(No Model.) 2 Sheets—Sheet 1.

D. C. RIPLEY.

MACHINE FOR FORMING GLASSWARE.

No. 458,191. Patented Aug. 25, 1891.

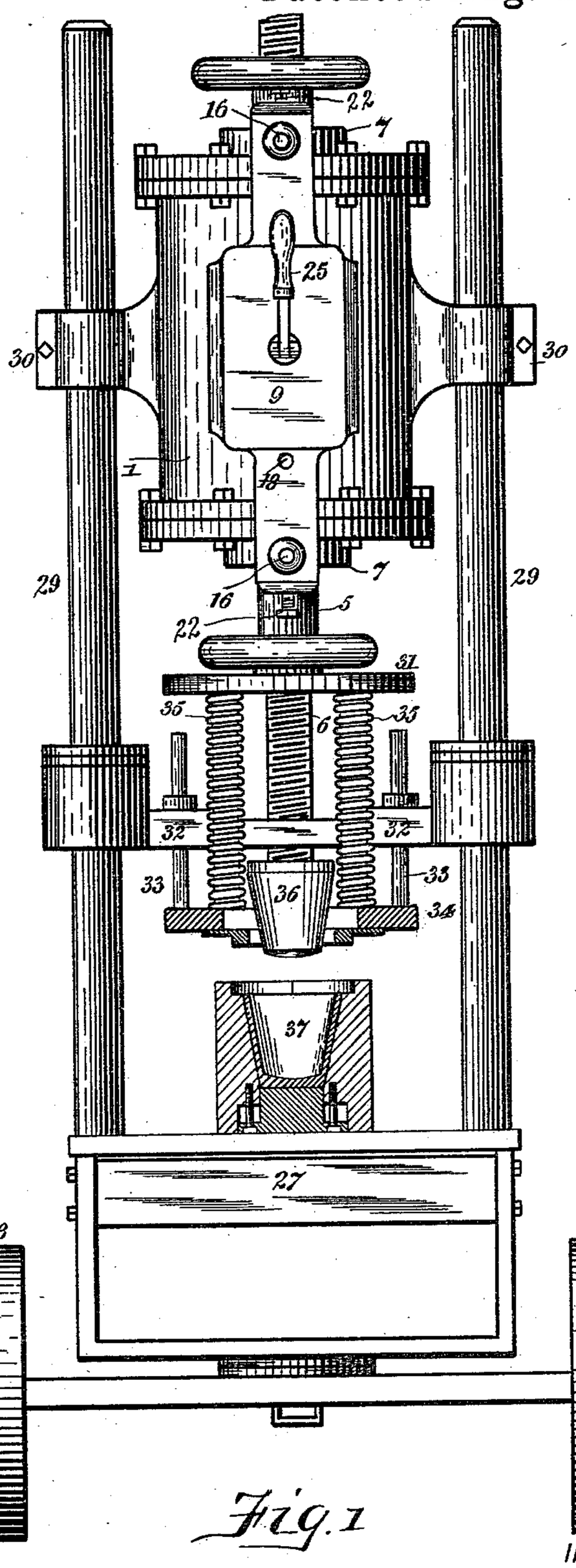

Fig. 1

WITNESSES:

H. L. Dyer.

Chas. H. Hooker.

INVENTOR

Daniel C. Ripley

BY Kerr & Curtis

ATTORNEYS.

(No Model.) 2 Sheets—Sheet 2.

D. C. RIPLEY.

MACHINE FOR FORMING GLASSWARE.

No. 458,191. Patented Aug. 25, 1891.

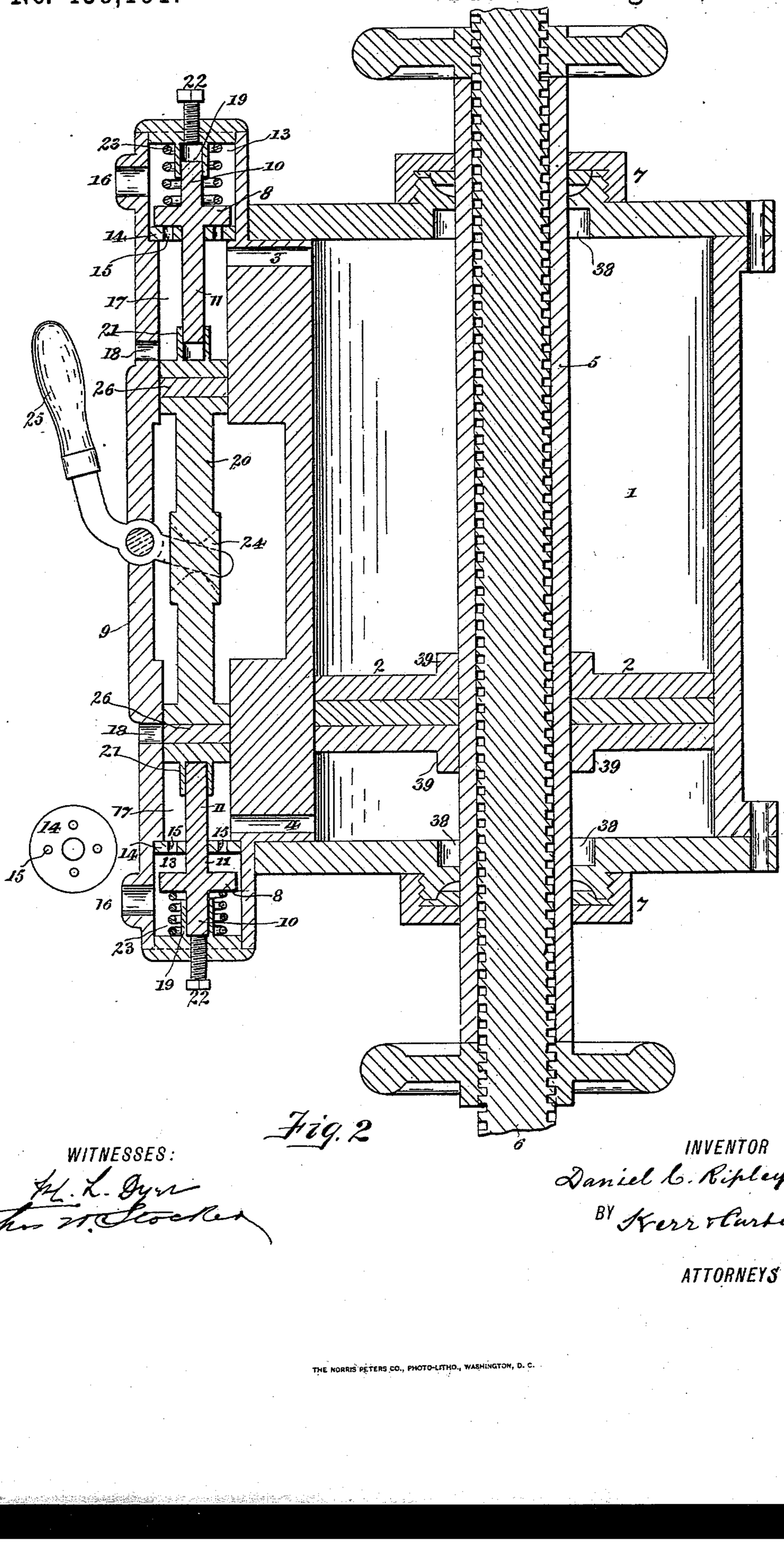

Fig. 2

WITNESSES:

H. L. Dyer

Thos. H. Stockett

INVENTOR

Daniel C. Ripley

BY Kerr & Curtis

ATTORNEYS

UNITED STATES PATENT OFFICE.

DANIEL C. RIPLEY, OF PITTSBURG, PENNSYLVANIA.

MACHINE FOR FORMING GLASSWARE.

SPECIFICATION forming part of Letters Patent No. 458,191, dated August 25, 1891.

Application filed January 13, 1891. Serial No. 377,610. (No model.)

To all whom it may concern:

Be it known that I, DANIEL C. RIPLEY, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Machines for Forming Glassware, of which the following is a specification.

In the manufacture of pressed glassware it is very important that the pressure should be accurately proportioned or adapted to the quantity of glass in the mold, over-pressure resulting in injury either to the mold or to the glass article. The quantity of glass deposited in the mold depends on the skill of the boy who gathers it from the furnace or pot and of the presser who cuts it off from the gathering-rod. These workmen attain a considerable degree of precision; but there is still a sufficient variation in the quantity thus deposited to require great skill on the part of the presser in the application of power of the plunger.

Attempts have been made to utilize air and steam for operating the press; but no adequate means of indicating the amount of power to be applied has ever been devised, and as a result such presses have never come into practical use. It is very desirable to substitute pneumatic pressure (either air or steam) for the ordinary manual pressure, because of the saving which can be effected in construction of presses and in labor, and of the increased output which can be secured thereby.

My invention therefore relates to the construction and operation of pneumatic glass-pressing machines, and its main object is to enable the power to be applied precisely in proportion to the amount of glass in the mold.

To enable others skilled in the art to make and use my invention, I will now describe it by reference to the accompanying drawings, in which—

Figure 1 is a front elevation of my improved pneumatic press; and Fig. 2 is an enlarged longitudinal section of the operating-cylinder, its piston, and valves.

Like figures of reference indicate like parts in each.

Referring first to Fig. 2, the numeral 1 indicates the air-cylinder, having a piston 2 and ports 3 4 at opposite ends. The piston 2 is mounted on a sleeve 5, which in turn is mounted on the spindle 6 of the press. The sleeve 5 works through stuffing-boxes 7 in the cylinder-heads.

The admission of the air to and its escape from the cylinder are governed by suitable valves 8, arranged in a valve case or box 9 at the side of the cylinder. There are two of these valves, one governing the upper port 3 and the other the lower port 4, and they are alike in construction and operation, except that they are reversed in position, so that, being operated by the movement of a common lever, one shall open when the other closes, and vice versa.

Referring now to the upper valve 8, it consists of a disk having a stem or piston which extends above and below it, as at 10 11. This valve is placed in a suitable chamber 13, in which it rests on a seat 14, having holes or perforations 15, through which the air passes from the valve-chamber on its way to the cylinder 1. The valve-chamber 13 has an opening 16 in its side, by which connection is made to an air pump, compressor, or reservoir, from which air is supplied at the required pressure. Beyond the valve-seat 14 is a chamber 17, from which the port 3 leads into the cylinder 1, and an exhaust-port 18 leads to the atmosphere. The stems 10 and 11 extend in opposite directions, one entering and moving in a guiding-sleeve 19 on the cap of the valve-chamber 13 and the other entering a guiding-sleeve 21 on the outer end of the sliding rod 20, by which the valve 8 is raised from its seat. A screw-stop 22, extending through the cap of the valve-chamber 13, enables the axial movement of the valve to be limited, as desired. A spiral spring 23, placed between the outer end of the valve-chamber 13 and the valve 8 and encircling the stem 10 and guide-sleeve 19, holds the valve to its seat, except when it is raised therefrom by the sliding rod 20. The valve devices just described are exactly duplicated at the other end of the valve-box 9 in connection with the cylinder-port 4.

The valves 8 are opened by the sliding rod 20, which occupies the middle part of the valve-box 9. It has a central slot (shown in broken lines at 24) flaring longitudinally on opposite sides, so that the ends of the slot are wedge-shaped or come to an apex in the mid-

dle. This rod is moved longitudinally by a lever 25, pivoted in the side of the box 9 and extending through the slot 24, so that when moved in either direction it shall bear upon the apex of one of the tapered ends of the same. The ends of the rod 20 are provided with pistons 26, working in the inner ends of the chamber 17 and suitably packed, so as to close the chambers tightly against the escape of the air when it is being supplied through the openings 16 to the cylinder 1, as shown in the lower end of the cylinder in Fig. 2. The pistons 26 control the exhaust-ports 18, and when the cylinder 1 is receiving air from either end the movement of the rod 20, which is necessary to open the valve at that end, also closes the exhaust-port 18 at that end and opens the exhaust-port 18 at the other end, as illustrated in the upper part of the cylinder in Fig. 2.

The movement of the rod 20 operates to open one of the valves 18 for the admission of air to the cylinder 1 by coming in contact with the end of the stem 11, and thereby forcing the valve 8 from its seat 14 against the spring 23. This opens the ports 15 in the valve-seat and permits the air to pass in through 13 and port 4 to the under side of the piston 2 and raise it. When the piston 2 reaches the top of the cylinder 1, the air-pressure may be left on it until the glass mold 37 is placed in position and the glass placed therein, or, if preferred, the rod 20 may be shifted slightly, so that the valves 8 shall both be closed and the pistons 26 shall close the exhaust-ports 18, trapping the air in the cylinder 1 and thereby sustaining the piston 2 in its raised position. Of course the air may be cut off in like manner when the piston is in its lower position. The mold being in place with the plastic glass therein, the lever 25 is moved so as to open the upper valve 8 and the lower exhaust-port 18 and close the lower valve 8. The air then passes into the cylinder 1 above the piston 2 and forces it downward, causing the plunger 36 to descend into the mold 37 and press the glass therein into shape. The amount of power exerted on the piston 2 is small as it moves freely downward; but when the plunger encounters the glass in the mold it increases rapidly as long as the valve 8 is open. The increase of pressure in the chamber 17 is the same per square inch as that exerted in the cylinder 1, and as it reacts through the medium of the piston 26 on the lever 25, which the operator is holding in his hand, he knows by his sense of touch exactly what pressure is being exerted on the piston and by the increase of that pressure what resistance the plunger is encountering in the mold. When the increase of pressure indicates that the article has been fully formed, he reverses the lever and raises the plunger.

Practical experience has demonstrated the fact that the pressure on the valve-lever in my improved press is as unerring in its indication to the operator of the amount of glass in the mold and the degree of pressure requisite to be applied thereto as the like resistance in an ordinary lever hand-press. The elastic character of the compressed air and the small size and easy movement of the lever 25 make this press much more sensitive, precise, and flexible in its operation than any hand-press heretofore made, because in the manipulation of the latter the pressman had to move enormous weights, requiring the exertion of great strength, assisted by the weight of his body at each motion of the plunger, and in addition to this there were many joints in a hand-press which were constantly liable to get out of order by reason of wear and tear, none of which are present in my improved machine. The amount of physical labor required is limited to the movement of the small lever 25, and the function of the pressman is limited to the exercise of his intelligence in determining the amount of pressure to put upon the mold.

Referring now to Fig. 1, the position of the cylinder 1 and its connection with the press are clearly shown. The press consists of a bed-plate or table 27, mounted on wheels 28 and having two uprights 29, between which the cylinder 1 is placed, being mounted thereon by means of clamping jaws or brackets 30. Mounted on the spindle 6 is a disk or plate 31, and supported on the cross head or bar 32, between the uprights 29, by adjustable rods 33 is the spring-plate 34 of the mold. Four spiral springs 35 are secured on guide-rods between the plates 31 and 34 in ordinary way. The lower plate 34 has a central opening for the passage of the plunger 36. The mold 37 stands on the bed-plate 27, directly under the plunger, and the spring-plate 34 descends upon and holds it, as in the ordinary press. Indeed, the press just described is the same in all essential particulars of construction and operation as the ordinary hand-press, except in so far as it is changed by the substitution of pneumatic-power appliances for the old arrangement of levers and counter-weights for operating the plunger by manual labor.

The operation of my improved press will be understood from the foregoing description. To raise the plunger preparatory to a stroke, the lever 25 is raised. This depresses the valve-rod 20, thereby opening the lower valve 8 by the pressure of the rod on the stem 11. The air then passes from the compressor or reservoir through the opening 16, chamber 13, openings 15, and port 4 into the cylinder 1, where it exerts its pressure upon the under side of the piston 2, raising it in the cylinder, and thereby raising the plunger. The movement of the valve-rod 20, by which the lower valve 8 is opened, causes the lower piston 26 to close the lower exhaust-port 18 and the upper piston 26 to open the upper exhaust-port 18, so that as the piston 2 rises in the cylinder a free passage through port 3, chamber

17, and exhaust 18 is established for the escape of the air in the cylinder above the piston 2. The movement of the valve-rod 20 also releases the upper valve 8 and permits the spring 23 to force it to its seat, thereby preventing the entrance of air at the upper inlet-port 16. When the plunger has reached its proper height, the lever 25 is pulled down, moving the valve-rod 20 so as to admit air to the upper end of the cylinder and open the exhaust-passage at the lower end, whereby the operation just described is repeated in the reverse direction to give the downward stroke to the plunger. The operator retains hold of the lever 25 during the movement of the plunger, so as to be able to apply with precision exactly the amount of pressure required at each stroke, being able to increase or decrease that amount by a greater or less movement of the lever, such movement being attended with a corresponding admission of air-pressure to the operative cylinder. With a cylinder of a given size the plunger has a certain definite length of stroke; but it is very advantageous and desirable to be able to deliver that stroke at various points, so as to adapt the press for use with molds of different heights. I accomplish this by making the spindle adjustable by means of the screw sleeve or bushing 5, so that its length below the cylinder can be varied to suit the height of the mold. Thus for use with a high mold the spindle can be shortened and for use with a low mold it can be lengthened by screwing it up or down through the sleeve 5, as the case may be. The sleeve 5 extends through and some distance beyond both heads of the cylinder 1 for the purpose of securing a smooth bearing-surface for the packing in the stuffing-boxes 7, in order that the cylinder may be properly packed to prevent the escape of air from the cylinder-heads during the movements of the spindle. Moreover, by the use of the sleeve or bushing extending entirely through the cylinder and beyond its ends I secure a guide and support at both ends, a longer and stiffer bearing for the spindle, a steadier stroke, and better and more lasting wearing-surfaces, and am enabled to use a threaded spindle in a pneumatic cylinder, thereby securing the ability to adjust it for use with molds of different heights and to have the adjusting-nuts on its opposite ends outside of the cylinder to secure the sleeve in its adjusted position in an evenly-balanced manner.

It is desirable to guard against the danger of the piston 2 striking and injuring the cylinder-heads in case the full pressure of the air should be accidentally admitted to it when retracting the piston or when the mold is not in place. I accomplish this by forming an annular or other suitably shaped recess 38, Fig. 2, on the inner face of the cylinder-head and a similarly-shaped projection 39 of slightly smaller diameter on the corresponding face of the piston. Then if the piston should be suddenly forced toward the cylinder-head the projection 39 would imprison a body of air in the recess 38, thereby forming an air-cushion, which would prevent it striking the head, and would then escape slowly around the edges of the projection. It is apparent that the positions of the recess 38 and projection 39 could be reversed.

I have illustrated my invention with the use of a tumbler-mold of ordinary construction; but I do not limit myself to any particular form of mold, nor indeed to any particular form of press, as these things form no part of my invention, nor do I limit myself to the use of compressed air, as steam may also be used as the medium for applying pressure to the spindle; nor do I limit myself to immaterial details of construction and arrangement of the valves and ports for admitting air to the cylinder so long as such construction and arrangement embodies the principle of my invention, which consists in the use of a hand-operative valve mechanism on which the same pressure per square inch as is exerted upon the piston or spindle of the press is exerted in such a way as to be communicated to the hand of the operator and its degree be indicated to him by his sense of touch. The use of the conical points or edges on which the lever 25 bears against the valve-rod 20 is of advantage, because it reduces friction and causes the pressure to be exerted against the lever in a very sensitive manner.

What I claim as my invention is—

1. The combination of the plunger or spindle of a machine for forming glassware with a pneumatic cylinder and piston, and a hand-operated valve-controlling mechanism, whereby the same pressure which operates the piston is exerted upon the valve-controlling mechanism and against the handle of the same and the degree of such pressure is indicated to the operator through the handle, substantially as and for the purposes described.

2. The combination, in a machine for forming glassware, of a pneumatic cylinder and piston for operating the plunger or spindle, with air-ports at both ends of the cylinder, valves for controlling the admission of the air to said ports, and a sliding valve-rod for operating said valves working against the pneumatic pressure by which the piston is operated, so that the pressure admitted to the cylinder is also admitted to and operates against the end of the valve-rod, substantially as and for the purposes described.

3. The valve-controlling mechanism of a pneumatic cylinder, consisting of a sliding valve-rod operating as a piston in a chamber, to which the air-pressure is admitted on its way to the cylinder and which communicates freely with the cylinder, and is also provided with an exhaust-opening and a lever whereby the said valve-rod can be moved to open the

valve to admit pressure to the cylinder and close the exhaust-opening, substantially as and for the purposes described.

4. In combination with a pneumatic cylinder, a valve arranged in the air-passage to control the admission of air to the cylinder, and a valve-rod operated by a lever to open the valve by pressing axially against the valve-stem, so as to raise it off of its seat, substantially as and for the purposes described.

5. The sliding valve-rod 20, having a slotted opening 24, with pointed or cone-shaped bearing-surfaces, in combination with a hand-lever 25 for operating the said valve-rod bearing against the said conical surfaces, substantially as and for the purposes described.

6. The combination of the lever-operated valve-rod 20, having piston ends 26, with the chambers 17, valves 8, valve-stems 11, ports 3 4, and exhaust-ports 18, substantially as and for the purposes described.

7. The combination of the sliding valve-rod 20, having a piston end 26, the guide 21, stem 11, valve 8, valve-seat 14, and spring 23, substantially as and for the purposes described.

8. The combination of the valve 8, valve-chamber 13, guide 19, stem 10, and stop 22, substantially as and for the purposes described.

9. The combination of a pneumatic cylinder and piston with the spindle of a machine for forming glassware operated by said piston, a recess in the cylinder-head, and a corresponding projection on the face of the piston of slightly less diameter than the recess, substantially as and for the purposes described.

10. The combination, in a machine for forming glassware, of a spindle, a pneumatic cylinder and piston for operating the spindle, and a screw sleeve or bushing incasing the spindle and extending entirely through and beyond the heads of the cylinder, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 8th day of January, 1891.

DANIEL C. RIPLEY.

Witnesses:
L. B. D. REESE,
THOMAS B. KERR.