No. 708,469. Patented Sept. 2, 1902.

P. EBELING.

STROKE REGULATING MECHANISM FOR GLASS PRESSES, &c.

(Application filed Dec. 30, 1901.)

(No Model.) 2 Sheets—Sheet 1.

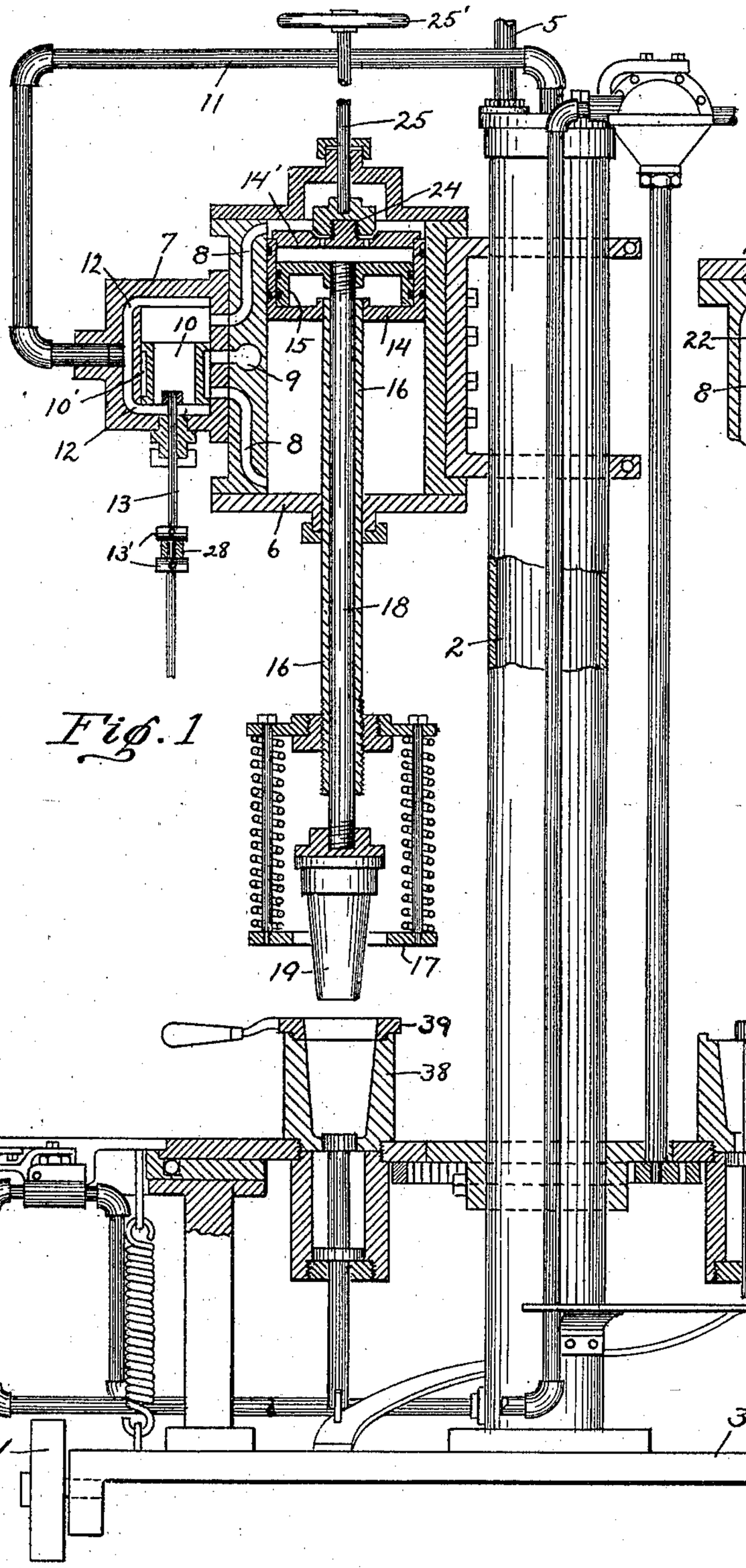

Fig. 1

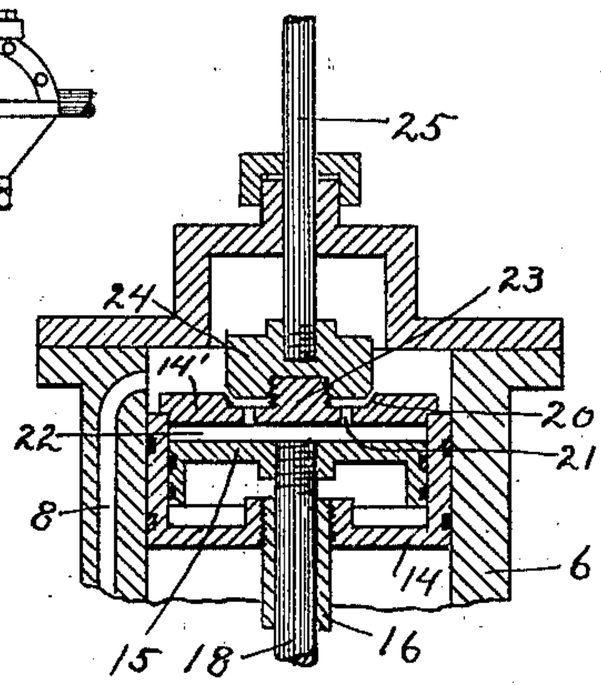

Fig. 2

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Fig. 3

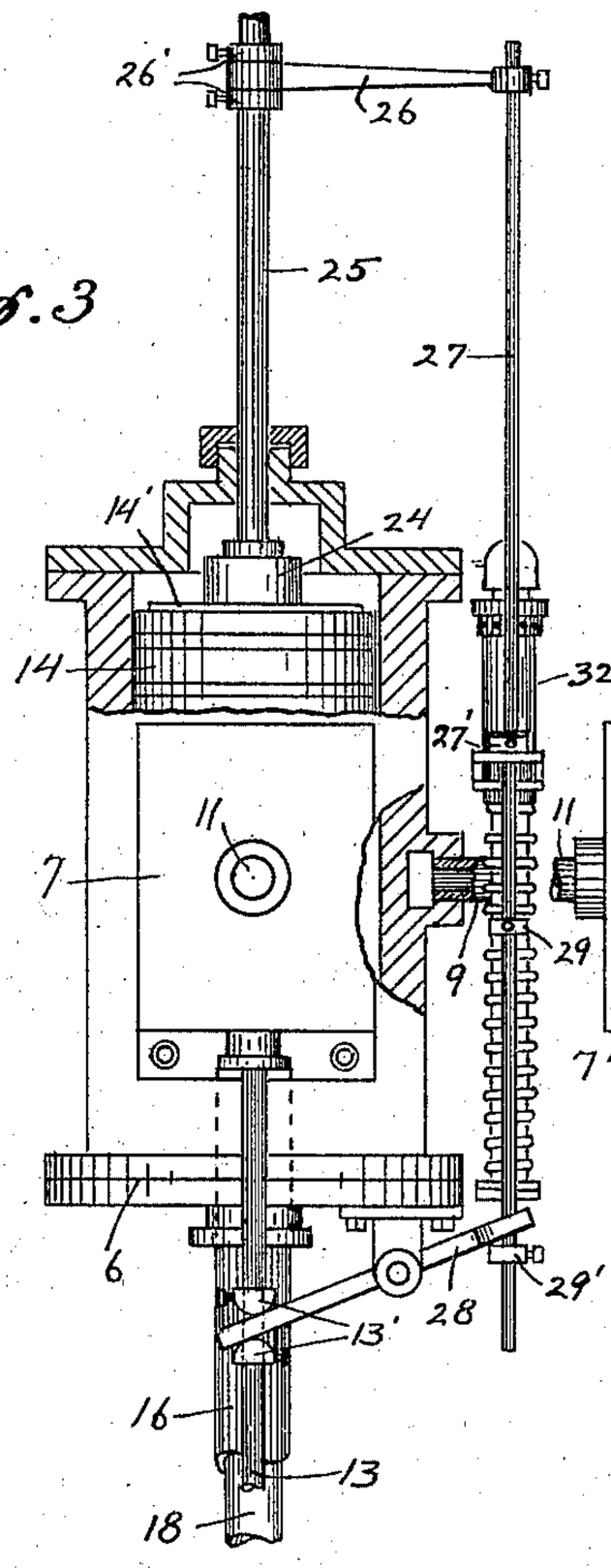


Fig. 4

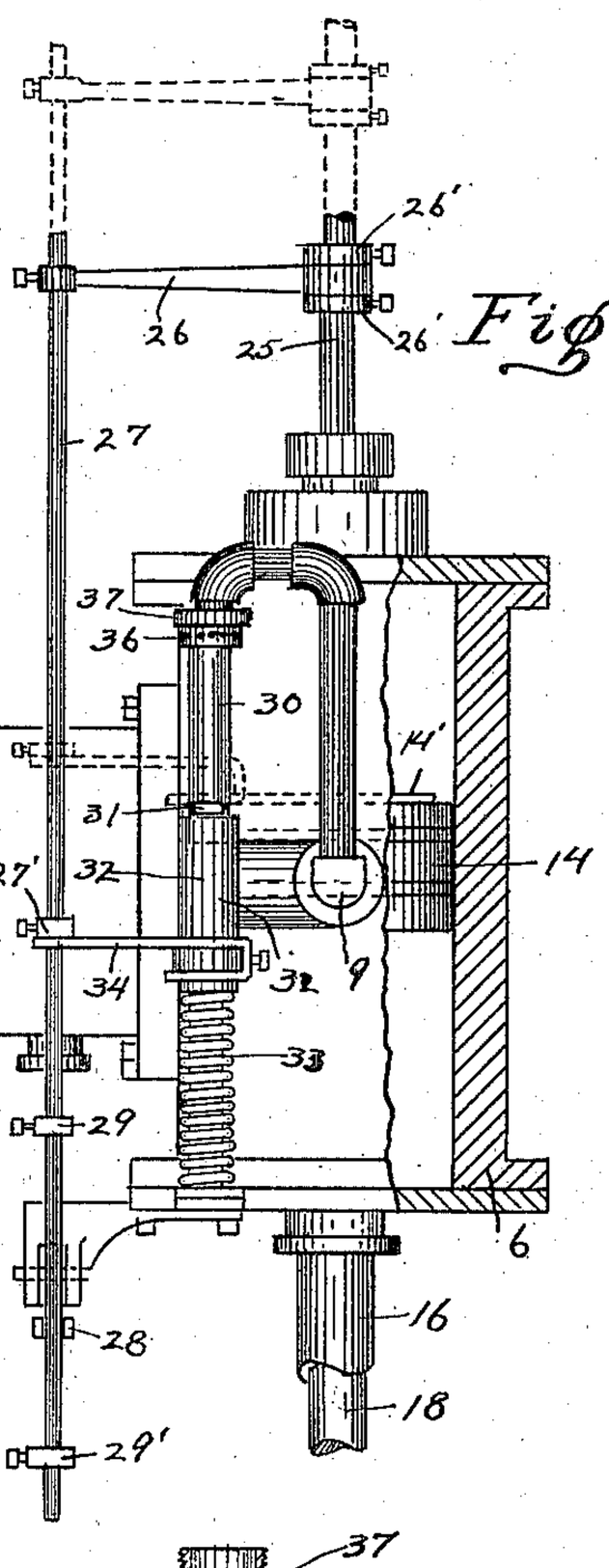


Fig. 5

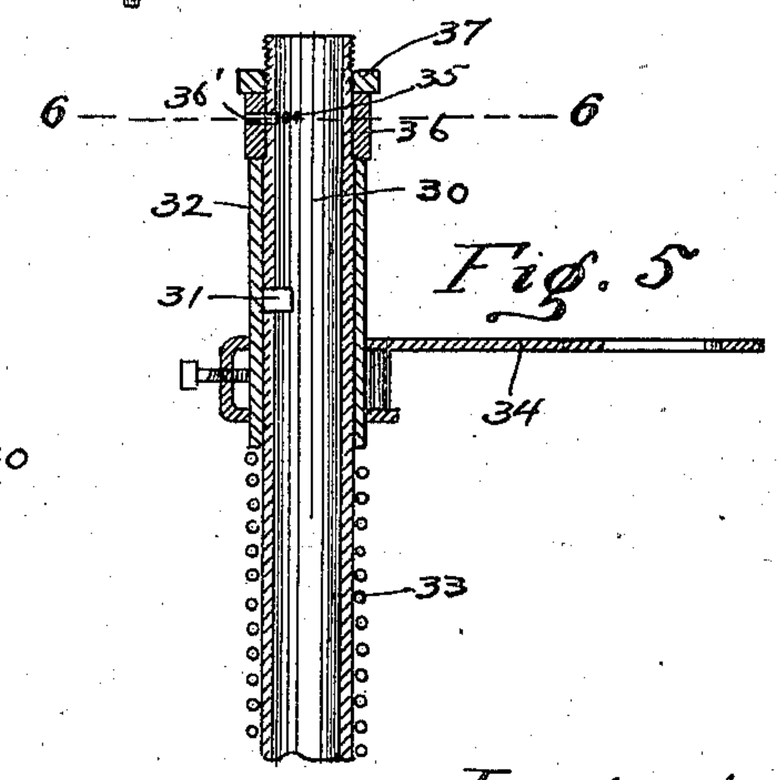
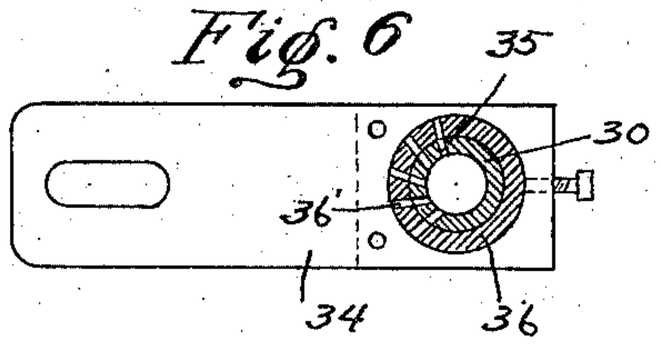


Fig. 6



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UNITED STATES PATENT OFFICE.

PHILLIP EBELING, OF MOUNDSVILLE, WEST VIRGINIA, ASSIGNOR OF ONE-HALF TO GEORGE LAFAYETTE CALDWELL, OF WELLSBURG, WEST VIRGINIA.

STROKE-REGULATING MECHANISM FOR GLASS-PRESSES, &c.

SPECIFICATION forming part of Letters Patent No. 708,469, dated September 2, 1902.

Original application filed August 27, 1901, Serial No. 73,456. Divided and this application filed December 30, 1901. Serial No. 87,650. (No model.)

To all whom it may concern:

Be it known that I, PHILLIP EBELING, a citizen of the United States, residing at Moundsville, in the county of Marshall and State of West Virginia, have invented certain new and useful Improvements in Stroke-Regulating Mechanism for Glass-Presses, &c., of which the following is a specification, reference being had therein to the accompanying drawings.

This invention pertains to power mechanism for presses, &c., and is a division of my application filed August 27, 1901, Serial No. 73,456, relating to glass-presses.

In Letters Patent No. 668,910, granted to me February 26, 1901, I show and describe apparatus for shaping glassware wherein the pressing-plunger is capable of a yielding or compensating movement for the purpose of avoiding excessive pressure when too much glass has been placed in the mold. This compensation is obtained through the medium of a coiled spring. While advantageous results have been secured from this mechanism, the same is open to the objection that the resistance of the spring varies with its compression, the resistance increasing as the spring contracts. It is highly desirable that the resistance of the compensating mechanism should be unvarying. Hence it becomes the primary object of the present invention to provide a compensating device of uniform resistance.

A further object of the invention is to utilize the compressed air, steam, or other press-actuating fluid in effecting the desired uniform resistance of the compensating mechanism and to adjustably control the action of the fluid in such manner as to either increase or diminish the resistance, determined by the exigencies of the work.

A further object is to provide improved mechanism for controlling the exhaust of the actuating fluid, whereby a gradual downward movement of the plunger may be effected during the first part of its pressing stroke, thereby preventing injury to the mechanism and to the glass.

In the accompanying drawings, Figure 1 is a view, partly in elevation and partly in section, of my improved mechanism applied to a glass-press. Fig. 2 is a vertical sectional view of the upper portion of the power-cylinder and pistons. Figs. 3 and 4 are elevations of the power-cylinder and exhaust mechanism, taken from different sides thereof and shown partly in section. Fig. 5 is a vertical sectional view of the upper portion of the improved exhaust mechanism. Fig. 6 is a sectional plan view taken on line 6 6 of Fig. 5.

Referring to the drawings, 2 represents a cylindrical column mounted on base 3, the latter being provided with floor-wheels 4, whereby the apparatus may be conveniently moved from place to place. In the present embodiment of the invention I propose to use compressed air as a motive fluid and to utilize column 2 as a reservoir therefor, the same being supplied through pipe 5 from a compressor. (Not shown.)

Secured to the upper portion of column 2 is the power-cylinder 6, provided with valve-casing 7. Ports 8, leading from opposite ends thereof, are connected alternately with the exhaust 9 by cylinder slide-valve 10, having its periphery recessed at 10′ to afford such connection. Air is passed from column 2 to the valve-casing through pipe 11, and said casing is formed with the oppositely-extending ports 12 for passing the air to opposite ends of valve 10, and the interior of the latter is also open for the free passage therethrough of air, so that the latter always has free and unobstructed passage to the uncovered port 8. Stem 13 projects from the valve and is actuated in manner presently to be explained.

Within cylinder 6 is the main piston 14, which is downwardly recessed from its upper end to receive the auxiliary piston 15, which has limited movement therein. Depending from piston 14 is tubular stem 16, which carries the adjustable spring-plate 17 and incloses rod 18, secured at its upper end to auxiliary piston 15 and at its lower end carrying pressing-plunger 19.

Piston-head 14′ is formed with a ground-

seat 20, having small ports 21 formed therein, communicating with space 22 over piston 15. A threaded nib 23 projects centrally from seat 20, and vertically adjustable thereon is valve 24, secured to the lower end of stem 25, the latter being provided at its upper end with operating-wheel 25′.

By this means admission of air to space 22 is controlled. Carried by stem 25 is laterally-extending arm 26, and adjustably secured thereto is rod 27, which extends downward through one end of lever 28, here shown fulcrumed between its ends to the under side of cylinder 6. The opposite end of this lever is adjustably secured to valve-stem 13 by stops 13′. Secured on rod 27 are stops 29 and 29′. It will be understood that stem 25 travels with the main piston 14, so that rod 27 is moved vertically in unison with the piston, and as the latter approaches the downward limit of its stroke stop 29 engages and turns lever 28 in such manner as to reverse valve 10, and a similar operation occurs, only that the valve is moved in a reverse direction, as stop 29′ engages lever 28 as the piston approaches the upward limit of its stroke. Arm 26 is secured to stem 25 by adjustable stops 26′, the stem being adapted to turn in the arm for adjusting valve 24.

In the operation of pressing if it is desired that plunger 19 shall exert a maximum degree of pressure valve 24 is opened quite wide to permit free ingress of air into space 22 above piston 15. Thus the inner or auxiliary piston will be subjected to the same air-pressure as the main piston and at approximately the same time; but even in this adjustment the total pressure upon piston 15 will be less than that upon piston 14, owing to the difference in areas. Thus it will be seen that even with valve 24 open the pressing-plunger will have a yielding movement in the main actuating-piston and that in consequence thereof the plunger will have an upwardly-yielding pressing stroke. If, on the other hand, it is desired to still further reduce the resistance of the pressing-plunger, valve 24 is adjusted toward its seat, thereby correspondingly contracting the air-passage to space 22, causing the pressure of air therein to rise only gradually, and the adjustment may be such that before the pressure in said space approaches the maximum or working pressure the pistons have completed the pressing stroke, with the piston 15 and the plunger carried thereby subjected to only a fraction of the working pressure. With the working pressure maintained, say, at one hundred pounds valve 24 may be so adjusted as to cause piston 15 to exert the same resistance in succeeding operations, with the degree of resistance determined by the requirements of the work in hand. Thus under a given adjustment of valve 24 the pressing-plunger will always be subjected to the same pressure, with the total length of stroke in each operation of the machine determined by the quantity of glass in the mold 38. If the right amount has been placed therein, a full or maximum stroke will be had, whereas if there is an excess of glass the pressing-plunger will stop somewhat short of its maximum stroke. In all cases and regardless of the amount of glass the main piston 14 will make a full or maximum stroke, the difference therebetween and the stroke of piston 15 being compensated for by the downward movement of the main piston over piston 15. With the pressing-plunger automatically adjustable, as described, and under less pressure than the mold-holding spring-plate it will be understood that there is no tendency to crowd the glass from the mold or to cause the mold-sections to spring apart, as when pressing in a sectional mold. The downward or pressing stroke is effected so quickly by the impact of the motive fluid against cylinder-head 14′ that under ordinary working conditions the pressure in space 22 on piston 15, determined by the position of valve 24, does not vary during said stroke. If, however, it is desired to create an ascending or increasing pressure on piston 15 during the pressing stroke, and thereby effect a more gradual flow of the glass in the mold, the same may be accomplished by retarding the exhaust from beneath piston 14 in manner presently to be explained, thus causing piston 14 to descend more slowly and affording time for a perceptible increase of pressure on piston 15. Under such conditions valve 24 would be opened very little, so that at the beginning the pressure on piston 15 would be comparatively low.

It is desirable that the downward stroke of the main piston should be checked until spring-plate 17 reaches the mold-ring 39 to prevent concussion and injury to the mechanism incident to a sudden and powerful downward stroke. To accomplish this, I connect cylinder-exhaust 9 with a vertically-disposed pipe 30, formed intermediate its ends with the main exhaust-port 31. Closely fitting pipe 30 and vertically movable thereon is sleeve 32, held normally raised and covering port 31 by spiral spring 33. Adjustable on sleeve 32 is arm 34, which projects in the path of the vertically-moving rod 27 and is engaged and depressed by stop 27′ on the latter. The arrangement is such that port 31 is uncovered during the downward stroke at about the time spring-plate 17 reaches the mold, thus removing all resistance from the under side of piston 14 and permitting it to respond to the full force of the working pressure. A partial exhaust is of course necessary for the preliminary portion of the downward stroke, and this is had through the small ports 35 in the upper portion of pipe 30. Arranged on said pipe in the plane of ports 35 is ring 36, secured by nut 37 and formed with openings 36′, adapted to register with ports 35, so that by turning the ring a greater or less number of said ports may be

opened and the preliminary exhaust thereby increased or diminished, thus determining the speed of the pressing stroke of the plunger, as above explained.

While here shown and described in connection with glass-pressing mechanism, it will be understood that the invention may be employed in other relations or wherever a compensating or yielding stroke is required. In such other uses the plunger may, when necessary, be displaced by devices of such form as will give effect to the force transmitted, and the term "plunger" wherever appearing in the specification and claims is to be read and construed with this understanding. If desired, steam or other motive fluid may be substituted for compressed air.

The structural arrangement and operation of the mold-carrier and carrier-actuating mechanism form no part of the present invention, being fully described and claimed in the parent application.

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

1. The combination of reciprocating mechanism having a piston-chamber and means for actuating said mechanism, a piston carried by the reciprocating mechanism and movable in the chamber thereof, means for supplying fluid under pressure to the piston-chamber for actuating said piston, and a plunger connected to the piston.

2. The combination of a cylinder, a recessed piston therein and open thereto, an auxiliary piston having limited movement in the recessed piston, and a plunger connected to the auxiliary piston.

3. The combination of a cylinder, a hollow main piston therein having valved communication therewith, an auxiliary piston having limited movement in the main piston, and a plunger connected to the auxiliary piston.

4. The combination of a cylinder, a hollow main piston having a port communicating with the cylinder, a valve for said port, valve-actuating means movable with the piston and projecting from the cylinder, an auxiliary piston movable in and with the main piston, and a plunger connected to the auxiliary piston.

5. The combination of a cylinder, a hollow main piston therein having a valve-seat in its exterior communicating with the piston-cavity, a valve adjustable toward and from the seat, a stem projecting from the valve through the cylinder, an auxiliary piston movable in and with the main piston, and a plunger connected with the auxiliary piston.

6. The combination of a plunger, power-cylinder, a piston operating therein to reciprocate the plunger, and means for checking the exhaust from the inactive side of the piston during the first portion of the pressing stroke and accelerating the same during the latter portion of the stroke.

7. The combination of a plunger, a power-cylinder, a piston operating therein to reciprocate the plunger, a valved main exhaust for the cylinder and a contracted permanently open exhaust therefor, and means operating before the completion of the stroke to open the main exhaust.

8. The combination of a plunger, a power-cylinder, a piston operating therein to reciprocate the plunger, a pipe extending from the cylinder-exhaust formed with a port, a spring-closed valve slidable on the pipe, and an operative connection between the piston and said valve.

9. The combination of exhaust-pipe 30 having a valve-controlled main exhaust 31 and auxiliary contracted openings 35, and rotatable ring 36 covering openings 35 and formed with openings 36′ adapted to register therewith.

In testimony whereof I affix my signature in presence of two witnesses.

PHILLIP EBELING.

Witnesses:
J. M. NESBIT,
ALEX. S. MABON.