(Model.)

J. W. RING.

DOOR CHECK.

No. 350,560. Patented Oct. 12, 1886.

Fig. 3.

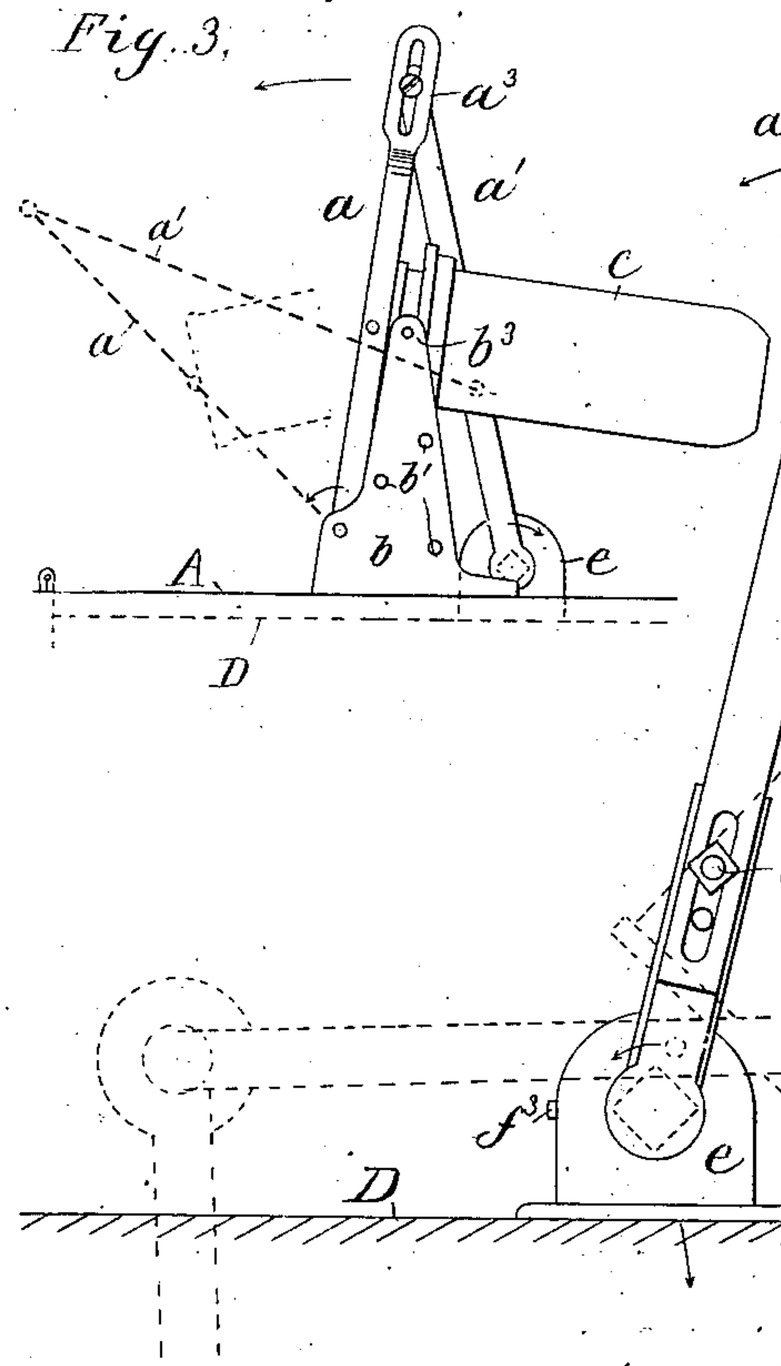


Fig. 1.

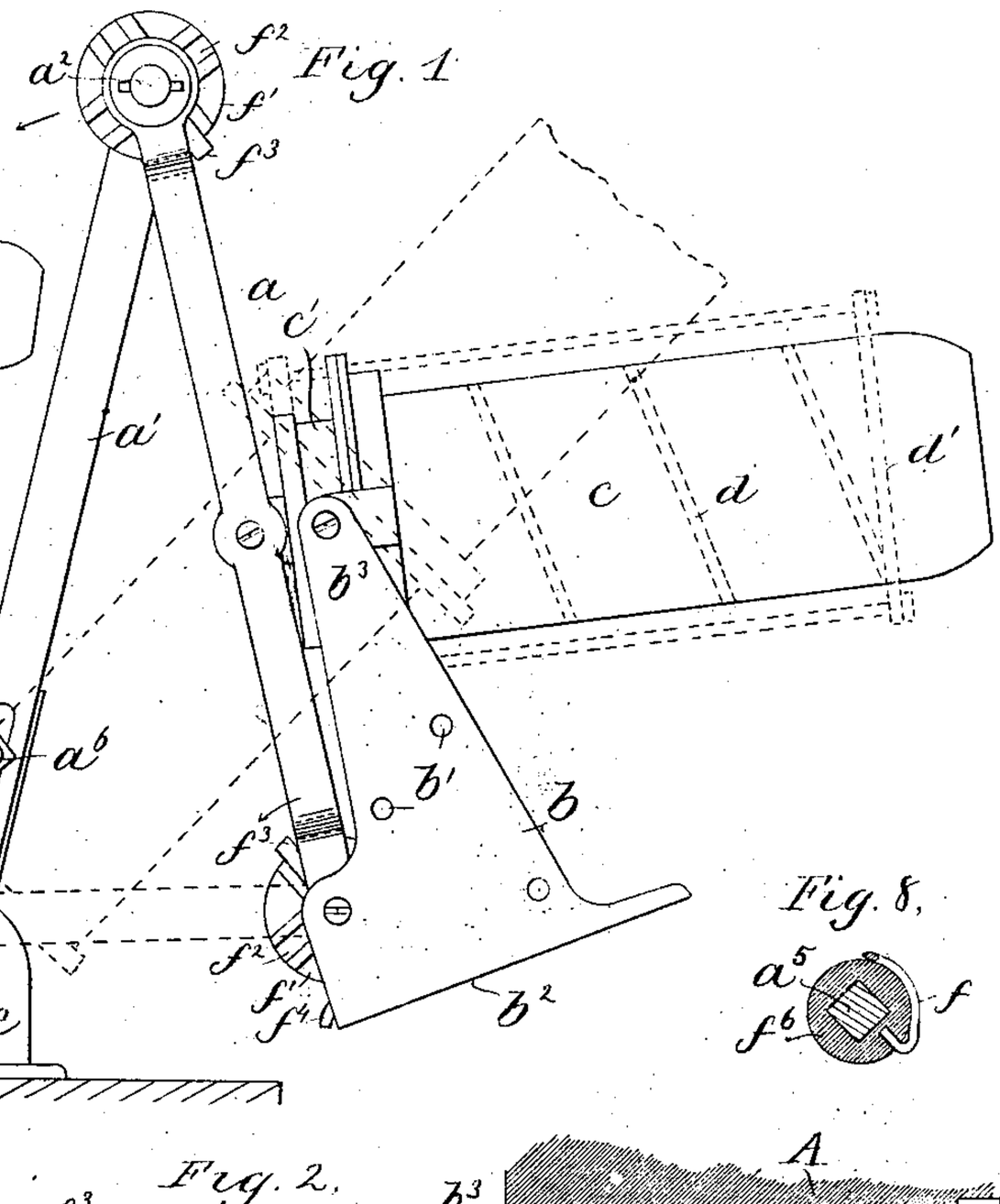


Fig. 8.

Fig. 2.

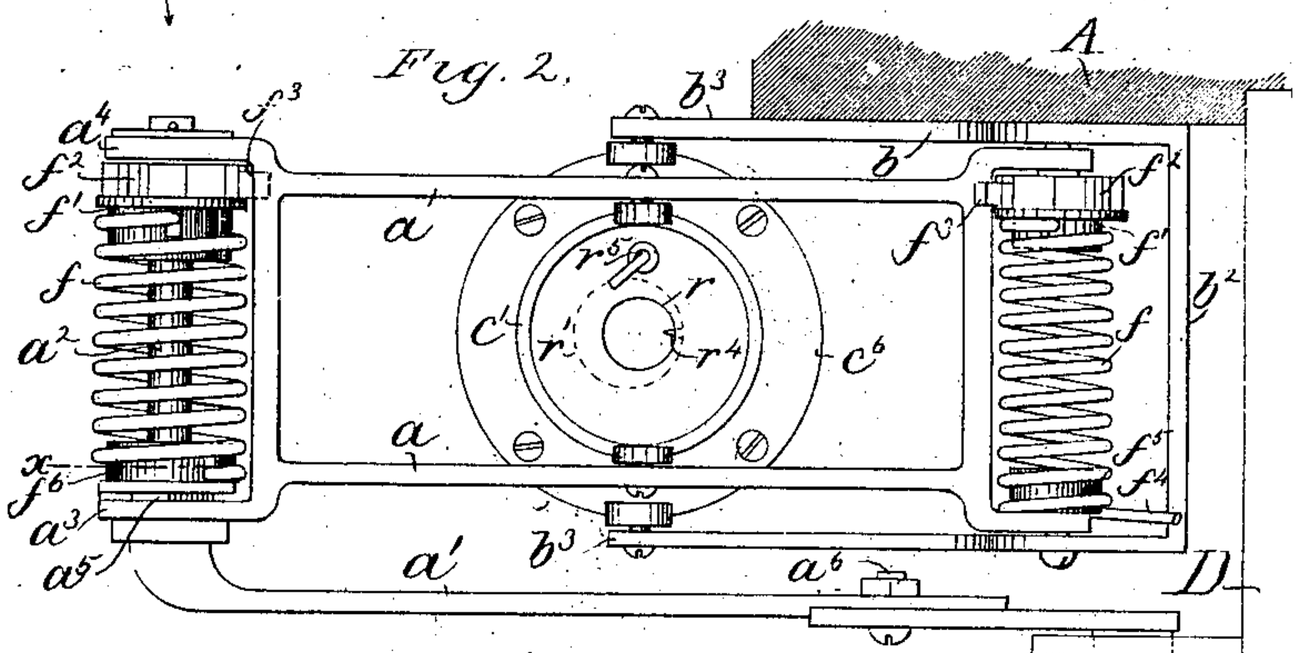
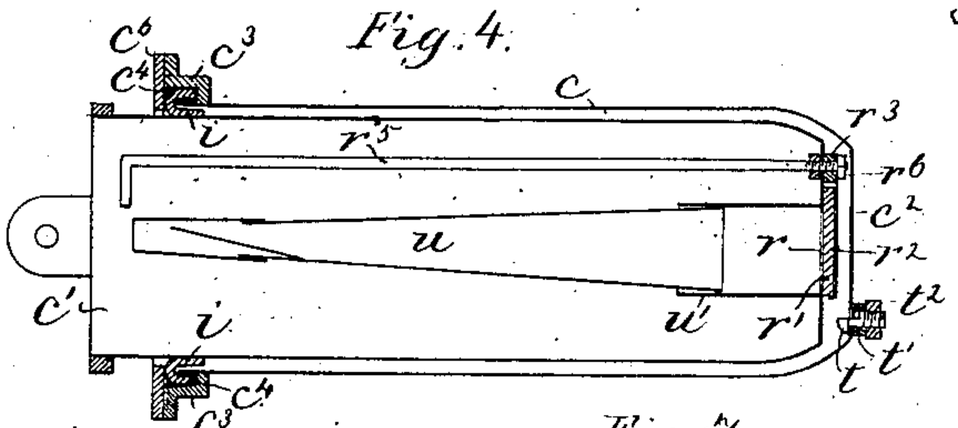


Fig. 4.



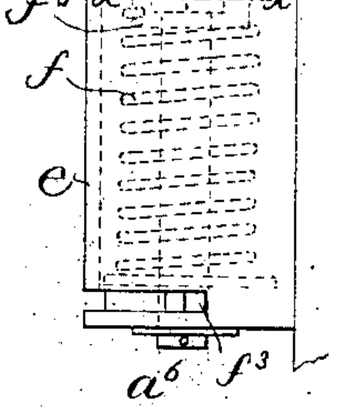


Fig. 5.

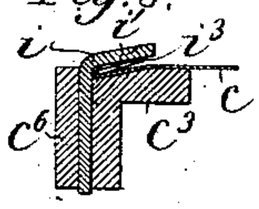


Fig. 6.

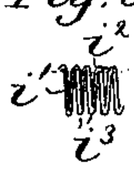
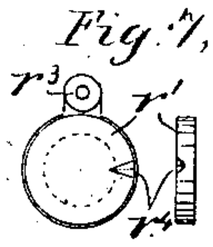


Fig. 7.



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Att'y.

UNITED STATES PATENT OFFICE.

JAMES W. RING, OF BOSTON, MASSACHUSETTS.

DOOR-CHECK.

SPECIFICATION forming part of Letters Patent No. 350,560, dated October 12, 1886.

Application filed May 12, 1886. Serial No. 201,953. (Model.)

To all whom it may concern:

Be it known that I, JAMES W. RING, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Door-Checks, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention is embodied in an apparatus for automatically closing doors and checking the movement thereof before they reach the jamb, so as to prevent slamming.

The invention consists, mainly, in a novel construction of the pneumatic checking device, by which its action is rendered more perfect and the construction greatly simplified and the expense reduced; and the invention also consists in details of construction and arrangement of the parts connecting the door, door-frame, and checking device, by which the force is transmitted to the door.

Instead of using a cylinder and piston having an air-tight fit therein, as heretofore practiced in pneumatic door-checking devices, I employ a cylindrical air-chamber closed at one end and provided with packing around its other end, which is open and in connection with said chamber. I use a cylindrical plunger, that works in the packing at the open end of the air-chamber. The packing thus co-operates with a convex surface, with which it is more easy to obtain an air-tight joint, and as there is no wear on the inner surface of the chamber, and no necessity of having an accurate bore or internal surface for said chamber, it can be made of comparatively cheap material—such as ordinary tinned iron—as can also the plunger, which is preferably hollow and made of commercial sheet-tin—that is, tinned iron. A pneumatic device of this kind can be made fully as effective as any now in use at far less expense, both for material and construction, and if the parts are damaged or worn out they can be readily repaired or replaced by workmen of ordinary skill accustomed to making and repairing articles of tinware, while most of the apparatus heretofore used for door-checks involve machine-work of good quality, which can usually be efficiently performed only at the place where the apparatus is manufactured.

Figure 1 is a plan view of a door-closing apparatus embodying this invention arranged to operate on the jamb side of the door-frame, or so that the door in its first movement in opening moves away from the apparatus; Fig. 2, a front elevation of the apparatus shown in Fig. 1; Fig. 3, a modification showing the apparatus arranged to operate on the hinge side of the door, or so that the first movement of the door in opening is toward the apparatus; Fig. 4, a longitudinal section of the pneumatic checking device; Fig. 5, a sectional detail showing a modification of the packing of the pneumatic device; Fig. 6, a detail thereof to be referred to; Fig. 7, a face and edge view of the valve of the pneumatic device; and Fig. 8, a sectional detail on line $x\,x$, Fig. 2.

The apparatus comprises a pair of jointed arms, $a\,a'$, pivotally connected together at one extremity, and having their other extremities pivotally connected, the one with the door-frame A, Figs. 2 and 3, and the other with the door D. The arm a is connected with the door-frame by means of a supporting bracket or casting, b, provided with screw-holes b', by which it may be attached to the door-frame A, as shown in Fig. 2, in the position with relation to the closed door, (best shown in Fig. 1, in which the door-frame is not shown,) and the said casting b is also provided with means for attaching its base b^2 to the door-frame, as shown in Fig. 3, when the apparatus is to be used on the hinge side of the door, in which case the entire casting b is placed above the level of the top of the door, so that the latter can swing beneath it in opening and closing, as will be readily understood. The casting b is provided with a pair of ears, b^3, which extend to a point about midway along the arm a, as shown, and to which is pivoted the outer member or air-chamber, c, of the pneumatic checking device. The arm a is made as an open frame, as best shown in Fig. 2, and has pivotally connected with it, about midway of its length, the inner member or plunger, c', of the pneumatic device, which can thus oscillate in the arm a as the door opens and closes, as indicated by the dotted-line positions, Figs. 1 and 3, which show the position of the parts when the door is partly open. The arm a' is provided with an arbor or spindle, a^2, which,

in the construction shown in Fig. 2, has its pivotal bearing in lugs a^3 a^4 at the end of the arm a, the arm a' being arranged at one side of the arm a, so that it can swing freely by the same when necessary, it being at one side of the arm a when used as shown in Figs. 1 and 2, and at the other side when used as shown in Fig. 3. In either arrangement the movement of the door on its hinge tends to turn the arm a on its pivot away from the ears b^3, thus drawing the inner member or plunger, c', out from the outer member, c, as shown in dotted lines, the said outer member turning on its pivotal connection with the lugs b^3, so as to remain always in line with the inner member, and this movement also tends to increase the angle between the arms a a', and also to turn the other ends of the said arms with relation to their bearings in the direction indicated by the arrows thereon. The door may consequently be closed by any sufficient force tending to move the parts in the opposite direction to that last described—namely, to draw the plunger c' into the chamber c, or to turn the arms on their pivots in the direction opposite to the arrows indicated thereon. This force may be provided by a spring, such as indicated in dotted lines at d, Fig. 1, acting on a yoke, d', connected with the plunger c', as shown, if it is desired to use a spring acting in a rectilinear direction; but in practice better results are attained by using helical springs applied at the pivots of the arms a a', and tending to turn the said arms on their pivots in the proper direction. If desired, such springs may be used at all three of the joints of the arms a a', as indicated in Figs. 1 and 2, and this arrangement is generally preferable where the door is large and heavy, so that considerable force is required to move it, it being better to apply a smaller force by means of a lighter spring at each of said points than to derive the whole power from a larger force produced by a stouter spring at one of said points. When, however, the door is light, a single spring will answer, and when the apparatus is used on the jamb side of the door—that is, as shown in Figs. 1 and 2—the most effective position for the spring is at the joint of the arm a with the casting b; but when used on the hinge side of the door, as shown in Fig. 3, the most effective position is at the joint of the arm a' with the casting e, connected with the door, and in Fig. 3 this is the only joint provided with such spring, as this will usually be sufficient in this arrangement of the parts. The construction of the helical springs f and means by which their force is applied to the members connected by the pivotal joints is substantially the same at each of the joints, one end of the spring being connected in the manner shown in Fig. 8 with the hub f', which extends a short distance into the spring, so as to properly center it, and is provided with a number of radial sockets, f^2, one of which may receive a projecting finger, f^3, that bears against one member connected by the pivot-joint, as clearly shown in Figs. 1 and 2, so that the said member in turning carries the hub f' with it, and thus strains the spring, the force of which is in turn transmitted through the hub and projection f^3 to the moving member. The opposite end of the spring f, at the joint of the arm a with the bracket b, bears directly against the bracket, as shown at f^4 in Figs. 1 and 2, after passing around a hub-like projection, f^5, on the arm a, which holds the spring in proper position coaxial with the joint. The other end of the spring f, that acts at the joint of the arms a a' is connected, as shown, with a hub, f^6, (see Fig. 8,) having a squared socket, which receives a squared portion, a^5, of the spindle of the arm a', so that the said hub and spindle turn together, and the force of the spring is thus transmitted to the arm a'. The spindle a^6 at the other end of the arm a', having its bearing in the casting e, fastened to the door, has a similarly-squared portion entering the squared socket of the hub f^6, connected with one end of the spring f, used at that joint, the construction of these parts being exactly the same as at the joint between the arms a a', so that the section, Fig. 8, represents either one of the said joints. The casting e that is connected with the door is made as a case or shell, inclosing the spring f used at that joint. The force of the springs f may be adjusted by turning the hubs f' and placing the fingers f^3 in different ones of the sockets f^2 of the said hubs.

In the construction shown in Fig. 3, where no spring is used at the joint between the arms a a', the construction of the said joint may be simplified by omitting the spindle a^2 of the arm a' and lug a^4 of the arm a and connecting the arm a' directly with the lug a^3 of the arm a, which is shown as having a longitudinal slot for adjusting the position of the joint, as is sometimes required, owing to the difference in the amount that the door-frame A overhangs or projects beyond the door. A means of adjustment of the distance between the pivotal connection of the arm a' with the door and with the arm a is provided for in the construction shown in Figs. 1 and 2 by making the arm a' in two parts, longitudinally adjustable upon one another, and being fastened together, when the arm is adjusted to the required length, by means of a bolt, a^6, connected with one part of the arm, passing through a slot in the other part. Additional bolt-holes may be provided, as shown in Fig. 1, to increase the range of adjustment, if need be.

The construction of the pneumatic check is best shown in Figs. 4 to 7, inclusive. The outer shell or air-chamber, c, is preferably cylindrical in shape, and may be made of commercial sheet-tin shaped and united by solder-seams in the usual manner of working this material, as it is not necessary that it should have a smooth or accurate internal surface, such as is required for a cylinder in which a piston is to work. One end of said chamber is closed, as shown at c^2, while the other end

has attached to it, by solder or otherwise, a cast-metal ring, c^3, provided with an internal groove, c^4, as shown in Fig. 4, and preferably, connected with the chamber *c* at a slight distance below its end, so that an annular channel is formed, as shown, between the end of the chamber and the inner wall of the groove c^4. Within this annular channel is placed one edge of a packing-washer, *i*, folded into U shape in cross-section, the outer part of which is secured in the channel air-tight by means of cement, as shown, while the inner part lies along the inner surface of the chamber *c* and bears against the outer surface of the plunger *c'* in such manner that internal fluid-pressure between the plunger and inner wall of the chamber tends to force the inner part of the packing-washer *i* against the plunger, so as to fit the same air-tight, and a substantially air-tight packing will thus be maintained, even if the outer surface of the plunger is not perfectly accurate or cylindrical, so that the said plunger may, like the casing, be made cheaply of sheet-tin without impairing the efficiency of the apparatus as a check. A ring, c^6, may be employed to positively hold the packing-washer *i* in place and prevent it from being blown out by the fluid-pressure, as might happen if the cement alone were depended upon; and, if desired, the packing-washer need not be bent into U shape in cross-section, but merely into Z shape, as shown in Fig. 5, that the pressure of the air acting on the plunger *c'* may resist and check the movement of the parts in closing the door, but not in opening the same. It is necessary to provide a passage controlled by a valve opening inward into the space between the chamber *c* and plunger *c'*. As shown in this instance, the end of the plunger is provided with an opening, *r*, controlled by a valve, *r'*, (see Figs. 2, 4, and 7,) consisting of a piece of rubber or other yielding material, held by a spring-plate, r^2, fastened at r^3 to the head of the plunger. The spring-plate permits the valve to move away from its seat on the plunger sufficiently to permit the air to pass freely through the passage toward the interior of the chamber *c;* but when the pressure is greater in the chamber than at the outside it holds the valve tightly seated, so as to prevent the escape of air through the passage.

In order to prevent the air in the chamber from wholly arresting the movement of the plunger, a slight vent is provided, which may consist of an angular notch, r^4, that may be made either in the valve itself, as shown, or might be made in the edge of the valve-seat, and to regulate the amount of opening provided at this point the valve *r'* is preferably pivotally connected with the plunger, being shown as screwed upon a valve-rod, r^5, and prevented from rotating thereon by a check-nut, r^6, the said valve-rod r^5 being bent at its end to provide a handle, as shown in Figs. 2 and 4, by which it may be turned to move the valve laterally and vary its position with relation to its seat, and thus bring a greater or less portion of the notch r^4 over the passage *r*, as will be readily understood from Fig. 2. The valve-rod r^5, with its handle, may be used to turn the valve wholly away from its seat, so as to permit the air to pass freely through the passage *r* in either direction, if for any reason it should not be desired to check the movement of the door in closing. If desired, the air-chamber *c* may also be provided with a vent, shown in Fig. 4 as made by a screw, *t*, having its head soldered or otherwise fastened to the inner surface of the chamber, and having a portion of its head and shank adjacent thereto cut away, as shown, to afford a passage from the inside to the outside of the chamber. A washer, *t'*, placed on the shank of the screw outside the chamber, covers this opening or passage, and may be held more or less tightly over the opening by means of a nut, t^2, on the end of the screw *t*. By turning the nut t^2 down the washer *t'* may be held more closely over the vent passage at the side of the head of the screw, thus diminishing the escape of air; or, if desired, it may be wholly closed.

In many places alarms are used in connection with doors to call attention to the opening of the door. Such an alarm may be readily used in connection with this apparatus, as shown in Fig. 4, consisting of a whistle or reed-trumpet, *u*, or other instrument operated by a current of air, held in connection with the passage *r*, as shown, so that the air passing into the chamber *c* when the plunger is drawn out in opening the door will flow through the alarm instrument and cause it to sound. A short tubular socket, *u'*, may be fastened to the interior of the plunger *c'*, as shown, into which the alarm-instrument *u* may be readily inserted, and from which it may be easily removed in case the alarm is not wanted.

It is obvious that a pneumatic device such as herein shown and described may be used in connection with any of the various forms of door-checks heretofore devised, and that this part of the invention is not limited to the particular construction illustrated of the devices for connecting the same with the door-frame and door, and for closing the door. The end of the plunger is shown as rounded, so that it will readily enter the mouth of the chamber *c*, when used in connection with door-checking devices of that kind in which the piston is wholly withdrawn from the cylinder in opening the door, and such devices, when containing a chamber and plunger such as herein shown and described, are considered to be within this invention.

It is obvious that the accessory devices—such, for instance, as the connecting-arms and their springs and the vent-passages—will operate equally well with pneumatic devices of other construction than that shown, and in the sub-combinations containing the said accessory devices other pneumatic devices—such,

for instance, as a piston and cylinder—are considered to be mechanical equivalents for the air-chamber and plunger herein shown.

I claim—

1. A pneumatic door-checking device comprising an air-chamber having an open mouth provided with packing, combined with a plunger having a working fit in the said packing and connecting devices for said air-chamber and plunger, by which they may be connected with the door-frame and door for the purpose of controlling the movement of the latter, substantially as described.

2. In a door closing and checking apparatus, the combination of the bracket to be fastened to the door-frame and an air-chamber pivotally connected therewith with a pair of arms pivotally connected together, and one pivotally connected with the said bracket and the other with the door, and a plunger pivotally connected with one of the said arms and working in the said air-chamber, substantially as described.

3. In a door-closing apparatus, the combination of a bracket to be fastened to the door-frame with a pair of arms pivotally connected together, and one pivotally connected with the said bracket and the other with the door, and a helical spring coaxial with the joint of the arm and bracket, acting on said arm, substantially as described.

4. The combination of the air-chamber closed at one end and open and provided with packing at its other end with a plunger having a working fit in said packing and a passage into said chamber, and a valve controlling said passage and made movable laterally with relation to the said passage for the purpose of wholly uncovering the said passage when desired, substantially as and for the purpose described.

5. A pneumatic door-check comprising an air-chamber having an open mouth provided with packing, combined with a plunger having a working fit in said packing, a passage for admitting air to said chamber and valve controlling said passage, and an alarm-instrument operated by the air flowing into the chamber, substantially as described.

6. In a pneumatic door-check, an air-chamber and plunger co-operating therewith, cushioned by the air in said chamber, and a passage for admitting air to said chamber, combined with a valve co-operating with the seat about said passage, being movable toward and from said seat, and also movable laterally with relation thereto, and a vent-notch the size of which is regulated by the lateral movement of the valve with relation to its seat, substantially as described.

7. In a door-closing apparatus, an arm pivotally connected with the door-frame and a second arm pivotally connected with the door and to the first-mentioned arm, combined with a pneumatic checking device co-operating with the said arms and means for adjusting one of said arms relative to the other for the purpose of accommodating said arms to the door-frame and door, substantially as described.

8. In a door-closing apparatus, the combination of a pair of jointed arms, one connected with the door and the other with the door-frame, and a pneumatic checking device co-operating therewith, with a helical spring coaxial with one of the pivot-joints of said arms and an adjusting-hub connected with one end of said spring and provided with a number of radial sockets, and a projection entering one of said sockets for the purpose of transmitting the force of the spring to one member of the joint, substantially as described.

9. In a door-closing apparatus, the combination of a bracket to be fastened to the door-frame with a pair of arms pivotally connected together, and one pivotally connected with the said bracket and the other with the door, and a helical spring coaxial with the joint of the arm and bracket, acting on said arm, and a helical spring coaxial with the pivotal joint of said arms, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES W. RING.

Witnesses:
JOS. P. LIVERMORE,
JAS. J. MALONEY.