

[54] **MOLD FOR MAKING METER BOX COVERS AND THE LIKE**

3,353,220 11/1967 Lenoble..... 425/123
3,363,040 1/1968 Aoki..... 264/278

[75] Inventor: **Walter B. Hahne**, Costa Mesa, Calif.

Primary Examiner—J. Howard Flint, Jr.

[73] Assignee: **Pre-Cast Concrete Products, Limited**, Santa Ana, Calif.

[22] Filed: **June 23, 1970**

[21] Appl. No.: **56,040**

Related U.S. Application Data

[63] Continuation of Ser. No. 673,444, Oct. 6, 1967, abandoned.

[52] U.S. Cl. **249/91; 425/DIG. 58; 249/103; 249/104; 249/127; 249/134; 249/140; 425/183; 425/19; 425/DIG. 44**

[51] Int. Cl. **B29c 5/00**

[56] **References Cited**

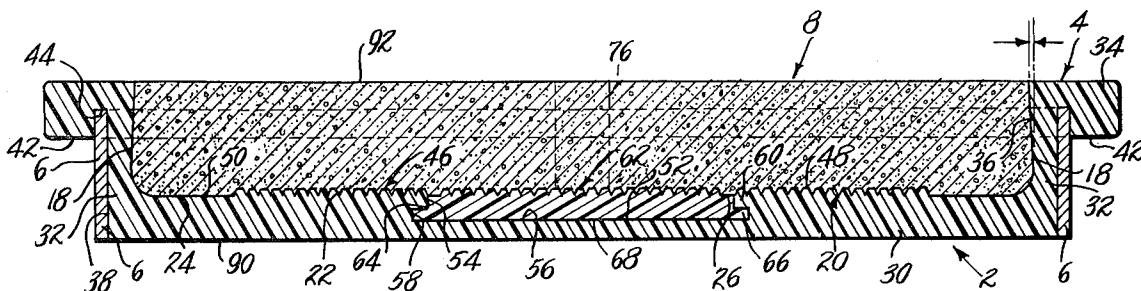
UNITED STATES PATENTS

1,907,503	5/1933	Chilton	249/127 X
1,969,083	8/1934	Lawson.....	425/45
2,611,170	9/1952	Theis	249/55
3,094,758	6/1963	Downie et al.....	425/352
3,161,917	12/1964	Wiland.....	249/54
3,161,938	12/1964	Graham	249/13
3,166,815	1/1965	Rappas	249/9

[57] **ABSTRACT**

A unitary mold for use in casting concrete objects, for example, meter box covers and the like. The mold comprises a one-piece tray molded from flexible polyvinylchloride having a bottom wall and a peripheral sidewall having an external annular flange on the upper end thereof, and a steel ring that is placed on the exterior of the tray prior to casting an object to ensure dimensional stability. The top surface of the bottom of the tray is formed with whatever nonskid or other pattern is desired for the top surface of the cast object, and can include a cavity to receive various pattern inserts for forming lettering, indentations or other formations on the cast object. The inner surfaces of the side walls are tapered inwardly from the lower end to the top thereof, to form side walls on the cast object that taper inwardly from the top to the bottom of said object. To remove the object from the mold, the ring is first removed, and the polyvinylchloride tray is then flexed or stretched as required to free the object.

8 Claims, 6 Drawing Figures



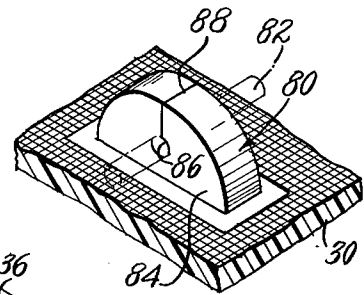
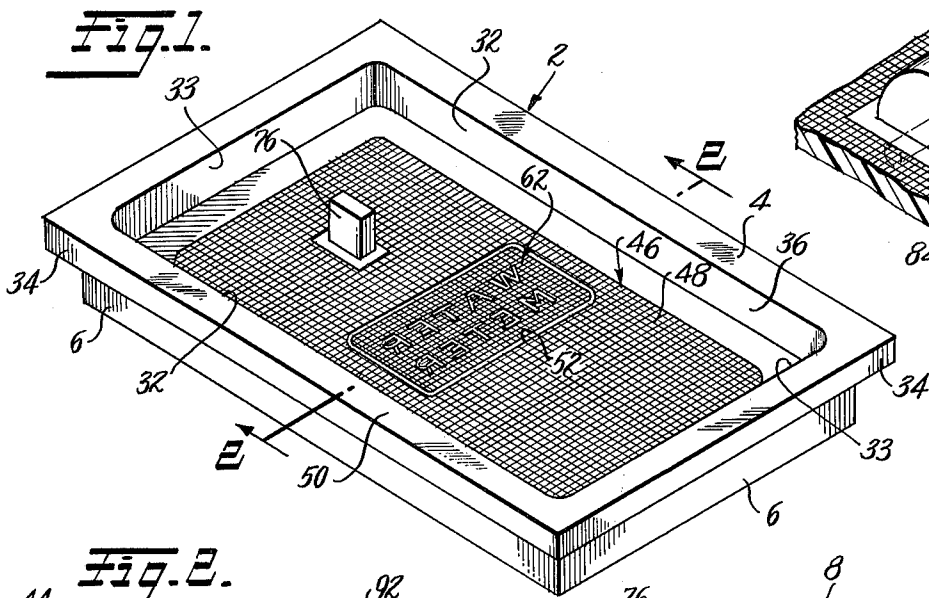


Fig. 5.

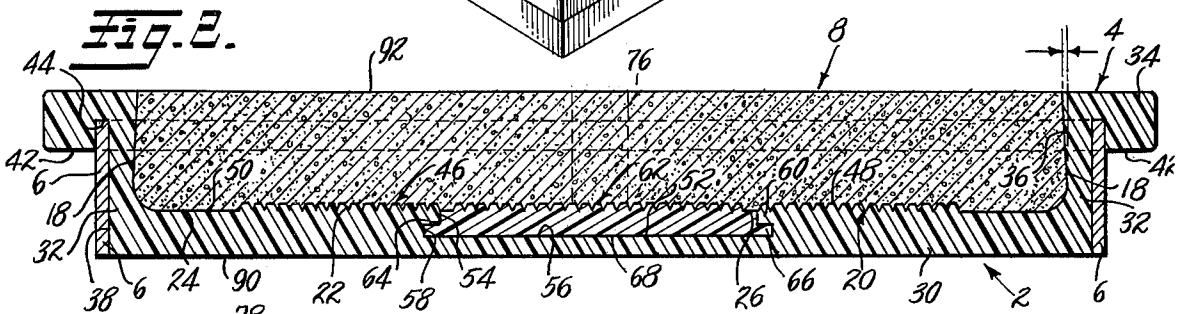


Fig. 2.

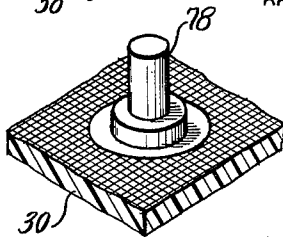


Fig. 8.

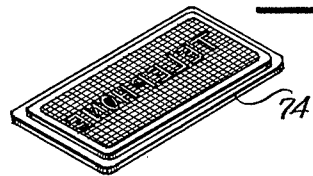


Fig. 4.

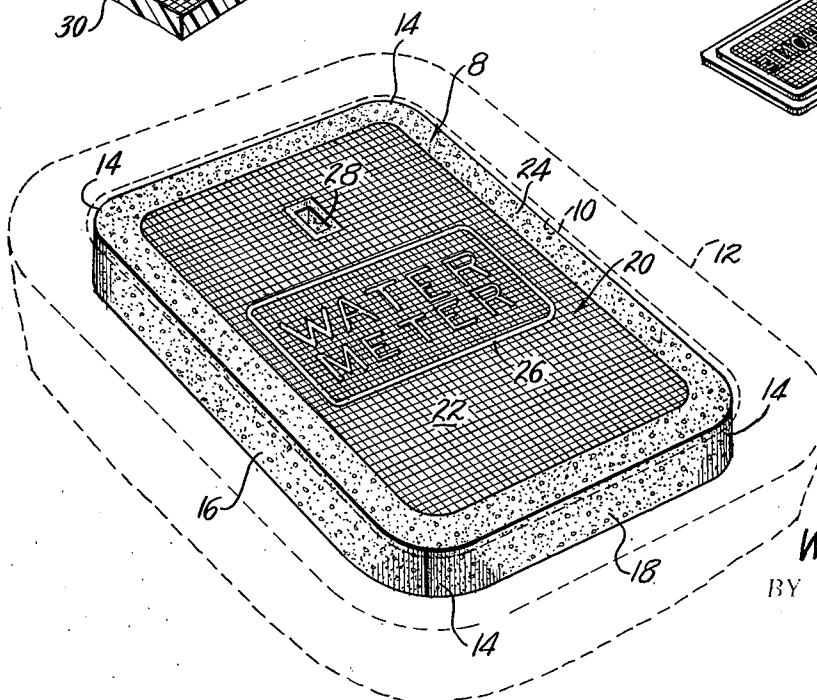


Fig. 3.

INVENTOR.
WALTER B. HAHNE

BY *Bacon & Thomas*
ATTORNEYS

MOLD FOR MAKING METER BOX COVERS AND THE LIKE

This application is a continuation of Ser. No. 673,444, filed Oct. 6, 1967, now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to molds for use in casting concrete objects, for example, meter box covers and the like, which include an upper surface having a nonskid surface and/or lettering or other formations, and side edges that taper inwardly from the top to the bottom of the object. More particularly, it relates to a flexible mold for casting dimensionally accurate concrete objects; that can be easily stripped from nearly any shaped object; that will accurately and precisely form any desired lettering or other formation on the object; and that will give the surfaces of the concrete object engaged with the mold a hard, glass-like finish.

2. Description of the Prior Art

Concrete objects, such as meter box covers, are commonly cast in rigid molds made of metal, wood or a like material. The completed object is usually difficult to remove from the mold because the concrete tends to bond itself to the mold walls, and because the rigid nature of the mold prevents any bending or distortion thereof to facilitate removal of the object. Products cast in such molds frequently need grinding, patching or other finishing after removal from the mold, and mass production with such molds is time consuming and often results in non-uniform products.

Further, with conventional molds, all surfaces of the object must be designed so that when the concrete has set, the object is not locked or keyed to the mold and can be slipped out, or else the mold must be multi-part and designed so that it can be disassembled for freeing the object. A multi-part mold is objectionable for several reasons, including the time and difficulty involved in assembly and disassembly, and the rough lines commonly formed on the cast object where parts of the mold come together.

There thus is need for a mold to which concrete will not bond, which leaves no seams or the like on the mold surfaces, and which can be easily stripped from objects of various shapes, including objects having projections or reversely tapered surfaces that would form an interlock with a conventional rigid mold.

SUMMARY OF THE INVENTION

The present mold comprises a one-piece tray molded from polyvinylchloride, and an encircling steel band or ring that is placed about the mold prior to pouring of the concrete to ensure dimensional stability. The polyvinylchloride material is utilized for the tray because it can be flexed and stretched, after removal of the steel ring, to readily remove a cast object therefrom.

Further reasons for utilizing polyvinylchloride are that it has been discovered that concrete will not bond or adhere thereto, and that the surfaces of a concrete object engaged during casting with a mold made of such material will acquire a non-porous, hard, glass-like finish. These unique qualities of polyvinylchloride make it possible to cast objects of various shapes having a smooth, uniform surface, and also make it possible to accurately and cleanly cast patterns, legends and other formations into such an object.

The invention is especially useful for casting high quality utility box covers, on a mass production basis. Such a cover will usually be rectangular in shape with rounded corners, and will have substantial thickness.

The end and side edges of the cover preferably slope or taper inwardly from the top to bottom to suit the taper on the cast utility box, and because the cover is usually placed at ground level the top surface thereof is provided with a nonskid surface. In addition, an identifying legend, such as "WATER," "TELEPHONE," "GAS METER" or the like, will be cast into the cover's top surface.

The present mold will form a precisely dimensioned nonporous cover from nearly any slump concrete mix, the polyvinylchloride material functioning to give a hard, non-porous, glasslike finish to the object. When the cover has set and has been cured, the steel mold ring is removed and the tray is stripped from the cover. The polyvinylchloride material is ideally flexible and stretchable, and hence no difficulty is encountered in stripping the mold. After stripping, the mold is ready for immediate reuse.

It is the principal object of this invention to provide a mold for the precision casting of concrete meter box covers and the like, designed to be easily stripped and to give a hard, non-porous surface finish to the cast product.

Another object is to provide a mold made of material to which concrete will not bond or adhere, and that can be readily stripped from a cast object.

Still another object is to provide a mold construction adaptable to casting a wide variety of concrete objects.

A further object is to provide a mold including easily installed and removable inserts for forming desired legends and other formations on a cast concrete object.

Yet another object is to provide a two-piece mold including a unitary flexible tray, and means designed to hold the tray dimensionally stable during casting of an object.

Other objects and many of the attendant advantages of the invention will become readily apparent from the following "Description of the Preferred Embodiment," and the attached drawings.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the two-piece mold of the invention with a legend-bearing insert and a rectangular depression-forming insert in place, ready to receive a concrete mix;

FIG. 2 is a vertical sectional view through the mold of FIG. 1, taken on the line 2—2 and showing the construction of the polyvinylchloride tray, the steel mold ring, and the removable legend-bearing insert;

FIG. 3 is a perspective view of a water meter utility box cover cast from concrete with the mold of FIGS. 1 and 2;

FIG. 4 is a perspective view of another legend-bearing insert, which can be substituted for the insert of FIGS. 1 and 2;

FIG. 5 is a perspective view of an insert for forming a semi-cylindrical depression and for placing a lifting pin in a cast object; and

FIG. 6 is a perspective view of another insert, for forming a stepped cylindrical bore in a cast object.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. 1 and 2, the mold of the invention is indicated generally at 2 and comprises a tray 4 and a steel band or mold ring 6. While the mold 2 is designed specifically for producing the utility box cover 8 of FIG. 3, it is to be understood that the principles thereof can be applied to making molds for other cast concrete objects.

The cover 8 is designed to be received within a complementary shaped opening 10 in a utility box structure 12 (indicated by broken lines in FIG. 3), and is generally rectangular with rounded corners 14. The side and end edges 16 and 18, respectively, of the cover 8 are formed with a slight inward taper from top to bottom as best shown in FIG. 2, and the top surface 20 of the cover has a uniform diamond grid pattern 22 thereon that forms a nonskid surface. The nonskid surface 22 is surrounded by a plain border 24, and carries the legend WATER METER centrally thereof surrounded by a narrower plain border 26. Further, the cover 8 has a rectangular recess or fingerhold 28 formed centrally therein, between the WATER METER legend and one end of the cover.

Until the present invention, covers similar to that indicated at 8 had to be produced by utilizing a rigid wood or metal mold. Because of the inward top to bottom taper of the cover side and end edges 16 and 18, the cover 8 had to be cast with the top cover surface 20 uppermost in the mold; otherwise, the reversely tapered edges 16 and 18 would prevent removal of the completed cover from the rigid mold. This arrangement resulted in the need to shape and finish the top surface 20 by hand methods, whereby a nonskid surface was brushed or stamped at the right time into the partially set concrete, and legends and other formations were formed with stamping dies or the like. The use of such hand methods is time consuming, and uniformity in appearance from one cover to the next was nearly impossible to attain. Further, the general surface finish of the cover was rough and grainy, and subsequent patching or grinding was a common necessity. The mold 2 overcomes all of these objections and difficulties.

The tray 4 is integrally molded from polyvinylchloride, as by injection molding. It includes a generally rectangular bottom wall 30 from which projects vertically directed side walls 32 and end walls 33, which terminate in an external, generally rectangular-in-cross-section annular flange 34. The inner surface 36 of the side walls 32 and end walls 33 tapers inwardly from bottom to top completely therearound, as indicated in FIG. 2, and the interior wall junctures and corners of the tray 4 are all rounded and smooth. The exterior surface 38 of the walls 32 and 33 extend perpendicularly to the plane of the bottom wall 30.

Received on the exterior surface 38 of the walls 32 and 33 is the complementary-shaped rigid, annular steel band or ring 6, which functions to hold the flexible side walls 32 and end walls 33 dimensionally stable during casting. The undersurface 42 of the annular flange 34 has a groove 44 therein adjacent to the walls 32 and 33 extending completely about said flange, within which the upper edge of the ring 6 is seated. Thus, the tray 4 and restraining ring 6 are detachably held assembled.

The top or inner surface 46 of the bottom wall 30 has a nonskid pattern 48 formed thereon, which can be of diamond or any desired configuration. The pattern 48 is easily formed on the bottom wall 30 during injection molding of the tray 4, and is surrounded by a smooth border 50 for forming the plain border 24 on the cover 8. Centrally of the pattern 48, the bottom wall 30 has a generally rectangular cavity or recess 52 formed therein, said recess having rounded corners and including a side wall 54 and a flat bottom wall 56. The side wall 54 has an undercut groove 58 formed therein adjacent the bottom wall 56, which defines an inwardly directed retaining flange 60 extending about the recess 52. The flange 60, because the tray 4 is molded from flexible and stretchable polyvinylchloride, can also be flexed and stretched.

Received within the recess 52 is an insert 62, including a peripheral side wall 64 that is shaped complementary to the recess side wall 54 and from the bottom of which projects an annular flange 66 engageable beneath the flange 60 to interlock therewith. The insert 62 is also made of polyvinylchloride, and thus no difficulty is encountered in engaging the flange 66 beneath the flange 60, nor in removing the insert 62 from the recess 52. The bottom surface 68 of the insert 62 is flat and rests on the flat recess bottom surface 56, and thus said insert is fully supported over its entire surface area.

The top surface of the insert 62 has a nonskid raised pattern 70 formed thereon, surrounded by a border 72 corresponding to the plain border 26 of the cover 8. Formed centrally on the insert 62 are the reversed, raised letters of the legend WATER METER, which function to form the legend in the cover 8. The insert 62 can be removed and another inserted, if a different legend is desired on the cover 8. For example, the insert 74 of FIG. 4, bearing the reversed letters of the legend TELEPHONE, can be substituted for the insert 62. If production volume on a given item warrants, the legends may be molded in the bottom wall 30 of the tray 4 and the recess 52 and inserts 62 and 74 can be omitted.

Located between the recess 52 and one end of the tray 4 is an upstanding rectangular polyvinylchloride insert 76, designed to form the rectangular recess 28 in the cover 8. The insert 76 is removably attached to the bottom wall 30 by the same type of interlocking recess and flange arrangement as the insert 62, or in the alternative it can be molded integrally with the tray 4.

Another form of insert that can be substituted for the insert 76 is shown at 78 in FIG. 6, the insert 78 also being made of polyvinylchloride and being designed to form a stepped cylindrical recess in the cast object. Because concrete will not adhere to the polyvinylchloride inserts 76 and 78, they can be easily withdrawn from the recesses they form in the cast object.

Still another insert that can be substituted for the inserts 76 and 78 is shown at 80 in FIG. 5, the insert 80 being designed not only to form a recess in a cast object, but also to hold a crosspin 82 while the opposite ends thereof are being cast in place. The insert 80 is attached to the tray bottom wall 30, either by a recess and flange arrangement like the insert 62 or by being integrally molded therewith, and includes an upstanding semi-cylindrical portion 84 having a bore 86 extending therethrough from one end face thereof to its opposite end face. The portion 84 is split axially at 88 from the bore 86 outwardly, so that the metallic pin 82

can be easily inserted into and removed from the bore 86.

In use, the pin 82 is inserted into the bore 86 with the opposite ends thereof projecting beyond the insert end faces. Concrete is then poured into the tray 4, and allowed to set and harden. Thereafter, the non-sticking polyvinylchloride insert is pulled from the recess it forms when the tray is stripped from the cast object; the axial split 88 and the flexible, stretchable characteristics of the polyvinylchloride material cooperate to free the insert from the pin 82, leaving the latter properly positioned with its opposite ends embedded in the cast object.

The mold is utilized in the following manner to manufacture the cover 8: First, the rigid ring 6 is mounted on the side wall 38, and the tray 4 is then placed on a flat surface so that the lower surface 90 of the bottom wall 30 is fully supported. The proper insert 62 and any additional inserts are then installed in the mold, after which a concrete mixture is poured into the mold. Other than to wipe the interior surfaces of the mold 2 clean, no other preparation of the polyvinylchloride surface is required. The concrete can be of nearly any desired slump, thus simplifying production procedures.

The concrete mix is packed into the mold 2, and the bottom surface 92 of the cover 8 is struck off flush with the flange 42. The concrete is then allowed to set and become fully hardened, after which the ring 6 is removed, and the tray 4 is flexed and stretched to strip it from the finished cover 8. The tray 4 is easily stripped despite the reverse taper of the side and end walls 16 and 18 of the cover 8, because of the flexible and stretchable characteristic of the polyvinylchloride. The inserts 62 and 76 will normally remain in the tray 4.

One unique characteristic of the polyvinylchloride material, as has been mentioned, is that concrete will not bond thereto. Thus, the tray 4 can be easily stripped without any chipping or cracking of the surfaces of the cover 8. This eliminates any need to patch or touch up the cover 8.

Another characteristic of the polyvinylchloride material is that any concrete mix engaged therewith will set and dry to form a hard, non-porous, glass-like surface, unlike anything known before in concrete work. Thus, the nonskid configuration 48 and the letters of the legend on the insert 62 will be sharply and precisely formed, and the borders 24 and 26 and the cover side and end walls 16 and 18 will be extremely smooth and glass-like, all without further polishing or finishing.

Thus, with the mold 2, uniform precision formed meter box covers 8 can be easily mass produced, with a minimum of skill and effort on the part of the worker. Further, it is manifest that the principles and concepts of the mold 2 can be utilized to cast nearly any type of object, and thus the invention is not limited to the production of meter box covers. Likewise, any other plastic material having the described properties of polyvinylchloride may be used in making the tray 4.

Obviously, many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be

practiced otherwise than as shown and described.

I claim:

1. A mold for casting objects from a concrete mix or the like, comprising: a unitary tray made of flexible stretchable polyvinylchloride, said tray having a bottom wall and side walls extending upwardly from said bottom wall, said side walls having vertical exterior surfaces, an annular flange projecting outwardly from the upper edge of said side walls, said annular flange having a lower face and having an annular groove formed in said lower face adjacent the exterior of said side walls said groove being defined in part by said side walls, said tray having its interior shaped to conform to the shape of the object to be cast therein, a rigid band detachably mounted upon said tray and having an upper edge received within said annular groove, said band being of a height sufficient to engage and support said vertical side walls throughout their height, said annular flange cooperating with said band as reinforcement for holding the exterior configuration of the tray from being distorted during casting, said bottom wall having a recess formed in its upper surface, said recess having an inwardly directed flange on the side wall thereof extending completely about said recess, and an insert received in said recess, said insert including a portion engageable beneath said inwardly directed flange for retaining said insert in said recess, said insert being removable by flexing said bottom wall.

2. A mold as recited in claim 1, wherein the removable insert is made of polyvinylchloride.

3. A mold as recited in claim 1, wherein the bottom surface of the removable insert is engaged with the bottom wall of the recess over the entire area thereof.

4. A mold as recited in claim 1, wherein the insert has an outwardly directed flange extending completely about the insert at its lower edge, said outwardly directed flange being engaged with the inwardly directed flange of the recess.

5. A mold as recited in claim 4, wherein the insert is flexible and carries a raised projection thereon, said projection having a bore therethrough for holding a pin so that the opposite ends of said pin can be cast into an object, said projection being split from said bore to the outer periphery of said projection so that after said object is completed said flexible insert can be removed from said pin.

6. A mold for casting objects from a concrete mix or the like, comprising: a flexible plastic tray for receiving said mix, said tray having a bottom wall and side walls extending upwardly therefrom, the upper surface of said bottom wall containing a recess having an inwardly directed marginal flange extending throughout its periphery; and an insert disposed in said recess and having a peripheral flange engaged with said inwardly directed marginal flange to demountably retain said insert in said recess, said insert being readily removable upon flexing of the bottom wall of said tray.

7. A mold as recited in claim 6, wherein the insert is made of flexible plastic material.

8. A mold as recited in claim 6, wherein the mold and insert are made of polyvinylchloride.

* * * * *