

April 30, 1935.

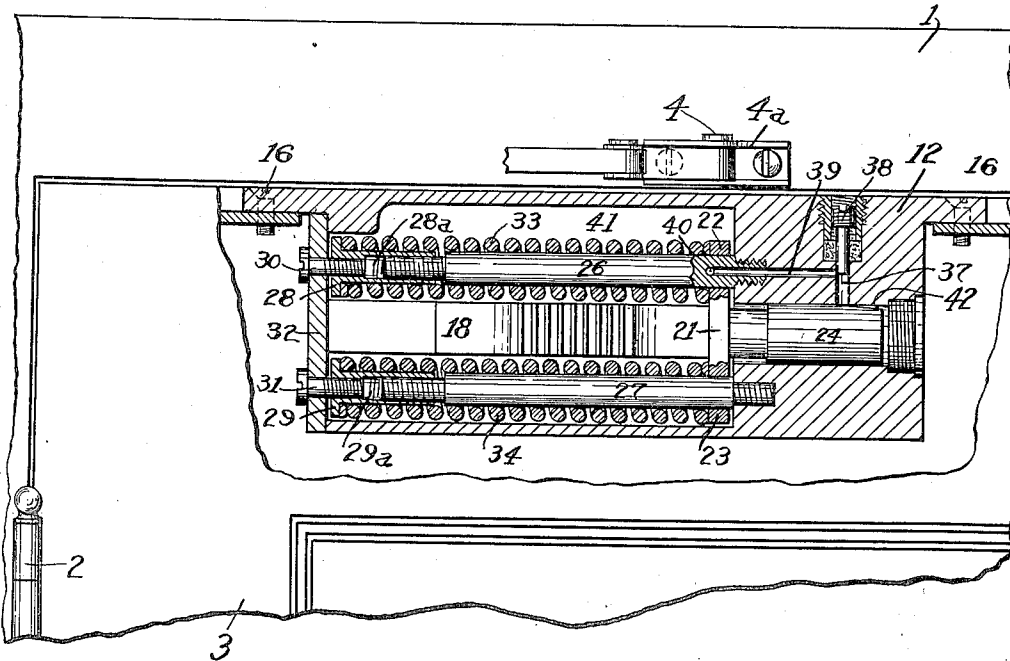
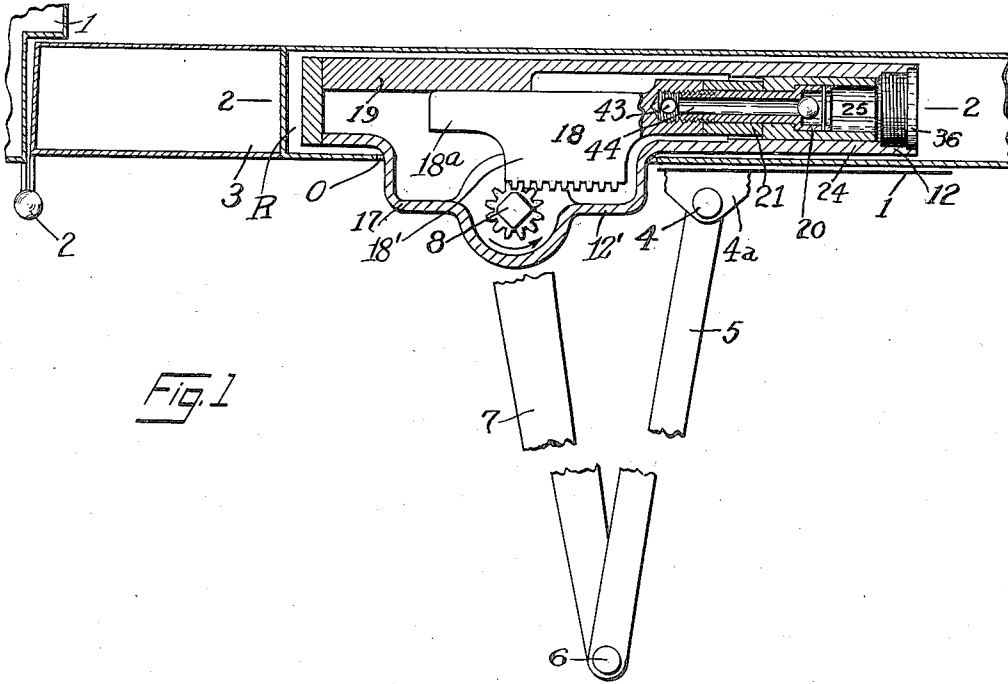
B. S. BERNHARD

1,999,274

DOOR CLOSER AND CHECK

Filed June 21, 1934

3 Sheets-Sheet 1



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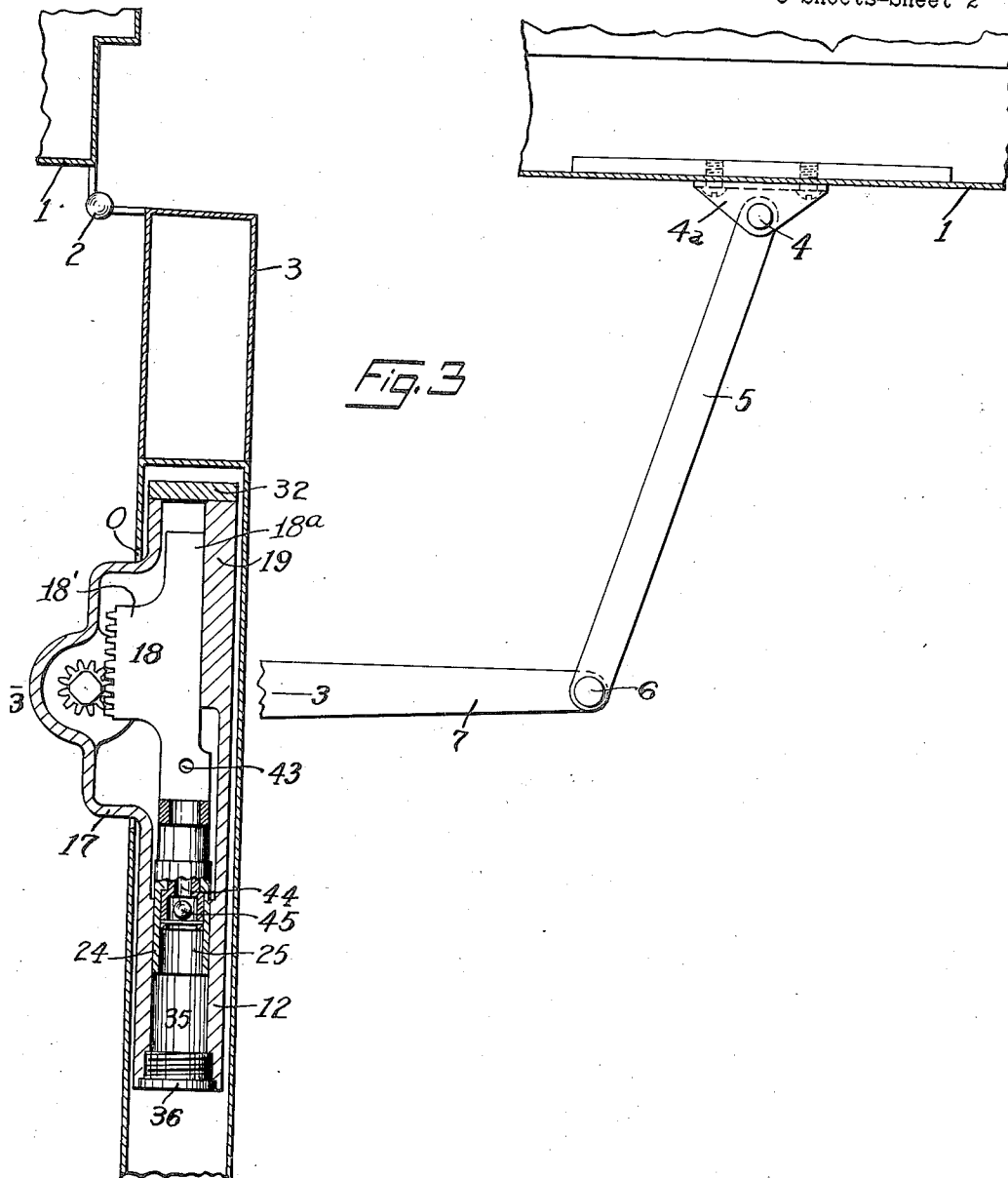
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3 Sheets-Sheet 2



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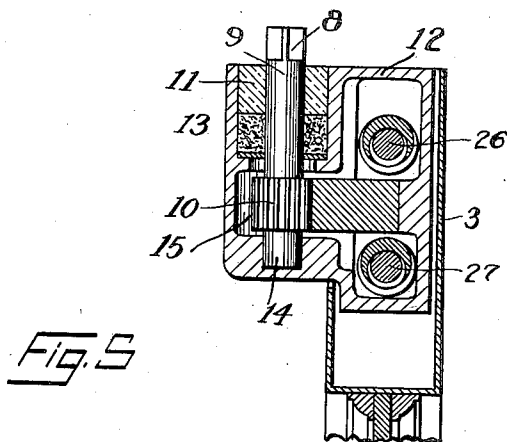
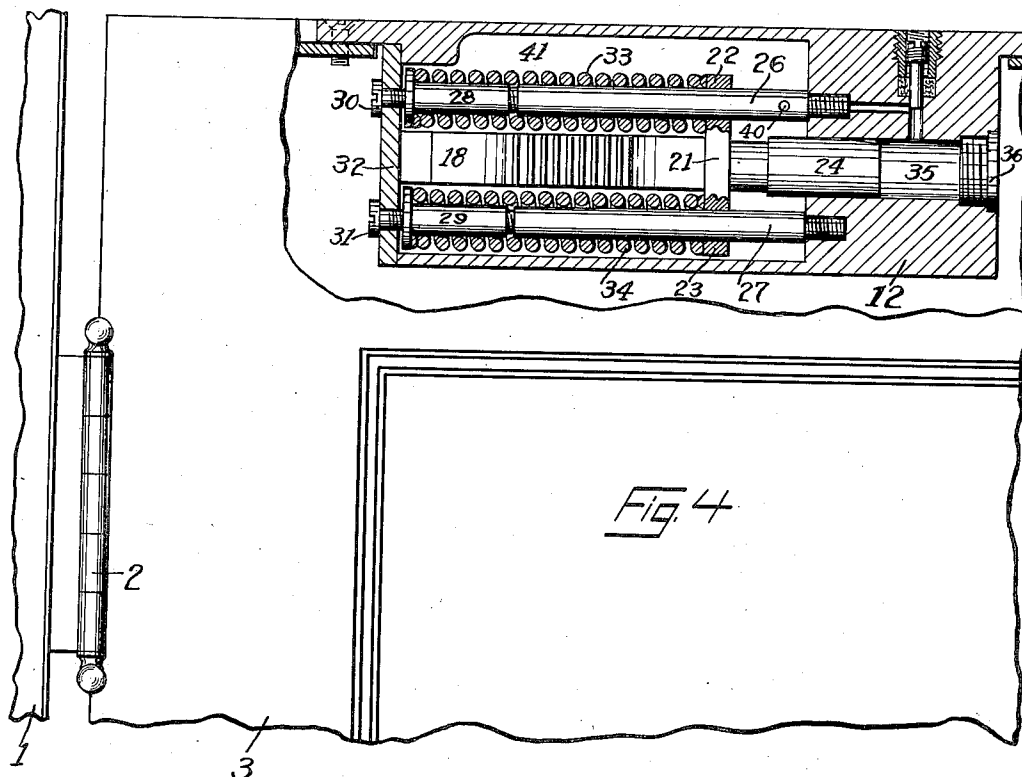
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DOOR CLOSER AND CHECK

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

1,999,274

DOOR CLOSER AND CHECK

Benjamin S. Bernhard, Boston, Mass.

Application June 21, 1934, Serial No. 731,716

3 Claims. (Cl. 16—62)

It is well understood by those familiar with the art that the visible overhead type of door check is quite efficient, although very unsightly. The concealed type of door check is not as efficient, partly due to the small space available for the operating parts, but is the most sightly of all door closing mechanisms. One object of my invention is to provide a door closing and checking mechanism which is concealed for its greater part with only a minor portion visible, it being desirable to make those parts of the mechanism, which are subject to great strain, of sufficient size and strength and to so locate them with relation to each other as to give the desired strength and efficiency. This requires an appropriate increase in available space and consequently a portion of the device extends outside of the door and is visible.

My invention is a mechanism for closing and checking doors or other swinging members which embodies the strength and efficiency of the ordinary overhead check but which has a great advantage over such prior overhead checks from the standpoint of sightliness, because so little of it is visible. In this way I provide substantially the sightliness of a concealed door check with substantially the efficiency of an overhead door check.

It is further well understood that the broken arm method of utilizing the closing power in a door check is more efficient than the parallel arm. With the former construction, the effective lever is shortest and, therefore, most powerful when the door reaches the latching or closed position. With the latter, the effective lever is the longest at the closing or latching position, there actually being no advantageous change in the length of the effective lever.

As disclosed in the drawings, the preferred form of my invention pertains to a door closing mechanism so designed that the closing springs and the checking piston are enclosed in that part of a casing which is concealed within the top rail of the door. The operating shaft, which carries a pinion, in the form disclosed in the drawings, is enclosed in that part of the casing which is visible beyond the surface of the door. The operating shaft is, therefore, not on the same center line as the checking piston, the latter being the case in all prior door checks in which the mechanism is concealed or partly concealed. This offsetting of the pinion axis with relation to the longitudinal axis of the piston provides compactness but also provides greater space where compactness might interfere with strength. In other words, the parts subject to great strain are located partly outside of the door, so that there may be sufficient space to make them of the desired size and strength, such space, if within the door, being insufficient

for the location and cooperation of the parts subject to great strain.

A feature of my invention is the use of a piston whose longitudinal axis is within the swinging member in combination with a rotary actuating shaft whose axis is located exterior to the swinging member.

Other features of compactness and efficiency will be pointed out below.

In the drawings:

Figure 1 is a plan, partly in section, of a device embodying my invention;

Figure 2 is an elevation, partly in section, on line 2—2 of Figure 1;

Figure 3 is a section, similar to Figure 1, but showing the swinging member in open position;

Figure 4 is a section, similar to Figure 2, but showing the swinging member in open position; and

Figure 5 is a section on line 5—5 of Figure 3. Support 1 may be a door frame, for example, and upon it is hinged at 2 a swinging member 3, which, in the form shown, is a metal door. The door is provided with a recess R and with a lateral opening O in one side face of the door; this recess serves to receive snugly the main or body portion of a casing 12 and the casing has a laterally projecting portion 12' extending snugly through the opening in the side face of the door beyond the side face. The laterally projecting portion of the casing is of substantially less length than the casing and constitutes the only visible part of the casing. Pivoted at 4 to a bracket 4^a fixed to the support 1 is one arm 5 of an ordinary broken arm, said arm 5 being pivoted at 6 to the other arm 7, the latter being formed, as usual, with an angular hole (not shown) adapted to operatively engage the corresponding angular projection 8 on shaft 9, the latter having fixed to it pinion 10. Shaft 9 rotates in bearing 11 which may be of metal or other suitable material, said bearing being pressed into a recess in casing 12, said recess receiving also packing 13. Said casing is also recessed to provide a bearing for the end 14 of shaft 9 and is also recessed at 15 to permit rotation of pinion 10. Casing 12 is suitably held, as by screws 16, so as to be partly in an opening in the top rail of swinging member 3, a part 17 projecting outside of the swinging member.

Within the casing 12 is a rack 18 mounted to be moved by pinion 10, the rack being guided at the back by portion 19 of casing 12. The rack member 18 has its teeth formed on a laterally projecting part 18' and with such a construction, I have found it desirable to provide an extension 18a on the rack member which serves to guide the same in its sliding movement and to resist strains imposed upon the rack in the actuating movement of the pinion. Rack member 18 is

interiorly threaded to engage the exterior threading of bolt 20, which fits within member 21 flanged at 22 and 23, said bolt 20 extending within the piston 24 and having its bolt-head located in a recess 25 in piston 24. The bolt is screwed into the rack member 13 and holds said member and the member 21 and the piston in fixed relation, this enabling the piston to guide the rack. Flanges 22 and 23 are perforated to receive guide rods 26 and 27, both of which are screwed into casing 12. Rods 26 and 27 are exteriorly threaded to engage the interior threading 28^a and 29^a of sleeves 28 and 29, the latter being also interiorly threaded to receive screws 30 and 31. These screws act not only to hold cover plate 32 in position but also act to prevent transverse displacement of the rods 26 and 27. Coiled springs 33 and 34 encircle the guide rods, abutting at one end against flanges 22 and 23 and at the other end against flanges on sleeves 28 and 29.

Cylinder 35 formed in casing 12 receives piston 24, being closed at one end by plug 36. From the cylinder extends conduit 37 for suitable checking liquid, such as glycerin and alcohol, this conduit 37 being controlled by a well-known valve 38, there being provided a conduit 39 extending into the guide rod 26 and out therefrom at opening 40 and thence into chamber 41 formed by the walls of the casing 12. A tapered by-pass 42 is provided on the exterior of the piston and cooperates with conduit 37 to permit passage of the checking material from cylinder 35 to conduit 37 when the right end of the piston, as in Figure 2, is to the right of conduit 37.

In using my device the swinging member, such as a door, may be opened, as by hand, and this opening spreads the arms 5 and 7, the latter rotating pinion 10 (as indicated by the arrow in Figure 1), this rotation resulting in moving rack 18 to the left in Figure 1 and consequently moving member 21 to the left, compressing springs 33 and 34, and moving piston 24 to the left, displacing a small quantity of the checking material from chamber 41, the latter being substantially filled with the checking material, such displacement being through opening 43 in the rack and thence through passage 44 in the bolt 20 and by the well-known ball valve 45 and thence into cylinder 25. When the door is released by the user the springs tend to move the member 21 and piston 24 to the right in Figure 4 forcing the checking material through conduit 37, conduit 39 and opening 40 into chamber 41. This movement of the piston 24 and member 21 moves the rack 18 to the right, as in Figure 4, which results in rotation of pinion 10 and consequently swings the arms 5 and 7 into the position of Figure 1.

Where a rack and pinion are used they are the parts subject to the greatest strain and with my construction the rack and pinion can be made of proper size to effectively take care of all strain and this is because I have so located the parts with relation to each other that the desired strength is obtained and also the desired efficiency. Moreover with my construction the pinion may be of a size to give larger travel to the piston with consequent large increase in piston displacement and with resultant increase in checking properties.

What I claim is:

1. In combination, a door having an interior recess and a lateral opening on one side face communicating with said recess, a door check

casing having a laterally projecting portion of substantially less length than the remainder of the casing, said casing being of cross sectional dimension to fit within said recess and substantially fill the same while being concealed therein except the laterally projecting portion thereof, said portion projecting through said lateral opening beyond the door side face, a slidable operating member in said concealed portion of the casing having means for cooperation with a toothed element, means in said casing for checking the movement of said member, and means including a toothed element and a shaft therefor in said casing projecting portion for actuating said first named means, the toothed element being sufficiently spaced from the longitudinal center of the concealed portion of the casing to have its axis positioned beyond the door side face, whereby to provide adequate clearance between the said shaft and the door jamb.

2. A door check comprising a casing having a laterally projecting portion of substantially less length than the remainder of the casing, said casing being of cross sectional dimension adapted to fit within a door having therefor an interior recess and a lateral opening on one side face of the door communicating with said recess, the casing being adapted to be concealed in said recess except the laterally projecting portion thereof and said portion being adapted to project through said lateral opening beyond the door side face, a slidable rack member in said concealed portion of the casing having a toothed part extending into said laterally projecting portion of the casing beyond the plane of the part of the casing adapted to be concealed, means in said casing for checking the movement of the rack and means including a pinion in said casing projecting portion for actuating said rack, the pinion being sufficiently spaced from the longitudinal center of the portion of the casing adapted to be concealed to have its axis positioned beyond the door side face.

3. A door check comprising a casing having a laterally projecting portion of substantially less length than the remainder of the casing, said casing being of cross sectional dimension adapted to fit within a door having therefor an interior recess and a lateral opening on one side face of the door communicating with said recess, the casing being adapted to be concealed in said recess except the laterally projecting portion thereof and said portion being adapted to project through said lateral opening beyond the door side face, a slidable rack member in said concealed portion of the casing having a toothed part extending into said laterally projecting portion of the casing beyond the plane of the part of the casing adapted to be concealed, means in said casing for checking the movement of the rack and means including a pinion in said casing projecting portion for actuating said rack, the pinion being sufficiently spaced from the longitudinal center of the portion of the casing adapted to be concealed to have its axis positioned beyond the door side face, said rack member having at one end a guiding and supporting extension projecting beyond the end teeth, said extension having a sliding engagement with the casing.

BENJAMIN S. BERNHARD.