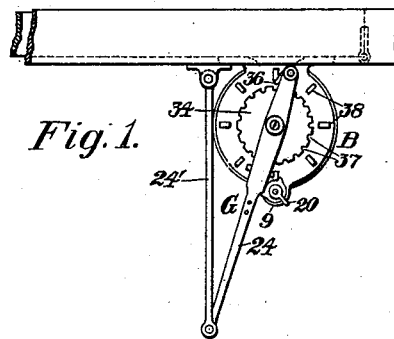
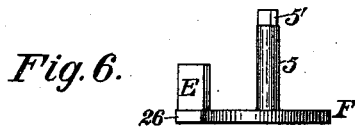
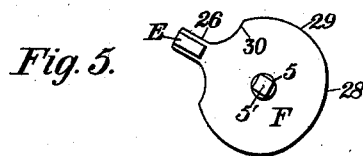


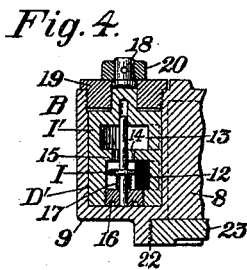
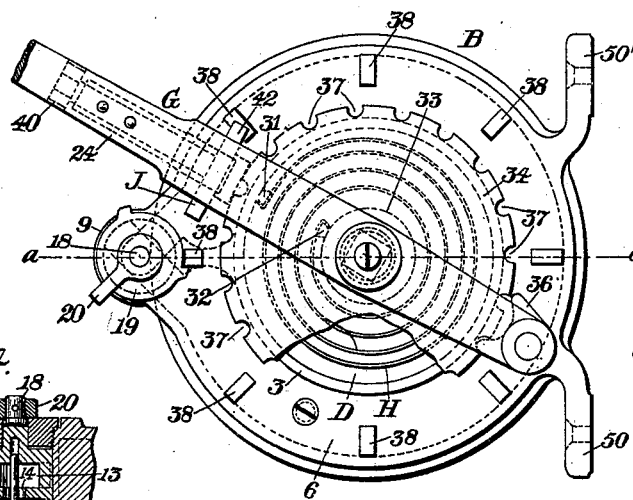
E. E. PUNZELT.  
DOOR CHECK.

No. 523,648.

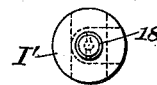
Patented July 24, 1894.



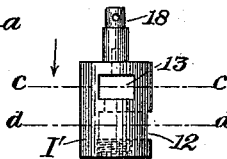
*Fig. 2.*



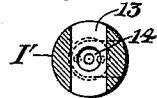
*Fig. 7.*



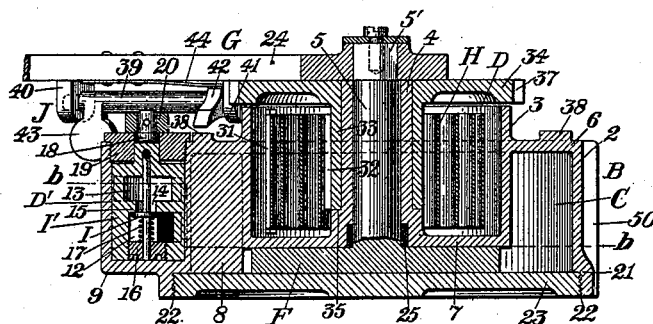
*Fig. 8.*



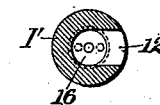
*Fig. 9.*



*Fig. 3.*



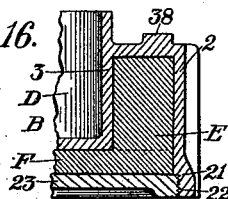
*Fig. 10.*



Witnesses.

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*Fig. 16.*



Inventor:

Edward E. Punzelt,  
By his Attorney,

F. H. Richards

(No Model.)

2 Sheets—Sheet 2.

E. E. PUNZELT.  
DOOR CHECK.

No. 523,648.

Patented July 24, 1894.

Fig. 11.

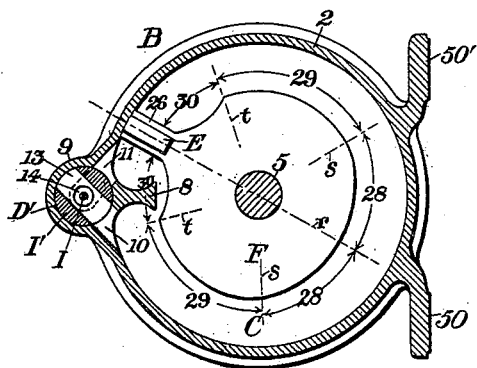


Fig. 12.

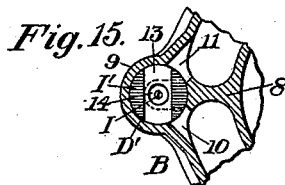
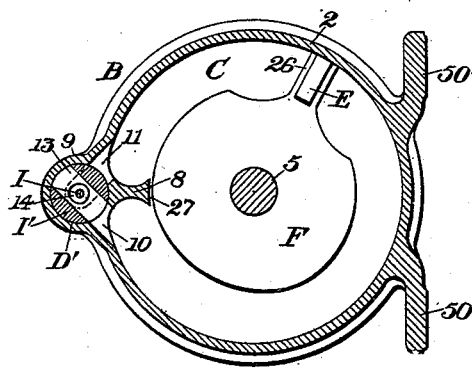


Fig. 13.

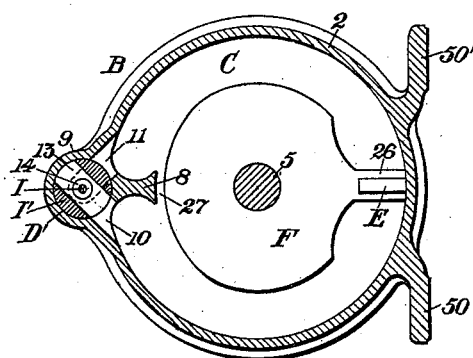


Fig. 14.

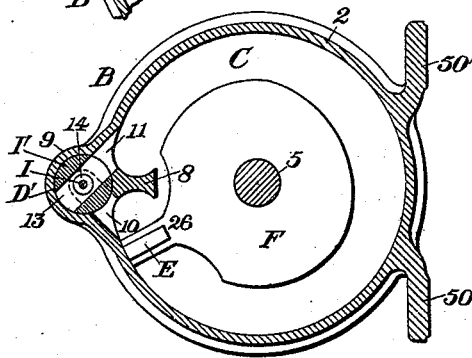


Fig. 17.

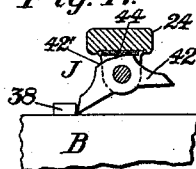


Fig. 18.

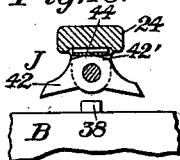
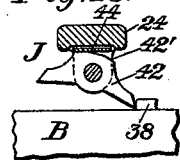


Fig. 19.



Witnesses:

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Fred. J. Dole.

Inventor:

Edward E. Punzelt.  
By his Attorney,  
F. H. Richards

# UNITED STATES PATENT OFFICE.

EDWARD E. PUNZELT, OF NEW BRITAIN, CONNECTICUT, ASSIGNOR OF  
ONE-HALF TO ANDREW TRUMBULL, OF SAME PLACE.

## DOOR-CHECK.

SPECIFICATION forming part of Letters Patent No. 523,648, dated July 24, 1894.

Application filed February 1, 1894. Serial No. 498,736. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD E. PUNZELT, a citizen of the United States, residing at New Britain, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Door-Checks, of which the following is a specification.

This invention, in door-checks, particularly relates to that class known as "fluid door-checks;" the object of the invention being to provide a simple and effective device for closing a door, and at the same time retard the closing movement thereof to prevent slamming; also to so construct and organize the same that it may be operable for use with right or left-hand doors; also to provide means in connection with and forming a part of said door-check whereby the door may be held in an open position without the employment of an outside agent; also to so construct and organize the various parts of the device that they may be readily assembled and disassembled for the purpose of adjustment or repairs.

Another object of the invention is to construct the door-check casing with a spring-containing chamber and a fluid-containing chamber in substantially horizontal alignment and provide a piston intermediate to the side walls of said chambers, and to so construct and organize said parts that the stress upon the piston will be so distributed as to cause no torsional strain tending to throw the parts out of alignment and cause undue wear.

In the drawings accompanying and forming a part of this specification, Figure 1 is a plan view of a door-check embodying my invention, applied to a right-hand door. Fig. 2 is an enlarged plan view of said door-check, a portion of the actuating-lever being broken away. Fig. 3 is a cross-sectional view of the door-check taken in line *a-a*, Fig. 2, looking from the under side in said figure, said Fig. 3 showing the reducing valve as closed, or in the position it occupies during the return or closing movement of the door. Fig. 4 is a cross-sectional view similar to Fig. 3 of a portion of the door-check casing, showing the reducing-valve as open or in the position it occupies during the open-

ing movement of the door. Figs. 5 and 6 are plan and side views, respectively, on a reduced scale, of the piston and piston-carrier. Fig. 7 is a plan view of the reducing-valve casing. Fig. 8 is a side elevation of the same. Fig. 9 is a cross-section of said valve-casing, taken in line *c-c*, Fig. 8, looking downward. Fig. 10 is a similar cross-section of the reducing-valve casing taken in line *d-d*, Fig. 8, looking downward. Figs. 11, 12 and 13, are horizontal cross-sectional views taken in line *b-b*, Fig. 3, looking downward in said figure, and illustrating three positions of the piston during the opening and closing movements of the door, said figures showing the parts arranged for use with a right-handed door. Fig. 14 is a similar cross-sectional view showing the parts in the position they occupy when adapted for use with a left-hand door. Fig. 15 is a similar cross-sectional view of a portion of the casing, showing the relief valve-body adjusted so as to permit the passage of but a small volume of liquid there-through. Fig. 16 is a vertical cross-section of a portion of the casing showing the piston and piston carrier therein. Figs. 17, 18 and 19 are views illustrating the operation of the locking-device for retaining the door in an open position.

Similar characters designate like parts in all the figures.

Briefly stated, the door-check as a whole, comprises a casing, designated in a general way by B, a piston, E, a rotary piston-carrier, F, a piston-actuator, G, a spring, H, means for holding and adjusting said spring, a reducing-valve, I, and a locking-device, J, for locking the piston-actuator with relation to the casing. In the preferred form thereof herein shown, the casing consists of three annular walls, preferably formed integral and designated by 2, 3 and 4, respectively; these walls which are of different diameters, are located one within the other, the annular space between the outer and intermediate walls 2 and 3 respectively, constituting a fluid-chamber, C, the space between the intermediate and inner walls 3 and 4, respectively, constituting a spring-receiving chamber, D, and the space within the inner wall 4 constitutes the

journal bearing for the piston-carrier stem 5. The outer and intermediate walls 2 and 3 are connected together at or near their upper ends by an annular web, 6, which constitutes a  
 5 cover for the fluid-chamber C, and the intermediate and inner walls 3 and 4, respectively, are connected at their lower ends by an annular web, 7, which constitutes the bottom of the spring-chamber D, as will be understood  
 10 by reference to Fig. 3 of the drawings.

The annular fluid-chamber C is divided at one side thereof (as shown in Figs. 11 to 15, inclusively) by a bridge wall, 8, which is connected at one side with the intermediate annular wall 3 and extends from the upper to  
 15 the lower edge of the chamber C. The outer annular wall 2 has an extension 9, at one side thereof, preferably in alignment with the bridge-wall 8, which extension forms a bearing for the reducing-valve-carrier I', the interior of this extension being in the nature of an annular chamber, D', with passages 10 and 11, in communication with the fluid-chamber C at either side of the bridge-wall,  
 20 as will be clearly understood by reference to the figures before referred to. The outer edge of the bridge-wall 8 in connection with the inner face of the extension wall constitutes a bearing for the reducing-valve-carrier I'. This carrier is in the nature of an annular valve-body I' having transverse inlet and outlet openings, 12 and 13, respectively, in communication with the passages 10 and 11, respectively, communication between  
 25 said inlet and outlet openings being had through a longitudinal or vertical valve opening, 14, formed in the valve-seat 15, said opening being normally closed by a check-valve I, which valve, in the preferred form thereof  
 30 herein shown, will be in the nature of a spindle-valve, the upper end of the spindle of said valve being seated in a socket formed in the upper wall of the valve-body, and the lower end of said spindle being seated in a socket formed in a screw-plug, 16, inserted in the  
 35 lower end of said valve-body, a spring, 17, being interposed between said plug and the head of the valve for normally pressing said valve against its seat.

The valve-body I' will preferably have at its upper end, a stem, 18, which, as shown, is extended through a cap, 19, fitting the top of the chamber D' (which cap retains the valve-body against vertical movement) and  
 40 will be provided at its outer end with an actuating member, or arm, 20, by means of which said body may be turned when it is desired to shift the same from the position shown in Fig. 13 to that shown in Fig. 14 to  
 45 bring the outlet-opening 13 in communication with the passage-way 11, to adapt the door-check for use with a left-hand door. As shown in the drawings, the outlet opening 13 extends transversely entirely through the  
 50 valve-body which enables it to be shifted into alignment with either of the passageways 11 or 10 by a relatively short movement of the

actuator arm 20. It will be obvious, however, that changes in the construction and organization of this valve might be made without  
 55 departure from my invention.

The lower open end of the fluid-chamber C will, in practice, be shouldered and screw-threaded, as shown at 21 and 22, respectively, and will have fitted thereto a cap, 23, whose inner edge may have a bearing against said  
 60 shoulder 21 as shown in Fig. 3. The lower end of the spring chamber D terminates at a point remote from the inner face of the cap 23; and closely fitting the space between said cap and  
 65 bottom wall of said chamber D is a piston-carrier, F, having a stem, 5, which extends through, and is adapted for rotation in, the bearing formed by the inner annular wall 4, as shown in Fig. 3, said stem preferably being  
 70 angular at its outer end as shown at 5', and having secured thereto the actuator-member 24, which constitutes one member of the actuating device G. In practice, the bearing for the stem of the piston-carrier will preferably be enlarged at its lower end contiguous  
 75 to said carrier, and be provided with a packing-ring, 25, to prevent the possibility of escape of the fluid contained in the fluid-chamber through said bearing.

The piston-carrier F, in the preferred form thereof herein shown, will be in the nature of a disk having an eccentric or cam-shaped periphery, whose greatest diameter coincides, substantially, with or is fractionally less than,  
 80 the external diameter of the intermediate wall 3 of the spring-chamber D. This carrier has a wide bearing upon the upper face of the cap 23, and is provided at one side thereof, as shown at 26, with an extension  
 85 whose outer edge is concentric with and bears against the inner face of the outer wall 2 of the fluid-chamber. Formed upon, or secured to this extension, is a verticle blade, or piston, E, whose side and top edges are in close but  
 90 movable contact with the sides and upper face of the fluid-chamber as will be clearly understood by reference to Fig. 16 of the drawings. It is obvious that the extension 26 might be constructed to constitute in itself the piston  
 95 proper. This piston-carrier F also constitutes a cut-off valve for automatically regulating the closing movement of the valve and door, said valve acting in connection with the bridge-wall to cut off the passage of the fluid  
 100 from the front to the rear side of the piston, more or less, to thereby increase the resistance of the fluid against the piston more or less as desired. To accomplish this end, the cut-off valve is divided peripherally into three portions each side of a line drawn through the piston and axis thereof, *i. e.*—an eccentric portion, 28, a concentric portion, 29, and a relief-portion, 30, and is so disposed with relation to the lower edge of the bridge-wall, that  
 105 when the valve is in the position shown in Fig. 13 (the position it occupies when the door is open) considerable space, as 27, is left between the eccentric portion 28 of the valve

periphery and the inner edge of the bridge-wall which permits a free circulation of the fluid, and when the said valve has reached the position shown in Fig. 12, the space 27 is materially contracted thus cutting off, to a considerable extent, the passage of the fluid from the front to the rear side of the piston, increasing the resistance thereof to the piston, and consequently decreasing the speed of the piston and its connecting mechanism. This resistance is maintained, owing to the uniformity of the concentric portion 29 of the valve periphery, until the point 30 at the extreme end of said concentric portion comes opposite the bridge-wall, after which a continued movement of the valve brings one of the relief-portions 30 opposite the bridge-wall, which immediately permits an increased volume of fluid to pass the bridge-wall, thus quickly reducing the resistance and causing the piston to complete its movement with rapidity, insuring the closing of the door without noise.

As will be seen by the drawings, the construction and organization of the piston, piston-carrier, and piston-carrier shaft or spindle, (all of which in the preferred form thereof herein shown are formed integral) is such that the piston and spindle lie in parallel planes, and in consequence thereof the bearing force due to the resistance exerted by the liquid upon the piston comes in a line midway of and is carried by said spindle, thus obviating transverse strain and undue wear of the parts.

As before stated, the periphery of the valve F is divided each side of a center line designated by *r* into three effective portions 28, 29 and 30, as will be clearly understood by reference to Fig. 11 of the drawings. The eccentric portions 28 extend each side of the center line *r* to the points *s* indicated by the dotted radial lines, its central portion being located in alignment with the center line *r* and at the side opposite the piston carried by said valve; the concentric or cutting-off portions 29 extend from the points *s* to the points *t* indicated by dotted radial lines, which points *t* are somewhat remote from the acting faces of the piston, and the relief-portions 30 which are formed preferably by notching the periphery of the valve at points contiguous to the piston, at either side thereof, extend from the points *t* and terminate at the side faces of the piston. The construction and operation of this device will be fully understood by reference to Figs. 11, 12 and 13, which illustrate the operation of said valve.

As a means for effecting the closing-movement of the door, I have provided a spring-actuated connection between the piston-actuating lever and the door-check casing, which, in the preferred form thereof herein shown, consists of a spiral spring secured at one end to a projection, 31, upon the inner side of the intermediate wall 3 of the casing, and at its opposite or inner end to a projection, 32, formed upon the hub 33, of a ratchet-wheel,

34, herein shown as journaled upon the inner annular wall 4 of said casing, said wall being shouldered, as shown at 35, to form a bearing for the lower end of said hub. This ratchet-wheel will, in practice, be of sufficient diameter to cover the open end of the spring-chamber D, as shown in Fig. 3 of the drawings, and is operatively connected with the actuating lever 24 by means of a double pawl, 36, pivotally secured to said lever in position for engagement with the notches 37 formed in the periphery of said ratchet-wheel. This pawl is constructed, as described, to render it operable for engagement with the ratchet-wheel when the device is used either with a right or with a left-hand door. The operation of the devices just described will be obvious.

As a means for retaining the actuating-lever in the position it will occupy when the door is open, and for preventing the accidental closing of the door, I have provided a locking-device, which in the preferred form thereof herein shown, consists of a series of radially-disposed abutments, or locking-projections, 38, formed upon the upper face of the casing near the outer edge thereof, and have provided in connection with the actuating-lever, a spring-actuated detent stop, designated in a general way by J. This detent-stop, in the form herein shown, consists of a rock-shaft, 39, journaled at its ends in bearings, 40 and 41, formed upon the under side of the actuating-lever 24, a double-ended pawl, 42, secured to the inner end of the rock-shaft, a rocking-arm, or actuator, 43, formed upon or secured to the outer end of said rock-shaft, and a detent-spring, 44, secured at one end to the under side of the lever 24 and bearing at its opposite free end upon the upper face of the pawl 42. This pawl 42 will preferably have an angular bearing-face, 42', against which the spring 44 bears when said pawl is in either of the three positions shown in Figs. 17, 18 and 19. By this construction, one end of the pawl may be thrown into engagement with one of the abutments 38 of the casing and will be held in the position shown in Fig. 17 owing to the stress of the door-closing spring, until by a further or backward movement of the lever, the pawl will be disengaged from the abutment, when the spring 44 will throw the pawl into the position shown in Fig. 18 with its abutment-engaging ends clear of said abutment which will permit the unobstructed return-movement of the lever 24. By using a double-ended detent-pawl in connection with a locking-device, said locking-device is operable when the door-check is used either with a right or left-hand door.

When it is desired to use the door-check in connection with a left-hand door, the actuating lever will be disconnected from the stem of the piston-carrier, the ratchet-wheel 34 will then be removed, the position of the door-spring will be reversed from that shown

in Fig. 2, and the piston shifted to the position shown in Fig. 13, after which these parts will be re-assembled and the spring wound to the desired tension by means of the ratchet-wheel, after which the pawl 36 will be thrown into locked engagement with the ratchet-wheel 34; the valve-body, or carrier 1' will be shifted from the position shown in Fig. 13 to that shown in Fig. 14. This reorganization and adjustment of the parts will render the device applicable for a left-hand door.

The door-check casing will, in practice, be secured to the door by means of screws extended through the arms 50 and 50'; and connection is made between the piston-carrier of said casing and the door-casing by means of the actuator, which in the preferred form herein shown, consists of the two lever members 24 and 24', the one 24 of which is secured to the stem of the piston-carrier as before described, and the other, 24', of which is pivotally secured at one end to the door-casing, and pivotally connected at its opposite end to the lever 24 as clearly shown in Fig. 1 of the drawings.

A detailed description of the operation of my improved door-check is considered unnecessary, as the same will be clearly understood by any one skilled in the art to which this invention appertains.

Having thus described my invention, I claim—

1. In a door-check of the class specified, in combination, a casing comprising an annular chamber constructed and adapted for receiving a valve-rotating spring and having an annular fluid-chamber surrounding said spring-receiving chamber in the same plane therewith and adapted for receiving a valve, a valve located in said fluid-chamber, a spring located in the spring-receiving chamber, and means for operatively connecting the spring and valve together and adapted for connection with a door, substantially as described.

2. In a door-check of the class specified, a casing comprising an annular spring-receiving chamber having an inner, outer and bottom wall, an annular fluid-receiving chamber extending below, and surrounding said spring-receiving chamber, and a valve-chamber located at one side and having inlet and outlet openings in communication with said fluid-chamber, substantially as described.

3. In a door-check, the combination with a casing having an inner and outer annular chamber in horizontal alignment, with a transversely bridged space intermediate to the bottom walls thereof, of a combined piston-carrier and cut-off valve revolvably supported in the space between the bottom walls of the said chambers and carrying a piston intermediate to the side walls of said chambers, substantially as described and for the purpose set forth.

4. In a door-check of the class specified, the herein described casing, it consisting of two cup-shaped chambers of different diameters

open at opposite ends and both having inner and outer walls in parallelism and so disposed in the same plane and with relation to each other that the open end of one chamber is contiguous to the closed end of the other chamber, and caps for closing the ends of both of said chambers, substantially as described.

5. In a door-check of the class specified, in combination, a casing comprising three annular chambers in circumferential parallelism, two of which chambers are located one within the other, and the other of which chambers is located at one side of, and has passage-ways in communication with the next adjacent chamber, a revoluble piston carried in one of said chambers, a piston-rotating spring carried in another of said chambers, and a valve-carrier and valve located in the other of said chambers in a manner substantially as and for the purpose described.

6. In a door-check of the class specified, the combination with a casing comprising two annular chambers located one within the other, of a piston-carrier having a piston and spindle in parallel disposition, and a spring surrounding said spindle and located between the piston and spindle, substantially as described and for the purpose set forth.

7. In a door-check, in combination, a casing comprising two annular walls of different diameters located one within the other, a piston located between the two walls, a piston-carrier having a spindle in parallelism with said piston, a lever connected to said spindle, a pawl-and-ratchet mechanism intermediate to said lever and spindle, and a spring intermediate to the spindle bearing and piston, substantially as described and for the purpose set forth.

8. In a door-check, in combination, a casing comprising three annular walls of different diameters located one within the other, the outer wall having an extension substantially as described, a valve-carrier and valve located in said extension and in communication with the interior of the outer wall, a bridge-wall located between said valve-carrier and the intermediate wall of the series of walls, a piston and piston-carrier, and means for operating said carrier, substantially as described and for the purpose set forth.

9. In a door-check, the combination with the casing having an annular fluid-chamber with inner and outer walls, of the reducing valve located at one side of said chamber, a bridge-wall intermediate to said valve and inner wall of the chamber, a revoluble piston-carrier having an eccentric or cam-like periphery contiguous to the bridge-wall, a piston carried by said carrier between the walls of the fluid-chamber, and means for actuating said carrier, substantially as described and for the purpose set forth.

10. In a door-check of the class specified, the combination with the casing having a fluid-chamber and with the piston and its

actuator, of a locking-device comprising a series of stops or abutments formed upon the casing, and a detent-pawl carried by the actuator in position for engagement with the stops or abutments of the casing, substantially as described and for the purpose set forth.

11. In a door-check of the class specified, the combination with the casing having a series of projections or abutments upon its upper face, and with the piston and its actuator, of the double-ended pawl carried by a rock-shaft journaled in bearings upon the actuator

and located in position for engagement with the projections or abutments of the casing, a spring in bearing-contact with said pawl for retaining the same normally out of engagement with said abutments, and means for actuating the rock-shaft thereof to throw said pawl into engagement with said abutments, substantially as described and for the purpose set forth.

EDWARD E. PUNZELT.

Witnesses:

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FRED. J. DOLE.