No. 869,538. PATENTED OCT. 29, 1907.

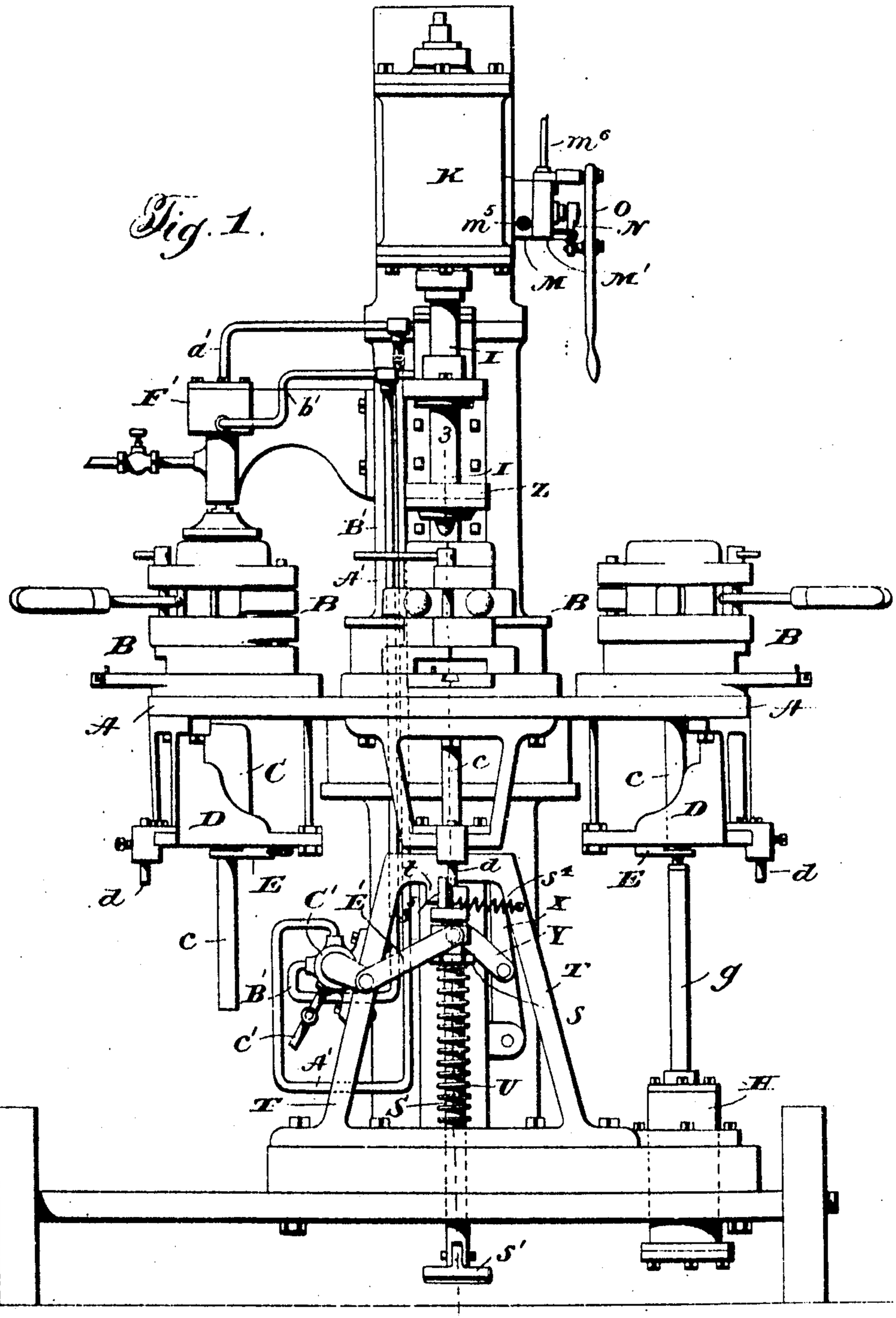
S. E. WINDER.

MACHINE FOR MAKING HOLLOW GLASSWARE.

APPLICATION FILED JUNE 30, 1906.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses.

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J. L. Lawlor.

Inventor

Samuel E. Winder,

by Prindle and Williamson

Attorneys

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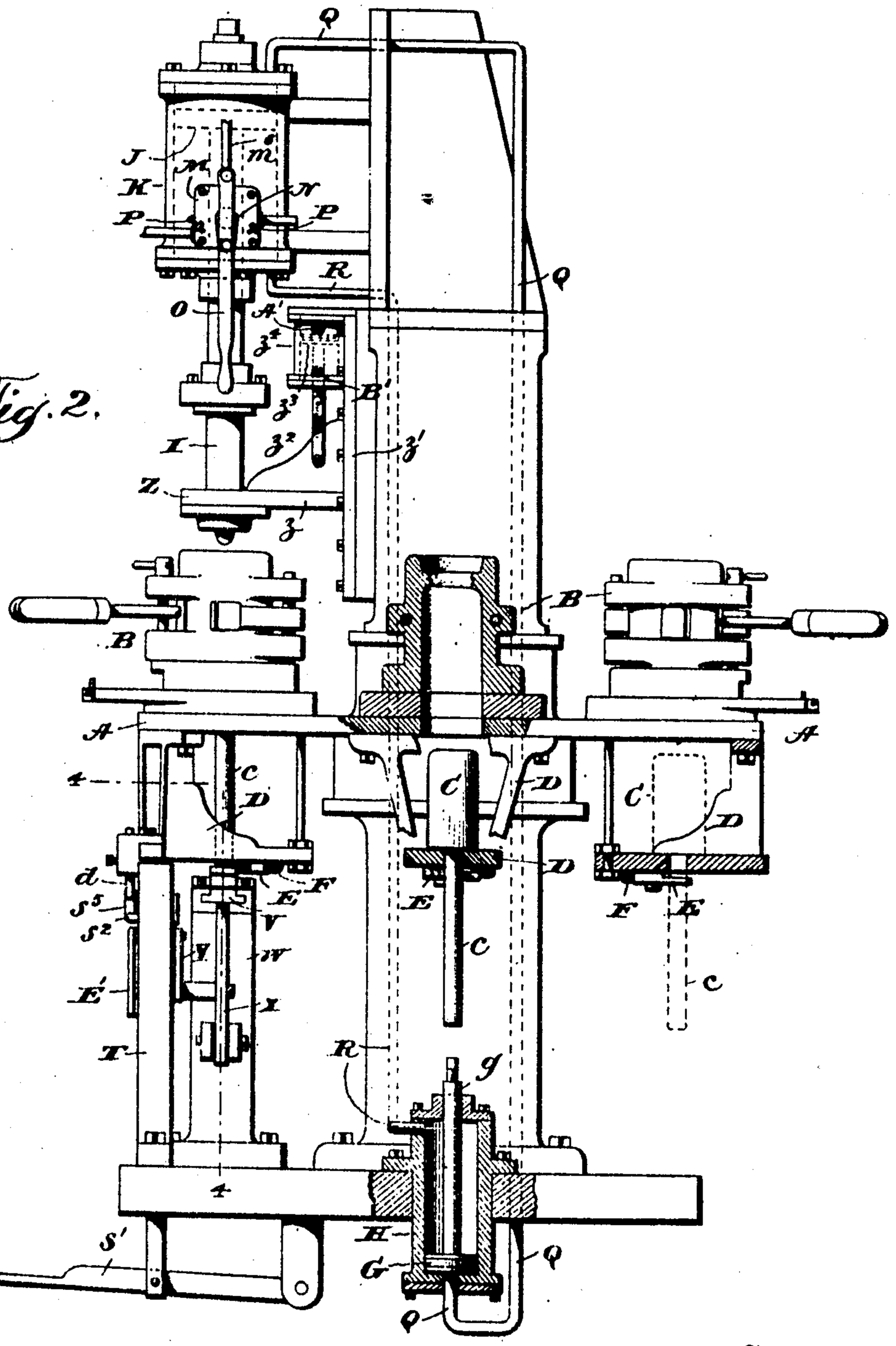
4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

Fig. 3.

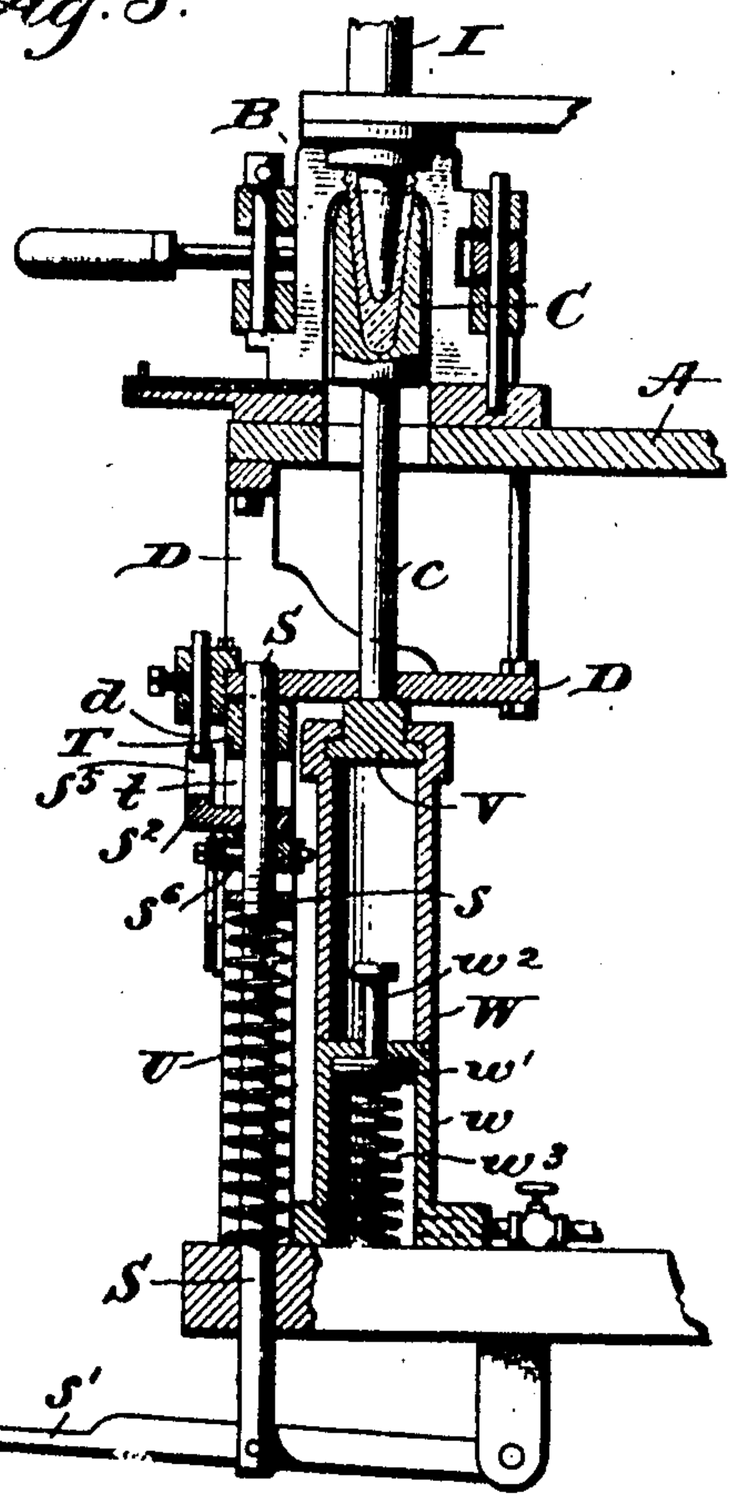


Fig. 4.

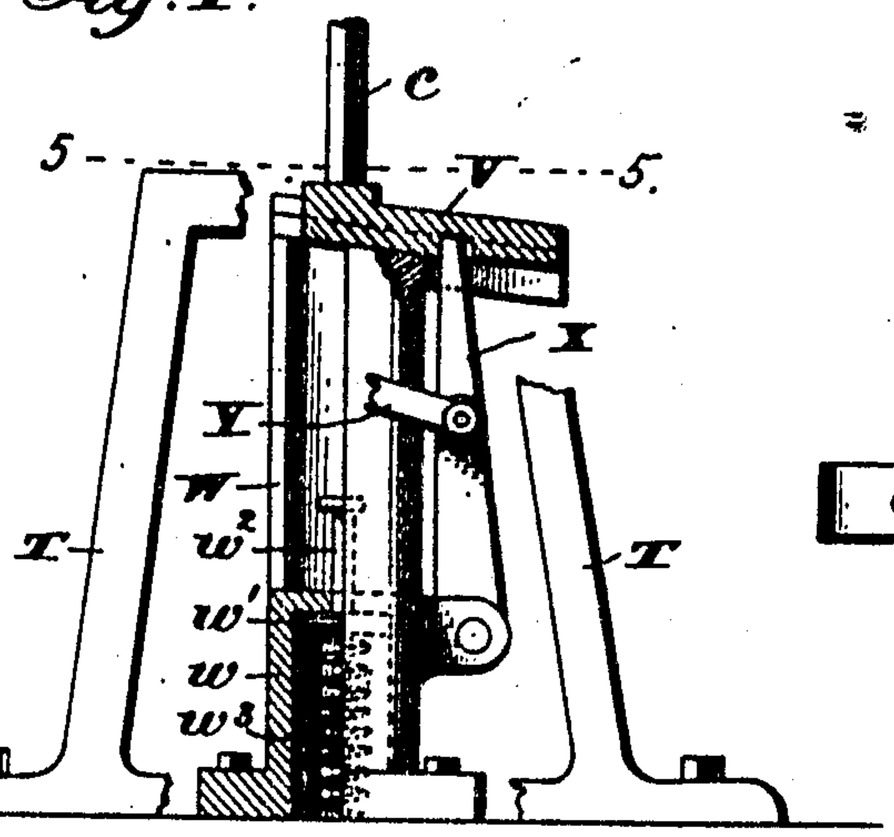
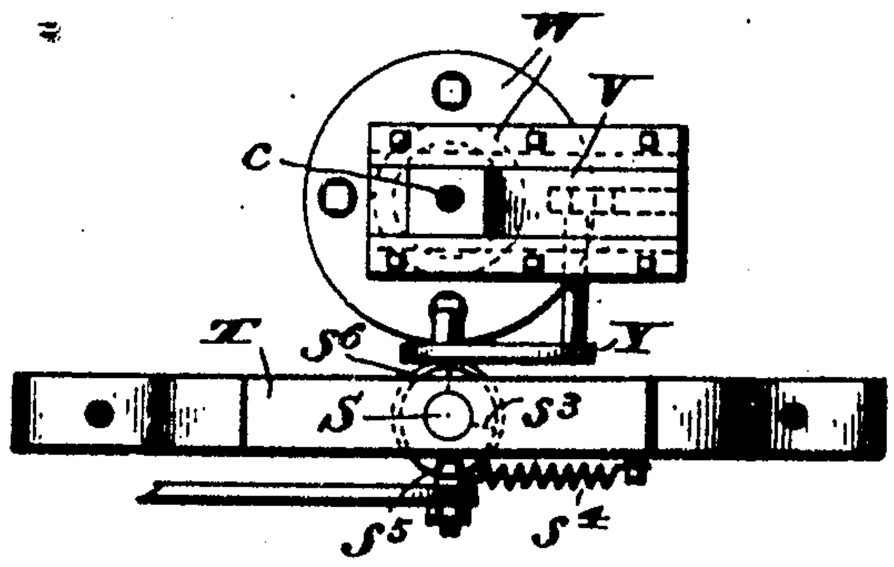


Fig. 5.



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4 SHEETS—SHEET 4.

Fig. 6.

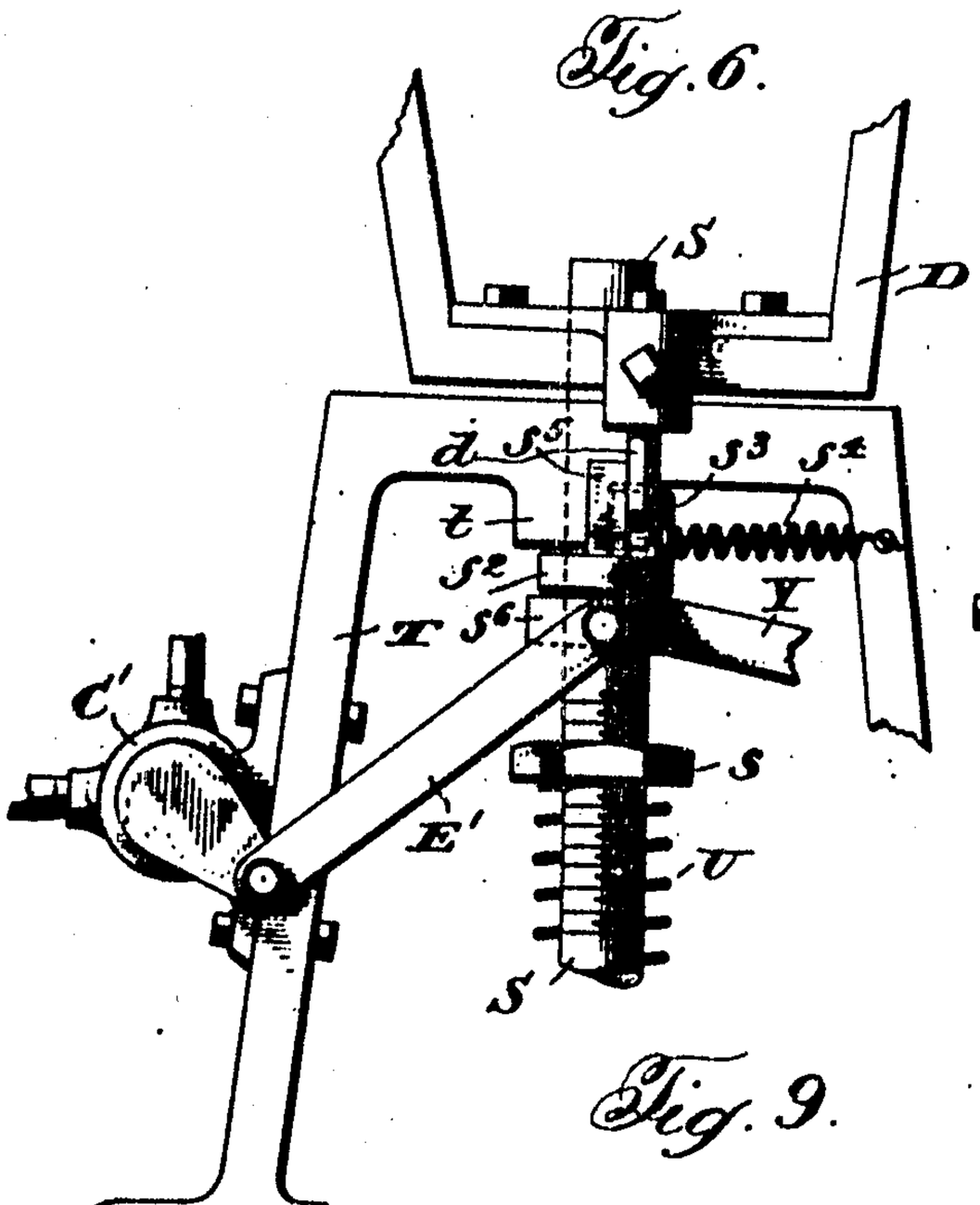


Fig. 7.

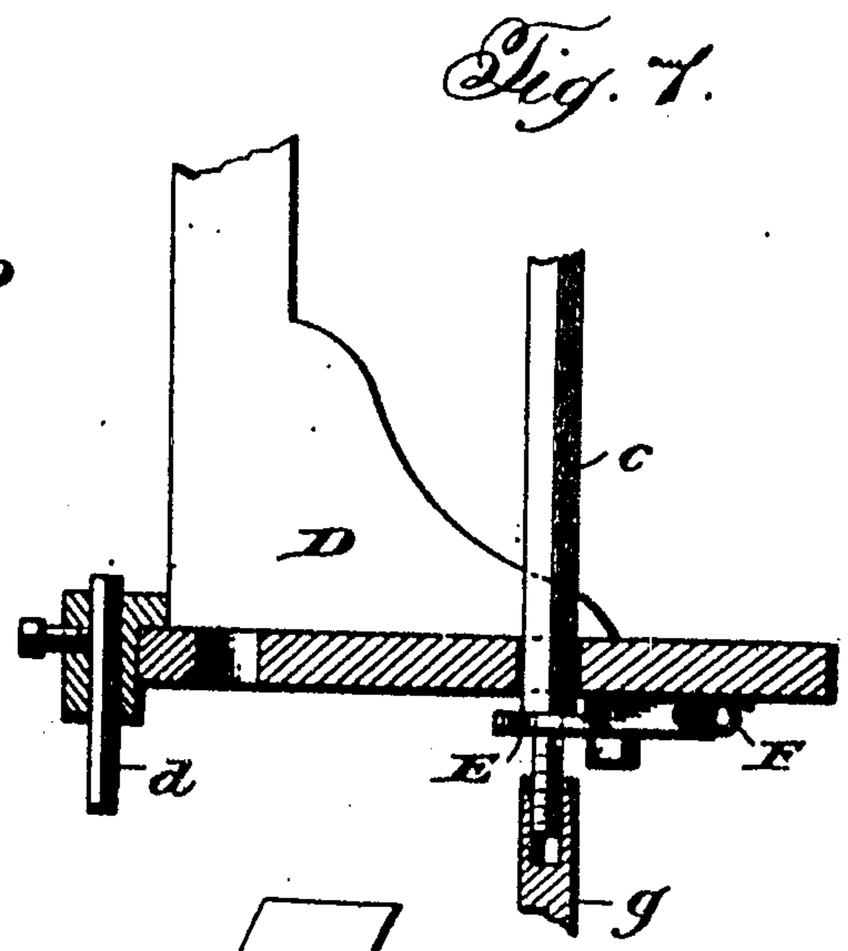


Fig. 8.

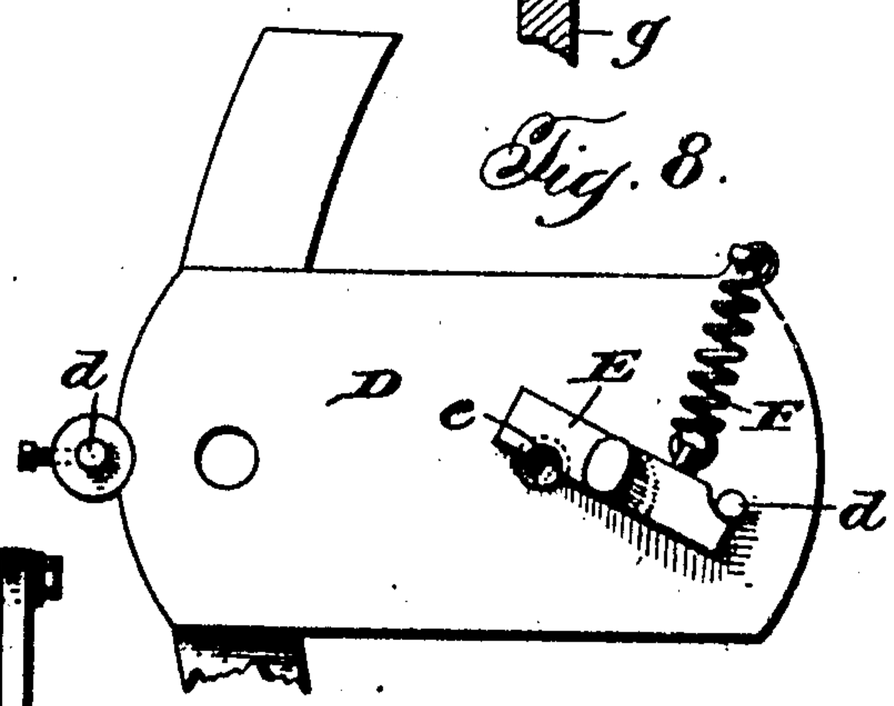


Fig. 9.

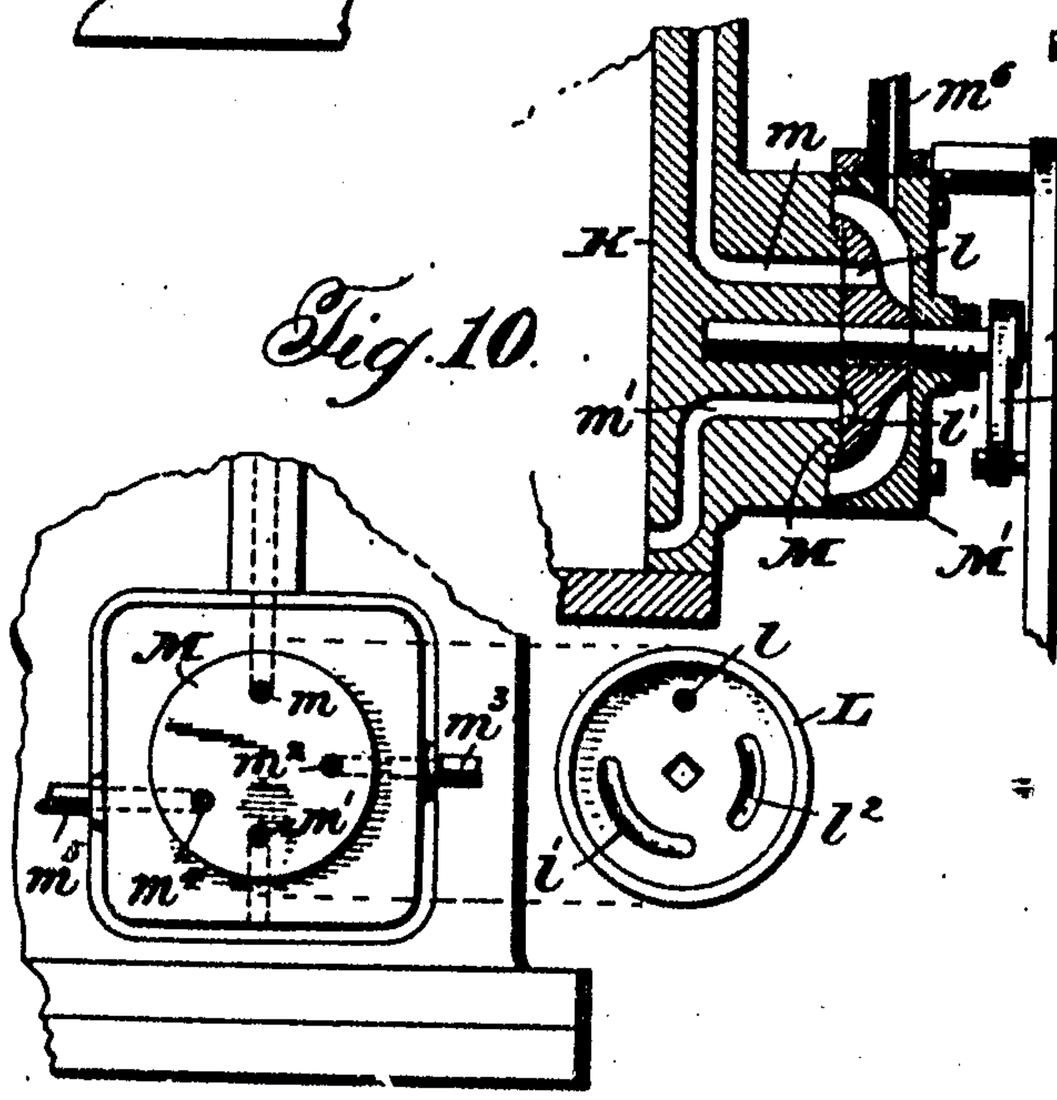
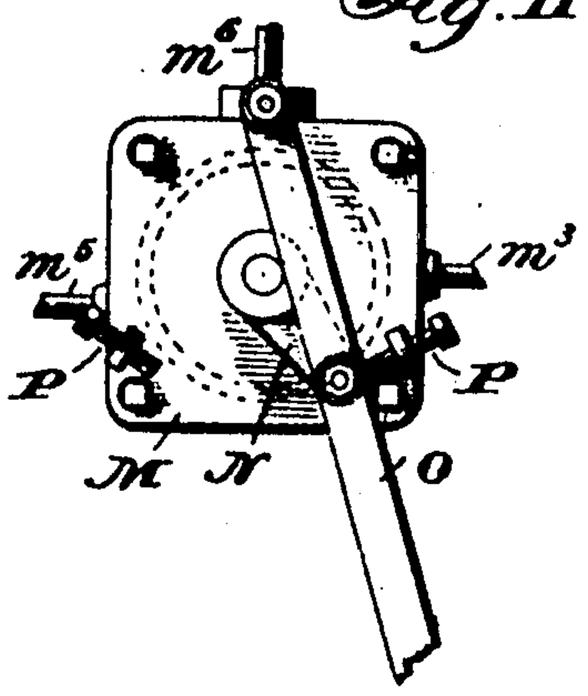


Fig. 10.

Fig. 11.



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UNITED STATES PATENT OFFICE.

SAMUEL E. WINDER, OF BRIDGETON, NEW JERSEY, ASSIGNOR TO THE FIRM OF COX BROTHERS, OF BRIDGETON, NEW JERSEY.

MACHINE FOR MAKING HOLLOW GLASSWARE.

No. 869,538. Specification of Letters Patent. Patented Oct. 29, 1907.

Application filed June 30, 1905. Serial No. 267,803.

To all whom it may concern.

Be it known that I, SAMUEL E. WINDER, of Bridgeton, in the county of Cumberland and in the State of New Jersey, have invented a certain new and useful Improvement in Machines for Making Hollow Glassware, and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation of a glass jar making machine embodying my invention. Fig. 2 is a side elevation with certain parts in section. Fig. 3 is a vertical section on the line 3—3 of Fig. 1. Fig. 4 is a detail section on the line 4—4 of Fig. 2. Fig. 5 is a horizontal section on the line 5—5 of Fig. 4. Fig. 6 is a detail view and side elevation of the automatic table locking and releasing mechanism. Figs. 7 and 8 are detail views of the blank supporting device. Figs. 9, 10 and 11 are detail views of the main cylinder valve mechanism.

The object of my invention is to so improve the construction of machines for the manufacture of hollow glass ware, and especially glass jars, that the number of manual operations may be reduced and such operations rendered easier, so that the output of the machines may be increased; and so that such machines may be simpler, with the result that they will be less expensive to build and cheaper to maintain because of decreased liability to get out of order, and to these ends my invention consists in the machine constructed substantially as hereinafter specified and claimed.

The machine belongs to that class employing a revolving table A on which are mounted five molds B, which, by the rotation of the table, are successively brought into position for, first, the lifting of the pressing bottom or blank into a mold and the reception of the molten glass; second, for position for the descent of the mold closing or follower ring and the plunger; third, for position for the descent of the blower head and for the blowing of the jar; and fourth, for position for the opening of the mold and the removal of the finished jar and the closing of the mold again.

The molds B are of ordinary construction and for each mold there is a pressing bottom or blank C that comprises a cylindrical head, which is hollow to receive the batch of molten glass, and a stem in the form of a rod *c* that extends downward from said head. Beneath each mold there is bolted to the underside of the revolving table, a bracket D made in one piece, which, at its lower horizontal end, has a hole through which the blank stem passes and is guided, and adjacent to such hole on the underside of the bracket there is pivoted a plate or dog E that is adapted to pass over the hole in the bracket, and is normally moved into position to do this by a spiral spring F, the stop in the form of a pin or stud *d* on the underside of the bracket engaging the plate to restrain its movement by the spring. On the edge of its portion that overlies the hole in the bracket, the plate has a semi-circular notch *e* of less radius than the radius of the lower end of the blank stem, the purpose of which will hereinafter appear. It will be seen that when the stem of the blank is lifted to a position above said pivoted plate, it will rest upon and be supported by said plate in its lifted position with the blank within the mold B above it. To so lift the stem and the blank, the stem at one point in the revolution of the rotating table is in alinement vertically with a rod *g* of a piston G in a vertical cylinder H, to which cylinder air under pressure is supplied, as will hereinafter be described, for lifting the piston to accomplish the engagement of its rod *g* with the blank stem and thereby lifting the latter. Air under pressure is likewise supplied to the cylinder to force its piston downward. The upper end of the piston rod *g* is reduced in diameter so that when the blank stem has been lifted above the plate E, the latter may swing beneath the bottom of the blank stem and it is for this purpose that the notch *e* is provided in the plate E. Preferably the stem engaging portion of the piston rod is vertically adjustable and for this purpose it may be in the form of a screw pin or bolt. The blank having been lifted, as has just been described, the next step in the turning of the table brings the mold with the lifted blank therein beneath the pressing plunger and the follower ring. The pressing plunger I is carried by a piston J in a vertical cylinder K, which I prefer to call the main cylinder, which is bolted to the frame of the machine.

On the side of the main cylinder K there is a valve which consists of a rotary disk L on a valve-seat M, which valve-seat has two ports, *m* and *m'* that lead respectively to the top and bottom of the main cylinder, a third port m^2 that leads to an exhaust m^3 and a fourth port m^4 from an air inlet m^5 to supply pressure to the bottom of the cylinder to lift the piston therein. A cap or cover M' incloses the valve. Besides such inlet m^5 the valve chamber has a second air inlet m^6 which supplies air constantly thereto and the air pressure acting upon the valve holds it to its seat. The valve has three ports; one in the form of a simple opening l clear through it, which, by the turning of the valve, is put in communication with the port *m* in the valve seat which leads to the top of the cylinder, and two in the form of segmental grooves, one, l', of which is longer than the other l^2, and serves by the

rotation of the valve to place the exhaust port in succession into communication with the two ports, *m* and *m'* which lead respectively to the top and bottom of the cylinder. The other segmental port l^2 by the rotation of the valve, places the port *m'* in the valve seat which leads to the bottom of the cylinder, in communication with the air inlet port m^5 in the valve seat. Heretofore a valve-operating handle has been applied directly to the stem of the rotating valve. This is objectionable, as it requires considerable movement of the handle, which, of course, takes time and it is otherwise objectionable. To obviate these objections I provide the valve stem with a crank arm N and pivotally connect such arm to a hand lever O pivoted eccentrically to the valve. With this construction a short motion of said operating lever is necessary, and the movement of the valve is easy and quick. I provide means for adjusting the swing of the valve, so that a longer or shorter movement thereof may be provided to regulate the opening of the ports. An air pressure may thus be economized. Such means for adjusting the swing, may, as shown, consist simply of two screws P mounted in lugs on the valve casing at opposite sides of the crank arm N and adapted to be struck by the sides of said crank arm when it reaches the desired limits of movement of the valve in either direction.

Air to operate the piston G in the cylinder H for lifting the blank into the mold, as heretofore described, is taken from the main cylinder K, and for this purpose a pipe Q runs from the upper end of the main cylinder K to the bottom of the cylinder H, for lifting the piston G therein. A second pipe R runs from the bottom of the cylinder K to the upper end of the cylinder H for supplying pressure to move the piston G down. When air is admitted to the main cylinder K, above its piston to move the pressing plunger downward to press the glass in the mold, it first acts to move said piston downward as far as it should go to press the glass in the mold, and then the air, continuing to flow into the cylinder and the pressure therein increasing, it will flow through the pipe Q, leading from the top of the main cylinder K and supply pressure to the cylinder H beneath the piston G and will lift the latter to effect the lifting of the blank for the next succeeding mold. This timing of the parts is important, for it affords means of insuring the requisite time of pressure of the glass by the plunger, which pressure should be released before the glass becomes too cool for proper blowing, for, by the time the piston G has been raised to lift the blank into the mold, until the top of the blank strikes the top of the mold, the plunger should be lifted. The striking of the top of the blank against the mold produces a slight noise which serves as a signal for the operator to lift the plunger. When air is admitted below the piston in the cylinder K, to lift the plunger, it may be also admitted to the cylinder H, above its piston G, to carry the latter and the blank downward. It is to be noted that there are no valves for controlling the passage of air from the main cylinder K to the cylinder H, and no special construction of the valve mechanism for controlling the supply of air to the cylinder K is necessary, to enable the movements of the piston G and the cylinder H to be controlled, as has been described. So it follows that the arrangement by which air is taken from the cylinder K to operate the piston G and the cylinder H is a very advantageous one. Air from the cylinder H is exhausted according to the direction or movement of its piston G through pipes Q and R, so that the cylinder H utilizes the same exhaust as the cylinder K.

The rotating table is moved by hand, the handles of the molds B being utilized for this purpose, and the table at each position of rest is locked by the upper end of a vertical rod S, which passes into an opening in the table bracket D provided for the purpose. Said vertical rod is guided by openings in the base of the machine and in a standard T bolted to the base and it is pressed upward by a coil spring U interposed between the bottom of the standard and a collar *s* on the rod, and a treadle *s'* is attached to the lower end of said rod by which it may be pulled down against the pressure of the spring to disengage the upper end of the rod from the hole in the table bracket. When the rod is lowered to disengage it, it is locked in its disengaged position by a collar s^2 pivoted upon it near its upper end, which has a vertical projection s^3 adapted when the collar is rotated by a spring s^4 to pass beneath a lug or projection *t* on the upper end of the standard T. Said collar s^2 is rotated automatically to free the rod to permit it to rise by the action of its spring into engagement with the hole in the table bracket D and for this purpose said collar has a vertical pin s^5 in the path of a pin *d* suitably attached to each table bracket, which pin *d*, by the rotation of the table, moves into engagement with the collar pin and thus rocks the collar to free it, such engagement of the pins taking place when the table is brought to the position in which it is desired to stop and lock it. The pins are disengaged to permit the table to move onward by causing the treadle to lower the rod, when releasing the table, sufficiently to carry the collar *s* far enough down to take its pin out of the path of the other pin.

When the table is moved to place a mold at the point where the glass is to be pressed by the plunger, the plate which supports the blank after it has been raised, as heretofore described, engages a block V as the table revolves and the said plate E is swung back. Simultaneously with its swinging back, the lower end of the blank stem passes upon the top of the block V, which block constitutes the support for the blank to sustain the thrust or pressure of the plunger and is itself supported by the presser post W. It will be seen that, after the blank has been lifted and the lower end of its stem is supported by the plate E, the operation of moving the blank to the next position for the action of the plunger involves merely the carrying of the weight of the parts by the table without any friction, such as occurs in those machines where a stationary track is employed over which the lower end of the stem passes and by which it and the blank are supported. The block V is slidably mounted in ways at an incline, so that when it is moved in one direction, it will lift the blank stem and the blank to force the top of the blank into close contact with the top of the mold in order to secure a sufficiently tight joint at such point to prevent

the squeezing through of the molten glass when the plunger descends. When the press block is moved in the opposite direction, it is withdrawn from beneath the stem of the blank leaving the latter free to descend and, to cushion its descent, a cylinder w is provided beneath it in the post W containing a piston w' having a rod w^2 against which the lower end of the blank strikes. A spring w^3 is provided in the cylinder to lift the piston and while incidentally the spring serves as a cushion, yet the cushion is essentially an air cushion.

For sliding the press block, it has in its underside a notch that is engaged by the upper end of a lever X, which, at its lower end, is pivoted to the side of the post W, and which lever is connected by a link Y to a collar s^6 on the locking rod S so that the movement of the press block is thus derived from the movement of the locking rod. It is very important that there shall be such nicety of adjustment of the upward movement of the blank, by the action of the press block, that such upward movement cease as soon as there is contact between the top of the blank and the mold, so that the lifting of the latter by the blank, which would derange the position of the mold, be avoided. In order to secure this nice adjustment the tension of the spring on the locking rod, by which spring the rod is moved upward and causes the movement of the press block to lift the blank, is adjustable and a convenient means for providing for adjustment of its tension is to screw the collar s on the rod.

In connection with the pressing plunger, a follower ring Z is, as usual, employed and said ring is carried by an arm z projecting horizontally from a slide z' movable vertically in guides upon the machine frame and connected by a link z^2 with the piston rod of a piston z^3 in a small cylinder z^4, bolted to the machine frame. Air is supplied to the cylinder z^4 to reciprocate the piston to lower or raise the follower ring by means of pipes A′ and B′, which lead respectively from the top and bottom of the cylinder to a valve chamber C′ bolted to the standard T, which valve chamber is in communication with a source of supply of compressed air by means of a pipe c'. The valve in the valve chamber is a rotary valve, adapted, by its oscillation, to alternately establish communication with the cylinder z^4, above and below the piston and with the inlet, and to alternately connect such portions of the cylinder with an exhaust port in the valve chamber. The movements of the valve in the valve chamber C′ are also effected by connection with the table locking rod, so that when the table is locked by the ascent of the rod, air will be at once admitted to the cylinder z^4 above its piston to lower the follower ring to the top of the mold beneath the same, and when the table is unlocked by the descent of the locking rod the valve will be rocked to reverse the travel of the piston in the cylinder z^4 and thus lift the follower ring. To actuate said valve from the locking rod, a link E′ connects the collar s^6 on said rod with a crank arm on the valve. The mold next preceding the one with which the above pressing plunger and the follower ring are coöperating, has a blow-head F′ of usual construction to the cylinder of which pipes a' and b' lead from the pipes A′ and B′, that run from the valve chamber C′ so that it will be seen that the operation of the blow-head is controlled by the same valve mechanism that controls the movements of the follower ring and by the operation of the table locking rod.

It will, of course, be understood that the various operations that are performed in connection with each successive position of the mold as it is rotated step by step, are simultaneously carried on with the series of molds as is common in this class of machines; and it will be understood that after the descent of the blank from within the mold after the glass therein has been pressed by the plunger, a bottom, as is usual, is slid beneath the mold in readiness for the operation of blowing.

The operation of my machine, briefly described, is as follows: The operator grasps the valve-operating lever O and moves it to open the valve to admit fluid under pressure into the cylinder K, above the piston therein, which, acting first to move the piston down to force the pressing plunger I down into contact with the top of the mold beneath it, then acts, by passing through the pipe Q to the cylinder beneath the piston G therein to lift the piston and its rod g, and through the latter which engages the lower end of the blank rod c lifts the blank C into the mold B above it a charge of glass then being placed in the blank C within the mold. In its ascent, the blank stem c passes above the pivoted latch plate E and the latter, moving into engagement with the lower end of the blank stem c, supports the blank in position in the mold. The treadle s' is now depressed to lower the mold-table locking-rod S out of locking engagement with the mold-table, and the latter is then rotated to bring the mold with the new charge of glass in it under the pressing plunger I. When the table locking-rod S is depressed, as described by the treadle s', it is automatically locked in its depressed position by the collar s^3 which is rocked to place its lug s^3 into engagement with the lug t. When the table is revolved sufficiently to place the mold with the new charge of glass in it in position beneath the pressing plunger I, the pin d, carried by the table engaging the lug s^5 on the locking collar s^3 releases the locking rod S and, under pressure of the spring U, the latter is moved upward to engage it again with the mold table. Just before the mold B, with the new charge of glass, reaches its position beneath the pressing plunger I, the blank supporting latch plate E strikes the edge of the block V and it partakes no more in the onward movement of the mold table, the result being that the lower end of the blank stem c passes upon the upper side of the inclined block V, and the latter, through its connections with the locking rod S, being moved in its inclined guide, acts upon the lower end of the blank stem c to lift the blank so as to form a tight joint between its upper end and the interior of the mold B. The valve lever O is again operated to admit fluid under pressure above the piston J, in the cylinder K (said lever O in the meantime having been moved to permit the exhaust of the fluid under pressure from the cylinders K, and H, and the ascent and descent of their respective pistons) and the pressing plunger I enters the charge of glass in the blank C. The valve operating lever O is then actuated to cause the lifting of the pressing

plunger I from the mold, the treadle s' is again depressed to release the mold table, the latter is again moved to carry the newly pressed charge in its mold to the next mold station for blowing, during which movement the blank C passes from within the mold, and, as usual, an ordinary bottom is put in position in the mold and the operation of blowing is performed, air being admitted to the blowing mechanism by the operation of the valve in the valve chamber C' through its connection with the table locking rod S.

It will be understood that in the operation of the machine after two molds have been put in use, the operations described at the various stations, are being carried on simultaneously.

The machine is highly automatic, and yet most simple and reliable in operation. The single operating lever controls the operation of the pressing plunger and the blank lifting mechanism, and yet but one valve is required with no special construction to enable it to control the supply of air to the cylinder H for lifting the blank; the table locking rod not only serves to lock and release the table but it operates the press block, controls the supply of air for moving the follower ring, and controls the supply of air for the blow-head and blowing; and the locking of the table is effected automatically by the rotation of the table.

I, of course, do not limit myself to the particular details of construction I have shown and described in the present embodiment of my invention, because with different embodiments thereof the construction of parts will vary.

Having thus described my invention, what I claim is:

1. The combination of a traveling carrier for a plurality of molds, two cylinders that respectively operate two members for coöperating with the molds, said members being situated to coöperate with different molds at the same time, a pipe leading from a source of supply of fluid pressure to one of the cylinders, and a supply pipe leading from said cylinder to the other cylinder, fluid pressure being supplied to the latter cylinder from the other one.

2. The combination of a plurality of molds, a pressing plunger in line with one of the molds, a pressing bottom or blank in line with another mold, a cylinder for operating the plunger, a second cylinder for operating the blank, means for controlling the supply of fluid under pressure to the plunger cylinder, and a constantly-open connection between the two cylinders to pass fluid pressure from the plunger cylinder to the other cylinder.

3. The combination of a traveling mold carrier, a mold, a mold member, a device mounted on the carrier movable into and out of engagement with said mold member to hold it in position when moved into the mold, and a part in the path of said device as it moves with the carrier to engage it and release said mold member from said device.

4. The combination of a traveling mold carrier, a mold member, a device mounted on the carrier movable into and out of engagement with said mold member to hold it in position when moved into the mold, a part in the path of said device as it moves with the carrier to engage it and release said mold member from said device, and a part into engagement with which said member moves when it is free from said device.

5. The combination of a traveling mold-carrying table, a mold member movable into and out of the mold, a plate pivotally supported by the table to engage said member and hold it in position in its mold, and a part in the path of said plate in its travel with the mold to engage and move the same to release said movable mold member.

6. The combination of a traveling mold-carrying table, a mold member movable into and out of the same, a plate pivotally supported by the table to engage said member and hold it in position in its mold, a part in the path of said plate in its travel with the mold to engage and move the same to release said movable mold member, and a block into engagement with which said movable member passes when freed from said pivoted plate.

7. The combination of a traveling mold-carrying table, a bracket for each mold bolted to the underside of said table, a vertically movable mold member for each mold guided by the bracket, a pivoted plate on each bracket to engage said mold member, means to lift said mold member for its engagement by said plate, and a part in the path of said plate in its travel with the table to engage the same and move it out of engagement with said movable mold member.

8. The combination of a mold support, a plunger, a cylinder for moving the plunger, a rotary valve controlling the fluid pressure for the cylinder, an operating lever for the valve, and a connection between said lever and the valve joined to the lever eccentric to its pivot.

9. The combination of a mold support, a plunger, a cylinder for moving the plunger, a rotary valve controlling the supply of fluid pressure to the cylinder having a crank arm, a lever pivoted eccentric to the valve, and connections between said crank arm and the lever.

10. The combination of a mold support, a plunger, a cylinder for operating the plunger, a rotary valve controlling the supply of fluid pressure to the cylinder having a crank arm, a lever pivoted eccentric to the valve, connections between the crank arm and the lever, and means for adjusting the throw of the valve.

11. The combination of a traveling mold carrier, means for locking said carrier, a mold member operated by a fluid under pressure, a valve for controlling the supply of such fluid and direct connections between the locking means and said valve whereby the valve is positively actuated by the locking means.

12. The combination of a mold, a member movable into and out of the mold, means for moving said member into the mold, and supplementary moving and supporting means for said member.

13. The combination of a traveling mold, a member movable into and out of the mold and traveling therewith, and an inclined, movable block for engaging said member, into engagement with which said member is moved after it is lifted into the mold.

14. The combination of a traveling mold, a member movable into and out of the mold, an inclined, movable block mounted on a support stationary with reference to the traveling mold, into engagement with which, the mold member moves, and an automatic mechanism for actuating said block.

15. The combination of a traveling mold carrier, a mold, a member movable into and out of the mold, means for temporarily supporting said member when it is moved into the mold, an inclined, movable block, into engagement with which said member is carried by the movement of the carrier, and means for moving said block.

16. The combination of a traveling mold carrier, a reciprocating locking rod therefor, a mold member movable relative to the other members of the mold, a movable block that engages said mold member and acts to lift said member by its movement, and connections between said block and said rod to actuate said block.

17. The combination of a traveling mold carrier, a reciprocating locking rod therefor, a mold member movable relative to the other members of the mold, a movable block that moves such member, connections between said block and said locking rod for actuating the block, fluid pressure operating mechanism, a valve controlling the supply of fluid for said mechanism, and connections between said valve and said locking rod.

18. The combination of a mold having a movable member, means for moving said member, a movable block for moving said member forming a supplementary moving means, spring actuated means for moving said movable block, and means for adjusting the tension of the spring.

19. The combination of a traveling mold carrier, a vertically movable mold member, movable relative to the other parts of the mold, means for lifting said mold member,

means for supporting it when lifted, supplemental lifting and supporting means, means for releasing said mold member to permit it to drop, and an air cushion for cushioning descent.

20. The combination of a traveling mold carrier, a spring actuated locking rod therefor, a pivoted locking device mounted on the rod and partaking of its movement as well as turning thereon, a part into engagement with which said pivoted locking device moves when it is carried by the rod when moved into unlocking position, and means upon the carrier to rock said locking device to release the rod.

In testimony that I claim the foregoing I have hereunto set my hand.

SAMUEL E. WINDER.

Witnesses:
N. B. OGDEN,
JAMES D. COX.