J. HUTCHINSON.

FLUID PRESSURE CONTROL OF TRANSOMS AND WINDOWS.

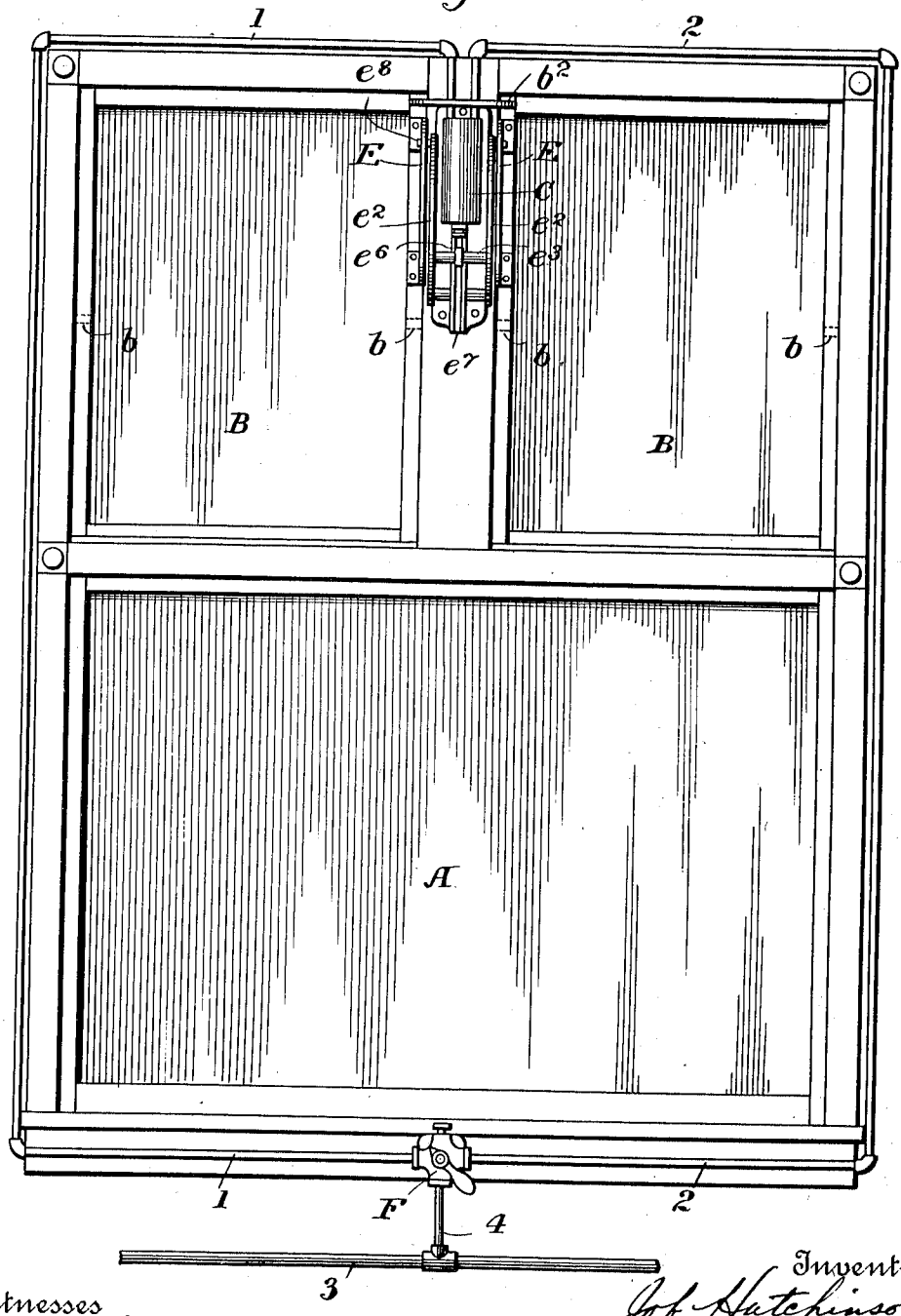
APPLICATION FILED JULY 17, 1907. RENEWED NOV. 21, 1912.

1,054,417.

Patented Feb. 25, 1913.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 3.

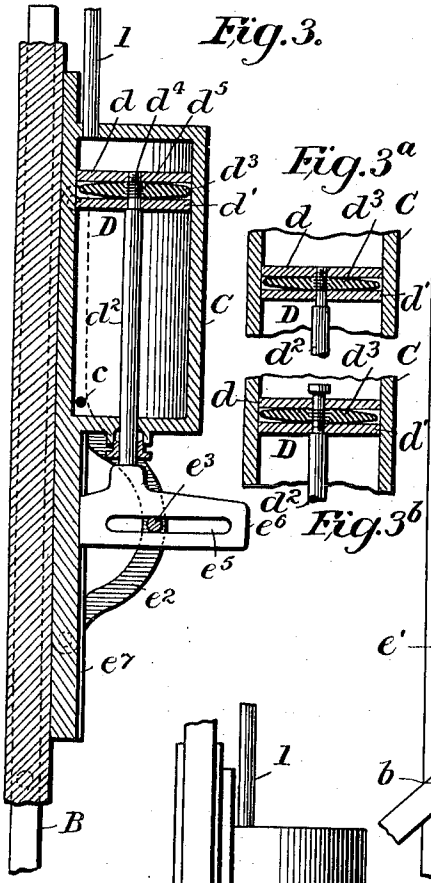


Fig. 3ª

Fig. 3ᵇ

Fig. 2.

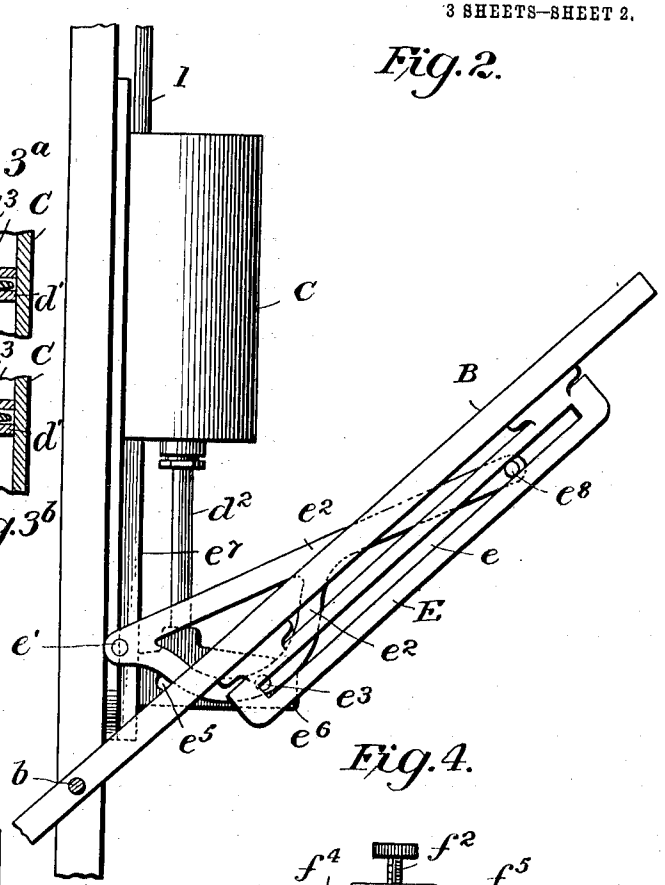
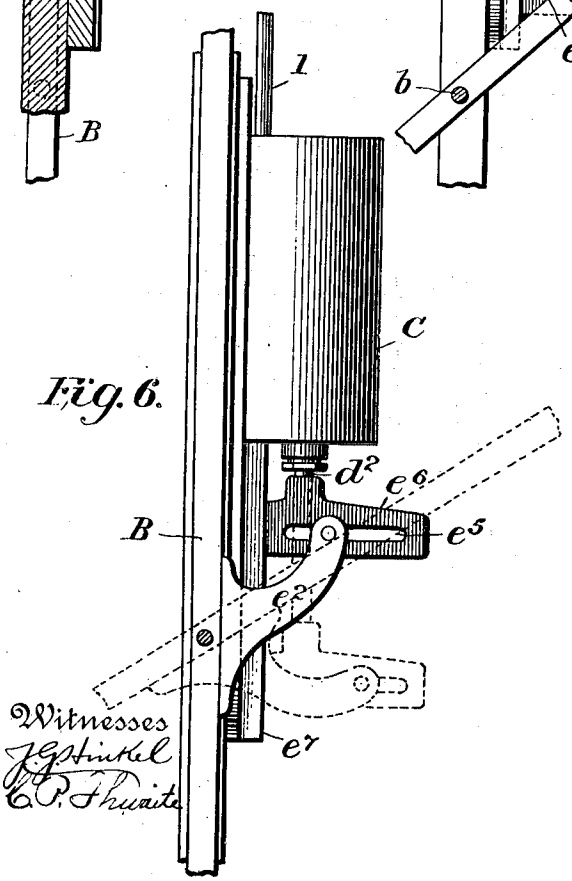


Fig. 4.

Fig. 6.



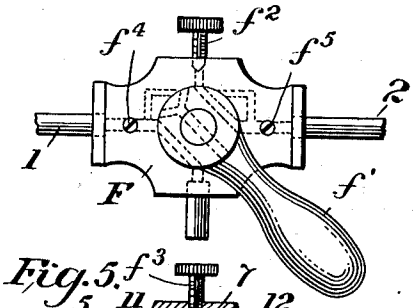
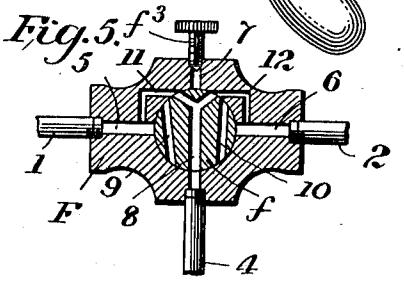


Fig. 5.



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3 SHEETS—SHEET 3.

Fig. 7.

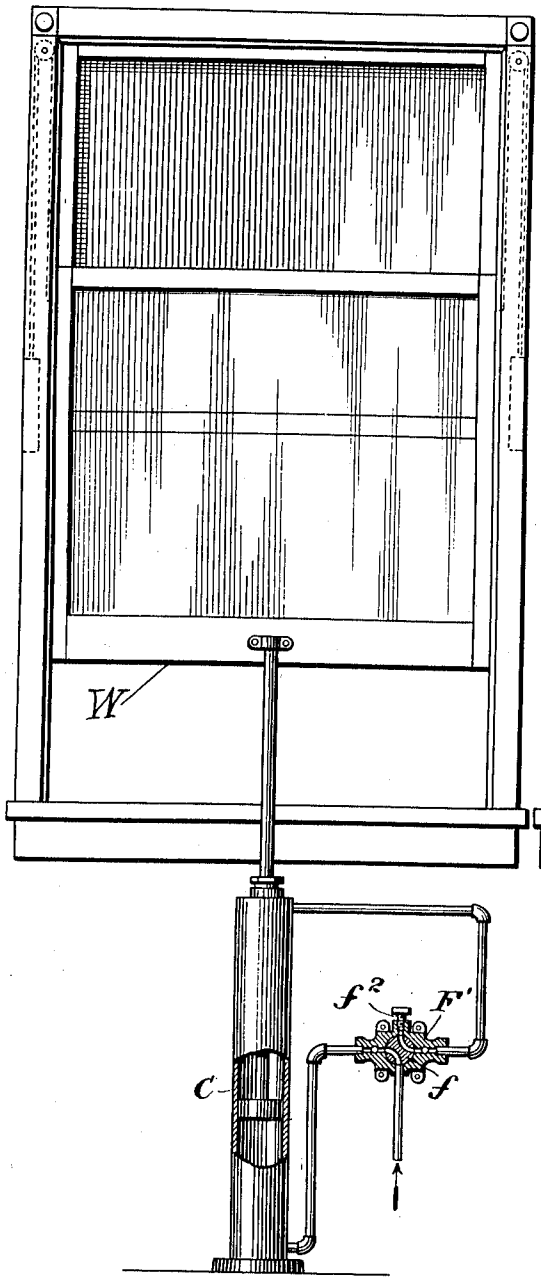
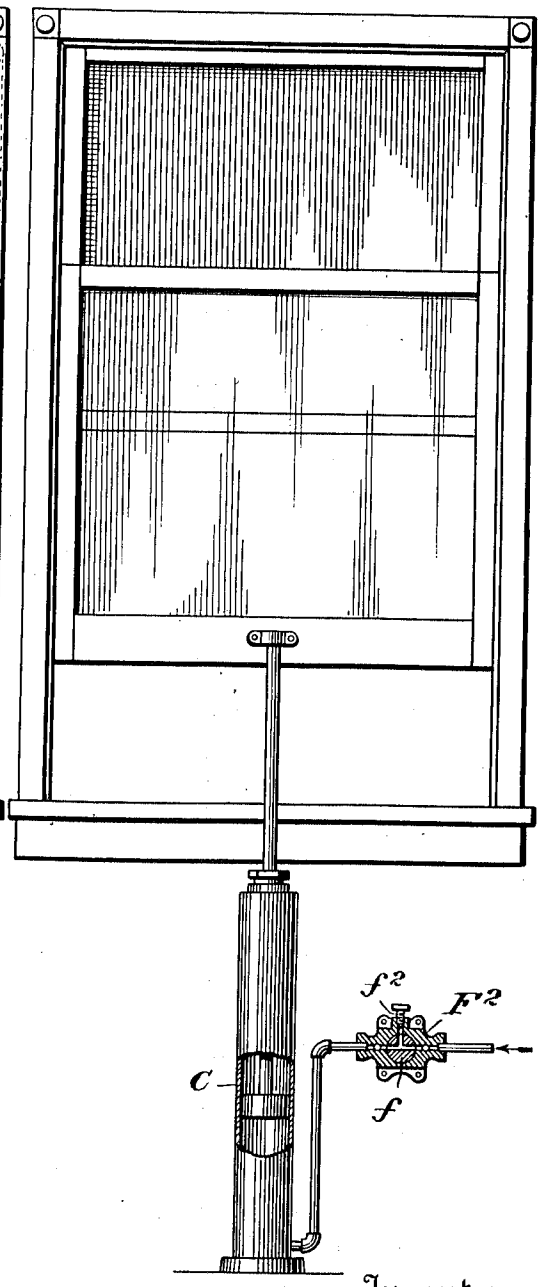


Fig. 8.



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UNITED STATES PATENT OFFICE.

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FLUID-PRESSURE CONTROL OF TRANSOMS AND WINDOWS.

1,054,417. Specification of Letters Patent. **Patented Feb. 25, 1913.**

Application filed July 17, 1907, Serial No. 384,232. Renewed November 21, 1912. Serial No. 732,798.

To all whom it may concern:

Be it known that I, JOB HUTCHINSON, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Fluid-Pressure Control of Transoms and Windows, of which the following is a specification.

My invention relates to the fluid pressure control of transoms and windows, and especially to the control of the heavy transoms of large windows, and the large heavy windows themselves, of hotels and office buildings.

One of the objects of the invention is to provide a system in which the transom or window is operated by compressed air acting upon a piston and controlled by a valve in such a manner that the rapidity of opening may be regulated with certainty and slamming in closing will be absolutely prevented.

Another object is to provide an improved piston construction by which the transom or window is securely held in any desired position when pressure is admitted to both sides thereof simultaneously.

Another object is to provide an improved connection between the operating piston and a transom.

Another object is to provide an improved controlling valve by which pressure may be admitted to either side of the operating piston and exhausted from the other, and by which pressure may be admitted to both sides of the piston simultaneously.

Another object is to provide an adjustment for the exhaust from the operating cylinder to prevent slamming of the transom or window.

Another object is to provide a system in which a number of transoms or windows, such as all upon a floor of the building, may be controlled by means of a master valve conveniently situated, as in the corridor, so that they may be closed or opened in case of storm without entering the rooms.

With these and other objects in view, the invention consists in the novel arrangement of parts and improved details of construction hereinafter described, and illustrated in the accompanying drawings; in which drawings—

Figure 1 is a view in front elevation showing the double transom of a large window equipped in accordance with my invention; Fig. 2 is a side elevation on a larger scale showing the operating cylinder and the connection between its piston rod and the transom; Fig. 3 is a vertical section through the operating cylinder showing the construction of the piston; Fig. 3^a is a detail showing the piston when pressure is exerted simultaneously on both sides thereof; Fig. 3^b is a similar view of a slight modification; Fig. 4 is a top plan view of the controlling valve, the movable element being shown in an extreme position and the ports being shown in dotted lines; Fig. 5 is a central section of the same valve, the movable element being shown in its intermediate position; Fig. 6 is a view similar to Fig. 2 showing a modified form of connection between the operating piston rod and the transom; Fig. 7 is a view in elevation showing some features of my improvements applied to raise and lower a counter-weighted window-sash; and Fig. 8 is a similar view of the same applied to an uncounter-weighted window.

Referring to the drawings, A represents a window frame, and B a transom of which two constituting a pair are shown in Fig. 1. Transoms B are pivoted at b, and mounted on the fixed frame between them is the operating cylinder C containing piston D. Piston D is preferably of special construction, and consists of two plates d, d' mounted upon the reduced end of piston rod d^2 with a compressible pad d^3 preferably of soft rubber between them. As shown in Figs. 3 and 3^a, plate d is fixed upon the end d^4 of the piston rod in any suitable manner, as by being threaded thereto, and plate d' is movable, being pressed against a shoulder on the piston-rod by coiled spring d^5. The periphery of compressible pad d^3 normally just clears the cylinder walls, but when pressure is admitted to both sides of the piston the pad d^3 is compressed to grip the cylinder walls and also act as a packing. If desired, plate d' may be secured to piston rod d^2, and plate d movable, as shown in Fig. 3^b.

The form of connection between piston rod d^2 and the transoms shown in Figs. 1, 2 and 3 comprises a member E oppositely mounted upon the frame of each transom in proximity to the hinge or pivot b, and

formed with a longitudinal slot e. Pivoted at e' upon the fixed frame adjacent each transom is an arm e^2, these arms being connected by bar e^3 extending between offset portions thereof. Each arm e^2 carries at its outer end a pin e^8 engaging slot e of member E. Bar e^3 works in slot e^5 of end block e^6 mounted upon piston rod d^2, this end block sliding in a groove e^7 upon the fixed frame. Besides being connected by bar e^3 of arms e^2, the transoms are connected at their upper ends by a strip b^2 which causes them to move together.

In some instances I may omit slotted members E, and form arms e^2 as shown in Fig. 6.

Operating cylinder C is connected with a source of pneumatic pressure by pipes 1 and 2, pipe 1 communicating with the upper end of the cylinder above the piston D, and pipe 2 communicating with the lower end of the cylinder by port c below the piston. These pipes 1 and 2 are connected with a general supply pipe 3 which may extend throughout the building or one of the floors thereof and supply pressure to any desired number of transoms or window operating devices. The connection with this supply pipe 3 is made from an inlet pipe 4 through a controlling valve F, shown in detail in Figs. 4 and 5. This controlling valve has supply ports 5 and 6, also exhaust port 7, located in the casing or fixed portion thereof. The movable member f of the valve, operated by handle f', is provided with a central supply port 8 and exhaust ports 9 and 10, one located on each side of the supply port. These ports in the movable member f of the valve are so arranged that when said movable member is in either of its extreme positions one of the exhaust ports 9 or 10 will connect the inlet pipe 4 with one of the supply ports 5 or 6, and the other will connect the remaining supply port, say 6, with exhaust port 7, thereby supplying pressure to one side of the piston D and exhausting it from the other side. When the movable member f is in a central position, the central supply port 8 will be in communication with both of supply ports 5 and 6 through auxiliary ducts 11 and 12.

One of the important features of my invention consists in the regulation or adjustment of the exhaust port 7 which is effected by means of a small screw f^2 having a duct f^3, the communication of which with exhaust port 7 is either increased or diminished by the turning in or out of the screw. An adjustment is also provided in the fixed supply ports 5 and 6 by means of screws f^4, f^5, these screws being usually adjusted to admit a larger amount of fluid to the cylinder than is permitted to exhaust therefrom by screw f^2, so that there will be no conflict between the two adjustments.

In Fig. 7, I have shown a modification of my invention in which a counter-weighted window W is operated by means of a piston working within cylinder C and controlled by a two-way valve F′ provided with exhaust adjustment f^2 similar to that shown in Figs. 4 and 5. The window shown in this Fig. 7 is operated positively in both raising and closing, while that shown in Fig. 8 is without a counter-weight and is raised only by a single-acting piston within cylinder C controlled by valve F^2, as shown.

The operation of the various parts of my invention will be apparent from the foregoing description, and is as follows: When the operating handle f' of valve F occupies the position shown in Fig. 4, pressure is admitted through supply pipe 1 above the piston D in cylinder C, thereby pressing said piston downward and exerting pressure upon rod e^3 which thereupon slides outwardly in slot e^5 of end block e^6. This throws arm e^2 outward and exerts pressure upon members E by pins e^8, thereby opening both transoms. In order to close the transoms the operating handle is placed in the other extreme position, when the above action is reversed, pressure being admitted to supply pipe 2 and exhausted from supply pipe 1. In the movements in both directions the exhaust adjustment f^2 operates to prevent too sudden opening or closing, or slamming, of the transoms thereby preventing breakage. In order to hold the transom in any desired position the operating handle of valve F is placed in its intermediate position, shown in Fig. 5, in which the side ports 9 and 10 of the movable member are disconnected from the ports of the fixed portion of the valve and the central supply port 8 is connected to both of the fixed ports 5 and 6 through ducts 11 and 12, thereby admitting pressure to both sides of the piston D, compressing the compressible pad d^3 which expands and grips the piston walls firmly, thereby holding the piston in that position and preventing the leakage of air from one side to the other thereof. It is to be noted that transoms are usually so pivoted that they have a tendency to close, and therefore the greater operating force must be exerted downward upon the pistons to open the transoms. The spring d^5 is made sufficiently strong to resist the relative movement of plates d, d' under pressure admitted to the piston to operate it in either direction, but yieldable to permit the compression of pad d^3 when pressure is admitted to both sides of the piston.

As above indicated, any number of transoms or windows may be operated from supply pipe 3 either by individual valves or by a master valve located at some convenient point such as the corridor through which access is had to the rooms. In this way all of the windows on a single floor of a hotel may

be closed in case of storm without entering the rooms, and may be again opened after the storm is passed.

It is obvious that instead of operating a double transom by a single valve, a separate valve may be provided for each transom, and many other changes and modifications may be made in the apparatus hereinbefore described without departing from the invention.

Having described my invention, what I claim as new and desire to secure by Letters Patent of the United States, is—

1. In a closure controller, the combination with a closure and a piston operatively connected therewith, of a cylinder for said piston, a valve, pressure supply and exhaust lines for admitting pressure to and exhausting it from said cylinder, an adjustable device for controlling the rate of flow through the admission line, and an adjustable device to limit flow rate through the exhaust line to an amount less than that through the admission line, substantially as described.

2. In a closure controller, the combination with a closure, a cylinder, a piston for said cylinder operatively connected with said closure and provided with a compressible element arranged to grip said cylinder walls when compressed, a valve, pressure supply and exhaust lines to admit pressure to and exhaust it from said cylinder at either side of said piston to operate the same, and to connect both sides of said piston to a source of pressure simultaneously to compress said compressible element and hold the piston stationary, an adjustable device for controlling the rate of flow through the admission line, and an adjustable device to limit flow through the exhaust line to an amount less than that through the admission line, substantially as described.

3. In a closure controller, the combination with a closure and a piston operatively connected therewith, of a cylinder for said piston, a valve provided with fixed ports for admitting pressure to and exhausting it from said cylinder at either side of said piston, an adjustable device to regulate the rate of flow through the exhaust port of said valve, and a movable element in said valve having ports arranged to connect one side of said piston to the admission port and the other side of said piston to the exhaust port when in its extreme position, and to connect both sides of said piston to the source of pressure when in an intermediate position, substantially as described.

4. In a closure controller, the combination with a closure, of a piston operatively connected therewith and constructed with plates, one of which is movable, and with a compressible element between said plates, a cylinder for said piston engaged by the compressible element when said element is compressed, a valve provided with fixed ports for admitting pressure to and exhausting it from said cylinder at either side of said piston, and a movable element in said valve having ports arranged to connect either side of said piston to a source of pressure and said exhaust, or to connect both sides of said piston to a source of pressure to compress said compressible device and hold the piston stationary, substantially as described.

5. In a closure controller, the combination with a closure, a cylinder, a piston for said cylinder operatively connected with said closure and provided with a compressible element arranged to grip said cylinder walls when compressed, and a controlling valve constructed to admit pressure to and exhaust it from said cylinder at either side of said piston to operate the same, and to connect both sides of said piston to a source of pressure simultaneously to compress said compressible element and hold the piston stationary, substantially as described.

6. In a closure controller, the combination with a closure, a cylinder, a piston for said cylinder operatively connected with said closure and constructed with plates one of which is movable with respect to the other, an annular resilient compressible element between said plates arranged to grip said cylinder walls and form a packing when compressed, and a controlling valve constructed to admit pressure to and exhaust it from said cylinder at either side of said piston to operate the same, and to connect both sides of said piston to a source of pressure simultaneously to compress said compressible element and hold the piston stationary, substantially as described.

7. In a closure controller, the combination with a closure, a cylinder, a piston for said cylinder operatively connected with said closure and constructed with plates one of which is movable with respect to the other, an annular resilient compressible element between said plates arranged to grip said cylinder walls and form a packing when compressed, a controlling valve constructed to admit operative pressure to said cylinder at either side of said piston, and to connect both sides of said piston to a source of pressure simultaneously to compress said compressible element for holding the piston stationary, and means for preventing said compression except when pressure is admitted to both sides of said piston, substantially as described.

8. In a closure controller, a cylinder, a piston rod, and a piston therefor within said cylinder provided with a compressible element arranged to grip said cylinder walls and hold said piston stationary when compressed, substantially as described.

9. In a closure controller, a cylinder, a

piston rod, a piston therefor within said cylinder constructed with plates one of which is movable with respect to the other, and a compressible element between said plates arranged to grip said cylinder walls and hold said piston stationary when compressed, substantially as described.

10. In a closure controller, a cylinder, a piston rod, a piston therefor within said cylinder constructed with plates one of which is movable with respect to the other, and an annular rubber compressible element between said plates arranged to grip said cylinder walls and hold said piston stationary when compressed, substantially as described.

11. In a closure controller, the combination with a closure and a piston operatively connected thereto, of a cylinder for said piston, a valve for admitting pressure to said piston and for exhausting pressure therefrom to move the closure in opposite directions, an exhaust flow-rate controlling device, and regulating means for varying the flow-rate of the supply pressure without affecting the exhaust flow-rate.

12. In a closure controller, the combination with a closure and a piston operatively connected thereto, of a cylinder for said piston, a valve for admitting pressure to said piston through either of two lines of supply and for exhausting pressure therefrom to a single exhaust line to move the closure in opposite directions, and independent regulating means for each line of supply for varying the flow-rate of supply pressure without affecting the exhaust flow-rate.

13. In a closure controller, the combination with a closure and a piston operatively connected thereto, of a cylinder for said piston, a valve for admitting pressure to said piston through either of two lines of supply and for exhausting pressure therefrom to a single exhaust line to move the closure in opposite directions, an exhaust flow-rate controlling device, and independent regulating means for each line of supply for varying the flow-rate of supply pressure without affecting the exhaust flow-rate.

14. In a closure controller, the combination with a closure and a piston operatively connected thereto, of a cylinder for said piston, a valve for admitting pressure to said piston through either or both of two lines of supply and for exhausting pressure therefrom to a single exhaust line to move the closure in opposite directions or retain it balanced, an exhaust flow-rate controlling device, and independent regulating means for each line of supply for varying the flow-rate of supply pressure without affecting the exhaust flow-rate.

15. In a closure controller, the combination with a closure and a piston operatively connected thereto, of a cylinder for said piston, a valve, two lines of pressure supply leading to said piston from said valve, a single exhaust pressure line leading from said valve, said supply and exhaust pressures being adapted to move the closure to and from a closed position, and an independent flow-rate regulating device positioned in each of said lines, whereby variations in the flow-rate of the supply lines may be had without affecting the flow-rate of the exhaust line.

16. In a closure controller, the combination with a closure and a piston operatively connected thereto, of a cylinder for said piston, a valve for admitting pressure to said piston and for exhausting pressure therefrom to move the closure in opposite directions, said valve being movable to provide a balancing pressure to opposite sides of the piston to retain the latter in relative fixed position for holding the closure stationary.

17. In a closure controller, the combination with a closure and a piston operatively connected thereto, of a cylinder for said piston, a valve for admitting pressure to said piston and for exhausting pressure therefrom to move the closure in opposite directions, said valve being movable to provide a balancing pressure to opposite sides of the piston to retain the latter in relative fixed position for holding the closure stationary, and a regulating device for controlling the flow-rate of said exhaust.

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

JOB HUTCHINSON.

Witnesses:
T. M. WILDER,
HENRY D. REED.