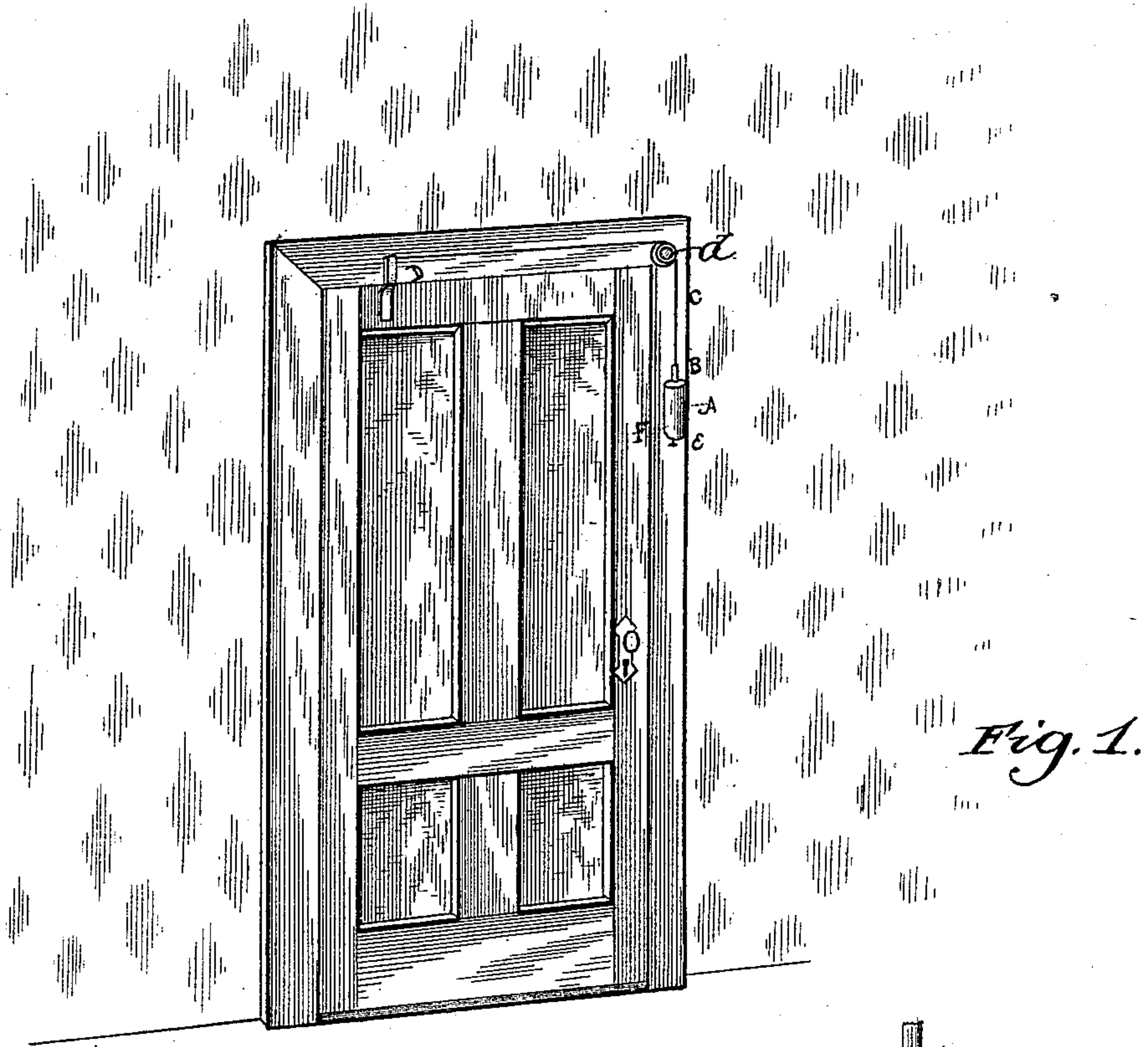


(No Model.)

J. W. GRAY.  
PNEUMATIC DOOR CONTROLLER.

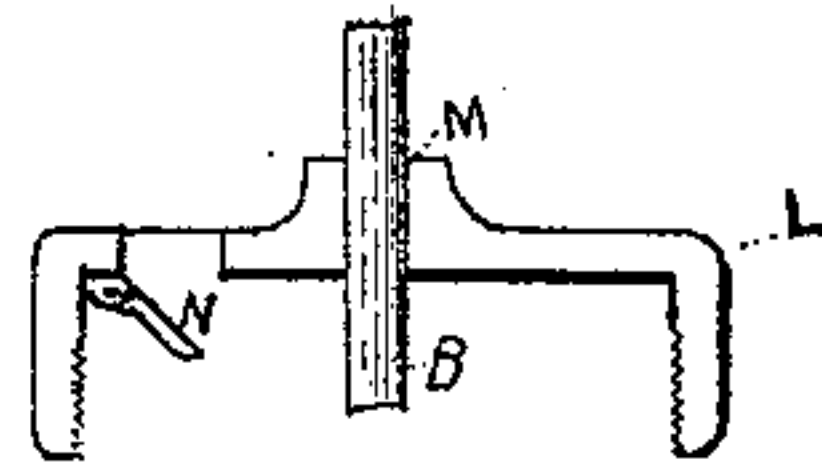
No. 528,909.

Patented Nov. 6, 1894.



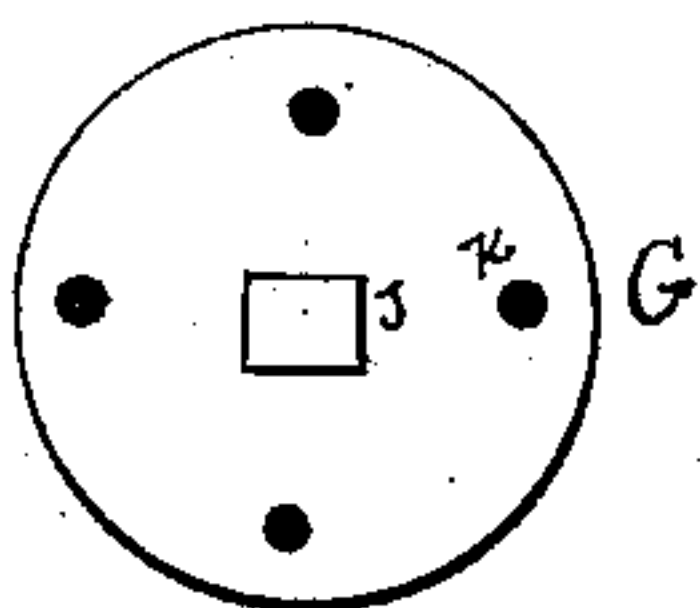
*Fig. 1.*

*Fig. 2.*

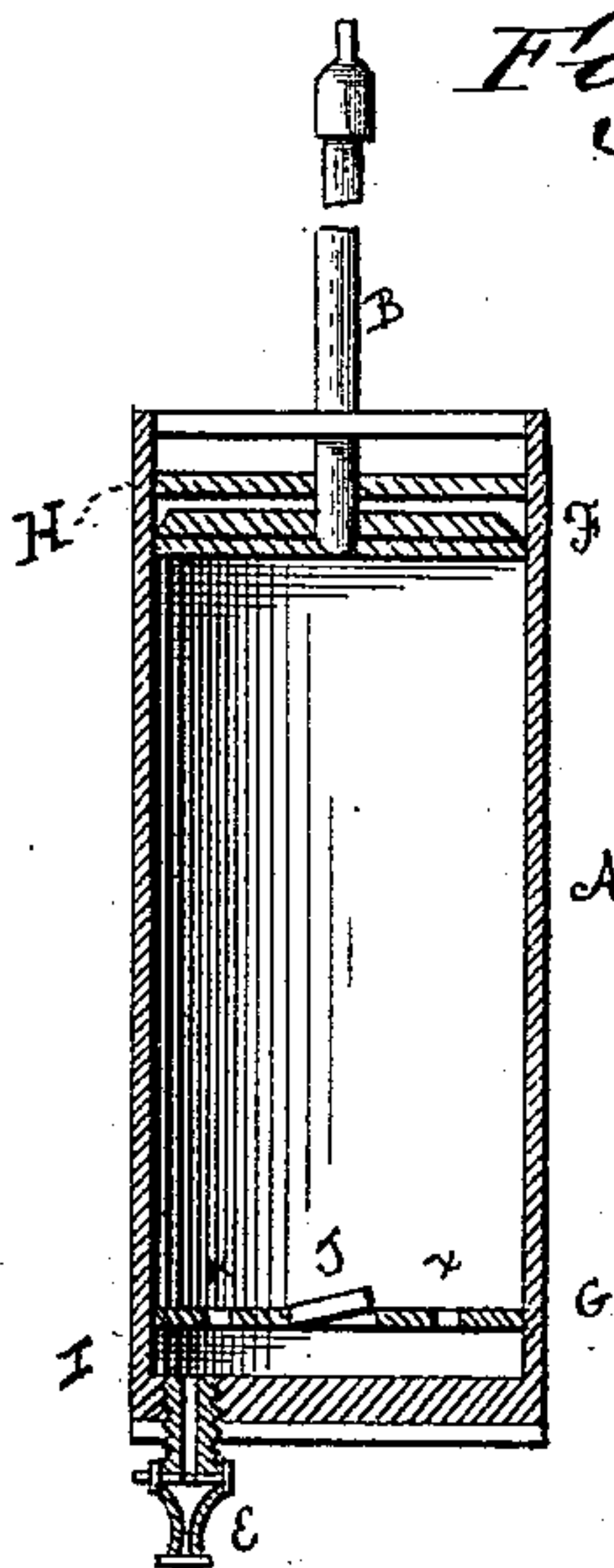
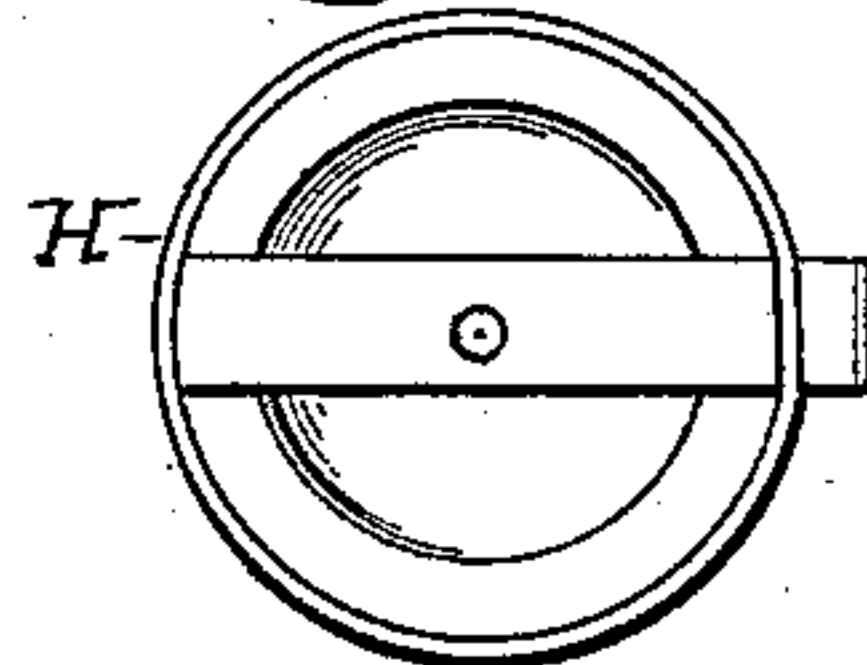


*Fig 5*

*Fig. 4.*



*Fig. 3.*



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# UNITED STATES PATENT OFFICE.

JOSHUA W. GRAY, OF CHICAGO, ILLINOIS.

## PNEUMATIC DOOR-CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 528,909, dated November 6, 1894.

Application filed November 18, 1890. Serial No. 371,778. (No model.)

*To all whom it may concern:*

Be it known, that I, JOSHUA W. GRAY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Pneumatic Door-Controllers, (Case No. 1,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

The object of my invention, is to provide a door controller, placed in connection with the door, and so arranged, that the door when opened will move the piston in cylinder thereof, and to set the piston in position, to be automatically returned to its first position, when the force exerted in opening the door is removed.

Speaking generally, it will be understood, that the principle of my invention, comprehends the use of a cylinder connected with the door, and so arranged, that the piston thereof will by the opening of the door be set in position, to automatically close the door, by the pressure of air against said piston, returning it to its initial position.

In the construction of an apparatus wherein air may be utilized as the motive power, for opening or closing a door, I may avail myself, of what I term the "vacuum principle," whereby the well known property of the weight or pressure of the atmosphere, may be utilized, or I may so construct the apparatus, by slight modifications, as to utilize the elastic property of air, or a combination of these two properties.

In all cases, I use a vent cock or valve, to be used in initially setting the controller, and a partition or diaphragm provided with a valve, and vents, to act as an air cushion.

I shall describe my invention as used for the purpose of automatically closing a door. It is evident however that it may be applied for the purpose of automatically opening a door.

My invention will be more readily understood by referring to the accompanying drawings, in which—

Figure 1 is a view illustrative of my invention as applied to a door. Fig. 2 is a sectional view of the cylinder, with the piston rod connected therewith. Fig. 3 is a plan view of cross piece used on open end of cylinder, as shown in Fig. 2, which cross piece, is

provided with an opening to serve as a guide for the piston rod. Fig. 4 is plan view of the partition, showing the valve and vents. Fig. 5 is a plan view of the cap, with (stuffing box, and valve) to be fastened on open end of cylinder.

Like parts, are indicated by letters of reference, throughout the different figures.

In Fig. 1 cylinder A, which comprehends (an open ended cylinder) is shown secured to the door casing. To the piston rod B, is attached cord C, passing over pulleys, and extending to an arm D, carried not far from the hinged edge of the door.

As shown in Fig. 1 but more clearly in Fig. 2 a vent cock E, is provided in the closed end of cylinder A. The piston is adapted to work air tight in the cylinder and its rod B, as shown in Fig. 2 has its bearing in a cross piece secured over the open end of the cylinder. To the piston rod is attached a cord C, which is passed over pulleys, (the cylinder being preferably secured in a vertical position to the upright of a door frame as shown in Fig. 1) and connected with an arm D, secured to the upper portion of the door, near its hinged edge. Now to initially set the controller for action; vent cock E, is opened, piston F, is then pushed down through cylinder A, until it reaches the reversible partition G, located near the closed end of cylinder against which it rests said partition being provided with a flap valve J, and vents K, for a purpose hereinafter set forth. Vent cock E is then closed, leaving the chamber I, between partition G, and closed end of cylinder, filled with confined air. Now it is evident that when the door is opened the pull upon the cord C, from the arm D, will act to raise the piston in cylinder A, and thus form a vacuum beneath said piston. On letting go of the door the piston will be actuated by atmospheric pressure to close the door. It is also evident, that when the pull upon the cord C, raises piston F, that valve J, in partition G, will lift, and that the confined air in chamber I, will be drawn into, and diffused, through cylinder A. Now when the door is released, atmospheric pressure forces piston, quickly back, to its initial position, valve J, in partition G, closes, and the air that was diffused through cylinder, can only slowly return through vents K, back into chamber I, and thus checks the speed of the door.



Inasmuch as partition G, is reversible, it is evident that said partition, may be inverted, and thus permit the flap valve J, to open in the opposite direction from that shown in the drawings (as indicated in dotted lines) whereby, the apparatus, is adapted to be used, when it is found desirable to utilize the elasticity or force of compressed air, in closing a door.

In Fig. 2, the cylinder A, is shown open at the top, the same as in Fig. 1, and provided with vent cock E, and partition G. To initially set the controller for action, vent cock E, is closed, the piston F, is started at the top of cylinder, and the rod is so connected to door, that when the door is opened, it forces the piston down into the cylinder, compressing the air in same. On removing the power tending to thrust the piston downward in cylinder the expansion of the air below the piston, will drive the same back to its initial point, and thus close the door. By this method of working the controller the valve J, in partition G, as shown in Fig. 2, drops downward, and the air is also compressed in chamber I. As the force on piston F, is removed and it starts upward, valve J, immediately closes, and the compressed air in chamber I, can only slowly escape through vents K. This retards the expansion of air in chamber, I, longer than the air in the cylinder above the partition, and thus checks the force of the door.

Now it is evident, that if one, and the same cylinder, can be used to close a door, either by creating a vacuum, or by compressing the air, that by fastening on the open end of same cylinder, the cap, L, provided with stuffing box M, and flap valve N, as shown in Fig. 5, that I can use a combination of the two forces. In this case the piston F, rests as its initial point on partition G. The cap L, is then fastened on the upper, and open end, of cylinder, with valve N, in same, opening downward. Vent cock E, is then closed, and the controller is thus initially set for action. As the piston is pulled upward valve N, in cap L, closes, and the air in cylinder between piston F, and cap L, is compressed, while below piston F, a vacuum is created in cylinder. Thus when the force is removed that pulls the piston upward the expansion of the air above the piston, forces it back into the vacuum created under the piston, to its initial point. When piston has reached initial point valve N, in cap L, opens, thus replenishing space between upper side of piston, and cap L, with any air, which may have escaped. The action of the check, or air cushion, in this method of using the controller is exactly the same, as when the vacuum principle should be used, as shown in Fig 1.

The flap valve N, on cap L, as described could be used on lower end of cylinder in place of vent cock E, if desired. In both cases it would open downward. Now it can be seen that when cap L, is placed on open end of cylinder, that the controller can be used in all

three, of the heretofore described methods. For instance, by opening vent cock E, when piston F, was raised, there would be no vacuum created beneath it, as the air would be drawn into, and expelled, from cylinder at each up and down movement of the piston, but in this case, as the piston is drawn upward valve N, in cap L, closes, and the air between the top of the piston and cap L, would be compressed, and the controller would be worked on the expansion principle. Now to work it on the vacuum principle you would close vent cock E, and fasten valve N, so that it would not close. In that case when the piston was pulled upward, a vacuum would be created in cylinder beneath the piston, but the air between the top of piston and cap L, would pass back and forth through the opened valve N. Now remove the fastening from valve N, so that it would close, and the controller would again work on the principle of the combination of the two forces.

To throw the controller entirely out of action, open vent cock E, and fasten valve N, so that it would not close. Now when the door was opened piston F would be drawn upward in cylinder, and remain there, and the door could be opened and shut, precisely the same, as though the controller was not on. To again throw the controller into action push down piston F, close vent cock E, unfasten valve N, so that it would close, and the controller would be set for action.

It is evident that the cylinder may be arranged in any suitable manner between the hinged door, or other device, and the casing, or wall, without departing from my invention.

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

1. The combination with the door, of a cylinder having an open and a closed end and provided with a piston, and mechanism, actuated by the movement of the door in one direction to set the piston, whereby on removing the pressure from the door; the piston is actuated by the pressure of air to automatically close the door, substantially as and for the purpose herein specified.

2. The combination with the door of an open ended cylinder, provided with a piston and its piston rod, a vent cock, E, in closed end of cylinder, a partition G in cylinder in front of the piston provided with valve J and vents K, and mechanism connected with the door and piston rod, and actuated by the opening movement of the door to set the piston, whereby upon the release of the door, the piston is actuated by atmospheric pressure to close the door, substantially as and for the purpose herein specified.

In witness whereof I hereunto subscribe my name this 15th day of November, A. D. 1890.

JOSHUA W. GRAY.

Witnesses:

ELLA EDLER,

GEORGE L. CRAGG.