

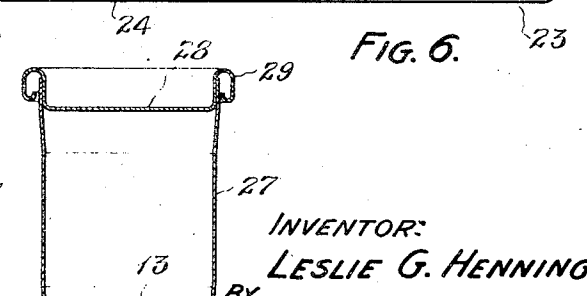
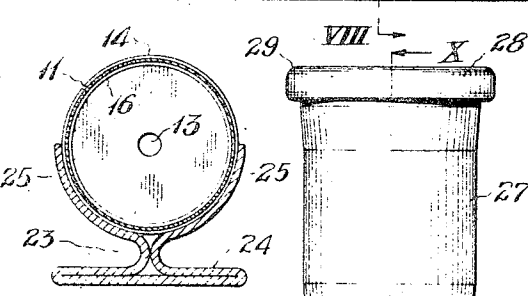
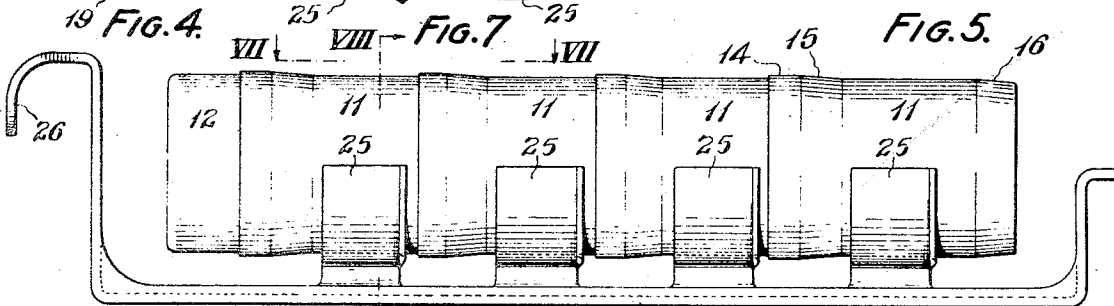
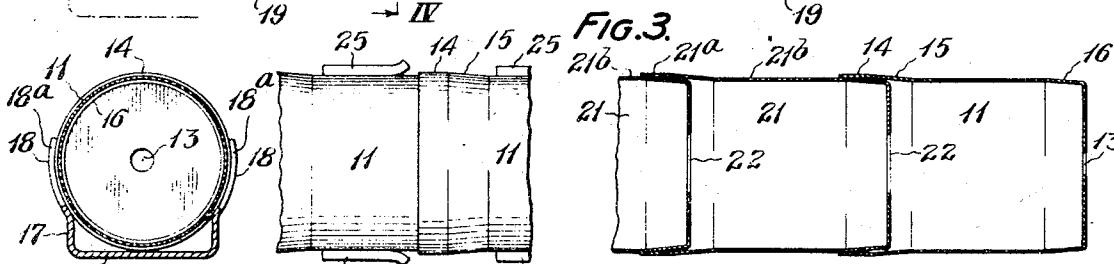
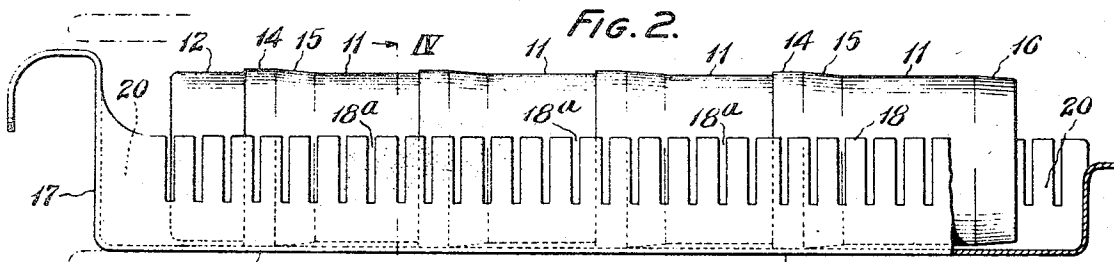
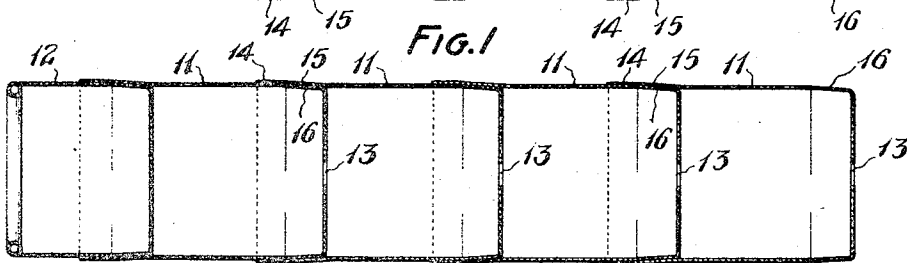
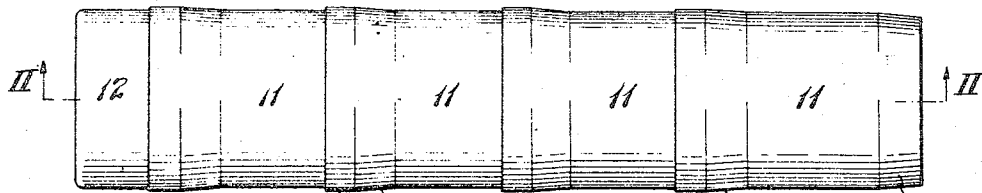
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2,247,017

ICE FREEZING MOLD AND TRAY THEREFOR

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2,247,017

ICE FREEZING MOLD AND TRAY THEREFOR

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Application May 22, 1939, Serial No. 275,115

18 Claims. (Cl. 62—108.5)

My invention relates to ice freezing methods, such as are used for freezing small ice cakes, commonly called cubes, in household mechanical refrigerators; or, for congealing gelatins, ices or other liquid substances.

The principal object of my invention is the provision of an ice mold from which the ice may be removed readily without the use of mechanical aids.

A further object of my invention is to provide a plurality of individual molds so constructed and assembled that the ice from a single mold may be removed without disturbing that in the other molds.

Further objects of my invention are the provision of a mold that can be quickly and easily filled with water; the provision of an individual mold having an aperture for the admission of air behind the ice to prevent the formation of a vacuum, and by this means to permit the free release of the ice from the mold without undue melting of the ice to admit air from the front of the mold; the provision of a mold from which the ice may be removed without the ice being touched by the hands; the provision of a metal ice mold adapted for freezing water readily because of the good heat conductivity which is provided between the mold and the freezing unit of the refrigerator; the provision of an ice mold whose shape does not have to be altered or distorted in the removal of the ice from it; and the provision of a mold or receptacle which may be used separately or telescoped to other like molds or receptacles for the purpose of congealing liquids by cooling.

Among the forces to be overcome in the removal of ice from a mold cavity in which it has been frozen are the frozen bond or adhesion between the ice and the walls of the mold cavity, and the external atmospheric pressure upon the ice which holds it in the mold until the vacuum behind it is "broken" so as to balance the external pressure.

I have discovered that ice can be removed by gravity from a mold cavity, preferably slightly tapered to facilitate the release of the ice, open at its larger end to permit the exit of the ice, but closed at its smaller end except for a relatively small hole or perforation, by holding the mold in the hand with the larger end down. The warmth of the hand quickly thaws the bond between the ice and the mold, the perforation in the smaller end of the mold admits air behind the ice, and it drops out with practically no loss from melting.

As a further aid to releasing the ice the thumb

or a finger of the hand holding the mold may be pressed momentarily upon the perforation in the closed end to melt the slight protrusion of ice through the perforation and start it out of the mold.

Preferably the mold should be made of thin, good heat-conducting metal such as aluminum, or copper, but any suitable material may be used.

I prefer to construct the molds so that a plurality of them may be telescoped or nested together in a series or stack, the perforated, small end of each mold, except the first of the series, telescoping into the large open end of the preceding mold, and the large end of the last mold of the series having a removable substantially air-tight closure.

It will be noted that in such a series of telescoped molds the cavity of each mold is connected to that of each contiguous mold by the aperture in the perforated end of one of the molds. This results in forming small necks of ice between the cakes in adjacent molds.

Hence, the ice as it is frozen in the molds before they are separated comprises a series of cakes, conforming in shape to that of the mold cavities, these cakes being integrally connected together by relatively small necks of ice which are frozen in the apertures in the small ends of the molds.

The stack of molds is preferably supported horizontally in the ice freezing compartment of the refrigerating unit in order that the molds may make contact with the metal of the unit. I have found that practically no water will leak out of the aperture in the exposed small end of the first mold of the stack, if the size of the aperture is not too large as hereinafter explained. During the freezing process, the internal pressure due to expansion of the water, may cause a small amount of water to come out of the aperture in the end mold.

Preferably the molds are made of circular cross section, but this is largely for convenience in manufacture. They may be made of any desired, suitable shape.

My invention is described in the following specification and shown in the accompanying drawing in which:

Fig. 1 is a side elevation of a plurality of telescoped molds.

Fig. 2 is an axial section on line II—II of Fig. 1;

Fig. 3 is a side elevation of a heat abstracting tray or support holding a stack of molds like that shown in Figs. 1 and 2;

Fig. 4 is a transverse section on line IV—IV of Fig. 3;

Fig. 5 is a fragmentary section similar to the right-hand end portion of Fig. 2 showing larger openings in the bottoms of intermediate molds, and the molds being shown incompletely telescoped;

Fig. 6 is a side elevation of a plurality of telescoped molds mounted in a heat-abstracting support, differing in form from that shown in Fig. 3;

Fig. 7 is a fragmentary plan view on line VII—VII of Fig. 6;

Fig. 8 is a section on line VIII—VIII of Fig. 6;

Fig. 9 is an elevation of one of the molds or cups, shown in Figs. 1, 2, 3 and 6, but having a closure in its larger end differing from the closure shown in those figures; and

Fig. 10 is an axial section on line X—X of Fig. 9.

In Fig. 1 a series or stack of molds or cups are shown telescoped or nested together, the left-hand mold having a removable substantially air-tight closure 12 at its large end. The same series of molds is shown in longitudinal axial section in Fig. 2 in which it will be seen there is a relatively small perforation 13 provided in the otherwise closed small end or bottom of each mold. Any desired number of molds or cups may be thus telescoped or nested together in a series or stack.

The closure 12 must be air-tight to the extent that substantially no liquid in the mold will be displaced by air before sufficient congealing or freezing has occurred to prevent any further escape of the liquid. The fit between the molds telescoped together to form a series must be similarly air-tight or leak-proof.

To fill a stack of molds with water I have found it preferable to hold one of the molds in the hand with a finger under and closing the perforation 13 in the bottom of that mold, and to allow water from a faucet to fill it, then to insert the next mold into the large end of the one that is full of water, still holding the perforation 13 of the bottom mold closed by the finger, and so on, inserting additional molds as fast as the preceding one has been filled with water, and finally inserting the closure 12 in the top mold. As the closure 12 is being inserted in the top mold, the finger may be removed from the perforation 13 of the bottom mold to permit any excess water to escape. When the closure 12 is seated, little, if any, water will leave the aperture 13 except as explained herein.

The stack of telescoped molds may then be laid horizontally in the ice freezing compartment of the refrigerating unit and only a negligible amount of water, if any, will escape from the opening 13 of the end mold during freezing. As the ice freezes in the stack, the telescoped portions of the molds will slide upon each other with the longitudinal expansion of the ice. With properly fitted telescoped portions no leakage occurs at the joints during freezing.

Because of the position in which the molds are held when being filled with water, I find it convenient at times to refer to the end mold of the series which is at the bottom of the stack of molds during the filling operation, as the bottom mold, and the end mold which is at the top during the filling operation, as the top mold.

It will be observed that the telescoped portions of the molds are partly cylindrical to fit the exterior of the body of the adjacent mold as shown at 14, and partly tapered or conical as shown at

15 to fit correspondingly tapered portion 16 at the bottom of the adjacent mold. The entire mold may be tapered, more or less, throughout its length if desired. Or, the telescoping portions of the mold may have one angle of taper and the body of the mold may be tapered on a smaller angle, merely to permit the ice to leave the mold more readily than it will leave a straight, untapered mold. In such molds as shown in the drawing the cylindrical parts are so short that the ice is readily released. A greater volume of ice may be made in the same length and maximum diameter of straight molds than is possible if they are tapered uniformly throughout their lengths.

After the ice is frozen in the stack of molds the stack may be removed from the refrigerator and readily separated by the hands, the small connecting ice necks in the apertures 13 readily breaking. Then, to remove the ice, the right-hand mold shown in Figs. 1, 2, and 3 may be separated from the adjacent mold, held in the hand over a receptacle with the large open end of the mold down, when the heat of the hand will warm the mold sufficiently to release the ice and it will drop out of the mold. Momentarily pressing the thumb or a finger on the hole 13 will aid in starting the ice out of the mold. If the ice filled mold feels too cold to the hands water may be applied to it for a moment. As the water does not come in direct contact with the ice, the latter cannot be wastefully washed away. Further, all that is needed to release the ice from the mold is the application of enough heat to skin thaw or break the bond between the ice and the mold when it will drop out of the mold without wasteful melting.

To facilitate the handling of the molds when placing them in or removing them from the refrigerator and to aid in the conduction of heat from the molds when they are in the refrigerator, a heat-abstracting tray such as is shown at 17 in Figs. 3 and 4 may be provided. This tray preferably has curved sides 18 formed to receive and make contact with the outer surfaces of the molds or cups. The sides of the tray may be made of spring metal and slots 18a may be provided in them to permit them to make yielding contact with the molds. The tray also is proportioned so that cylindrical portions 14 of the molds may contact the bottom 19 of the tray.

It will be seen that the tray is longer than the assembled molds are before the ice is frozen in them, to provide expansion spaces 20 between the ends of the molds and the ends of the tray.

Trays may be provided for holding a plurality of series of telescoped molds, and these trays may be made to substantially fit the ice freezing compartment provided for receiving other forms of trays in refrigerators.

Fig. 5 shows a fragmentary axial section through an end mold 11 having a small opening 13 at its small end, and two intermediate molds 21, 21, having holes 22 in their small ends which are larger than holes 13. These larger holes are permissible in the ends of the intermediate molds, but should not be so large that the ice formed in them will not readily break when the molds are separated. There is a limit to the permissible size of hole such as 13, in the end mold whose small end is exposed. If this hole is too large, water may escape from it when the mold is supported with its axis horizontal. I have found that a hole having a diameter of about three

sixteenths of an inch is satisfactory in either an intermediate or end mold having a maximum diameter of about one and three eighths inches. The maximum practical diameter of hole for any given mold may readily be determined by experiment. The only limitation on the size of the hole 13 is that it be of such size as to function in the manner set forth herein and to accomplish the results described herein.

Obviously, if the mold is placed with hole 13 at the top the hole can be made larger, if desired, because the liquid will not then leak out and the hole will function to admit air behind the ice when it is desired to remove it from the mold. I have found that holes 22 in intermediate molds having a diameter of about one half inch are satisfactory although by using holes of the same size as the smaller holes 13 in all of the molds, as shown in Fig. 2, any one of the molds may be used at the bottom end of the stack of molds when a plurality of molds are telescoped together.

The advantage of having larger holes in the small ends of intermediate molds is that the entire stack of molds may be telescoped together before filling them. By placing a finger under the small hole in the end mold, the entire stack may be held under the water faucet and filled from the top as the large holes between molds will permit all of the air in the molds to escape. Another reason for using the larger holes in the intermediate molds is that the resulting larger connecting necks of ice between the molds help prevent the premature separation of the individual molds of the stack.

The molds 21, 21 are shown only partially telescoped to illustrate how the cylindrical, large ends 21a, of the molds maintain contact with the body portions 21b when the expanding ice causes them to slide upon one another. This also helps to prevent separation of the individual molds of the stack.

The first method above described for filling a stack of molds, like those shown in Figs. 1 and 2, having small perforations 13, is perfectly satisfactory for filling a stack of molds like those shown in Fig. 5. The larger holes 22 in the intermediate molds permit the ice to leave the molds a little more readily than when the small holes 13 are used, as the thumb or finger can exert more expelling force through the larger holes.

In Figs. 6, 7 and 8, a modified form of tray or support 23 is shown. It comprises a base portion 24, adapted to rest upon the bottom of the ice freezing compartment of a refrigerating unit, and mold-supporting, heat-abstracting arms or chairs 25, properly spaced to contact with the exterior surfaces of the molds and shaped to make good heat conducting contact therewith.

In Fig. 7 a pair of arms 25 are shown having their edges flared outwardly to permit the molds to readily slide through them during freezing when there is expansion of the length of the ice within them.

Fig. 8 which is a section on line VIII—VIII of Fig. 6 illustrates the shape of the supporting arm or chair 25. It will be observed that these arms 25 contact with the cylindrical body portion of the mold between the telescoped portions. The arms 25 may be made of spring metal if desired, in order that they may press firmly on the molds.

While the tray 23 is made to support only a single stack of molds, it is obvious that trays may be made in which there will be provision for a plurality of stacks of molds lying side by side and parallel to each other. A suitable handle 26 may

be provided for handling the tray when placing it in or removing it from the refrigerating unit.

In Figs. 9 and 10 there are shown respectively a side elevation and an axial section of a mold 27, which is like one of the molds 11, having a removable closure 28 at the large end, and a small hole 13 in the bottom of the mold. Such a closure may be used instead of the type of closures 12 shown in Figs. 1, 2, 3 and 6, it being understood that if a supporting tray be used for a stack of molds in which one of the closures shown at 28 is used, the tray would have to be made long enough to accommodate the length of the stack of molds and space would have to be provided to accommodate the head 29 of closure 28. Such a tray as 23 shown in Figs. 6, 7 and 8 would provide clearance for the head 29.

The mold 27 filled with water, and with its closure 28 in place as shown in Figs. 9 and 10, will retain the water when the mold axis is either vertical or horizontal. Such molds may be set or laid loosely in the freezing compartment of a refrigerator and removed one by one as desired. A small aperture which constitutes an air inlet in the end of a mold, or of a stack of molds, opposite the substantially air-tight closure is essential if the mold or stack lie horizontally as in Figs. 2 and 5, or the aperture be at the bottom as in Figs. 9 and 10. It is not essential to limit the size of the aperture if the mold or stack be upright with the aperture at the top and the closure at the bottom, as would be the case if the mold of Figs. 9 and 10 be inverted or any of the stacks of molds shown in the drawing be stood vertically with the air inlet at the top.

I am filing on even date herewith applications Serial No. 275,116 and Serial No. 275,117. These simultaneously filed applications cover related subject matter and it is possible that certain features shown but not claimed in one application are claimed in one of the copending applications.

I do not limit my invention to the specific apparatus shown and described herein, but claim as my invention all embodiments thereof coming within the scope of the appended claims.

I claim:

1. An ice mold composed of a tube of heat-conducting material, said tube being tapered inwardly at one end, and tapered outwardly at its other end, the interior dimensions of said outwardly tapered portion being the same as the exterior dimensions of said inwardly tapered portion whereby the inwardly tapered portion of one such tube may be telescoped into the outwardly tapered portion of a like tube, the end of the inwardly tapered portion of said tube being closed except for a relatively small opening through it to the interior of said tube.

2. A plurality of telescoped tubes such as the tube defined by claim 1 having a removable closure closing the large open end of the end tube thus forming a series of connected but separable molds.

3. An ice mold comprising a body portion having a mold cavity, an opening through said body into said cavity large enough to permit ice which has been frozen in said cavity to pass through it, an aperture through the wall of said cavity opposite said opening to admit air behind the ice which has been frozen in said cavity, and means preventing the leakage of water from said mold.

4. In refrigerating apparatus a plurality of molds telescoped together and means for conduct-

ing heat from said molds comprising a heat-conducting support having a plurality of separated chairs, one for each mold, each chair being positioned and shaped to make contact with the mold to which it is adjacent.

5. In refrigerating apparatus, a plurality of separable molds telescoped in series, each mold having a large opening at one end and a smaller opening at the other end, the wall defining said large opening of each mold except the top mold of the series being telescoped over and making a substantially air-tight fit with the outer wall surrounding the smaller opening of the adjacent mold, and a removable closure forming a substantially air-tight seal for the large opening of the top mold of the series, the size of the smaller opening in the bottom mold of the series being such that water will not run out of it when the series of molds is filled with water and the removable closure is seated in the large opening of the top mold.

6. In refrigerating apparatus, a plurality of separable molds as defined by claim 5, telescoped together, and means adapted to support said telescoped molds having spring yielding portions adapted to contact with the external surfaces of said molds.

7. An ice mold having a freezing cavity therein, an ice exit at one end and an air inlet at the other end of the freezing cavity, said exit being substantially the same shape and dimensions as the outside surface of the body of the mold surrounding the air inlet end of said cavity, whereby the exit end of one such mold may be telescoped over the end of the body surrounding the air inlet of a like mold and means preventing the leakage of water from said first-named mold.

8. In refrigerating apparatus, a plurality of separable molds telescoped together, and means for conducting heat from said molds comprising a heat-conducting support constructed and arranged to support said telescoped molds in a horizontal position and to make contact with said molds.

9. In refrigerating apparatus, an ice mold comprising a hollow metal body, said body having one end tapered inwardly and the other end tapered outwardly, the outside dimensions and shape of said inwardly tapered end being substantially the same as the inside dimensions and shape of said outwardly tapered end, an extension beyond the outwardly tapered end of suitable shape and dimensions to telescope over the portion of the mold body adjacent the inwardly tapered end, a removable closure forming a substantially air-tight seal for said outwardly tapered end, and an opening in said inwardly tapered end for admitting air behind ice frozen in the mold to permit it to leave the mold.

10. A plurality of separable, telescoped ice molds, each mold having a freezing cavity therein, an ice exit at one end and an air inlet at the other end of the freezing cavity, said exit being substantially of the same shape and dimensions as the outside surface of the body of the mold surrounding the air inlet end of said cavity, the exit end of one such mold being telescoped over the end of the body surrounding the air inlet of a like mold, said plurality of telescoped molds having a removable closure forming a substantially air-tight seal for the ice exit of the top mold, the air inlet of the bottom mold being of such size that liquid will

not leak out of it when the stack of telescoped molds is full of liquid and said closure is seated in the exit of the top mold.

11. In refrigerating apparatus, a plurality of separable molds telescoped together, each mold having a large opening forming an exit at one end for liquid congealed in said mold and a smaller opening at the other end, said exit end being telescoped over and making a substantially leak-proof fit with the outer wall at the smaller-opening end of the adjacent mold, said smaller opening being adapted for admitting air behind congealed liquid in the mold to permit it to leave the mold, and means substantially preventing the leakage of liquid from said molds when they are telescoped together.

12. In refrigerating apparatus, an ice mold having an exit, a removable closure forming a substantially air-tight seal for said exit, and an opening in the wall of the mold opposite said exit for admitting air behind ice frozen in the mold to permit it to leave the mold.

13. In refrigerating apparatus, an ice mold comprising a tube having a removable closure forming a substantially air-tight seal at one end, the other end of said tube being open for admitting air behind ice frozen in the mold to prevent it to leave the mold.

14. In refrigerating apparatus, an ice mold having a large opening at one end adapted to permit ice which has been frozen in the mold to pass through it, a relatively smaller opening at the other end for admitting air behind ice frozen in the mold to permit it to leave the mold, and a removable closure forming a substantially air-tight seal for said large opening.

15. In refrigerating apparatus, an ice mold having an ice freezing cavity therein, an ice exit at one end of said cavity, a removable closure forming a substantially air-tight seal for said exit, and a closure for the other end of said cavity having an air inlet adapted to admit air to break the vacuum behind the ice to permit it to drop out of said cavity.

16. The ice mold defined by claim 15 in which the size of said air inlet is such that water in the mold will not run out of said air inlet when the mold is on its side.

17. In refrigerating apparatus, an ice mold comprising a hollow metal body, said body having one end tapered inwardly and the other end tapered outwardly, the outside dimensions and shape of said inwardly tapered end being substantially the same as the inside dimensions and shape of said outwardly tapered end, a removable closure forming a substantially air-tight seal for said outwardly tapered end of said mold, and a perforate closure for said inwardly tapered end.

18. In refrigerating apparatus, an ice mold comprising a hollow metal body, said body having one end tapered inwardly and the other end tapered outwardly, the outside dimensions and shape of said inwardly tapered end being substantially the same as the inside dimensions and shape of said outwardly tapered end, a removable closure forming a substantially air-tight seal for said outwardly tapered end of said mold, a perforate closure for said inwardly tapered end, the perforating in the closure of said inwardly tapered end being of such size that water will not leak out of it when the mold is full of water and its axis is horizontal.

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