

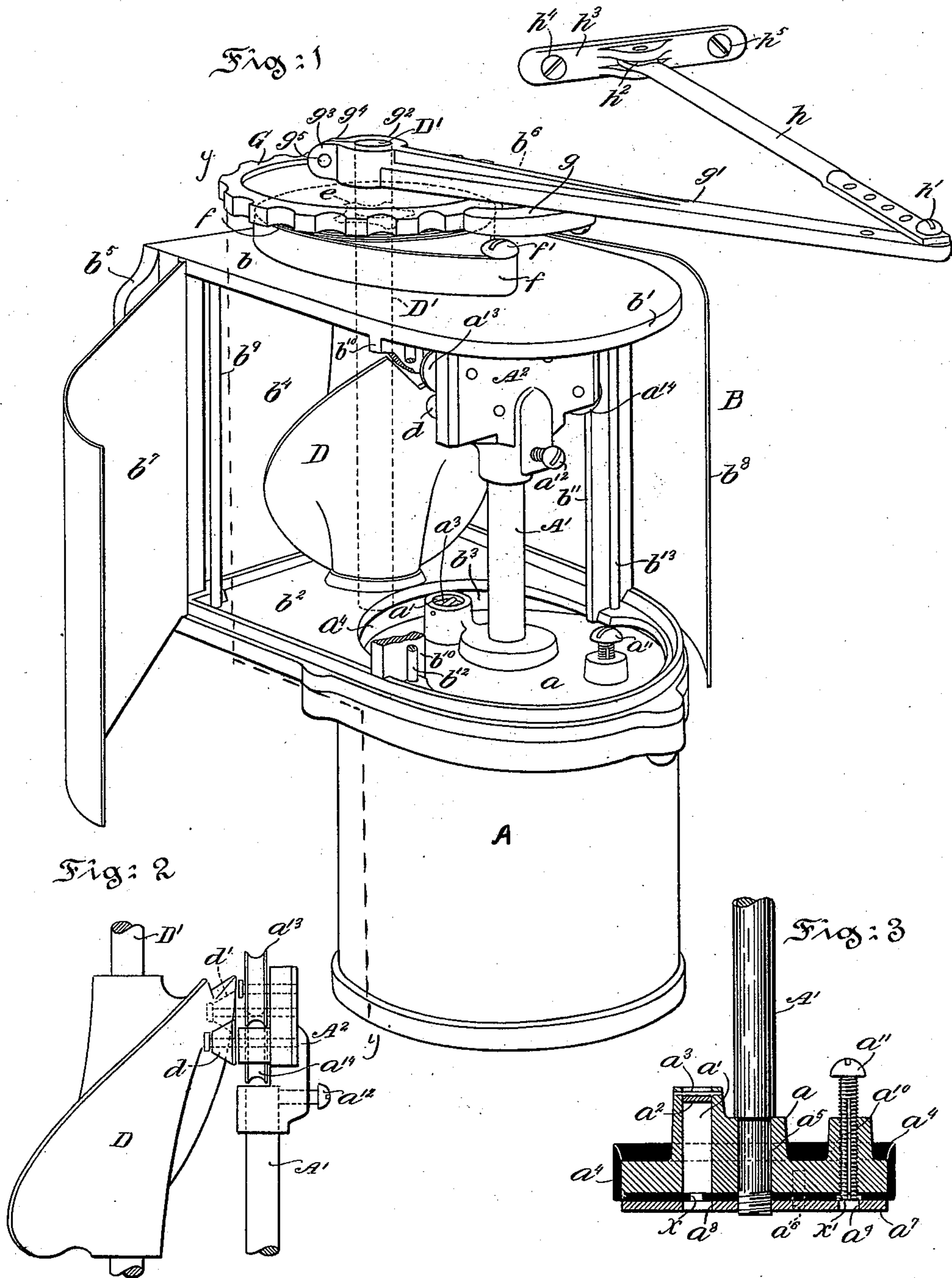
(No Model.)

2 Sheets—Sheet 1.

J. S. SHRAWDER.  
PNEUMATIC DOOR CHECK AND CLOSER.

No. 534,525.

Patented Feb. 19, 1895.



Witnesses:  
Thomas M. Smith.  
Richard C. Maxwell.

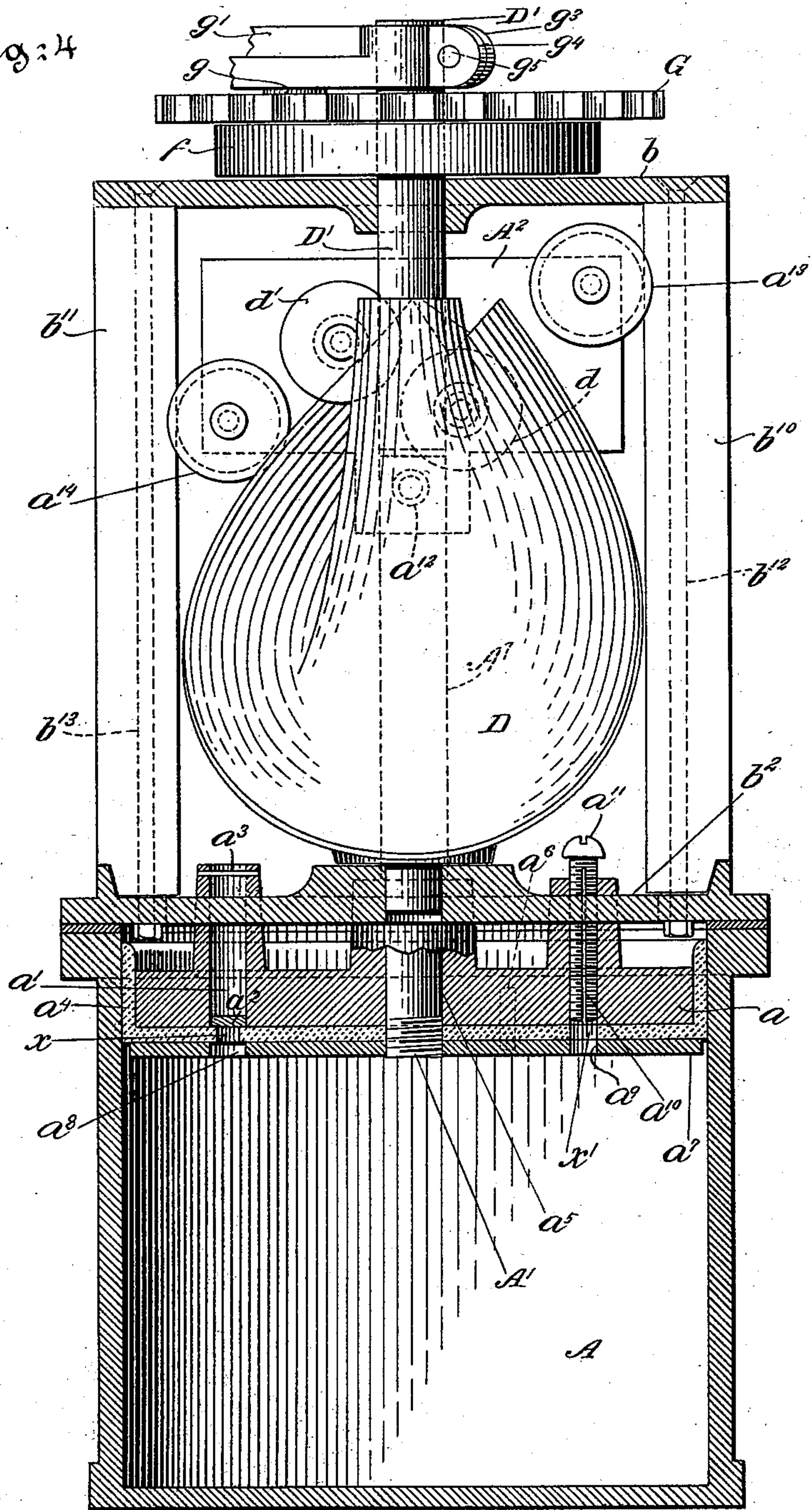
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Fig. 4



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By J. Walter Douglas,  
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# UNITED STATES PATENT OFFICE.

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MESNE ASSIGNMENTS, TO THE NATIONAL HARDWARE SPECIALTY  
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## PNEUMATIC DOOR CHECK AND CLOSER.

SPECIFICATION forming part of Letters Patent No. 534,525, dated February 19, 1895.

Application filed February 19, 1894. Serial No. 500,633. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN S. SHRAWDER, a citizen of the United States, residing at Collegeville, in the county of Montgomery and State of Pennsylvania, have invented certain new and useful Improvements in Pneumatic Door Checks and Closers, of which the following is a specification.

My invention has relation to a door check and closer operating by a piston within a cylinder; and it relates more particularly to the general construction and arrangement of such an appliance.

The principal objects of my invention are, first, to provide a pneumatic door check and closer in which the parts are subjected to only a limited or predetermined pressure or strain; second, to provide a door check so constructed and arranged that leakage is practically prevented in the operation thereof; third, to provide a pneumatic door check and closer so constructed and the parts thereof so arranged as that the force of a spring tending to close a door is opposed by the influence of a partial vacuum created in a cylinder beneath the piston head thereof; fourth, to provide a pneumatic door check and closer so arranged in connection with a door as that the latter is restrained or checked by the pressure of the atmosphere upon the exterior surface of the piston through a partial vacuum created in the cylinder of the device below the piston head thereof; fifth, to provide a door check so constructed and arranged as that the strain upon the working parts thereof will not exceed the normal pressure of the atmosphere on one face of the piston partially counterbalanced by a vacuum created in the rear thereof, in order that the door may close under the influence of a spring; and, sixth, to provide a door check and closer so constructed and arranged that in the operation thereof the pressure will not exceed that of the atmosphere irrespective of pressure manually or otherwise brought to bear against the door in the opening and closing thereof.

My invention stated in general terms, consists of a pneumatic door check and closer

constructed, arranged and adapted for operation in substantially the manner hereinafter described and claimed.

The nature and general features of my invention will be more fully understood from the following description taken in connection with the accompanying drawings forming part hereof, and in which—

Figure 1, is a perspective view of a door check and closer containing or embodying the general features of my invention, and also showing the housing thereof containing the working parts exposed to view. Fig. 2, is a view partly in broken section and partly in side elevation of the detail construction and arrangement of the governor or worm-screw device and travelers and bearers of the piston stem. Fig. 3, is a transverse sectional view through the check and relief valves of the piston-head provided with a flanged dish-shaped packing ring and removable circular plate or disk and in broken section the piston stem or rod thereof. Fig. 4, is a view partly in section on the line  $y-y$ , of Fig. 1, and in elevation showing the detail construction and arrangement of the double acting cam or governor device of my invention.

Referring to the drawings A, is a vertical cylinder open at one end and seated therein and detachably connected therewith is a housing B, provided with a top-plate  $b$ , with a curved front  $b'$ , a flanged base plate  $b^2$ , having an opening  $b^3$ , formed therein and a rear plate  $b^4$ , provided with ears or wings  $b^5$  and  $b^6$ , having openings therein for the insertion therethrough of screws or the like. In rear of the housing B, are hinged doors  $b^7$  and  $b^8$ , conforming to the shape or contour of the same. These doors are adapted to be swung into and out of engagement with the housing and they are to be provided with a locking device of any preferred construction for maintaining the same in a closed position.

$b^9$ , are rear supports connected with the base and top plates of the housing.

$b^{10}$  and  $b^{11}$ , are rails connected with the top and base plates of the housing and located adjacent thereto are vertical supports  $b^{12}$  and  $b^{13}$ .



$a$ , is the piston-head of the cylinder A, provided with a chamber  $a'$ , extending through the same.

$a^2$ , is a disk or plug adapted to be afforded a range of up and down movement in the chamber  $a'$ , and in the top of the chamber is provided a cross pin  $a^3$ , for the purpose of preventing said disk or plug from being dislodged from its position in the chamber  $a'$ , in the actuation of the plunger or piston head  $a$ , in the cylinder A of tin, brass or other preferred material and open at one end. The piston head  $a$ , is also provided with a flexible dish-shaped gasket or packing ring  $a^4$ , projecting beyond the rear body of the head  $a$ , and forming a flange around the same, and which dish-shaped packing ring or gasket is applied to the head of the piston and held to place against the head  $a$ , by means of the recessed shank  $a^5$ , of the piston stem  $A'$ , in the manner, for example, as fully illustrated in Fig. 3. The packing ring  $a^4$ , is provided with apertures  $x$  and  $x'$ , communicating with the chambers  $a'$  and  $a^{10}$ , as shown in Fig. 3, so as to respectively permit of the admission and escape of air to and from said chambers in the operation of the check and closer.

$a^6$ , is a stud or pin in the piston-head  $a$ , and extending into a disk or circular plate  $a^7$ , to prevent the plate or disk  $a^7$ , turning while in position and provided with an aperture  $a^8$ , leading to the chamber  $a'$ , and with a similar aperture  $a^9$ , leading to a chamber  $a^{10}$ , which latter is provided with a split screw  $a^{11}$ , adjustably engaging the wall of the chamber  $a^{10}$ , in order to regulate or control the retrograde movement of the piston head  $a$ , under the influence of a spring in connection with the device, to be hereinafter more fully explained.

At the upper end of the piston stem is adjustably attached a weighted bearing block  $A^2$ , by means of a tightening screw  $a^{12}$ . This bearing block  $A^2$ , is provided with traveler wheels  $a^{13}$  and  $a^{14}$ , engaging with the rails  $b^{10}$  and  $b^{11}$ , provided on the interior of the housing, and located adjacent to said wheels and diagonally with respect to the plane of the bearing  $A^2$ , are conical shaped bearers or travelers  $d$  and  $d'$ , engaging the wings or curved vanes of a double acting cam termed a governor device D, mounted on a vertical shaft  $D'$ , which is secured in the base plate  $b^2$ , of the housing B, and extending through the top plate  $b$ , thereof. This shaft  $D'$ , carries a star or similar shaped device  $e$ , around which is coiled a leaf or other spring  $f$ , which is connected at one end to said device, and at its opposite end to a post or pin  $f'$  mounted in the top of the housing B. This double acting cam or governor device operates in conjunction with the conical rolls  $d$  and  $d'$ , of the bearing block  $A^2$ , to depress the piston when the door is moved against the tension of the spring and to retract the same when the shaft  $D'$ , and the door are moved in the opposite direction by the expansive

force of the spring and the said piston and door respectively returned to their normal positions. Above the star or similar shaped device on the shaft  $D'$ , is a toothed-wheel G, engaged by a pawl  $g$ , in pivotal connection with a lever-arm  $g'$ , provided with a split tubular bearing  $g^2$ , at one end and with lugs or projections  $g^3$  and  $g^4$ , through which is inserted a screw  $g^5$ , for maintaining said lever arm in required position on the shaft  $D'$ . At the forward end of the lever arm  $g'$ , is pivoted a recessed arm  $h$ , having openings therein for the application of a screw or pin  $h'$ , in order to adjust the arm to required position in connection with the lever arm  $g'$ , to adapt the device to doors of different sizes and in order to control the extent of movement of the door in connection with the jamb to which the same is hinged. At the rear extremity of the arm  $h$ , recessed at  $h^2$ , is pivotally attached thereto a bifurcated bracket or holder  $h^3$ , provided with openings  $h^4$  and  $h^5$ , for the insertion of screws or the like so as to permit of the application of the bracket or holder  $h^3$ , to the jamb of a door.

The operation of the device hereinbefore described is as follows:—The housing B, being supported on the door and the bracket or holder  $h^3$ , being secured to the jamb thereof, by opening the door inward the coiled leaf spring  $f$ , is compressed and at the same time the piston head  $a$ , is depressed in the cylinder A, by the movement of the double acting cam D, on the shaft  $D'$ , which actuates the traveler rolls  $d$  and  $d'$ , of the bearing block  $A^2$ , mounted on the upper end of the piston stem  $A'$ , thereby causing the downward movement of said piston head in said cylinder. The air due to the compression of the same in the cylinder A, is relieved therefrom, through the chamber  $a^{10}$ , in the piston head  $a$ , when the split screw  $a^{11}$ , has been properly adjusted to position. The double acting cam D, during the depression of the piston head to the full extent thereof in the cylinder A, will make a half revolution on the shaft  $D'$ , and when the pressure exerted against the door in the opening thereof has been released under the tension of the spring  $f$ , the shaft  $D'$ , will be rotated in the opposite direction to that hereinbefore described and therewith the double acting cam D, to cause the rolls  $d$  and  $d'$  and  $a^{13}$  and  $a^{14}$ , of the bearing block  $A^2$ , to travel in engagement with said cam D, and the rails  $b^{10}$  and  $b^{11}$ , so that the piston head may assume automatically the position illustrated in Figs. 1 and 4 at the head of the cylinder A. It may be here remarked that in the retrograde movement of the piston-head  $a$ , it will operate to produce a sufficient suction in the chamber  $a'$  to draw in a downward direction the movable disk or plug  $a^2$  so as to seat with the opening  $x$ , in the packing ring  $a^4$ , and thus to allow under due regulation through the tension of the spring  $f$ , under which it is held, the piston to return to its initial position and the double acting



cam D, to assume the position illustrated in Figs. 1 and 4, with the door in a closed position against the jamb thereof. It will be observed that the door is restrained or checked by the pressure of the atmosphere upon the outer surface of the piston in view of the partial vacuum in the cylinder below the head thereof. It will thus be seen that the pressure exerted from without upon the cylinder is such that the same may be made very inexpensively and out of a light material. Moreover, the pressure upon the cylinder cannot exceed normal atmospheric pressure of about fifteen pounds to the square inch, for the reason that when the air is exhausted from the cylinder by the rise of the piston, due to the closing of the door automatically through the action of the spring, it will be impossible to increase the degree of the resultant vacuum in the cylinder by pushing on the door or otherwise so long as the exterior surface thereof is exposed only to atmospheric pressure. Consequently the door will be moved and closed and the parts of the device will not be affected or injured.

In the closing of the door the piston of the device will assume its normal position, whereby at the utmost limit practicable, all air will be exhausted from the cylinder and the face of the piston and wall of the cylinder will be subjected in consequence to atmospheric pressure only against the force of a coiled spring tending to close the door.

In case of any abnormal strain brought to bear from an extraneous source or through an unwillingness to allow the device time to accomplish its functions by the ordinary operation of the same such will be expended upon the door jamb and the excessive force exerted will only tend to close the door and no more. Furthermore a check and closer of my invention may be readily repaired in case the packing ring should become worn and with the least possible time and expense; and moreover, may be kept in good working order, without the use of fluids in the cylinder in which some of the checks hitherto in use are immersed, in order to insure the proper working thereof.

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

1. In a pneumatic door check and closer, a cylinder open at one end, a piston normally located at its open end and provided with check and relief valves and a flanged and apertured packing ring and means for operatively connecting said piston with a door, whereby the opening movement of the door will thrust the piston inwardly and thereby displace a certain quantity of confined air in the cylinder and by the reverse movement of the piston caused by the closing movement of the door a partial vacuum will be created between the closed end of the cylinder and the inner face of the piston and the closing move-

ment of the door be checked by atmospheric pressure on its outer face.

2. A pneumatic door check and closer, comprising a cylinder, a piston movable therein and provided with check and relief valves, a stem connected with said piston, a block detachably connected with said stem and provided with rolls, a shaft provided with a cam governor device, a leaf spring connected at one end with said shaft and at the other with a post, lever-arms connected with said shaft and with a bracket or holder, and pawl-and-ratchet connections with one of said arms and said shaft, substantially as and for the purposes set forth.

3. A pneumatic door check and closer, comprising a cylinder open at one end, a piston normally located at its open end and provided with check and relief valves and a packing ring detachably secured thereto and having apertures therein, and spring actuated mechanism operatively connecting said piston with a door and the jamb thereof, substantially as and for the purposes set forth.

4. A pneumatic door check and closer, comprising a vertical cylinder open at one end, a piston normally located at its open end and provided with a movable check valve, a chamber with a split screw and a flanged packing ring having apertures therein and detachably secured to said piston, and spring actuated mechanism operatively connecting said piston with a door and the jamb thereof, substantially as and for the purposes set forth.

5. A pneumatic door check and closer provided with a cylinder, a piston movable therein and provided with a stem, grooved traveler rolls connected with the stem of said piston, rails engaged by said rolls, a shaft, a double acting cam mounted thereon, a spring coiled around said shaft, means connected with said shaft and a bracket for permitting of the movement thereof and for actuating said double acting cam therewith to cause by means of rolls the actuation of said piston, and pawl-and-ratchet connections for supporting said spring in operative position, substantially as and for the purposes set forth.

6. A pneumatic door check and closer, comprising a cylinder, a piston movable therein, grooved and conical traveler rolls connected with the stem of said piston, a shaft, a double acting cam mounted thereon and held under spring tension, and means connected with a bracket and said shaft for rotating the latter and causing said double acting cam to actuate said piston within said cylinder, substantially as and for the purposes set forth.

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

JOHN S. SHRAWDER.

Witnesses:

JOHN R. CULBERT,  
WM. C. GORDON.