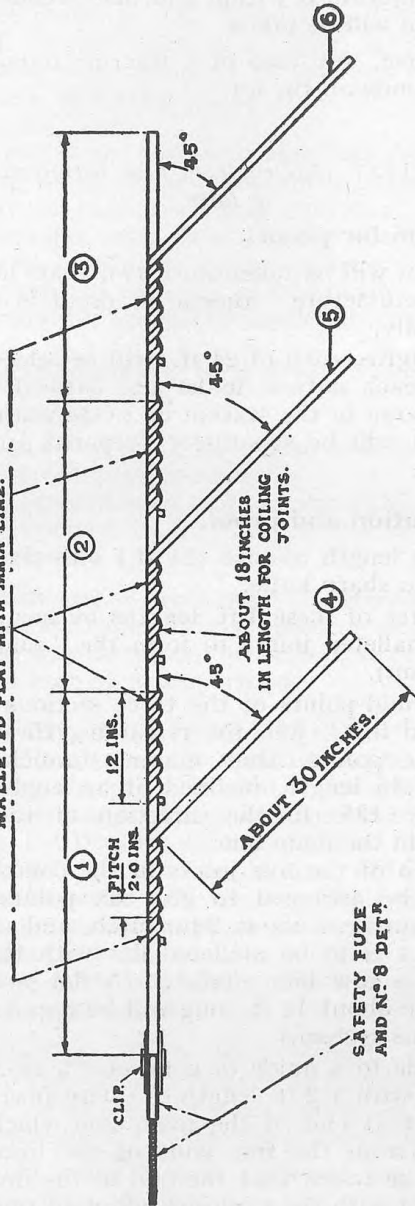
181. Preparation and proof.

- (a) Cut the length of fuze (24 ft.) into six equal parts, using a sharp knife.
- (b) Join three of these 4-ft. lengths by means of twisted and malleted joints to form the "main line" (see diagram).
- (c) To the mid-points of the three sections forming the "main line," join the remaining three lengths by similar points, thus making branches of about 30 in. in length, inclined at an angle of approximately 135° to the direction of the detonation wave in the main line.

Each of the five joints in the completed system must be arranged to give six points of contact, with turns of about 2-in. pitch, and each point of contact is to be malleted flat with the main line, using a raw hide mallet. (A flat wood or metal surface about 12 ft. long will be required for laying out this system.)

- (d) Assemble to a union or connector a No. 8 detonator fitted with a 2-ft. length of safety fuze and connect it to that end of the main line which is furthest away from the free ends of the branches. Care must be taken that the end of the detonator is in contact with the explosive filling of the fuze.
- (e) Ignite the free end of the safety fuze and retire to cover.

6 TURNS MAKING 6 POINTS OF CONTACT
ON TOP SIDE; EACH POINT TO BE
MALLETTED FLAT WITH MAIN LINE.



SAFETY FUZE
AND NO. 8 DET.

LENGTH OF FUZE = 24 FEET
CUT INTO 6 LENGTHS OF 4 FEET.

182. Sentencing.

- (a) The whole of the fuze, both main and branch lines, should detonate completely.
- (b) In all cases where a failure occurs, full details must be reported to the Chief Inspector of Armaments, Woolwich.

183. Precautions.—Proof must be carried out only in a place affording adequate cover for the operator, since pieces of the fuze sheathing (tin or lead) may be thrown off at high velocities ; overhead cover is not of such great importance.

Fuze, Safety, Nos. 11, 15 and 16**184. Examination.**

- (a) One per cent. of all packages containing safety fuze will be opened annually and their contents examined.
- (b) This fuze is peculiarly liable to a fungoid growth, and should any fuze be so found during the annual examination a report must be rendered to the Chief Inspector of Armaments, Woolwich, stating the nature and quantity of the affected fuze.
- (c) Fuze on which growths have appeared must be immediately segregated out of contact with other exposed lengths of good fuze and care must be taken to prevent infection of the good fuze ; to this end no person who has been handling infected fuze is to be allowed to handle good fuze until his hands have been washed and clothes well brushed.

185. Proof.

- (a) One per cent. of each type of safety fuze will be fired annually for proof, unless the fuze is less than two years old from the date of manufacture.
- (b) Lengths of 24 ft. will be cut off and bent into the form of a "W," the two outer limbs of which are to be 1 ft. longer than the two inner limbs. The four limbs are then to be tied together at their mid points.
- (c) The "W" so prepared is to be immersed in water for *two* hours, all except the cut ends, which must be kept dry.
- (d) Immediately after the period of immersion, 2 in. will be cut with a sharp knife from each end and the remainder fired by lighting one of the ends.

186. Times of burning.—The times of burning of a yard should be :—

Fuze, safety, No. 11	...	...	70 to 110 seconds.
„ „ No. 15 and 15A	...	85 „ 107	„
„ „ No. 16	...	125 „ 165	„

187. Failures.—The following defects at proof will count as failures :—

- (a) Fuze fails to ignite initially.
- (b) Time of burning outside the given limits.
- (c) Fuze fails to burn through completely.

188. Sentencing.

- (a) *At first proof*, if more than one-third of the selections fail, the lot or group represented will be sentenced unserviceable.
- (b) If at first proof one-third or less of the selections fail, a second proof will be taken.
- (c) *At second proof*, if any failure occurs, the lot or group will be sentenced unserviceable.

189. Destruction.—Safety fuze sentenced unserviceable will be disposed of by burning.

Igniter, Safety Fuze, Percussion

190. Proof.

- (a) Two per cent. of the stock of igniters will be selected for proof annually, unless the igniters are under two years of age from the date of manufacture.
- (b) Each igniter will be proved by fitting it with a freshly cut 6-in. length of serviceable No. 11 safety fuze, holding the igniter in a pair of tongs or grips and firing by withdrawing the safety pin.

191. Failures.—The following will count as failures at proof :—

- (a) Percussion cap fails to fire (*assuming that the striker has worked correctly*).
- (b) Cap fires but fails to ignite the safety fuze (*assuming that the safety fuze itself is serviceable*).

192. Sentencing.

- (a) *At first proof*, if not more than five per cent. of failures occur, the lot represented will be sentenced unserviceable.
- (b) If at first proof, more than five per cent. *but not more than ten per cent.* of failures occur, a second proof will be taken.

- (c) Where failures exceed ten per cent. at first proof, the lot will be sentenced unserviceable.
- (d) *At second proof*, if any failure occurs, the lot will be sentenced unserviceable.

193. Disposal.—Igniters sentenced unserviceable will be destroyed either by firing as for proof or by dropping into deep water.

Quickmatch and Slowmatch

194. Proof.

- (a) These stores will be examined and proved annually.
- (b) 2 yds. of quickmatch and 1 ft. of slowmatch will be selected from each date of manufacture held on charge.
- (c) The match should be suspended freely in a position sheltered from draught and ignited from the lower end.

195. Rate of burning.

- (a) *Quickmatch.*—A length of 1 yd. should burn for not less than 20 nor more than 40 seconds.
- (b) *Slowmatch.*—A length of 1 ft. should burn for at least two hours.

The match should burn steadily and completely throughout its length.

196. Sentencing.—Should any proof selection fail, the bulk represented will be sentenced unserviceable.

Any sentenced unserviceable should be destroyed by burning.

SECTION V

CAPS AND PERCUSSION PRIMERS

CARTRIDGES, Q.F., 6- AND 3-PR.—CAP, MK. II
 CARTRIDGES, Q.F., BLANK, 6- AND 3-PR.—PRIMER,
 PERCUSSION, MK. III
 PRIMERS, PERCUSSION, Q.F. CARTRIDGES, No. 1
 PRIMERS, PERCUSSION, Q.F. CARTRIDGES, No. 2

197. Proof selection.

- (a) At annual inspection caps or primers will not normally be selected for proof until they reach the age of four years from the date of filling.
- (b) Thereafter, *one per cent.* of each lot or group will be taken for proof *every other year*, a similar percentage being taken for second proof when required.

- (c) Whenever cartridges are broken down for heat test of the cordite (*see* R.A.O.S., Part II, Pamphlet No. 2) *all* the caps therefrom will be expended at proof, and, where cartridges are broken down for destruction of cordite, *three per cent.* of the caps therefrom will be fired; any caps so fired will be regarded as part of the first proof of the total selected for proof.
- (d)—(i) Where caps and/or percussion primers have been taken for practice *from equipment or any stock other than that issued specially for practice*, the results at practice may be taken to govern the sentence of all caps and/or primers held at the station *of the same lot number* or, where lot numbers are not given, of all stores of that nature having the same filler and date of filling.
- (ii) Any specific cases of failure amongst the stores governed by the provisions of (d) (i) will be noted by the I.O.O. on his annual report of inspection of explosives, and, if such stores merit an unserviceable sentence as the result of failures at practice, full information as to the failures so obtained must be rendered.

Cartridges, Q.F., 6- and 3-pr.—Cap, Mk. II

198. Caps requiring removal from cartridge cases will be extracted, after removal of the cordite charge, by gently tapping with a suitable wooden drift on the inner face of the cap, care being taken that the cap when it leaves the case does not fall on any hard surface.

199. Stores required.

- (a) Apparatus proving percussion caps and primers, and detonators of fuzes. (*See* Appendix II, Section 2.)
- (b) Adapter, G.
- (c) Block, G.
- (d) Puffs, powder, No. 6.
- (e) Weight, C (1-lb.).

200. Preparation.

- (a) See that the apparatus is properly set up and levelled, that the weight moves freely in the guides. Support the weight by means of the suspending pin.
- (b) Place the puff, powder, in the recess of the block so that it lies 1 in. below the percussion cap when in position.

- (c) Insert the cap into adapter G, and the adapter into block G.
- (d) Slide the block centrally under the guides.
- (e) Slide the protecting shield into position.

201. Firing.—Raise the weight to a height of 22 in. above the cap and release it by withdrawing the suspending pin smartly.

The cap should fire and ignite the puff.

202. Missfires.

- (a) Wait one minute, then raise and support the weight.
- (b) Remove the adapter with percussion cap in position.

Missfired caps will be destroyed by burning.

203. Instructions for sentencing.—See para. 221.

Cartridges, Q.F., Blank, 6- and 3-pr.—Primer, Percussion, Mk. III

204. Stores required.

- (a) Apparatus proving percussion caps and primers, and detonators of fuzes.
- (b) Block, C.
- (c) Puff, powder, No. 6.
- (d) Weight, C (1-lb.).

205. Preparation.

- (a) See that the apparatus is properly set up and levelled, and that the weight moves freely in the guides. Support the weight by means of the pin.
- (b) Place the puff, powder, in the recess in block C so that it lies 1 in. below the primer when in position.
- (c) Place the primer in position in the block.
- (d) Slide the block centrally under the guides and the protecting shield into position.

206. Firing.—Raise the weight to a height of 22 in. above the primer and release it by withdrawing the pin smartly.

The primer should fire and ignite the puff.

207. Missfires.

- (a) Wait one minute, then raise and support the weight.
- (b) Tilt the block sideways and allow the primer to fall out gently.

Missfired primers will be destroyed by emptying the contents of the magazine into water and burning the caps.

208. Sentencing.—See para. 221.

Primer, Percussion, Q.F. Cartridges, No. 1

209. Stores required.

- (a) Apparatus proving percussion caps and primers, and detonators of fuzes.
- (b) Block, D (in two parts).
- (c) Key, inserting and removing primers.
- (d) Lanyard with hook.
- (e) Lever, Mk. I.
- (f) Receiver, K.
- (g) Shalloon discs, 2-in. diameter.
- (h) Spirit level.
- (j) Stand, Mk. III.
- (k) Vent, G.
- (l) Weight, C (1-lb.).

210. Preparation.

- (a) Adjust the apparatus as necessary to the horizontal position, using a spirit level, by means of the adjusting screws and lever.
- (b) See that weight C moves freely in the guide bars and use the suspender to hold it at the required height by its pin.
- (c) Secure the lower part of block D to the recess in the base plate by means of vent G with receiver K attached.
- (d) Screw the primer into its recess in the block, using the key as necessary, and place the block in its recess in the lower part under the guide.
- (e) Turn the safety shield to protect the operator.
- (f) Insert two shalloon discs into the receiver and see that they lie flat, one upon the other.

211. Firing.

- (a) Hook the lanyard into the suspending pin.
- (b) Release the weight by withdrawing the suspending pin by means of the lanyard. The weight falling should strike the cap and ignite the primer; the flash from the primer magazine should burn holes through *both* shalloon discs.

212. Missfires.

- (a) Wait one minute, then raise and support the weight.
- (b) Remove the primer from the block, examine it, and put aside for destruction.

(Note.—Only where there is a clear indication that the cap has been badly struck will a second attempt be made to fire the primer.)

213. Destruction of missfires.

- (a) Place the primer in the jaws of a vice, open the sections of the closing disc by means of a *brass* or copper pricker and empty the gunpowder contents of the magazines into a bucket of water.
- (b) Remove the flash hole plug, anvil and pea ball from the primer and press the cap from its seating by means of a wooden drift. Then destroy the cap by burning.

214. Sentencing.—See para. 221.**Primer, Percussion, Q.F. Cartridges, No. 2****215. Stores required.**

- (a) Apparatus, proving percussion caps and primers, and detonators of fuzes.
- (b) Adapter, I (for the Mk. III primer only).
- (c) Block, I.
- (d) Cordite, size $4\frac{1}{4}$, in 4-ft. lengths.
- (e) Weight, C (1-lb.).

216. Preparation.

- (a) See that the guides of the apparatus are vertical and the base plate level, adjusting as necessary by means of the levelling screws.
- (b) See that weight C works freely in the guides and support it by means of the pin.
- (c) Wrap a 4-ft. length of cordite round the magazine of the primer, covering the fire holes, and secure the cordite by two or three turns of fine thread.
- (d) In the case of Mk. III primers only, place the primer in adapter I.
- (e) Screw the wrapped primer (or adapter with primer) into block I.
- (f) Place block I into its recess on the base plate of the apparatus under the guides and turn the safety shield to protect the operator.

217. Firing.—Raise weight C to a height of 22 in. above the primer and allow it to fall by withdrawing the pin.

The falling weight should strike the cap, igniting the primer, and the flash from the magazine ignite the cordite wrapping.

218. Missfires.

- (a) Wait one minute, then raise and support the weight.
- (b) Remove the primer from the block, examine it and put aside for destruction.

(Note.—Only where there is a clear indication that the cap has not been fairly struck will a second attempt be made to fire the primer.)

219. Destruction of missfired primers.

- (a) Remove the cordite wrapping from the magazine and place it aside for destruction by burning.
- (b) Place the primer magazine in lead clamps in a vice and, using a suitable key and wrench, unscrew the primer head from the magazine.
- (c) Empty the powder from the magazine into a bucket of water and wash out the magazine.
- (d) Remove the anvil, flash hole plug and pea ball from the body of the primer, press the cap from its seating and destroy it by burning (*see* para. 25).

Defects and Sentencing

220. Defects.—At proof of caps and percussion primers, the following defects will count as failures :—

- (a) **Missfires of all natures, i.e.**
 - (i) Cap fails to fire.
 - (ii) Cap fires but fails to ignite primer.
 - (iii) Cap or primer fires but fails to ignite the puff, shalloon, or cordite round the magazine.
- (b) **Blowbacks, i.e.** cap, or cap and cap chamber blow out of primer, *or* hole blown through cap.
- (c) **Hangfires, i.e.** abnormal length of time elapses between striking of percussion cap and firing of cap or primer.

221. Sentencing caps and primers.

- (a)—(i) If not more than five per cent. of failures occur at first proof, the lot represented will be sentenced serviceable.
- (ii) If failures at first proof exceed five per cent., but do not exceed ten per cent., a second proof will be taken.
- (iii) Where failures at first proof exceed ten per cent., or any failure occurs at second proof, the lot represented will be sentenced unserviceable.
- (b) In the case of “grouped” and/or “exposed” stores, the conditions of paras. 13 and 16 will be applied.
- (c) *In the case of primers filled prior to 1928*, when a second proof is required, the weight C will be dropped from a height of 25 in. instead of 22 in.

SECTION VI

TUBES

TUBE, FRICTION, MK. IV.
TUBE, PERCUSSION, S.A. CARTRIDGE
TUBE, PERCUSSION, T
TUBES, VENT, ELECTRIC, .4-IN.
TUBES, VENT, ELECTRIC, .5-IN.
TUBES, VENT, PERCUSSION, .4-IN.
TUBES, VENT, PERCUSSION, .5-IN.

222. Proof selection.

- (a) At annual inspection, tubes will not normally be selected for proof until they reach the age of three years from the date of filling (or two years in the case of .4-in. and .5-in. tubes).
- (b) Thereafter three per cent. of each lot or group will be taken for proof *every other year*, up to a maximum of 20 tubes, or 25 where a single cylinder contains this number.
- (c) For second proof, when necessary, the number taken will be twice that for the first proof, except that the maxima given above must not be exceeded.
- (d) After reaching the age of ten years, all natures of tube will be proved *annually*.
- (e)—(i) Where tubes have been taken for practice *from equipment or any stock other than that issued specially for practice*, the results at practice may be taken to govern the sentence of all tubes held at the station *of the same lot number*, or, where lot numbers are not given, of all tubes having the same filler and date of filling.
- (ii) Any specific case of failure amongst the tubes referred to in (e) (i) will be noted by the I.O.O. on his annual report of inspection of explosives, and, if tubes are sentenced unserviceable as a result of failures at practice, full information as to the failures so obtained must be rendered.

223. Proof apparatus.

- (a) Proof of all natures of tube will be carried out in the "Apparatus proving tubes and primers" (Appendix II, Section 5), using the appropriate component parts as detailed hereafter (*see also* R.A.O.S., Part II, Pamphlet No. 11, Appendix II).

- (b) The apparatus must be set up in such a position as to prevent a strong draught of air blowing at right angles to the direction of the channel in the "receiver."
- (c) Before beginning proof, a tube (without puff) should be fired so as to dry out the vent.
- (d) The vent and channel of the apparatus must be frequently cleared to prevent choking with fouling, and the vent itself should be washed out after every 50 rounds and well dried before recommencing proof operations.
- (e) The end of the receiver must be brushed out *after every round* with a "brush, sash tool, No. 8."

The foregoing precautions must be strictly observed, as otherwise incorrect results at proof are likely to arise.

Tube, Friction, Mk. IV

224. Stores required.

- (a) Apparatus proving tubes and primers—Stand, Mk. IV.
- (b) Brush, sash tool, No. 8.
- (c) Lanyard, firing.
- (d) Puff, powder, No. 6.
- (e) Receiver, K.
- (f) Spanners (large and small).
- (g) Vent, A, upper part.
- (h) Vent, A or F, lower part.

225. Preparation.

- (a) Screw vent A or F, lower part, to vent A, upper part, and the upper part into the stand, tightening up with a spanner.
- (b) Screw receiver K on to the lower end of the vent and place the puff, powder, in the receiver.
- (c) Place the friction tube in the upper part of the vent and attach the firing lanyard.

226. Firing.—Give the lanyard a sharp pull, thus withdrawing the friction bars. The tube should fire and the flash ignite the puff.

227. Missfires.—Wait one minute, then remove the tube from the vent and put it aside for destruction. Destroy the tube by removing the cork plug by means of a copper pricker, empty out the contents into water, and immerse the tube in water.

228. Sentencing.—See para. 251.

Tube, Percussion, S.A. Cartridge

229. Stores required.

- (a) Apparatus proving tubes and primers—Stand, Mk. IV.
- (b) Adapter, No. 3, Mk. I.
- (c) Base piece, Mk. I.
- (d) Brush, sash tool, No. 8.
- (e) Clip, supporting receiver F.
- (f) Key, vent, Mk. I.
- (g) Lanyard, firing.
- (h) Lock, percussion, No. 2, Mk. I.
- (j) Puff, powder, No. 6.
- (k) Receiver, F.
- (l) Spanners, large and small.
- (m) Vent, F, upper part.
- (n) Vent, A or F, lower part.

230. Preparation.

- (a) Turn the stand of the apparatus over on its side and pack it in a horizontal position by means of wooden blocks.
- (b) Insert adapter No. 3 into the base piece and secure the base piece to the stand by means of the four screws provided.
- (c) Assemble vent F, upper part, and vent A or F, lower part, together with receiver F to the apparatus, so as to form a vent of total length 54 in., the assembly being supported by the clip.
- (d) Place the puff, powder, in the receiver and the tube under proof in the adapter.
- (e) Carefully slide the lock percussion over the tube and see that the guide bolt engages into its recess.

231. Firing.—Place the lanyard over the firing pin of the lock and give it a smart pull; this compresses the striker spring and releases the striker pin when maximum compression of the spring is reached.

The tube should fire and ignite the puff in the receiver.

232. Missfires.

- (a) Wait one minute, then remove the tube and put it aside for destruction.
- (b) Destroy the tube by opening it up with a *metal* pricker, empty out the powder into water and immerse the tube. Destroy the cap by burning.

233. Sentencing.—See para. 251.

Tube, Percussion, T

234. Stores required.

- (a) Apparatus proving tubes and primers—Stand, Mk. IV.
- (b) Brush, sash tool, No. 8.
- (c) Lanyard, firing.
- (d) Puff, powder, No. 6.
- (e) Receiver, L.
- (f) Spanners, large and small.
- (g) Vent, T, Mk. I* or II.

Note.—The vent T, Mk. I, may be converted locally to the Mk. II pattern by screwing the vent at the lower part to suit the receiver L. Receiver K may be used instead of receiver L by removing the spigot from the former.

235. Preparation.

- (a) Screw vent T into the stand and tighten up with a spanner.
- (b) Screw receiver L on to the bottom of the vent and place the puff, powder, in the receiver.
- (c) Place the percussion tube in the vent and attach the lanyard.

236. Firing.—Give the lanyard a sharp pull; the tube should fire and ignite the puff in the receiver.

237. Missfires.

- (a) Wait one minute, then remove the tube and put it aside for destruction.
- (b) Destroy the tube by burning.

238. Sentencing.—*See* para. 251.

Tube, V.S., Electric, T

243. Sentencing.—*See* para. 251.

Tubes, Vent, Electric, 4-in.

Tubes, Vent, Electric, 5-in.

Tubes, Vent, Percussion, 4-in.

Tubes, Vent, Percussion, 5-in.

244. Stores required.

- (a) Apparatus proving tubes and primers—Stand, Mk. IV.
- (b) Base piece, Mk. I.
- (c) Brush, sash tool, No. 8.
- (d) Clip, supporting receiver, F.
- (e) Extractors, large, V.S. tubes.

- (f) Lock, percussion, No. 1, Mk. I (for percussion tubes only).
- (g) Puff, powder, No. 6.
- (h) Receiver, F.
- (j) Slide, Mk. IV.
- (k) Vent, F, upper part.
- (l) Vent, A or F, lower part.
- (m) Vents, J (for .4-in. tubes) and L (for .5-in. tubes).
- (n) Contact piece B.

245. Preparation.

- (a) Turn the stand over on its side and pack it in a horizontal position by means of wooden blocks.
- (b) Secure the base piece fitted with vent J or L (as appropriate) to the stand by means of the screws.
- (c) Assemble vent F, upper part, to vent A or F, lower part, and attach receiver F, the latter being supported by the clip supporting, the spanners being used where necessary for tightening up.
- (d) Place the tube under proof in the vent.

Note.—Before firing “ Tubes, vent, electric, .5-in.” at proof, provision must be made to allow for a 31-in. air space between the puff and the end of the vent.

246. Resistance test and firing of electric tubes.

- (a) Using the apparatus and method described in Appendix I, Section 1, test the tube for resistance.
- (b) The resistance of the various natures of tubes must be between the following limits :—

Tube, V.S., electric, wireless—

.5-in.	0.9 to 1.1 ohms.
.4-in., Mks. III and below ...	1.5 „ 1.8 „
.4-in., Mks. IV and above ...	0.9 „ 1.1 „

Any electric tubes which fail at the test will be put aside and subsequently disposed of as laid down in para. 18.

- (c) Disconnect the firing leads from the battery, and place the puff, powder, in the receiver.
- (d) Connect one of the leads to contact piece B and the other to the stand.
- (e) Re-connect the battery end leads to the battery, adjust the firing current to 1.2 amps., and complete the firing circuit by depressing the firing key on the ammeter.

The tube should fire and correctly ignite the puff.

Note.—It is very important that the vent should be thoroughly cleaned out after each tube has fired.

247. Firing percussion tubes.

- (a) Carefully slide the percussion lock over the tube and see that the guide bolt engages in its recess.
- (b) Place the puff, powder, in the receiver.
- (c) Raise the hammer of the lock until it is caught and held by the cock notch of the trigger.
- (d) Release the hammer by giving the lanyard a sharp pull.

The tube should fire and correctly ignite the puff.

248. Missfires.

- (a) Wait one minute.
- (b) At electric firing, insert an insulating wedge under the firing key, verify that the electrical circuit is complete, and disconnect firing leads from battery.
- (c) Slide the percussion lock or slide clear of the tube.
- (d) Extract the missfired tube and place it aside.

249. Disposal of missfired tubes.

- (a) *Electric tubes* will be dealt with as laid down in para. 18, *i.e.* sent to Woolwich for "special examination."
- (b) *Percussion tubes* : remove the closing plugs by means of a metal pricker, empty the gunpowder into water and immerse the tubes. Push out the percussion caps and destroy by burning.

Defects and Sentencing

250. Defects.—The following defects will count as failures :

- (a) Missfires (including cap fired but powder charge in tube not ignited).
- (b) Hangfires (*see* para. 220).
- (c) Tube fired but failed to ignite puff.
- (d) Blowbacks, *i.e.* cap or contact disc blown out of head of tube or hole blown through cap, insulating cups cracked or broken.
- (e) Caps pierced by striker.
- (f) Split cases or fused bodies.
- (g) Electrical resistance outside the limits prescribed.

Where defects as at (a) or (c) occur, care must be taken to see that the fault is not due to a choked or incorrect vent.

Where "pierced caps" occur, the protrusion of the striker of the percussion lock must be checked.

If split cases are found to be occurring frequently, the vent (or adapter) should be examined and gauged : if this is found correct, a special note to that effect should be rendered on the Army Form.

251. Sentencing tubes.

- (a)—(i) If not more than five per cent. of failures occur at first proof, the lot represented will be sentenced serviceable.
- (ii) If failures at first proof exceed five per cent. but do not exceed ten per cent. a second proof will be taken.
- (iii) Where failures at first proof exceed ten per cent. the lot will be sentenced unserviceable.
- (iv) Any failure at second proof will condemn the lot.
- (b) In the case of "grouped" and/or "exposed" stores the conditions of paras. 13 and 16 will be applied.

APPENDIX I

SECTION 1

Resistance Test and Firing of Electric Detonators, Fuzes and Tubes

1. Stores required.—(See also R.A.O.S., Part II, Pamphlet No. 11, Appendix II.)

- (a) Ammeters, 3-amp., with rheostat.
- (b) Cable, electric, E1, Mk. II.
- (c) Cells, inert, A (three).
- (d) Galvanometers, detector, 3-ohms.
- (e) Cell Daniell "B."

2.—(a) Connect up the stores as shown in Fig. 1.

- (b) Depress the "2-ohm" key and obtain a reading of 2 ohms on the galvanometer by adjusting its rheostat; release the key.
- (c) Join the test leads together and find their resistance by depressing the primer key on the galvanometer; release the primer key.
- (d) Depress the firing key on the ammeter and adjust its rheostat so as to give the prescribed firing current (see text); release the firing key.
- (c) Take off the rheostat the mean resistance of the store to be proved (see text).

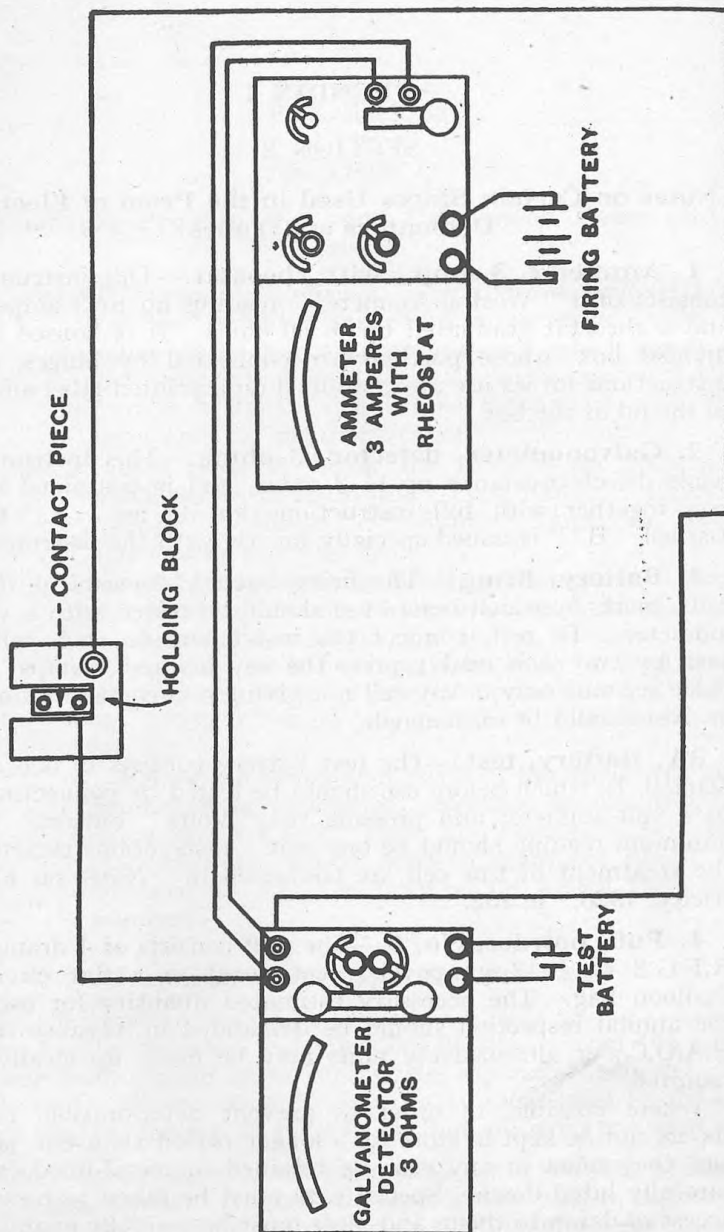
3.—(a) Insert the tube in its vent and place the slide over it, connect one wire from the galvanometer to the slide and the other to the stand.

- (b) In the case of detonators, connect the leads to the detonator.

4. Depress the primer key on the galvanometer. *The reading obtained is that of the resistance of the store under proof, plus the leads; deduct the latter resistance as already found (see 2 (c)); release the primer key.*

5. To fire the store under proof, depress the firing key of the ammeter.

FIG. 1



APPENDIX I

SECTION 2

Notes on Certain Stores Used in the Proof of Electric Detonators and Tubes

1. Ammeter, 3-amp., with rheostat.—This instrument consists of a "Weston-Ammeter" reading up to 3 amperes, and a rheostat graduated up to 50 ohms. It is housed in a divided box, whose portions are connected by hinges, and instructions for its use are contained on a printed label affixed to the lid of the box.

2. Galvanometer, detector, 3-ohms.—This instrument reads direct resistance up to 3 ohms, and is contained in a box together with full instructions for its use. A "Cell, Daniell, 'B'" is issued specially for use with the instrument.

3. Battery, firing.—The firing battery consists of three cells, inert, A, which before use should be tested with a volt-ammeter. To test, connect the instrument to each cell in turn by two *short* leads; press the key marked "Amps" for three seconds only. Any cell not giving a current of 4 amps. or over should be exchanged.

3A. Battery, test.—The test battery consists of one cell, Daniell, B, which before use should be tested by connecting it to a volt-ammeter and pressing the "Volts" button. The minimum reading should be one volt. Instructions regarding the treatment of this cell are contained in "Notes on Electricity, 1926," p. 132.

4. Puff, powder, No. 6.—The puff consists of 4 drams of R.F.G.2 or G.12 gunpowder, contained in a flat circular shalloon bag. The necessary estimated quantity for use at the annual inspection should be demanded in advance from R.A.O.C., or alternatively puffs may be made up locally as required.

Where possible, in order to prevent deterioration, puffs should not be kept in store for a longer period than one year, and they must in any case be retained in metal-lined cases carefully luted down. Special care must be taken to prevent access of damp to them, and puffs must be carefully examined to see that they are dry and serviceable before being taken into use.

APPENDIX II

SECTION 1

Apparatus Proving D.A. and Percussion Fuzes and Gaines

- 1.—(a) The apparatus consists essentially of a long vertical “guide, weight,” supported on a stand, with a pulley at its upper extremity over which works a line from which a “weight” is suspended; the “guide, weight,” has a hole through it, near its lower end, for the insertion of a “pin, safety.”
- (b) Situated centrally below the guide is the “block” which serves to house the “blast block,” “liners,” “plug,” “plunger,” “adapter” and the fuze under proof (*see* Fig. 2).
- (c) It should be specially noted that there is more than one Mark of certain of the above-mentioned components. These Marks are not in all cases interchangeable, and they must therefore be used only with specific Marks of other components, *e.g.* “Plug, No. 1, Mk. I” must only be used in “Block, No. 1, Mk. I.”

Before the component parts of the apparatus are demanded or assembled, reference should first be made to R.A.O.S., Part II, Pamphlet No. 11, Appendix II, which gives a complete detail of components and the purpose for which they are required.

Preparation of Apparatus for Use

2. The apparatus must be erected in a place giving suitable cover for the operator, and must not be sited within 100 yds. of any thoroughfare or building unless separated from it by a high wall. Where no wall exists, a suitable steel shield or stout wooden fence 6 ft. by 6 ft. by 3 in. must be provided.

3. Place the line over the pulley and lower it to the bottom of the guide, weight; attach the appropriate weight and raise the latter up the guide by hauling on the line, insert the safety pin below the weight and lower the weight so that it rests on the pin.

4. Ascertain that the plunger is a free fit in the plug (should it subsequently become tight or jam, immediate steps must be taken to free it). Place the block so that the escape hole in its base is facing away from the operator (the escape hole must be closed during firing but opened after each round).

5. Place a mirror so that the block may be observed by the operator whilst behind cover, prepare the fuze for proof, place it in the block using the appropriate adapter, plunger, etc. (*see text*).

6.—(a) Suitable cover must always be provided for the operator.

(b) The weight must always be drawn up the guide, weight, and the safety pin correctly inserted in position, before the prepared fuze is placed in the block.

Examination of Apparatus

7. To dismantle the apparatus for examination, remove the six bolts and lift off the base plate ; note the position of the check stud ; remove the shutter.

8. Mark the position of the slot in the lower half of the liner ; this must always be replaced in the same position.

Remove the liners from the block, clean them and examine for fractures and wear. If any fractures are found or the wear is such that further firing will cause damage to the inside of the block, the liners must be exchanged for serviceable ones.

9. If the liners are in good condition, replace them in the block, after cleaning the inside of the latter, taking care that the slot in the lower half comes into the position previously marked. Replace the shutter.

10. Replace the base plates in position with the check stud in the slot and screw home the bolts in the same holes as before ; at first each bolt should be screwed home only lightly. When all are in position, finish by screwing them hard home.

TER.

C.

K, BLAST.

E, WEIGHT.

RS.

SAFETY, M*1.

GER.

HT.

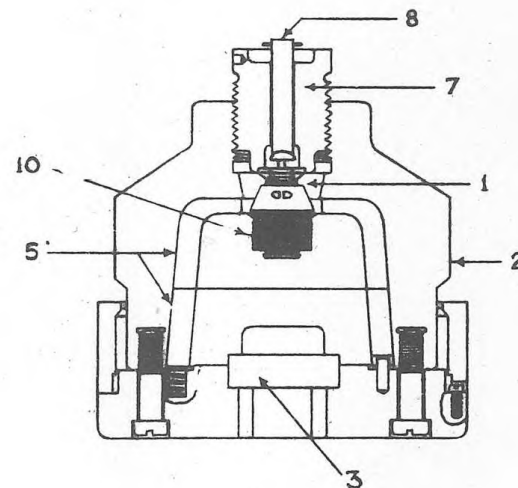
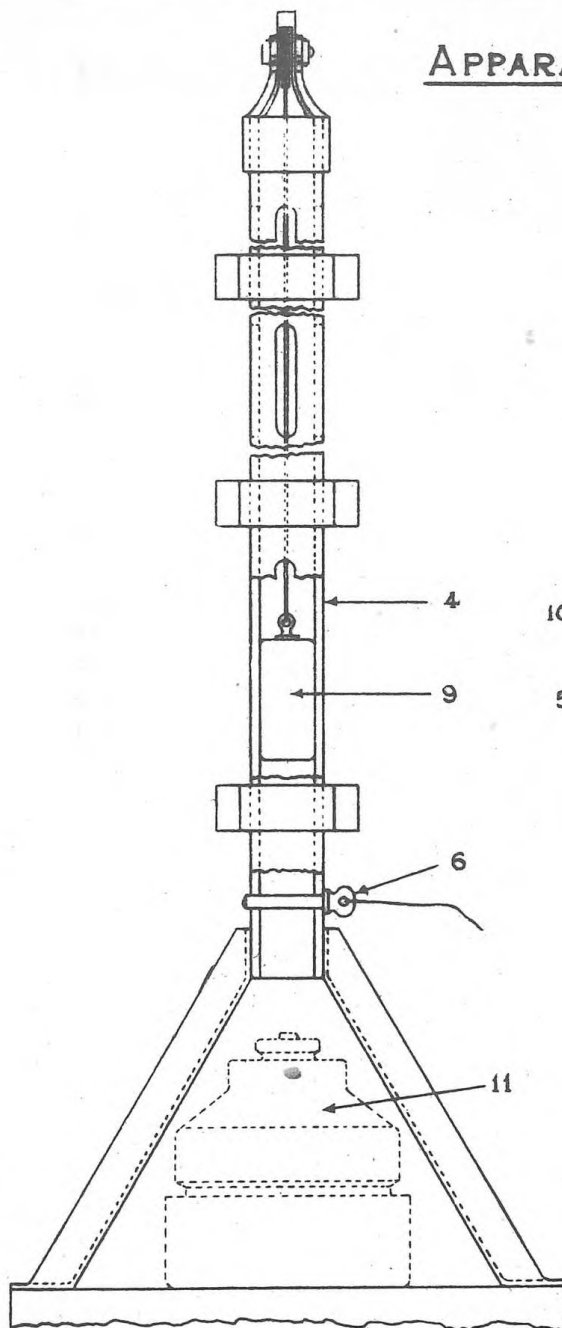
IN POSITION, (106 TYPE)

ION OF BLOCK FOR FIRING.

FIG. 2.

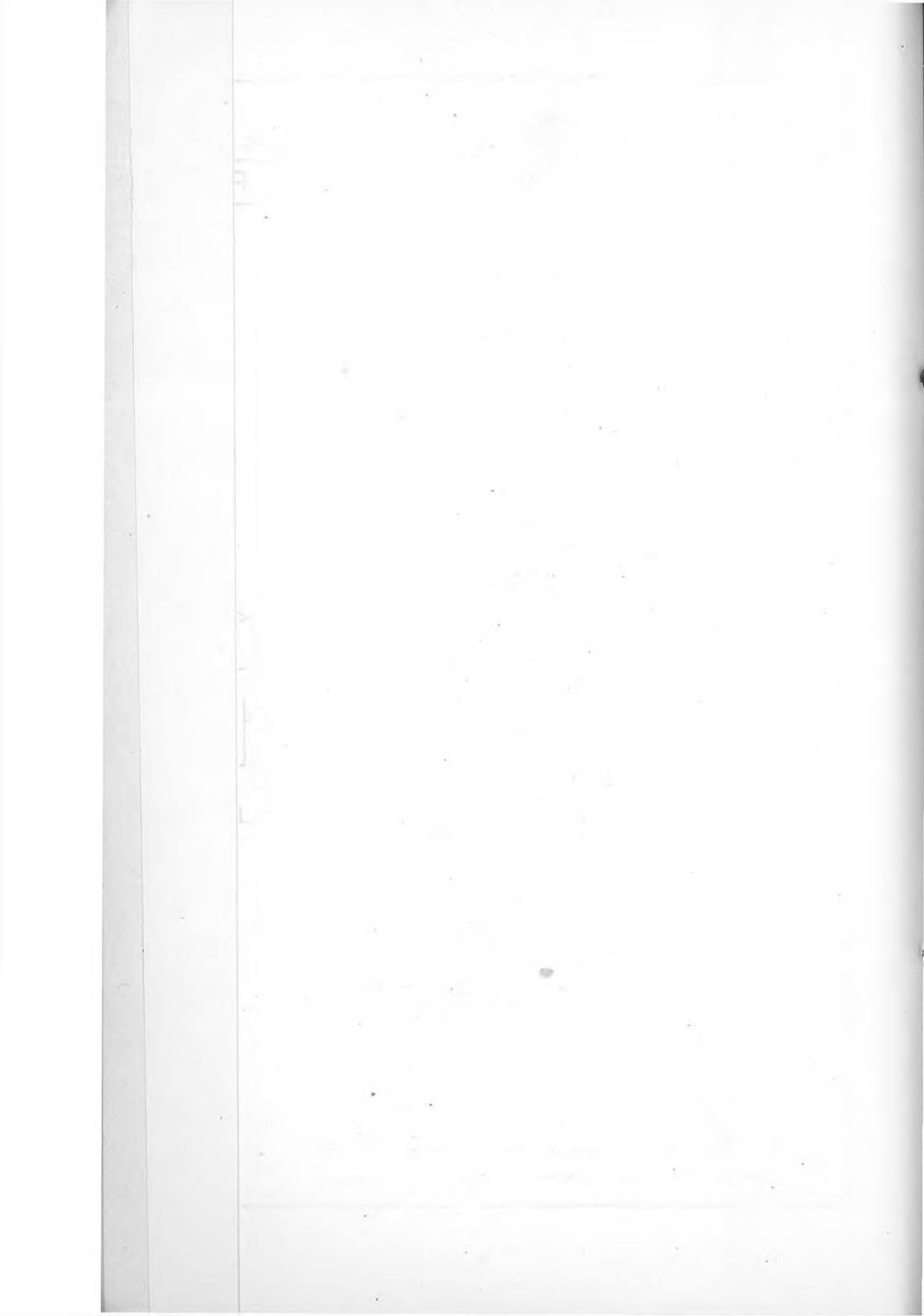


APPARATUS PROVING D.A. PERCUSSION FUZES & GAINES.



1. ADAPTER.
2. BLOCK.
3. BLOCK, BLAST.
4. GUIDE, WEIGHT.
5. LINERS.
6. PIN, SAFETY, M^KI.
7. PLUG.
8. PLUNGER.
9. WEIGHT.
10. FUZE IN POSITION, (106 TYPE)
11. POSITION OF BLOCK FOR FIRING.

FIG. 2.



APPENDIX II

SECTION 2

Apparatus Proving Percussion Caps and Primers, and Detonators of Fuzes

1. A complete detail of the components and accessories used with the apparatus is given in R.A.O.S., Part II, Pamphlet No. 11, Appendix II. The components appropriate to the proof of each type of store are as stated in the text of this Pamphlet.

2. Fig. 3 shows the general layout of the apparatus.

3. **General description.**—The stand of the apparatus consists of a base plate fitted with three pillars carrying a brass plate on which stand three steel guides for the accommodation of a weight. The store undergoing proof is placed on an anvil underneath the guide bars and the weight drops down the guides on to it.

One of the guide bars is graduated in inches and fitted with a sliding bracket (suspender) with a clamping screw. The weights are attached to the suspender by a brass or steel pin which is withdrawn when the weight is to be dropped on to the store under proof.

The iron anvil bed is pivoted to one of the lower pillars by a handle, thus allowing the bed to be swivelled from under the guide bars whilst the required weight and anvil are being inserted or removed.

A shield is provided on the stand to afford protection to the operator.

4. Where both types of apparatus are available it may be convenient to use the "Apparatus, proving percussion caps and primers, and detonators of fuzes," on top of the stand of the "Apparatus proving tubes and primers," but this is not essential so long as a sound, level platform can be found for the former.

**APPARATUS, PROVING PERCUSSION
CAPS AND PRIMERS, & DETONATORS
OF FUZES.**

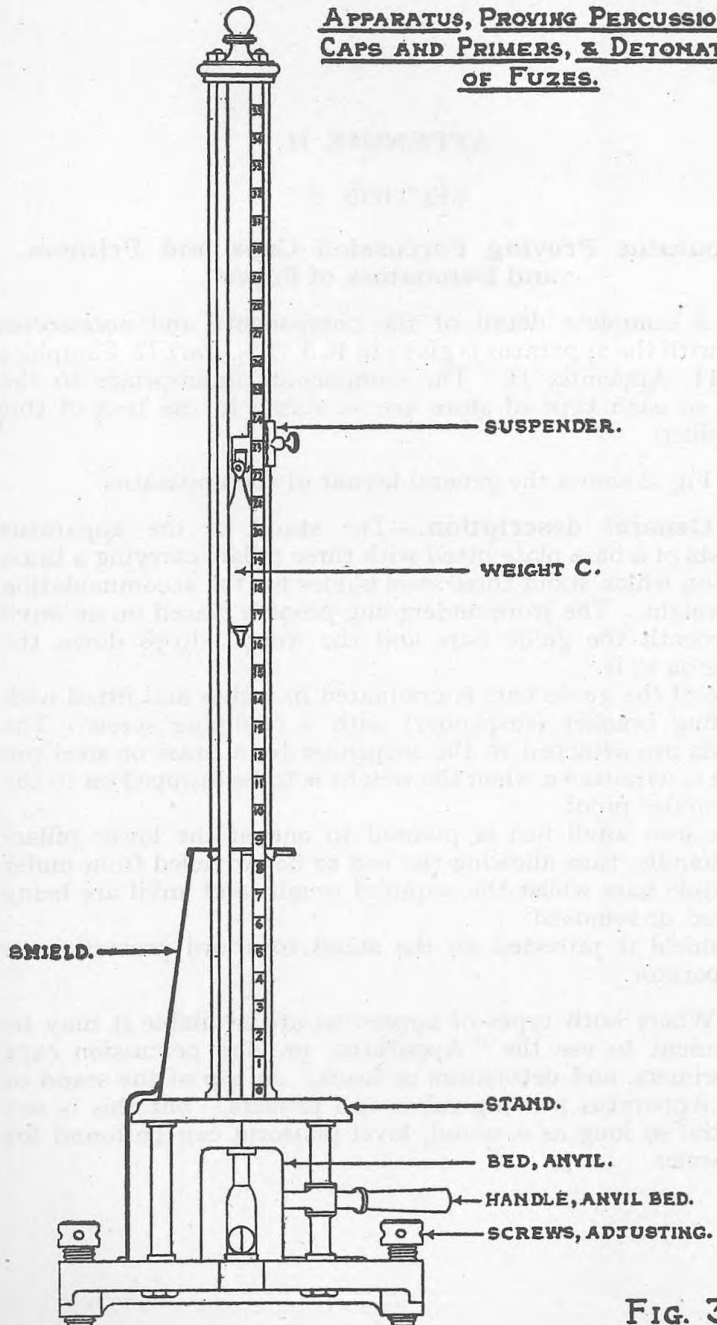


FIG. 3.

APPENDIX II

SECTION 3

Preparation of No. 101 Type Fuzes for Proof, Using the Apparatus, Removing Gains, 2-in. Fuzes

1. Apparatus. (See Fig. 4.)

- (a) The "Apparatus, removing gains, 2-in. fuzes," consists of a standard which can be clamped to a bench by means of the screws provided, an empty shell of 2-in. fuze-hole gauge (18-pr. or other suitable calibre) with a hole bored in the base, and a clamp.
- (b) To assemble the apparatus, secure the standard with clamp to a suitable bench by the screws, and suspend the empty shell, nose downwards, from the arm of the standard by means of the nuts and bolts provided.

2. Preparation of fuze for proof.

- (a) Remove the set screw securing the fuze to the adapter (where such exists).
- (b) Place the threaded portion of the fuze in the jaws of the clamp with the gaine in the fuze-hole of the empty shell, the position of the latter being so adjusted by means of washers (if necessary) as to leave just sufficient room for the application of Key No. 79.
- (c) Tighten up the clamp on to the fuze threads.
- (d) By means of the key, unscrew the adapter with gaine from the fuze.

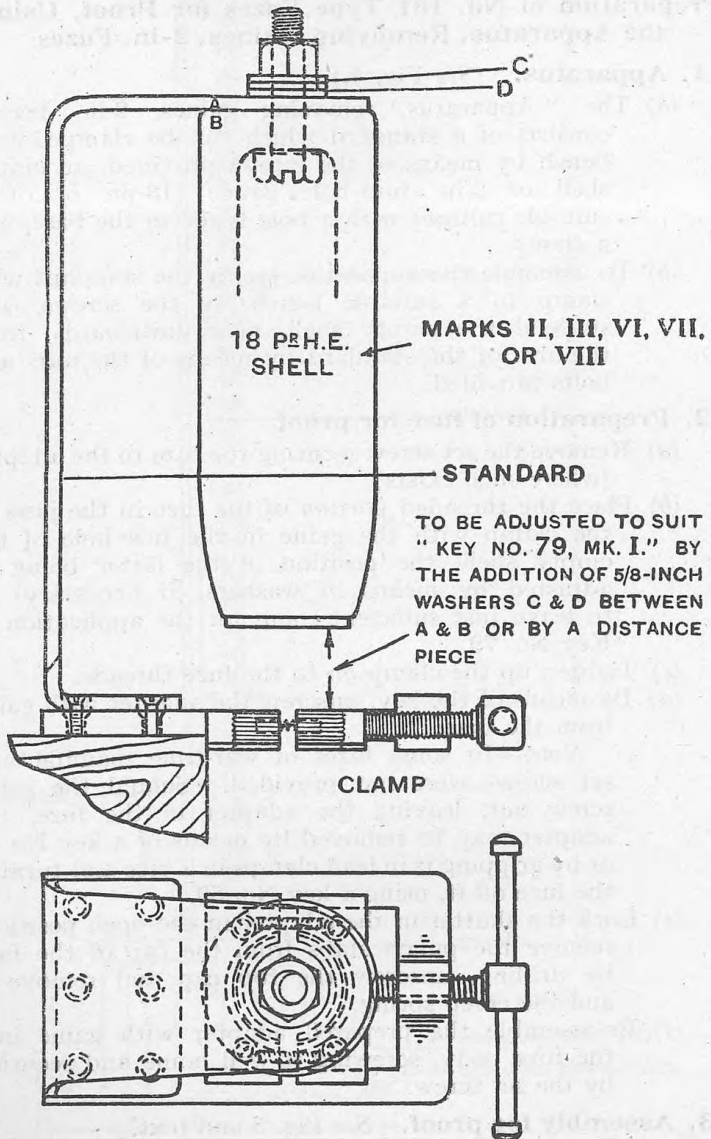
Note.—In some fuzes of war-time manufacture, set screws were not provided. Should the gaine screw out, leaving the adapter in the fuze, the adapter may be removed by means of a key No. 6, or by gripping it in lead clamps in a vice and turning the fuze off it, using a key No. 53.

- (e) Lock the shutter in the adapter in the open position, remove the punch stabs from the cap of the fuze by drilling, unscrew the top cap and remove it and the creep spring.
- (f) Re-assemble the prepared adapter with gaine into the fuze body, screwing it well home and securing by the set screw.

3. Assembly for proof.—See Fig. 5 and text.

FIG. 4

Apparatus, Removing Gaines, 2-in. Fuzes



APPARATUS PROVING N°101 TYPE FUZES WITH GAINÉ.

2. WEIGHT.
3. GUIDE RODS.
4. GUARD.
5. HEAD.
6. BASE PIECE.
7. ADAPTER.
8. NEEDLE.
9. SHEARING WIRE.
10. FUZE, PERCUSSION N°101
WITH GAINÉ.
11. SHELL, EMPTY, 8 INCH,
(WITH HOLE IN BASE)

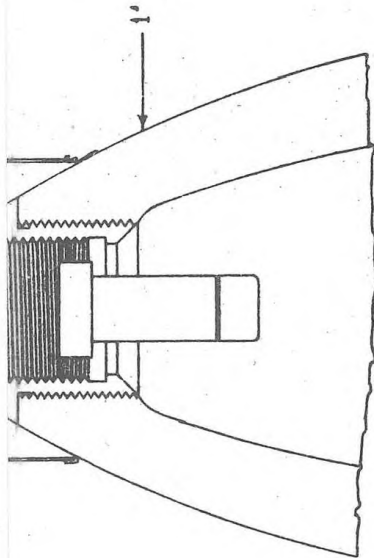


Fig. 5.

APPARATUS PROVING №101 TYPE FUZES WITH GAIN.

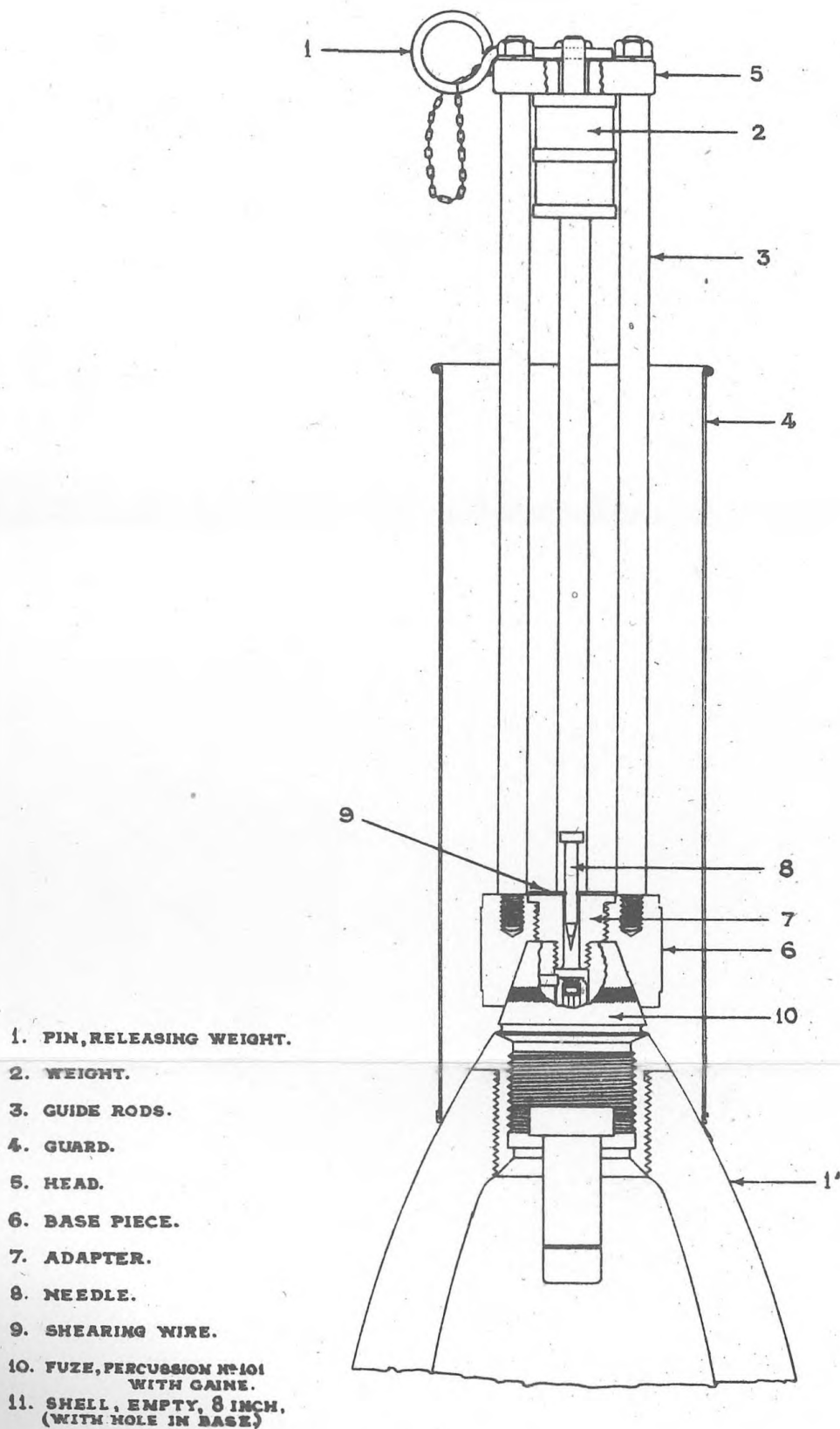


FIG. 5.

APPARATUS PROVING N°101 TYPE FUZES WITH GAINÉ.

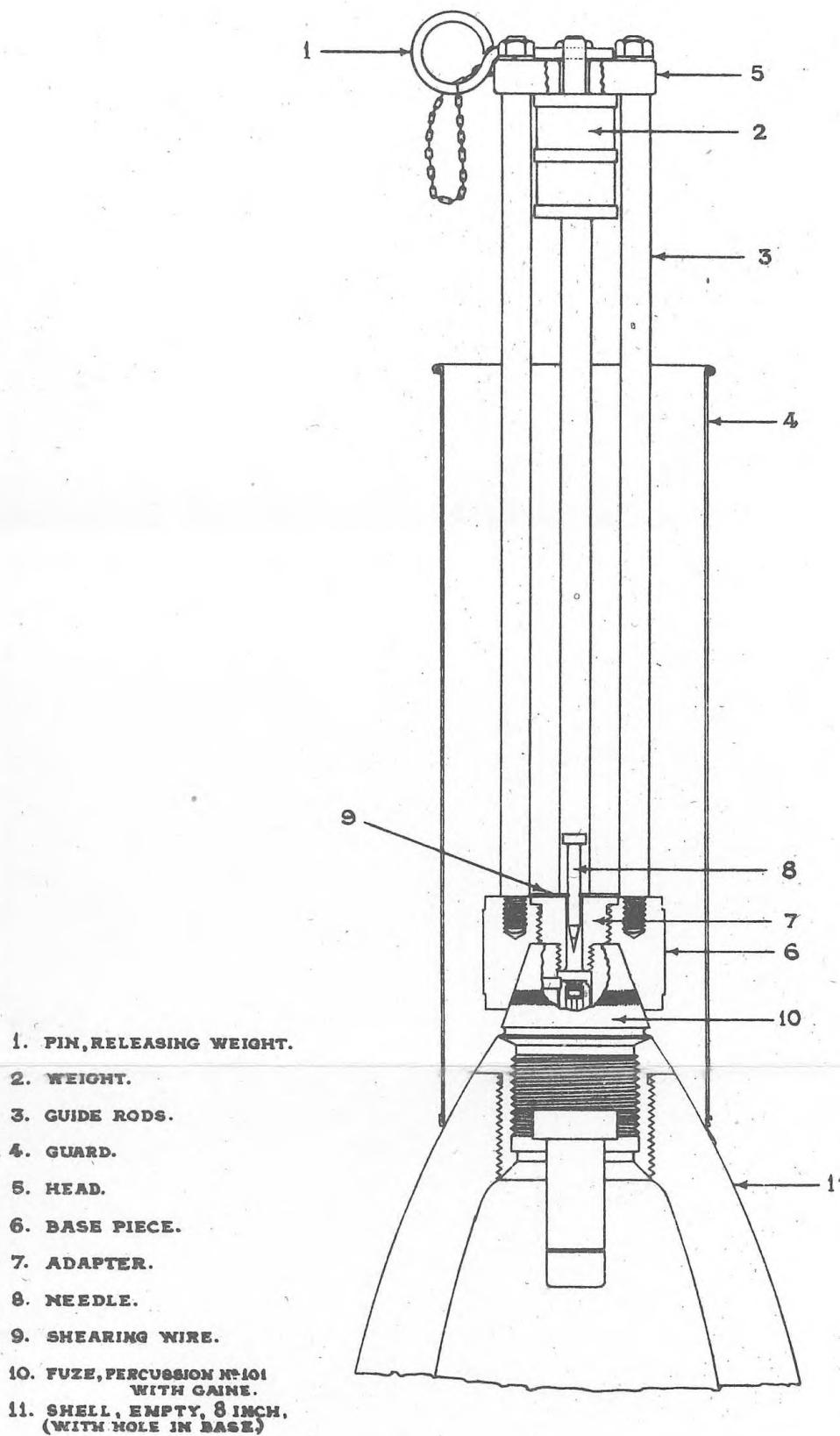


FIG. 5.



APPENDIX II

SECTION 4

Timing Fuzes at Rest

1.—(a) The stores required for the rest proof of time or time and percussion fuzes [after suitable preparation of the fuzes (*see text*)] are :—

(i) Apparatus, proving fuzes—

Adapters, gad, 2-in.

Gads, Mk. III.

(ii) Apparatus timing fuzes at rest.

(iii) Battery, with leads.

(iv) Ammeter, 3-amp., with rheostat.

(v) Circuit breakers (one or two as necessary).

(vi) Instrument, time of flight, *or*

(vii) Instrument, electro-magnetic, operating stop watch, *and*

(viii) Stop watch.

(b)—(i) The “apparatus timing fuzes at rest” includes an iron drum with door and bracket (for circuit breaker) and a wooden block, iron capped, also with a bracket for holding a circuit breaker.

(ii) Either of the alternative time recording devices may be used, the respective electrical circuits being arranged as shown in Figs. 6 and 7.

2. Preparation of apparatus.

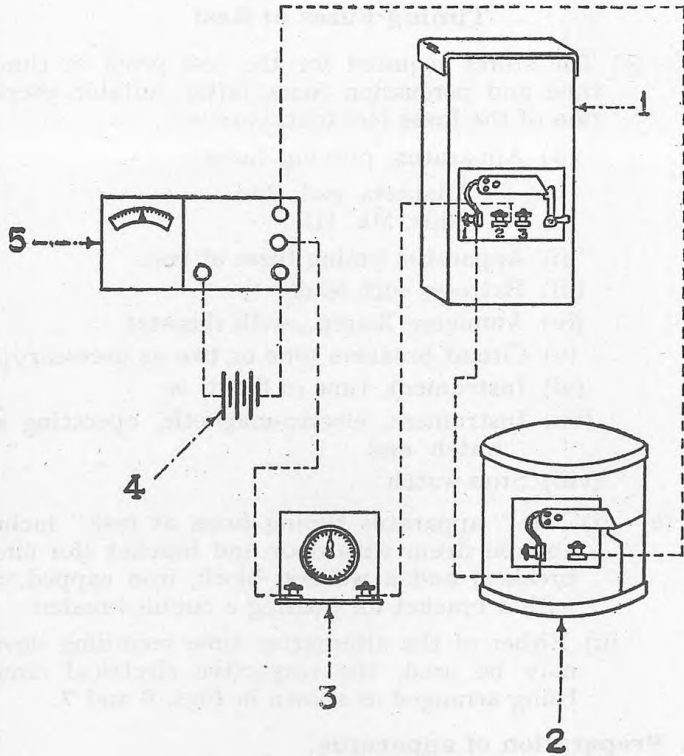
(a) Place the battery, time recording instrument and ammeter in position and short circuit the ammeter key with a metal wedge.

(b) Place the block and drum in position and secure the contact breakers to their respective brackets.

(c) Connect up the battery, time recorder, ammeter and circuit as shown in Figs. 6 and 7.

APPARATUS, TIMING FUZES AT REST

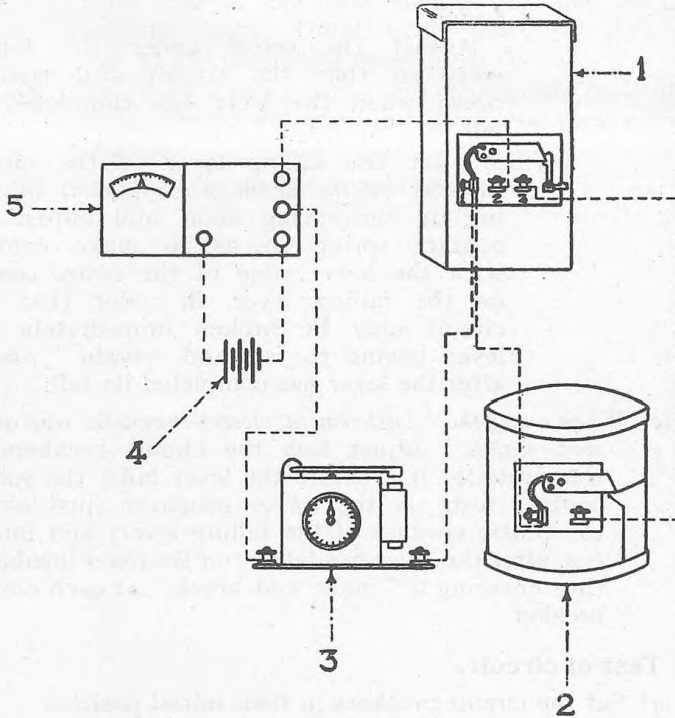
FIG. 6



1. Wooden block with circuit breaker.
2. Steel drum with circuit breaker.
3. Instrument, time of flight.
4. Battery, 6 volts.
5. Ammeter and rheostat.

APPARATUS, TIMING FUZES AT REST

FIG. 7



1. Wooden block with circuit breaker.
2. Steel drum with circuit breaker.
3. Instrument, electro-magnetic, operating stop watch.
4. Battery, 6 volts.
5. Ammeter and rheostat.

(d) *When using the instrument, time of flight :—*

- (i) See that the falling lever of the circuit breaker *on the block* is supported by the rocking lever, adjusting the contact spring so that it is resting on the insulator and just above the centre contact on the falling lever. This ensures that the circuit is "closed" immediately the lever begins to fall.

Adjust the screw under the falling lever so that the circuit still *remains closed* when the lever has completed its fall.

- (ii) See that the falling lever of the circuit breaker *on the drum* is supported by the lug on the spring door, and adjust the contact spring so as to make contact with the lower edge of the *centre contact* on the falling lever, in order that the circuit may be broken immediately the lever begins to fall and *remain "open"* after the lever has completed its fall.

- (e) *When using the "Instrument, electro-magnetic, operating stop watch,"* adjust both the circuit breakers so that initially (*i.e.* before the lever falls) the spring contact rests on the *upper* insulator (just above the centre contact of the falling lever) and finally (*i.e.* after the lever has fallen) on the *lower* insulator, thus ensuring a "make and break" at each circuit breaker.

3. Test of circuit.

- (a) Set the circuit breakers in their initial position.
- (b) With the point of the gad strike the steel plate on the iron block a sharp blow and note if the time recording instruments start correctly.
- (c) Using the rheostat as necessary, adjust the ammeter reading to a value (approximately) of 0.6 amp. if using the "Instrument, time of flight," or 1.0 amp. if using the "Instrument, electro-magnetic, operating stop watch."
- (d) Force open the spring door of the drum and see that the instruments stop immediately.
- (e) Re-set the circuit breakers and set the stop watch back to zero (or note the reading on the Instrument, time of flight).

4. Firing.

- (a) Keeping the prepared fuze (*see text*) horizontal, screw it home into the adapter in the gad, taking care that the escape hole in the fuze is away from the operator.
- (b) Strike the steel plate on the block a hard *vertical* blow with the point of the gad; the detonator and time ring of the fuze should fire and the time recorder start. Immediately place the gad with fuze in the drum and close down the lid.
- (c) When the fuze magazine fires, the spring door of the drum should fly open and cause the time recorder to stop.
- (d) Note the time of burning of the fuze.

APPENDIX II

SECTION 5

Apparatus Proving Tubes and Primers

1. A complete detail of the components and accessories used with this apparatus is given in R.A.O.S., Part II, Pamphlet No. 11, 1933, Appendix II. The particular components appropriate to the proof of each type of store is given in the text of this pamphlet.

2.—(a) Figure 8 shows the general layout of the apparatus as normally erected.

(b) Figure 9 shows the apparatus as employed in the proof of V.S. Tubes.

FIG. 8

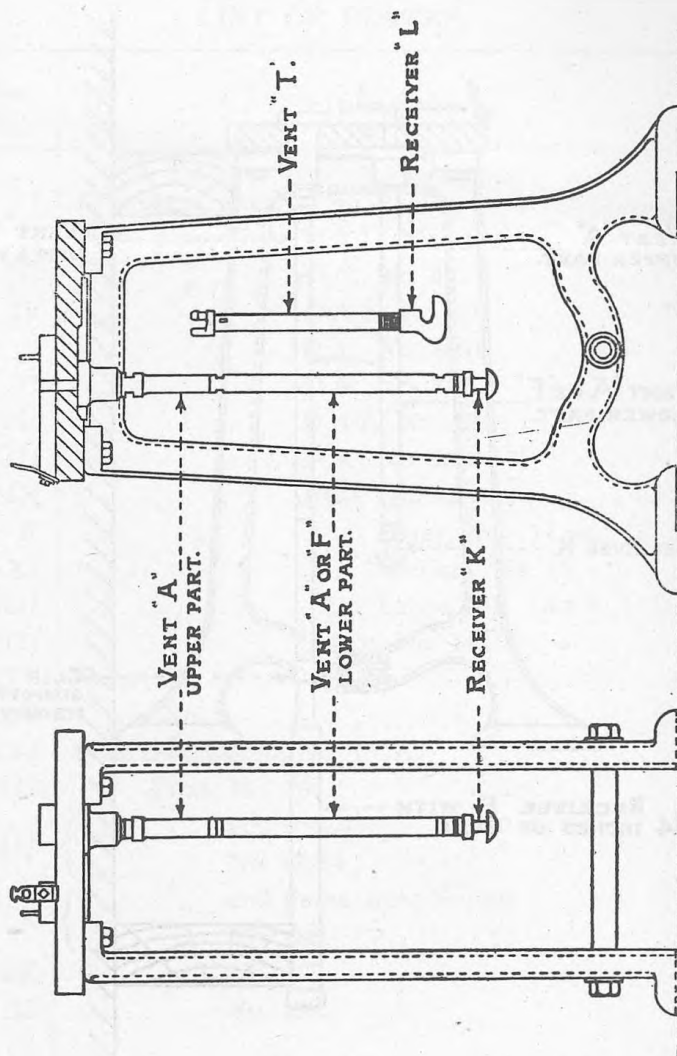
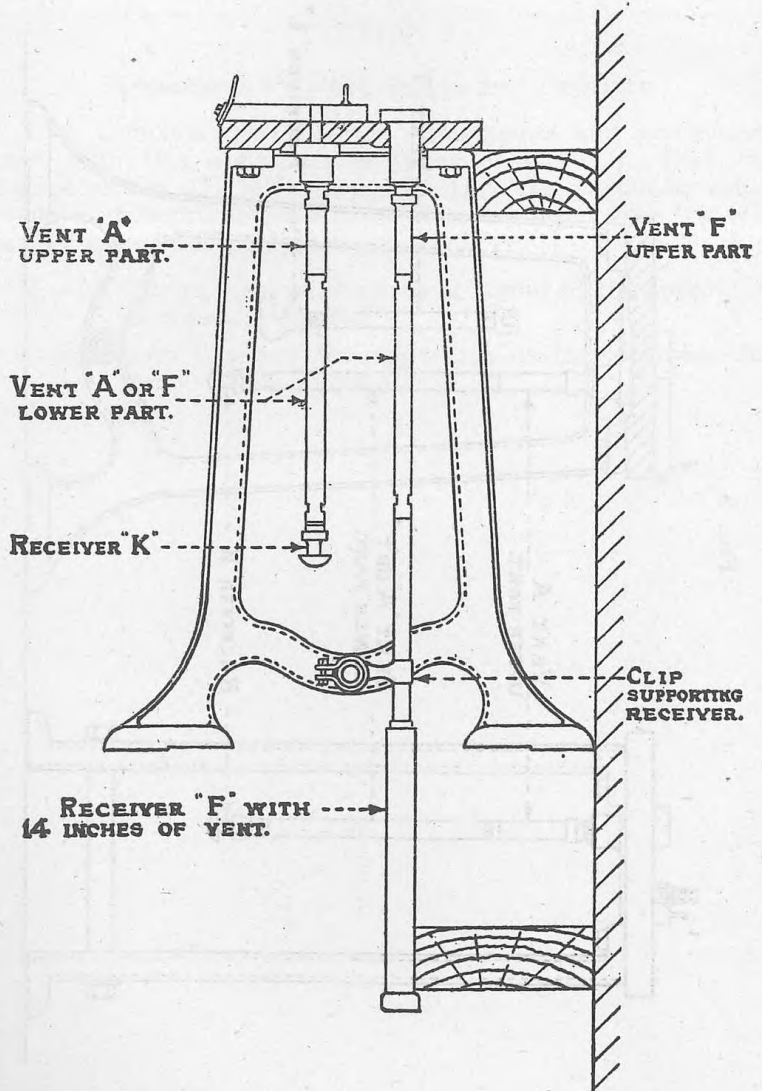


FIG. 9



LIST OF PLATES

<i>Plate No.</i>	<i>Description</i>
I	Detonator, electric, No. 9.
II	Fuze, percussion, D.A.I., No. 18.
III	„ „ D.A., No. 44.
IV	„ „ D.A.I., No. 45.
V	„ „ D.A., No. 106E.
VI	„ „ D.A., No. 117.
VII	„ „ D.A.I., No. 13.
VIII	„ „ D.A., No. 132.
IX	„ „ Base, Hotchkiss.
X	„ „ „ Large, Nos. 11 and 15.
XI	„ „ „ Medium, No. 12.
XII	„ „ „ Large, Nos. 16 and 16D.
XIII	„ „ Spigot, No. 146.
XIV	Gaine, No. 8.
XV	„ No. 9.
XVI	Fuze, Percussion, No. 101E.
XVII	„ Time, No. 79.
XVIII	{ „ „ and Percussion, No. 80.
	{ „ „ No. 80/44.
XIX	{ „ „ and Percussion, No. 88.
	{ „ „ No. 183.
XX	„ „ No. 197.
XXI	„ „ No. 199.

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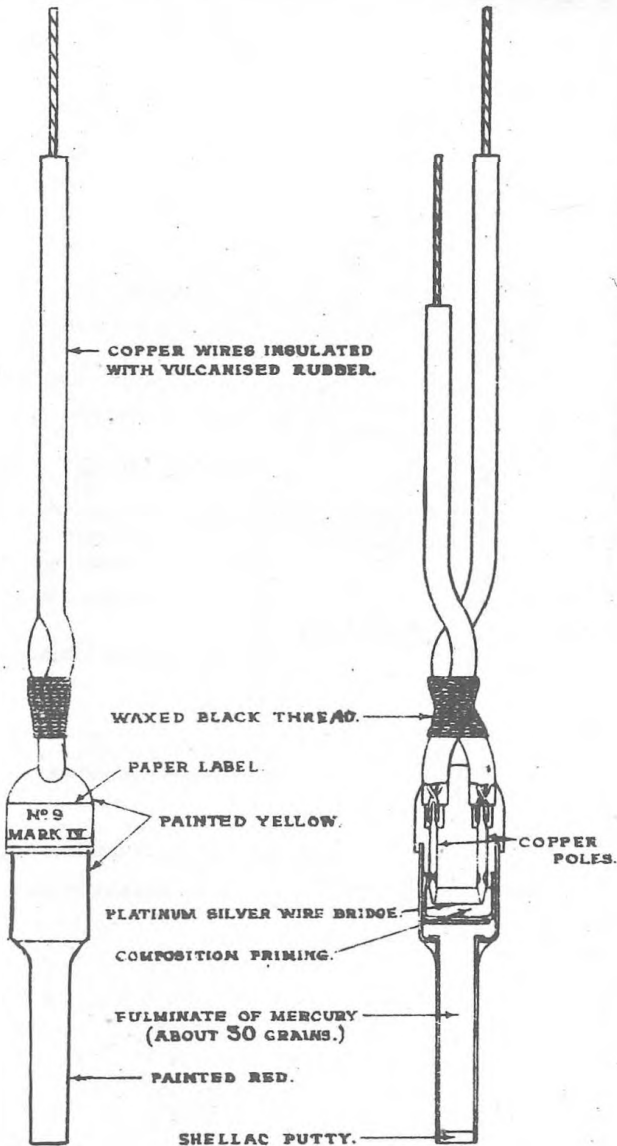
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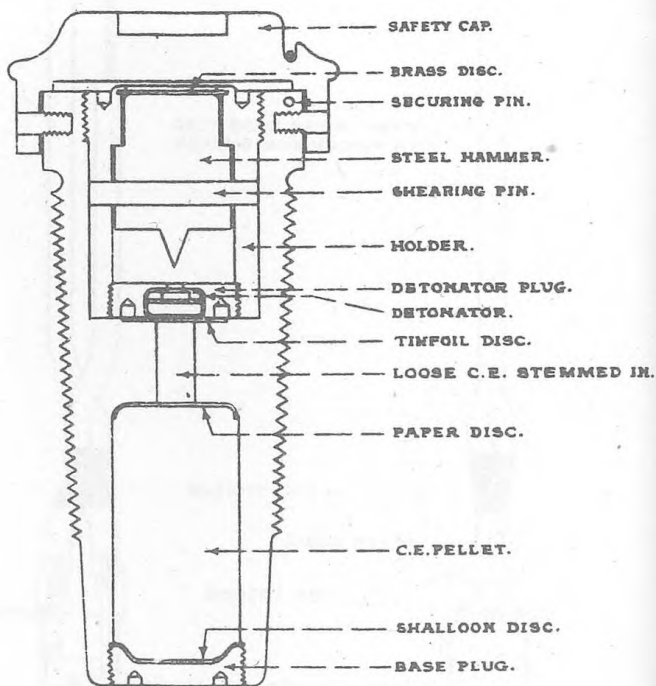
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PLATE I.

DETONATOR, ELECTRIC, N° 9. MARK IV.

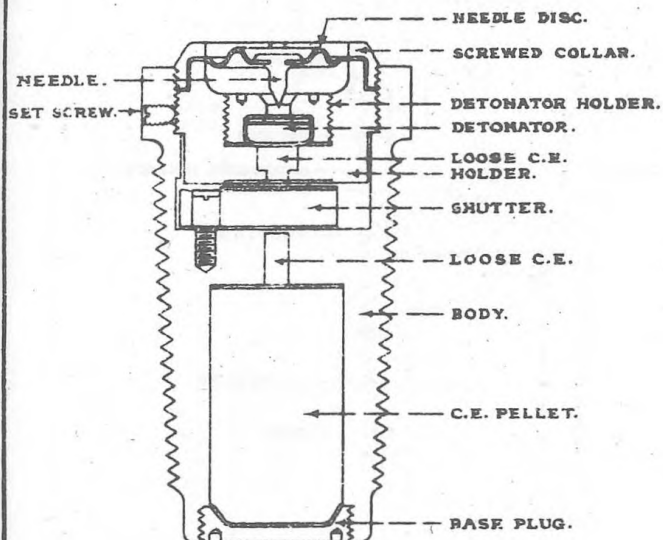


FUZE, PERCUSSION, D.A. IMPACT N° 18 MARK II.

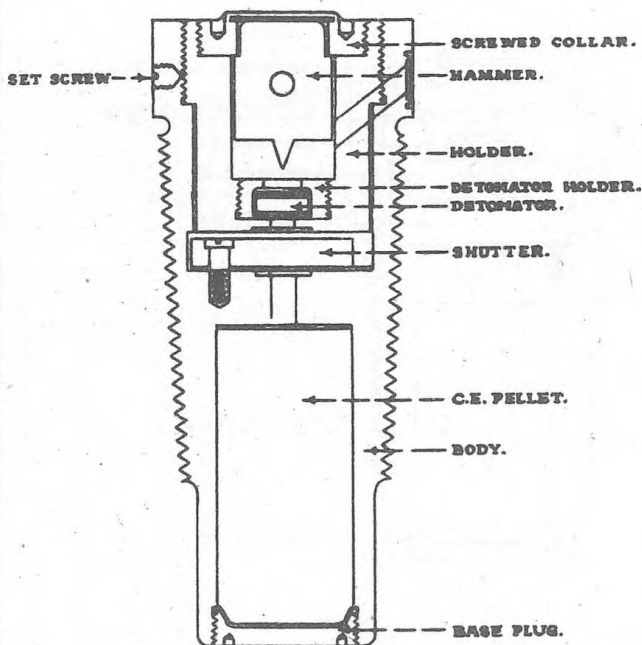


FUZE, PERCUSSION, D. A. N° 44 MARK X.

(TYPICAL)

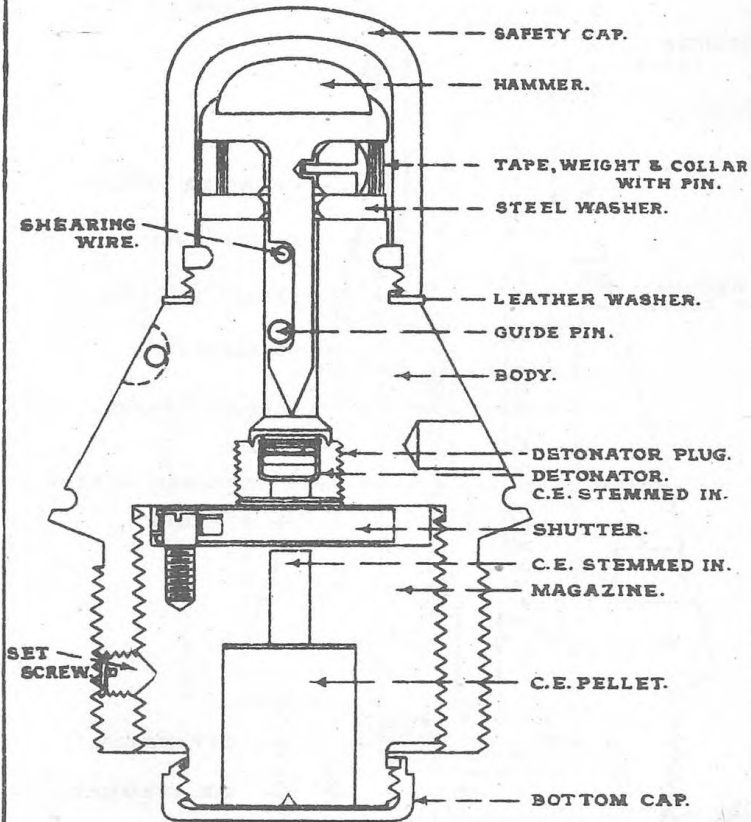


FUZE, PERCUSSION, D.A. IMPACT, N° 45 MARK IX.

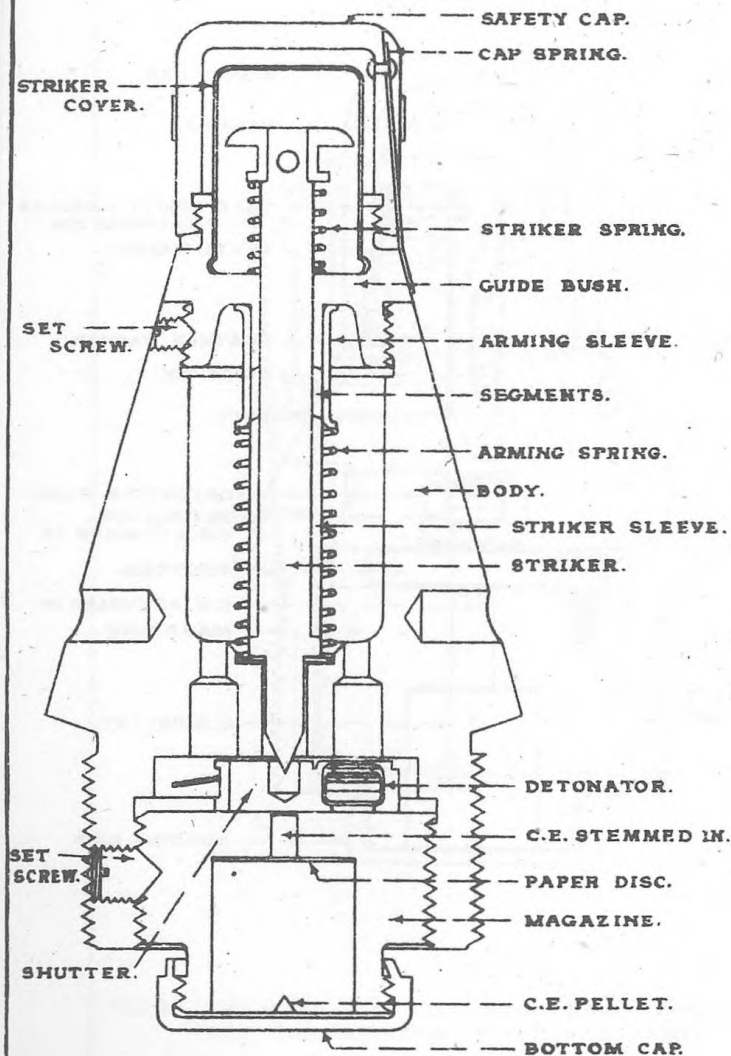


NOTE:- THE N° 45 F FUZE IS SIMILAR MECHANICALLY BUT HAS THE MAGAZINE FILLED GUNPOWDER.

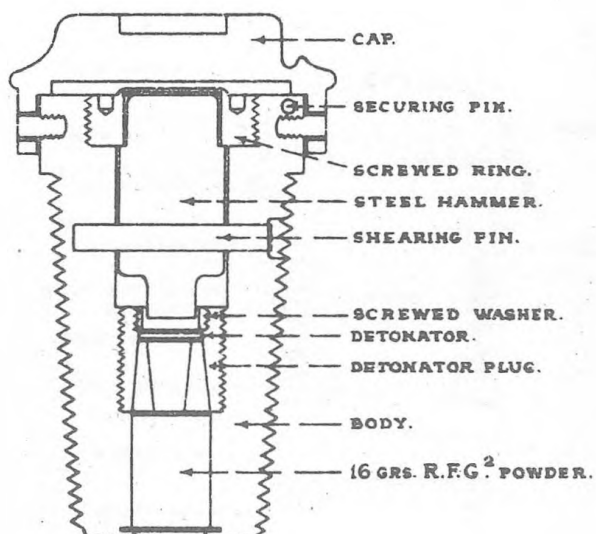
FUZE, PERCUSSION, D.A. N° 106 E, MARK VII.



FUZE , PERCUSSION, D.A. N°117 MARK III Z.



FUZE , PERCUSSION , D.A. IMPACT, N° 13, MARK IV.



FUZE, PERCUSSION, D.A N°132 MARK VI.

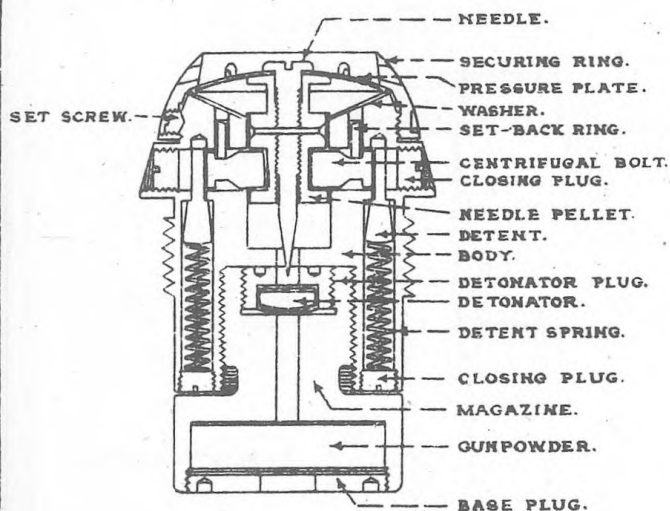
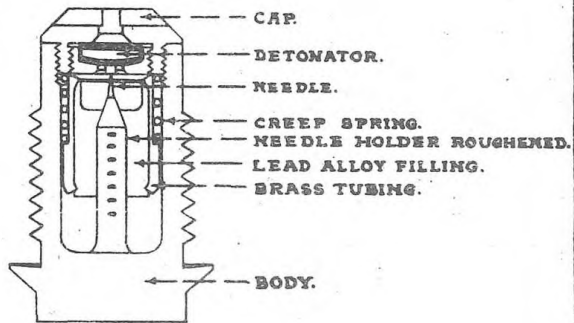


PLATE IX.

FUZE, PERCUSSION, BASE, HOTCHKISS, MARK I.



FUZE, PERCUSSION, BASE, LARGE.

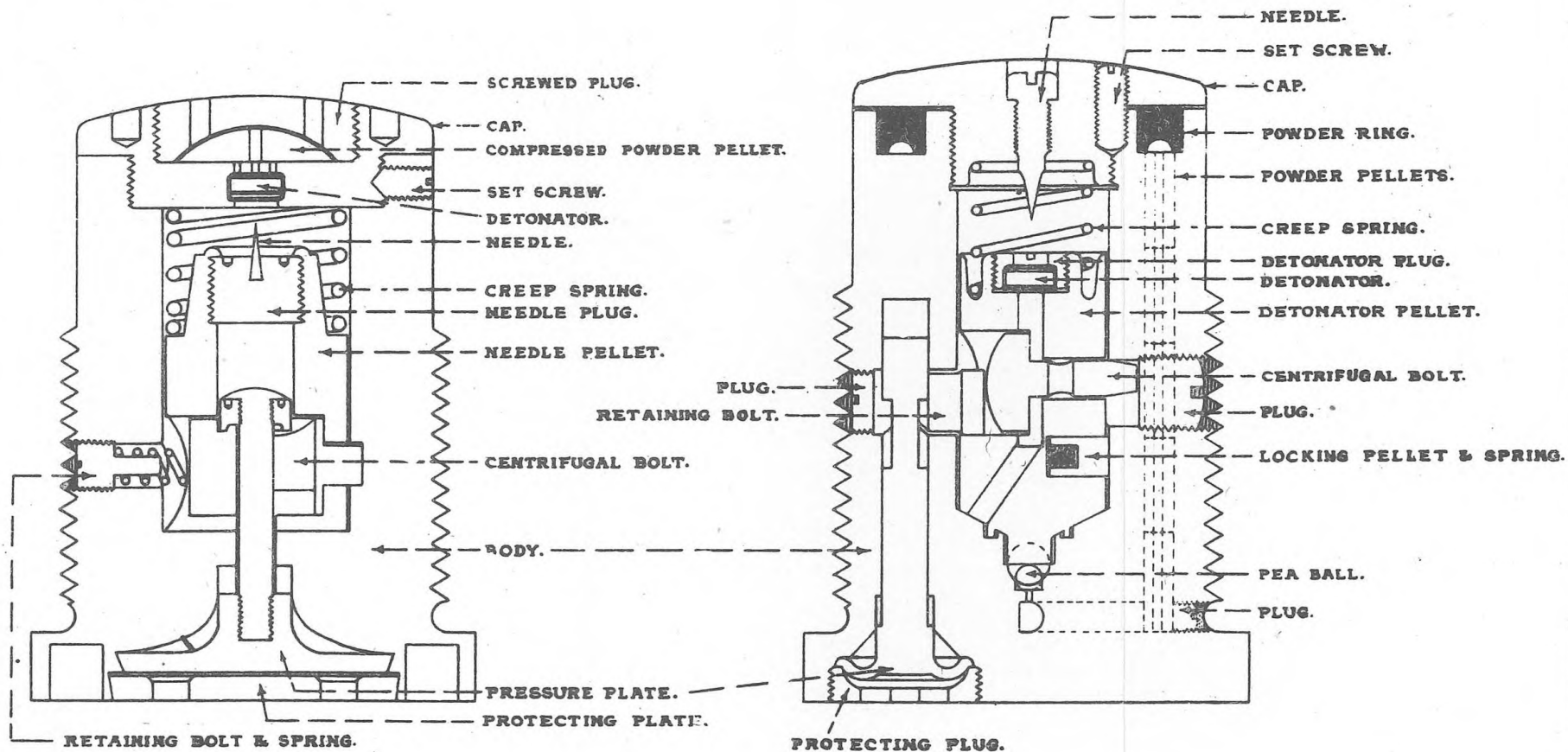
Nº 11 MARK I* & II*.

Nº 11 " IV.

Nº 15 " I.

Nº 11 MARK VI.

Nº 15 " V.



FUZE, PERCUSSION, BASE, MEDIUM.

Nº 12 MARK XI.

Nº 12 MARK V.

Nº 12 MARK VI.

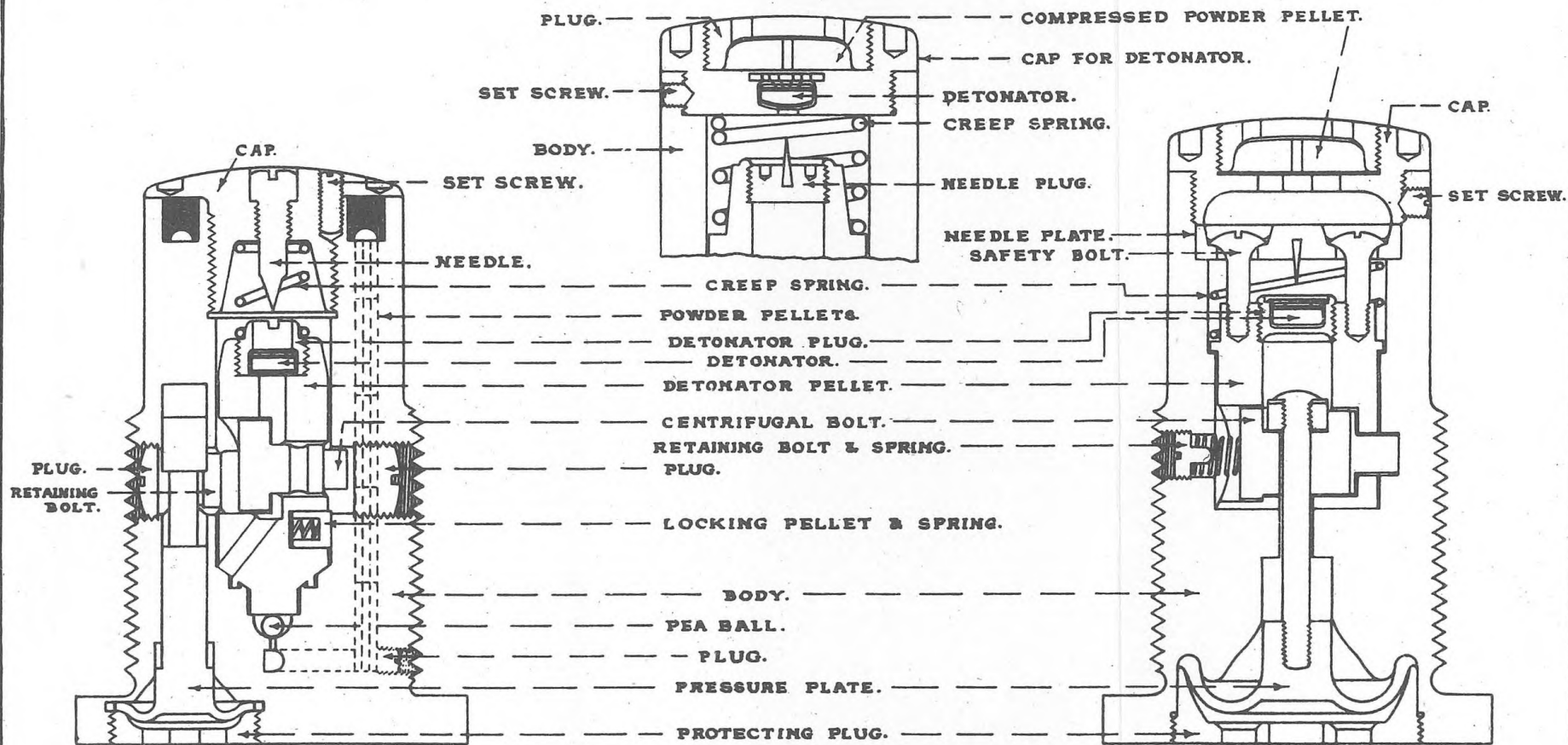
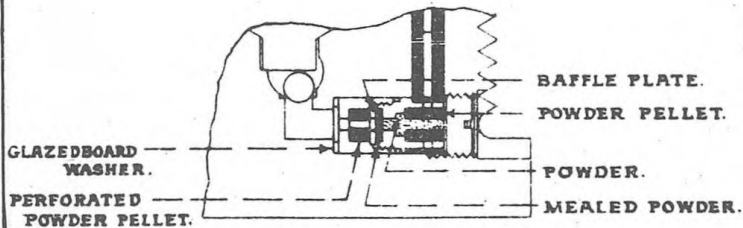
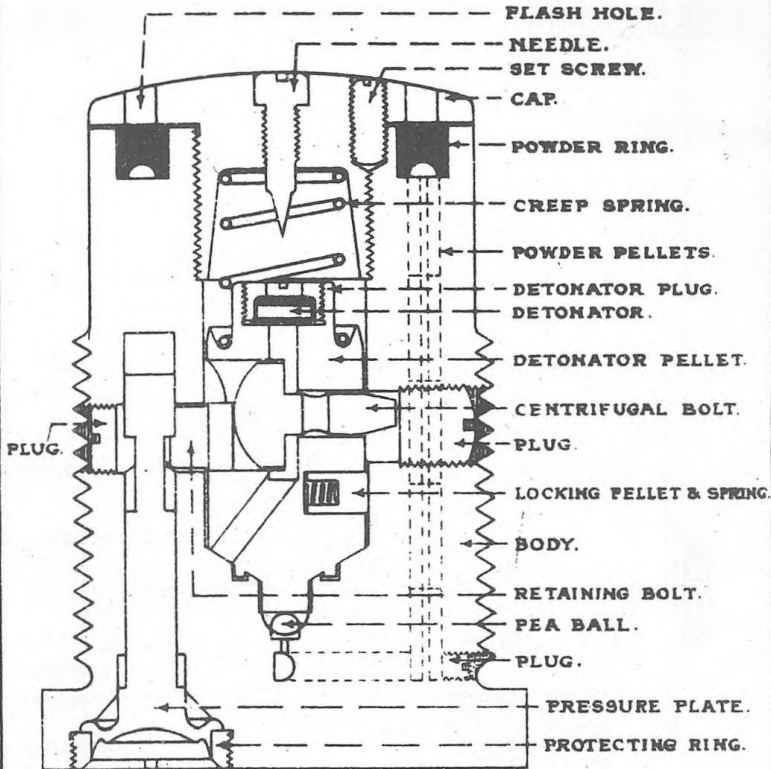


PLATE XII.

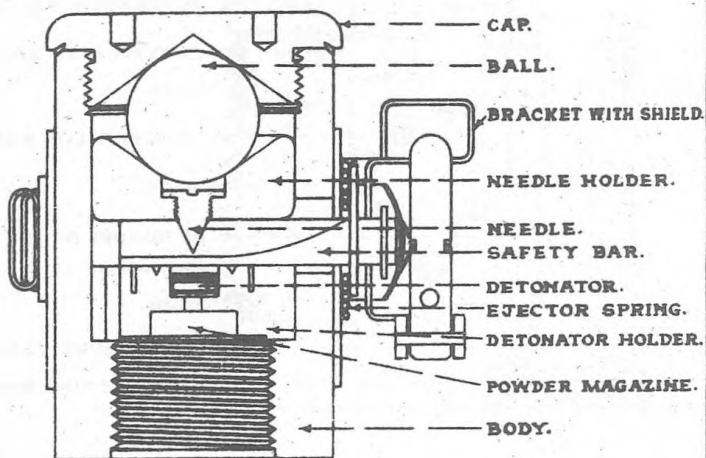
FUZE, PERCUSSION, BASE, LARGE N°16 & 16^D MARK IV



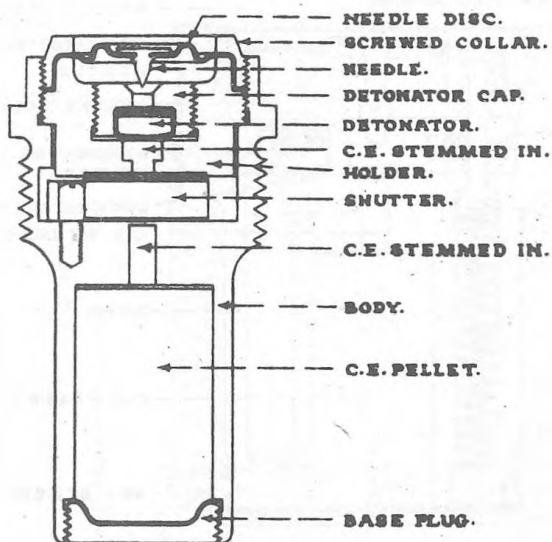
VIEW SHOWING DELAY.

PLATE XIII.

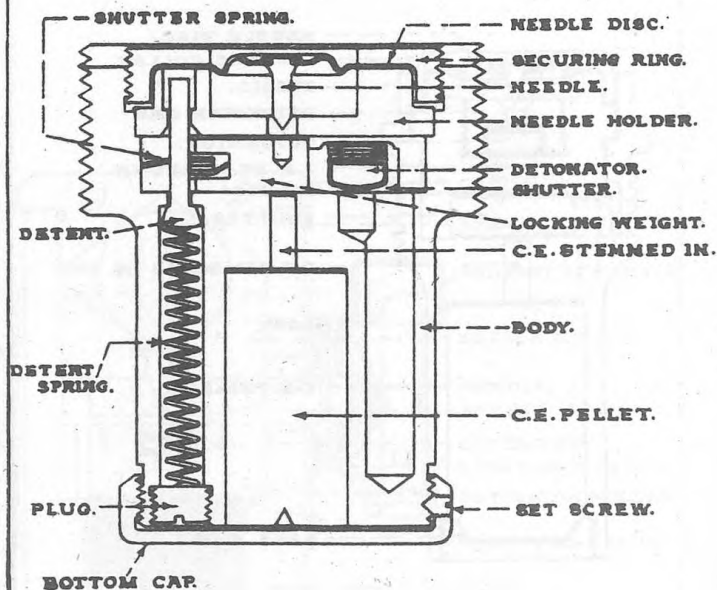
FUZE , PERCUSSION, SPIGOT, № 146. MARK V.



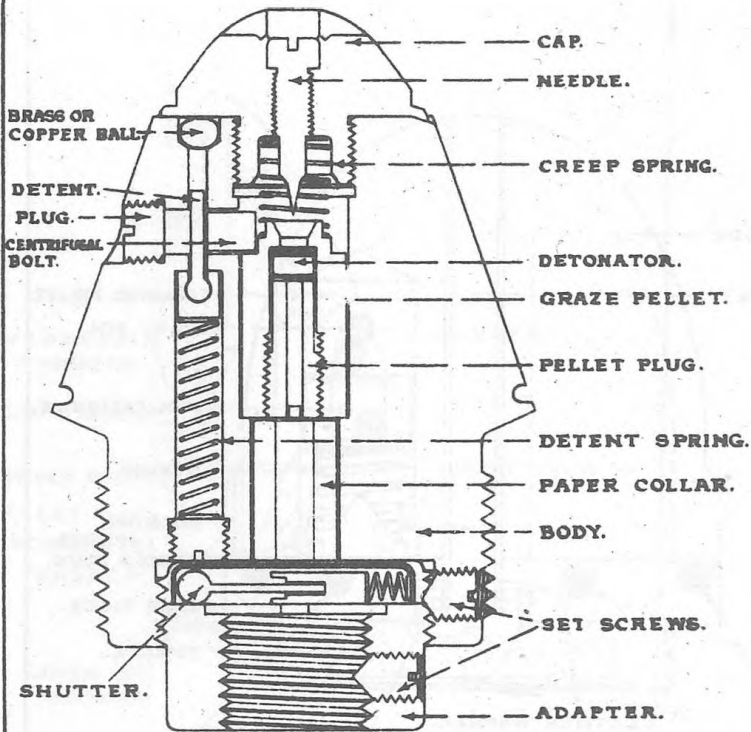
GAINE, N° 8. MARK V Z.



GAINE N° 9, MARKS II & II Z.



FUZE, PERCUSSION, N° 101 E, MARK II.

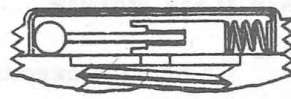


"D" SHUTTER.



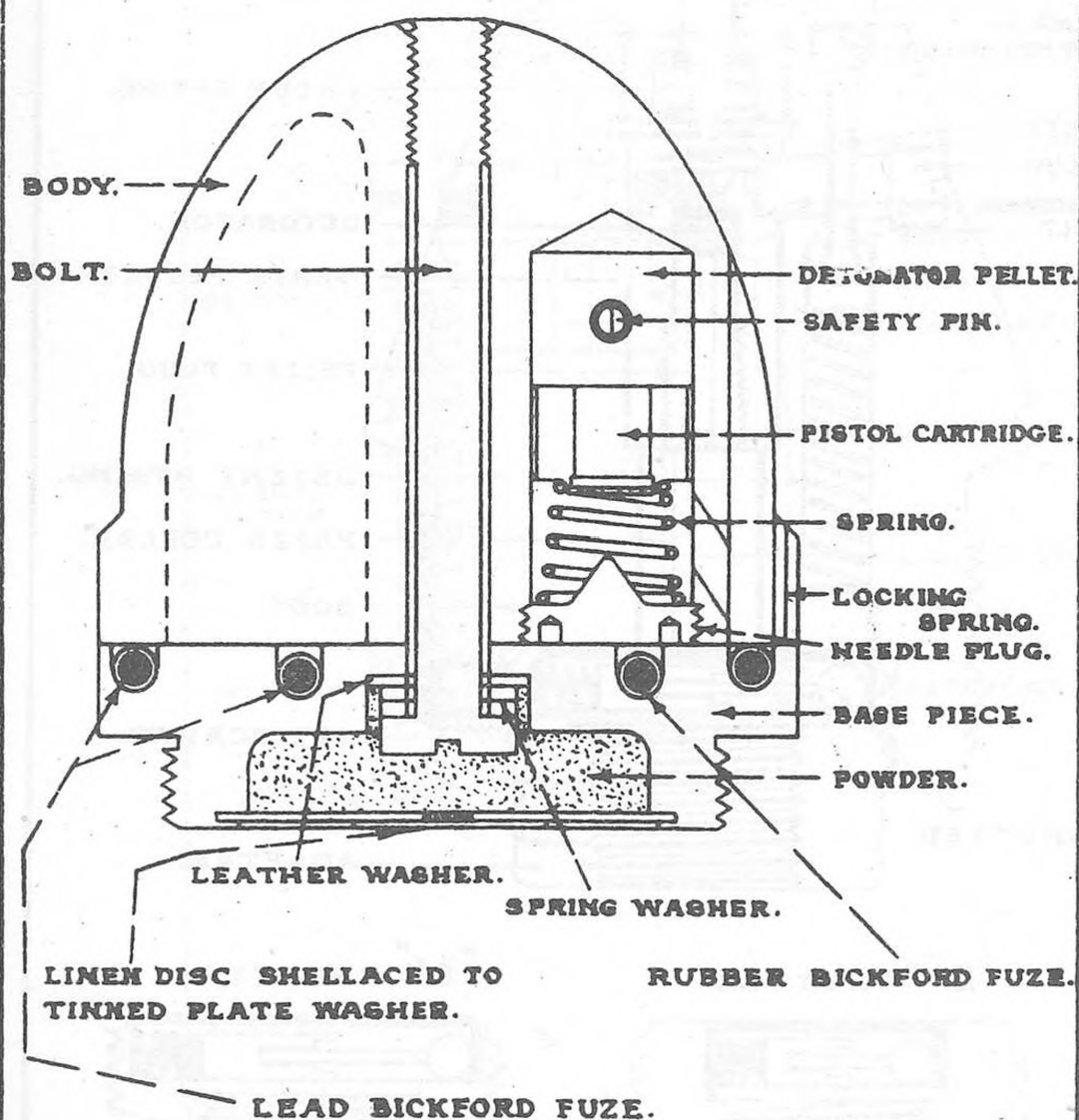
FITTED TO MARK II.

"M" SHUTTER.



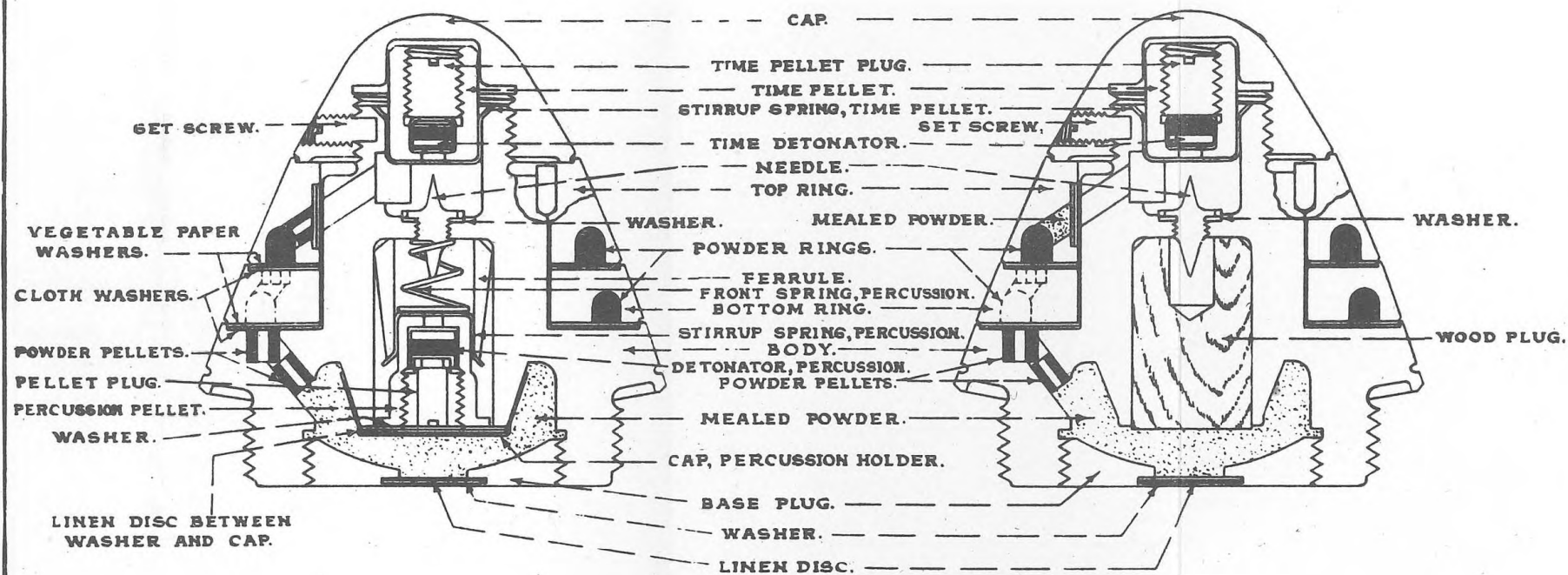
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FUZE, TIME, N° 79, MK. II.



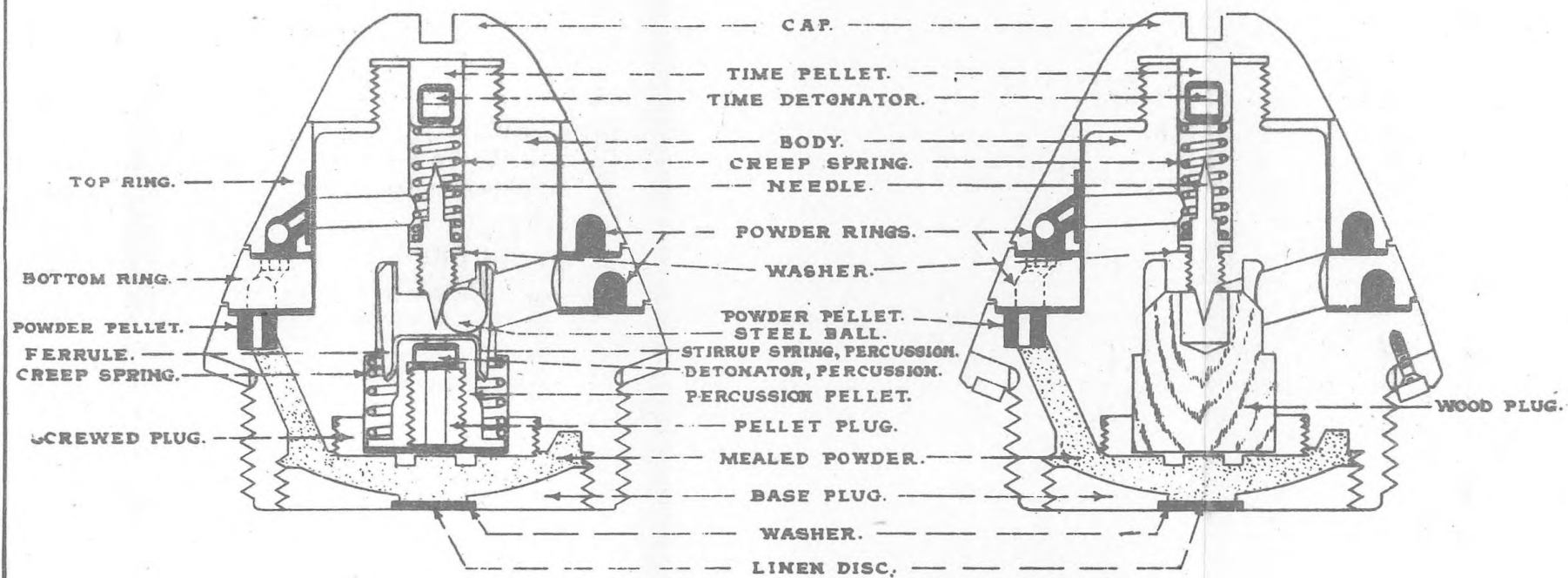
FUZE, TIME & PERCUSSION,
Nº 80, MARK XI.

FUZE, TIME,
Nº 80/44 MARK XII.



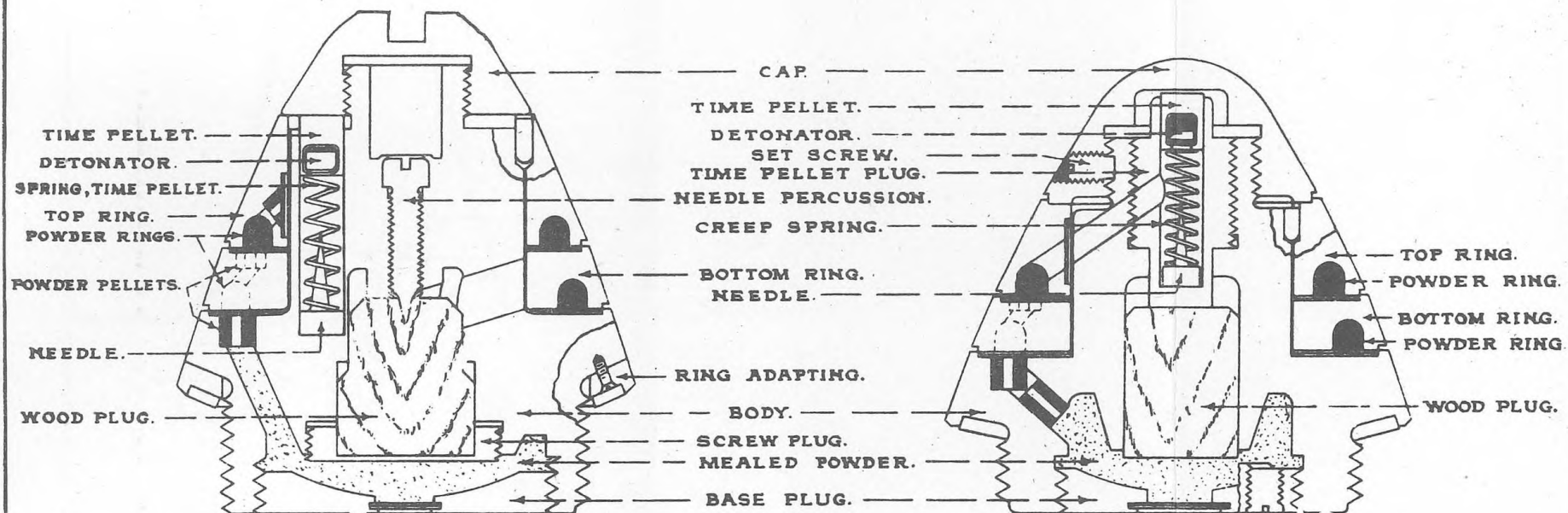
FUZE, TIME & PERCUSSION,
Nº 88, MARK VI.

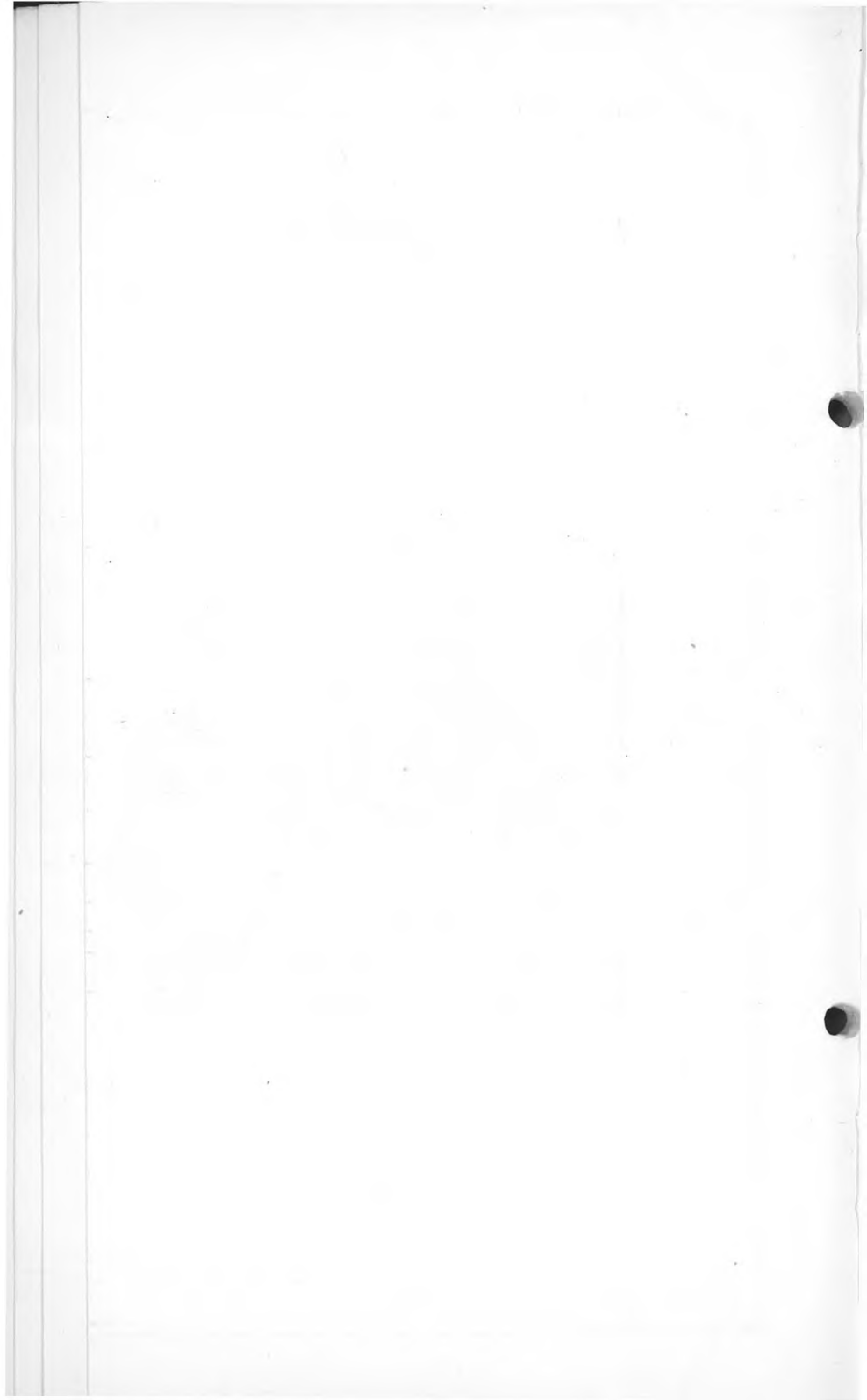
FUZE, TIME,
Nº 183, MARK VI.



FUZE, TIME,
Nº 197 MARK I.

FUZE, TIME,
Nº 197 MARK II.





FUZE, TIME, N°199 MARK I.

