

June 26, 1928.

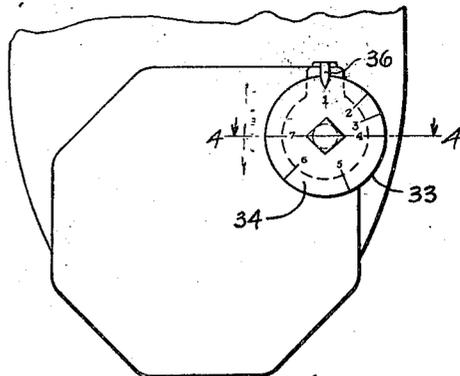
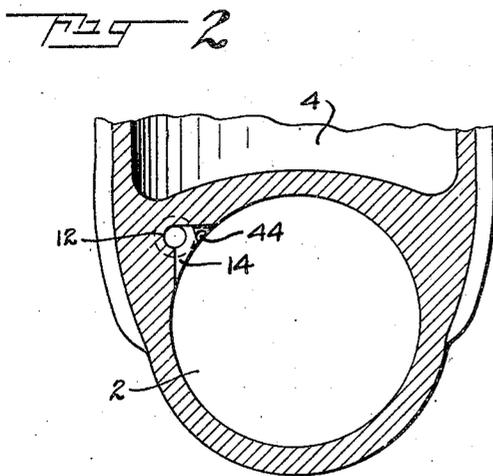
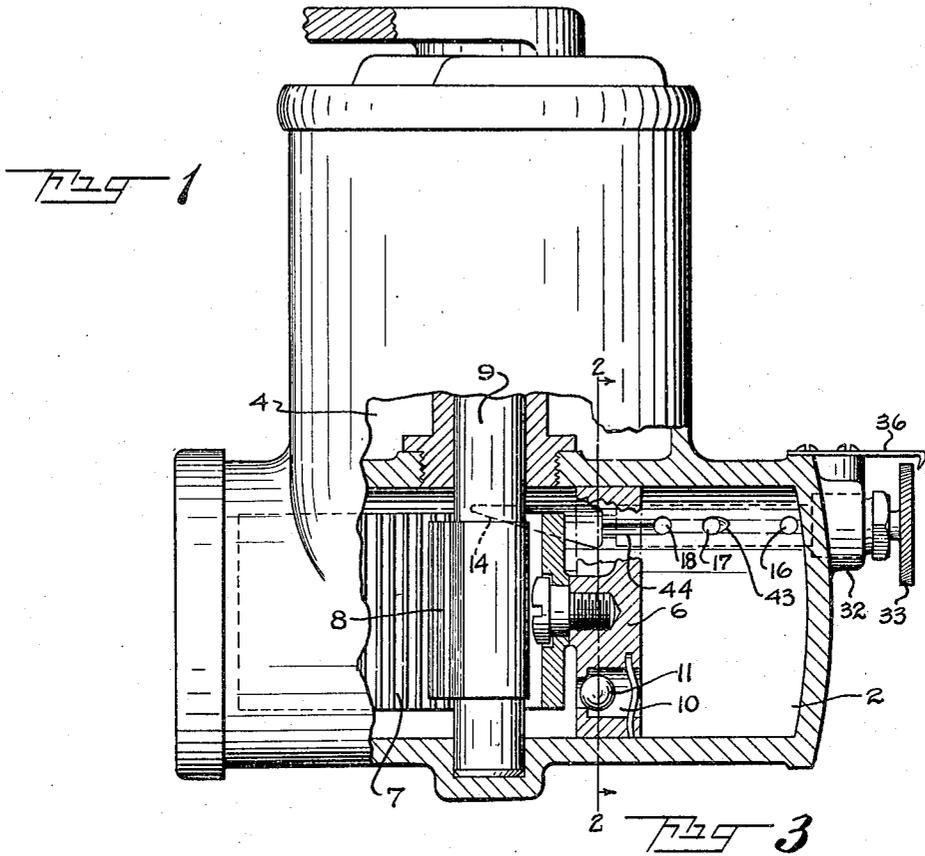
G. H. WUCHERT

1,674,756

DOORCHECK

Filed Oct. 2, 1926

3 Sheets-Sheet 1



G. H. Wuchert,  
INVENTOR.

BY *Walter H. Moore*  
ATTORNEYS.

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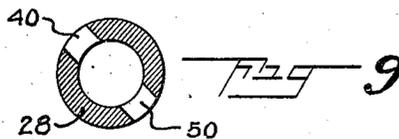
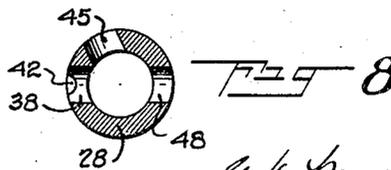
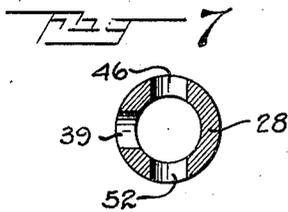
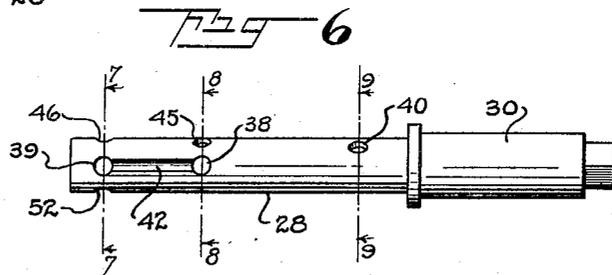
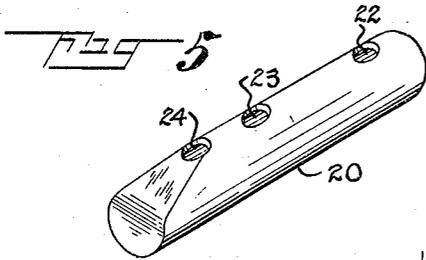
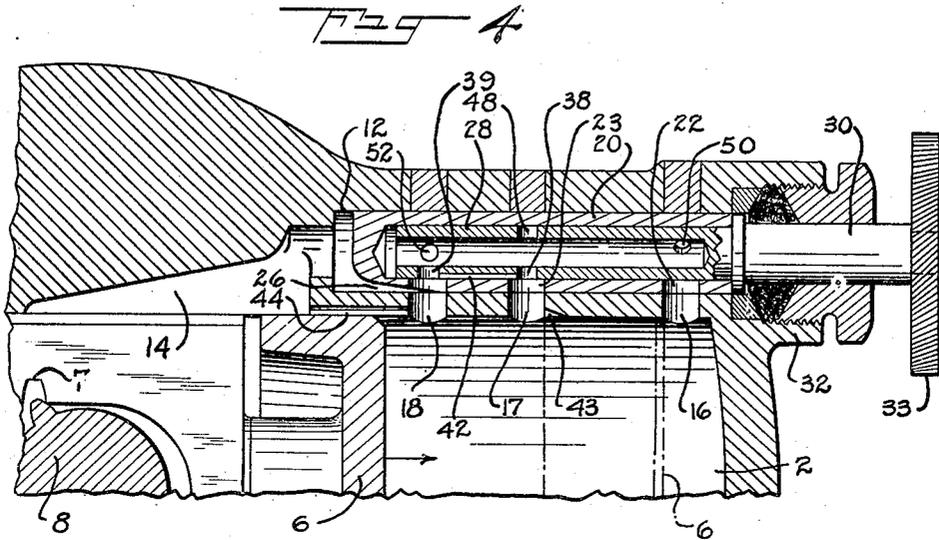
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G. H. WUCHERT

DOORCHECK

Filed Oct. 2, 1926

3 Sheets-Sheet 2



*G. H. Wuchert*  
INVENTOR.

*H. H. H. H. H.*  
ATTORNEYS.

June 26, 1928.

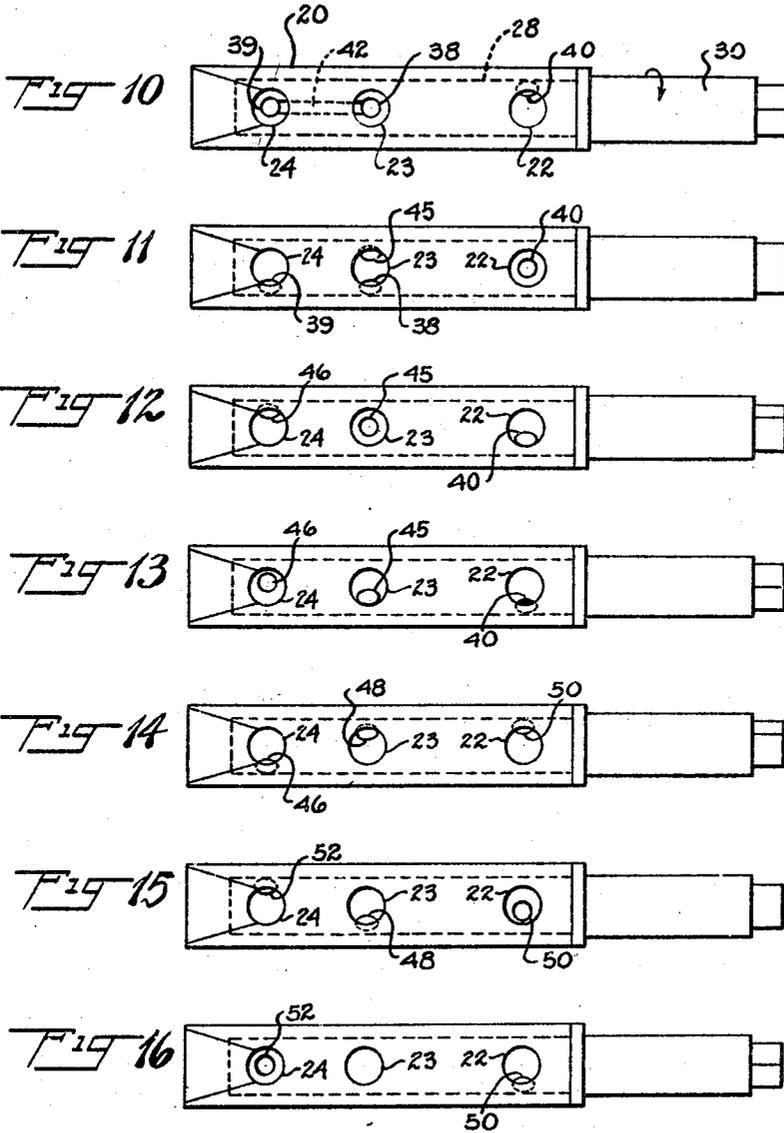
1,674,756

G. H. WUCHERT

DOORCHECK

Filed Oct. 2, 1926

3 Sheets-Sheet 3



*G. H. Wuchert*  
INVENTOR.

BY *Wentworth & Associates*  
ATTORNEYS.

# UNITED STATES PATENT OFFICE.

GEORGE HENRY WUCHERT, OF NEW BRITAIN, CONNECTICUT, ASSIGNOR TO THE AMERICAN HARDWARE CORPORATION, OF NEW BRITAIN, CONNECTICUT, A CORPORATION OF CONNECTICUT.

## DOORCHECK.

Application filed October 2, 1926. Serial No. 139,067.

My invention relates to checks or retarding devices, and has special reference to door checks in which a liquid is employed in a cylinder to check the closing of the door.

5 One of the objects of the invention is to provide a device of this character in which novel and improved means are employed for regulating the checking action thereof.

10 Another object of the invention is to provide a door check which is adapted to be easily controlled to cause the door to be checked anywhere between an opening of substantially 60 degrees to the latching of the door so as to close the door slowly the 15 entire distance; or to close slowly part way and impart a quick action to the door at the closing point to overcome a stiff spring-acting latch bolt or a plunger pressure such as is used in electric door opening; or to close 20 quickly to within a few inches of the latching point and then close very slowly and noiselessly, which movement is desirable for doors in a hospital.

25 A still further object of the invention is to provide a valve controlled door check in which any desired adjustment thereof may be made by turning the valve a distance less than 360 degrees, such a construction permitting the use of a dial indicator whereby the 30 operator may readily determine the angular position to turn the valve to secure the desired adjustment.

35 The several features of the invention, whereby the above-mentioned and other objects may be attained, will be clearly understood from the following description and accompanying drawings, in which:

40 Figure 1 is a longitudinal sectional elevation of a door check embodying the features of the invention in their preferred form;

Fig. 2 is a detail sectional view of a portion of the cylinder of the door check taken on the line 2—2 of Fig. 1;

45 Fig. 3 is an end elevation of the lower portion of the check;

Fig. 4 is a sectional view on an enlarged scale taken on the line 4—4 of Fig. 3;

50 Fig. 5 is a detail view in perspective of a bushing forming a component part of the controlling valve of the door check;

Fig. 6 is a detail side elevation of the movable member of the controlling valve;

Figs. 7, 8 and 9 are detail sectional views taken on the lines 7—7, 8—8 and 9—9, respectively, of Fig. 6; and

55 Figs. 10 to 16, inclusive, are detail diagrammatical views of the valve shown in seven different positions.

The door check illustrated in the drawings is provided with a casing having a piston 60 chamber or cylinder 2, and a chamber 4 for the usual actuating spring (not shown) for the check. A piston 6 is mounted within the cylinder and is actuated by means of a rack 7 secured to the rear side thereof which is 65 operatively engaged by a pinion 8 formed on a vertical shaft 9 which is connected with the actuating spring. The piston is provided with the usual opening 10 through which the liquid is free to pass during the retracting 70 movement of the piston upon opening the door, and which is closed by a ball check valve 11 during the advancing movement of the piston.

75 In the illustrated construction the door check casing is bored to provide a by-pass chamber 12 which extends longitudinally of the forward portion of the piston chamber. The inner surface of this by-pass chamber is cylindrical and its rear end 14 opens in- 80 to the piston chamber at the rear side of the piston. The wall of the by-pass chamber is provided with three ports 16, 17 and 18 leading into the piston chamber at points in front of the piston when the piston is 85 in retracted position. The port 18 is spaced a slight distance from the outer or front end of the piston when the piston is in retracted position; the port 17 is spaced a distance in front of the port 18 so that the 90 piston will pass by the port as it approaches the limit of its advancing movement; and the port 16 is positioned in proximity to the outer or front end wall of the piston chamber. A bushing 20 is secured in the 95 by-pass chamber 12 and is provided with three ports 22, 23 and 24 that register with the ports 16, 17 and 18, respectively. This bushing has its inner or rear end closed and the rear end portion of its surface is bevelled 100 to provide a space 26 between the ports 18 and 24 through which these ports are in communication with the rear or inner open end 14 of the by-pass chamber 12.

A tubular valve 28 is mounted for turning movement in the bushing 20. The outer end of this valve member is closed and is provided with a stem 30 which extends

5 through a suitable packing nut that is screwed into a boss 32 on the casing. An operating wheel or handle 33 is secured on the outer end of the valve stem.

A tubular valve 28 is provided with three series of holes corresponding in position to the ports 22, 23 and 24, respectively, in the bushing or valve chamber 20, with the ports in the several series suitably arranged so that by revolving the valve to different

10 angular positions the passage of the liquid through the ports may be controlled so as to control the movement of the closing of the door. A dial 34 is provided on the valve operating wheel 33, and a fixed pointer 36

15 extends over this dial. The numbers 1 to 7 on the dial indicate seven different angular positions to which the valve member may be moved to effect different closing movements of the door.

25 When the valve is turned to position No. 1 on the dial, holes 38 and 39 (Fig. 10) in the valve coincide with ports 23 and 24 in the bushing 20 and there is also a slight opening of a hole 40 in the valve with port

30 22. A groove 42 is provided on the outside of the valve member connecting holes 38 and 39. When the valve is in this position during the closing of the door, as the piston advances, the liquid in the cylinder passes

35 freely through the port 18, space 26, and out through the open end 14 of the by-pass and back into the cylinder at the rear of the piston. Also, in order to insure a free passage of the liquid at the start of the closing

40 of the door, the inner side of the cylinder is provided with a groove 44 leading rearwardly from the port 18 in the cylinder through which the liquid also passes. After the front end of the piston passes by the

45 port 18, the liquid is still free to pass through the port 17 in the cylinder and back through the groove 42, and also may pass through the hole 38 in the valve and out through the valve hole 39 to the rear side

50 of the piston. Thus the liquid passes freely to the rear of the piston during the first part of the advancing movement of the piston. When, however, the advancing end of the piston passes by the port 17, the liquid

55 is then forced to pass through the small opening provided by the hole 40 of the valve. The free flow of the liquid up to the time the end of the piston passes the port 17 permits the door to close within a few inches

60 of the latching point, after which, as the liquid is forced to pass through the small opening provided by the hole 40, the closing of the door is retarded. In order that the closing of the port 17 by the piston will

65 not be so abrupt as to cause an objection-

able abrupt checking of the door, a short tapering groove 43 is formed in the cylinder wall and leads rearwardly into the port.

When the valve is turned to position No. 2 on the dial, the hole 40 of the valve is positioned in alinement with the by-pass port 22 (Fig. 11) and holes 38 and 39 show slight openings in by-pass ports 23 and 24, respectively. Also a hole 45 in the valve shows

70 a slight opening in the port 23. With the valve in this position, the liquid is free to pass until the piston closes the port 23 and then all of the liquid entering the valve through the hole 40 is forced to pass out

75 through the restricted opening provided by the valve hole 39 so that the door is retarded at this point. When, however, the rear end of the piston passes by the port 23 which occurs when the door is closed

80 close to the latching point, the liquid is free to pass out through the openings provided by the holes 38 and 45 as well as the hole 39, which permits the door then to close quickly. Thus when the valve is turned to

85 position No. 2 on the dial, the door may close quickly part way and then will be retarded until it is close to the latching point, whereupon it will close quickly.

When the valve is turned to position No. 3 on the dial, said hole 45 (Fig. 12) will be in alinement with by-pass port 23 of the valve bushing, a hole 46 will be partly open with by-pass port 24, and the hole 40 will be open slightly more than 46. It will be

90 apparent that this position of the valve checks the door within ten to twelve inches from closing, and then the check allows a quick closing movement of the door to latching position.

When the valve is turned to position No. 4 on the dial (Fig. 13) the valve hole 46 is in alinement with the port 24, the valve hole 40 is only slightly open at the port 22, and the hole 45 presents a larger opening

95 than hole 40. It will be apparent that this position of valve, allows a door to be checked about ten to twelve inches from the latching point and then will close slowly the remaining distance.

When the valve is turned to position No. 5 on the dial (Fig. 14) a valve hole 48 is in substantial alinement with by-pass port 23, the hole 46 has a slight opening with relation to by-pass port 24, and a hole 50

100 presents a slight opening to by-pass port 22. This position of the valve allows the door to close quickly at the beginning of the closing movement, and to decrease in speed to within four to six inches of the latching

105 point, whereupon the door closes very slowly.

When the valve is turned to position No. 6 (Fig. 15) the valve hole 50 is in alinement with port 22, the valve hole 48 is

110 130

slightly open with by-pass port 23, and a valve hole 52 is slightly open with port 24. This position of the valve allows a checking of the door at a point approximately 60 degrees from the closing point. When near the closing point it allows the door to close quickly.

When the valve is turned to position No. 7 upon the dial (Fig. 16) the valve hole 52 is in open position with relation to by-pass port 24, Fig. 16, and also the valve hole 50 is slightly open at by-pass port 22, the by-pass port 23 being completely closed by the valve. When the valve is in this position the door is checked at approximately 60 degrees and then closes slowly the remaining distance.

It will be apparent that the adjustments of the valve above described and any other desired adjustments, may be accomplished by turning the valve a distance less than 360 degrees, and because of this it is practical to use a dial indicator so that the operator by merely turning the valve to any of the points marked on the dial may cause the door check to operate in whatever manner he may desire.

As will be evident to those skilled in the art, my invention permits various modifications without departing from the spirit thereof or the scope of the appended claims.

What I claim is:

1. A door check of the class described having, in combination, a piston, a piston chamber, a chamber having at least three ports, one in communication with the piston chamber at the rear of the piston and the other two in communication with the piston chamber in advance of the piston when the piston is in retracted position, and one of the last two mentioned ports being spaced a distance behind the other and adapted to be closed by the piston during part of its advancing movement, and a single valve member for controlling all of said ports with relation to each other.

2. A door check of the class described having, in combination, a piston, a piston chamber, a chamber having at least three ports, one in communication with the piston chamber at the rear of the piston and the other two in communication with the piston chamber in advance of the piston when the piston is in retracted position, and one of the last two mentioned ports being spaced a distance behind the other and adapted to be closed by the piston during part of its advancing movement, and means for controlling all of said ports independently of each other.

3. A door check of the class described having, in combination, a casing having a piston chamber and a by-pass chamber through which the liquid passes during the advancing movement of the piston, a piston

within said piston chamber, and means for regulating the flow of liquid through said by-pass chamber comprising a valve chamber having a plurality of ports, and a tubular valve member mounted to turn in said valve chamber and having a plurality of series of holes corresponding in position to the ports in said chamber, respectively, the holes in each series being adapted to be successively positioned in alinement with the corresponding port in the valve chamber by turning said valve member, and the holes of the several series being so positioned with relation to each other as to present openings of different sizes to said ports.

4. A door check of the class described having, in combination, a piston, a piston chamber, a by-pass chamber having a plurality of ports through which the liquid passes during the advancing movement of the piston, and means for regulating the flow of liquid through said ports comprising a tubular valve member mounted in the chamber and having a plurality of holes adapted to be positioned in alinement with said ports, respectively, by turning said valve member, said holes being differently positioned with relation to each other than said ports so as to permit said valve member to be turned to cause said holes therein to present openings of different sizes to said ports.

5. A door check of the class described having, in combination, a piston, a piston chamber, a by-pass chamber having a plurality of ports through which the liquid passes during the advancing movement of the piston, and a longitudinally fixed rotatable valve member for controlling all of said ports with relation to each other.

6. A door check of the class described having, in combination, a piston, a piston chamber, a by-pass chamber through which the liquid passes during the advancing movement of the piston, and a rotatable valve adapted to be adjusted by turning it less than 360 degrees to either increase or diminish the rate of flow of the liquid through said by-pass chamber at a plurality of predetermined points in the advancing movement of the piston.

7. A door check having, in combination, a piston, a piston chamber, a valve chamber having three ports, one in communication with the piston chamber at the rear of the piston, and the other two in communication with the piston chamber in front of the piston when the piston is in retracted position, and a single valve for controlling all of said ports with relation to each other.

8. A door check having, in combination, a piston, a piston chamber, a valve chamber having three ports, one in communication with the piston chamber at the rear of the piston, and the other two in communication

with the piston chamber in front of the piston when the piston is in retracted position, and a longitudinally fixed rotatable valve member for controlling all of said ports with relation to each other.

9. A door check having, in combination, a piston, a casing having a piston chamber, and a by-pass chamber having an outlet port leading into the piston chamber at the rear of the piston and three ports leading into the piston chamber at points in advance of the piston when the piston is in retracted position, said three ports being arranged one in advance of the other so that the piston passes over at least two of them during its advancing movement, a bushing extending into said by-pass chamber having its inner end closed and having three ports in alignment with said ports, respectively, in said by-pass chamber, the rearmost port being also in communication with said outlet port of the by-pass chamber, and a tubular valve

member mounted to turn in said bushing for controlling all of said ports.

10. A door check having, in combination, a piston, a casing having a piston chamber, and a by-pass chamber having an outlet port leading into the piston chamber at the rear of the piston and a plurality of ports leading into the piston chamber at points in advance of the piston when the piston is in retracted position, a bushing arranged within said by-pass chamber having its inner end closed and having a plurality of ports in alignment with said ports, respectively, in said by-pass chamber, the rearmost port being also in communication with said outlet port of the by-pass chamber, and a valve mounted to turn in said bushing for controlling all of said ports.

In testimony whereof, I have signed my name to this specification this 28th day of September, 1926.

GEORGE HENRY WUCHERT.