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REGULATIONS
FOR
ARMY ORDNANCE SERVICES

PART II

PAMPHLET No. 1

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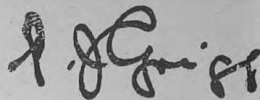
1933

PROJECTILES

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By Command of the Army Council,



THE WAR OFFICE,
October, 1941

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REGULATIONS FOR ARMY ORDNANCE SERVICES, PART II

PAMPHLET No. 1

PROJECTILES

SECTION I

SCRAPING AND REPAINTING

NOTE.—Before scraping projectiles an accurate record is to be made of all the painted and stencilled markings found thereon in order that they may subsequently be correctly reproduced.

A. SHOT AND EMPTY SHELL

1. Shot runs and trestles are to be provided for all working parties employed in scraping, cleaning, and painting empty shot and shell. If shot runs are not available, suitable materials, such as stout wooden planks, will be supplied in order that the work may be properly carried out.

2. Fuze-hole plugs will first be removed from the shell, examined for condition and replaced as necessary. Certain shell in the Service have a washer under the fuze-hole plug. In all cases the washer is to be discarded.

3. The interior of the shell will then be examined visually for corrosion and condition of varnish and searched, but not scraped, by some responsible person with a copper scraper * (tinned copper for H.E., ordinary copper wire for powder-filled shell) to ascertain if they contain any explosive.

4. Shell found to contain traces only of explosive matter will be removed and washed out with repeated washings of hot water. Shell found initially to contain an appreciable

* To be made up locally from wire of suitable gauge.

quantity of explosive matter will be replugged, segregated, and subsequently dealt with as " Filled " shell (*see below*).

5. The interior of shell will *not* be scraped, but the shell will be inverted to ensure freedom from water, loose grit, etc. If water has been used the interior will then be dried out.

6. The shot or shell are to be thoroughly scraped externally with the scrapers and rubbed with the scratch cards provided, in order to remove all old paint, dirt, rust, grease and grit, and are finally to be wiped with clean dry rags. Particular care must be taken throughout these operations not to damage the shell driving band, and damaged grumets are to be replaced as necessary.

7. After scraping is completed, armour piercing and common pointed shell, capped and uncapped, will be examined as detailed in paras. 84, 85 and 94 (so far as these paragraphs apply to empty shell).

8. The fuze-holes of all shell will be thoroughly cleaned by means of cotton waste lightly moistened with turpentine, and the plugs lubricated as laid down in paras. 147 to 154, reinserted and screwed home.

9. Paint prepared for use, and varnish, will be obtained from R.A.O.C. on demand in accordance with Equipment Regulations, the demand stating the purpose for which they are required.

10. A detail of the correct paints required for the body coats and distinctive markings will be found in R.A.O.S., Part I, 1929, Appendix XXV (c).

11. Before use the paint is to be well stirred ; if it is found too stiff to work freely under the brush it must be thinned by the addition of a suitable quantity of " Turpentine, lead-free."

12. The shell are to be completely clean, free from oil and grease, and dry before any paint is applied ; suitable cover must be provided for them during the process of painting.

13. (1) The shell are to be painted with two coats of paint, the second not being applied until the first has set thoroughly dry and hard.

(2) The first and second coats for the shell body are to be applied by brushing evenly over the whole exterior surface of the shell, including the fuze-hole bush or socket and plug, but driving bands must in all cases be left clean and free from paint.

14. Tips, rings and other distinctive markings will be painted with one coat only over the second body coat when the latter has dried hard.

15. After painting, all shot and shell will be gauged with the appropriate "over paint" gauges and any not correct to gauge set aside to be scraped and repainted.

B. FILLED SHELL (Except Fixed Ammunition)

16. The painting of filled shell will be carried out in a building or tent to which Magazine Regulations will apply, and under the supervision of an officer, master gunner, ammunition examiner, or such other person as the I.O.O. may certify to be duly qualified.

17. (1) The shell will be dealt with in a similar manner to "Empty" shell, but will first be examined to ascertain that the plugs or fuzes are secure. The latter must not on any account be removed.

(2) No other work is to be carried on in the room where shell are being scraped and repainted, except in the case of filled-shell stores in R.A.O.C. charge, where, if space permits, a portion of the store may be specially set aside as a scraping and painting room.

18. Normally the number of men employed as a gang in scraping and repainting should not exceed eight; if, however, the I.O.O. is satisfied that the *circumstances and accommodation* justify the use of a larger number of men, he may authorize the employment of a second gang of eight.

For particulars of paint, etc., see paras. 9-14.

19. After the second body coat of paint has dried hard, care must be taken to renew all the painted and stencilled markings which were on the shell prior to scraping (and such markings should be renewed whenever they are subsequently becoming illegible). Reference should, however, be made to the current approved markings on shell (see R.A.O.S., Part II, Pamphlet No. 3), and where these differ from those on the shell actually under repair, the markings on the latter should be brought up-to-date. If the "date of filling" marking cannot be deciphered, the date of the shell (year only), which is stamped on the shell, should be substituted. (With regard to "weight markings" on shell, see paras. 102 and 103.)

20. All shell that have actually been examined and/or repaired *internally* will be stencilled—

"EXD." and date and monogram of station.

Particulars of the latest examination only need be renewed.

C. FIXED AMMUNITION

22. The scraping and repainting of shell in Q.F. Cartridges will be carried out as a laboratory operation (*see* R.A.O.S., Part II, Pamphlet No. 11), and under the supervision of an officer, master gunner, ammunition examiner, or such other person as the I.O.O. may certify to be duly qualified.

23. (1) The shell will be dealt with in a similar manner to "Empty" shell, but will first be examined to ascertain that the plugs or fuzes are secure; the latter must not on any account be removed.

(2) Normally the number of men employed in a gang in scraping and repainting will not exceed eight; if, however, the I.O.O. is satisfied that the *circumstances and accommodation justify* the use of a larger number of men, he may give the necessary authority.

24. (1) Old paint will be removed with a scraper and rust with emery cloth or scratch card. If necessary the rusty part may be cleaned with a cloth moistened with the minimum amount of turpentine and then carefully wiped with a clean, dry cloth.

(2) No other work is to be carried on in the room where shell are being scraped and/or repainted.

(3) The cartridges will then be passed to the inner room of the laboratory for painting where the shell body, excluding the driving band, will be painted, and all necessary markings renewed.

For particulars of paints, etc., *see* paras. 9-14.

25. After all paint and renewed markings have set thoroughly dry and hard the shell are to be gauged with the appropriate "over paint" gauge and the complete round will also be gauged in the "low chamber" gauge, and, if found correct, passed to the outer room to be repacked; the box will be stencilled "REPD." with the date and monogram of station."

26. (1) When carrying out the foregoing operations all the necessary laboratory precautions are to be observed. No greater number of complete rounds should be exposed at any time than is necessary to ensure that the paint is thoroughly dry before packing, and in no case should the number of exposed rounds exceed 200 (300 in the case of 3 and 6-pr.).

(2) **Safety clips must never be removed from complete rounds unless it is absolutely necessary** (*e.g.*, if the base of the cartridge requires re-stencilling), and, if removed, they must be replaced at the earliest opportunity. Rounds from which clips have been removed must be placed on a separate bench and every precaution taken to avoid packing an "unclipped" round.

D. MORTAR BOMBS AND H.E. GRENADES

27. These stores, if found painted, will be dealt with on the same lines as for "empty" or "filled" shell respectively. The guides and propellant containers of mortar bombs will be cleaned bright and smeared with mineral jelly.

28. Mortar bombs, if found coated with copal varnish, stoved, will, if the varnish has become broken or chipped, be treated as follows :—

- (a) Empty bombs will be sentenced "Repairable, to be cleaned and re-varnished";
- (b) Filled bombs will be cleaned by means of a scraper or emery cloth and coated with "Varnish for the exterior and bases of shell."

29. Grenades which have been lacquered or rustproofed by any process will, if found rusty, be treated as follows :—

- (a) Empty grenades will be sentenced "Repairable, to be cleaned and re-rustproofed";
- (b) Filled grenades will be cleaned and coated with "Varnish for the exterior and bases of shell."

30. Care must be taken during these processes not to disturb the mechanism of any filled bombs or grenades (*see also* Sections VI and VII).

SECTION II

EXAMINATION OF FILLED SHELL

GENERAL

31.—(1) An inspection of filled shell will be made annually. One per cent. of each nature of shell will be opened and internally examined (*but see also* Pamphlet No. 2 regarding Q.F. Ammunition).

If in carrying out this internal examination, defects are found in shell of a particular type and date of filling, etc., a further 4 per cent. of these shell will be examined and, if further defects are then found, the shell concerned must *all* be examined.

(2) In the event of any serious deterioration in shell fillings which, in the opinion of the I.O.O., renders the stores dangerous, particulars, including the type of shell, date of filling and number of rounds involved, will be reported at once, *by telegram*, to the Chief Inspector of Armaments, Royal Arsenal, Woolwich, S.E.18, and the shell concerned will be isolated pending instructions.

(3) For handling shell of the larger calibres the tackle referred to in para. 106 and the appropriate shell-holder should be used.

(4) Instructions for "Closing" shell after examination are contained in Section IV.

32. It is particularly important, especially where shell are provisionally sentenced "Unserviceable," that the "Report of Inspection" should contain a full and accurate record of all the stencilled markings (*e.g.* Method of Filling, Design No., Lot No. of exploders, etc.), and the relevant circumstances.

33.—(1) All shell that have actually been *internally* examined and/or repaired will be stencilled—

"EXP." and date and monogram of station, such particulars replacing those of any previous examination.

34. Boxes containing shell which have been examined and/or repaired will be similarly marked.

35. The examination of filled projectiles will, whenever possible, be carried out in the inner room of a laboratory. Where no laboratory exists, however, a building or tent situated at a safe distance from the magazine, or explosive stores, may be used, and "magazine conditions" must be observed as far as possible (*see* Magazine Regulations).

36. The number of plugged or fuzed shell allowed in the inner room of the laboratory at one time must not exceed the following limits :—

Shell, unboxed	Under examination	Awaiting examination
8-in. and upwards	1	1
4·7-in. and under 8-in.	2	2
Under 4·7-in.	4	4
Q.F. cartridges or shell in boxes ..	1 box	1 box

The number of shell in the outer room should normally not exceed double the number in the inner room.

EXTERNAL EXAMINATION

37. Before internal examination, filled shell are to be visually examined externally to ascertain if :—

- (a) they are free from rust ;
- (b) the paint, including markings, is in good condition ;
- (c) the driving bands are corroded or damaged ;

- (d) plugs are of the correct type and current Marks (*vide* Appendix VIII);
- (e) they are of current design and correctly marked (*see* R.A.O.S., Part II, Pamphlet No. 3).

In all cases the external condition of the shell and the percentage examined will be recorded on the "Report of Inspection." If defects are found which are beyond local repair a recommendation as to subsequent action should be made.

38. Where shell, or the fuzes or plugs in shell, are found corroded or damaged the procedure will be as follows:—

- (a) Shell with damaged body, loose base plate, or driving band loose or damaged beyond local repair will be plugged (if fuze) and recommended for return to C.O.O., Woolwich, as "beyond local repair."
- (b) Shell (**other than Lyddite**) with driving band slightly damaged may be repaired locally by setting up with a hammer and chisel and cleaning up with a file. **If fuze, the shell must first be plugged before this repair is undertaken.**
- (c) Shell with plug set fast, or so damaged that it cannot be extracted on the spot, and shell with fuze set fast or so damaged that in the opinion of the I.O.O. it would be unsafe to attempt to extract it, will be provisionally sentenced "Unserviceable."
- (d) Damaged or corroded plugs will be replaced by plugs of the latest approved pattern (*see* Appendix VIII).

39. Shell found with protruding base plates, or in the case of H.E. base-fuzed shell, with protruding base adapters, will be provisionally sentenced "Unserviceable."

SPECIAL PRECAUTIONS AT INTERNAL EXAMINATION

40.—(1) Shell fuze with the No. 106 type fuze in which the wire securing the safety cap is found broken are to be put aside and dealt with as laid down in R.A.O.S., Part II, Pamphlet No. 4, 1933, Appendix I.

(2) No undue force is to be used in opening shell, and only service keys may be used (except as provided in the "Note" to sub-para. (4)).

In the extraction of exploders or primers, shell are not on any account to be up-ended or knocked with a mallet (save as specified in the relevant sub-sections below).

(3) In the case of H.E. shell fitted with the No. 44/80 fuze, extraction of the No. 44/80 fuze with adapter from the shell is to be carried out under precautions (*see* under), as it may have become corroded.

In Amatol-filled shell this corrosion usually takes the form of blue crystals on the exposed portion of the thread of the fuze, the underside of the adapter and on the bottom of the fuze. These salts are sensitive to friction or shock (*see* para. 64).

If no corrosion is apparent, the adapter and fuze may be removed separately.

If, however, corrosion is found, the adapter and fuze must be removed as a whole; should this not be possible, owing to the fuze pins masking the keyholes in the adapter, the shell concerned will be provisionally sentenced "Unserviceable."

(4) Owing to the possibility of rusting of steel gages, when fitted in Amatol-filled shell, their removal from such shell will invariably be carried out by one operator working "under precautions."

NOTE.—"Under precautions" implies the provision of a traverse between the operator and the shell sufficient to protect the operator in the event of an explosion. A design of a form of apparatus which can be locally improvised suitable for defuzing "under precautions" is held by the Chief Inspector of Armaments, Woolwich, from whom a copy can be obtained direct on demand.

(5) All persons when carrying out internal examination of shell containing an explosive filling of Trotyl, or an explosive containing more than 5 per cent. of Trotyl, or of shell fitted with Trotyl or C.E. exploders, will, as far as possible, observe the "rules and precautions for T.N.T. workers" as laid down in R.A.O.S., Part II, Pamphlet No. 10. In any event the conditions of Pamphlet No. 10, 1934, para. 91, sub-para. (a), (b), (c) and (f), should be observed.

EXPLODERS

41.—(1) Exploders requiring removal will normally be removed by means of the "Tongs" or "Hook, extracting exploders" (*see* Appendix I).

(2) When shell are found to contain Picric Powder exploders, the exploders will be removed and dealt with as detailed in para. 48.

(3) Trotyl or C.E. exploders will, however, not be removed for examination unless the filling appears to be broken or exuding, or the exploder bag is torn or otherwise defective.

It will frequently be found that these exploder bags are stained pink, brown, or purple, owing to contact with Trotyl or Amatol. This staining is not in itself detrimental and does not normally justify an "Unserviceable" sentence, except in the case of Trotyl exploders, where the staining may be due to "exudation" (*see* para. 61 *et seq.*).

(4) Where the lower exploder has been compressed in place, it cannot, in general, be removed by the normal methods. If, however, on lifting out the upper exploder or removing the plug, the lower exploder is seen to be in bad condition it may, *if of Trotyl*, be extracted by the special method detailed in Appendix V.

C.E. or Picric Powder exploders or any type of exploder in Lyddite or shellite filled shell must, however, *not* be extracted by this method and any such exploders in bad condition, which cannot be removed by the "Tongs," "Hook," or "Pump extracting explosives" (*vide* Appendix II), must be left *in situ* and the shell concerned provisionally sentenced "Unserviceable."

(5) If exploders are removed, the filler, Lot No., and condition of the bags will be recorded on the "Report of Inspection," and any found damaged or expended in test will be replaced by serviceable ones.

A. H.E. SHELL

GENERAL INSTRUCTIONS

42. The following types of filling may be met :—

(a) Solid filling.

Space below fuze-hole filled—

(i) Bags of batiste filled Trotyl. *See Plate I, R.L. 16693.*

(ii) Compressed pellets of picric powder in bag (one or more 7-dram P.P. exploders, to fill up space after the bag has been choked, may be found in some shell). *See Plate II, R.L. 16992A.*

(b) Short cavity. *See Plate III, R.L. 20844B and D.D. (L) 861.*

(i) 3·65-in. cavity with one 5-dram or two 3- or 5-dram Trotyl exploders.

(ii) 3·65 in. from top of adapter or G.S. fuze-hole to bottom of cavity, with one 5-dram P.P. exploder.

NOTE.—These types are suitable only for G.S. fuzes.

(c) Cavity 6·2 in. deep (from top of 2-in. fuze-hole) with one 1¼ or 1½-oz. trotyl exploder. *See Plate IV, R.L. 22222, 22223, and 23929.* Normally Picric Powder exploders are fitted, if the shell are for use in fixed armaments, with powder-filled fuzes. Some shell, however, may be found in which the

P.P. exploders have been replaced by two Trotyl or C.E. exploders, and these are equally suitable for use in fixed armaments with powder-filled fuzes.

(d) **Cavity 6.2 in. deep** but fitted with—

- (i) Trotyl pellet at bottom and one "C" exploder. *See Plate V, R.L. 23865A.*
- (ii) One "A" exploder. *See Plate V, R.L. 23865A.*

In each case the exploder is compressed in the cavity until the top of it is 3.85 in. from the top of the fuze-hole.

- (iii) Alternatively (*see Plate VI, R.L. 23894C and 27222A*), shell may be fitted with steel exploder containers, having either exploders as at (i) or (ii), or loose Trotyl pressed into the container and retained by a tight-fitting millboard disc. In this case the depth to the top of the exploder is 3.85 in.

(e) **Cavity 5.6 in.** (from top of 2-in. fuze-hole), fitted with one "C" exploder as at (d) above. *See Plate VII, R.L. 23929A and Plate VIII, R.L. 24018 AND R.L. 24539.*

NOTE.—When shell with G.S. fuze-hole are filled to this method, or that in (d) above, the cavity is filled with two exploders.

(f) **Repaired cavities.**—Shell having cavities originally as at (d) (i) or (ii) or (e) may be found repaired as in *Plate IX, D.D. (L) 4976.*

(g) **Burster container design.** *See Plate X, R.L. 27924A.* Plugged filled shell to this design have no exploder in the cavity.

(h) **Shell fitted with No. 9 Gaine and 26-dram Pellet exploder.** *See Plate XI, D.D. (L) 4052.*

(j) **Anti-aircraft shell.**

- (i) *Shell taking fuze No. 44/80 in Adapter No. 9 under time fuze. See Plate XII, R.L. 25529A.*

The depth from the bottom of the fuze-hole to the top of the compressed exploder is 1.8 in.

- (ii) *Shell taking Gaine No. 8 in Adapter No. 16 under time fuze. See Plate XIII, D.D. (L) 4153 and R.L. 26947.*

The depth from bottom of fuze-hole to top of compressed exploder is 1.88 in.

43. A list of stores required for use in the examination of H.E. shell (and for testing Picric Powder exploders) is contained in Appendix I.

44. Where exploders have been removed from non-exploder container type shell an examination will be made of the cavity. Minor defects, such as chips or small cracks, may be ignored, provided that it is possible to reinsert the exploder without further damage to the filling.

45. "Permissible" repairs for damaged shell fillings are given under their respective sub-headings. Any found damaged beyond local repair will be provisionally sentenced "Unserviceable."

H.E. SHELL FILLED LYDDITE

46.—(1) The "General Instructions" of paras. 31 to 45 are to be observed wherever applicable to this particular type of shell.

(2) All plugged Lyddite shell must be fitted with "lead-free" plugs (*see* Appendix VIII).

(3) Any shell found with damaged driving band will be provisionally sentenced "Unserviceable."

47.—(1) If in the operation of withdrawing an exploder it becomes so torn that it cannot be removed by any of the methods detailed in para. 41, the shell will be sentenced "Unserviceable." Further shell of the same batch will then be opened and examined until the requisite 1 per cent. has been obtained.

(2) If difficulty is experienced in the extraction of 7-dram exploders from "solid filled" shell, the "Pincers removing H.E. shell exploders" may be used instead of the "Tongs" (*see* Appendix I).

48. Moisture testing of Picric Powder exploders.

(1) Exploders will be tested as follows :—

- (a) The contents of the exploder bag will be emptied into a glass-stoppered bottle and turned over several times so as to ensure thorough mixing.
- (b) Heat a pair of watch-glasses in a water oven for 30 minutes at 120° F., cool for a like period, and weigh the pair of glasses (without their clip).
- (c) Leaving the glasses on the balance pan, weigh accurately 100 grains of the powder into the uppermost glass.
- (d) Note the total weight of glasses plus powder.

- (e) Remove the glasses from the balance, place them in the oven with the empty glass over, but not wholly covering the glass containing the powder, and heat them for $1\frac{1}{2}$ hours at 120° F.
- (f) Take the glasses from the oven, by means of the clip secure the glasses firmly together so that one covers the other, and allow the pair to cool for 30 minutes.
- (g) Remove the clip, and re-weigh the pair of glasses plus powder.

(Then the difference between the weights at (d) and (g) represents the percentage of moisture.

- (2) Any exploder showing a moisture content of 0.5 per cent. or less will be considered serviceable.

49. A Cylinder No. 6 (*see* Appendix I) is to be used for carrying exploders, and cylinders must be thoroughly cleaned by means of a piece of clean, dry rag, both before and after use. Different types of exploders must not be carried in the same cylinder.

50. Pellet exploders.

Where shell are found having compressed pellets of picric powder, the exploders will be dealt with, as follows, in the laboratory :—

- (a) Where the pellets are contained in a bag, six pellets will be removed, placed one at a time in a mortar, broken by a gentle blow with a pestle and reduced to a coarse powder by the minimum amount of gentle grinding. The amount of powder thus obtained is to be rapidly transferred to a glass-stoppered bottle.

It should be noted that as the pellets are relatively friable no great force is necessary in the grinding operation, nor need any danger be apprehended provided ordinary care is taken.

These operations must be carried out as expeditiously as possible.

- (b) The powder thus obtained, as also that from the 7-dram exploders, will be severally subjected to the "moisture test" detailed in para. 48, re-tests being made if necessary.
- (c) Broken bags will be exchanged for serviceable ones, and the same pellets, if unbroken, used again. Any pellets broken or expended in test will be replaced by others of the same lot; if this is not possible, however, all the pellets in the exploder will be exchanged for those of another lot.

- (d) Should an accumulation of serviceable pellets arise (insufficient, however, to complete an exploder), the pellets will be kept in glass-stoppered bottles under their respective lot numbers for subsequent use as replacements if required.

51. Where any exploders are found with excessive moisture content, those of the same lot in all shell of the same date of filling in the magazine or store are to be replaced.

52. When exploders of lot numbers different to those originally in the shell are inserted, care must be taken that the particulars stencilled on the shell are amended accordingly.

53. Permissible repairs.

- (a) If in shell of early dates of filling, the tamping of powdered lyddite used to rectify the length of the exploder cavity is found to have broken up, or if the powder from the primer or exploder has been spilled, the loose explosive will be removed from the shell by means of the " Pump, extracting explosives," with the requisite extra fittings (*see* Appendices I and II).

- (b) The depth of the cavity will then be gauged and adjusted if necessary to suit the exploder by means of glazedboard discs (*see* Appendix II, para. 7).

54. Care must be taken in replacing exploders that only those of the correct size are used. The length of the exploder is shown on the waterproofed paper cylinder, but where exploders without paper cylinders exist or where the marking on the paper has become illegible, the depth of the cavity must first be measured by means of the appropriate " Gauge, depth of cavity, filled H.E. shell " (Appendix I).

55. **Disposal of Picric Powder.**—Picric powder recovered from unserviceable exploders and broken pellets will be disposed of as laid down in R.A.O.S., Part II, Pamphlet No. 10.

H.E. SHELL FILLED TROTYL OR AMATOL

56. The General Instructions of paras. 31 to 45 are to be observed where applicable, particularly the " Special Precautions " given in para. 40.

57. Amatol shell, being affected by high temperatures, must not be exposed during examination to the direct rays of the sun, nor should such shell be subjected in storage to a temperature exceeding 80° F.

58. If on examination of block-filled shell, the blocks are found to be slightly cracked, the shell will not on that account be sentenced " Unserviceable " unless it is impossible to

insert plugs or fuzes (and exploders, if necessary) without causing further damage to the filling.

59. Any Amatol filled shell found fitted with brass nose bushes (but otherwise serviceable) will be segregated and used for "practice" as opportunity offers. They should be stencilled "B.B." on the base, and if boxed, the box should be so marked.

60. **Exudation.**—(a) Shell filled Amatol may be found suffering from either or both of the forms of "exudation" mentioned below, and, when so found, are to be specially treated.

(b) Trotyl-filled shell, however, are liable only to Trotyl exudation.

61. Trotyl exudation.

Trotyl and Amatol fillings are liable, especially under warm storage conditions, to give rise to an "exudation" of a brown, more or less viscous, oily fluid, commonly known as "Trotyl oil." This exudation may appear either on an exterior or interior of the shell **and is an explosive.**

62. If at visual external examination signs of exudation are observed, proceed as follows :—

(a) A very small quantity of the suspected exudation will be placed on a filter paper (5 cm. diameter), and pure acetone poured on a few drops at a time until the dark brown spot is spread out into a light brown patch about a square inch in area. After the excess of acetone has dried off, a drop of "ammoniacal acetone" is allowed to fall on the patch.

(The ammoniacal acetone solution is prepared, as required, by adding to pure acetone 20 per cent. by volume of a mixture composed of equal parts of 0.880 ammonia and distilled water.)

(b) The appearance of a brilliant red-brown stain, which changes in a minute or two to a dark purple-brown, indicates that the exudation is Trotyl oil, and subsequent procedure will then be as given below. If, however, the suspected exudation is found to be merely non-explosive oily matter, it will be wiped off and the subsequent opening and internal examination of the shell follow normal lines.

63. Trotyl exudation, treatment.

Shell affected by Trotyl exudation will be treated as follows :—

(a) *Exploser container type shell :*

When signs of exudation are observed in the fuze-hole, the shell will be provisionally sentenced "Unserviceable."

(b) *Non-exploder container type :*

- (i) Before attempting to move the fuze or plug, the exudation is to be wiped off the nose of the shell with a clean, dry sponge cloth.
- (ii) When unscrewing the fuze or plug from the shell, no force other than that obtainable by a proper use of the service keys is permissible, and the operation must be carried out " under precautions " (*see para. 40 (4)*).
- (iii) After removing the fuze or plug, the threads of the fuze-hole will be cleaned with a sponge cloth and the exploders, if of Trotyl and affected by exudation, withdrawn. The shell will then be up-ended, drained, wiped clean with a sponge cloth and dried.

At this stage the condition of the shell filling should be examined and, if necessary, repaired (*see para. 68 and Appendix VI*). If the break-up of the filling is too extensive to admit of this method of repair, the shell will be provisionally sentenced " Unserviceable."

- (iv) Trotyl exploders affected by exudation are to be replaced by C.E. exploders (*see paras. 66 and 67*), and the shell suitably stencilled.

It has been found that C.E. exploders, even when thoroughly impregnated with Trotyl exudation, will function successfully ; such exploders will not therefore be removed and/or exchanged unless the exudation is so pronounced as to threaten attack of the filling surrounding them.

- (c) *Base adapter* shell showing signs of exudation at the base will be provisionally sentenced " Unserviceable " and segregated.

64. Ammonium nitrate exudation.

Ammonium nitrate in the presence of moisture may deliquesce, forming a yellowish liquid called " ammonium nitrate exudation " ; this type of exudation is entirely distinct from " Trotyl exudation " and, as far as is known, has never been met with in the liquid form. Its effects, however, are commonly met with in the following forms :—

- (a) A strong smell of ammonia when a shell is opened up for examination.
- (b) Corrosion of steel exploder containers, gaines or plugs with gain extension, accompanied by heavy accumulations of rust, culminating sometimes in the

complete perforation of the exploder container or gaine.

- (c) Corrosion of the brass parts of fuze or plugs with resulting deposits of crystals, which may be purple, green, or blue in colour, and which, when dry, are to some extent sensitive to blows or friction.

65. Ammonium nitrate exudation, treatment.

- (a) Any shell showing external signs of corrosion products due to ammonium nitrate exudation on the surface of the plug or fuze will be first dealt with "under precautions" as at para. 63 (b) (i) and (ii), except that in this case the sponge cloth will be moistened with warm water.
- (b) Any shell which when opened smells strongly of ammonia will be reclosed, provisionally sentenced "unserviceable" and segregated.
- (c) At internal examination, under no circumstances must any attempt be made to remove gaine which show any signs of having become rusted by corrosion and/or which do not move perfectly freely under light pressure of the service keys. Containers, whether rusty or not, must not on any account be removed. Any shell found defective in either of these respects are to be re-closed, provisionally sentenced "unserviceable" and segregated.
- (d) Where there is no appreciable smell of ammonia and the corrosion on the plug or fuze-hole thread is only slight, the shell should, where possible, be used up at practice. If there is no immediate outlet at practice, the shell should be prepared and new components inserted.

REMOVAL OF TROTYL EXPLODERS AND INSERTION OF C.E. EXPLODERS

66. Shell plugged with plug fuze-hole 2-in. No. 3 or No. 8.

- (a) After removal of the plug, if the compressed exploder cannot be removed by the "Tongs" or "Hook," proceed as in Appendix V. When the cavity is entirely free of debris, dry it out as far as possible.
- (b) Insert a C.E. exploder of the correct size, choke downwards and compress it in place to a depth of 3.8 in. from the lip of the fuze-hole by means of a "Tool for compressing exploders in shell." **On no account is a fuze or plug to be used for this purpose.**

67. Shell fuzed No. 106 type or No. 44 in adapter No. 2, or plugged with Plug fuze-hole special No. 1 in adapter No. 2.

- (a) Remove the fuze, fuze and adapter, or plug and adapter, and lift out the top exploder.
- (b) Then proceed as in para. 66.

PERMISSIBLE REPAIRS (TROTYL AND AMATOL FILLED SHELL)

68.—(1) Shell in which the filling is found so broken that the exploders cannot be replaced may be locally repaired as detailed in Appendix VI.

(2) At the conclusion of this filling repair, as also whenever the exploders in a shell have been replaced, opportunity should be taken to replace the original millboard or leather-board and felt washers by "warm waxed" washers. The necessary wax and washers can be obtained from R.A.O.C. on demand, and care is to be taken that the treated felt washers are warm and plastic, but free of superfluous wax, before insertion. Care should be taken that surplus wax is not allowed to enter the exploder cavity.

B. SHRAPNEL SHELL

See Plate XIV, R.L. 21747.

69. The "General Instructions" of paras. 31 to 41 are to be observed where applicable.

70.—(1) After removal of the fuze-hole plug, note if any gunpowder has worked up into the socket. Remove the shalloon or cambric disc with a copper tool and, placing a paper or cardboard collar in the fuze-hole to prevent powder getting into the threads, gently invert the shell to ascertain if the powder runs freely in the tube.

NOTE.—Certain shell of early filling designs had perforated pellets in the central tube. In examining the bursting charge of such shell the pellets must first be removed.

(2) If the gunpowder charge runs freely and the central tube appears clean and free from rust, return the powder, using a paper funnel; insert a wood plug in the tube and scrape off any shellac remaining on the platform or fuze socket with a copper or bronze tool. Carefully scrape off with the tool any corrosion on the platform or fuze socket and any adhering grains of powder.

(3) Re-shellac the platform of the fuze socket, remove the wood plug (replace the pellets if fitted), and place a new shalloon disc in position.

71. If the gunpowder charge does not run freely the shell should be lightly tapped on the side with a wooden mallet, as a portion of the gunpowder may have jammed in the tube.

- (a) If the gunpowder is then found to run freely and the central tube is free from rust, proceed as at para. 70.
- (b) If, however, the gunpowder still refuses to run freely, a few grains should be loosened by means of a copper wire and their condition ascertained.

NOTE.—In the use of the copper wire for this operation the greatest care is to be taken that only the minimum amount of force is used in loosening the grains of gunpowder.

- (c) If the powder grains are found to be dry and the central tube free from rust, proceed as at para. 70 (2) and (3).
- (d) If, however, the grains are found to be damp (and the charge caked for that reason) and/or the central tube rusty, they will be dealt with as set forth in para. 73.

72. Shell, which, on examination by the Chief Inspector of Armaments, exhibit any of the defects detailed in the first column of the following table, are dealt with as shown :—

Description of defect	Sentence	Special marking	
		On boxes, <i>see</i> Pamphlet No. 2	On bases of unboxed shell*
(a) All powder free, but central tube slightly affected by rust.	Not for issue overseas, except in emergency. Issue for practice, if no shell, as at (b), are available. To be specially re-examined after 3 years from date of sentence.	"R" in red, 2 in. high, in the top left-hand corner of both sides.	"R" in red.
(b) Powder caked in cup or central tube rusty.	"S" for practice only.	"R" PRACTICE 193—" in red, 2 in. high, in the top left-hand corner of both sides.	"R" PRACTICE 193—" in red.

* Size of stencilling appropriate to calibre of shell.

73. Any shell which, at annual inspection, are found to have any of the defects mentioned above (para. 72) will be dealt with by I.O.O.s, on similar lines as regards sentence and marking, except that the sentence " Not for issue overseas, except in emergency " applies only to home stations.

C. SMOKE SHELL

74. The following methods of filling may be met :—

(a) **Double diaphragm type.** See Plate XV, R.L. 27933.

(b) **Tinplate container type.** See Plate XVI, R.L. 25018 and 25018A.

(c) **Burster container type.** See Plate XVII, R.L. 27268 and 24907.

(i) Short cavity, with one exploder, " D " or " F."

(ii) Long cavity with two exploders, the sizes of which vary according to the date of filling.

75.—(1) Since a leakage of white phosphorus is very likely to burst into flame, an ample supply of water must be readily available, both at examination and in storage. At examination one bucket of water should be provided for each person employed in unpacking or examination.

(2) Before any other examination is begun, shell are to be carefully examined for any sign of phosphorus leakage at the burster container joint and/or charging-hole plug. Any leaky shell will be immediately dropped into water and kept under water until it can be disposed of by dumping in deep water or otherwise destroyed (see R.A.O.S., Part II, Pamphlet No. 4).

76. The head filling and exploder system will be examined in accordance with the relevant instructions for H.E. shell.

77.—(1) Particular care is to be taken that any material which may have been in contact with leaky shell is destroyed the same day and any appliances cleaned from contamination before further use.

(2) Components (*e.g.*, plugs or fuzes) recovered from smoke shell are not to be used with other natures of shell without prior reference to the Chief Inspector of Armaments, Woolwich.

D. STAR SHELL

See Plate XVIII, R.L. 26586.

78. The General Instructions of paras. 31 to 41 are to be observed where applicable. Great care must be taken in handling not to bump or jar the shell, as the base pins are liable to shear and the base plate to become partially ejected.

79.—(1) During external examinations, particular attention is to be paid to the shell base ; if any of the pins have sheared or the base is found to be loose, the shell will be sentenced “Repairable.”

(2) Internal examination will be confined to an inspection to ascertain if the fuze-hole is clean and dry and the burster bag secure and correct.

E. BASE-FUZED SHELL

GENERAL

80.—(1) Types of shell in the Service are Common Pointed, Armour Piercing and Semi-Armour Piercing, and may be capped or without cap. C.P. and A.P. shell may be filled either H.E. or Gunpowder ; S.A.P. is filled H.E. only (Lyddite or Trotyl).

(2) (a) H.E. filling.

(i) **Lyddite** (or Shellite). *See Plate XIX, R.L. 25562.*

(ii) S.A.P. filled Lyddite. The main filling is similar to that in Plate XIX, but has a special type of fuze and exploders. The exploder is normally $2\frac{1}{2}$ drams P.P., but some shell have in addition a 12-drams P.P. exploder.

(iii) S.A.P. filled Trotyl. In this case the exploder is a 14-drams Trotyl pellet.

(iv) 3-pr. A.P. filled Lyddite, fitted $2\frac{1}{4}$ -drams P.P. exploder and Hotchkiss base fuze. *See Plate XX, D.D. (L) 3876.*

(b) Gunpowder filling :—

(i) 6-pr. steel shell, fitted with Hotchkiss base fuze. *See Plate XXI, R.L. 12574B.*

(ii) 12-pr. fitted No. 12 Base Fuze (non-burster bag type). *See Plate XXII, R.L. 25755.*

(iii) A.P. fitted No. 15 Base Fuze (burster bag type). *See Plate XXIII, D.D. (L) 669.*

81. The General Instructions of paras. 31 to 41 to be observed where applicable.

82. Particular care is to be taken that the caps of capped shell are not subjected to any blow or strain, and that the points of uncapped shell do not come into contact with other shell.

83. **Fuzes.**—Any medium or large base fuze found with damaged pressure plate will be dealt with as follows :—

(a) If the damage is apparently limited to the indentation or crushing in of the pressure plate, the fuze may be removed, but only at the discretion of the I.O.O.

(b) If, however, in the opinion of the I.O.O., the damage is of such a sort, or so extensive, as to render removal of the fuze undesirable :—

(i) At home stations—the shell will be left undisturbed and the circumstances reported direct to the Chief Inspector of Armaments Royal Arsenal.

(ii) At stations abroad—the shell will be removed under the personal supervision of the I.O.O., care being taken to maintain it point uppermost, to a place where it can be carefully lowered overboard from a boat into deep water or safely destroyed by guncotton (see R.A.O.S., Part II, Pamphlet No. 4).

NOTE.—It should be noted that, when the pellet is supported by the spring alone, a drop of 4 in., point downwards, is sufficient to fire the detonator.

84. **Damaged Points and Cracks.**—Uncapped A.P. shell will be examined for damaged points and cracks. Uncapped A.P. shell and A.P. practice projectiles 6-in. and 9.2-in. will be acid etched in order to detect season cracks, and no such shell or projectile will be fired unless it has been submitted to this test within six months before the date of firing. In the case of equipment ammunition of the above natures, the test should be carried out every four years, i.e. 25 per cent. of the shell should be tested every year.

Shell so tested will have the following stamped above the driving band :—

↑
E
...../...../.....(Date)

Instructions for carrying out the test are detailed in Appendix IX.

(a) Those with damaged points will be dealt with as follows :—

- (i) Any not damaged to a greater extent than the "model points" (*see* Appendix I) will be considered serviceable.
 - (ii) Any which have sustained greater damage than that shown on the model points will, if otherwise serviceable, be sentenced "for practice only."
- (b) (i) Gunpowder-filled projectiles with cracks will be provisionally sentenced "unserviceable," and emptied (*see* Section V) without awaiting confirmation of sentence.
- (ii) H.E.-filled shell with cracks will be provisionally sentenced "unserviceable."

H.E.-FILLED SHELL

85. Capped shell will be examined for loose caps and any so found provisionally sentenced "unserviceable."

86. For the internal examination prescribed in para. 31, the "Apparatus, fixing base cover plates, A.P. shell," according to type of shell, is required (*see* Appendix I).

87. The apparatus will be used as follows :—

- (a) Support the shell, base up, in a suitable wood block or holder projectile and remove the set screw securing the screwed ring of the cover plate.
- (b) Secure the clamping ring of the "Apparatus" on the shell by means of the four screw bolts, lay, but do not engage, the circular key of the apparatus over the cover plate and tightly clamp the steel cover plate by screwing down the wood block. Insert the pins on the circular key of the "Apparatus" into the slots of the screwed ring and unscrew the latter, using the tommy in the holes in the edge of the key.
- (c) Remove the apparatus (thus unclamping the wood block), and then remove the perforated cover plate, copper gas check plate and metal plugs filling the key holes in the fuze.

NOTE.—No attempt is to be made to tighten up or unscrew the adapter, but should it be found partially unscrewed or become so during

the operation of defuzing, etc., the shell must be immediately "closed" as described in Section IV, sentenced, "repairable" and returned to C.O.O., Woolwich Arsenal, under authority of this paragraph.

88. The fuze will now be unscrewed and the exploder, if of picric powder, lifted out by means of the "Pincers," and moisture tested as described in para. 48.

89.—(1) The cavity will be examined to ascertain if the filling is broken or cracked, and any shell so found provisionally sentenced "unserviceable."

(2) Any shell found with a space 0.4 in. or less between the top of the filling and the adapter may be repaired locally as laid down in Appendix VII; if the space exceeds 0.4-in. the shell will be provisionally sentenced "unserviceable."

90. If the cavity proves to be correct, insert a new exploder choke downwards, press it into position, gauge the depth of the fuze-hole with the appropriate gauge, examine the fuze and fuze-hole (cleaning where necessary), and close the shell (see Section IV).

91.—(1) In the event of the exploders failing at moisture test, those of the same lot in all shell in the magazine or store of the same date of filling must be replaced.

(2) When exploders of lot numbers different to those originally in the shell are inserted, care must be taken that the particulars stencilled on the shell are brought up-to-date.

GUNPOWDER-FILLED SHELL

92. Powder-filled shell are filled with gunpowder as in the following table:—

Shell	Gunpowder	
	Old nomenclature	Present approved nomenclature
Common Pointed ..	P. and F.G.	P.3 and G. 12
Armour Piercing ..	L.G.	G. 12
Steel shell 3- and 6-pr. ..	Shell, Q.F., F.G.	G. 12

93. The floor of the room in which gunpowder-filled shell are being examined must be covered with a wadmilt.ilt.

94. External examination.

In addition to the external examination of fuzes, points and cracks in uncapped shell (paras. 83 and 84), capped shell will be examined for loose caps.

- (a) Where facilities exist, all loose caps will be refixed as described in para. 95.
- (b) Where no facilities exist, if the caps are so loose as to move readily under hand pressure, the shell will be sentenced "repairable"; if, on the other hand, the caps, though loose, will not move easily under hand pressure, the shell will be considered "serviceable" in this respect.

95. Instructions for refixing loose caps on capped shell.

- (a) The shell must first be emptied (*see* Section V).
- (b) The method of attachment of the cap then determines the appropriate repair, *viz.*:—
 - (i) *Those in which portions of the cap are forced into indents on the shell.*—Hold the cap firmly on the point of the shell by means of a powerful screw clamp, and with a hammer and punch force the cap into the shell indents.
 - (ii) *Those put on with solder.*—First remove the cap and clean away all the old solder from the cap and shell (at this stage opportunity should be taken to examine the shell point for "cracks").

The cap will then be re-soldered on, but great care must be taken that in this process only the minimum necessary amount of heating is applied to the projectile point.

- (iii) *Those put on with cotter-pins.*—Tighten up the old pins or replace by new pins as required.
- (iv) *Those with an annular recess on the shell into which the base of the cap is sprung.*—Hold the cap firmly on to the head of the shell by means of a powerful clamp, and hammer the edge into the groove with a suitable hammer and chisel.

96. Internal examination.

One per cent. of each type of shell will be opened and internally examined, unless the shell are less than two years of age from date of filling.

- (a) Remove the 7-dram primers, open one and inspect the powder to ascertain if it is dry and serviceable. If it is damp and/or caked all the remaining primers will be opened, examined and replaced as necessary.
- (b) Draw out the neck of the burster bag by means of the "Hook," untie the twine and examine the gunpowder charge. If the powder is in serviceable condition, tie up the neck of the bag again and proceed as directed in Section IV for "filling" shell.

If, however, the powder is caked from the effects of damp or otherwise "unserviceable," the shell will be sentenced "unserviceable" and emptied (see Section V) without awaiting confirmation of sentence.

- (c) The burster bag is to be carefully examined for cuts around the neck and repaired or replaced as necessary.
- (d) Should any shell be found to have damp bursting charge or defective burster bag, all shell of the same lot must be examined.

97. Repair of burster bags.

- (a) Any bag having a cut $\frac{1}{2}$ in. or more in length must be replaced by a serviceable bag (see thence under "Filling" Section IV).
- (b) Cuts shorter than $\frac{1}{2}$ in. will be repaired *in situ* by means of small patches of shalloon (or lasting cloth), cemented on the *inside* of the bag with "shellac cement"; the patch not being applied until the cement becomes "tacky" (lasting cloth patches, however, are to be put on as soon as the cement is applied) and firmly pressed down.

(The shellac cement is made up as required by dissolving gum shellac in methylated spirit in the proportions of 1 lb. of shellac to 1 pint of spirit.)

98. Plugging of shell.—A list of the plugs permissible is included in Appendix VIII and shell must be plugged with the category stipulated below :—

Shell filled H.E. for firing plugged—Class A.

Shell filled powder for firing plugged—Class B.

Filled shell may be plugged with any suitable plug for storage purposes but, if the plug used is of a category lower than that stipulated above, such shell must be stencilled "**Plugged for Storage Only.**"

F. PROJECTILES FOR USE AT PRACTICE

98A. **Common Shell.**—Common shell, though suitable for service use in an emergency, are included in this subsection as their use is now mainly at practice. They are fitted with nose fuze-hole plugs or fuzes, and examination should be carried out as for other types of gunpowder-filled shell.

They should not, if filled, be marked as for "Projectiles, practice" (*see also* Appendix VIII as to restrictions on the use of cast-iron plugs).

99. **Projectiles, practice.**—These are distinguished by markings as shown in R.A.O.S., Part II, Pamphlet No. 3, and are suitable for use at practice only. They are of the following types:—

- (a) service projectiles emptied and weighted (*see* Section III);
- (b) projectiles filled to a special practice design for use with Service fuzes. The types of fillings are:
 - (i) complete filling of gunpowder, (ii) weighting composition plus a blowing charge of gunpowder;
- (c) service shell filled, but specially restricted for use at practice only.

100. All filled practice projectiles will be treated for examination in the same manner as for the corresponding type of service shell.

100A. All base filled practice projectiles must be plugged with a plug as defined in the following table and Appendix VIII:—

Projectiles filled H.E. for firing plugged—Class A.

Projectiles filled powder for firing plugged—Class B.

Projectiles filled weighted for firing plugged—Class C.

Filled projectiles may be plugged with any suitable plug for storage purposes but, if the plug used is of a category lower than that stipulated above, such projectiles must be stencilled "**Plugged for Storage Only.**"

SECTION III

FILLING SHELL

101. All natures of Service shell, except those for gunpowder filling, are issued filled.

102. **Weight marking.**—All shell for service in fixed armaments whose weight, filled and fuzed, is within a limit of ± 0.1 per cent. of mean weight (*see* Appendix III) will be stencilled "DEAD WT."

Those which vary from the above will be stencilled with their actual weight as follows:—

9.2-in.	..	To the nearest 1 lb.
Under 9.2-in. to 6-in.	..	To the nearest $\frac{1}{4}$ lb.
5-in. and under	..	To the nearest 1 oz.

103. All shell (3.7-in. and above) for field service (*except* shrapnel) are weight marked on the "unit system," by which variations above or below the mean weight of a filled and fuzed shell are indicated by symbols (*see* Plate XXVII).

This marking, it should be noted, is based on the actual weight of the filled shell fitted with the "standard" fuze.

104.—(1) When calculating the dead weight or actual weight, the weight of the fuze is to be included. When shell are weighed plugged, a corresponding plug should be placed on the weight pan and the weight of the "standard" service fuze added to that of the shell.

(2) A table of mean weights of the various service fuzes, and adapters, is given in Appendix IV.

105. Whenever possible shell are to be weighed without grummets; where this is not convenient, a spare grummet of the same type should be placed on the weight pan of the scales.

A. GUNPOWDER FILLING

GENERAL INSTRUCTIONS

106.—(1) The undermentioned ferrous implements may be used (and should be demanded as required) in a laboratory during shell filling, but only when absolutely necessary, viz.:—

Blocks, malleable, cast or wrought iron, galvanized.
Bolts, eye, lifting projectiles.
Clips, lifting projectiles.
Gauges, shell.
Holders, shell.

Keys, fuze and plug.
 Pulley blocks, differential and chain.
 Spanners for tightening of bolts shell holders.
 Wrenches, base plug.

NOTE.—All keys must have their handles covered with leather (*see* L. of C., para. 12970).

(2) The floor of the room in which shell are to be filled with gunpowder must be covered with a wadmiltilt.

107. Burster bags.

- (a) With C.P. above 12-pr. and C.P.C. shell filled powder, the bursting charge is enclosed in a dowlas bag with shalloon neck.
- (b) With A.P. and A.P.C. shell, the burster bag is of lasting cloth with no shalloon neck.

108.—(1) Before taking them into use, special care must be taken that the burster bags and shell are thoroughly serviceable (*see* para. 96) and dry (*see* R.A.O.S., Part II, Pamphlet No. 11, 1933, para. 15).

(2) When burster bags are inserted in shell, care is to be taken that the shalloon portion of the bag (where shalloon exists) comes against the fuze-hole.

109. **Gunpowder.**—The types of gunpowder appropriate to the filling of the various nature of shell is given in para. 92. (NOTE.—4-in. C.P. Mk. II is filled G. 12 only.)

110. The following are the proportions of P. 3 and G. 12 powder which may be inserted at a time into the various types of shell :—

<i>Nature of shell</i>	<i>Quantity of powder</i>
Below 12-in. to 8-in.	About 4 lb. P. 3, then 10 oz. G. 12.
6-in. and below ..	About 2 lb. P. 3, then 5 oz. G. 12.
All without bag ..	Fill with P. 3, then fill interstices with G. 12.

NOTE.—The proportion of G. 12 powder may be varied to bring the shell to dead weight, *see* para. 102.

Special precautions.

111.—(1) The quantity of loose gunpowder (*i.e.*, in barrels and unplugged shell) in the filling room should not be more than is necessary for the work in hand and must never exceed 225 lb. The number of shell in the inner room or under the operation of filling at any one time is not to exceed :—

9·2-in.	2
Under 9·2-in. to 4·7-in.	4
Under 4·7-in.	8

(2) The number of filled shell in the outer room must not exceed double the number in the inner room.

(3) The operations of filling and emptying are not to be carried on simultaneously in the same building.

(4) Shell should, where possible, be fuzeed in a separate building from that in which they are being filled ; if this is not possible, the limits given in (1) above must be halved.

112. **Shell.**—The shell for filling will be placed outside the receiving hatch of the outer room of the laboratory and thoroughly cleaned and brushed externally before being passed into the outer room.

113. In the outer room the shell will be thoroughly cleaned from any internal dust or grit, internally and externally examined, and gauged before passing to the inner room for filling.

During internal examination the copper scraper should be used with care so as to avoid damage to the lacquer or varnish, and shell without containers must be examined for cracks.

Uncapped A.P. shell will be examined for broken points and cracks (*see* para. 84), and capped shell for loose caps (*see* para. 94).

114. Empty shell of all calibres less than 6-in. can be up-ended by hand for filling, but heavier natures require a tackle, and in all cases the appropriate shell holder should be used.

115. It is important that the weights of filled shell should be as near as possible to the nominal weights, but it is at the same time essential that the cavity should be so filled as to prevent any shifting of the burster and primer bags (*see* para. 120).

FILLING C.P. AND C.P.C. SHELL WITH GUNPOWDER

116. Place the shell with its point resting on a block of wood suitably hollowed out to receive it, or in any other convenient place ; in the case of capped shell the weight of the shell must be supported by the body in order to avoid strain on the cap.

117. Remove the plug from the fuze-hole, place the filling rod in the bag, and insert it through the fuze-hole, taking care not to force the end of the rod through the bottom of the bag ; carefully push in the bag until the neck only is in the fuze-hole, a portion being kept outside, as the whole bag must not be allowed to slip into the shell during the operation of filling, then withdraw the rod and insert the funnel.

118. The proportions of powder are weighed (or measured where there are measures to hold exactly the weights required)

and inserted as in para. 110, each portion being lightly stirred and pressed with the filling rod, so as to occupy the smallest possible space, as otherwise the bursting charge will settle down when jolted in transit. In using the rod for this purpose care must be taken not to cut the bag.

119. When the shell is quite full, withdraw the funnel and filling rod, and tie the neck of the bag close to the top of the fuze-hole with the twine attached to the neck for the purpose. If necessary, the twine must be shifted to a suitable position. Cut off the superfluous choke and push the neck of the bag well down, and to one side of the fuze-hole.

120. After filling of the burster bag is complete, insert "Primers, shell, 7-dram," the *minimum* numbers required being :—

Shell taking medium base fuze No. 12	..	4
Shell taking large base fuze No. 11, Mk. I to IV, or No. 15, Mk. I or when plugged with plugs representing these fuzes	..	5
Shell taking large base fuze No. 11 (of Marks later than Mk. IV), or No. 15 (of Marks later than Mk. I), or when plugged with plugs representing these fuzes		6

It may sometimes be necessary to exceed these numbers slightly, and if so, as many primers as can be used are to be inserted. It should, however, be noted that the main object to be attained in shell filling is to have the burster bag as full as is possible, consistent with sufficient space being left for the "minimum" number of primers laid down.

121. Care must be taken to ensure that one of the primers is opposite the end of the fuze, choke downwards, and the "Gauge, depth, fuze-hole, base percussion fuze" will be used to ascertain that sufficient clearance is left for fuze or plug.

FILLING A.P. AND A.P.C. SHELL WITH GUNPOWDER

122. These shell will be filled in a similar manner to that laid down for Common Pointed shell, save that the gunpowder to be used will be G.12, instead of P.3, and G.12.

B. WEIGHTING SHELL FOR PRACTICE

123. It is particularly important that the weight of shell filled sand and/or salt for practice should be as near as possible to the nominal weights (*see* Appendix III).

124.—(1) For H.E. shell generally, sand alone is to be used in the filling of practice projectiles, but in some types it may

be necessary for weight purposes to add 10 per cent. of salt (and in certain cases a small amount of dust shot).

(2) For powder shell about 2 parts of sand to 1 of salt will generally prove a suitable mixture.

125. Practice projectiles, filled sand, will, when found heavy, be adjusted by substituting salt for a proportion of the sand; if found to be light, the weight will be adjusted by substituting for sand a quantity of dust shot, iron turnings, borings or filings as required.

126. When suitable sand is not available, salt may be used for filling, the weight being adjusted, if required, by the substitution of dust shot, etc.

C. PAPER SHOT

127. Paper shot for use at station practice will be made up locally as required in the following manner :—

- (a) Take a sufficient quantity of diamond grit or waste shot (Nos. 1 to 5), measure it by capacity and place it in a receptacle for mixing.
- (b) Measure by capacity a quarter as much sawdust as diamond grit, add it to the latter and thoroughly mix the two together.
- (c) Insert sufficient of this mixture into the case to bring the paper shot up to its required weight, lightly tapping the case at the same time. Should the shot not thus be completely filled, the vacant space should be filled with sawdust only.
- (d) When the shot is full, insert the cork bung in the filling hole.

SECTION IV

CLOSING FILLED SHELL

128.—(1) Filled shell are closed by means of fuzes or plugs. Fuzes and plugs are to be lubricated before insertion according to the instructions given below, so as to give efficient sealing. Care must, however, be taken in all cases not to use such an excess of luting (*see* Appendix I) as to cause injury to the contents of the shell.

(2) After closing shell care must be taken to bring up to date the relevant markings on the shell (*i.e.*, the exploder particulars and, where applicable, the suitability for tropical climates, etc.).

A. INSERTION OF FUZES AND GAINES

GENERAL INSTRUCTIONS

129.—(1) No fuzing operation is permitted on fixed ammunition unless the safety clip is in position on the base of the cartridge case.

(2) Fixing screws, if present, will be removed before unscrewing the plug or adapter.

130. When removing plugs fuze-hole, having washers under the flange, care must be taken to ensure that the washers are always removed before inserting the fuze, except in the case of those Time or Time and Percussion type fuzes under which "washers, leather, lead-free" are required.

131. Those plain surfaces of all fuzes and gaines that will, when in position in shell, be nearest to the explosive filling must be coated with "Cement R.D. No. 1," and allowed to dry before insertion.

Adapters will be coated with Cement R.D. No. 1 as detailed in para. 150.

Steel 2-in. fuze-hole collars will be cemented all over.

When applying cement to the surfaces of components, as directed, care must be taken to ensure that cement does not get on to the screw threads or any surface not specifically authorized to be coated.

NOTE.—The time of drying of R.D. No. 1 Cement, under bad conditions, may be as long as two days, and even under the best possible conditions is never less than two hours.

132.—(1) The threads of the fuze (except the bottom three) are, unless otherwise stated, to be well coated with thin lead-free luting, and the top three threads with a thick coat of thick lead-free luting, a thick fillet of the latter being placed round the underside of the flange.

(2) In the case of fuzes with short-threaded portions (*e.g.*, the No. 80 type) *all* the threads will be coated with thin luting.

133. In all fuzing operations care must be taken that no moisture or dirt is allowed to enter the fuze-hole.

134. After preparing the shell, when necessary, for reception of the fuze, the latter (with gaine attached if applicable) is to be inserted into the shell and screwed home with the authorized key provided in equipments, and any excess of luting wiped off.

135.—(1) When inserting or removing gaines No. 8, fuzes No. 44/80, or their adapters, only the "Implements, ammunition Key No. 69," fitted with the appropriate key-piece, will be used.

(2) When inserting gaine No. 8, fuzes No. 44/80 and adapters for these stores, the bottom threads of the fuze-hole and the exterior threads of the gaine or fuze are to be coated with thin lead-free luting.

(3) **A No. 2 plug must never be used over a 44/80 fuze or a No. 8 Gaine.**

136. A recess for the point of the fixing screw is to be drilled in the side of the fuze or adapter through the fixing screw hole (if existing), with a brace and "bit set-screw recess," the bit being provided with a stop to prevent over-drilling. (NOTE.—Certain bits cut left-handed.) The fixing screw hole is then to be filled with thick lead-free luting and the screw head is to be filled with Cement R.D. No. 1. If shell are provided with three slots on lip and are to be held fuzed with No. 101 or No. 106 type fuzes, the edge of the fuze should be set down into *one* of the slots with a suitable punch.

137. When D.A. fuzes with cap (Nos. 18, 44 or 45) are inserted, the bottom of the cap should be in line with or below the top of the adapter or bush in the shell. Any fuze which is found not to enter to this extent must be removed and a fresh one inserted. Care must be taken to see that the securing pin of the fuze does not foul the bush or adapter.

138. Bag exploders are to be inserted in shell choke downwards. Paper case exploders are to be inserted with closing disc upwards. Trotyl exploders are marked (or, if not, should be marked) with a green bar, 0.2 in. in width, on the base for bag exploders and at both ends for carton exploders.

NOTE.—Exploders are not to be marked if in position in the shell.

139. Certain types of H.E. shell were formerly fitted with paper collars, and such collars may be found packed with 101 type fuzes. Such collars are to be discarded except, where they are found already in position in the shell.

H.E. AND SMOKE SHELL

140. When smoke shell have been fuzed with the No. 106 type fuze the plain portion of the body of the fuze is to be painted green.

141. **Shell with G.S. fuze-hole.**—Remove the plug and insert the fuze.

142. **Shell with 2-in. fuze-hole. :—**

- (a) When plugged with a 2-in. plug with gaine extension :
 -) If to be fuzed with No. 101 or 116 type fuzes :—
 - remove the plug, insert the fuze with gaine fitted and screw it home.

- (ii) If to be fuzed with No. 106 or 115 type fuze or No. 44 fuze with adapter No. 2 :—remove the plug, insert a “ B ” exploder and press it into place with the thumb ; insert the fuze and screw it home.

NOTE.—In the case of the Nos. 106 or 115 type fuzes, if the wire securing the cap is found to be broken during or after the fuzing process, the fuze must be removed (*see also* para. 40) and a fresh one inserted. Where caps and safety pins are fitted, they must not on any account be removed.

- (iii) If it be fuzed with a G.S. fuze :—remove the plug, screw in the adapter No. 2, and insert an exploder, pressing it into place with the thumb ; insert the fuze and screw home.

- (b) When plugged with plug, fuze-hole special No. 1 in adapter No. 2, or with plug fuze-hole 2-in. No. 13, or No. 13 converted, or similar plug. If to be fuzed with a 2-in. gauge fuze :

- (i) *No. 101 type.*—Remove the plug and adapter ; remove the upper exploder by means of the “ Pincers ” or “ Hook,” insert the fuze with gaine fitted and screw home.

- (ii) *Nos. 106 or 115 type.*—Remove the plug and adapter, and, if the top exploder in the shell is in good condition, insert the fuze and screw it home. If, on removal of the plug and adapter, the top exploder is found to be damaged exchange it for a new one.

- (c) When fitted with Adapter No. 2 and Fuze No. 44. If to be fuzed with No. 106 type fuze, remove the adapter and No. 44 fuze and proceed as in (b) (ii).

- (d) When plugged with plug, fuze-hole, 2-in., No. 12, or No. 12 converted, or similar type. If to be fuzed with time fuze and No. 8 gaine :

- (i) Remove the plug, millboard washers (if fitted), steel collar and adapter.

- (ii) If the waxed millboard washer over exploder, and the exploder are in good condition, replace the adapter and screw home the gaine No. 8. Lubricate as in para. 135 (2).

- (iii) The steel collar is then to be inserted, and the necessary number of “ Washers, millboard, 1·9-in., 1·0-in. hole ” inserted. These washers

are either 0.1 or 0.05-in. thick and sufficient of either nature will be used to prevent movement of the steel collar when the fuze is in place.

(iv) Insert the time fuze.

(e) Replacement of No. 44/80 fuze :

(i) Remove fuze " under precautions " (see para. 40) if the filling is Amatol.

(ii) Screw the new No. 44/80 fuze securely into the adapter which has been previously prepared as indicated in para. 150. The portion of the fuze which protrudes below the adapter will be wiped free of luting and then coated with R.D. No. 1 cement, so that the coating on the underside of the components is continuous. After the cement has been allowed to dry, and provided that the condition of the filling, exploder, etc., is satisfactory, the adapter with fuze is to be screwed home in the shell, care being taken to ensure that the fuze does not loosen in the adapter.

(iii) Sufficient millboard washers of the appropriate size are to be inserted to occupy the space between the No. 44/80 fuze and the time fuze, care being taken to ensure that the pins of the No. 44/80 fuze are correctly accommodated in the slots of the slotted washer.

(iv) Insert the time fuze.

(f) Replacement of No. 8 gaine :

(i) Remove time fuze, washers and steel collar. The gaine and adapter are then to be removed, the precautions stated in para. 40 (4) being observed, if the shell is filled Amatol.

(ii) Provided that the condition of the filling exploder, etc., is satisfactory, proceed as in (d) above.

(g) Conversion of shell, B.L., H.E., 9.2-in. gun, Mk. XIII A for landward firings by removal of " Adapter, 2-in. fuze-hole, No. 2 " and replacement of " Plug, fuze-hole, special, No. 3 " by " Plug, fuze-hole, 2-in., No. 3 " in preparation for fuzing No. 117. Detailed instructions for carrying out the conversion are shown in Appendix X.

NOTE.—Particulars of gaine and time fuze are to be stencilled on the shoulder of the shell.

SHRAPNEL AND STAR SHELL

143. Remove the plug and insert the fuze (see para. 136).

BASE-FUZED SHELL—BASE FUZES (OTHER THAN HOTCHKISS)

144. Special precautions.

- (a) Before fuzing or defuzing see that the adapter is not partly unscrewed; if the adapter has become partly unscrewed, or if it moves when defuzing, the shell should be dealt with as laid down in para. 87 (c).
- (b) **In view of the fact that, if the fuzing operation is not properly carried out, a premature may be caused, the complete operation should not be done by a single operative. The work should, whenever possible, be divided in such a manner as to ensure a definite check on each operation during the process of fuzing.**
- (c) All base fuzes, or the cover plates where such are fitted, will, after insertion, be painted red.

145. For fuzing operations the "Apparatus, fixing base cover plates, A.P. shell," according to type of shell, is required (see Appendix I).

- (a) While the shell is in the wood block or holder remove the plug or fuze. Insert exploder and gauge depth of cavity with the "Gauge, depth, fuze-hole, base percussion fuzes" applicable. Examine the fuze and fuze-hole to see that the threads are clean, and spread a thick layer of thick lead-free luting evenly on the inside of the flange of the fuze; this layer must be sufficient to fill the undercut under the flange and leave a surplus to be forced out when the fuze is screwed home; the threads of the fuze, except the innermost three, will be lubricated with thin lead-free luting. Insert the fuze, screw it well home, and then wipe off the surplus luting.
- (b) Insert the metal plugs in the keyholes of the fuze, place a small fillet of thick lead-free luting round the outer edge of pressure plate of the fuze, and on top of the metal plugs.

Shell in which the keyholes in the base adapter are covered by the copper gascheck plate, will have steel plugs fitted in the keyholes and covered with thick lead-free luting.

- (c) Lubricate the inner surface of the copper gascheck plate with mineral jelly and place in position, taking

care that the three projections fit above the pressure plate and keyholes of the fuze.

- (d) Coat the inner face of the steel "base cover plate" and the inner face and threads of the screwed ring with thin lead-free luting, place the perforated portion of the cover plate centrally over the gascheck plate, and hold firmly in position whilst the screwed ring is engaged. Secure the clamping ring of the above-mentioned "apparatus, fixing base cover plates" on the shell by means of the four screw bolts provided, lay but do not engage the circular key of the apparatus over the cover plate and tightly clamp the perforated cover plate to prevent the gascheck moving, by screwing down the wood block. Insert the pins of the circular key of the apparatus into the slots of the screwed ring and screw the latter home, using the tommy provided, in the holes formed in the edge of the key.
- (e) Remove the apparatus, lubricate and insert the fixing screw.

BASE-FUZED SHELL—HOTCHKISS FUZES

146. Hotchkiss fuzes will, before insertion, be lubricated as laid down in para. 132, unless the fuze is to be fitted to a gunpowder-filled shell, in which case no thin lead-free luting is to be applied to the threads of the fuze.

B INSERTION OF FUZE-HOLE PLUGS, BASE PLUGS AND ADAPTERS

GENERAL INSTRUCTIONS

147. Plugs and adapters are to be lubricated as under before insertion into shell, the lubricants employed being "thick lead-free luting" and "thin lead-free luting."

148. When inserting or removing plugs or adapters, only such keys as are authorized for the particular operation are to be used.

149. Where set screws are provided for fixing the plugs or adapters, the threads of the set-screw will be lubricated with thin lead-free luting and, after screwing home, the recess over the screw will be filled with thick lead-free luting.

150.—(1) The plain surfaces of all fuze-hole and shell base plugs, also fuze-hole adapters, that will when in position in shell, be nearest to the explosive filling, must be coated with Cement R.D. No. 1, and allowed to dry before insertion. (See note to para. 131).

2*—(1724)

(2) In the case of adapters No. 9 for No. 44/80 fuzes and adapters No. 16 for No. 8 gaine, the cement will be applied to the entire plain surfaces, but in the case of adapters, 2-in. fuze-hole, No. 11 and No. 12, only the plain surfaces below screw threads are to be coated.

(3) When applying cement to the surfaces of components as directed, care must be taken to ensure that cement does not get on to the screw threads or any surface not authorized to be coated, or come in contact with safety shutters.

151. G.S. fuze-hole plugs and adapters without flanges.

—The threads, except the innermost three, will be coated with thin lead-free luting, the components screwed home and any excess of luting wiped off. A coat of paint of the same colour as the tip of the shell will be applied over the junction of plug and shell, when the latter is filled.

152. G.S. fuze-hole plugs with flanges and 2-in. fuze-hole plugs, having washers.

—If the washer is defective, or other than of leather, serviceable leather washers will be fitted. The threads, except the innermost three, will be coated with thin lead-free luting, and the plug screwed well home. Plugs, fuze-hole special, will be further secured by stabbing the lip of the flange into the fuze-hole bush or adapter in three places with a centre punch. The stabbing should be just sufficient to prevent the plugs unscrewing in transit, and the punch should be held at an angle of 60 degrees from the vertical, care being taken to avoid distorting the underface of the flange.

153. 2-in. fuze-hole plugs without washers, and flanged adapters.

—The threads, except the innermost three, will be coated with thin lead-free luting and a thick fillet of thick lead-free luting will be placed around the underside of the flange. The thick lead-free luting will be sufficient to fill the undercut under the flange and leave a surplus to be forced out when the components are screwed home. After screwing the plugs or adapters well home, the surplus luting will be wiped off.

154. Base plugs.—These will be lubricated and fixed in the same way as the corresponding fuzes. (See paras. 145 and 146.)

155. Burnt-out fuzes :—

Painting.—All burnt-out fuzes used as plugs, and all plugs, when in filled shell, will be painted the same colour as the body coat of the shell, except in the case of nose-fuzed powder-filled shell, when the plugs will be painted red.

SECTION V

EMPTYING SHELL

GENERAL INSTRUCTIONS

156. Only gunpowder-filled shell may be emptied locally.
157. Powder-filled shell are only to be emptied in a laboratory or detached building under the personal supervision of an I.O.O., ammunition examiner, or such other person as the I.O.O. may certify as being duly qualified.
158. The numbers of shell, explosive limits and restrictions during defuzing will be as laid down in para. 111.
159. When the fuze is removed in a separate building to that in which the shell is emptied, a service metal fuze-hole plug will be screwed in and the shell conveyed to the proper place to be emptied.
160. In removing fuzes from shell, only the appropriate service keys are to be used.
161. All shell, when emptied, will have any marking painted on them relating to the filling (including the red band), obliterated. They will then have the letter "E" and the monogram of the station stencilled in white paint on the head.
162. A certificate to the effect that the empty shell are free from explosive will be furnished on each copy of the voucher, inspection form, or examination order, by the I.O.O. or other officer, or responsible official of the ordnance factories supervising the emptying of the shell, to the ordnance officer on whose charge the shell are held. A copy, duly certified, of the form applicable will accompany the shell 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, the date of examination and the station.
- This certificate will be the authority of the ordnance officer as consignor, for certifying as free from explosive matter empty shell consigned to another depot or factory or to a contractor.

A. SHELL OTHER THAN SHRAPNEL

163. Remove the plug from the fuze-hole. Fill the shell with hot water, lay the plug on the fuze-hole, allow the shell to stand for 5 minutes and drain off the water; then again fill it with hot water, allowing it to stand for 15 minutes; extract the "Wad, fuze hole, G.S." and 7-dram primers, if present, with the "Hook, extracting exploders," and if there is a bag draw it out and untie the neck.

164. With shell 6-in. and above, place the special holder with trunnions over the shell, and fix it by means of the four screws at the centre of gravity of the shell. The shell will then be suspended by tackle attached to the trunnions of the holder so that it can be easily inverted.

165. Invert the shell, allowing the wetted powder and water to pour into a receptacle placed ready to receive it.

166. Continue alternately to pour in hot water (allowing it to remain in the shell for 5 minutes) and empty out the wetted powder and water, as in para. 165, until the charge is entirely removed.

167. The charge may be stirred and loosened with a wooden rod, after the second application of hot water.

168. If necessary, the copper scraper may be used to loosen the powder, but only when the shell is full of water. **The scraper is never to be applied to dry powder.**

169. Where a water-jet is installed, place the shell on the stand over the trough; insert the jet into the mouth of the bag and allow the water to play into it until the powder is out. Remove the bag and wash out shell with fresh water.

170. The shell will then be stood so as to allow the water to drain off, and finally will be wiped out with a piece of waste tied to a rod, and left to dry. Capped common pointed shell, which are fitted with container, will then be returned to C.O.O., Woolwich Arsenal, for repair.

171. When dry, examine the interior for broken or cracked lacquer and ascertain that the shell is completely empty of powder.

Particulars of a lamp suitable for this purpose may be obtained on application to the Chief Inspector of Armaments, Woolwich.

B. SHRAPNEL SHELL

172. (1)—Remove the fuze or plug and the shalloon or cambric disc. Turn the shell nose downwards, and tap it lightly with a mallet on the sides to cause the bursting charge to flow out of the central tube.

(2) If the whole of the bursting charge cannot be extracted in this manner, proceed as detailed in paras. 163 to 168, above. (Note, however, that a copper or brass wire must be used instead of a scraper.)

Since the powder is very liable to cake in the central tube or cup of shrapnel shell, especial care is to be taken to ascertain that the shell are completely free of powder before furnishing the certificate required by para. 162.

SECTION VI

MORTAR BOMBS

See Plate XXIV, Design D.D. (L) 485.

173.—(1) H.E. bombs may be found filled (a) Trotyl, (b) Amatol (*see*, generally, under shell filled Trotyl or Amatol).

A central cavity formed in the main filling houses a flanged metal or steel detonator sleeve; for a distance of 0.5 in. under the flange the sleeve is coated with Cement R.D. No. 1, and the mouth opened out by a centre punch to secure it in the head of the bomb.

Bombs are closed by means of a cap protecting spigot or fuze-hole plug.

(2) Bombs are normally packed in boxes together with the necessary components for firing, *i.e.*, detonators, fuzes, propelling charges, etc.

174. (1) Mortar bombs will be inspected annually. Five per cent. of the stock of packages containing bombs will be opened and a total of 1 per cent. of the bombs, representative of all the opened packages, taken for examination, unless the bombs are under two years of age from date of filling. (*See Pamphlets 5 and 6 regarding the examination of other component stores.*)

(2) The packages for examination are to be taken from all parts of the stack so as to ensure a representative selection, provided always that the same packages are not taken at successive inspections.

(3) If any of the bombs taken for examination are found to be defective, a further 4 per cent. will be examined, and if others are then found to be defective, *all* bombs of that particular type and date of filling will be examined.

(4) In the event of any serious deterioration in the bomb fillings, which, in the opinion of the I.O.O., renders the stores dangerous, particulars, including the date of filling and number

A. SHELL OTHER THAN SHRAPNEL

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164. With shell 6-in. and above, place the special holder with trunnions over the shell, and fix it by means of the four screws at the centre of gravity of the shell. The shell will then be suspended by tackle attached to the trunnions of the holder so that it can be easily inverted.

165. Invert the shell, allowing the wetted powder and water to pour into a receptacle placed ready to receive it.

166. Continue alternately to pour in hot water (allowing it to remain in the shell for 5 minutes) and empty out the wetted powder and water, as in para. 165, until the charge is entirely removed.

167. The charge may be stirred and loosened with a wooden rod, after the second application of hot water.

168. If necessary, the copper scraper may be used to loosen the powder, but only when the shell is full of water. **The scraper is never to be applied to dry powder.**

169. Where a water-jet is installed, place the shell on the stand over the trough; insert the jet into the mouth of the bag and allow the water to play into it until the powder is out. Remove the bag and wash out shell with fresh water.

170. The shell will then be stood so as to allow the water to drain off, and finally will be wiped out with a piece of waste tied to a rod, and left to dry. Capped common pointed shell, which are fitted with container, will then be returned to C.O.O., Woolwich Arsenal, for repair.

171. When dry, examine the interior for broken or cracked lacquer and ascertain that the shell is completely empty of powder.

Particulars of a lamp suitable for this purpose may be obtained on application to the Chief Inspector of Armaments, Woolwich.

B. SHRAPNEL SHELL

172. (1)—Remove the fuze or plug and the shalloon or cambric disc. Turn the shell nose downwards, and tap it lightly with a mallet on the sides to cause the bursting charge to flow out of the central tube.

(2) If the whole of the bursting charge cannot be extracted in this manner, proceed as detailed in paras. 163 to 168, above. (Note, however, that a copper or brass wire must be used instead of a scraper.)

Since the powder is very liable to cake in the central tube or cup of shrapnel shell, especial care is to be taken to ascertain that the shell are completely free of powder before furnishing the certificate required by para. 162.

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A central cavity formed in the main filling houses a flanged metal or steel detonator sleeve; for a distance of 0.5 in. under the flange the sleeve is coated with Cement R.D. No. 1, and the mouth opened out by a centre punch to secure it in the head of the bomb.

Bombs are closed by means of a cap protecting spigot or fuze-hole plug.

(2) Bombs are normally packed in boxes together with the necessary components for firing, *i.e.*, detonators, fuzes, propelling charges, etc.

174. (1) Mortar bombs will be inspected annually. Five per cent. of the stock of packages containing bombs will be opened and a total of 1 per cent. of the bombs, representative of all the opened packages, taken for examination, unless the bombs are under two years of age from date of filling. (*See Pamphlets 5 and 6 regarding the examination of other component stores.*)

(2) The packages for examination are to be taken from all parts of the stack so as to ensure a representative selection, provided always that the same packages are not taken at successive inspections.

(3) If any of the bombs taken for examination are found to be defective, a further 4 per cent. will be examined, and if others are then found to be defective, *all* bombs of that particular type and date of filling will be examined.

(4) In the event of any serious deterioration in the bomb fillings, which, in the opinion of the I.O.O., renders the stores dangerous, particulars, including the date of filling and number

of bombs involved, will be reported at once, *by telegram*, to the Chief Inspector of Armaments, Royal Arsenal, Woolwich, S.E.18, and the bombs concerned will be isolated pending instructions.

175. It is particularly important, especially where for any reason bombs are sentenced "unserviceable," that the report of inspection should contain a full and accurate record of all the stencilled markings on the bomb and of the relevant circumstances.

176.—(1) The examination of all filled bombs will, whenever possible, be carried out in the inner room of a laboratory. Where no laboratory exists, however, a building or tent may be used which must be situated at a safe distance from the magazines or explosives stores, and magazine conditions must be observed as far as possible.

(2) The number of bombs allowed in the inner room of the laboratory at one time must not exceed the following limits :—

<i>Under examination</i>	<i>Awaiting examination</i>
3	3

The number of bombs in the outer room should normally not exceed double the number in the inner room.

177. **External examination.**

(a) Before internal examination is begun, bombs are to be visually examined externally to ascertain if :

- (i) They are free from rust.
- (ii) The varnish (or paint) and markings are in good condition.
- (iii) The guides and propellant containers are free from corrosion or damage, and all machined surfaces free from burrs.
- (iv) There are any signs of exudation (*see paras. 61 and 64*) at the head or base.

Bombs suffering from exudation must have the exudation cleaned off with a sponge cloth, and those with base exudation are to be provisionally sentenced "unserviceable."

When necessary such repairs as can be effected locally (*see paras. 27 and 28*) will be carried out.

(b) In all cases the external condition of the bombs and the percentage examined will be recorded on the "Report of Inspection," and, in the case of defects beyond local repair, a recommendation as to subsequent action made.

178. Special precautions.

- (a) No undue force is to be used in removing the "cap protecting spigot" or "plug fuze-hole." Should any plug or cap be so damaged or set fast as to render its removal impossible by the normal methods, the bomb concerned must be set aside and provisionally sentenced "unserviceable."
- (b) The rules and precautions for T.N.T. workers (*see* para. 40 (5)) are to be observed.
- (c) **Before any other inspection of the filling is undertaken, the bombs are to be examined to see if they contain detonator systems.**—If any are so found, the detonators are to be removed and must not subsequently be fitted into the bomb after examination, unless special orders to this effect have been given.

179. Internal examination.

- (a) If exudation is present, the bombs will be treated generally as for H.E. shell exudation (paras. 61 to 65).
- (b) Where there is no exudation, if verdigris is present on the detonator sleeve the bomb will be sentenced "unserviceable."
- (c) Search the detonator sleeve with a wood or copper scraper to ascertain if there is a detonator present, and if so remove it; examine also for the presence of the cotton-wool plug and for any corrosion of the sleeve. Any found with appreciable signs of corrosion are to be sentenced "unserviceable."

180. Before closing bombs, the threads of the cap protecting spigot are to be coated with a thin coating of thin lead-free luting, care being taken that the luting is not applied on the innermost threads.

181.—(1) All bombs that have been *internally* examined will be stencilled—

"EXD." and date and monogram of station, such particulars replacing those of any previous examination.

(2) All bombs that have been *externally* repaired (which includes repainting) will be stencilled—

"REPD." and date and monogram of station.

182. Packages whose contents are found to be serviceable will be reclosed, using fresh packers and station labels, and marked "EXD." with date and monogram of station, such particulars replacing those of any previous examination. Other markings on packages will be brought up to date as and when necessary.

SECTION VII

H.E. GRENADES*(See Plates XXV and XXVI.)*

183.—(1) H.E. grenades of the No. 36M type may be met with filled : (a) Trotyl, (b) Baratol.

(2) The No. 54 Grenade is filled Baratol.

(3) Grenades are normally packed in boxes together with the necessary components for firing, *i.e.*, detonators and cartridges.

(4) In the event of any serious deterioration in the fillings of the grenades, which, in the opinion of the I.O.O., renders the stores dangerous, particulars, including a full record of all stencilled markings on grenades and packages, and the number of grenades involved, will be reported at once, *by telegram*, to the Chief Inspector of Armaments, Royal Arsenal, Woolwich, S.E.18, and the grenades concerned will be isolated pending instructions.

184.—(1) Grenades will be inspected annually. Three per cent. of the packages containing each nature of grenade are to be opened and a total of 1 per cent. of the grenades representative of all the opened packages taken for examination, unless the grenades are under two years of age from date of filling (*see Pamphlets 5 and 6 regarding the percentage examination of other component stores*).

(2) The packages for examination are to be taken from all parts of the stack so as to ensure a representative selection, provided always that the same packages are not taken at successive inspections.

(3) If any of the grenades taken for examination are found to be defective, *all* those in the packages opened will be examined, and if others are then found to be defective, all grenades of that filler and date will be examined.

185. It is particularly important, especially where grenades are sentenced "unserviceable," that the report of inspection should contain a full and accurate record of all the stencilled markings on the grenade and package, and of the relevant circumstances.

186. Special precautions :—

(a) The type of building for use during the examination of filled grenades will be as detailed in para. 176 (1).

(b) **The first operation in connection with the examination of grenades will be to remove**

the base plug and ascertain that they are not fitted with detonator sets (*see also* para. 188 (b)).

187. External examination.

Before internal examination is begun, grenades will be visually examined externally to ascertain if—

- (a) They are free from rust.
- (b) The varnish (or paint) is in good condition.
- (c) There are any external signs of corrosion or exudation at the base plug or filling hole plug (*see* paras. 61 and 64).

Any suspected Trotyl exudation will be treated as described in paras. 62 and 63.

When necessary such repairs as can be effected locally (*see* para. 29) will be carried out.

- (d) The wax sealing on the striker is intact (36M type grenade). A few grenades should be tested to see if the striker functions correctly; should they not do so, all striker mechanisms must be stripped and cleaned. All those in which the sealing has been broken will be resealed with a special waterproofing composition which will be supplied, on demand, by R.A.O.C., the purpose for which the composition is required being stated on the demand.
- (e) The guides are free from burrs, damage on corrosion (No. 54 type).

188. Internal examination.

- (a) The rules and precautions for T.N.T. workers (para. 40 (5)) are to be observed.
- (b) No undue force is to be used in removing the base plugs, particularly where Trotyl exudation is suspected. If Trotyl exudation is observed in the threads of the base or filling hole plugs the grenade will be provisionally sentenced "unserviceable," and subsequently destroyed by dropping into deep water or otherwise as directed in R.A.O.S., Part II, Pamphlet No. 4.
- (c) The detonator chambers and centre pieces will be carefully examined for any traces of exudation, verdigris or corrosion.

Any grenades which are found to have the centre piece, striker or detonator chamber corroded, rusted or affected by verdigris will be provisionally sentenced "unserviceable" and subsequently disposed of as at (b) above.

- (d) Particular search is to be made for any deposit of coloured crystals in the detonator chamber ; any so found are to be sentenced " unserviceable."

189. Packages whose contents are found to be serviceable will be reclosed, using fresh packers and station labels, and marked " EXPD." with date and monogram of station, such particulars replacing those of any previous examination.

Other markings on the packages will be brought up to date as and when necessary.

APPENDIX I

LIST OF STORES REQUIRED FOR THE EXAMINATION,
REPAIR AND CLOSING OF SHELL

(See also Appendix II, Pamphlet No. 11.)

Store	No.
V.A.O.S. Section F	
Brush, sash tool, No. 2	As required.
Section H 1	
Bottles, glass-stoppered, narrow mouth, $\frac{1}{2}$ pint	As required.
Methylated spirit, industrial	*As required.
Section Q 2	
Adapters, 2-in. fuze-hole, No. 2 (for use with " Pump, extracting explosives ")	1
Implements, ammunition—	
Keys—	
No. 5	1
No. 8	1
No. 32	1
No. 48	1
No. 53	1
No. 69	1
No. 93	1
Pincers, removing H.E. shell exploders	1
Luting—	
Lead-free, thick lb.	As required.
" " thin "	As required.
Section R 2	
Screws, fixing fuze	As required.
Section S 1	
Exploders, shell	As required.
Section S 2	
Drivers, grummet	1
Gauge, depth fuze-hole, base percussion fuze—	
No. 1	1
No. 2	1
No. 3	1
No. 4	1
Gauge, depth fuze-hole, filled H.E. shell—	
No. 1	1
No. 2	1
Grummetts	As required.
Section U	
Apparatus, testing gunpowder—	
Balances	1
Forceps, weights, grain pair	1
Funnels, glass	1
Glasses, common pairs	6
" watch	6
Lamps, spirit	*1
Mortars	1
Ovens, water.. .. .	1
Pestles	1
Spatulas	2
Stands	1
Thermometer, Mk. II	2
Weights, grain set	1

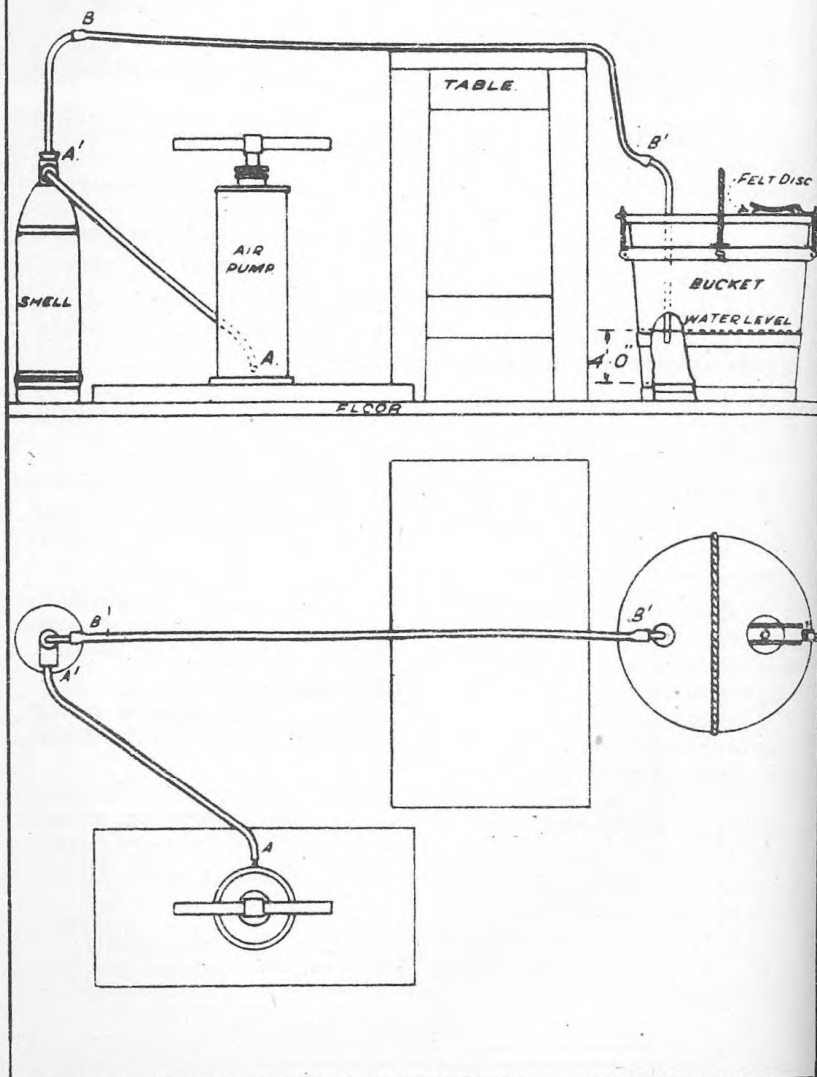
* Only required when gas is not available.

Store	No.
Section U— <i>continued</i>	
Brace, magazine, Mk. III	1
Cement, R.D. No. 1, lead-free lb.	As required.
Cylinder, No. 6	As required.
Funnels, exploder, lyddite shell	1
Gauges—	
Depth of cavity, filled H.E. shell—	
No. 1	1
No. 2	1
No. 3	1
Depth of cavity, filled H.E. or smoke shell, No. 6 ..	1
Implements, ammunition—	
Apparatus, fixing base cover plates, A.P. shell—	
Spanners, $\frac{1}{2}$ -in. and $\frac{3}{4}$ -in.	1
Tommies, $\frac{5}{8}$ -in. dia.	1
Apparatus, fixing base cover plates, A.P. shell, No. 3—	
Clamps { 9.2-in.	1
6-in.	1
Crossbars { 9.2-in.	1
6-in.	1
Keys, perforated plate	1
" screwed ring { 9.2-in.	1
6-in.	1
Nuts, fixing perforated plate key	1
Screws, adjusting screwed ring key	1
Apparatus, fixing base cover plates, A.P. shell, No. 4—	
Clamps	1
Crossbars	1
Keys, base plate	1
" screwed ring	1
Nuts, fixing base plate key	1
Screws, adjusting screwed ring key	1
Hooks, extracting exploders	1
Keys—	
No. 6	1
No. 21	1
No. 79	1
Mallets, common	1
Punches, stabbing H.E. shell plugs	1
Tongs	1
Tools, compressing exploders in shell	1
Levers, grummet	1
Models, points, A.P. projectiles—	
No. 1	1
No. 2	1
No. 3	1
Pincers, magazine pair	1
Pumps, extracting explosives	1
Adapters—	
Large base fuze-hole	1
Medium base fuze-hole	1
Buckets	1
Valves for shell	1
Rods, inserting exploders, H.E. shell	1
Wadmiltits	As required.
Section V 2	
Glass, reading, No. 1	1



Appendix II.

DIAGRAMMATIC SKETCH OF APPARATUS
APPARATUS FOR REMOVING LOOSE EXPLOSIVE
FROM SHELL CAVITIES

TYPICAL

APPENDIX II

APPARATUS FOR REMOVING LOOSE EXPLOSIVES FROM
SHELL CAVITIES

1. Place the shell in a vertical position, remove the plug or fuze, insert a G.S. fuze-plug (without flange) and clean the recess of the brush; then remove the G.S. plug, clean the fuze-hole and extract the exploder.

2. Pour into the bucket sufficient water to give a depth of 4 in., fasten on the lid and moisten the felt disc.

3. Set up the apparatus as shown on the diagram, connecting the delivery tube A of the pump to the inlet tube A of the valve, and the delivery tube B of the valve to the delivery tube B of the bucket by means of the rubber tubing. Adjust the vulcanite tube to the appropriate cavity depth, as shown by the engraved lines on the table.

4. Fit the apparatus to the shell by placing the valve carrying the vulcanite tube in the fuze-hole and secure it by giving a partial turn to the right.

5. The loose debris in the cavity can now be removed by taking three sharp strokes with the pump, then pause a few seconds; repeat this operation three times.

6. Remove the valve with tube from the fuze-hole and test the cavity with a wooden rod. Should the cavity be found soft, replace the valve and repeat as in 5 until the cavity is clear.

7. Gauge the depth of cavity by means of the appropriate gauge; if high to gauge insert a sufficient number of glazed-board discs to bring it to the correct depth, insert suitable exploders and close the shell (*see* Section IV).

NOTES.—(a) At the end of each day the contents of the waste bucket must be disposed of and the bucket washed out with clean water.

(b) At the end of each week, or before the apparatus is put aside pending further use, the pump should be taken to pieces and cleaned to prevent the possibility of the accumulation of explosive debris in the barrel. The valve and tubing should also be thoroughly cleaned.

(c) The parts can be cleaned by boiling in water containing 5 per cent. of washing soda.

APPENDIX III

DEAD WEIGHT LIMITS OF SHELL

Calibre	Normal weight	Dead weight limits
9-2-in. gun	380 lb.	{ H. 380 lb. 6 oz. L. 379 lb. 10 oz.
6-in. gun	100 lb.	{ H. 100 lb. 1 oz. 10 dr. L. 99 lb. 14 oz. 6 dr.
4-7-in.	45 lb.	{ H. 45 lb. 0 oz. 12 dr. L. 44 lb. 15 oz. 4 dr.
4-in. "light"	25 lb.	{ H. 25 lb. 0 oz. 6 dr. L. 24 lb. 15 oz. 10 dr.
12-pr.	12 lb. 8 oz.	{ H. 12 lb. 8 oz. 3 dr. L. 12 lb. 7 oz. 13 dr.
6-pr.	6 lb.	{ H. 6 lb. 0 oz. 1½ dr. L. 5 lb. 15 oz. 14½ dr.
3-pr.	3 lb. 4 oz. 15½ dr.	{ H. 3 lb. 5 oz. ½ dr. L. 3 lb. 4 oz. 14½ dr.

APPENDIX IV

WEIGHTS OF FUZES AND ADAPTERS

Nature	Weight
Fuze, base, medium, No. 12	lb. oz. dr. 1 8 12
" " " " 500	1 8 12
" " " " 501	1 12 14
" " large, " 11	2 10 8
" " " " 15	2 9 0
" " " " 16 and 16D	2 8 8
" " " " 346	2 12 12
" " " " 480	2 12 12
" perc., No. 13 (without cap)	9 12
" " " 18 " "	10 13
" " " 44 " "	8 0
" " " 45 and 45P (without cap)	10 3
" " " 101 type, with gaine, No. 2	2 11 0
" " " 106 (without cap)	2 1 0
" " " 106E (without cap)	2 0 0
" " " 116	2 5 8
" " " 117	2 8 0
" " " 230	2 5 0
" time, " 188	1 9 6
Adapter, No. 2, Mk. II { Metal	1 0 0
{ Steel	1 0 0
{ C.I.	14 0
" " 2, " III { Metal	1 4 0
{ Steel	1 2 0
{ C.I.	1 1 0
" " 23	2 2 0

APPENDIX V

INSTRUCTIONS FOR THE REMOVAL OF DAMAGED COMPRESSED TROTYL EXPLODERS

NOTE.—Only Trotyl exploders in shell filled other than Lyddite and Shellite may be removed by this special method.

1. The special implements required for this operation are—
Apparatus, repairing H.E. shell fillings—
Guide, 2-in. fuze-hole, Mk. I.
Brace, magazine, Mk. III.
Bit, removing trotyl exploders from H.E. shell, Mk. I.
Gouge clearing exploder cavity, 0.75-in.
Tongs (*see* Appendix I).

2. Screw the guide into the 2-in. fuze-hole and adjust the pin in the stock of the bit to suit the depth of cavity, 5.5-in. for the 5.6-in. cavity, 6.1-in. for the 6.3-in. cavity.

In exploder container designs the setting of 6.1 is always to be used, but, where there is any doubt as to the depth of the cavity, the shorter setting of 5.5-in. must invariably be used.

It is particularly important that in designs having a paper tube the latter should not be pierced or damaged.

3. Insert the bit, with brace attached, into the guide and carefully and steadily bore out the compressed exploder. When the guide pin comes down against the guide, cease boring, withdraw the brace and bit and unscrew the guide.

4. With the gouge carefully detach any remnants from the walls of the cavity, and then remove any loose debris from the cavity by means of the tongs, or, if necessary, the method detailed in Appendix II may be used.

APPENDIX VI

INSTRUCTIONS FOR LOCAL REPAIR OF DAMAGED FILLINGS OF TROTYL OR AMATOL FILLED H.E. SHELL

Local Repair with Lead-free Paraffin Wax

1. Where no facilities exist for repair with liquid trotyl, broken fillings may be repaired locally by I.O.Os. as under.

2. The lead-free paraffin wax required can be obtained on demand from R.A.O.C., the purpose for which it is required being stated on the demand.

Suitable formers are to be provided locally, hard wood or aluminium being the best materials for the purpose.

3. Repair—

- (a) Remove exploders from cavity.
- (b) Pack into position, or remove, any loose fragments of the filling (the quantity of explosive removed should be as small as possible).
- (c) Pour in sufficient molten paraffin wax to repair the cavity and to fill up all interstices between broken fragments of the filling.
- (d) Insert the former so as to force the molten wax around and on top of the cavity, and leave it in position.
- (e) As soon as the paraffin wax has cooled and solidified, remove the former carefully, and with a wooden spatula detach any surplus wax from the top of the exploder cavity.
- (f) Ascertain that the cavity is free from surplus wax or debris, gauge depth of cavity, insert exploders as necessary and close the shell (*see* Section IV).

4. Shell repaired by this method will be stencilled—"RPW," with monogram of station and date of repair (day, month and year). The numbers so treated will be recorded on the Report of Inspection.

APPENDIX VII

INSTRUCTIONS FOR LOCAL REPAIR OF A.P.C. SHELL FILLED LYDDITE OR SHELLITE

Local Repair with Lead-free Beeswax Composition

1. Shell filled as above which at examination are found to have a space 0.4 in. or less between the filling and the adapter may be repaired locally by I.O.Os. as under.

2. The lead-free beeswax composition required can be obtained on demand from R.A.O.C., the purpose for which it is required being stated on the demand. Suitable formers are to be provided locally, hard wood or aluminium being the best materials for the purpose.

3. Repair—

- (a) Using a wooden spatula, turn back the paper tube and gauge the distance from the underside of the adapter to the surface of the filling. If this distance does not exceed 0.4 in., remove the exploder from the cavity.
- (b) If the paper tube is damaged by the removal of the exploder or otherwise, it must be entirely detached by means of the wooden spatula.
- (c) Insert into the cavity a " former " with a draw string attached to its top face, which is to be positioned at a maximum distance of 0.3 in. from the underside of the adapter.
- (d) Pour in sufficient molten beeswax composition to fill completely the space between the adapter and the filling.
- (e) As soon as the composition has cooled and solidified, cut through the beeswax round the fuze-hole by means of the spatula and remove the former by the draw string.
- (f) If the paper tube has been removed, insert a new serviceable tube, ascertain that the cavity is free from debris, gauge depth of cavity, insert the exploder and " close " the shell (*see* Section IV).

4. Shell repaired by this method will be stencilled—"RPB," with monogram of station and date of repair (day, month and year). The numbers so treated will be recorded on the Report of Inspection.

APPENDIX VIII

LIST OF SERVICE PLUGS

Plug	Use
Plug, 2-in. F.H.—	
*No. 1	Shrapnel shell, 18-pr. and below (except 3-in. 20-cwt.). Star shell, 4.5-in. and 3.7-in. How. Practice projectiles filled powder or weighted.
*No. 2	Shrapnel shell, 3-in. 20 cwt. and above (except 18-pr.). Star shell, 6-in. How. Practice projectiles filled powder or weighted.
No. 3	H.E. shell fitted for fuze and gaine No. 2 or fuze with exploder "B."
No. 12	H.E. and target shell filled for fuze and gaine No. 8.
No. 13	H.E. and smoke shell explodered for No. 106 type fuze.
No. 15	H.E. shell 6-in. gun, fitted for gaine No. 9.
No. 16	H.E. and target shell fitted for fuze and gaine No. 8 (shell fitted with this plug have adjusting washers inserted ready for fuzing).
Plug, F.H., special—	
*No. 1	H.E. shell with G.S. fuze hole explodered for No. 13 or 44 fuze, also practice projectiles with G.S. fuze-hole, filled powder or weighted (except shrapnel).
No. 3	H.E. shell with G.S. fuze-hole explodered for No. 18, 45 or 45P fuze, also practice projectiles with G.S. fuze-hole, filled powder or weighted (except shrapnel). Practice projectiles with G.S. fuze-hole, filled powder or weighted.
*Plug, F.H., G.S., with loop } *Plug, F.H., G.S., without loop } Adapter, 2-in. F.H., No. 2, with plug F.H. Special—	
No. 1	H.E. and smoke shell explodered for Nos. 13, 44 or 106 type fuze.
No. 3	H.E. shell explodered for Nos. 18, 45 or 45P fuze.

NOTES.—* Iron plugs will not be fitted in projectiles to be fired "plugged."

The following plugs are not "lead-free," and must not be used for plugging shell filled lyddite—

Plug, F.H.—

Nos. 1 and 2

Special No. 1, Mks. I and II.

G.S., with and without loop.

Plug	Use
Plugs, base, shell—	
No. 1—	
Converted, Mk. V—Class C	Converted No. 11 or 15 base fuzes. For shell taking large base fuze, except Nos. 15, 159, 346 and 480 ; B.L. or Q.F. 6-in. and above.
Mk. IM—Class B	
Mk. IIM—Class B	
Mk. IIS—Class B	
No. 2—	
Converted—	
Mk. V—Class C	Converted No. 12 base fuze. Converted No. 12 special base fuze.
Mk. VI—Class C	
Mk. IM—Class B	For shell taking medium base fuze; Q.F., 4-7-in. to 12-pr.
Mk. IIM—Class B	
Mk. IIIM—Class B	
Mk. IVM—Class B	
Mk. IVS—Class B	
Mk. VM—Class B	
Mk. VS—Class B	
No. 3—	
Converted, Mk. II—Class C	Converted Hotchkiss base fuze.
Mk. IM—Class B	For shell taking Hotchkiss type fuze.
Mk. IS—Class A	
Mk. IIF—Class D	
No. 4—	
Mk. IF—Class D	For pointed shell ; B.L. or Q.F., 6-in. and above.
Mk. IM—Class D	
Mk. IS—Class D	
No. 5—	
Mk. IF—Class D	For pointed shell ; Q.F., 4-7-in. to 12-pr.
Mk. IM—Class D	
Mk. IS—Class D	
No. 6—	
Converted, Mk. III—Class C	Converted No. 16 base fuze.
Mk. IM—Class B	For shell taking large base fuze.
Mk. IS—Class B	
No. 9—	
Mk. IS—Class A	For shell taking medium base fuze No. 500.
No. 10—	
Mk. IS—Class A	For shell taking medium base fuze No. 501.
No. 11—	
Mk. IS—Class A	For shell taking large base fuzes Nos. 159, 346, and 480.
No. 12—	
Mk. IS—Class A	For shell taking large base fuze No. 16.

APPENDIX IX

INSTRUCTIONS FOR THE APPLICATION OF THE ETCHING OF (UNCAPPED) A.P. SHELL AND A.P. PRACTICE PROJECTILES, FOR DETERMINATION OF SEASON CRACKS.

(Referred to in para. 84)

Scraping and Cleaning

The shell will be thoroughly scraped free of paint down to 2 inches below the shoulder, if the painting on the body is in good condition ; if not, the scraping will be continued down to the driving band.

The head of the shell, from the point to 2 inches below the shoulder, will then be well polished by means of emery cloth, preferably fixed to suitable wooden strips.

Examination of the Surface

The cleaned surface will be examined visually for cracks, those found cracked being sentenced unserviceable.

Those found to show no signs of cracks at this stage will be treated as follows :—

Preparation of Acid Bath for Etching (*see precautions*)

A solution of 15 per cent. of nitric acid (1.42 S.G.) to 85 per cent. of water by volume (1 of acid to $5\frac{2}{3}$ of water) will be made up in a porcelain or earthenware bath as follows:—

- (a) A suitable quantity of water will first be poured into the vessel.
- (b) The requisite quantity of acid will then be *slowly* added, the solution being constantly stirred with a wooden rod or stick while this is being done.
- (c) The solution will then be allowed to cool.

Suspending the Shell and Etching

The shell to be etched will be suspended vertically (nose downwards) by means of suitable tackle.

The shell will be lowered into the bath until the head is partly submerged in the solution.

The solution will be frequently but gently stirred, and applied evenly and continuously to the head of the shell with a brush, care being taken to keep the steel as free as possible from black deposit.

The process will be continued for approximately 50 minutes, after which the head of each shell will be thoroughly washed and scrubbed with *clean* water and wiped dry.

It will then be further cleaned and dried with acetone.

Examination for Cracks

The etched shell will be lowered on to skids or a suitable bench and left till the following day when they will be examined visually for cracks.

Any shell exhibiting cracks will be sentenced unserviceable.

Repainting and Stencilling

When the examination of a batch of shell is completed, the scraped surfaces on the shell found free from cracks will be painted with the appropriate service colour and the stencilling brought up to date.

Renewal of Nitric Acid Solution

The nitric acid solution will be renewed from time to time ; the necessity for this will be indicated by the absence of, or slow, action on the steel.

Disposal of Solution

Spent solution will be well diluted with water before being poured away to waste, in open ground. It must not be poured into main drainage systems.

Precautions

The acid will always be added to the water ; *not* water to acid.

Nitric acid is dangerous and contact with it will cause severe burns to flesh or clothing, so that every care in handling it must be taken. Men employed on this work must wear protective clothing. In the event of an operator sustaining a burn, the burnt part should be washed at once with plenty of water followed by the application of sodium bicarbonate solution to remove adhering acid and the fact reported to the officer in charge.

Splashes of acid or of the acid solution which fall on to the surrounding floor must be well watered.

When not in use, the bath used for the solution must be covered over with a wooden lid, which should be provided for the purpose.

Brushes must be cleaned by being thoroughly rinsed in water before they are put away. Surplus water must be removed from the brushes after rinsing.

No smoking will be allowed in the vicinity of this work.

Filled Shell

When the operation is carried out on filled shell, the men employed thereon will be subject to the regulations governing the building.

General

Approximately $1\frac{1}{2}$ pints of acetone (in glass bottles) and $2\frac{3}{4}$ pints of nitric acid (in glass bottles) are required to complete 100 shell.

An 8-oz. bottle of picric acid solution should always be available for application to flesh burns.

The protective clothing will consist of the following items:—

Clogs, W.D. vessels .. Section C.D., Vocabulary of Clothing and Necessaries.

Aprons, lasting cloth .. }
Gloves, gauntlet, rubber .. } N.I.V.
Goggles }

APPENDIX X

(Referred to in para. 142)

SHELL, B.L., H.E., 9.2-in. GUN, MK. XIII A
LANDWARD FIRINGS

INSTRUCTIONS FOR CONVERSION BY REMOVAL OF "ADAPTER,
2-IN. FUZE-HOLE, NO. 2" AND REPLACEMENT OF "PLUG,
FUZE-HOLE, SPECIAL, NO. 3," BY "PLUG, FUZE-HOLE,
2-IN., NO. 3," IN PREPARATION FOR FUZING NO. 117.

STORES REQUIRED

V.A.O.S. Section S2

Plugs, fuze-hole, 2-in., No. 3, Mk. V*F or	
VIF	.. 1 per shell
Washers, leather, lubricated, 2.35-in. ..	.. 1 per shell

Section H1

Paint, prepared for use—

Black, ammunition, lead free	.. as required
Buff, ammunition, lead free	.. as required

Section Q2

Luting, lead free—

Thick, Mk. IV	.. as required
Thin, Mk. V	.. as required

Section U

Cement, R.D., No. 1, lead free	.. as required
--------------------------------------	----------------

PRELIMINARY.

1. The atmosphere of the room in which the deplugging and replugging is carried out must be quite dry, to prevent moisture entering the shell while operations are in progress.

2. Only one shell will be deplugged and replugged at a time.

3. The "Plugs, fuze-hole, 2-in., No. 3" must be coated on their plain portions below the screw-threads with "Cement, R.D., No. 1, lead free", and arrangements must be made for sufficient time to elapse to ensure that the cement has thoroughly dried before the plugs are used.

4. The plugs will be fitted with the "Washers, leather, lubricated, 2.35-in.", which must sit down under the flange.

5. The washers must be in a thoroughly serviceable condition.

CONVERSION

1. Shell filled to designs R.L. 23929, 23929A, 23894A, B or C and 27222A, B or C, when ordered to be prepared for landward firings, will be converted as follows :—

- (a) Remove " Plug, fuze-hole, special, No. 3 ".
- (b) Remove fixing screw. Take care not to damage screw-threads with screwdriver.
- (c) Remove " Adapter, 2-in. fuze-hole, No. 2 ".
- (d) Remove lubricant from fuze-hole screw-threads, using a clean dry cloth.
- (e) Remove top exploder " D ".

2. The cavity will then be gauged, and, if less than 3.85-in., the bottom exploder must be compressed, using " Implements, ammunition—Tool, compressing exploder in shell " until the required depth is obtained.

3. Coat the threads, except the bottom three, of the " Plug, fuze-hole, 2-in., No. 3 ", with " Luting, lead free, thin, Mk. V ", place " Washer, leather, lubricated, 2.35-in." in position, insert in shell and screw securely home. A little thin luting will be placed in the fixing screw hole and the fixing screw replaced and lightly screwed home; the space behind the fixing screw will be filled in with " Luting, lead free, thick, Mk. IV ".

4. Remove existing fuze markings and stencil on head " USE 117 FUZE ".

LIST OF PLATES

Plate	Design No.	Description
I	16693	Method of filling, Shell B.L. or Q.F., H.E., 4-7-in. and 12-pr., except 4-5-in. How.—Typical.
II	16992.A	Method of converted filling, Shell, B.L., or Q.F., H.E., 6-in. gun.
III	20844.B	Method of filling—Shell, B.L. or Q.F., H.E.—Typical, lyddite for coast defence.
IV	861 22222 22223 23929	„ B.L. or Q.F., H.E., 12-pr., 4-in. and above. Paper tube design.
V	23865.A 23865.B 23865.C	„ H.E., 4-5-in. to 9-2-in. Paper tube design.
VI	23894.A 23894.B 23894.C 27222.A	„ H.E. 3-7-in. to 9-2-in. Exploder container design.
VII	23929.A	„ filled lyddite, 12-pr. and above for coast defence.
		„ filled lyddite, 3-7-in. and above for field service.
		„ filled trotyl, 12-pr. and above for coast defence.
		„ filled amatol, 12-pr. and 3-7-in. to 9-2-in.
VIII	24018	Method of Block filling, shell, Q.F., H.E., 18-pr. and 13-pr.
IX	24539 4976	Rectified H.E. shell, 13-pr. and above, filled amatol, trotyl or lyddite.
		Method of filling—
X	27924.A	Shell, B.L., H.E., streamline, 6-in. How.
XI	4052	„ B.L., H.E., 6-in. gun, Mk. XXVI/XXB.
XII	25529.A	„ Q.F., H.E., anti-aircraft—Typical, fused No. 44/80.
XIII	26947 4153	„ Q.F., H.E., anti-aircraft—fitted gaine No. 8.
XIV	21747	„ shrapnel—Typical.
XV	27933	„ Q.F., smoke, 4-5-in. How. Double diaphragm type.
XVI	25018.A 25018	„ Q.F., smoke, 18-pr. Charged phosphorus in tinned-plate container.
XVII	27268 24907	„ Q.F., smoke 4-5-in. How. Charged phosphorus.
XVIII	26586	„ star with parachute—Typical.
XIX	25562	„ B.L., A.P.C., 6-in. gun. Filled lyddite.
XX	3876	„ Q.F., A.P., 3-pr. 2-cwt. Filled lyddite fitted with tracer fuze.
XXI	12474.B	„ Q.F., steel, filled powder.
XXII	25755	„ Q.F. common pointed, filled powder.
XXIII	669	„ B.L., A.P. or A.P.C., 6-in. and 9-2-in., filled powder.
XXIV	485	Bomb, M.L. 3-in. mortar, cylindrical type.
XXV	IDW(TW)359	Grenade, .303-in. rifle, No. 36 or 36M, fitted with gas-check plate.
XXVI	DD(L)1266	Grenade, percussion, 2-in., No. 54.
XXVII	CIA(A)250	Weight marking on filled shell for field service.

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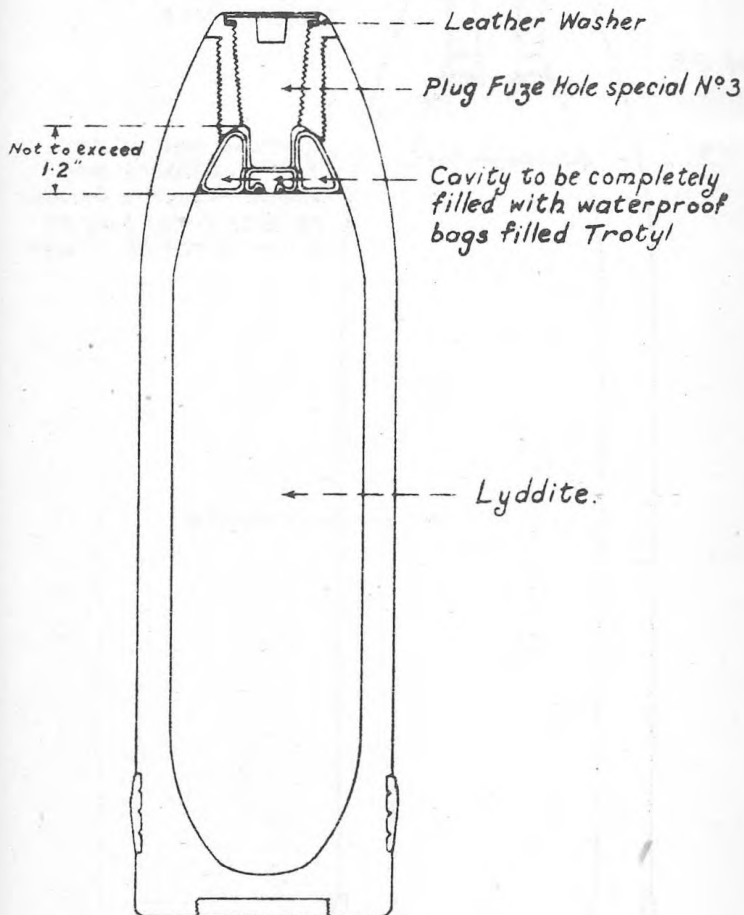
METHOD OF FILLING:-

SHELL B.L. OR Q.F. HIGH EXPLOSIVE.

TYPICAL 4.7 IN. TO 12 P^{DR} EXCEPT 4.5 IN. HOW^R

OBSOLEScent TYPE.

Design N^o 16693.



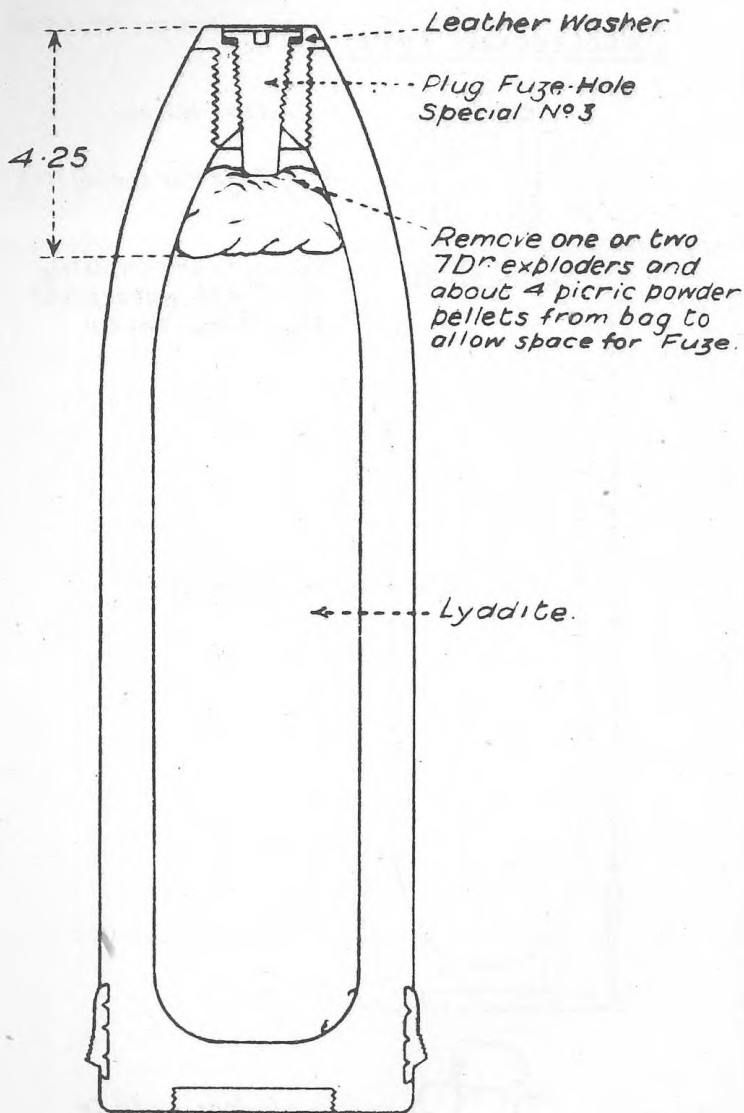
PLAN OF
EXPLODERS.



Exploders, Lyddite,
Shell bag Trotyl.

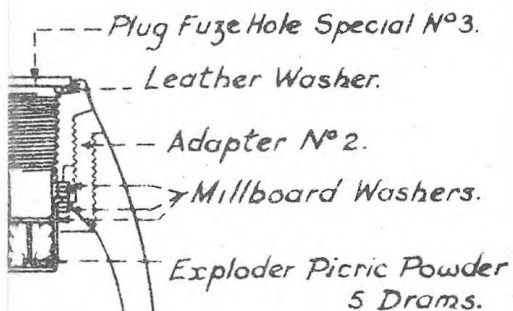
METHOD OF CONVERTED FILLING
SHELL, B.L. OR Q.F. H.E. 6 INCH GUN.

R.L. Design N°16992A.



FENCE

Design D.D. (L) 861.

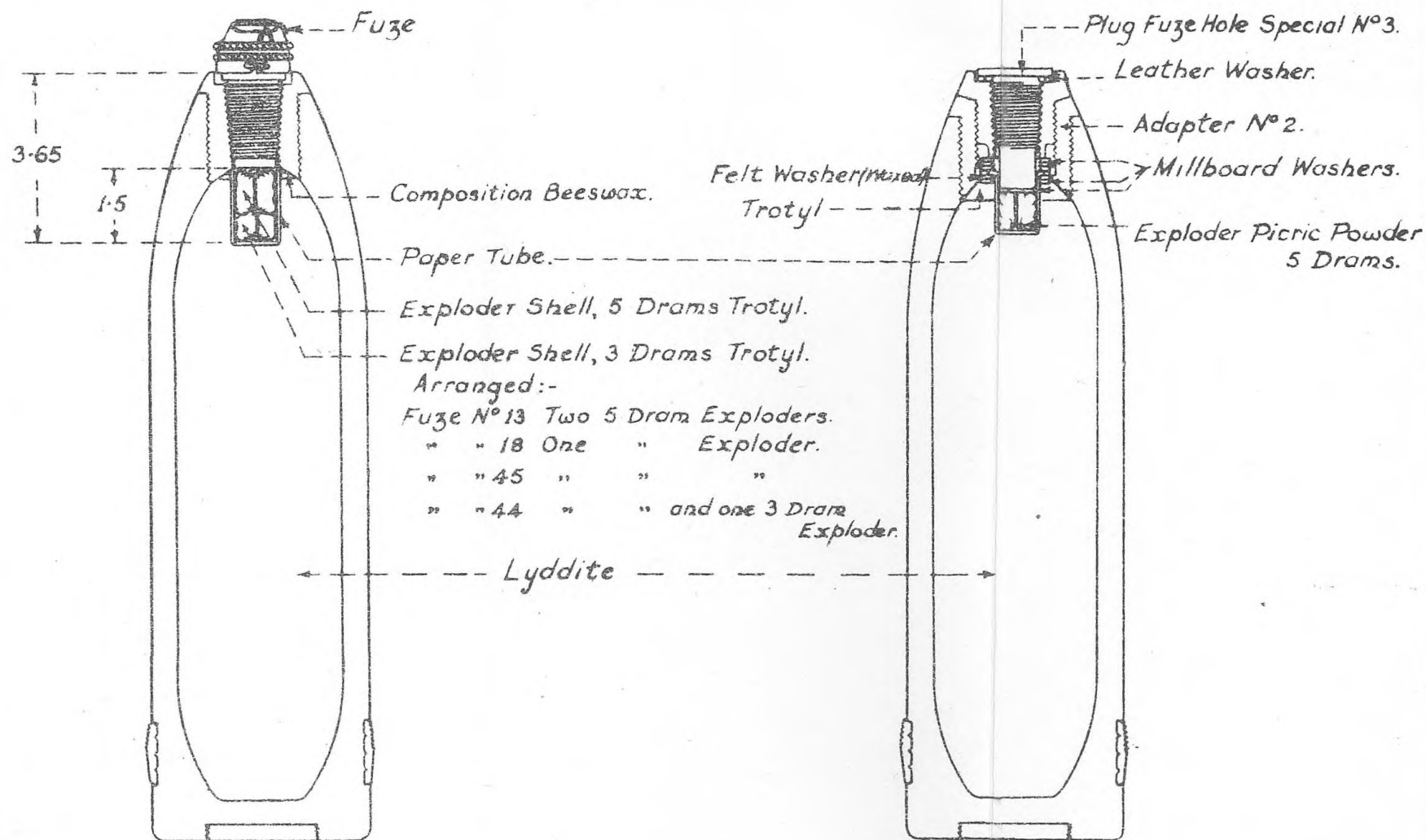


METHOD OF FILLING :- SHELL
B.L. OR Q.F. HIGH EXPLOSIVE, COAST DEFENCE

Design R.L. 20844 B

TYPICAL

Design D.D.(L) 861.



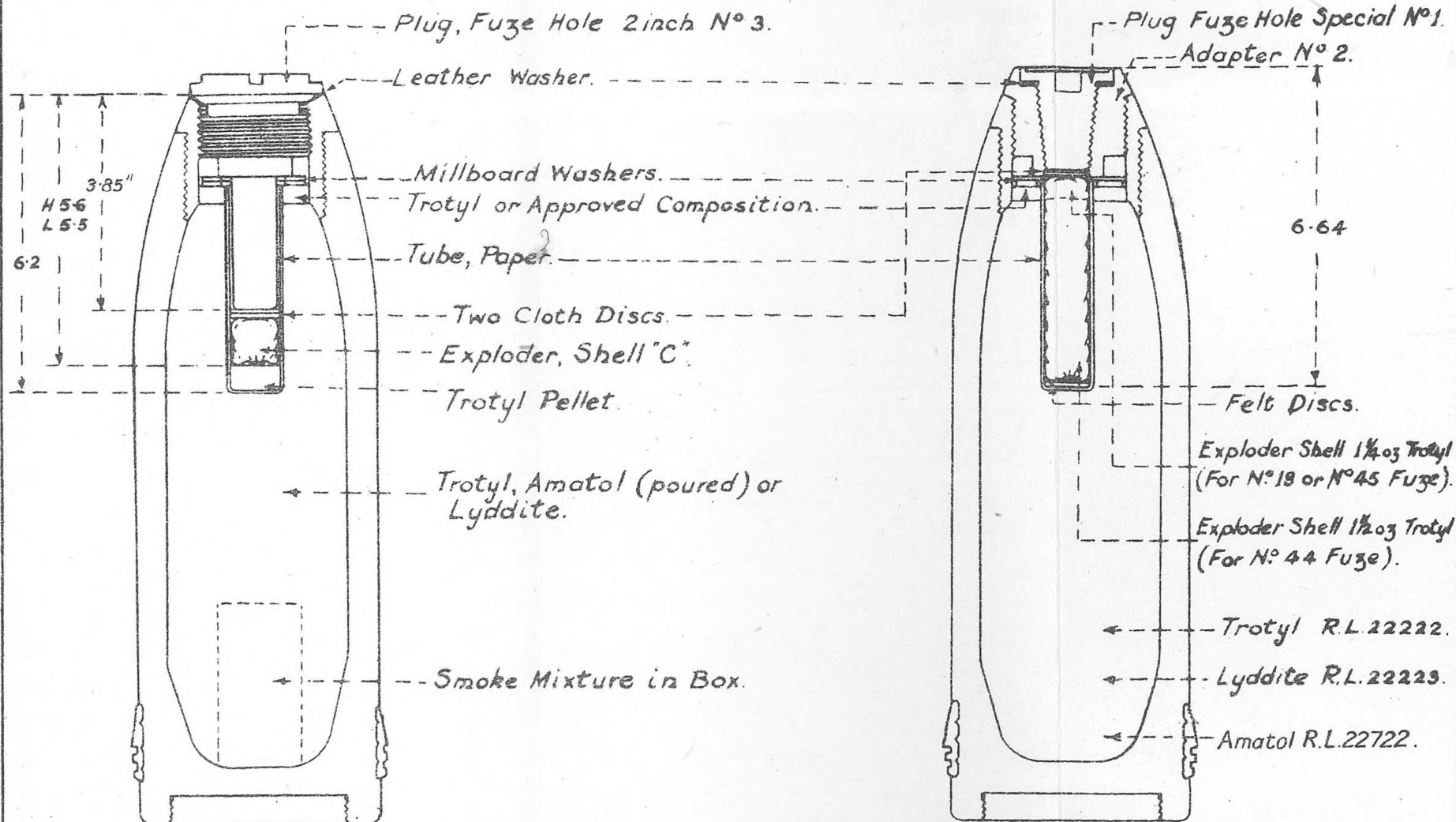
METHOD OF FILLING :- SHELL, B.L. OR Q.F.
HIGH EXPLOSIVE, 12 PR. 4 INCH AND ABOVE.

Design R.L.23929.

Design R.L.22222.

" 22223.

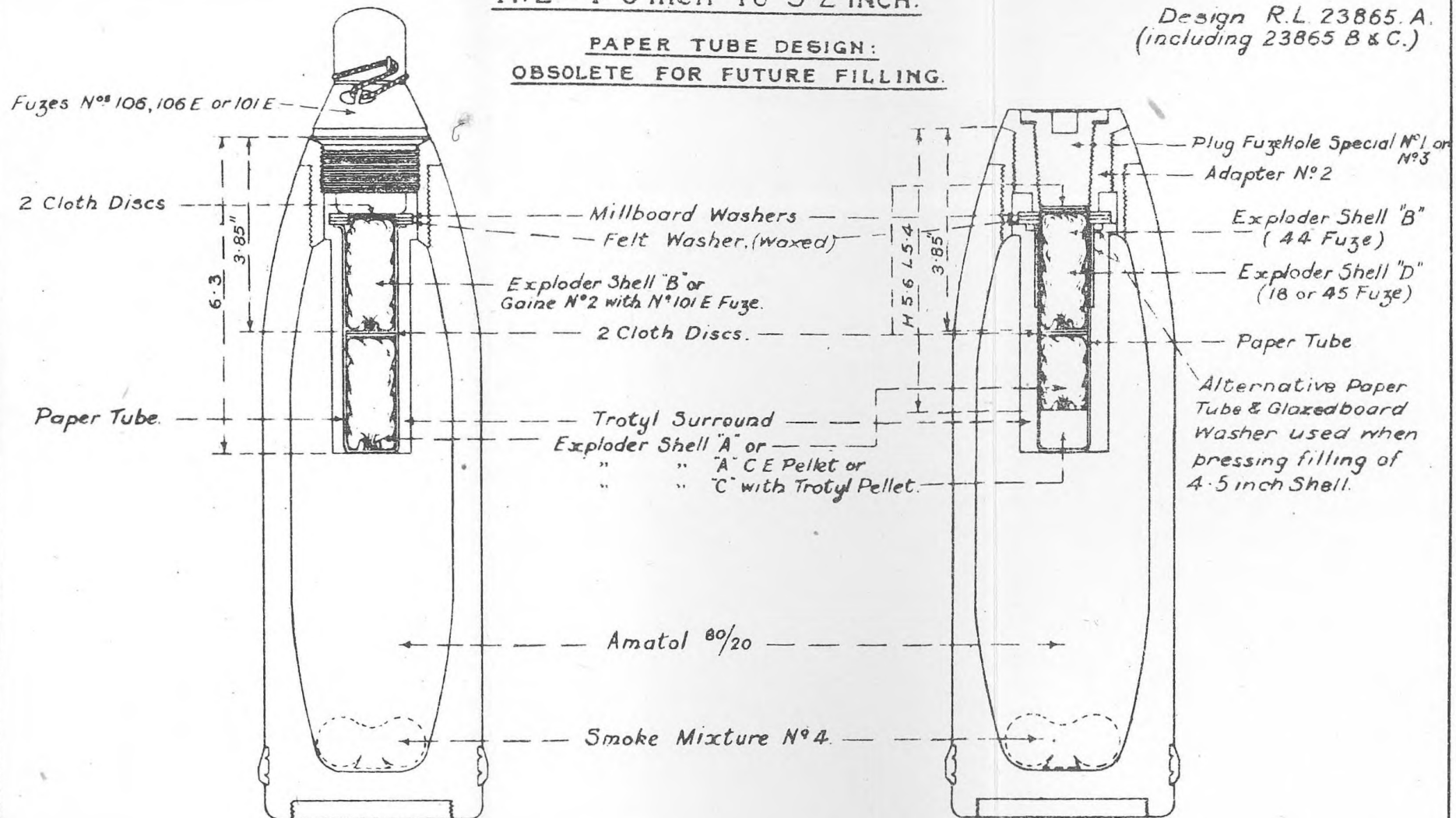
" 22722.



METHOD OF FILLING:- SHELL H.E 4.5 INCH TO 9.2 INCH.

PAPER TUBE DESIGN:
OBSOLETE FOR FUTURE FILLING.

Design R.L. 23865. A.
(including 23865 B & C.)



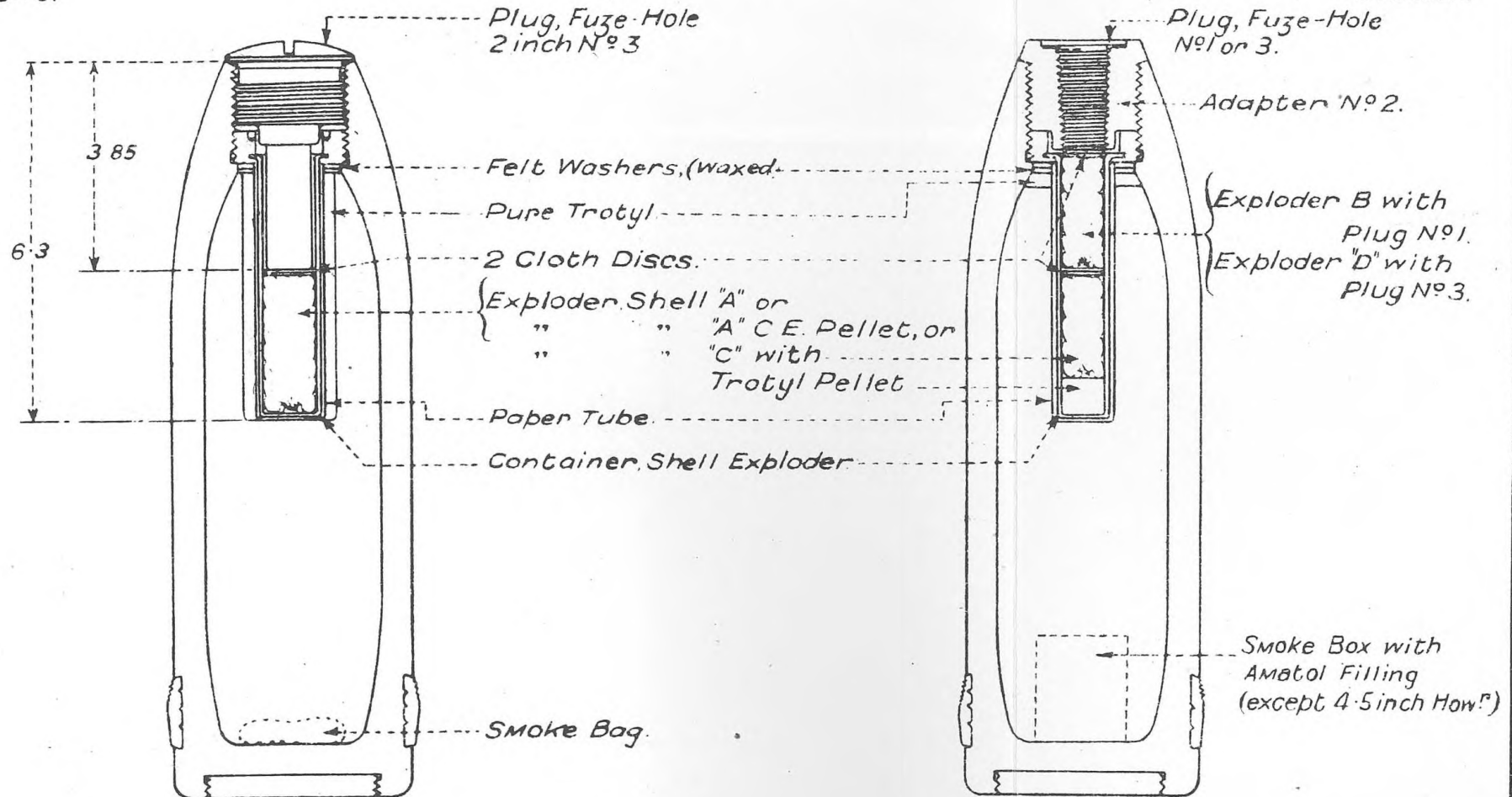
R.L. DESIGN NUMBER.	NATURE OF FILLING.	SMOKE MIXTURE.
23865 A	80/20 Cold Pressed.	No. 4 in Bag.
23865 B	80/20 Cold Pressed.	No. 5 Incorporated in filling.
23865 C	80/20 Hot Mixed.	No. 7 Incorporated in filling.

METHOD OF FILLING:- SHELL HIGH EXPLOSIVE 3.7 INCH TO 9.2 INCH

— TYPICAL —

R.L. Design
23894C.

R.L. Design
27222A.



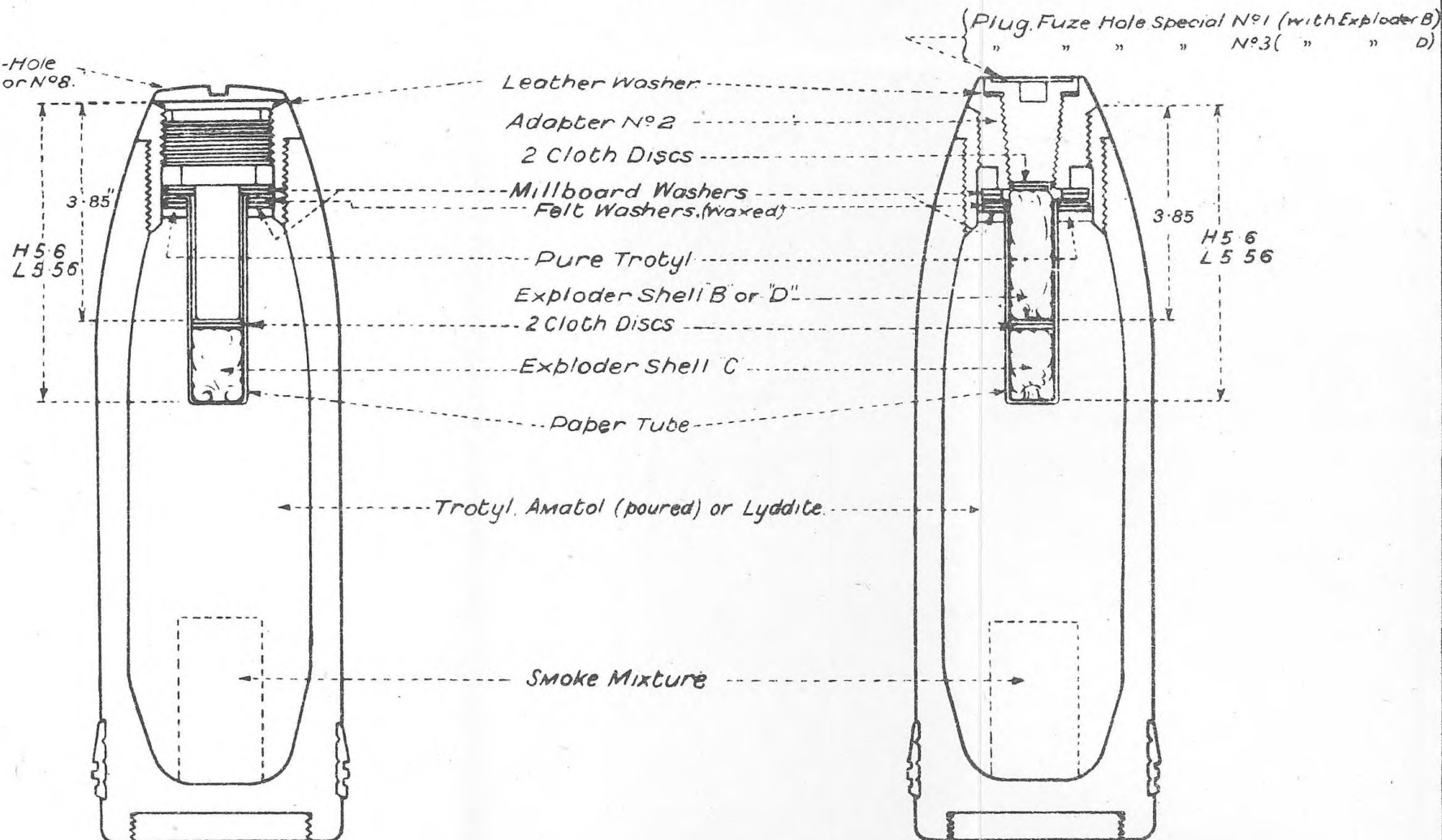
R.L. DESIGN NO	NATURE OF FILLING.	SMOKE MIXTURE.
23894A	80/20 Cold Pressed	No 4 in Bag
23894B	80/20 Cold Pressed.	No 5 incorporated in filling
23894C	80/20 Hot Mixed	No 7 incorporated in filling

Obsolete for Future Filling

METHOD OF FILLING:- SHELL, HIGH EXPLOSIVE.

Filled Lyddite.....	12 PR & 3.7 inch & above
" Amatol (poured).....	12 PR & 3.7 inch to 9.2 inch.
" Trotyl.....	12 PR & above for coast defence

Plug Fuze-Hole
2 inch N°3 or N°8.



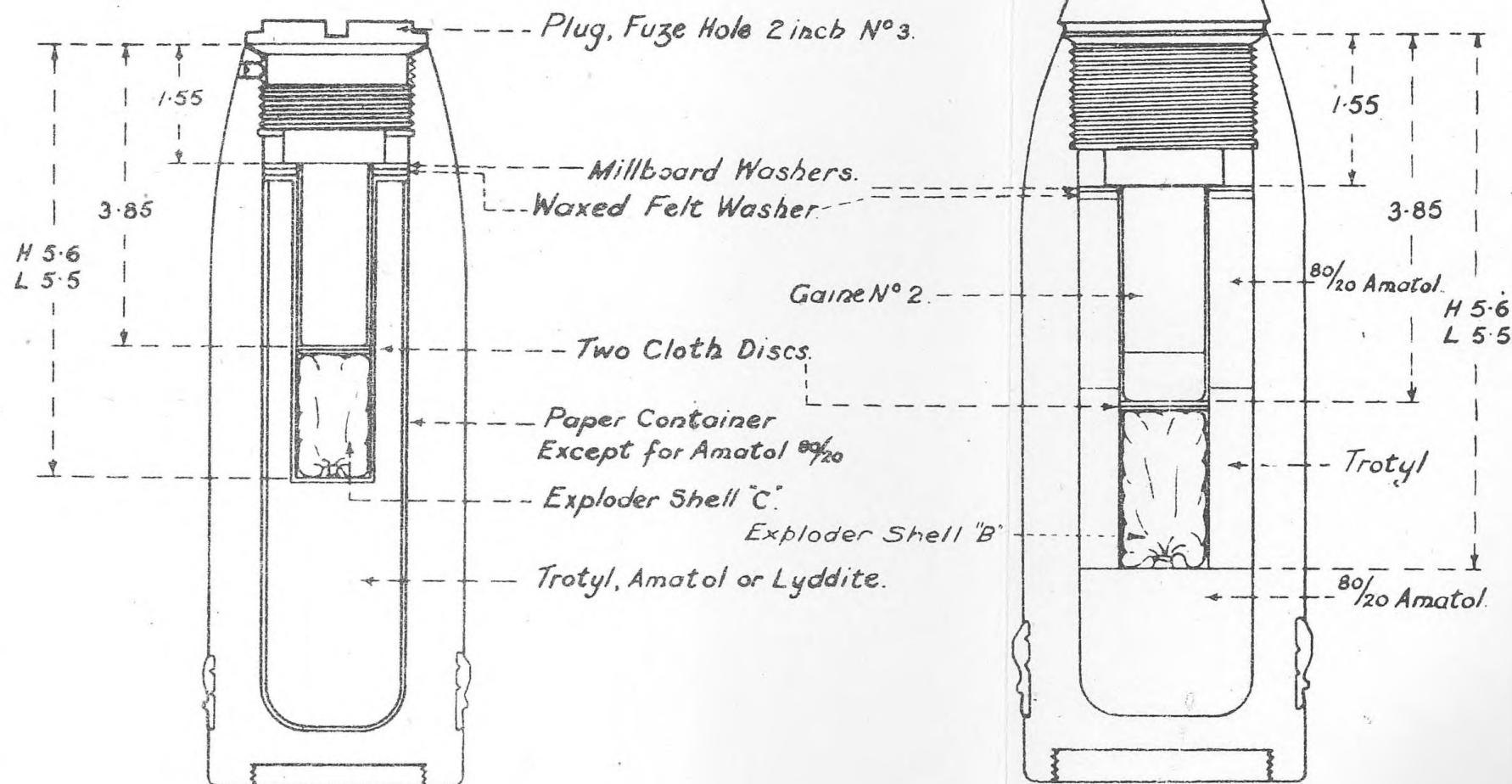
In Shell filled Lyddite, only Trotyl exploders are used

METHOD OF BLOCK FILLING :- SHELL Q.F.

Design R.L. 24018.

HIGH EXPLOSIVE 13 PR. & 18 PR.

Design R.L. 24539.

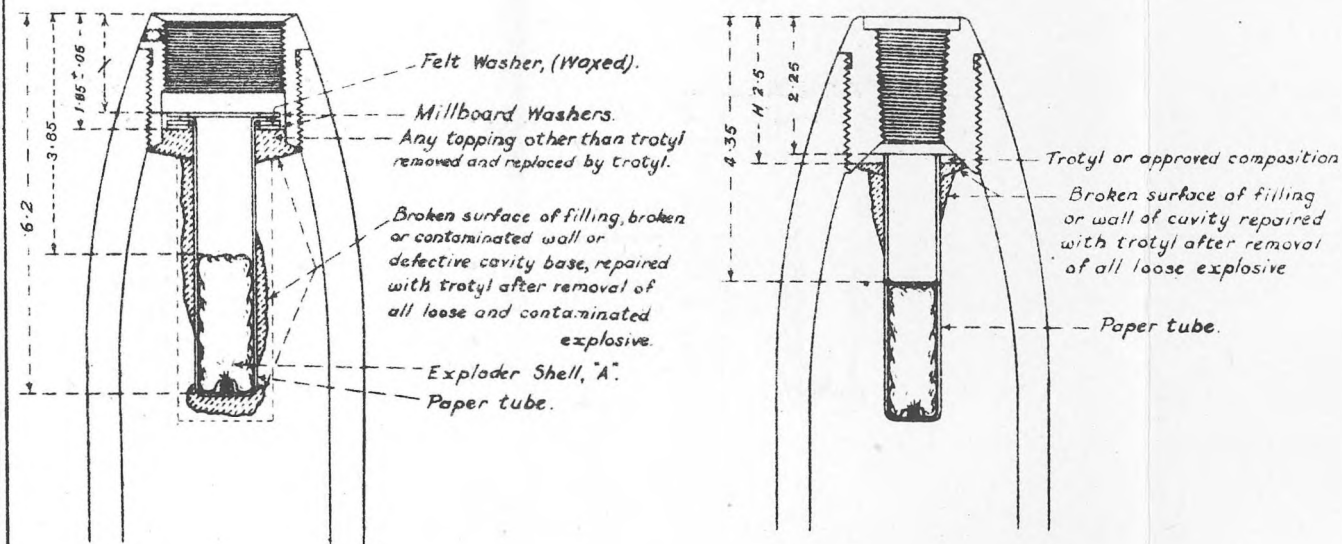


METHOD OF RECTIFICATION :-

SHELL, B.L. OR Q.F., HIGH EXPLOSIVE, 13 PR & ABOVE.

FILLED AMATOL, TROTYL, OR LYDDITE.

Design D. D. (L) 4976.

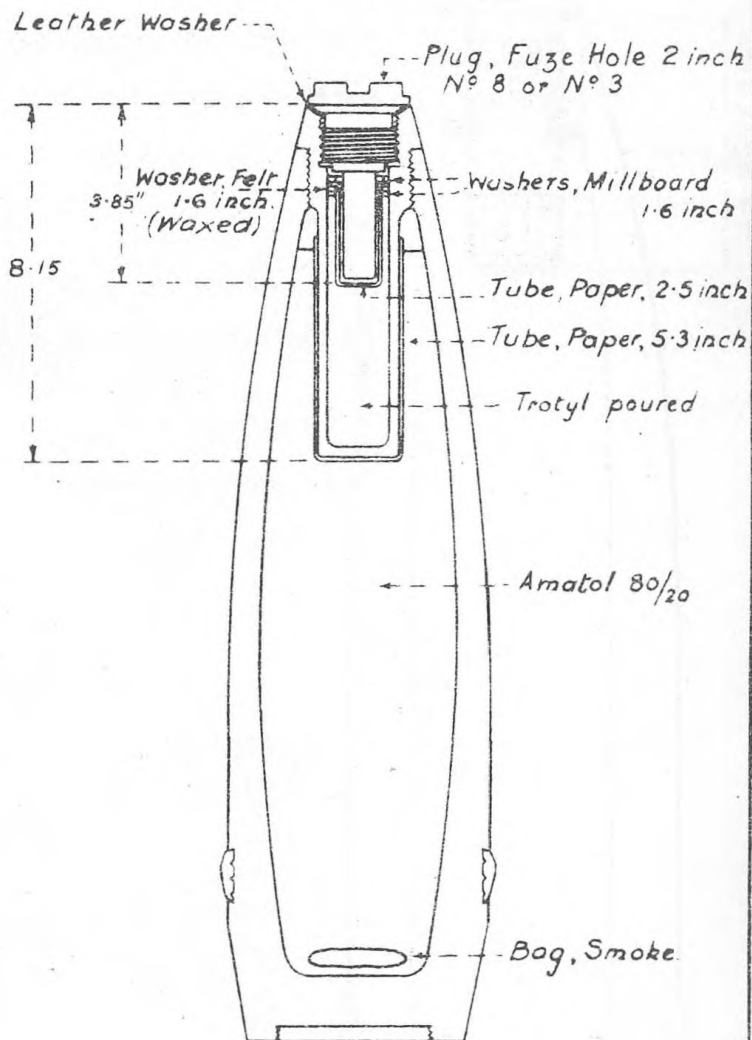


* Dimensions from lip of shell to top of washers on filling are:-
 Shell fitted with 2-in fuze or plug, or adapter, 2-in. fuze-hole No. 2, Mk. II = 1.55-in.
 Shell fitted with adapter, 2-in. fuze-hole, No. 2, Mk. III = 1.5-in.

<u>#976</u> 2	<u>Repair by short thick paper tube, rectifying:-</u> (A) Damaged cavity wall above top of bottom exploder. (B) Damaged surface of filling. (C) Torn paper tube.	Shell with 2 inch fuze hole without exploder container (Except A.A. Shell).
<u>#976</u> 3	<u>Repair by full length thick paper tube, rectifying:-</u> (A) Damaged cavity wall around bottom exploder. (B) Cavitation below bottom exploder.	
<u>4976</u> 4	<u>Repair by short thin paper tube, rectifying:-</u> (A) Damaged cavity wall above top of bottom exploder. (B) Damaged surface of filling. (C) Torn paper tube.	Shell with G.S. fuze hole
<u>4976</u> 5	<u>Repair by full length thin paper tube, rectifying:-</u> (A) Damaged cavity wall around bottom exploder. (B) Cavitation below bottom exploder.	
<u>4976</u> 6	Replacement of exploder container	Shell with 2 inch fuze hole fitted with exploder container
<u>4976</u> 7	Repair of defective seal.	Shell with 2 inch fuze hole without exploder container (Except A.A. Shell).
<u>4976</u> 8	<u>Repair by short thick paper tube, rectifying:-</u> (A) Damaged paper lining and cavity wall above top of bottom exploder. (B) Damaged top of paper container and surface of block.	Shell filled blocks in paper containers
<u>4976</u> 9	<u>Repair by new thick paper tube.</u> <u>" " "short thick paper tube, rectifying:-</u> (A) Damaged cavity wall around fuze or gaine. (B) Damaged surface of filling. (C) Torn paper tube.	Shell prepared for fuze N°44H " " "gaine N°A A.A. Shell without smoke box. Troutyl filling only.
<u>4976</u> 10	Repair of broken surface of filling	Shell filled lyddee without exploder cavity, for N°13 fuze

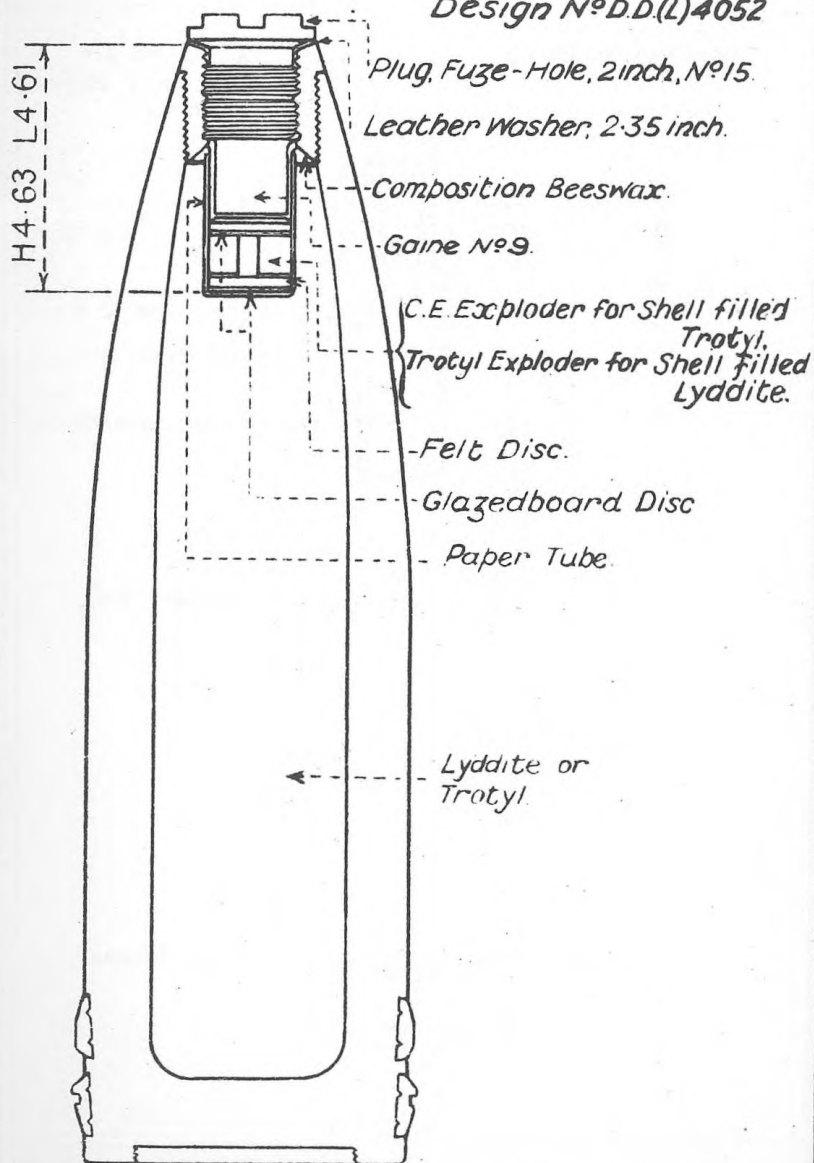
METHOD OF FILLING :-
SHELL, B.L., H.E., STREAM LINE, 6" HOW*

Design, R.L. 27924 A



METHOD OF FILLING:- SHELL, B.L.
HIGH EXPLOSIVE, 6 INCH GUN, MK XXVI/XXB.

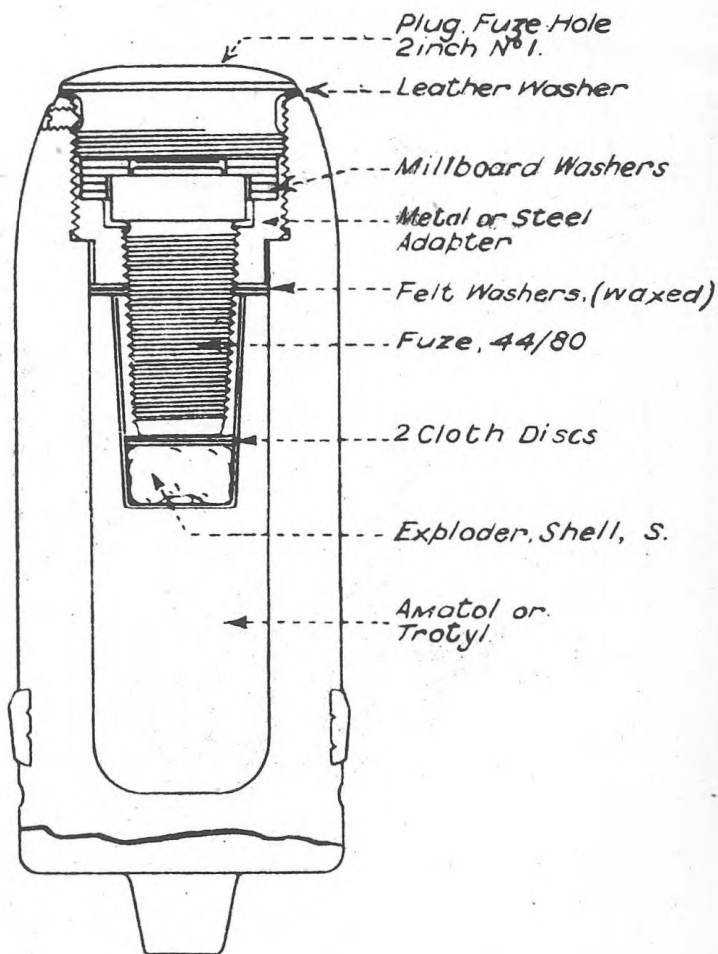
Design N° D.D.(L) 4052



METHOD OF FILLING :- SHELL Q.F.
HIGH EXPLOSIVE - ANTI-AIRCRAFT.

- TYPICAL -

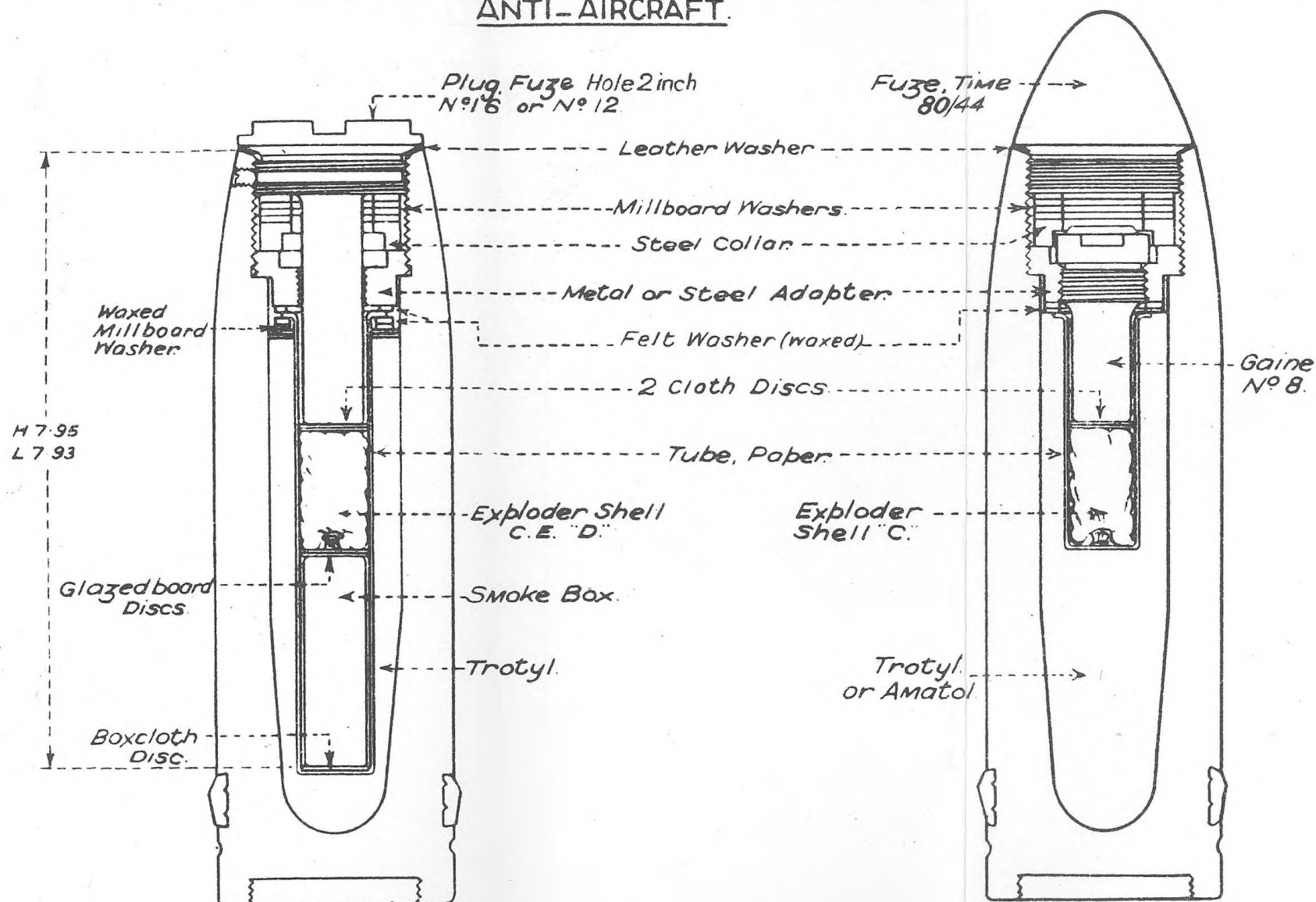
R.L. Design
25529A

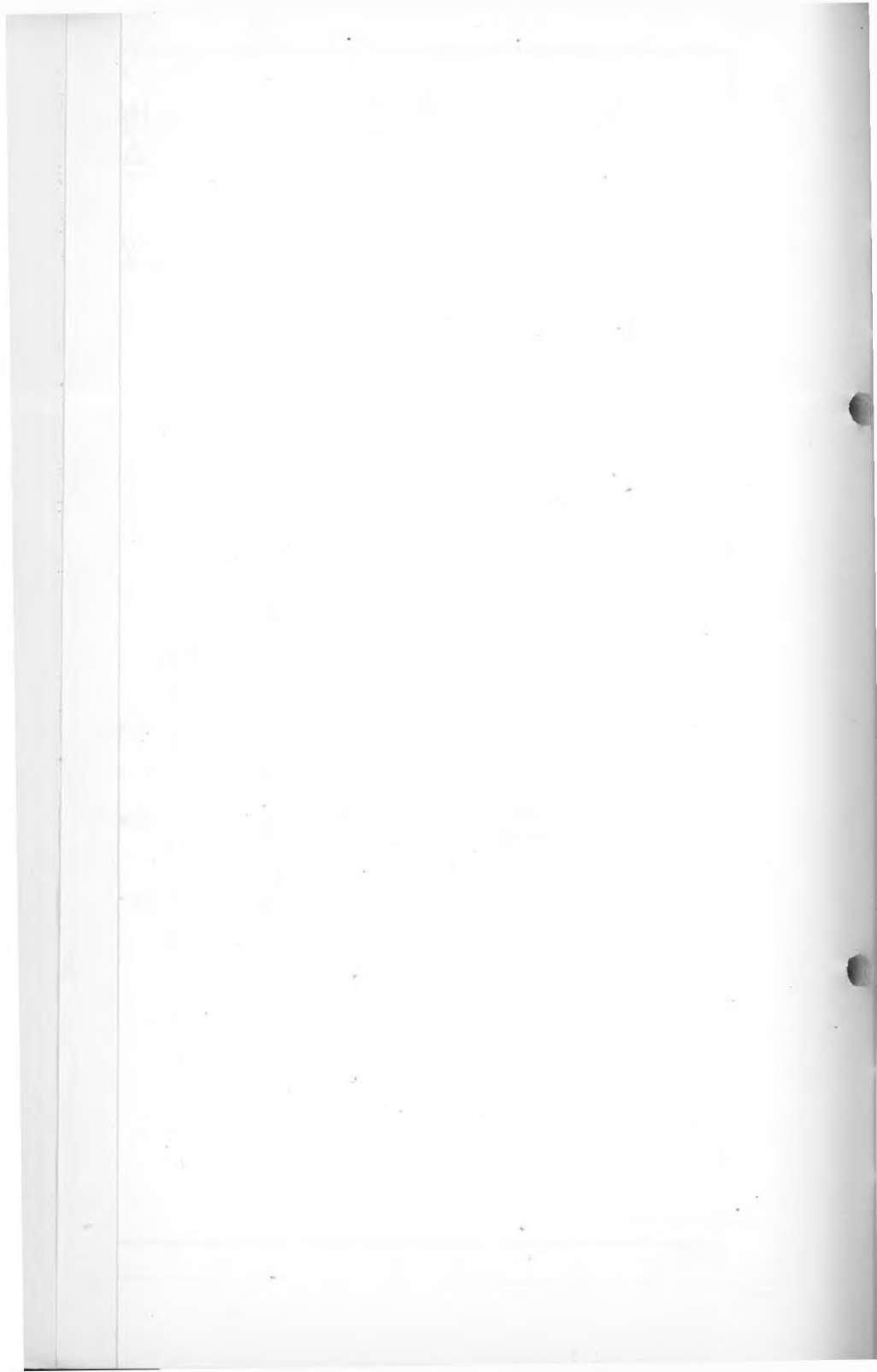


Design D.D.(L)4153

METHOD OF FILLING :- SHELL Q.F. HIGH EXPLOSIVE
ANTI-AIRCRAFT.

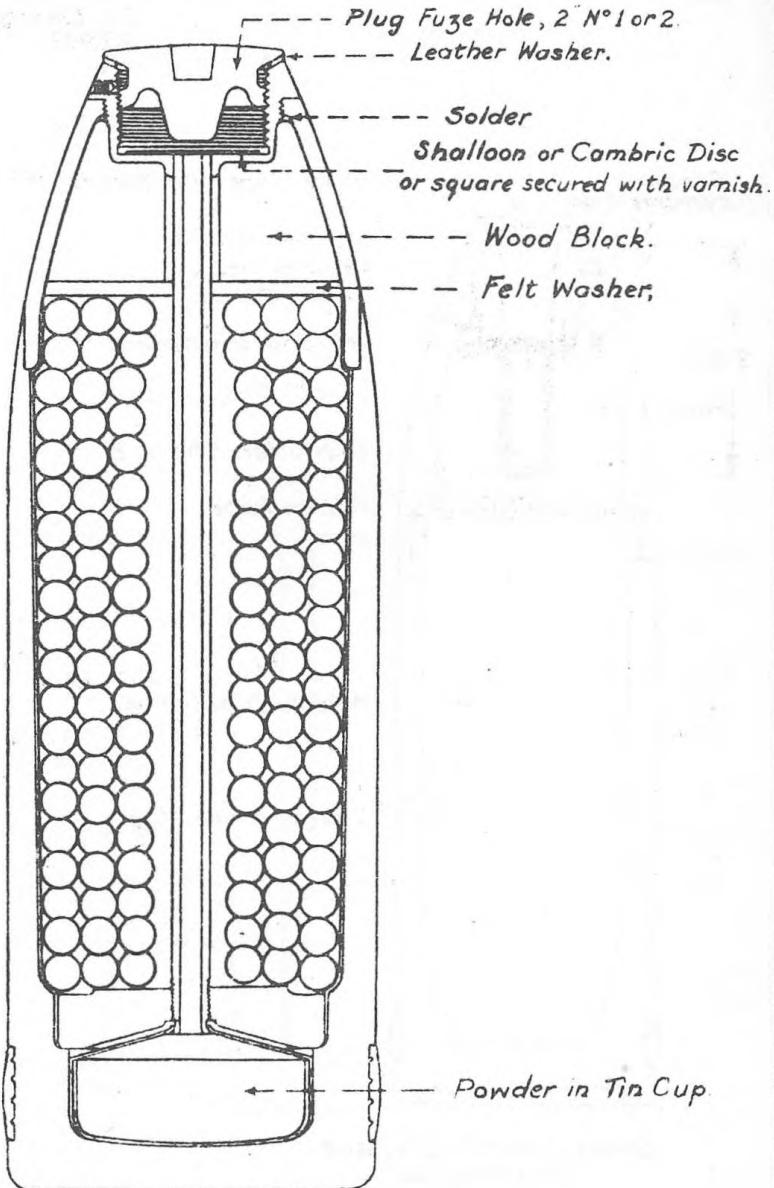
Design R L 26947





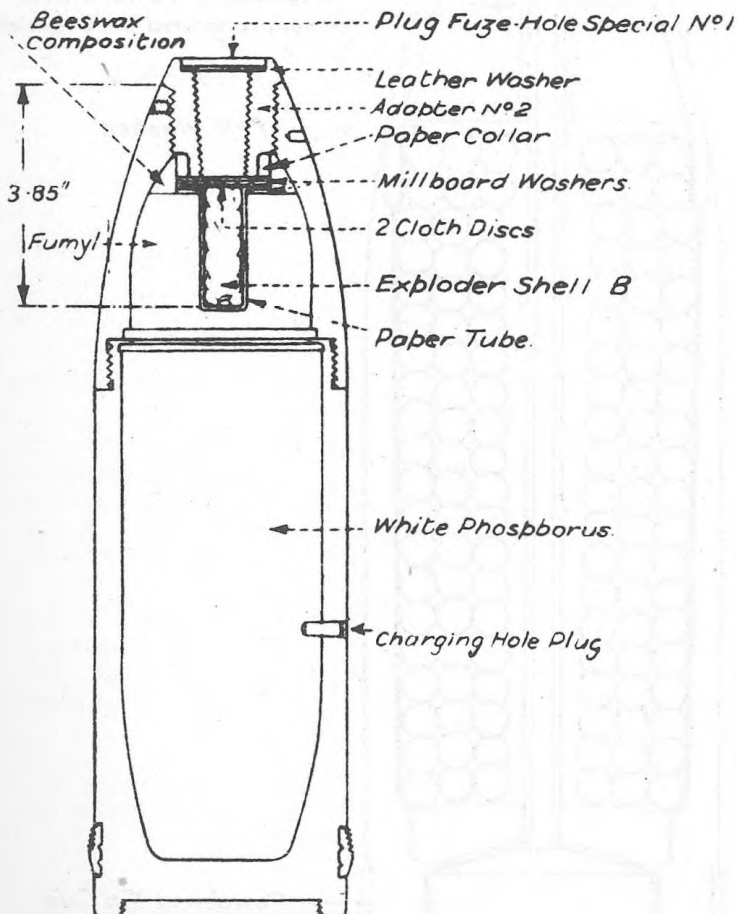
METHOD OF FILLING :-
SHELL, SHRAPNEL
TYPICAL.

Design R. L. 21747.



METHOD OF FILLING SHELL SMOKE 4.5 INCH HOWITZER

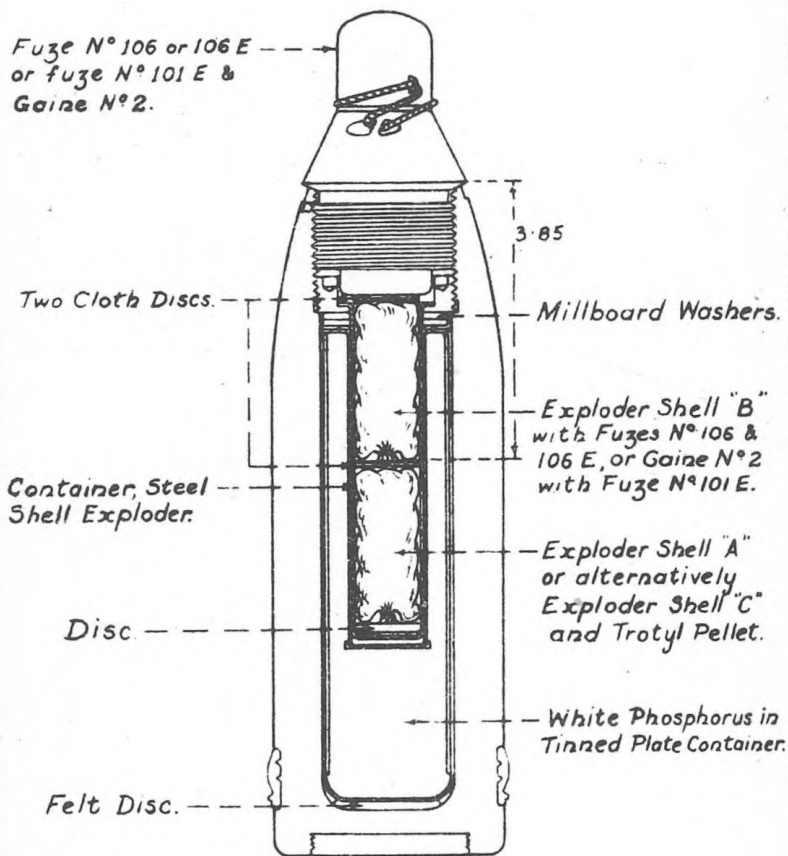
R.L. Design
27933



SHELL WITH DOUBLE
DIAPHRAGM

METHOD OF FILLING:- SHELL
SMOKE 18 PR
CHARGED PHOSPHORUS IN CONTAINER.
OBSOLETE FOR FUTURE FILLING.

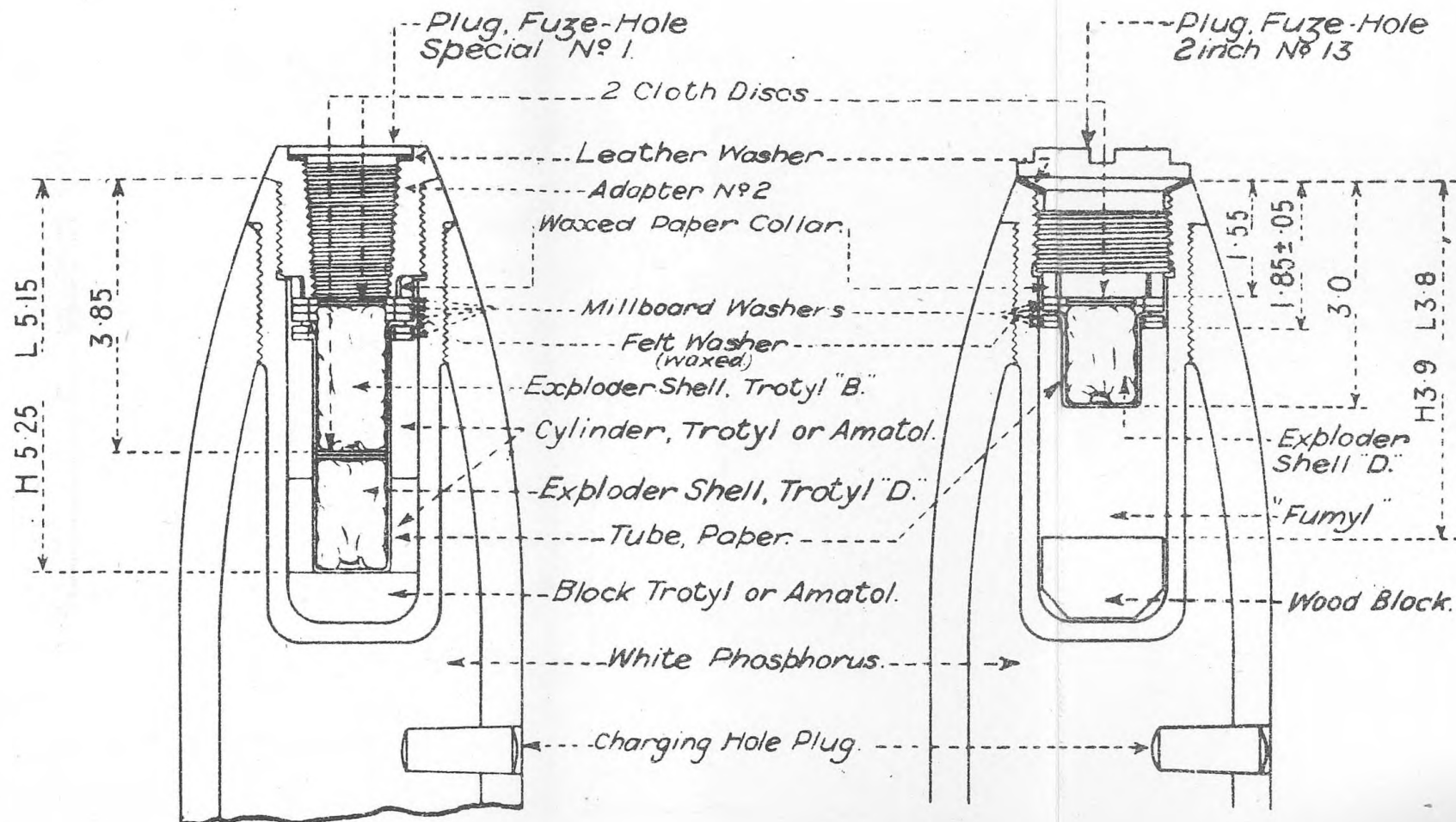
*Design R.L. 25018 A.
 or " 25018*

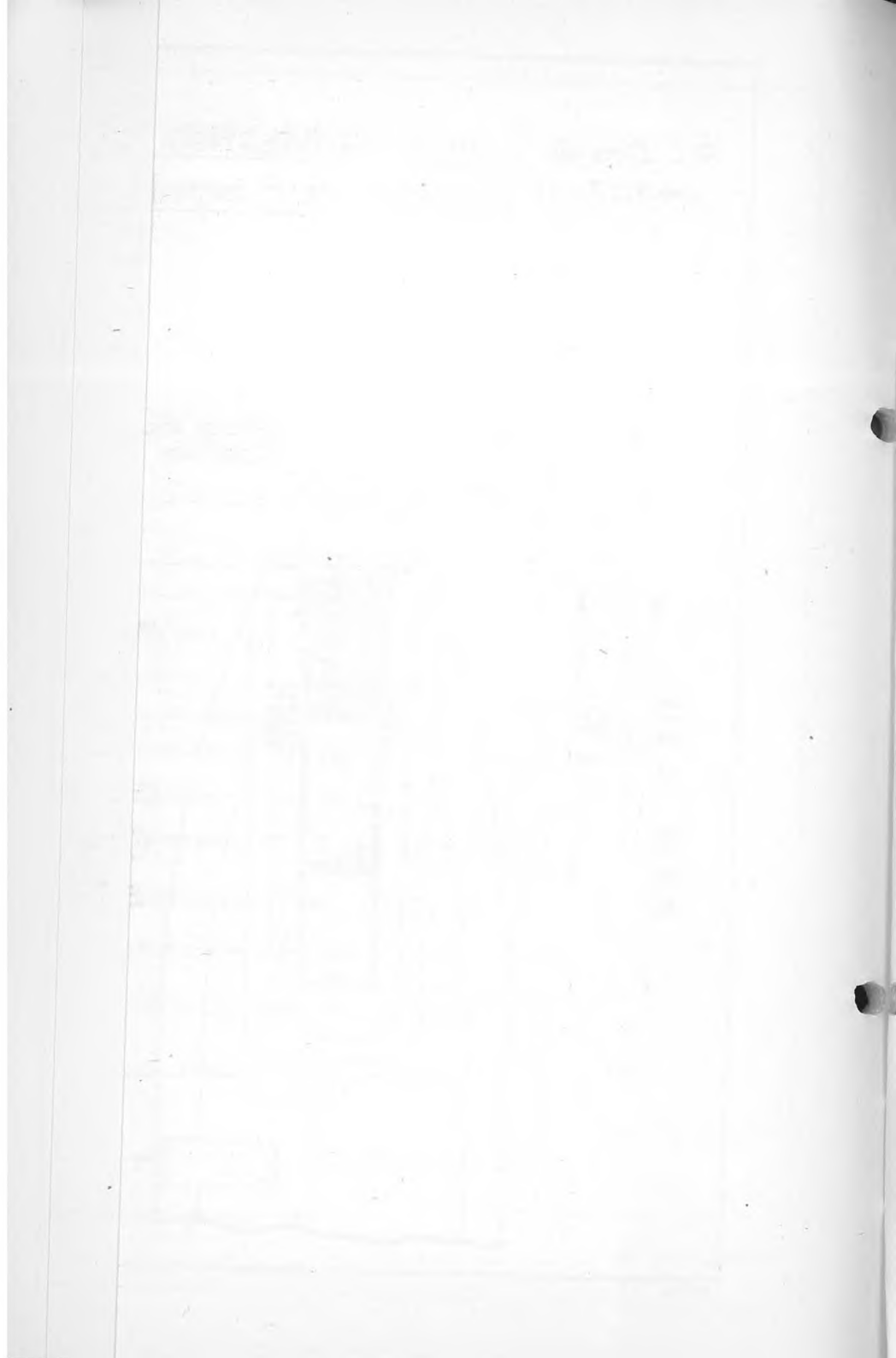


R.L. Design
24907

METHOD OF FILLING :- SHELL, Q.F. SMOKE
4.5 INCH HOWITZER - CHARGED PHOSPHORUS.

R.L. Design
27268.

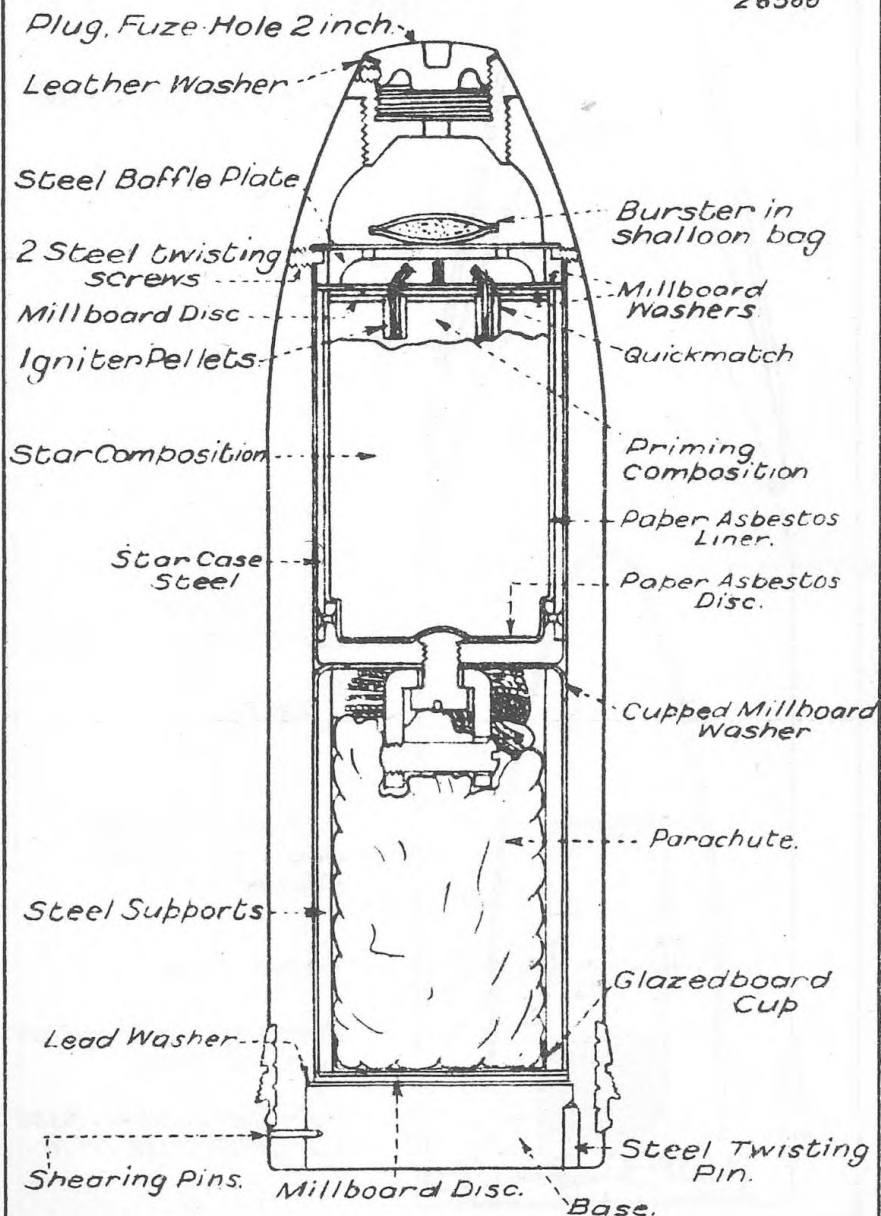




METHOD OF FILLING:- SHELL, STAR, WITH PARACHUTE

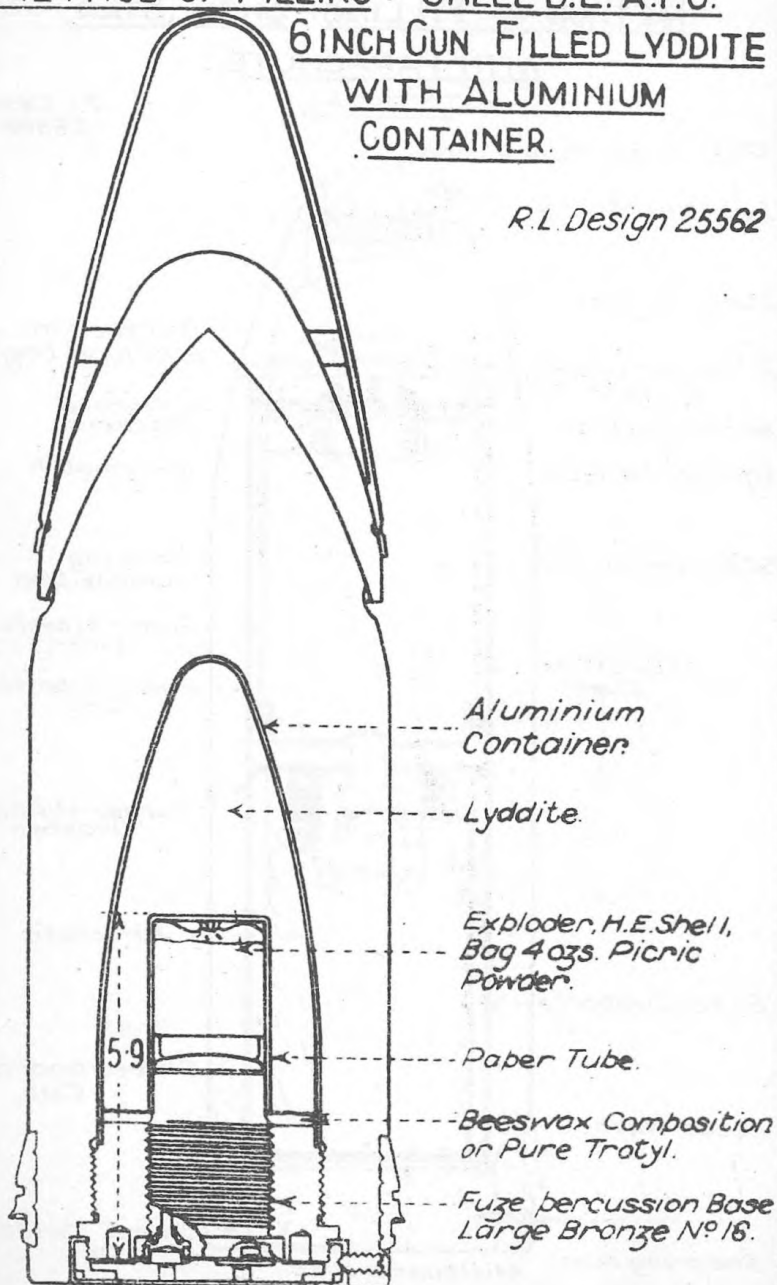
TYPICAL

R L Design
26586



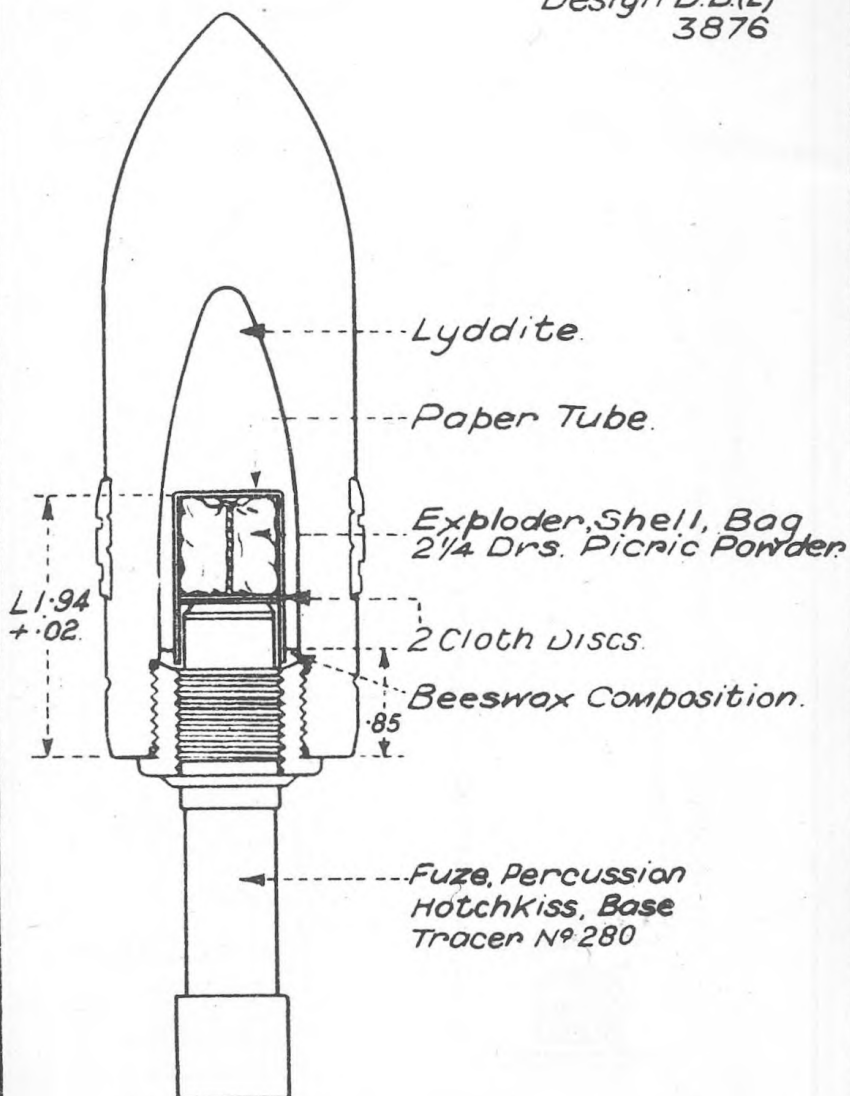
METHOD OF FILLING :- SHELL B.L. A.P.C.
6 INCH GUN FILLED LYDDITE
WITH ALUMINIUM
CONTAINER.

R.L. Design 25562



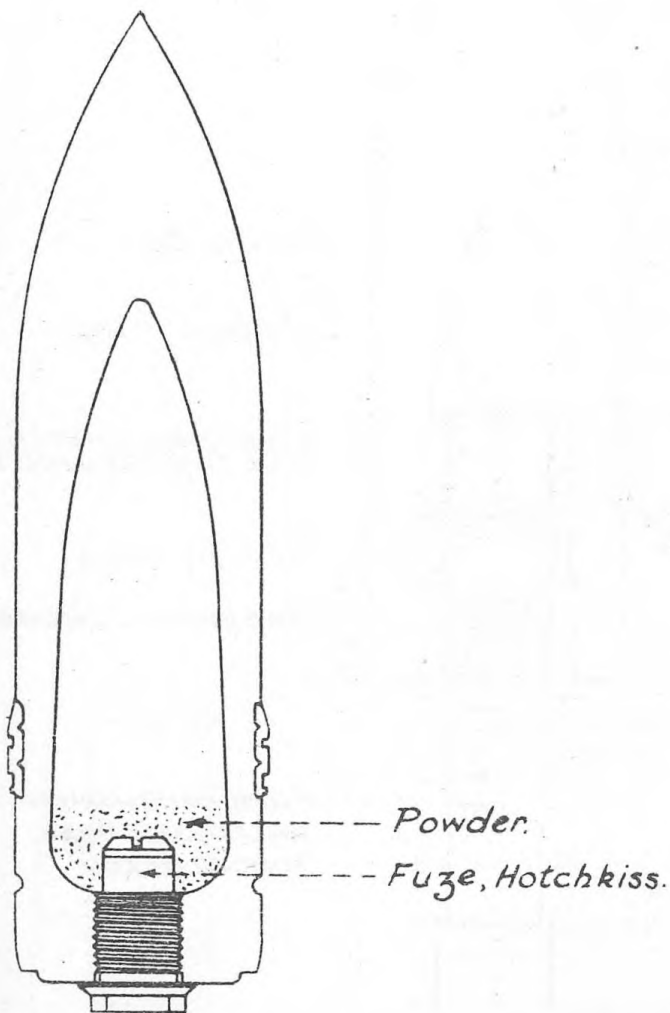
METHOD OF FILLING :- SHELL
Q.F. A.P. 3Pr. 2 CWT.

Design D.D.(L)
 3876



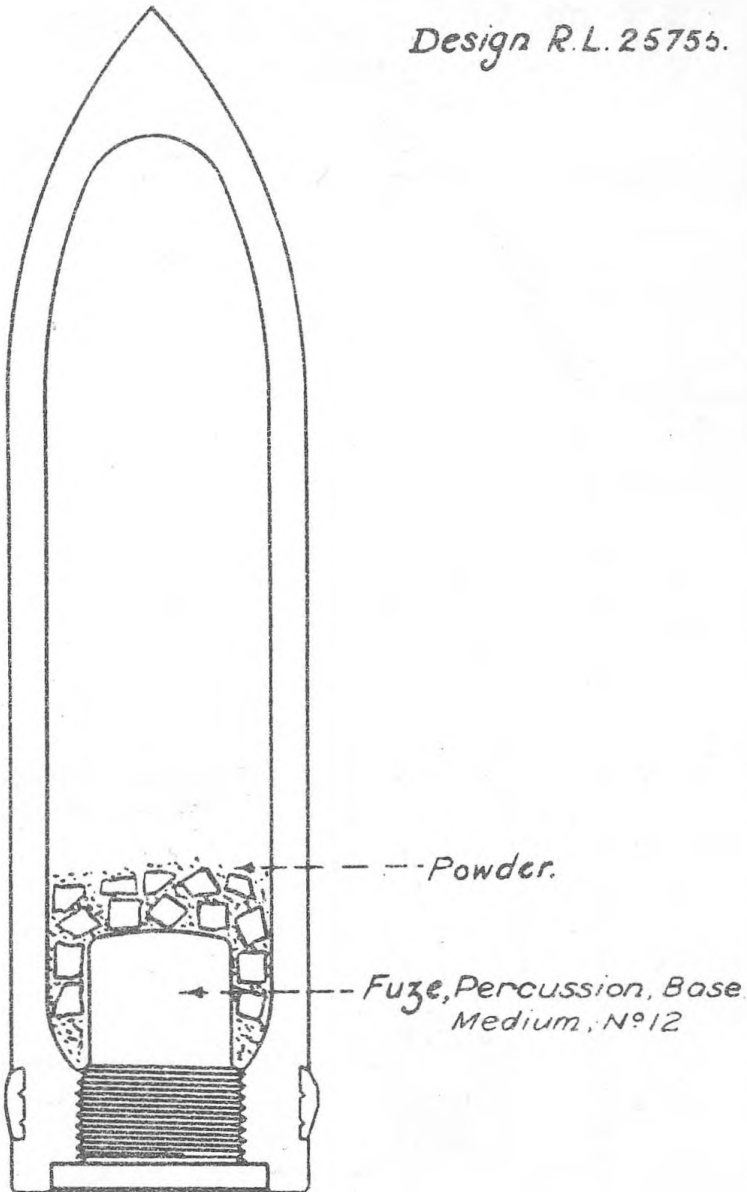
METHOD OF FILLING:-
SHELL, Q.F. STEEL.

Design R.L.12474 B.



METHOD OF FILLING:- SHELL,
Q.F. COMMON POINTED.

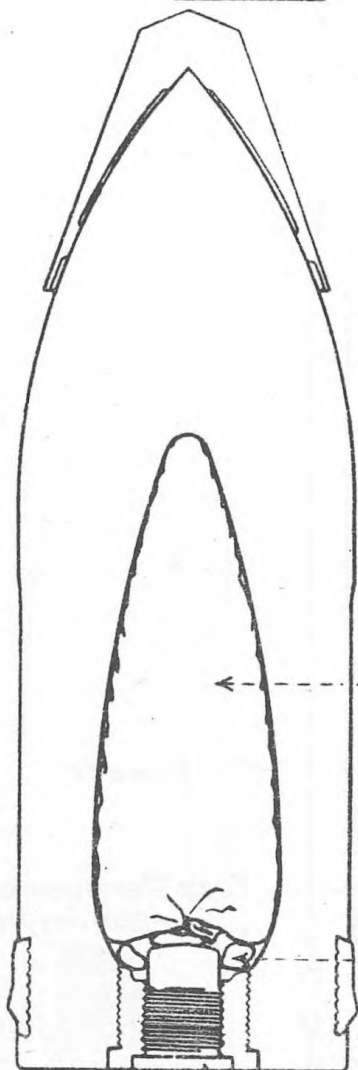
Design R.L. 25755.



METHOD OF FILLING: SHELL, B.L.
A.P. OR A.P.C. 6 INCH & 9.2 INCH.

— TYPICAL —

Design N° D.D.(L)669.



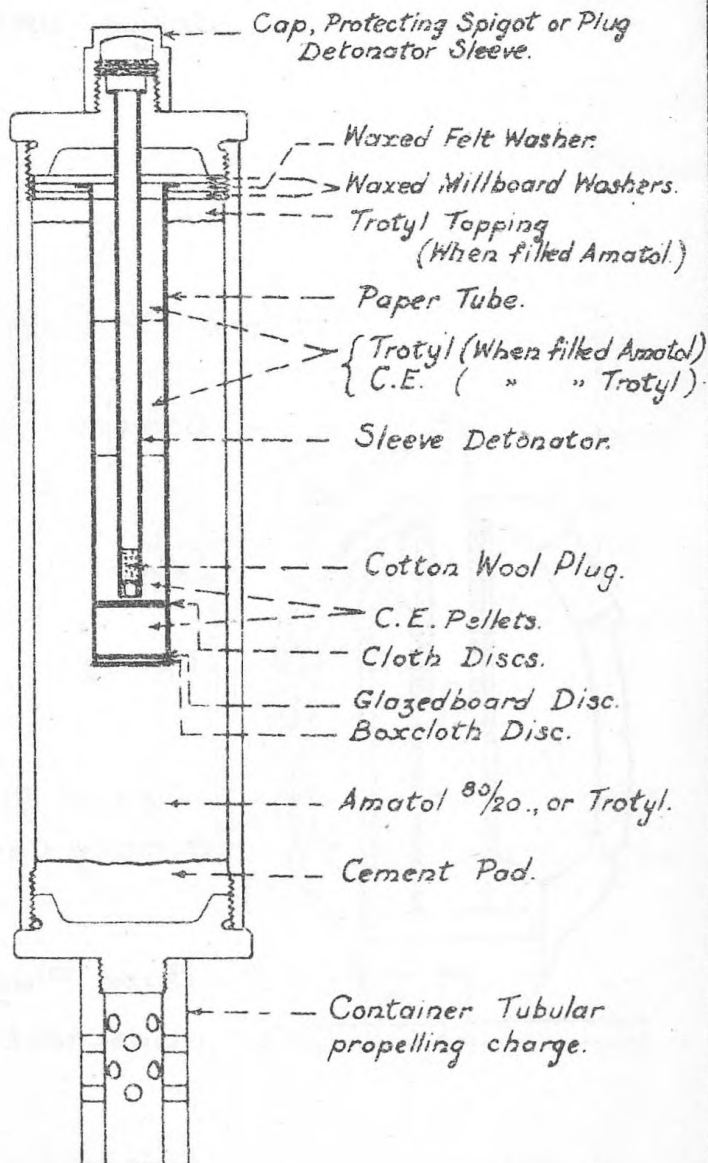
← Filled Powder,
Blank L.G. or G.12.

← 7 Dram Primers.

← Fuze N° 15 or N° 11.

METHOD OF FILLING:- 3 INCH MORTAR BOMB.

Design D.D.(L) 485.

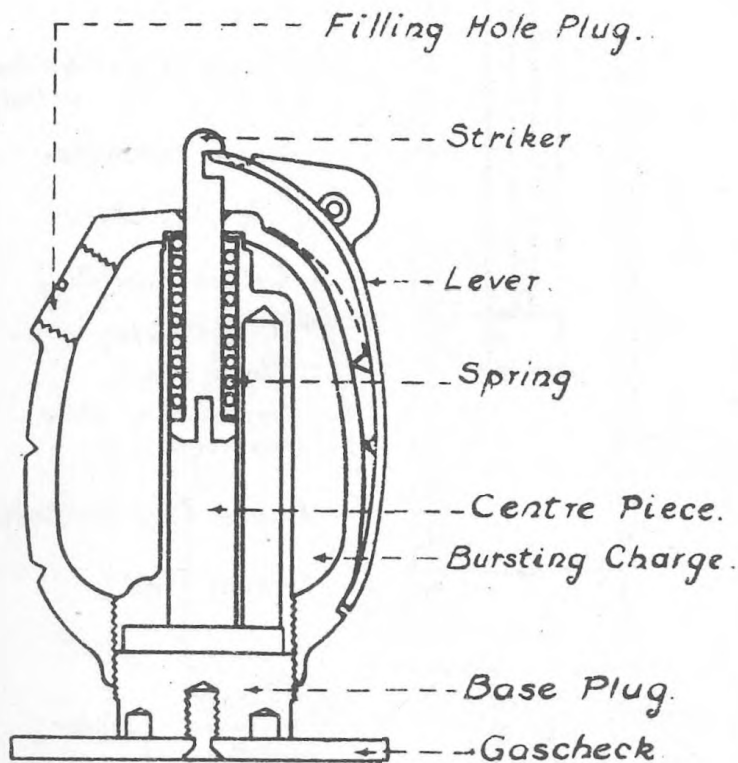


METHOD OF FILLING :-

GRENADE, .303 IN. RIFLE, N° 36 OR 36 M, MARK I.

TYPICAL

Design I.DW.(T.W)359.

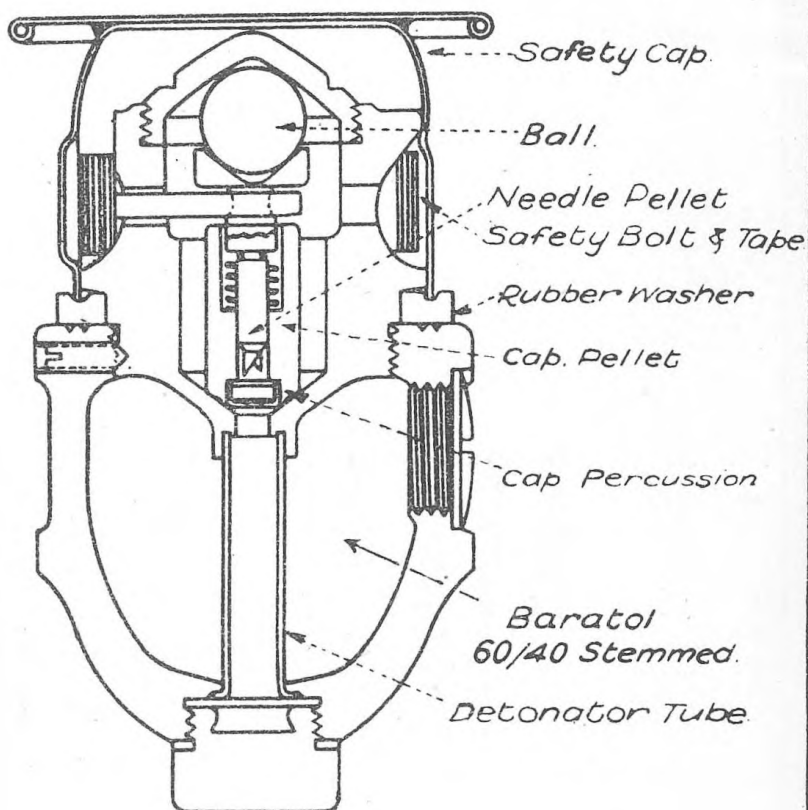


METHOD OF FILLING:-

GRENADE. PERCUSSION 2 INCH N° 54.

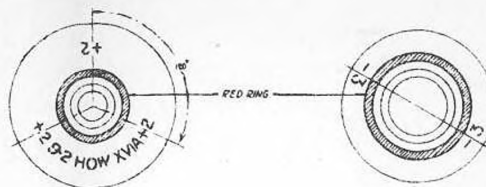
FILLED BARATOL

Design N° DD(L) 1266.





SIZE OF SYMBOLS.



ABOVE 6 INCH.

6 INCH & BELOW

STAMPING IS PLACED ON THE HOSE OF THE SHELL IN LINE WITH THE CALIBRE AND UNIVERSAL N° 3 EQUIVALENT SPACES FOR SHELL ABOVE 6 INCH AND IN 2 PLACES FOR SHELL 6 INCH TO 3.7 INCH INCL.

SHELL WHOSE WEIGHT IS OUTSIDE THE RANGE SHOWN IN THIS TABLE WILL BE MARKED WITH A + OR - FIGURE ACCORDING TO THE NUMBER OF APPROPRIATE UNITS BY WHICH THE WEIGHT IS ABOVE OR BELOW THE MEAN WEIGHT AT THE CENTRE OF THE 0 RANGE FOR THAT CALIBRE.

3.7" HOWA SHELL (WEIGHT UNIT 1/4 LB)
FILLED WEIGHT 20 LB 8 OZ WOULD BE MARKED +4.
FILLED WEIGHT 18 LB 8 OZ " -4

TABLE OF WEIGHTS.

FOR 3 UNITS ON EACH CALIBRE OF SHELL 3.7 IN. TO 18 IN.

THE WEIGHTS IN ANY SQUARE ARE INCLUSIVE. THE WORDS "ABOVE" & "BELOW" APPLYING THROUGHOUT THE RESPECTIVE LINES.

UNIT	1/4 LB		1/2 LB		1 LB		2 LB			5 LB	10 LB	15 LB	
CALIBRE	3.7 IN.	4.5 IN.	60 PR	60 PR 56 LB.	8 IN. HOWA STRAIN LINE	8 IN. GUNITE 8 IN. HOWA (CL)	8 IN.	9.2 IN.		12 IN.		14 IN. HEAVY	18 IN. HOWA
	HOWA	SUN	HOWA	SUN	HOWA	SUN	HOWA	SUN	HOWA	SUN	HOWA	SUN	HOWA
+ 3	LB OZ 20-6	LB OZ 35-6	LB OZ 61-12	LB OZ 57-12	LB OZ 89-0	LB OZ 103-0	LB OZ 207-0	LB OZ 297-0	LB OZ 387-0	LB OZ 767-8	LB OZ 1521-0	LB OZ 2552-8	
	ABOVE 20-2	35-2	61-4	57-4	88-0	102-0	205-0	295-0	385-0	762-8	1511-0	2537-8	
+ 2	20-2	35-2	61-4	57-4	88-0	102-0	205-0	295-0	385-0	762-8	1511-0	2537-8	
	ABOVE 19-14	34-14	60-12	56-12	87-0	101-0	203-0	293-0	383-0	757-8	1501-0	2522-8	
+ 1	19-14	34-14	60-12	56-12	87-0	101-0	203-0	293-0	383-0	757-8	1501-0	2522-8	
	ABOVE 19-10	34-10	60-4	56-4	86-0	100-0	201-0	291-0	381-0	752-8	1501-0	2507-8	
0	19-10	34-10	60-4	56-4	86-0	100-0	201-0	291-0	381-0	752-8	1501-0	2507-8	
	19-6	34-6	59-12	55-12	85-0	99-0	199-0	289-0	379-0	747-8	1501-0	2492-8	
- 1	BELOW 19-6	34-6	59-12	55-12	85-0	99-0	199-0	289-0	379-0	747-8	1501-0	2492-8	
	19-2	34-2	59-4	55-4	84-0	98-0	197-0	287-0	377-0	742-8	1501-0	2477-8	
- 2	BELOW 19-2	34-2	59-4	55-4	84-0	98-0	197-0	287-0	377-0	742-8	1501-0	2477-8	
	18-14	33-14	58-12	54-12	83-0	97-0	195-0	285-0	375-0	737-8	1501-0	2462-8	
- 3	BELOW 18-14	33-14	58-12	54-12	83-0	97-0	195-0	285-0	375-0	737-8	1501-0	2462-8	
	18-10	33-10	58-4	54-4	82-0	96-0	193-0	283-0	373-0	732-8	1501-0	2447-8	

THE FILLED WEIGHT FOR THE PURPOSE OF THIS MARKING IS TO BE THE ACTUAL WEIGHT OF THE FILLED SHELL, FITTED WITH THE STANDARD FUZE AS SHOWN BELOW.

	SHELL	STANDARD FUZE
A.	H.E. SHELL - 60 PR (EXCEPT 56 LB) 5.2" GUN & 12" HOWA	101E WITH GAINIE N°2
B.	H.E. SHELL (EXCEPT AS AT A & C) & SMOKE SHELL 6.3"	101E WITHOUT CAP WITH EXPLODER B
C.	H.E. SHELL - 14"	101E WITHOUT CAP WITH EXPLODER B
D.	SMOKE SHELL 3.7" & 4.5" HOWA	101E WITHOUT CAP
E.	C.P. SHELL	101E WITHOUT CAP

NOTE: SHELL ISSUED, FUZED WILL BE WEIGHT MARKED IN ACCORDANCE WITH THE FUZE ALLOCATED IN THE ABOVE TABLE IRRESPECTIVE OF THE FUZE ACTUALLY IN THE SHELL.

THE WEIGHTS TO BE ALLOWED FOR FUZES, ADAPTERS, PLUGS, ETC ARE AS GIVEN BELOW.

	METAL	STEEL	CAST IRON
FUZE, N° 101E AND GAINIE N° 2	2	11	
FUZE, N° 44 (WITHOUT CAP)		8	
FUZE, N° 106E (WITHOUT CAP)	2	0	
FUZE, N° 106 (WITHOUT CAP)	2	1	
ADAPTER, 2 INCH FUZE HOLE N° 2, MARK II	1	0	10
ADAPTER, 2 INCH FUZE HOLE N° 2, MARK III	1	4	1
PLUG, FUZE HOLE, SPECIAL N° 1, MARK III		8	7
PLUG, FUZE HOLE, 2 INCH, N° 3, MARK III	1	13	11
PLUG, FUZE HOLE, 2 INCH, N° 3, MARK III ***	1	12	10
PLUG, FUZE HOLE, 2 INCH, N° 3, MARK V			1
PLUG, FUZE HOLE, 2 INCH N° 3, MARKS V & VI			1
PLUG, FUZE HOLE, 2 INCH, N° 3 CONVERTED, MARK I			1
PLUG, FUZE HOLE, 2 INCH, N° 3 CONVERTED, MARKS I & II			2
PLUG, FUZE HOLE, 2 INCH N° 8 MARK II			2
PLUG, FUZE HOLE, 2 INCH N° 8 MARK III			2
PLUG, FUZE HOLE, 2 INCH N° 13	1	10	9
EXPLODER SHELL B			1
CAP FOR N° 106 & 106E FUZES		3	
CAP FOR N° 44 FUZE		4	

DIMENSIONS ARE IN INCHES

C.I.A.(A)250.

WEIGHT MARKING ON FILLED SHELL FOR FIELD SERVICE.
HIGH EXPLOSIVE, SMOKE & COMMON POINTED.
IN CONFORMITY WITH RANGE TABLE WEIGHTS OF NORMAL STANDARD PROJECTILE AND FUZE.

dimension is obtained by using "Implements, ammunition—Tool, compressing exploder in shell."

Two cloth discs are to be placed above the top of the "F" exploder.

9. Coat the threads except the bottom three, of the "Plug, fuze-hole, 2-in., No. 3 or 13", with "Luting, lead free, thin, Mk. V," place "Washer, leather, lubricated, 2-35-in." in position, insert in shell and screw home securely.

10. Remove the existing fuze markings and stencil on head "USE 119 FUZE."

Note.—Shell should be examined for nature of filling and cavity depth to top of exploder "D" before demanding components.

11. Stores required for the alternative method are—

	Each shell
<i>Section S1</i>	
*Exploder, shell, "F", T.N.T. or C.E., Mk. VI	1
<i>Section S2</i>	
Discs, cloth, 1-78-in. (S.F.D. No. 276)	2
Plug, fuze-hole, 2-in., No. 13, Mk. VM. (If shell are to be held plugged.)	1

* T.N.T. exploders must be demanded for Lyddite filled shell.

By Command of the Army Council,

THE WAR OFFICE,
30th July, 1941.

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APPENDIX X—continued

STORES—continued

	Each shell
<i>Section S2</i>	
Plug, fuze-hole, 2-in., No. 3, Mk. VF or VIF	1
Washer, leather, lubricated, 2-35-in.	1
<i>Section U</i>	
Cement, R.D., No. 1, lead free	As required.

1. The atmosphere of the room in which the de-plugging and re-plugging is carried out must be quite dry, to prevent moisture entering the shell during the period operations are in progress.

2. Only one shell is to be de-plugged and re-plugged at a time.

3. The "Plugs, fuze-hole, 2-in., No. 3 or 13," must be coated on their plain portions below the screw-threads with "Cement, R.D., No. 1, lead free," and arrangements must be made for sufficient time to elapse to ensure that the cement has dried thoroughly before the plugs are used.

4. The plugs are to be fitted with the "Washers, leather, lubricated, 2-35-in." which must sit down under the flange.

5. The washer must be in a thoroughly serviceable condition.

6. Shell filled to designs R.L.23929, 23929A, 23894A, B or C, when ordered to be prepared for Landward Firings are to be converted as follows:—

- Remove "Plug, fuze-hole, special, No. 3".
- Remove "Adapter, 2-in. fuze-hole, No. 2".
- Remove lubricant from fuze-hole screw-threads, using a clean dry cloth.
- Remove top exploder "D".

7. The cavity is then to be gauged, and, if less than 3-85-in., the bottom exploder must be compressed, using "Implements, ammunition—Tools, compressing exploder in shell" until the required depth is obtained.

8. Where it is not possible to remove the top exploder D, the cavity is to be gauged and if less than 2-36-in. the exploders are to be compressed until this

Notified in A.C.Is. 30th July, 1941

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26
Regulations
2106

REGULATIONS FOR ARMY ORDNANCE SERVICES, PART II

PAMPHLET No. 1, 1933

AMENDMENTS (No. 1A)

- Para. 142 (g). (As promulgated by Amendments 70
(No. 35) notified in A.C.I. 368 of 1938). Line 5. Shells
For "117" substitute "119". 825

2. For Appendix X substitute:—

Amtd. 1A
July, 1941

APPENDIX X

(Referred to in para. 142.)

SHELL, B.L., H.E., 9-2-IN. GUN, MK. XIII.A.
LANDWARD FIRINGS

INSTRUCTIONS FOR CONVERSION BY RE-
MOVAL OF "ADAPTER, 2-IN. FUZE-
HOLE, No. 2" AND REPLACEMENT OF
"PLUG, FUZE-HOLE, SPECIAL, No. 3"
BY "PLUG, FUZE-HOLE, 2-IN., No. 3"
IN PREPARATION FOR FUZING No. 119

STORES REQUIRED

	Each shell
<i>Section H1</i>	
Paint, prepared for use—	
Black, marking, lead free	As required.
Buff, ammunition, lead free	As required.
<i>Section Q2</i>	
Luting, lead free—	
Thick, Mk. IV	As required.
Thin, Mk. V	As required.