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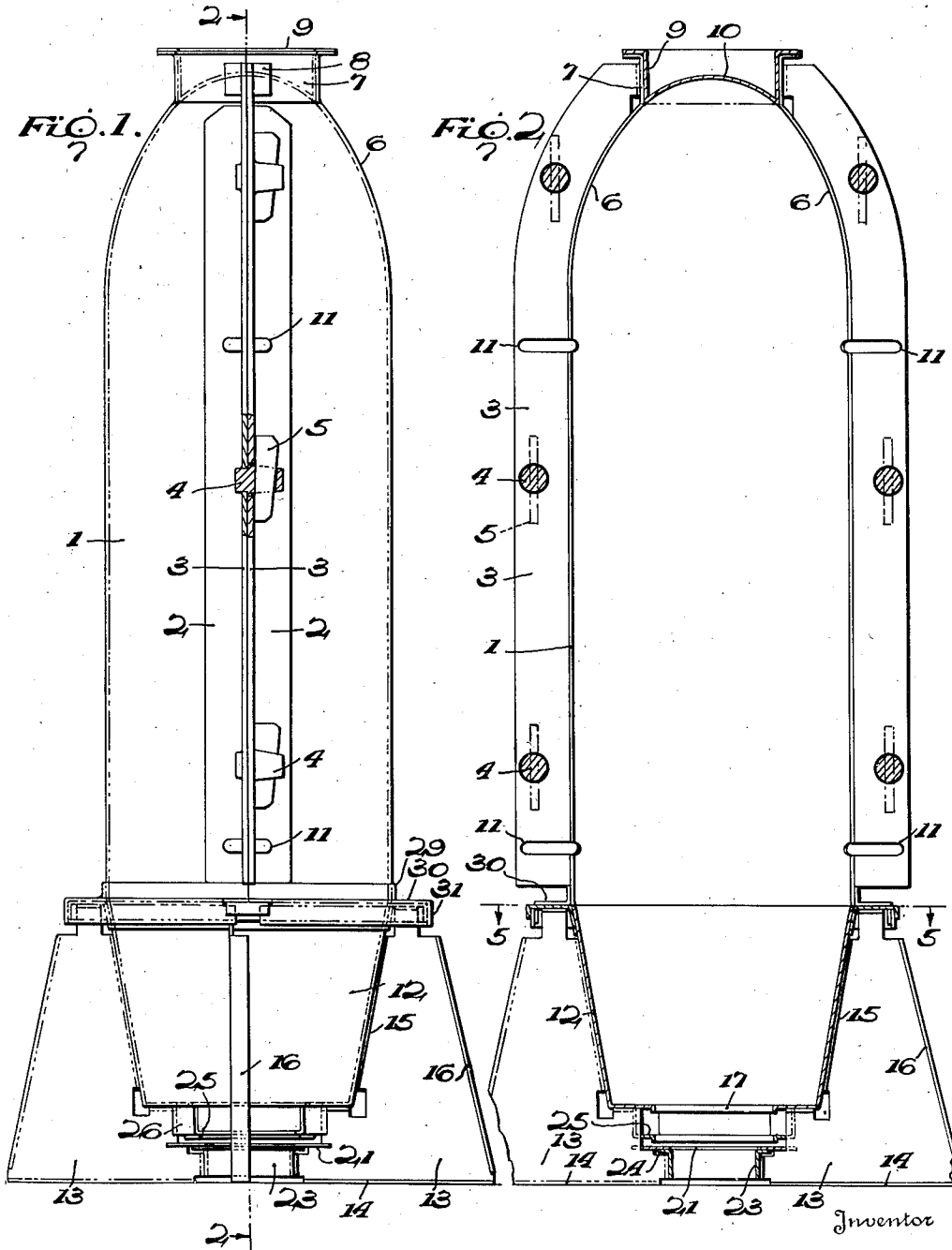
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MOLD FOR CONCRETE BOMBS

Filed Dec. 26, 1944

3 Sheets-Sheet 1



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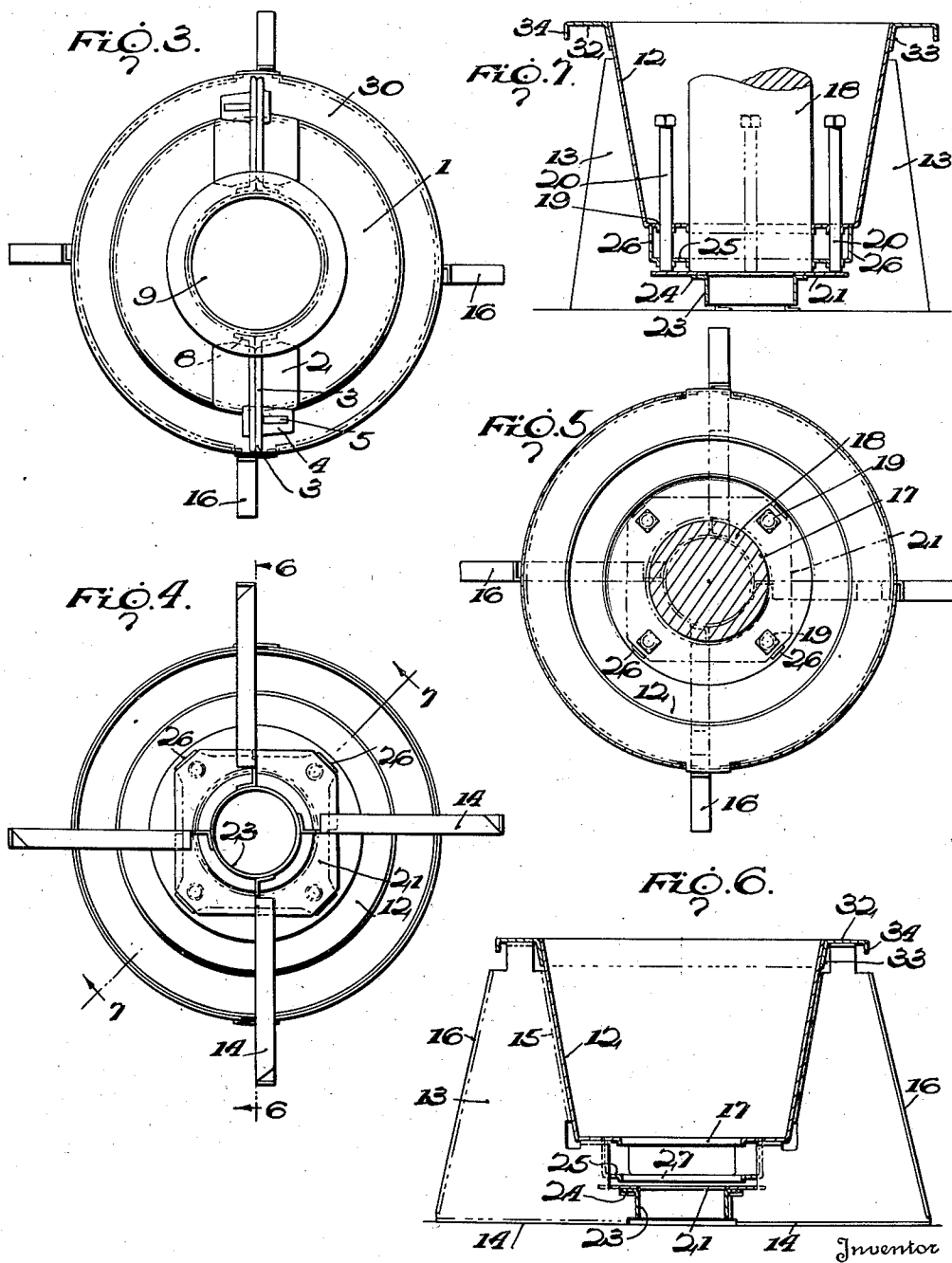
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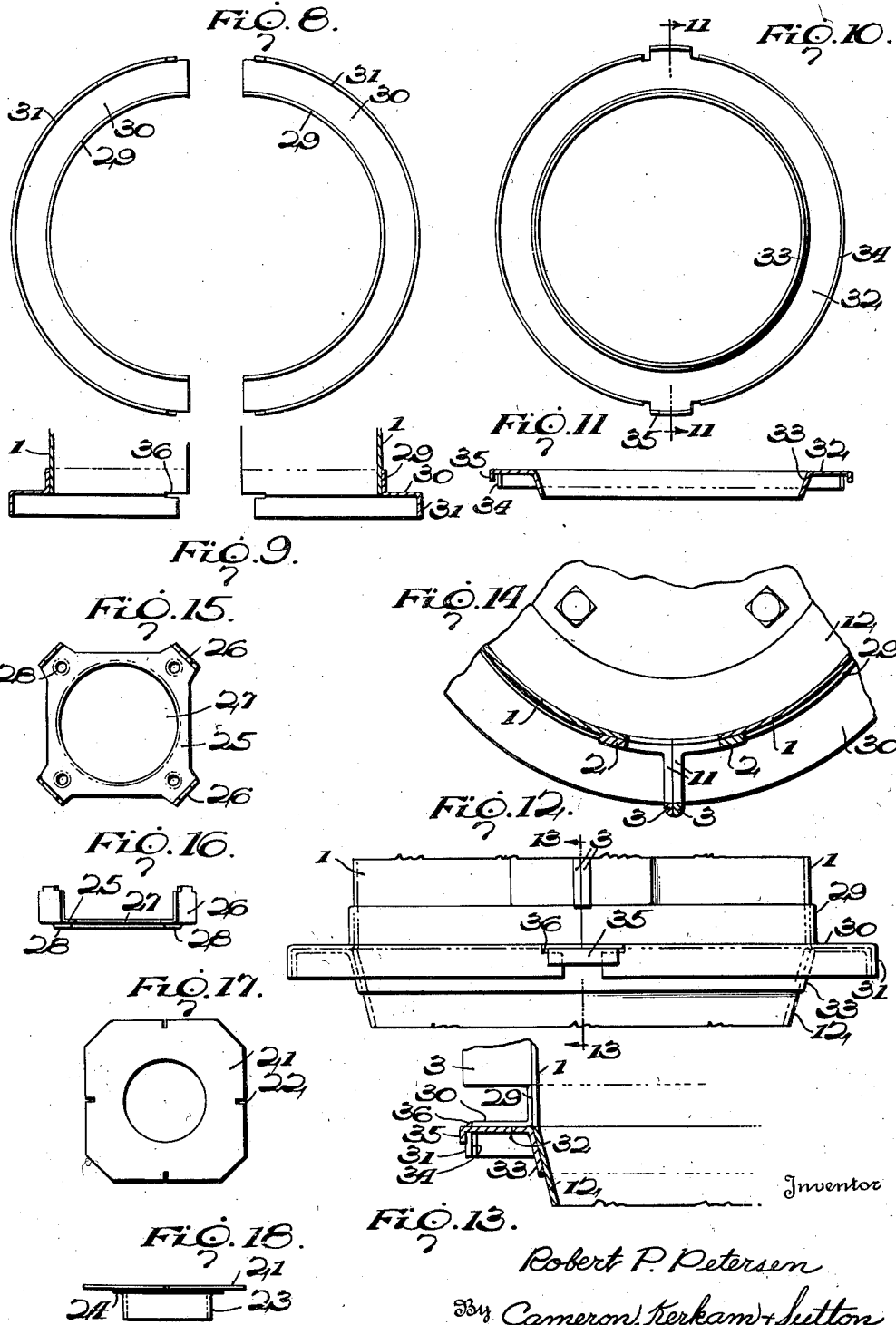
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UNITED STATES PATENT OFFICE

2,388,569

MOLD FOR CONCRETE BOMBS

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7 Claims. (Cl. 25—118)

This invention relates to the manufacture of concrete practice bombs and more particularly to forms or molds for making such bombs.

Actual bombing practice is desirable in developing the bombing proficiency of military aviation personnel, and large quantities of practice bombs are expended in such training. These practice bombs are required to have the same size, shape, weight and flight characteristics as actual bombs if the practice results are to represent the results of actual bombing with any degree of accuracy. As heretofore made, such practice bombs have usually consisted of metal casings of the desired size and shape and adapted to be filled with sand or the like to make up the proper weight. Both the cost of materials and the cost of manufacture have been high, and moreover the variation in weight of the sand according to moisture conditions has caused variations in results which have gone far to nullify the desired benefit of the practice. Concrete bombs, on the other hand, can be made quickly and cheaply of non-critical materials, can be molded to the exact size and shape desired, do not need to be filled before use, are of uniform and non-varying weight, and provide entirely satisfactory results.

The present invention is concerned with the molding of such concrete practice bombs having the characteristic shape of a substantially cylindrical body with a rounded nose and a tapered conical base. In addition provision must be made for accurately located bolts set in the concrete base but protruding for attachment of the usual metal fin, for axially aligned lugs on the side of the bomb for suspending it in the bomb rack, which lugs must line up accurately with one of the vanes of the fin, and for a charging recess in the base in which a container of smoke-producing material or the like can be inserted.

The invention provides a novel mold or form for these purposes which is light and inexpensive, simple to assemble or knock down, and easy to use, while at the same time providing accurate location and alignment of the suspension lugs, fin-attaching bolts, and charging recess. This mold comprises three main sections, namely, a plural-part substantially cylindrical shell having a pouring opening at its nose and axially aligned openings for the suspension lugs, a nose piece to be inserted in said nose opening after the bomb is poured and having a rounded inner surface to shape the nose of the bomb, and a base assembly supporting the shell and forming the tapered base of the bomb with its charging recess and

fin-attaching bolts. The assembled shell is locked to the base assembly with the lug openings and bolts properly aligned while the bomb is being poured but is thereafter stripped off leaving the formed bomb supported by the base assembly for curing.

One embodiment of the invention has been illustrated in the accompanying drawings, but it is to be expressly understood that said drawings are for purposes of illustration only and are not to be construed as a definition of the limits of the invention, reference being had to the appended claims for this purpose.

In the drawings:

Fig. 1 is a side view of a complete assembled mold embodying the invention;

Fig. 2 is a section on the line 2—2 of Fig. 1;

Fig. 3 is a top plan view of Fig. 1;

Fig. 4 is a bottom plan view of Fig. 1;

Fig. 5 is a section on the line 5—5 of Fig. 2;

Fig. 6 is a section through the base assembly on the line 6—6 of Fig. 4;

Fig. 7 is a section of the base assembly on the line 7—7 of Fig. 4;

Figs. 8 and 9 are detail views illustrating locking means for attaching the shell to the base assembly;

Figs. 10 and 11 are detail views illustrating the cooperating locking means on the base assembly;

Figs. 12 and 13 illustrate the assembly of these locking means;

Fig. 14 is a detail of part of the shell;

Figs. 15, 16, 17 and 18 illustrate details of the base assembly.

The shell in the form shown consists of two half-cylindrical parts 1 the meeting edges of which are provided with angles having circumferential flanges 2 welded to the shell parts and radial flanges 3 which engage one another and are locked together in any suitable manner. In the form shown, studs 4 are welded to one of the flanges 3 and extend through openings in the adjacent flange 3, the protruding ends of these studs having openings through which wedges 5 are driven to lock the flanges tightly together. The shell parts 1 are rounded off as shown at 6 to form the tapering nose of the projectile and terminate in a two-part ring 7 providing a pouring opening at the nose, the ends of the radial flanges 3 being bent over and welded to this ring at 8. A nose piece or plug 9 is shaped to fit tightly in the ring 7 and to close the pouring opening, said nose piece having a rounded or curved inner surface 10 which completes the shaping of the nose of the projectile.

The shell parts are also provided with a plurality of axially aligned openings whereby the suspension lugs can be molded into the bomb. In the form shown, openings 11 are cut through the radial flanges 3 and through the circumferential flanges 2 of the stiffening angles and the shell beneath, as shown in Figs. 1 and 2. Mating openings are provided in the two shell parts and when the shell is assembled, these openings merge (Fig. 14) and provide for the location of the suspension lugs along the axial line of the flanges 3.

The base assembly comprises an inverted conical cup 12 which forms the tapered base of the bomb, this cup being preferably mounted in a fabricated sheet metal assembly which supports the shell while the bomb is being poured and which supports the formed bomb during curing of the concrete as stated above. In the form shown, this assembly comprises four supporting legs 13 generally triangular in shape and preferably formed from sheet metal flanged at 14 along their bottom edges to provide greater supporting area, said legs being arranged substantially radially with their inner edges flanged at 15 for attachment to the cup 12 as by spot welding. The outer edges of the legs may be stiffened by flanges 16.

A central opening 17 in the bottom of the cup 12 is adapted to receive and locate a core piece 18 (Fig. 7) which forms a charging recess in the tapered base of the bomb. A plurality of smaller openings 19, here shown as four in number, are formed in the bottom of the cup 12 around the central opening 17 to receive and locate fin attaching bolts 20 the heads of which are molded in the base of the bomb and the lower ends of which extend below the bottom of the cup so that they protrude from the base of the finished bomb. Beneath the bottom of the cup, the lower ends of the core piece 18 and bolts 20 are vertically located and supported by suitable means such as a plate 21 forming part of the base assembly. Preferably this plate is notched at 22 (Fig. 17) to receive the inner edges of the legs 13, said legs extending inwardly beneath the plate and terminating at a ring 23 having an upper flange 24 on which the plate 21 is supported. These parts may be secured together in any suitable manner as by spot welding at appropriate points.

Preferably the lower ends of the core piece 18 and bolts 20 beneath the bottom of the cup are held in proper alignment while the bomb is being poured. For this purpose an alignment plate 25 (Figs. 15 and 16) is suspended from the bottom of the cup in any suitable manner, as by the upturned lugs 26 the ends of which extend through openings in the bottom of the cup 12 and are upset to secure the alignment plate in position. This plate is provided with a central opening 27 corresponding to the central opening 17 in the bottom of the cup, and with four surrounding openings 28 corresponding to the openings 19 in the bottom of the cup. Thus the core piece and the bolts are firmly engaged at spaced points (see Fig. 7) and held in proper alignment while the concrete is being poured and during the curing process.

The shell is supported on the base assembly during the pouring of the bomb and suitably locked thereto. Since the axially aligned suspension lugs must line up accurately with one of the vanes of the fin, the locking means also comprises indexing means which establish the line of the suspension lug openings 11 in a predeter-

mined circumferential position with respect to the fin-attaching bolts 20. It will be understood that the relation of this predetermined position relative to the bolts 20 will depend upon the position which the vane of the fin will occupy with respect to the bolts 20.

The details of suitable indexing and locking means are illustrated in Figs. 8-13. Secured to the bottom of the shell parts is a two-part ring 29 (Figs. 8 and 9) having a horizontal shell supporting portion 30 and a downturned peripheral flange 31. Secured to the upper edge of the cup 12 is a cooperating supporting ring (Figs. 10 and 11) having a horizontal flange 32 supporting the horizontal flange 30 of the shell ring, an inner peripheral flange 33 attached to the rim of the cup 12 as by spot welding, and an outer downturned peripheral flange 34 over which the flange 31 of the shell ring fits. The flange 34 is interrupted at diametrically spaced points and the horizontal portion 32 extended radially and then bent down to form lugs 35. The corners between the flanges 30 and 31 of the two-part shell ring are also cut away or notched at 36 so that the ends of the flanges 31 can slide under the horizontal flange 32 and inside the lugs 35 of the base ring (Figs. 12 and 13). The ends of the flanges 31 can be cut off to less than a half circumference if desired, as shown in Figs. 8, 9 and 12.

The engagement of the ends of the flanges 31 under the horizontal flange 32 locks the shell to the base assembly against vertical or axial displacement, and the location of the lugs 35 fixes the rotational position of the shell relative to the base assembly. The axial line of the suspension lug openings 11 is thus definitely fixed relative to the position of the bolts 20 and hence properly located relative to the vane of the fin to be subsequently attached.

The use of the mold will be clear from the foregoing description and may be summarized as follows. The core 18 and bolts 20 are placed in the base assembly, and the two halves of the shell are pushed on the base assembly from opposite sides, engaging the locking and indexing means described above. The wedges 5 are then inserted and driven tight, the suspension lugs are inserted, and the mold is ready for pouring. If desired, suitable reinforcing means may be placed between the halves of the shell, and in such case the suspension lugs may form part of or be attached to the reinforcement. The bomb is then poured and the nose piece inserted to finish the nose. Tamping, shaking or other suitable operations may be employed if desired. When the concrete has set sufficiently to be self-supporting, the shell and nose piece are removed, leaving the bomb supported in the base assembly while curing.

It will be understood that the invention is not limited to the particular embodiment described above and illustrated in the drawings, as various changes may be made in the form, details of construction and arrangement of the parts without departing from its spirit. Reference should therefore be had to the appended claims for a definition of the limits of the invention.

What is claimed is:

1. A mold for making concrete practice bombs comprising a plural-part substantially cylindrical shell having a pouring opening at the nose, means for locking the parts of said shell in assembled relation, a base assembly supporting the

mold and having an inverted conical cup to form the tapered base of the bomb, and means for locking the assembled shell to the base assembly, said cup having a central opening in its bottom to locate a core piece forming a charging recess in the base of the bomb, said base assembly comprising a support for said core piece spaced a predetermined amount below the bottom of the cup to locate the lower end of said core piece.

2. A mold for making concrete practice bombs comprising a plural-part substantially cylindrical shell having a pouring opening at the nose, means for locking the parts of said shell in assembled relation, a base assembly supporting the mold and having an inverted conical cup to form the tapered base of the bomb, and means for locking the assembled shell to the base assembly, said cup having a central opening in its bottom to locate a core piece forming a charging recess in the base of the bomb, said base assembly comprising means below the bottom of the cup surrounding and aligning said core piece and a support for said core piece below said aligning means and spaced a predetermined amount below the bottom of said cup to locate the lower end of said core piece.

3. A mold for making concrete practice bombs comprising a plural-part substantially cylindrical shell having a pouring opening at the nose, means for locking the parts of said shell in assembled relation, a base assembly supporting the mold and having an inverted conical cup to form the tapered base of the bomb, and means for locking the assembled shell to the base assembly, the bottom of said cup having a plurality of openings to receive and locate fin-attaching bolts, said base assembly comprising supporting means for said bolts spaced a predetermined amount below the bottom of said cup to locate the lower ends of said bolts.

4. A mold for making concrete practice bombs comprising a plural-part substantially cylindrical shell having a pouring opening at the nose, means for locking the parts of said shell in assembled relation, a base assembly supporting the mold and having an inverted conical cup to form the tapered base of the bomb, and means for locking the assembled shell to the base assembly, the bottom of said cup having a plurality of openings to receive and locate fin-attaching bolts, said base assembly comprising a plate below the bottom of the cup having corresponding openings to receive and align said bolts and supporting means for said bolts below said plate and spaced a predetermined amount from the bottom of said cup to locate the lower ends of said bolts.

5. A mold for making concrete practice bombs comprising a plural-part substantially cylindrical

cal shell having a pouring opening at the nose, means for locking the parts of the shell in assembled relation, a base assembly supporting the mold and having an inverted conical cup to form the tapered base of the bomb, the bottom of said cup having a central opening to locate a core piece forming a charging recess in the base of the bottom and a plurality of openings around said central opening to receive and locate fin-attaching bolts, said base assembly comprising supporting means spaced a predetermined amount below the bottom of said cup for supporting and locating the lower ends of the core piece and bolts, and means for locking the assembled shell to the base assembly while the bomb is being poured.

6. A mold for making concrete practice bombs comprising a plural-part substantially cylindrical shell having a pouring opening at the nose, means for locking the parts of the shell in assembled relation, a base assembly supporting the mold and having an inverted conical cup to form the tapered base of the bomb, the bottom of said cup having a central opening to locate a core piece forming a charging recess in the base of the bottom and a plurality of openings around said central opening to receive and locate fin-attaching bolts, said base assembly comprising a plate below the bottom of the cup having corresponding openings to receive and align said core piece and bolts and supporting means below said plate and spaced a predetermined amount below the bottom of said cup for supporting and locating the lower ends of said core piece and bolts, and means for locking the assembled shell to the base assembly while the bomb is being poured.

7. A mold for making concrete practice bombs comprising a plural-part substantially cylindrical shell having a pouring opening at the nose, means for locking the parts of the shell in assembled relation, a base assembly supporting the mold and having an inverted conical cup to form the tapered base of the bomb, the bottom of said cup having a central opening to locate a core piece forming a charging recess in the base of the bottom and a plurality of openings around said central opening to receive and locate fin-attaching bolts, said shell having a plurality of axially aligned openings to receive suspension lugs for the bomb, and means for locking the assembled shell to the base assembly comprising indexing means to locate the line of said lug openings in a predetermined circumferential position with respect to said bolts so that the lugs will be aligned with one of the vanes of the fin.

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