

(No Model.)

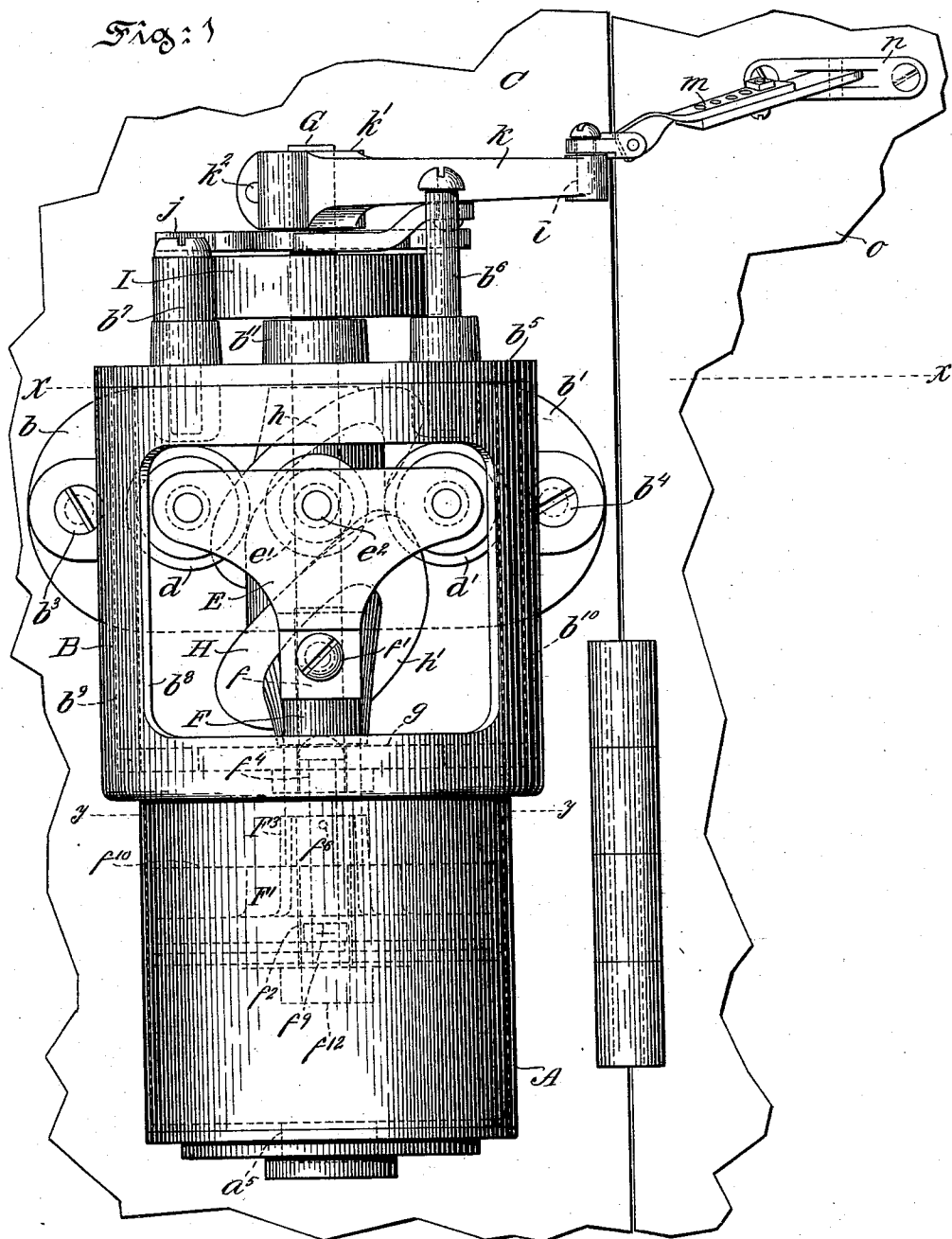
J. S. SHRAWDER.

4 Sheets—Sheet 1.

PNEUMATIC DOOR CHECK AND CLOSER.

No. 537,240.

Patented Apr. 9, 1895.



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

Inventor,
John S. Shrawder,
By J. Walter Longlass
Attorneys.

(No Model.)

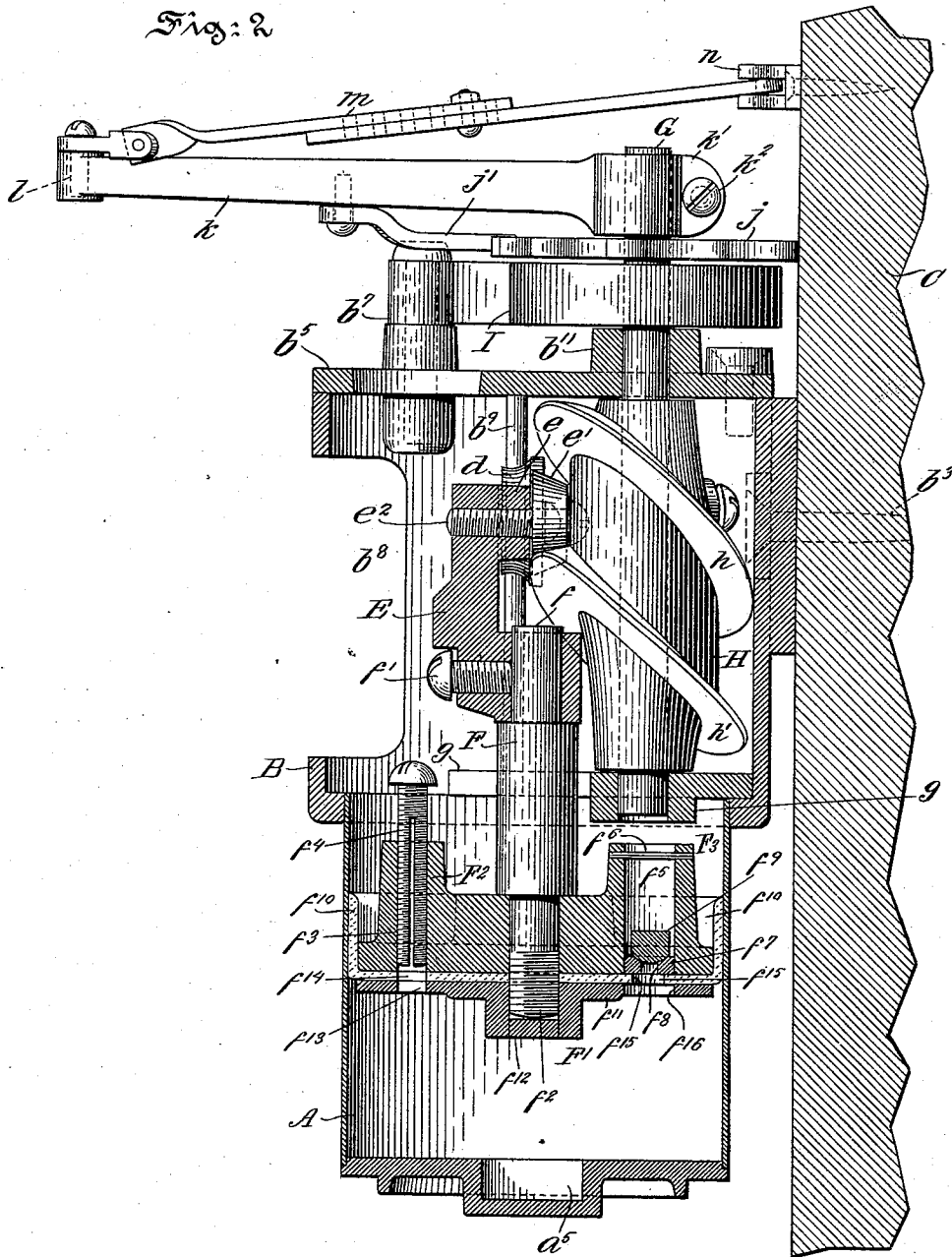
J. S. SHRAWDER.

4 Sheets—Sheet 2.

PNEUMATIC DOOR CHECK AND CLOSER.

No. 537,240.

Patented Apr. 9, 1895.



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

John F. Armorer,
Inventor.
By J. Walter Douglas,
Attorney.

(No Model.)

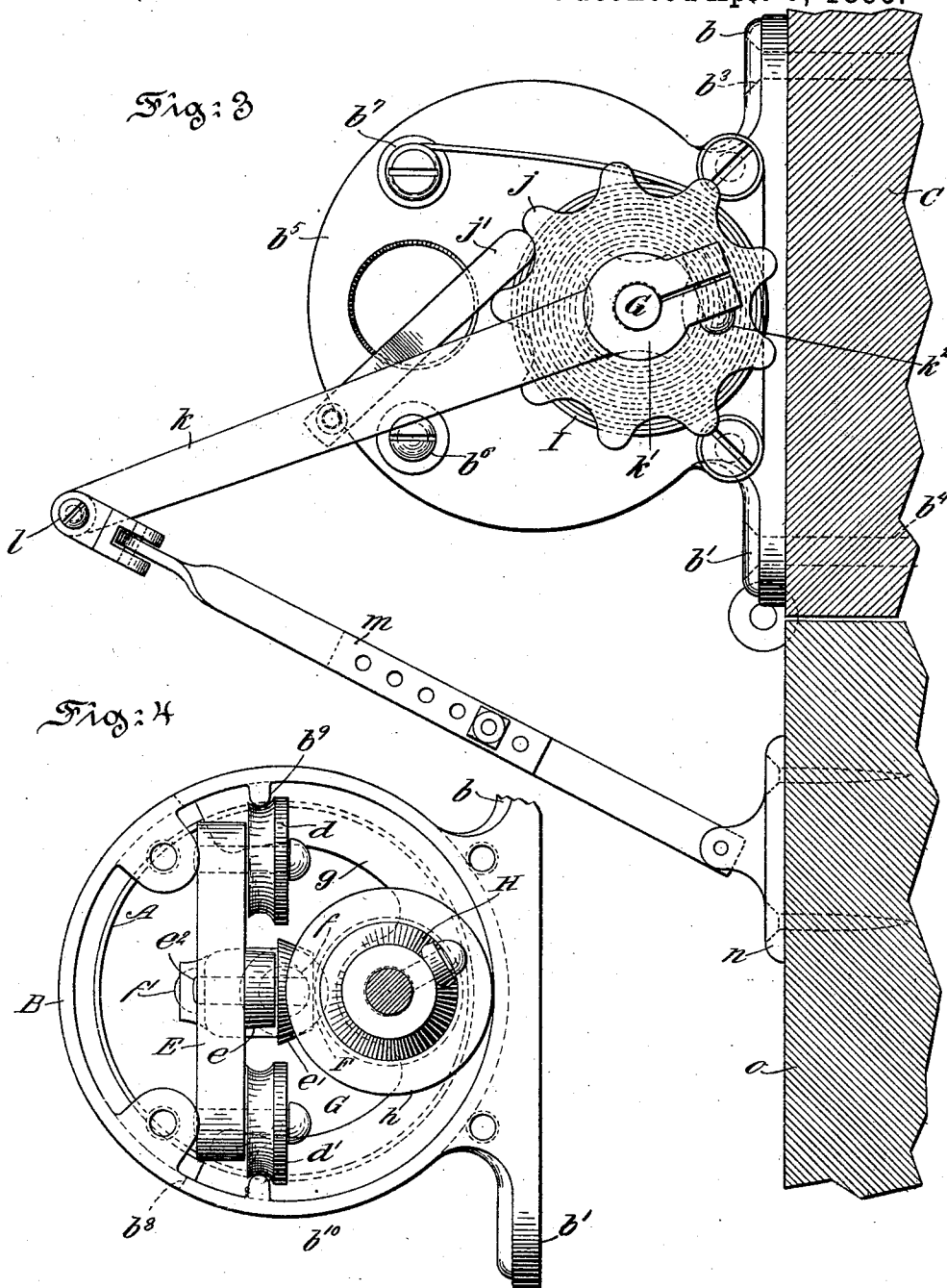
4 Sheets—Sheet 3.

J. S. SHRAWDER.

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4 Sheets—Sheet 4.

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Fig: 7

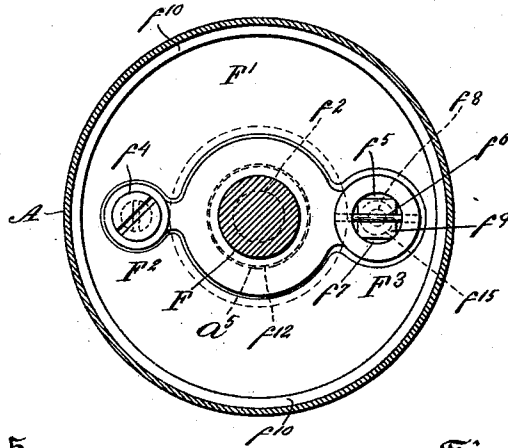


Fig: 5

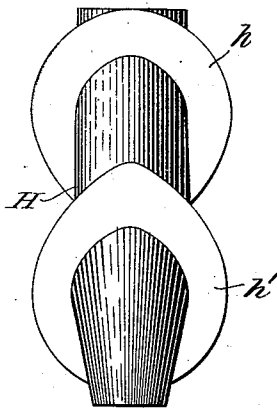
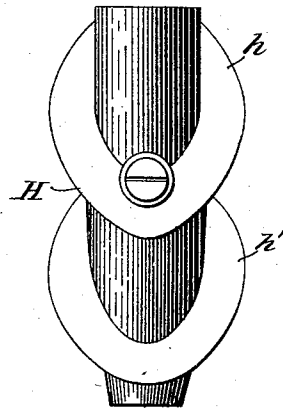


Fig: 6



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

Inventor,
John F. Shrawder,
By J. Walter Engleau
Attorney.

UNITED STATES PATENT OFFICE.

JOHN S. SHRAWDER, OF COLLEGEVILLE, PENNSYLVANIA, ASSIGNOR TO
THE NATIONAL HARDWARE SPECIALTY COMPANY, OF CAMDEN, NEW
JERSEY.

PNEUMATIC DOOR CHECK AND CLOSER.

SPECIFICATION forming part of Letters Patent No. 537,240, dated April 9, 1895.

Application filed July 10, 1894. Serial No. 517,044. (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 pneumatic door check and closer operating by means of a piston working within a cylinder; and it relates more particularly to the 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 as that leakage is prevented in the working of the same; third, to provide a door check and closer so constructed and the members thereof so arranged as that the force of a spring adapted to close the door is opposed by the difference in pressure between the expansive force of a limited quantity of air in a cylinder behind the piston thereof, in which a partial vacuum has been created and atmospheric pressure is exerted on the outer face of said piston; fourth, to provide a door check and closer so constructed and arranged that in the use of the same the pressure on the working members does not exceed that of the atmosphere irrespective of the pressure manually or otherwise brought to bear against the door in manipulations of the same, and, fifth, to provide a pneumatic door check and closer having a piston working within a cylinder and provided with a simple air check valve, whereby effective action in use of the check is insured.

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, in which—

Figure 1 is a front elevational view of a pneumatic door check and closer embodying features of my invention in application to a door and the jamb thereof. Fig. 2 is a vertical central section through the check and closer, showing the detail construction and arrangement of the parts thereof. Fig. 3 is a top or plan view of the check and closer in application to a hinged door and the jamb thereof. Fig. 4 is a transverse section through the pneumatic check and closer on the line $x-x$, of Fig. 1. Figs. 5 and 6 are respectively front and rear views of the cam controlling device for the piston of the pneumatic door check and closer of my invention; and Fig. 7 is a transverse view through the check and closer on the line $y-y$, of Fig. 1.

Referring to the drawings A, is a vertical cylinder and seated thereto and detachably connected therewith is a cylindric form housing B, for the reception of certain of the working members of the appliance and provided with side wings or ears b and b' , having openings therein for the insertion of screws or the like b^3 and b^4 , therethrough in order to secure the device of my invention to a door C, as fully illustrated in Figs. 1, 2 and 3. The top plate b^5 , of the housing B, is removably connected therewith and is provided with a back-stop b^6 , and a bearing post b^7 , for purposes to be presently fully explained. The front of the housing may be provided with an opening b^8 , as illustrated in Figs. 1 and 2, in order that ready access may be had to the interior of the housing for repairs or other purposes.

b^9 and b^{10} , are vertical guide-rails arranged on the interior of the housing B, for engaging with grooved traveler rolls d and d' . These rolls are journaled to a T-shaped frame or block E, detachably engaging the upper shank f , of the piston stem F, by means of a tightening screw f' . The block or frame E is provided with a centrally arranged projection e , forming a bearing for a conical roll e' , movably connected therewith by means of a stud bolt e^2 , as clearly illustrated in Fig. 2. The lower shank f^2 , of the piston-stem F, is partially or wholly threaded and engages the piston F'. The piston F', is provided with a re-

relief valve F^2 , comprising a chamber f^3 , having a split screw f^4 , detachably engaging therein and a check valve F^3 , comprising a chamber or tube f^5 , with a cross-pin f^6 , at or near the upper end thereof and a dish-shaped seat f^7 , with an opening f^8 , extending there-through. The seat f^7 , is located in the lower part of said chamber or tube f^5 , and seating therewith is a complementary faced plug f^9 , as clearly illustrated in Fig. 2.

f^{10} , is a flanged and apertured packing ring or gasket engaging with the piston head F' , and held to position against the same by means of a perforated disk f^{11} , provided with a central projection f^{12} , into which engages the threaded end of the shank f^2 , of the piston stem F . The openings f^{13} and f^{14} , in the disk f^{11} , and in the flexible gasket or packing ring f^{10} , to the relief valve chamber f^3 , are preferably of a uniform dimension, while the apertures f^{15} and f^{16} , to the check valve chamber f^5 , are of decreasing diameter from the disk f^{11} , to the seat f^7 , in said chamber f^5 , whereby most efficient actions of the piston within the cylinder A, are insured.

In the bottom of the cylinder A, is provided a pocket or recess a^5 , complementary to the central projection f^{12} , of said piston F' , and in the downward movement of the same it engages in the said recess a^5 , as will be observed upon reference to Figs. 1 and 2, of the drawings, and thus to insure due regularity in the movements of the piston within the cylinder A.

G, is a vertical shaft journaled at one end to a plate or bearer g , secured to the interior wall of the housing B, in any suitable manner. This shaft extends through a bearing post b^{11} , of the removable top plate b^5 , of the device.

H, is a cam-device for controlling the ranges of movement of the piston F. This device is mounted on the shaft G, and is provided with upper and lower cams, projections or the like, h and h' , and between and alternately in engagement with the projections or cams h and h' , of said device in its movements, the conical-shaped roll e' , travels as clearly illustrated in Figs. 1, 2 and 4, so as to actuate in two different directions the piston F' , within the cylinder A. On the upper end of the shaft G, is secured and coiled around the same, a leaf spring I, the opposite end of which spring is secured to the bearing post b^7 .

J, is a ratchet-wheel loosely mounted on the shaft G, and having engaging therewith a pawl j' , which is in pivotal connection with a lever k . This lever is provided with a split bearing k' , at one end engaging the extremity of the shaft G, and held thereto by means of a tightening-screw k^2 . To the lever k , by means of a pin l , is attached an extensible apertured bent or twisted arm m , movably connected with a bracket or holder n . This bracket or holder n , is adapted for the insertion of screws therethrough, in order to secure the same to a door jamb o , as clearly illustrated

in Figs. 2 and 3. It will be observed that the shaft G, is held normally under tension by means of the leaf spring I, coiled around the same and connected with the bearing post b^7 , and that it is also so maintained under the said tension aided by the pawl-and-ratchet connection hereinbefore fully explained; moreover, that the back-stop b^6 , Figs. 1, 2 and 3, is adapted to limit the range of movement of the lever-arm k , in the manipulations of the check and closer applied to the door C.

The mode of operation of the pneumatic door check and closer hereinbefore described, is as follows: The check and closer is secured to the door C, and the bracket or holder n , connected with the arm m , is secured to the jamb o . By then opening the door inwardly the coiled leaf spring I, will be compressed and at the same time the piston F' , will be depressed within the cylinder A. The air due to the compression of the piston in the cylinder in one movement thereof is relieved from the cylinder through the valve F^2 , when the split screw f^4 , thereof is adjusted so as to permit of such relief of the air. During the time when air is being relieved from behind the piston F' , the movable check valve f^9 will be raised from its seat f^7 , but not to escape therefrom, because the cross-pin f^6 , in the upper end of the said chamber is adapted to prevent the same and in the reverse movement of the piston F' , to that just explained, the said valve f^9 , will be held snugly against its seat in the chamber f^5 . In a word, the movable check valve f^9 , as practice has demonstrated, is afforded such a range of movement in the chamber f^5 , as that most efficient action in the working of the device is insured, due mainly to the particular construction and arrangement thereof, as fully illustrated in Fig. 2. The cam controlling device H, in one movement of the piston F' , in the opening of the door C, makes about a half revolution and when the pressure exerted on the door in opening the same is released, said device returns automatically to its initial position, that is to say, the piston F' , assumes again a position at the upper end of the cylinder A, substantially as illustrated in Figs. 1 and 2.

It will thus 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 created within the cylinder below the piston head F' , and the pressure exerted from without on the cylinder A, is such as that it may be made of very light and inexpensive material. Again the pressure upon the cylinder cannot exceed normal atmospheric pressure, that is, 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 therein due to the closing of the door automatically by the leaf spring I, it will be impossible to increase the degree of resultant vacuum in the cylinder by pushing on the door or otherwise, so long as the exterior surface of the cylinder is ex-

posed to only atmospheric pressure. Consequently the door will be moved and closed and the working members of the device will not be affected or injured. In the closing of the door the piston of the device will thereby be caused to 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 the spring tending to close the door. In the event 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 this excessive force exerted will only tend to close the door and no more.

It may be here remarked that a check and closer constructed and arranged as hereinbefore explained can be kept in good working order without the use of fluids in the cylinder, in which many of the checks heretofore used were immersed, in order to secure any sort of 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. A pneumatic door check and closer, com-

prising a cylinder, a piston provided with a movable plug engaging an apertured dish-shaped seat and limited as to its range of movement by means of a pin and a split screw relief valve therein, means connected with a spring controlled shaft for actuating said piston, and means connecting said shaft with a door-jamb to permit of the opening and closing of the door, substantially as and for the purposes described.

2. A pneumatic door check and closer, comprising a cylinder having a recessed end, a piston with a complementary projection and provided with a split screw relief valve and a movable check valve, a double cam device engaged by a conical-shaped roll in detachable connection with the stem of said piston, a spring controlled shaft for actuating said device, means connecting said shaft with a door-jamb and pawl-and-ratchet connections, substantially as and for the purposes described.

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

JOHN S. SHRAWDER.

Witnesses:

THOMAS M. SMITH,
RICHARD C. MAXWELL.