June 19, 1934. D. TAPPAN 1,963,687

DOORCHECK

Filed Dec. 11, 1930 2 Sheets-Sheet 1

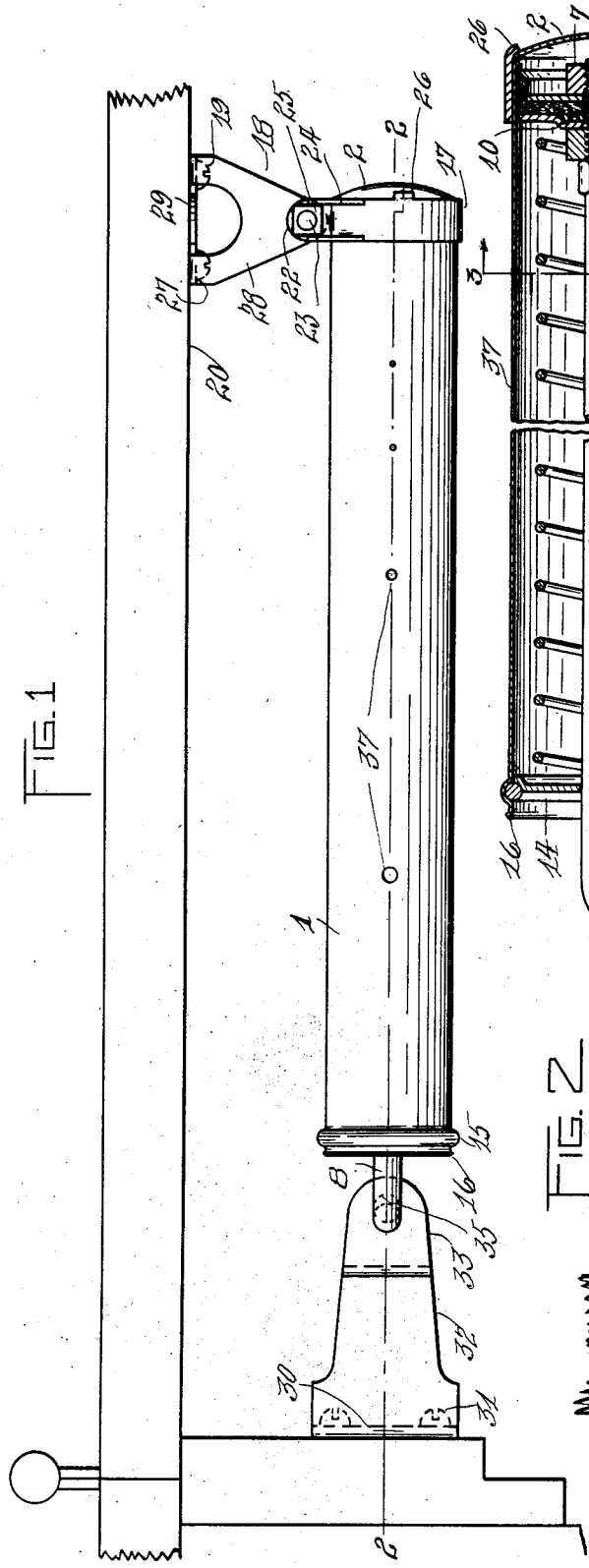


FIG. 1

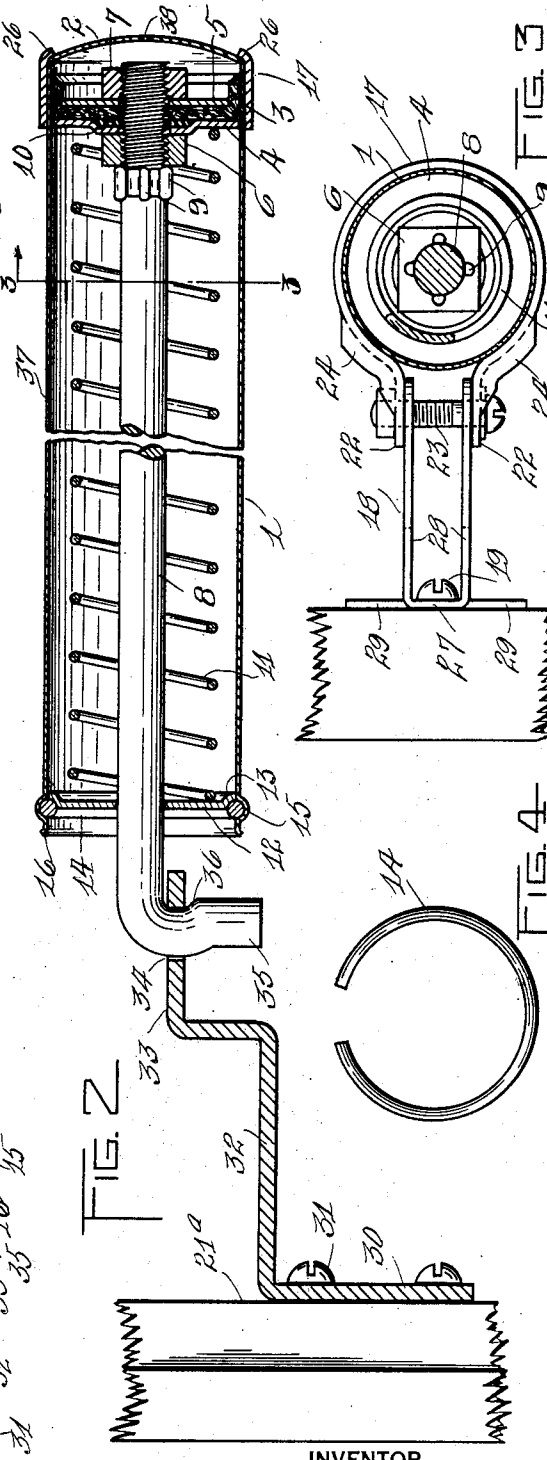


FIG. 2

FIG. 3

FIG. 4

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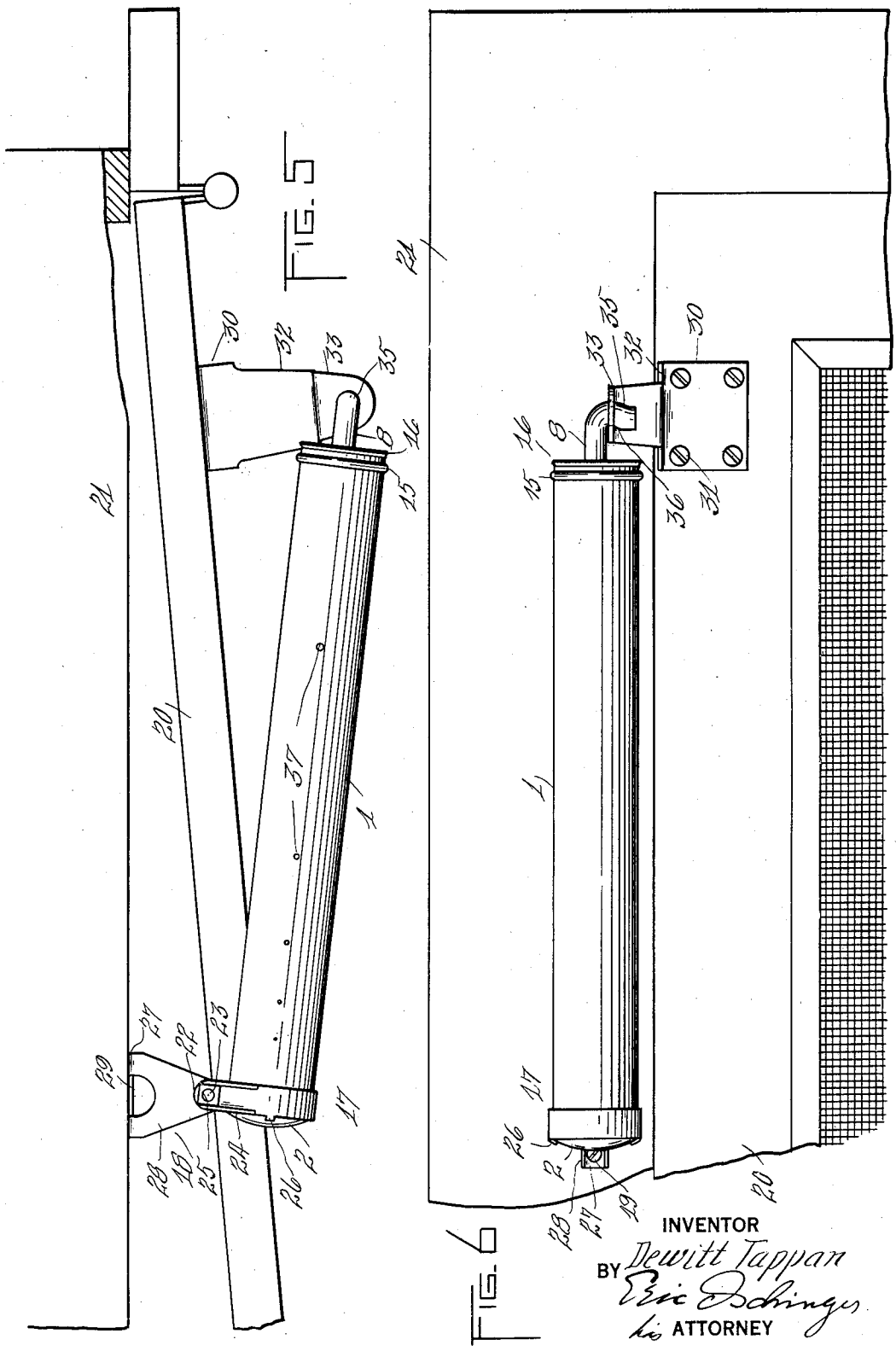


FIG. 5

FIG. 6

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Patented June 19, 1934 1,963,687

UNITED STATES PATENT OFFICE

1,963,687

DOORCHECK

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Application December 11, 1930, Serial No. 501,614

7 Claims. (Cl. 16—66)

The present invention relates to door checks, an object thereof being to provide a device of this character applicable to screen and other doors and which will function both as a door closing means and pneumatic check operating to permit the door to close easily and without slamming.

Another object of the invention is to provide a so-called four-way check, that is, one which may be used on the outside or inside of a door and either right or left.

Another object of the invention is the provision of a door check which is of few parts, inexpensive to manufacture, easy of application, effective in operation and not liable to derangement.

A further object of the invention is the construction of a device which will function equally as well on light or heavy doors.

And, still further objects of the invention are the provision of novel supporting means for the door check and retaining means for the enclosed spring.

To these and other ends relating more particularly to structural details, the invention consists of certain parts and combinations of parts as will be fully set forth in the following description and particularly defined in the appended claims.

The accompanying drawings illustrating the invention and forming a part of the specification are as follows;

Figure 1 is a top plan view of the door check mounted on the inside of a door hinged to swing outwardly.

Fig. 2 is an enlarged longitudinal sectional view on line 2—2, Fig. 1.

Fig. 3 is a sectional view on line 3—3, Fig. 2.

Fig. 4 is a view of the split ring disc retainer.

Fig. 5 is a view similar to Fig. 1 but showing the device as used on the outside of a door opening outwardly.

And, Fig. 6 is a side view of the door check and mounting seen in Fig. 5.

In the drawings similar reference numerals refer to similar parts throughout the several views.

The numeral 1 indicates a cylinder made preferably of drawn tubing and having an integrally formed head 2 at one end. Operating in the cylinder is a cup-shaped piston 3 of leather or like material, this piston being clamped between washers 4 and 5 by nuts 6 and 7 on the threaded inner end of a piston rod 8, the nut 6 abutting a shoulder which, in this instance, comprises the adjacent ends of a plurality of peripheral lugs 9 pressed outwardly from the rod, the nut 7 being the adjustable or clamping member. The central portion of the washer 4 is pressed outwardly to form a recess for receiving a packing washer 10 of rubber or like compressible material which, due to the pressure exerted against the washers 4 and 5, is forced into the depressions between adjacent threads on the rod, thus forming an effective seal and making the piston airtight around the rod.

Within the cylinder and surrounding the rod 8 is a helical spring 11 which is held in place by a removable retainer at the outer or open end of the cylinder, this retainer comprising a disc 12 having a central opening for receiving and guiding the rod 8 and an annular flange 13 conformed to the curvature of a split retaining ring 14 of spring wire which is seated in an annular recess 15 in the cylinder wall. The open end of the cylinder is reinforced by being flared outwardly at 16 and this construction permits a more easy insertion of the parts within the cylinder.

The inner end of the cylinder is supported by means of a strap or split clamp 17 having pivotal connection about a vertical axis upon a bracket 18 secured by screws 19 to the face of a door 20, as in Fig. 1, or to the frame 21 above the door, as in Figs. 5 and 6, according to which mounting of the device is desired.

The clamp 17 is formed, in this instance, from sheet metal and comprises a band portion with spaced laterally turned ends 22 in which are aligned openings for receiving the pivot bolt 23, the clamp being reinforced by segmental side flanges 24 which also extend part way along the edges of the lateral extensions 22 and provide means for holding the nut 25 on the bolt 23 against turning. Substantially diametrically opposed ears 26 bent inwardly from an edge of the clamp engage the cylinder end 2 and thus insure a proper relative positioning of the clamp and cylinder.

The bracket, indicated generally by the numeral 18, is formed from a one piece blank of sheet metal and comprises a body portion 27 and spaced arms 28 at right angles thereto, portions 29 of the arms being struck out and bent parallel with the body portion to give additional bearing surface against the member to which the bracket is secured. The tapered, rounded ends of the arms 28 engage between the ends 22 of the clamp and are provided with openings for receiving the bolt 23. And, the arms being yieldable permit the clamp to be tightened about the cylinder without the necessity of allowing play between the ends of the clamp and the arms.

The open end of the cylinder is supported by a bracket 30 secured by screws 31 to the side 21ª of the door frame, as in Figs. 1 and 2, in which event the median plane of the bracket lies in the direction of the axis of the cylinder. Or, it is secured to a face of the door 20, as in Figs. 5 and 6, in which event, with the door closed, it is turned at substantially right angles to the cylinder. The arm 32 of the bracket 30 has its outer end 33 offset upwardly so as to be cleared by the cylinder when the door is opened and the relative arrangement of the parts are as in Figs. 5 and 6.

The portion 33 of the bracket arm has an opening 34 for receiving the laterally turned outer end 35 of the rod 8, this end of the rod also being slightly offset to form a shoulder 36 which engages the under face of the arm and holds the rod against accidental displacement, the extension 35 being free to turn in the opening 34.

In using the device on the inside of a door, either right or left, the bracket 30 is secured to the casing 21ª at the hinged side of the door, as shown in Figs. 1 and 2. With the door closed, the end 33 of the rod 8 is, pointed downward, hooked into the bracket. Then, with the cylinder held level and the rod 8 drawn slightly outward, the position of the bracket 18 is marked on the door. The clamp 17 is then removed to enable the bracket 18 to be secured to the door. The rod, if disengaged from the bracket 30, is again hooked thereinto, the door slightly opened, and the cylinder end slipped into the clamp 17 which is then properly adjusted by tightening the bolt 23.

In using the device on the outside of a door, either right or left, the bracket 30 is secured to the door at the hinge side and slightly below the top, in which event it is turned at right angles to the cylinder, and the bracket 18 is secured to the frame 21 above the door, the cylinder lying parallel with and slightly above the door.

Operation of the door check for either outside or inside mounting is as follows:

Opening of the door causes the brackets 18 and 30 to swing relatively farther apart whereby the rod 8 draws the piston 3 outward in the cylinder 1 and effects a compression of the spring 11 between the piston washer 4 and the retaining disc 12, the relative angular positions of the cylinder and brackets changing as the clamp 17 and rod 8 turn on their respective pivotal connections. And, during opening of the door air between the piston and the disc 12 is forced out through the longitudinally arranged series of openings 37 in the cylinder wall and also escapes through the opening in the disc 12 around the rod 8, air being drawn into the cylinder through a minute opening 38 in the end wall 2 and the openings 37 as the latter are successively passed by the piston. These openings or air vents 37 are preferably irregularly spaced and of gradually increased diameter toward the open end of the cylinder.

When the door is released, expansion of the spring 11 effects an inward or return movement of the piston and closing of the door, such closing being gradually retarded and cushioned by compression of air within the cylinder, the air escaping through a gradually reduced outlet as the openings 37, starting with the largest one, are successively passed by the piston, the last of the air under pressure escaping through the minute opening 38 in the end wall 2.

Whether the door is a heavy one or a light screen door, the closing is substantially the same as to the retarding and cushioning effect thereon, this result being obtained by the novel arrangement of the series of air vents 37 which accommodate the variable discharging of the air.

What I claim is:

1. In combination with two hinged members one of which is a door and the other a door casing, a door check including a cylinder, a piston and a piston rod guided for axial movement in the cylinder, a bracket secured to one of said members, a combined pivotal connection and clamping member whereby one end of the cylinder is removably supported by the bracket to swing about an axis at right angles to that of the cylinder, a bracket secured to the other of said members and having an opening, a lateral extension on said rod rotatable in said opening, and a shoulder on said extension for engaging said last named bracket in the manner and for the purpose set forth.

2. The combination with two hinged members one of which is a door and the other a door casing, of a door check including a cylinder, a piston and a piston rod guided for axial movement in the cylinder, a combined bracket and clamping member secured to one of said members, a pivotal connection between said hinged member and said combined bracket and clamping member whereby one end of the cylinder is removably supported by the bracket to swing about an axis at right angles to that of the cylinder, a bracket secured to the other of said members, an arm on such bracket and an offset portion at the outer end of such arm, the offset portion having an opening, and a lateral extension on said rod rotatable in said opening, said offset portion permitting the cylinder to swing over the other portion of the arm.

3. In a door check, a cylinder and a support for one end of the cylinder comprising a bracket including an arm, a strap for removably receiving the cylinder comprising a band portion, spaced laterally extending ends for receiving said arm, a bolt extending through said arm and said strap extensions, a nut on said bolt, and segmental flange portions bent outwardly from said band portion and continued along the edges of said extensions, substantially as set forth said bolt holding said strap clamped to said cylinder and forming a pivot for said cylinder to swing on said arm.

4. The combination with two hinged members one of which is a door and the other a door casing, of a door check including a horizontally arranged cylinder, a piston, a piston rod, a support secured to one of said members on which the outer end of said rod is mounted to swing about a vertical axis, and a support for the other end of the cylinder including a bracket secured to the other of said members, a strap in which the end of the cylinder is removably received, spaced laterally extending ends on said strap, means limiting relative axial movement of the cylinder and strap to properly position the strap, and a pivot bolt extending through said bracket and said strap extensions.

5. A door check in accordance with claim 3 including ears bent inwardly to engage the end of the cylinder.

6. In a door check, a cylinder, a strap engaging about an end of the cylinder and including spaced laterally turned ends, a bracket formed of sheet material and comprising a body portion, spaced yieldable arms turned outwardly from the body portion with their ends in engagement with said strap extensions, a pivot bolt extending through

said strap ends and said arms, and a nut on said bolt.

7. The combination, in a door check including a cylinder open at one end, a piston operating in the cylinder and a piston rod, of a disc adjacent the open end of the cylinder having an opening for receiving and guiding said rod, means for removably holding the disc in the cylinder, and a coiled compression spring surrounding the rod and arranged between the piston and said disc, said spring operating to hold the disc against said retaining means.

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