No. 665,055. Patented Jan. 1, 1901.

C. BOUCHER, AÎNÉ.

APPARATUS FOR MAKING GLASS BOTTLES.

(Application filed Feb. 21, 1899.)

(No Model.) 2 Sheets—Sheet 1.

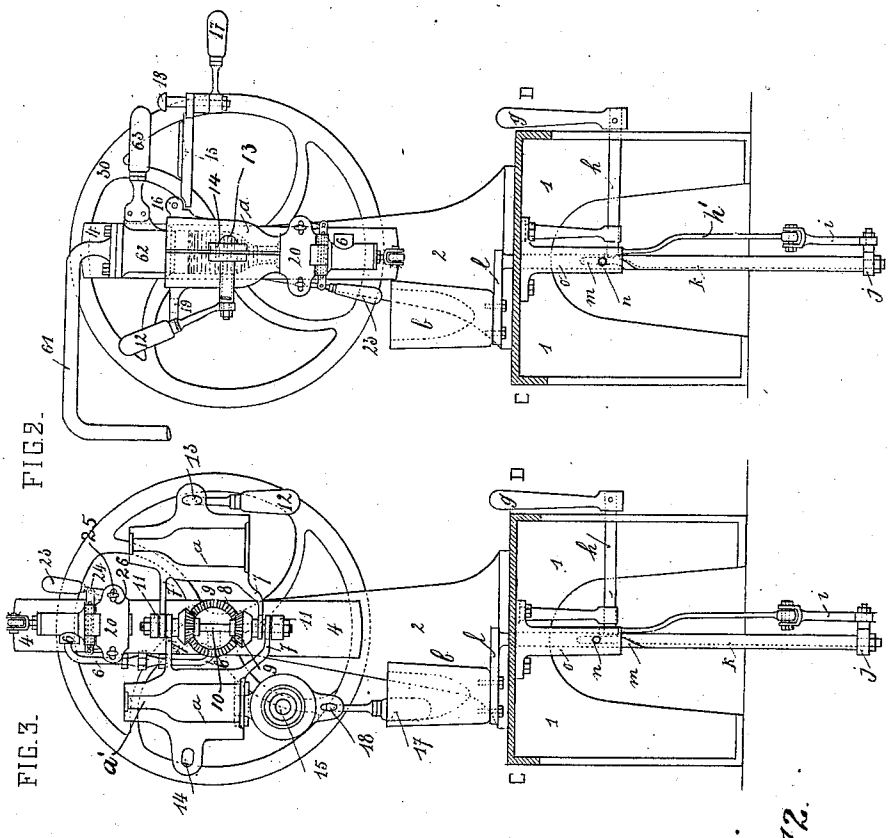

FIG. 2.

FIG. 3.

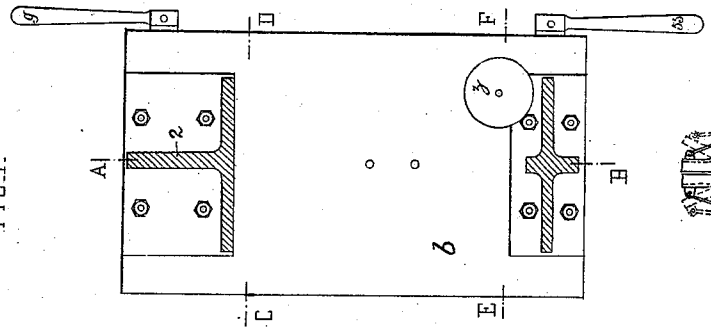

FIG. 1.

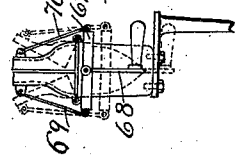

Fig. 12.

Witnesses.
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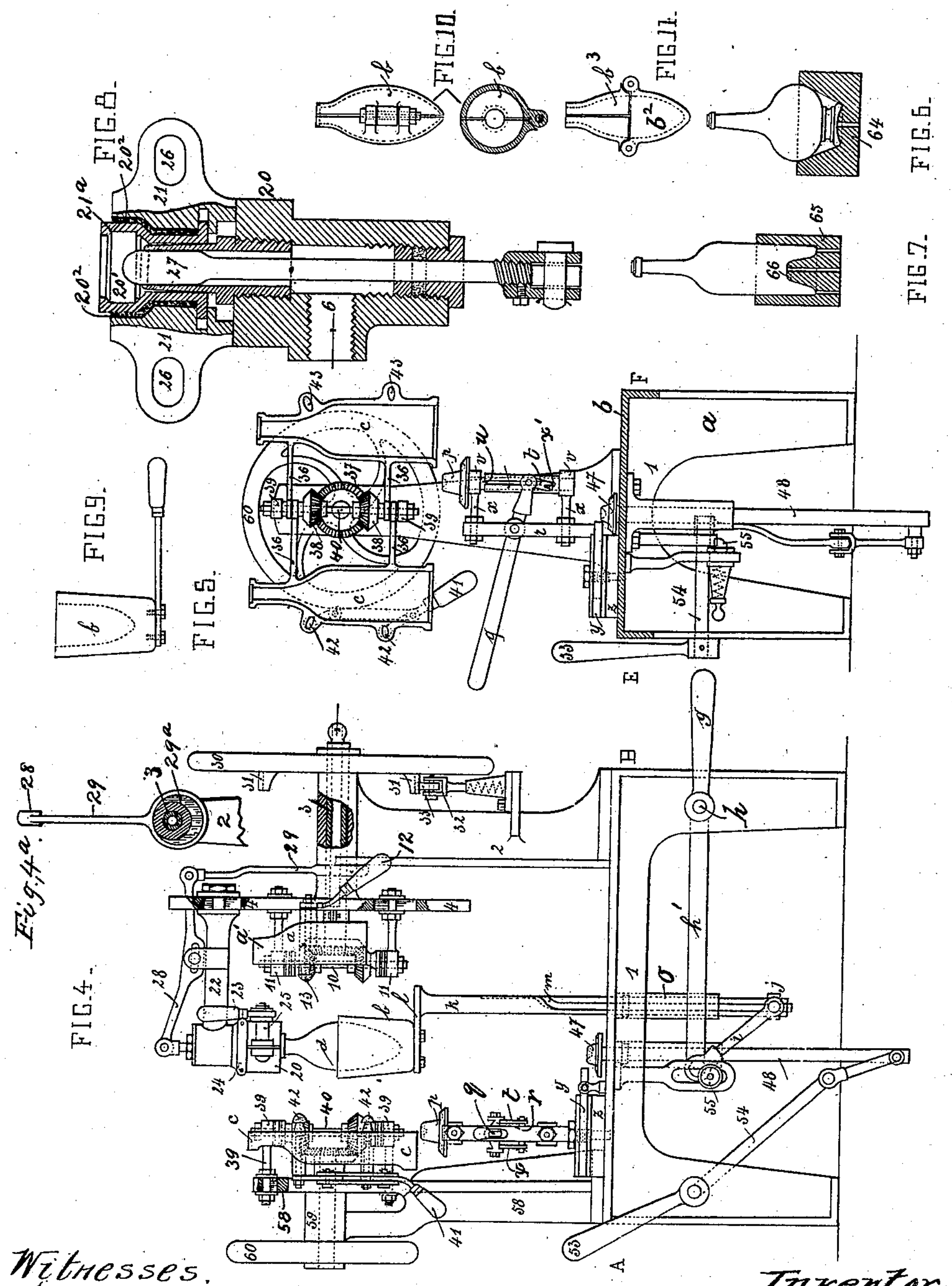

Witnesses.
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UNITED STATES PATENT OFFICE.

CLAUDE BOUCHER, AÎNÉ, OF COGNAC, FRANCE.

APPARATUS FOR MAKING GLASS BOTTLES.

SPECIFICATION forming part of Letters Patent No. 665,055, dated January 1, 1901.

Application filed February 21, 1899. Serial No. 706,374. (No model.)

To all whom it may concern:

Be it known that I, CLAUDE BOUCHER, Aîné, residing at Cognac, department of the Charente, in the Republic of France, have invented a new and useful Improvement in Apparatus for Making Glass Bottles, &c., which invention is fully set forth in the following specification.

This invention relates to apparatus for manufacturing all kinds of bottles, demijohns, flasks, carafes, preserve-jars, and the like, or, in short, most of the blown-glass articles obtainable in the ordinary way; and the object of the invention is to provide a machine which produces such articles mechanically and without the aid of special skilled workmen or glass-blowers. Such machine enables a regular form and the desired solidity to be imparted to bottles and the like.

My invention will best be understood by reference to the accompanying drawings, wherein—

Figures 1, 2, 3, 4, and 5 show a form of machine wherein no provision is made for imparting movement to the finishing-mold, as above referred to, Fig. 1 being a horizontal sectional view above the bed-plate; Fig. 2, a view on line C D of Fig. 1, showing the measuring-mold closed and in the position it occupies when the glass is emptied into it and while the compression takes place. Fig. 3 is a similar view showing the measuring-mold open. Fig. 4 is a front elevation of the machine, showing both the finishing and measuring molds open and in the positions which they respectively occupy during the formation of the bulbous blank in the intermediate mold. Fig. 4^a is a detail of the eccentric and its pitman for operating the reciprocating rod of the mouth-mold, said parts occupying the position in which they are shown in Fig. 4. Fig. 5 is a sectional view of line E F, Fig. 1, showing the finishing-mold open and the indenting mechanism lowered. Fig. 6 is a sectional view of a cup or half-mold in which carafes, flat-bottomed bottles, and analogous articles are placed when withdrawn from the finishing-mold, so as to prevent their deformation through the sinking of the bottom and sides, these being supported in the mold. Fig. 7 is a sectional view of a cup provided with a conical part for preventing the deformation of the indentation in the bottom of the bottle, or it may be for forming such indentation also. Fig. 8 is a vertical sectional view of the mouth-mold, the rod for forming the opening being shown in the position which it occupies at the time the glass is emptied into the measuring-mold, of which the mouth-mold forms a part. Fig. 9 is a detail view of the intermediate mold provided with a handle for manipulating the same. Fig. 10 shows detail views of a form of intermediate mold which gives the full form to the bulbous blank and which opens longitudinally from the bottom to the top. Fig. 11 is a detail view of another form of intermediate mold which is composed of a cup and two hinged sections. Fig. 12 is a detail view of an intermediate mold consisting of a cup and two hinged sections and having means for manipulating said hinged sections to open and close the same.

Independently of the special arrangement of my machine and of the particular means which I employ for opening and closing the molds for operating the different parts of the machine I have devised a combination to obtain a proper working of the glass, so as to give as far as possible the results obtained by glass-workers employing the ordinary processes, which combination embraces the following: first, a first or measuring mold *a*, intended to receive the quantity of glass necessary to the fabrication of a bottle or any other object; second, a second or intermediate mold *b*, having for its purpose to obtain a bulbous blank analogous to that made by the head workman in the ordinary process of blowing when he rolls the glass on the marver or in a block, and, third, a finishing-mold *c*, serving simply to give the form to the bottle or other object to be made. This combination enables one by the use of the intermediate mold *b* to obtain remarkably handsome products and to increase, notably, the production, for the following reasons, to wit: When, for example, two molds only are used for the mechanical fabrication of bottles, a good distribution of the glass is rarely obtained and bright spots or, in other words, very thin places are produced on the sides, particularly when bottles of a certain length are made and when it is desired to elongate the partly-formed object in order to remove the

roughnesses which form when the glass is emptied into the first mold. It is likewise difficult to obtain a proper distribution of the glass at the edge and bottom of the bottle. These various defects result in a lack of homogeneity in the mass of glass which constitutes the partly-formed object when it is withdrawn from the first mold. In fact, it is easy to note that when the glass is emptied into the first mold the part which touches the neck and the shoulders is longer in contact with the mold than the glass which occupies a lower place in the bottle. Consequently when this first mold is opened the partly-formed object has solidified to a greater extent at the shoulder than in the other parts, and naturally the glass is drawn out irregularly; but besides this the interior glass, which, unlike that at the outside, has not been solidified by contact with the mold, escapes and falls to the bottom of the partly-formed object without possibility of restraining it even when the object is sustained by the bottom of the finishing-mold or other analogous support during the elongation. In a word, by making the glass pass directly from the rough mold into the finishing-mold a partly-formed object is obtained whose temperature and malleability are irregular, and this irregularity does not allow a uniform thickness to be given to the walls nor to the bottom of the bottles. With a view to obviating these defects of manufacture I employ an intermediate mold into which the glass ball or partly-formed object is introduced and wherein it is blown after it has been withdrawn from the first mold. By operating in this way the glass solidifies uniformly at the base and over the sides and a veritable bulbous blank is obtained analogous to that made on the marver or in the block by the head workman when the classic processes of fabrication are employed. This intermediate mold *b*, which is shown in Figs. 2, 3, and 4, can be operated, apart from the mechanism represented, by a lever of any suitable description or by any other suitable mechanism. It is even possible to place and to withdraw it very simply by hand (by fixing to it a handle such as is represented in Fig. 9) for the fabrication of smaller objects, since this mold would be very light. By imparting the customary ovoid form to the partly-formed object and by enabling sufficient solidification to take place at the base in the parts in which the yet almost liquid glass has a tendency to escape the intermediate mold *b*, consisting of a simple cup, (shown in Figs. 2, 3, 4, and 9,) enables the quality of the products to be greatly improved and the production to be increased; but for making certain bottles and a large number of objects I preferably employ an intermediate mold, in which the bulbous blank is molded completely under the action of the blast. This bulbous-blank mold *b'*, which is adapted to open longitudinally (see Fig. 10) or which can be composed of a cup b^2 and two shoulder-pieces b^3, as shown in Fig. 11, is operated by means of links 69 70 and slide 67, adapted to be moved by handle 68 or in any other suitable way, as is indicated, for example, in Fig. 12. After the partly-formed object, disengaged from the measuring-mold *a*, has been inclosed in the mold *b* of Figs. 10, 11, and 12 a certain quantity of compressed air is let in, and this presses the glass against the walls of the mold, thus producing an always similar blank. Then as the quality of the bottle or other object which it is desired to obtain depends particularly on the bulbous blank it will be readily understood that the intermediate or bulbous-blank mold which I have just indicated plays an important role in the mechanical manufacture of blown-glass articles. Finally, according to the composition of the glass and the size of the bottle or other objects which it is desired to make there is occasion sometimes to use two or more intermediate molds *b* in order to solidify the glass more rapidly and to increase gradually the size of the bulbous blank before introducing it into the finishing-mold. By employing this means I avoid the over-large difference in size which might otherwise exist between the dimensions of the bulbous blank when it leaves the mold *b* and those of the objects to be made, and one is enabled thus to obtain a good distribution of the glass even for very voluminous articles, such as demijohns.

I shall first describe my machine as it is arranged for making bottles and other articles which are to be blown without movement in the finishing-mold, because they are to bear inscriptions or which on account of their form it is impossible to give a rotary movement. This machine is represented in Figs. 1 to 5 of the drawings. *a* represents its measuring-mold formed in two parts and having for its object to receive a quantity of glass necessary to the manufacture of a bottle or other articles. Said mold terminates in a neck *a'*, Fig. 3, which fits mouth-mold 20, which latter will be more fully described hereinafter. Fig. 2 shows the mold in the position—bottom upward—which it occupies when the molten glass is introduced, the bottom 15, Fig. 3, hinged to ears 16, carried by one of the parts, being open. Bottom 15 is locked in its closed position by means of locking pin or catch 18 entering an opening in lug 19, Fig. 2, and adapted to turn by means of handle 17. A similar locking-pin 13, engaging an opening in lug 14 and adapted to be manipulated by handle 12, serves to hold the two parts of mold *a* together in their closed position. The two parts of mold *a* are supported from the swinging plate 4 by means of adjustable supports 11 11, said supports at their inner ends being adjustably secured in slots through plate 4 and at their outer ends supporting a pin 10, which latter passes through the ends of arm 7, two on each part of mold *a*, and constitutes the pivot on which said parts

swing. The mouth-mold 20, or, in other words, the mold which imparts the proper form to the mouth of the receptacle, forms part of the measuring-mold when the parts of the latter are assembled for receiving a charge of glass. Mold 20 is carried at the end of a support 22, adjustably secured in a slot in plate 4 by means of a suitable clamp-nut. The measuring-mold *a* and the mouth-mold 20 being fastened to the swing-plate, as I have just explained, they can be moved to the different positions required either with the bottom of the measuring-mold above when the glass is to be received, as in Fig. 2, or with it below, as in Fig. 3. These molds are moved to their different positions through the plate 4, which itself receives motion through the wheel 30 and the hollow shaft 3, it being understood that the plate and the wheel are fast on this shaft, which turns freely in the upper part of the support 2, which last is with this object hollowed out to form a sleeve or bearing.

It is through the shaft 3, which is hollow, that the compressed air for blowing the bulbous blank and the bottle is introduced. After passing through the shaft 3 the compressed air enters the tube 6, Fig. 3, connected with the mouth-mold 20, whatever position this mold may occupy, for the shaft 3 and the tube 6 turn with it. The wheel 30 carries two stops 31, in which notches are formed for engaging the roller 33, which is pressed outward by the spring in the socket 32 and yields when wheel 30 is turned, but engages the notches as they alternately come opposite it in order to hold stationary the measuring-mold and the mouth-mold as well when they occupy the positions shown in Fig. 2 as when they occupy those of Fig. 3. Supports 22 and 11 may be adjusted, as already described, so as to raise or lower molds *a* and 20 for setting them to the proper relative position.

The mouth-mold 20, which can, if necessary, include a part of the neck, is composed of a jacket 21, Fig. 8, divided into two parts longitudinally, and of the mold proper, 20′, which interiorly is of proper form to impart the desired shape to the ring on the neck of the bottle.

Between the jacket 21, Fig. 8, and the interior parts constituting the ring-mold there is a space that is filled with plaster, clay, charcoal, or any other bad conductor of heat 20^2 in order to maintain this mold at the red heat necessary to avoid calcination and the breaking of the mouth and neck. This combination is more especially useful when it is desired to obtain a thin ring, because it is at this point that the glass falls first when it is emptied into the measuring-mold, so that it cools consequently more at the ring than at any other part of the bottle.

The two sections of the mouth-mold 20 are brought together when it is desired to close this mold or separated when it is desired to open it by means of handle 23, Figs. 3 and 4, which, through links 24, acts upon locking bolts or pins 25, adapted to engage through openings in lugs 26 to hold the parts of the mold together in a closed position.

To form the mouth-opening and passage through the neck of the bottle, mold 20 has at its center rod 27, corresponding in diameter to the diameter to be imparted to the said opening and passage. This rod 27, Fig. 8, is operated by lever 28 and rod 29, Fig. 4, which enables it to be introduced into the mouth-mold to a suitable extent before emptying the glass into said mold and which also enables it to be withdrawn automatically by the action of an eccentric 29^a, fixed to support 2 and acting on rod 29, after compression of the glass has been obtained in order to leave a passage for the compressed air, which by pushing back the glass effects the perforation of the neck and presses the glass against the wall and bottom of the measuring-mold. The rod 27 rises and falls in the tube which conducts the compressed air to the mouth-mold; but that the air may escape from this tube and enter the mouth-mold the rod 27 must be withdrawn from this mold, it being understood that when it is inserted in the tube to make the mouth-orifice it fills the said tube completely, so as to prevent the glass entering the same when it is emptied into the measuring-mold and into the underlying mouth-mold and also especially when the glass is subjected to exterior compression, as hereinafter described.

The sides of the measuring-mold are brought together by means of the toothed wheel 8 and the pinions 9. To this end bevel-pinions 9 9 are secured to one of the arms 7 of each mold, respectively, and geared together by the toothed wheel 8, loose on the end of the shaft 3. In this way when the workman grasps the handle 12 and pushes the side of the mold to which said handle is fixed he operates the toothed wheel 8, which being rotatable transmits the movement to the other pinion, so that it in turn moves the other part of the mold.

With a view of suitably molding the ring on bottles or the handles with which certain vessels are provided or other ornaments I compress the glass after it has been emptied into the measuring-mold by means of steam or of hot air, which being raised to a proper temperature allows the glass to retain the necessary malleability where the compressing fluid comes in contact therewith. The steam employed for the compression arrives by the tube 61, Fig. 2, which terminates in the compressor 62, having the dimensions desired for suitably fitting into the orifice of the measuring-mold, so as to prevent the glass spurting out of the mold at the moment of compression. A valve is placed in the tube 61. This valve is operated by a pedal in order that the workman may have his hands free for closing more rapidly the measuring-mold by means of the bottom 15 and for giving a half-revolution to the mold, and thereby plac-

ing it bottom down—the position shown in Fig. 3.

The handle 63, Fig. 2, serves to manipulate the end of the tube 61 (which is movable for the purpose) in fitting the compressor 62 to the orifice of the measuring-mold when it is desired to compress the glass, and it also serves to move this tube to an out-of-the-way position when the compression has been completed in order that it may not interfere with the other manipulations, particularly the reversal of the measuring and mouth molds. Tube 61 and compressor 62 are not shown in Figs. 3 and 4, it being understood that with the other parts in the positions shown in these figures said tube and compressor are moved to an out-of-the-way position.

During the introduction of the glass into the measuring-mold *a* and also during the blowing of the bottle in the finishing-mold *c* the bulbous-blank mold *b* rests on the bed-plate, so as not to be in the way. To raise this mold and to cause it to assume the position which it occupies in Fig. 4 for receiving the partly-formed object after withdrawal of said object from the first mold, use is made of the jointed lever mechanism composed of the handle *g*, the rock-shaft *h* and its arm *h'*, the link *i*, and the collar *j*, this last upholding rod *k*, which carries the support *l*, on which is placed the mold *b*. In order to permit this rod *k* to make a quarter-turn for placing the mold *b* in the middle, where it receives the partly-formed object, the said rod is provided with a helicoidal groove *m*, in which the end of pin *n* is lodged. This pin is fixed in the sleeve *o*, which serves as a guide to the rod *k*. By this disposition when pressure is applied to the arm *g* it operates the armed rock-shaft and the link *i*, which last, through the collar *j*, lifts the rod *k*, supporting the mold. This rod being free to turn in the collar *j* receives a helicoidal movement imparted thereto by the combination of the groove *m* and the pin *n*.

The finishing-mold *c*, Figs. 4 and 5, is supported and maintained in place by means of the arms 36, through which passes the pin 40, forming a hinge whereon the two parts of this mold may turn in order to bring them together or to separate them. The two threaded bolts 39, through which the pin 40 passes, pass through slots in the support 58, in which they are adjustably held by nuts. By adjusting bolts 39 the finishing-mold, whatever its length, may be fitted to the mouth-mold 20 when the blowing of the bottle is being effected. The support 58 has at its upper end bearings, in which may be rotated wheel 60, fast on one end of said shaft. At its other end the shaft 59 carries the toothed wheel 37, which operates the pinions 38, fast on the arms of the parts, respectively, of the finishing-mold. By this arrangement when the wheel 37 is turned—for example, from right to left—the sides of the mold are brought together for closing the mold, whereas by turning it in the opposite direction they are separated until the mold is open. To maintain the two parts of the finishing-mold firmly in place, the lock bolts or catches 42 are engaged by the handle 41 in the holes of lugs 43, Figs. 4 and 5. The bottom 47, which in use is set into the bottom of the finishing-mold *c*, is mounted on the rod 48, Fig. 4, which passes through the bed-plate and through a sleeve for guiding it in its rising movement, which is communicated to it through the jointed lever composed of the parts 53 and 54. When the handle of said lever has been pressed down until the part 54 reaches a horizontal position, the spring or locking-bolt 55, Fig. 5, engages with the part 54, which operates the rod 48. In this manner the mold-bottom 47, placed at the upper end of this rod, is held firmly at a suitable height for the two parts of the finishing-mold in coming together to fit about it and to inclose it in the recess at the bottom of the finishing-mold.

When flat-bottomed bottles are being made, it is sufficient for the bottom of the finishing-mold *c* to be flat; but to obtain indented bottles I employ the mechanism shown in Figs. 4 and 5. This mechanism is composed of the frusto-conical bottom *p*, which is operated by the lever *q*, fulcrumed on the support *r* and serving to raise and lower the rod *u* through the intermediary of the links *t*, the rod *u* sliding in openings in the ends of the support *x* and sleeve *x'* on the lower support. The support *r* being fixed on the disk *y*, which turns freely in a recess about the plate *z*, the bottom *p* can be placed in the different positions which it has to occupy, either next to the support 58 in the position which it occupies in Figs. 4 and 5 or at the center for embedding itself under the action of lever *q* in the bottom of the bottle in order to expand the glass for obtaining a sufficiently-deep indentation. It is to be noted that at this time the edge of the bottle and the base of the indentation have been partly formed by means of the bottom 47, which for this purpose is provided with a groove near its periphery and at the center with a convex portion hollowed on top to receive the surplus glass or "bull's-eye." Consequently on pressing on the lever *q* the bottom *p* is raised, which completes this indentation partly formed by the bottom 47 at the time of blowing the bottle in the finishing-mold. It is also possible, either during the indenting or when this is completed, to introduce compressed air for pressing the bottom well into the part which forms the edge and against the projection which forms the indentation and which in this case should have the form and dimensions which it is desired to give to the said indentation. In order that the glass may form itself properly along a horizontal line corresponding with the base of the finishing-mold, I employ clay or other poor heat-conducting substances for the manufacture of the bottom 47 of the finishing-mold, at least for the circular part which is

to serve for the formation of the edge. By this means the glass preserves sufficient malleability for shaping itself when the projection is embedded therein and, besides, defects are avoided which are frequently produced when it is desired to obtain indented bottles by the aid of a metal bottom.

With a view to increasing the production the bottles and other articles are generally withdrawn from the finishing-mold before the glass is completely solidified, and to prevent deformation it has been necessary to roll them until the glass has acquired a suitable consistency. To avoid this manipulation, I employ cups in the form of half-molds, (shown in Figs. 6 and 7,) in which the objects are placed when taken from the finishing-mold. In this way and by giving to the cup the form shown in Fig. 7 it is even possible to obtain the indentation of the bottles. For this it suffices to remove the bottle from the finishing-mold while the glass of the bottom is yet sufficiently malleable to be shaped when it rests on the projecting part 66, whose height is equal to the depth it is desired to give to the indentation. The cups shown in Figs. 6 and 7 are of clay or other poor conducting substance in order to avoid the calcination of the bottles or other objects which they are intended to contain. Moreover, some small holes are made in the bottoms of these cups to facilitate the expulsion of the air when the bottles are inserted. The machine which I have invented and have just described enables bottles and other blown-glass objects to be made in the following manner: The measuring-mold having been placed open end up, the bottom 15 turned out of the way, (see Fig. 2,) and the rod 27 raised by the action of lever 28, arm 29, and its actuating-eccentric, a workman brings the glass to the proper temperature and pours into the mold the quantity necessary to the making of a bottle or other object. This done the workman grasps the handle 63 and introduces the end of the compressor 62 into the orifice of the mold *a*. Then he turns on the steam by pressing on a pedal, which opens the valve placed in the tube 61. The steam, which is introduced at proper pressure above the glass, compresses it and causes it to descend into the mouth-mold 20, which is placed under the measuring-mold *a*, so as to obtain a perfect molding of the ring or other ornaments. This operation having been performed very rapidly for retaining a proper malleability of the glass, the workman lifts up and withdraws the compressor 62. Then he applies the bottom 15 on the mold, secures it by inserting the locking bolt or catch 18 into the hole 19, and, grasping the wheel 30, he turns the mold bottom down. Next the workman presses on the pedal which works the valve placed in the tube by which the compressed air arrives, and this entering the vacant space formed by the rod 27 pushes out the glass against the walls and the bottom of the measuring-mold *a*. After the glass has solidified sufficiently in this mold the latter is opened by removing the bottom and separating the sides, so as to make them occupy the positions in which they are represented in Figs. 3 and 4. After opening the measuring-mold *a* the workman presses on the lever *g*, Fig. 4, in order to raise the mold *b* until it incloses about their bottom and sides or a portion of their sides the partly-formed articles from the mold *a*. Then he lets in air to force the glass against the walls of this mold *b*, whose form the glass assumed while at the same time acquiring the desired consistency and a uniform temperature. When this result is attained, the workman lets the bulbous-blank mold *b* redescend onto the bed-plate, the blank being still held by mouth-mold 20. Then he raises the bottom 47 to the desired height, and after the bulbous blank rests on this bottom he incloses said blank in the finishing-mold *c* by bringing together the two parts of this mold, which he holds in place by inserting the locking bolts or catches 42 into the holes 43. This done the workman presses anew on the pedal, which opens the compressed-air valve and the air enters the bulbous blank to press it against the walls and the bottom of the finishing-mold. When the bottle made is flat-bottomed or slightly concave, it is completed at this time by the pressure of the glass against a flat or a convex bottom; but if it is to have an indentation the workman lets down the bottom 47, by which the indentation has already been partly formed, and he completes said indentation by raising the bottom *p* by means of the lever *q*, so that said projection is forced into the glass until the indentation has attained the desired depth. At this moment the compressed air can be again let in in order to perfectly mold the indentation and the edge. The bottle being completed, in order to remove it from the finishing-mold *c* the locking bolts or catches 42 must be withdrawn from the holes 43 by means of the handle 41, the mold must be opened by turning the wheel 60, letting down the projection *p*, and opening the mouth-mold 20, and at the same time the bottle must be grasped, for example, with a pair of pincers ending in a round part having the diameter of the neck or with any suitable instrument for carrying it to the annealing-oven.

Of course various modifications of the machine herein described may be made without departing from the invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a machine for mechanically producing hollow glass articles, the combination of a measuring-mold into which the molten glass is first poured, an intermediate mold in which the solid blank is subjected to internal fluid-pressure and expanded to the form of a hollow bulbous blank, said intermediate mold

being of such form as to impart a definite shape to the bottom and sides or a portion of the sides of the blank, and a finishing-mold in which the bulbous blank is subjected to further internal pressure and the final shape imparted to the article, substantially as described.

2. In a machine of the kind described, the combination of a measuring-mold, a mouth-mold for closing one end of the measuring-mold while the charge of molten glass is being introduced therein, a plunger or bar adapted to be reciprocated in the mouth-mold for forming the mouth-opening in the glass blank, an intermediate mold of such form as to impart a definite shape to the bottom and sides or a portion of the sides of the blank, means for removing the measuring-mold and transferring the blank to the intermediate mold, means for subjecting the blank to internal fluid-pressure while in the intermediate mold, a finishing-mold, means for transferring the hollow bulbous blank to the finishing-mold, and means for subjecting the blank to further internal pressure while in the finishing-mold whereby it is given its final configuration, substantially as described.

3. The combination with a measuring-mold formed in two hinged parts, of a mouth-mold adapted to closely fit the end of the measuring-mold when the parts of the latter are brought together, a rotatable support on which said molds are mounted, an intermediate mold, and means for manipulating the same to bring it to a position to receive the glass blank from the measuring-mold when the parts of the latter are separated, but while the blank is held by the mouth-mold, means for subjecting the glass blank to internal air-pressure while it is in the intermediate mold, whereby it is formed into a hollow bulbous blank, a finishing-mold formed in two hinged parts adapted to be closed against the bulbous blank after the intermediate mold has been removed but while the blank is still held by the mouth-mold, and means for subjecting the blank to further internal fluid-pressure in the finishing-mold whereby the final shape is imparted thereto, substantially as described.

4. The combination with a finishing-mold for bottles, of a bottom for said mold having an indenting projection thereon and adapted to be raised against the lower open end of the mold, and a second bottom having an indenting projection thereon larger than that on the first-mentioned bottom, and adapted to be moved to a position against the lower open end of the mold after the first bottom has been removed therefrom, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CLAUDE BOUCHER, AÎNÉ.

Witnesses:

LEON RIGOLLEAU,

EMILE FAUGÉ.