

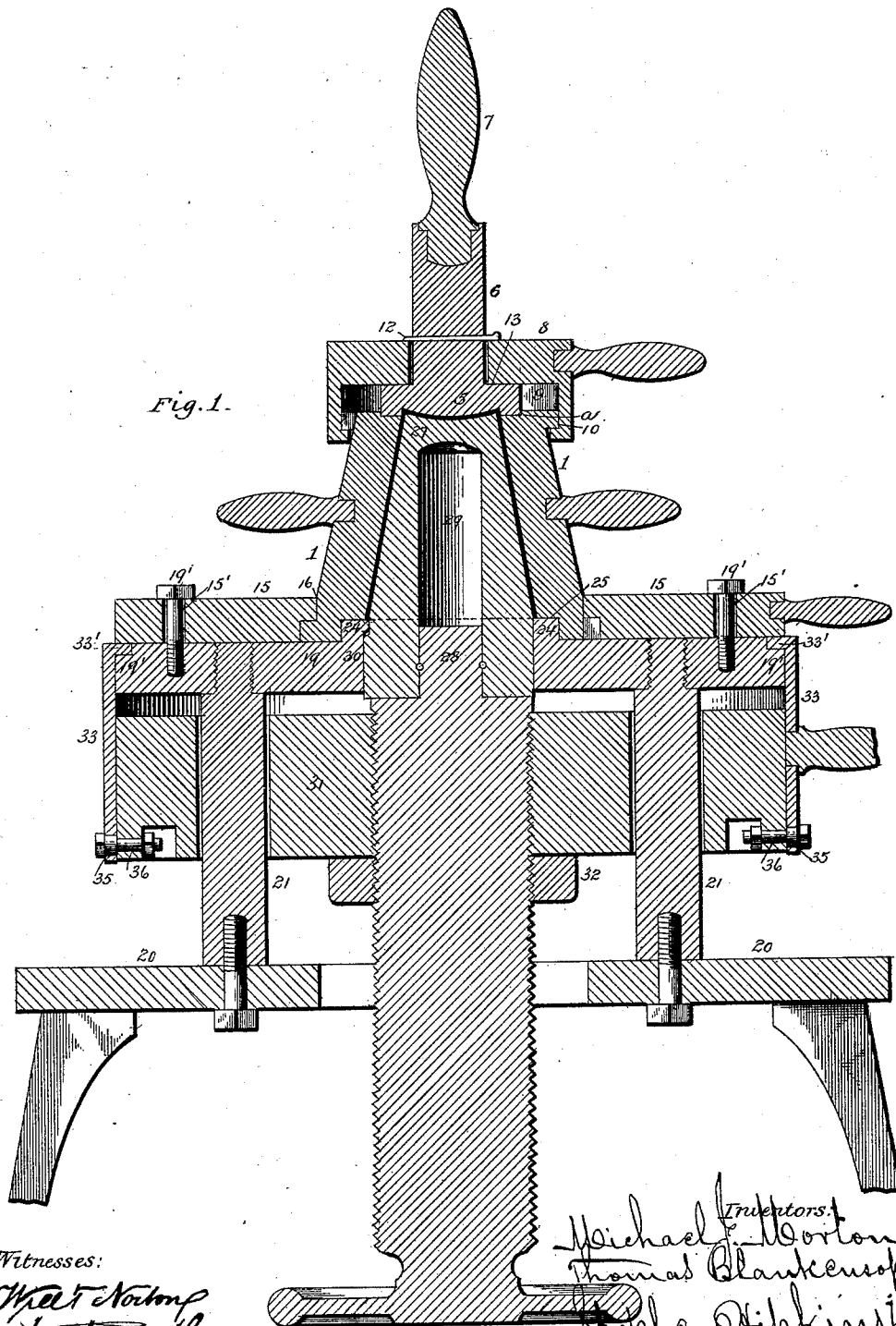
(No Model.)

4 Sheets—Sheet 1.

M. J. MORTON, T. BLANKENSOP & S. HIPKINS, Jr.
MOLD FOR CASTING HOLLOW GLASSWARE.

No. 424,331.

Patented Mar. 25, 1890.



Witnesses:

Wm. T. Norton
Howell Battle

Inventors:
Michael J. Morton
Thomas Blankensop
Stephen Hipkins Jr.

By their Attorneys *John S. Johnson*

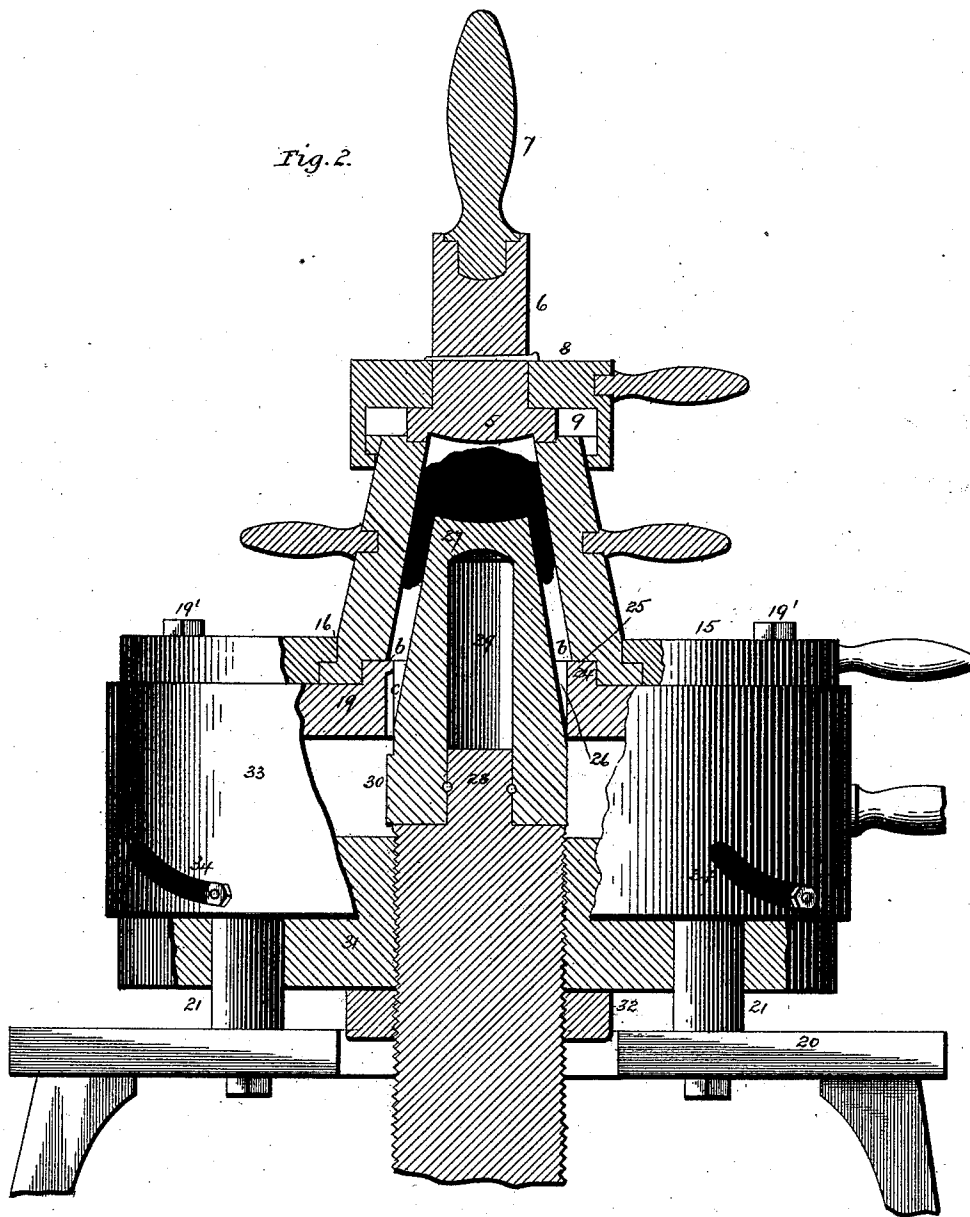
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4 Sheets—Sheet 2.

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MOLD FOR CASTING HOLLOW GLASSWARE.

No. 424,331.

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(No Model.)

4 Sheets—Sheet 3.

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Fig. 5.

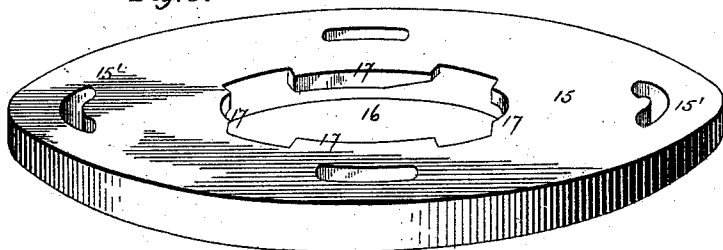


Fig. 4.

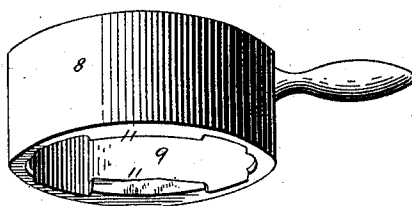
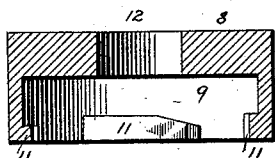


Fig. 6.

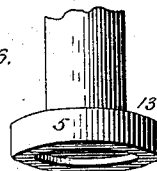
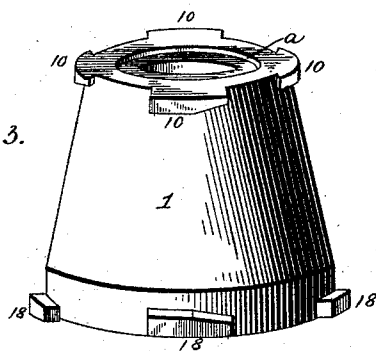


Fig. 3.



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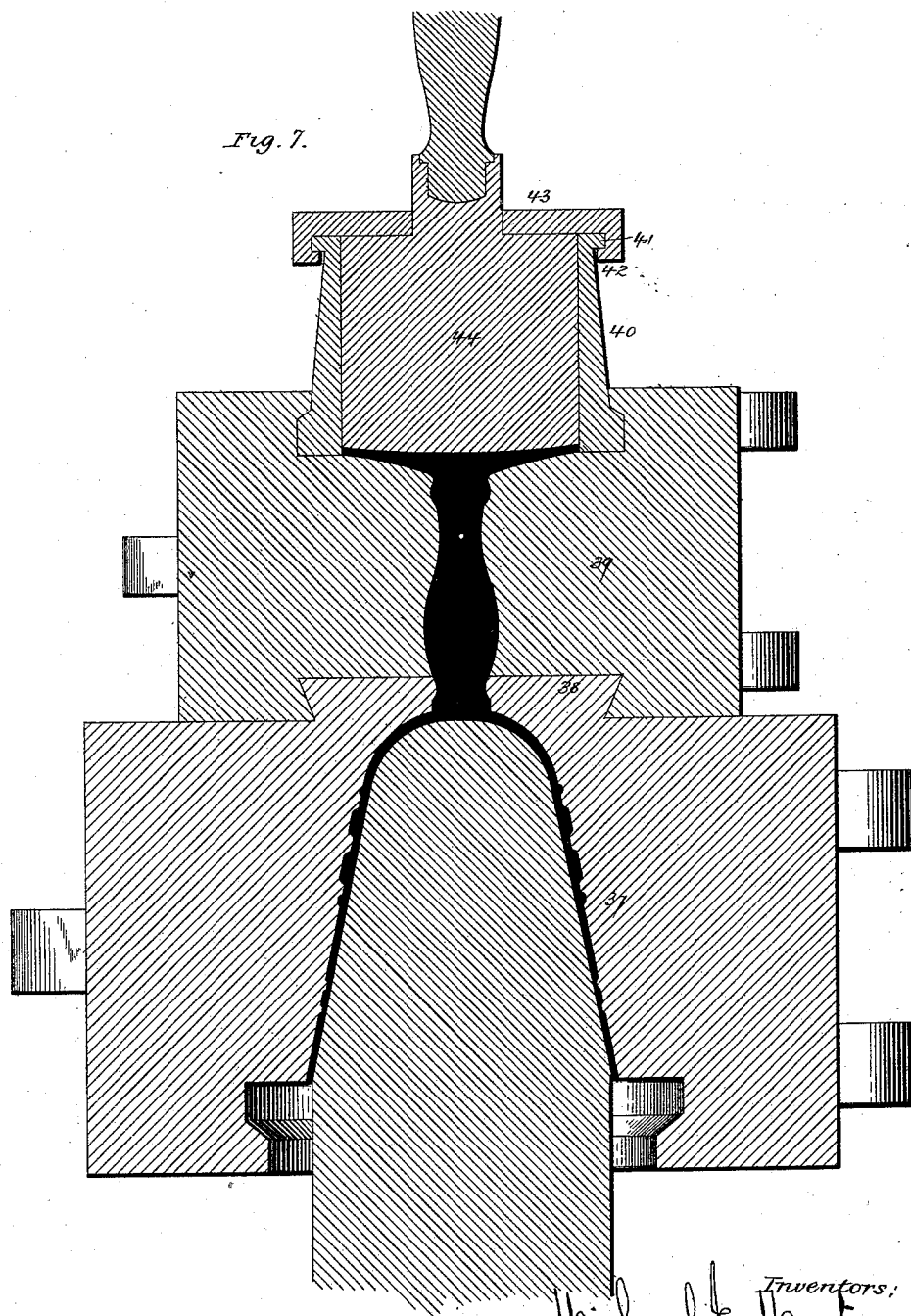
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UNITED STATES PATENT OFFICE.

MICHAEL J. MORTON, THOMAS BLANKENSOP, AND STEPHEN HIPKINS, JR.,
OF MARTIN'S FERRY, OHIO.

MOLD FOR CASTING HOLLOW GLASSWARE.

SPECIFICATION forming part of Letters Patent No. 424,331, dated March 25, 1890.

Application filed December 23, 1889. Serial No. 334,641. (No model.)

To all whom it may concern:

Be it known that we, MICHAEL J. MORTON, THOMAS BLANKENSOP, and STEPHEN HIPKINS, Jr., citizens of the United States, residing at Martin's Ferry, in the county of Belmont and State of Ohio, have invented new and useful Improvements in Molds for Casting Hollow Glassware, of which the following is a specification.

Our present invention is directed to improvements in molds for casting hollow glassware, whereby glass articles—such as tumblers, goblets, lamp-shades, and the like—are fashioned from molten glass by one operation; and our invention consists in the construction and arrangement of the several parts of the mold whereby the hollow glass articles are made, all of which will clearly appear from the following description, drawings, and claims.

In dealing with the molten glass in the manufacture of glassware it is essential to a successful casting of an article that the molten glass be handled and worked as little and as quickly as possible, in order to prevent the hardening or setting of the mass before the casting operation is ended. It is also desirable and essential that the labor and force employed in casting be reduced to the minimum, and that the article when made shall be complete and without flaws or other imperfections. With these ends in view we have devised a mold which is constructed in such a manner as to avail of the natural flow of a plastic mass of glass over the walls of the mold and casting-plunger to cause a partial casting of an article even before power is applied to displace the mass and press it into the desired shape.

Referring to the accompanying drawings, which illustrate our invention, Figure 1 represents a vertical central section of our improved mold, showing in section a completed tumbler within the mold-box. Fig. 2 represents a similar section and a mass of molten glass within the mold-box as fed by its own flow partially around the casting-plunger and before the casting-plunger is forced upward to complete the casting. Fig. 3 is a perspective view of the mold-box; Fig. 4, perspective

and sectional views of the cap or cover for the mold-box; Fig. 5, a perspective view of the base plate or support for the mold-box. Fig. 6 shows the head of the mold; and Fig. 7, a vertical central section of an open-and-shut mold, showing in section a complete goblet within the same.

Referring now to Fig. 1, the mold-box 1 proper has the interior molding or casting chamber corresponding in shape with the shape or design of the article to be molded, the said chamber extending through the entire length of the mold-box and serving as a receptacle for the molten mass of glass as it comes from the furnace. (Seen in Fig. 2.) In the top of the mold-box is formed an annular recess *a*, Fig. 3, which serves as the seat for the head 5, which is provided with a reduced stem portion 6, terminating in a handle 7. The underside of the head 5 is shown as forming the base of a tumbler and corresponds to a portion of the shape or design of the article to be cast. This head 5 is held in place by a cap or cover 8, which has a cylindrical recess 9, Fig. 4, by which it is adapted to fit over the top of the mold-box, which is provided with a series of projections 10, Fig. 3, slightly inclined on the underside, and these projections are adapted to enter the cylindrical recess 9 and to engage with similar projections 11, extending inward from the inner wall of the recess 9 and inclined on their upper side. The head 5 and cover 8 are keyed together, as shown, to enable the operator to handle them together. It will now be seen that in placing the cover on the mold-box the projections 10 on the mold-box pass through the spaces between the projections 11 on the cover 8, and on a slight turn being given to the cover the inclined portions of the projections 10 and 11 engage and secure the mold-box and cover firmly together. A hole 12 in the cover receives the reduced portion 6 of the head, and the under side of the cover, bearing against the shoulder 13, formed by the reduced stem portion, locks the parts together.

The mold-box is held in its required position by a base plate or bed 15, which has a central opening 16, adapted to receive the base of and hold the mold-box. Projections 17 on

the walls or sides of this opening engage with projections 18 on the mold-box and serve as a ready and efficient means for connecting and disconnecting the mold-box from its base, the operation being similar to that above described for placing and removing the cover from the mold-box.

The mold-box and its base are supported by a plate 19, which is in turn supported by the table 20 by means of posts 21, each of which is screwed into the plate 19, and is bolted or otherwise secured to the table, and which posts terminate in a reduced portion 22, forming a shoulder 23, on which the under side of the plate 19 rests or abuts. This plate has an annular ridge or collar 24, which enters a shallow cylindrical recess 25 in the bottom of the mold-box and insures a true adjustment of the mold-box with the plate 19. This plate has a central opening 26, preferably smaller in diameter than that of the chamber of the mold-box. This opening 26 forms, when the parts are connected, a continuation of the chamber; but by reason of the difference in size of the two openings a slight ledge *b* is formed. The purpose of this ledge will be presently stated. The plate 15 is secured to the plate 19 by two or more headed bolts 19', which are screwed into the plate 19 and enter curved slots 15', formed in the plate 15. By this means the plate 15, while it is held down to the plate 19, may still, by means of the curved slots, by a slight turn of the plate 15 in either direction, be capable of separation.

The plunger 27 is formed by two swivel-connected parts, the lower part being screw-threaded and terminating at its lower end in a wheel or other suitable means, whereby a turning in either direction of this screw-threaded portion is attained. The upper end of this screw-threaded portion is reduced, as shown, forming a short stem 28, cylindrical in its cross-section. The upper part of the plunger forms the die which molds or casts the interior of a hollow glass article and displaces the molten mass about the walls of the molding-chamber to form the outer shape or design of the article. This upper part is bored out centrally for nearly its whole length, and this bore forms a central cavity 29, part of which receives the stem 28 of the screw-threaded portion of the plunger. The die or head of the plunger is made slightly smaller than the molding-chamber, and is connected to the screw portion in such a manner as to allow a vertical movement only to the die, a fin or projection 30 on the die entering a vertical groove in the wall of the opening 26 of the plate 19, permitting such vertical movement of the die, while preventing the turning of it in either direction.

31 is a disk having a central screw-threaded hole adapted to receive and hold the screw-threaded portion of the casting-plunger, a nut 32 serving, when desired, to lock them securely together. A hoop or band 33 has an

inwardly-projecting flange 33', which fits in a rabbet 19' in the edge of plate 19, and may revolve upon said plate and around the disk 31. Said hoop or band is provided with a series of inclined slots 34, each of which receives a friction-roller 35, mounted on a stud 36, which is bolted to the disk 31. When this band 33 is partially revolved in one direction, the rollers 35 ride up the inclined slots 34 and impart an upward vertical motion to the disk 31, which, being connected to the plunger, forces it upward until the die has reached its proper limit. If for any reason the movement imparted by the inclined slots be not sufficient, the lock-nut 32 must be unscrewed and a sufficient number of turns given to the swivel-connected screw-threaded portion of the plunger to complete its upward movement. To facilitate the handling of the several parts, which, during the operation of casting, become much heated, I provide wooden (or other non-conducting material) handles, and these serve as ready means for giving the requisite turning to the parts and for connecting and separating them.

When it is desired to mold or cast a tumbler—for instance, of the form shown—I provide a mold-box, a head, and a die, which together will constitute the desired shape and will form the article above mentioned. I then connect the screw portion of the plunger by swivel-connection and then securely fasten the mold-box to its base-plate. The head is then keyed to the cover and laid aside. A mass of molten glass is then taken from the furnace and dropped into the now open molding-chamber and the head is put in place and fastened by the cover. The hoop or band is then revolved, and by means of the inclined slots the casting-plunger is thereby forced upward to complete the castings. This is done by displacing the mass until it has filled every portion of the space left between the plunger and sides of the molding-chamber, the downward flow of the mass being checked by the collar or ledge *b*, formed by the junction of the casting-chamber and the opening in the plate 19, this part of the casting being the rim or edge of the tumbler. It will be seen that the mass, being in a plastic state, has a natural flow down and over the walls of the mold and the plunger-die, and a portion of the casting is done by the flow of the glass itself, so that during the time employed in adjusting the head and cover and in starting the plunger the glass is flowing down the space between the walls of the chamber and the plunger, and hence it will be seen that no time is lost, that a greater number of articles can be cast in a certain length of time than heretofore, and that, the casting being done while the molten mass is at its highest temperature, a better and more perfect line of articles is the result.

By making the reciprocating plunger hollow it is less liable to injury from expansion and contraction by excessive heating and sub-

sequent cooling than a solid plunger, which, on account of the extreme heat to which it is subjected, is liable to crack or break after a short while of use. The metal of the plunger may, when heated, expand inward into the hollow bore of the same as well as outward into the space between it and the mold, for which reason said space will be less filled by the expanded hollow plunger than by an expanded solid plunger, which can expand outward only. The unequal expansion of the outer heated portion of a solid plunger and its inner comparatively less-heated portion is avoided in this hollow plunger, which for this reason will be more durable and efficient than a solid plunger. The hollow plunger will give off its heat to the body of air within the bore, and said air, being less powerful in its expansion than the surrounding metal, will have but a slight expanding influence upon the plunger, while the interior metal of a solid plunger will necessarily expand with the exterior metal, and thus cause a greater degree of expansion than exists in a hollow plunger. The head of the mold, being detachably secured in the cap or cover for the mold-box, may be exchanged for a head of a different shape or differently ornamented or inscribed, so that a number of outer changeable heads may be employed with the same mold-box.

Referring now to Fig. 7, in which is employed what is termed an "open-and-shut mold" for casting such articles which on account of their shape and design would preclude the withdrawal after casting from a closed mold similar to the one shown in the preceding figures, 37 indicates the main portion of the mold, in which is cast or molded the bowl of a goblet or other similar article. This main part is formed in two parts hinged together, and having the central chamber conforming to the shape of the bowl of the article to be fashioned. It is supported on a stand similar to that employed for the closed mold, and has a beveled annular ridge 38, which enters an annular recess whose sides or walls are beveled to correspond with the ridge 38, this recess being made in the bottom of a smaller open-and-shut mold 39, which is adapted to form or cast the leg and step of the goblet. These two molds are held firmly together by means of the ridge and recess and form the mold for a complete goblet or other article whose shape precludes the withdrawal from a closed mold. This mold 39 is likewise made in two parts and hinged together, and has a recess adapted to receive and hold a cylindrically-shaped portion 40, which at its top is formed with projections 41, engaging with projections 42 on the inside of a cover 43, which allows of its placing and removal. A head 44 fits the base of the cylinder 40, and is prevented from being forced out by the cover 43. The base of this head or die forms the die or shape for the step of the goblet, and has also another very important purpose or function, which will presently be explained. The plunger

used for this open-and-shut mold is similar in construction to the one already described for the closed mold, and it is operated in a similar manner.

If it be desired to cast a goblet similar to that shown in Fig. 7, suitable molds are first obtained and joined together. The molten mass of glass is deposited in the cylinder 40 and flows down into the main mold and on the top and sides of the plunger. The head 44 is then fastened in place and the plunger is forced upward to complete the casting. If it is found that the casting is not complete by reason of a sufficient quantity of the molten glass not having been deposited and acted on, the head 44 is removed and more glass is deposited, and the head is then forced down by hand until the casting is complete.

In an application for a patent filed by us December 2, 1889, under Serial No. 332,309, for improvements in molds for casting feet to blown bowls, we have shown, described, and claimed certain matters of construction and of combination which are shown herein, and particularly the means for supporting the mold and for raising and lowering the casting-die in relation thereto, consisting of the shouldered posts for supporting the fixed rabbeted plate on which the mold is secured, the flanged hoop suspended upon the rabbeted circumference of said fixed plate and having the inclined slots, the disk loosely fitted upon said posts and having bolts engaging said inclined slots and carrying the casting-die adapted to operate through the said fixed rabbeted plate, the said flanged hoop being operated rotatively upon its fixed rabbeted support and upon the die-carrying disk to raise and lower the die in relation to the matrix or mold, and except for the purposes of the new combinations, hereinafter set forth in the claims, we do not in the Letters Patent to be issued in this application claim such matter, or anything shown and described in said application filed of date December 2, 1889.

We claim as our invention—

1. In a mold for casting hollow glassware, the combination, with the mold-box 1, having the inclined ribs 10 at its upper end and a casting-die 27, of the head-die 5 and a hollow cap or cover 8, having the internal inclined wall-ribs 11, registering with and engaging the box-ribs 10, whereby the said cap is locked to the top of said mold-box, and the head-die is locked within the said cap from vertical displacement.

2. In a mold for casting hollow glassware, the combination of the mold-box 1 and a head-die 5 with the casting-die 27, the screw having a swiveling connection with the lower end of said casting-die, the disk 31, having the screw-threaded opening engaging said screw, and a fixed supporting-plate 19 for said mold-box, substantially as described.

3. In a mold for casting hollow glassware, the combination of the mold-box 1, its supporting-plate 19, and the head-die 5 with the

casting-die 27, means for raising and lowering said casting-die, consisting of the disk 31, the flanged hoop 33, suspended from said plate 19, and having the inclined slots 34, and
 5 rotatively connected to said disk by the studs 36, and independent auxiliary means for raising and lowering the casting-die, consisting of the screw-stem having a swiveling connection with said die and engaging the said disk
 10 31, substantially as described.

4. In a mold for casting hollow glassware, the combination, with the casting-die 27, having the interior annular recess 25 at its lower end and the external inclined ribs 18 at its
 15 lower end, of a fixed supporting-plate 19 therefor having the annular top ridge or collar 24, registering with said annular recess 25, and means for locking said mold-box upon said fixed collared plate 19, consisting of the top
 20 plate 15, having a central opening formed with edge-beveled ribs 17, registering with the said box-ribs 18, and having the concentric slots 15' and the bolts passing through said slots, for securing the top plate to the
 25 fixed plate and for limiting the turning movement of said top plate, for the purpose stated.

5. The combination, in a mold for casting hollow glassware, of a removable mold-box open at its lower end, having an annular interior recess 25 and exterior beveled ribs 18 at its lower end, a head-die, and a casting die or plunger, with a fixed supporting-plate 19 for said mold-box, having a central opening 26, and an annular top ridge or collar 24, fitting said box-recess, a movable plate 15, having a central opening 16, formed with interior beveled ribs 17, corresponding and registering with the said box-ribs and provided with concentric slots 15', and suitable bolts in the
 30 fixed plate passing through said slots for confining said movable plate and limiting its movement, for the purpose stated.
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 40

6. The combination, in a mold for casting hollow glassware, of a removable mold-box open at its lower end and a head-die with a
 45 casting-die, a disk below said mold-box having means for raising and lowering it and formed with a central screw-threaded hole, a screw engaging said disk and having a swiveling connection with the casting-die, and
 50 means for preventing the turning of said casting-die, substantially as described, for the purpose specified.

7. The combination, in a mold for casting hollow glassware, of the mold-box, the head-die, and the fixed plate 19, having a central
 55 opening, with the casting-die, the disk 31, supported by said fixed plate, the screw-stem having a swiveling connection with said casting-die, and means for preventing the turning of the said die, consisting of the vertical
 60 groove *c* in the wall of the opening in said fixed plate and rib or feather 30 of the die engaging the said groove, substantially as described.
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8. A mold for casting hollow glassware, consisting of the separate mold-box 1, open at both ends, the separate head-die 5, the separate chambered cap or cover 8, containing said head-die, the casting die or plunger 27,
 70 and the fixed plate 19, having the central opening, and the ledge *b*, standing within the lower edge of the molding-chamber, substantially as described.

In testimony whereof we have hereunto set
 75 our hands in the presence of two subscribing witnesses.

MICHAEL J. MORTON.
 THOMAS BLANKENSOP.
 STEPHEN HIPKINS, JR.

Witnesses:

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 FRANK ZINK.