No. 809,902. PATENTED JAN. 9, 1906.

C. E. BLUE.

MACHINE FOR THE MANUFACTURE OF GLASSWARE.

APPLICATION FILED MAR. 26, 1903.

3 SHEETS—SHEET 1.

FIG. 1.

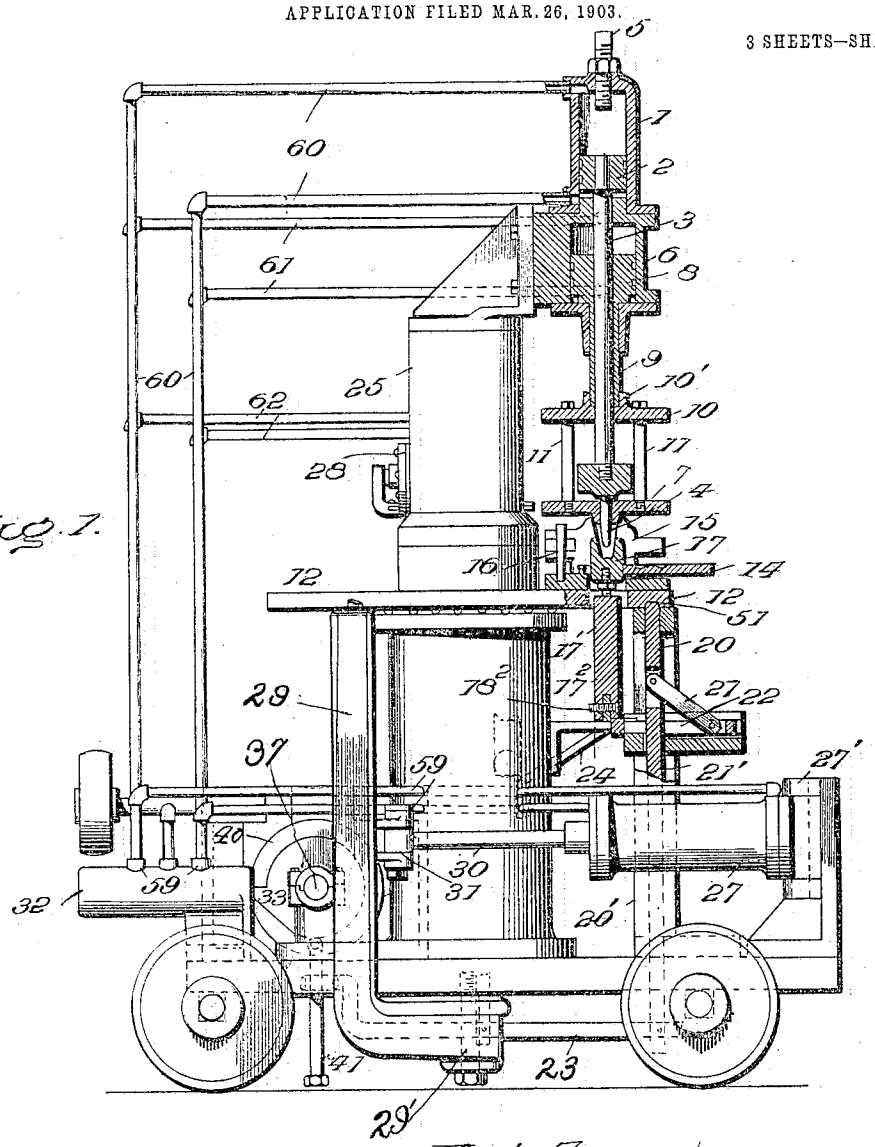
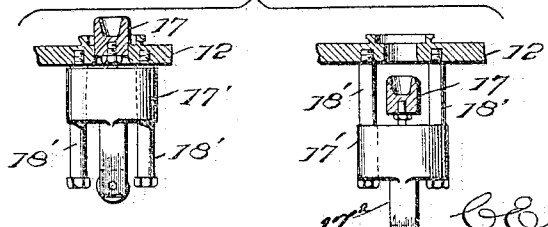


FIG. 4.



Witnesses

Chas. P. Wright, Jr.

Inventor

C. E. Blue,

By A. S. Pattison,

Attorney

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3 SHEETS—SHEET 2.

Fig. 5

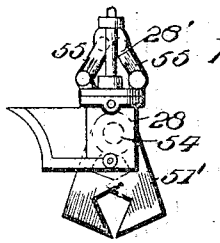


Fig. 2

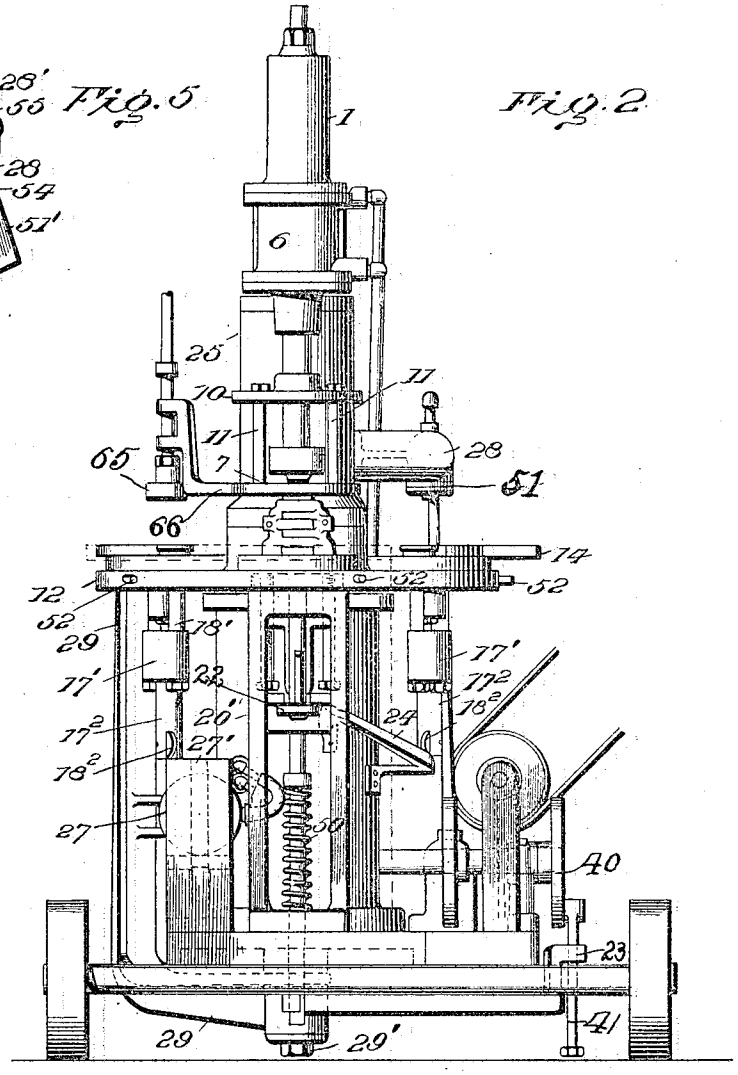


Fig. 6

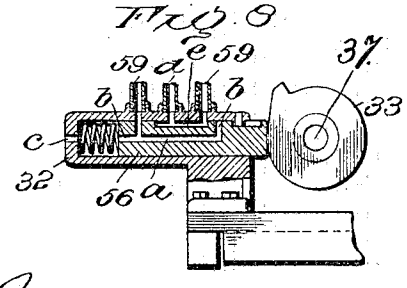
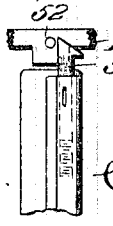


Fig. 7



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Chas. P. Wright Jr.

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A. S. Pattison,

Attorney

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3 SHEETS—SHEET 3.

Fig. 6.

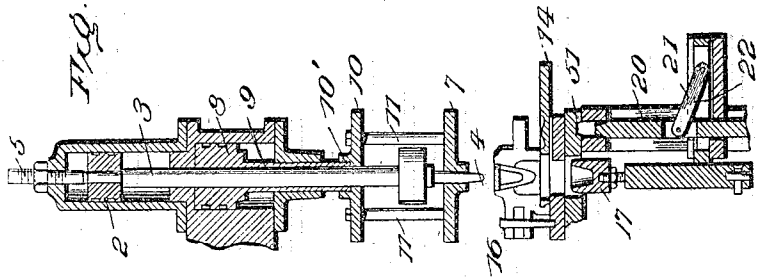
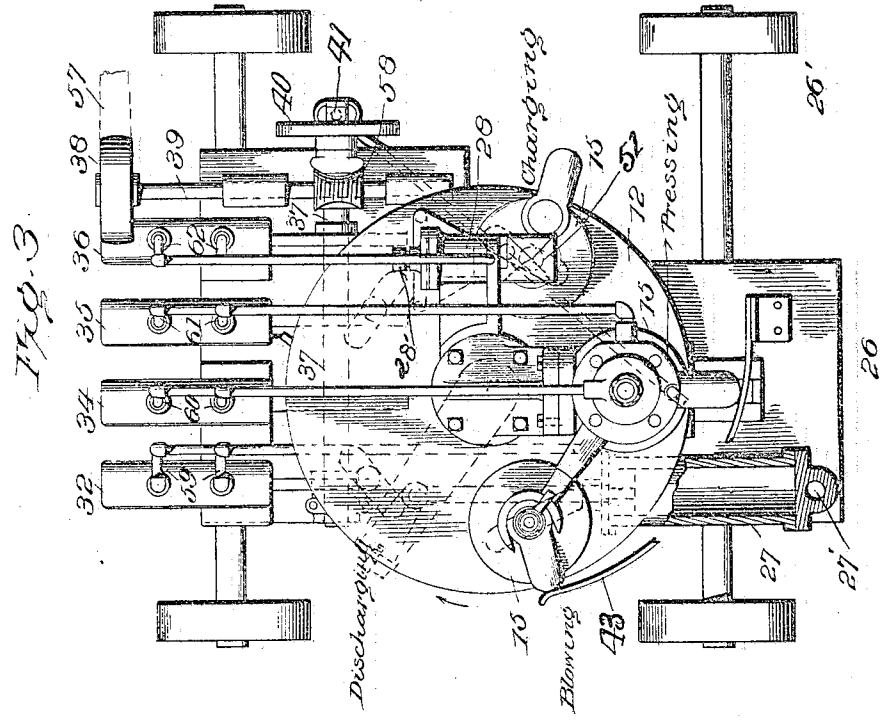


Fig. 3.



Witnesses

Chas. P. Wright, Jr.

Inventor

C. E. Blue,

By A. D. Partridge,

Attorney

UNITED STATES PATENT OFFICE.

CHARLES E. BLUE, OF WHEELING, WEST VIRGINIA.

MACHINE FOR THE MANUFACTURE OF GLASSWARE.

No. 809,902. Specification of Letters Patent. Patented Jan. 9, 1906.

Application filed March 26, 1903. Serial No. 149,755.

To all whom it may concern:

Be it known that I, CHARLES E. BLUE, a citizen of the United States, residing at Wheeling, in the county of Ohio and State of West Virginia, have invented new and useful Improvements in Machines for the Manufacture of Glassware, of which the following is a specification.

My invention relates to improvements in machines for the manufacture of glassware and pertains to a mechanism constructed and adapted to perform its several operations automatically; and the primary object of the invention is to cheapen the production of the article by doing away with the "pressman," who is usually necessary in machines of this character.

In the accompanying drawings, Figure 1 is a vertical sectional view through a part of the machine, the remaining portion being shown in side elevation. Fig. 2 is an end elevation looking in the direction indicated by arrow in Fig. 3. Fig. 3 is a top plan view of the machine embodying my invention. Fig. 4 is a detached view of the press-bottom for the mold, showing the manner of supporting it. Fig. 5 is a detached view of the shears for cutting the glass and its operating-cylinder. Fig. 6 is a detached vertical sectional view through the mold, its press-bottom and the plunger-rod with its connected and coöperating parts. Fig. 7 is a detached view of the upper end of the swinging arm 29. Fig. 8 is a longitudinal sectional view through one of the valve-cylinders and showing the cam for operating the valve.

Referring now to the drawings, 26 indicates the base of the machine, which is supported upon suitable wheels 26′, by means of which the machine is adapted to be moved around a factory, as desired. Extending from this base 26 is a column 25, and rotatably supported upon this column about midway its length is a table 12. This table 12 carries a plurality of mold-sections 15, which are preferably five in number. Each mold-section is provided with what may be termed a "press-bottom" 17 and a "blow-bottom" 14, the two bottoms adapted to be alternately used in connection with their respective mold-section 15 in a manner to be described hereinafter. The mold-section 15 is made of two horizontally-movable portions, which are pivoted at the point 16, whereby the two parts can be opened and closed in a manner and for a purpose which is well understood by those skilled in this art, and further description is therefore unnecessary.

The press-bottoms 17 are adapted to move vertically in respect to their respective mold-sections 15, there being a press-bottom for each of the said mold-sections 15. These press-bottoms are each separably supported and separably movable and each is supported by a vertically-sliding head 17′. Secured to the under side of the table 12 and extending downward are the guiding-rods 18′, which serve to support the head 17′ and to guide it in its vertical movement. Projecting downward from the said head 17′ is an arm 17^2, and this arm has journaled in its lower end a wheel 18^2. The wheel 18^2 is adapted to engage an inclined or cam track 24, as the table 12 is revolved for the purpose of causing the press-bottom 17 to be elevated into its operative position, as shown in Fig. 1.

A plunger 4 is adapted to coact with the press-bottoms, as shown in Fig. 1, for the purpose of forming a blank which is afterward blown into the completed article. Surrounding the plunger is a plunger-ring 7, and this plunger-ring is connected to the lower ends of the rods 11, the upper ends of the rods being connected with a suitable head or member 10. Supported by the upper end of the column 25 and at one side thereof are the two cylinders 1 and 6, the former being situated above and concentric with the latter. Situated within the lower cylinder 6 is a piston 8, and this piston is provided with a hollow or sleeve piston-rod 9, which has its lower end suitably connected with the head 10—as, for instance, by screw-threads, as shown at 10′.

Located within the upper cylinder 1 is a piston 2, and connected with this piston 2 is a piston-rod 3, which passes through the said piston 8 and its hollow piston-rod 9, as clearly shown in Figs. 1 and 6. The plunger 4 is connected with the aforesaid piston-rod 3, and the upward movement of the piston-rod 3 and its connected parts is regulated by means of a set-screw 5.

Automatic means is provided for intermittently rotating the table 12, which will be presently described, and the table is locked in its operative positions through the medium of a vertically-movable pin 20, supported by a vertically-arranged arm 20′, extending upward from the base 26, the upper end of the said pin being held normally upward in engagement with the under side of the table

through the medium of a spring 50, and thus caused to engage the cavities 51 made in the under side of the table when they are caused to register with each other by the movement of the table.

Means is provided for supporting the press-bottoms 17 in the position shown in Fig. 1 while the blank is being pressed therein and then to permit them to drop. I here show one form of means for accomplishing this, which consists of a horizontally-movable member 22, which is connected with the pin 20 through the medium of a link 21. When the pin 20 is moved upward, this member 22 is caused to move inward into the position shown in Fig. 1, and thus forms a support for the lower end of the arm 17^2, and hence a support for the press-bottoms 17, and will hold the press-bottom in its operative position. As before explained, the spring 50 serves to hold the pin 20 normally upward and with its upper end in contact with the under side of the table 12. When in this position, the inner end of the member 22 will be moved inward sufficiently to receive and to support the press-bottom in the manner just explained. By reference to Fig. 2 it will be noted that this member 22 is located at the upper end of the incline or cam 24 and, in effect, forms a part of the cam-track. When, however, the pin 20 is moved downward for releasing the table 12 and permitting it to be moved, the member 22 is moved outward from under the arm 17′ and the said arm is permitted to drop out of operative position, as shown in Fig. 6. The blank is pressed at the point marked "pressing," Fig. 3, and is blown into the finished article at the point marked "blowing," Fig. 3, and the finished article is removed from the mold at the point marked "discharging," Fig. 3. The table 12 rotates in the direction indicated by the arrow in Fig 3, and the mold is charged with molten glass in advance of the pressing at the point marked "charging," Fig. 3. After the pressing the press-bottom is caused to fall and the blow-bottom 14 moved inward before the mold reaches the point indicated by blowing, Fig. 3. Shears or other suitable cutting device 51′ is located so as to be over the molds when they reach the charging-point for cutting the glass.

The operation of the parts of the machine is automatic, and I will now describe the means by which their operation is automatically effected. The table 12 is caused to intermittently rotate a distance equal to the distance between the molds through the medium of a swinging arm 29, which has its lower end turned inward and pivoted at a point 29′, which is concentric with the axis of the table. The table is provided at its edge with a number of pins 52, corresponding with the number of molds, and is also provided with a cavity 51 for each mold. The upper end of the swinging arm 29 is provided with a spring-catch 53, which is adapted to engage alternately the pins 52 when moved in one direction and to slide under the pins when moved in another direction, as will be readily understood. The means for swinging the arm 29 consists of a cylinder 27, which is pivotally supported at its outer end at the point 27′, and the piston-rod 30 of this cylinder is pivotally connected at the point 31 with the said arm 29. The shears are caused to open and close through the medium of a cylinder 28 and its piston-rod 28′, the shears 51′ being intermediately pivoted at the point 54, and their opposite ends are connected with the piston-rod 28′ by means of the links 55. When the piston is moved in one direction, the shears are caused to open, and when moved in the opposite direction the shears are caused to close for cutting the glass. The pistons within the cylinders 1, 6, 27, and 28 are operated through the medium of preferably compressed air, though steam or other pressure may be used, and the pressure-supply and pressure-exhaust to and from the ends of these cylinders is controlled through a system of valves, and the valves are controlled in the manner which I will now describe. A suitable shaft 37, which I term a "master-shaft," is provided with a plurality of cams 33, and each of these cams is adapted to operate a valve 56, and these valves are respectively situated in the valve-casings 32, 34, 35, and 36, Fig. 3. The shaft 37 may be caused to rotate by any suitable motor. As here shown, it is rotated through the medium of a counter-shaft 39, carrying a pulley 38, around which passes a belt 57, connected with any suitable motor, and the counter-shaft 39 is operatively connected with the master-shaft 37 through the medium of the worm-gears 58. From this it will be observed that the master-shaft is continuously rotated. The valve-casing 32 is connected with opposite ends of the cylinder 27 by the pipes 59, having suitable flexible connections. The valve-casing 34 is connected with the cylinder 1 through the pipes 60, the valve-casing 35 is connected with opposite ends of the cylinder 6 through the pipes 61, and the valve-casing 36 is connected with opposite ends of the cylinder 28 through the pipes 62. The cams 33 force their respective valves inward, and suitable springs located within the casings and at the ends of the valves move them out when the cams are out of engagement therewith. Each valve is provided with a longitudinal passage-way *a*, and this passage-way is provided with the lateral passage-ways *b*, that are adapted to alternately register with the pipes extending from the valve-casings to the opposite ends of the operating-cylinders with which they are connected, and the valve-casings are provided with supply-inlets *c*. Each valve-

casing is also provided with an exhaust *d*, and each valve is provided with a passage *e* for connecting the exhaust-port with the exhausting end of its operating-cylinder. The operation of a valve of this character is so well understood that further explanation is unnecessary.

The operation of my machine is as follows: The master-shaft 37 being continuously rotated, the cams controlling the valves in the casings are caused to operate and to control the parts as follows: Glass is dropped into the mold at the point marked "charging," and the valve in the casing 35 is moved by its cam to cause the operation of the shears. The continued revolution of the shaft 37 draws upward upon the bolt 41, which is pivotally connected with the disk 40, and hence draws upward upon the adjacent end of the intermediately-pivoted lever 23, the opposite end of the lever being connected with the pin 20, and thereby draws the pin downward into the position shown in Fig. 6, and this movement of the pin, as before explained, causes the press-bottom to fall. The cam 33, controlling the valve in the casing 32, is then caused to operate its valve and to admit air to the outer end of the cylinder 27, forcing its piston upward and causing the arm 29 to swing and to rotate the table 12 one-fifth of a revolution. This movement of the table through the medium of the cam-spring 43 forces the blow-bottom 14 inward and in the position for the blowing of the blank when the mold reaches the blowing position. The cam 33, which controls the valve in the casing 35, is next thrown into operation and moves the valve to admit air into the upper end of the cylinder 6, which carries the plunger-ring 7 downward to the position shown in Fig. 1. The plunger-ring carries with it the blow-head 65, which is connected with the plunger-ring through the medium of a bracket 66, so that the blow-head is seated upon the mold at the blowing-point at the same time that the plunger-ring is seated upon the preceding mold at the pressing-point. The cam controlling the valve in the casing 35 is next caused to admit air to the upper end of the cylinder 1 and to force the plunger downward for forming the pressed blank, as shown in Fig. 1. The cutting of the glass at the charging-point and the pressing of the blank at the pressing-point and the blowing of the blank at the blowing-point occur practically simultaneously.

From this description it will be noted that it is only necessary to drop the glass in the mold at the pressing-point and to remove the finished article from the mold, the other operations being performed automatically and at the proper time by the setting of the cams 33 upon the master-shaft 37 to act upon their valves in proper sequence.

While I here show means for automatically controlling the operation of the parts of a machine in which the glass is first pressed and finally blown, I desire it understood that (generically considered) the means here shown for automatically controlling the operation of the parts are capable of use in other forms of glass-making machines in which there is a movable mold-carrier, a plunger, and a movable bottom for the molds irrespective of the fact whether the article is completed by a pressing operation or a combined pressing and blowing operation.

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

1. A machine for the manufacture of glassware, including a movable mold-carrier, a plurality of mold-sections carried thereby, a vertically-movable press-bottom for each mold, a blow-bottom for each mold-section, means for moving the press-bottom up into operative position while the carrier is moving, and means for dropping the press-bottom while the carrier is stationary at the pressing-point.

2. A machine for the manufacture of glassware, including a movable mold-carrier, a plurality of mold-sections carried thereby, a vertically-movable bottom for each mold, means for moving the bottom into operative position while the mold-carrier is moving and means for depressing the bottom out of operative position while the carrier is stationary at the pressing-point.

3. A machine for the manufacture of glassware, including an intermittently-movable mold-carrier, a plurality of mold-sections carried thereby, a vertically-movable bottom for said mold-sections, a movable plunger and a movable plunger-ring for said mold-sections, and a continuously-rotating shaft provided with coacting means controlling the movements of said movable members.

4. A machine for the manufacture of glassware, including an intermittently-movable mold-carrier, a plurality of mold-sections carried by the mold-carrier, a member for moving the carrier intermittently, movable bottoms for said mold-sections, a movable plunger and a movable plunger-ring coacting with said mold-sections, pressure-cylinders operatively connected with the carrier movable member the plunger and the plunger-ring, valves controlling the pressure to said cylinders, and a continuously-rotating shaft controlling said valves.

5. A machine for the manufacture of glassware including a movable mold-carrier, a mold carried thereby, a vertically-movable bottom for said mold, means for elevating the bottom while the carrier is moving, a movable support for said bottom when it is elevated, and means for moving said support

to depress said bottom while the mold-carrier is stationary.

6. A machine for the manufacture of glassware, including a movable mold-carrier, a mold carried thereby, a vertically-movable bottom for said mold, means for elevating erally-movable support for said bottom when elevated, and means for moving the support laterally and permitting the bottom to drop.

7. A machine for the manufacture of glassware, including a movable mold-carrier, a mold carried thereby, a vertically-movable press-bottom for said mold, a blow-bottom therefor, an incline adapted to move the press-bottom into operation during the movement of the said carrier, and means for dropping said press-bottom after the pressing operation.

8. A machine for the manufacture of glassware, including a movable mold-carrier, a mold carried thereby, a vertically-movable press-bottom for said mold, a blow-bottom therefor, an incline adapted to move the press-bottom into operative position by the movement of said carrier, a movable support at the upper end of the incline for said press-bottom, and means for moving said support and causing said press-bottom to drop after the pressing operation.

9. A machine for the manufacture of glassware, including an intermittently-movable mold-carrier, a plurality of molds carried thereby, a pressure-actuated mechanism moving said mold-carrier, a pressure-actuated vertically-movable plunger and blow-head, a vertically and a horizontally movable bottom for said molds actuated in sequence by the movement of said mold-carrier, valves for the said pressure-actuated mechanism, and a member controlling said valves in relative sequence to the said coöperating mechanism as described.

10. A machine for the manufacture of glassware, including an intermittently-movable mold-carrier, a plurality of molds carried thereby, a pressure-actuated mechanism moving said mold-carrier, pressure-actuated press and blow mechanisms a lock for the said mold-carriers when at rest, valves controlling the pressure for said pressure-actuated mechanism, and means controlling the valves in sequence as described and actuating the lock to release the carrier after the operation of the pressing and blowing and in advance of the movement of the carrier.

11. A machine for the manufacture of glassware, including an intermittently-movable mold-carrier, a plurality of molds carried thereby, a plunger adapted to coact with said molds, mechanisms for actuating the carrier and the plunger, a movable bottom actuated by the movement of the carrier, and a controlling member directly controlling the movement of the carrier and the plunger, and through the movement of the carrier controlling the movement of the bottom.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CHARLES E. BLUE.

Witnesses:
E. D. HOGE,
S. M. BAIRD.