

Dec. 13, 1932.

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1,890,814

CHECKING FLOOR HINGE

Filed Jan. 23, 1932

3 Sheets-Sheet 1

Fig. 1

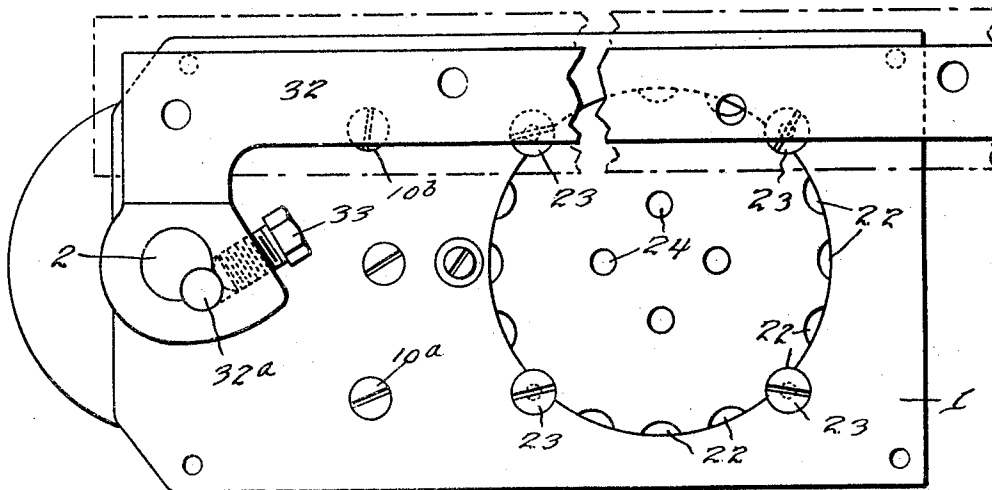


Fig. 2

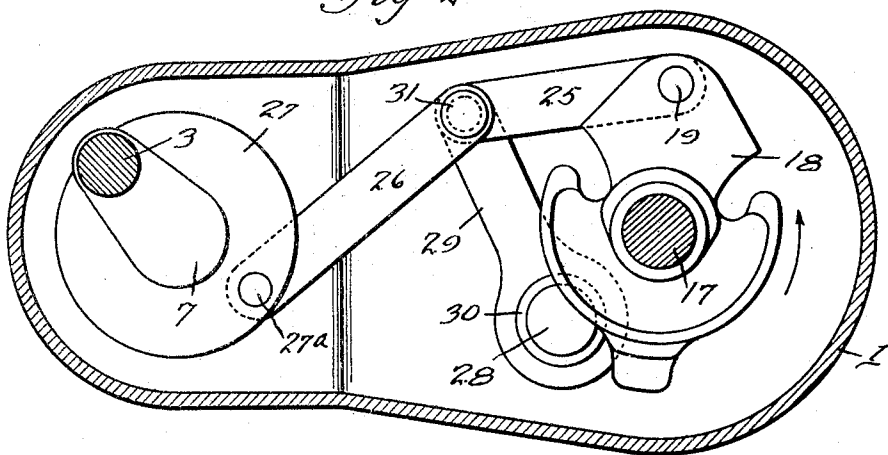
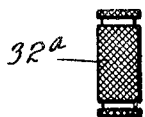


Fig. 9

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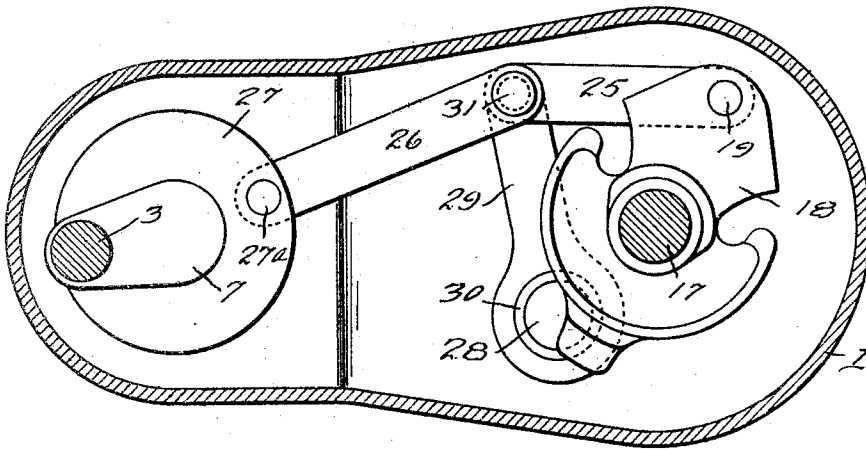
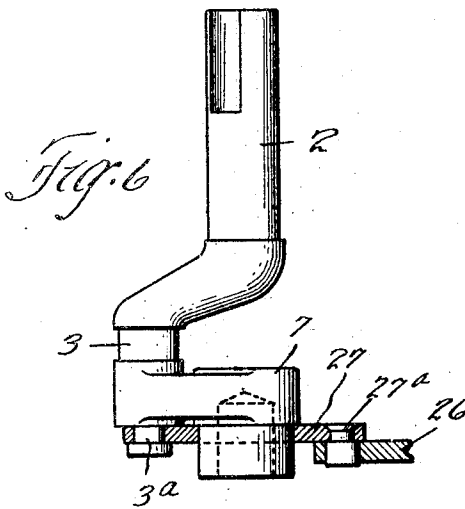
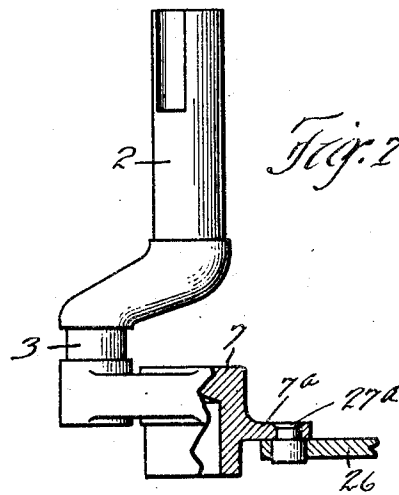
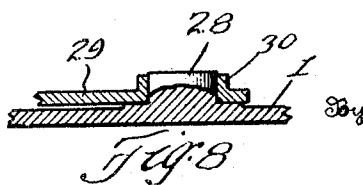
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Fig. 3



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Fig. 4

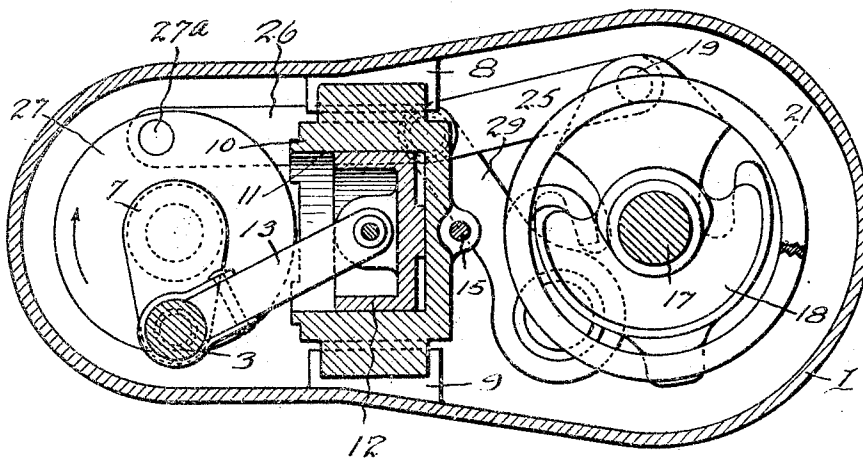
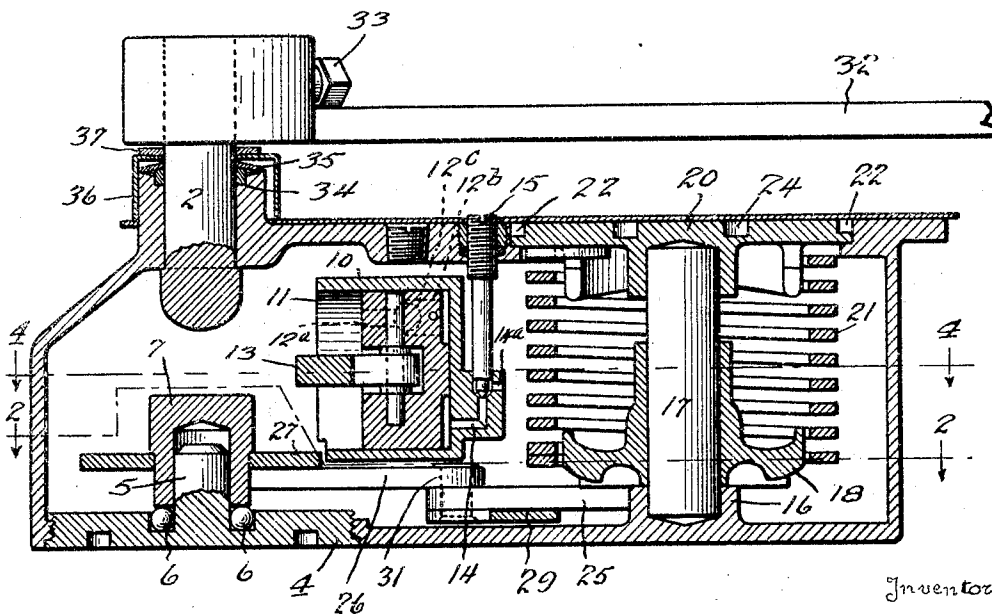


Fig. 5

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UNITED STATES PATENT OFFICE

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CHECKING FLOOR HINGE

Application filed January 23, 1932. Serial No. 588,407.

This invention relates to checking floor hinges of the type adapted to be embedded within a depression provided in the floor and which have provision for checking the action of the door and urging it toward the closed position and are also provided with means for retaining the door in its opened position.

The main object of the invention is to generally improve the construction of checking hinges of this type and to provide a more positive hold-open feature so that the door may be moved further without releasing it from the closed or hold-open positions.

Another object of the invention is to provide a checking hinge of the type herein described in which the strain on the spring is reduced due to the fact that there is less travel of the spring.

Another object of the invention is to provide a checking floor hinge of the character described having operative connections between the door supporting spindle and the door spring adapted to be moved by the door spindle in such a manner that the spring functions to hold the door open as well as to close the door, such connections including a plurality of pivotally connected links arranged to produce a toggle action as the door moves between closed and open positions.

Further and more limited objects of the invention will appear as the description proceeds and by reference to the accompanying drawings in which Fig. 1 is a top plan view of my improved checking floor hinge showing the relative position of the hinge and door when the door is in closed position; Fig. 2 is a horizontal sectional view on the line 2—2 of Fig. 5 and with the parts disposed in the position which they will occupy with the door in the wide open position; Fig. 3 is a view similar to Fig. 2 with the parts in the position which they will occupy with the toggle links in the dead center position; Fig. 4 is a bottom plan view of the hinge with the parts in the position which they will occupy when the door is in the closed position; Fig. 5 is a vertical sectional view of the hinge shown in Fig. 4; Fig. 6 is a detail view partly in section and partly in side elevation of the door supporting spindle; Fig. 7 is a

view similar to Fig. 6 disclosing a slightly modified form of spindle; Fig. 8 is a detail fragmentary sectional view disclosing the part of the casing to which one of the links is pivotally connected; and Fig. 9 is a detail view in side elevation of the knurled key forming the driving connection between the door spindle and the door bracket.

Referring now to the drawings, my improved hinge consists essentially of a casing 1 in which is arranged a door supporting spindle 2 having a crank portion 3. Threadedly secured in the bottom of the casing is an annular member 4 which is provided with an upstanding post or boss 5 about which is provided an annular depression forming a bearing race adapted to receive the ball bearings 6 therein. The lower end of the door spindle 2 is provided with a portion 7 having a recess in the lower end thereof which fits over the post or boss 5, as seen most clearly in Fig. 5.

Preferably formed integral with the casing are a pair of oppositely disposed bosses 8 and 9 between which is arranged a housing 10 having a cylindrical opening 11 therein in which fits a piston 12 which is operatively connected with the crank 3 by means of a link 13 pivotally connected thereto. Extending through the piston 12 is a bore 12^a which connects with a larger bore 12^b in which is secured a check valve 12^c. Leading from one end of the piston chamber 10 is a bore 14 which connects with a bore 14^a leading to the exterior of the housing. Threadedly secured through the top portion of the housing is a valve member 15 the lower end of which is shaped to provide a valve adapted to seat in the upper end of the bore 14 and to regulate the flow of liquid through the bores 14 and 14^a, the purpose of which will be hereinafter described. The housing 10 is secured in place by suitable screws 10^a and 10^b threadedly secured through the top of the casing. The bottom of the casing is also provided with an upstanding hollow boss 16 in which is arranged a pin 17. Fitting over the pin 17 is a lower spring retainer or carrier 18 which carries a downwardly extending pin or boss 19 the purpose of which will hereinafter appear. Surrounding the upper

end of the pin 17 and fitting within an opening provided in the casing is an upper spring retainer 20. Disposed between the spring retainers 18 and 20 is a heavy coil spring 21 the lower end of which is non-rotatably connected with the spring retainer 18 and the upper end of which is engaged by the upper spring retainer 20. The upper spring retainer 20 also serves as a spring adjusting member and is provided with peripheral recesses 22. Threadedly secured in the top of the casing are a plurality of screws 23 which are adapted to engage in the recesses 22 and hold the spring adjusting member 20 against rotation. The spring adjusting member 20 is provided with a plurality of openings 24 which are adapted to receive a wrench whereby the same may be adjusted to vary the tension on the spring.

Pivottally connected to the pin 19 is a link 25 to the opposite end of which is pivottally connected a link 26, the opposite end of the link 26 being pivottally connected to a disk 27 which fits over the lower end portion of the door spindle. The disk 27 is provided with a downwardly extending pin 27^a which projects through an opening provided in the link 26. Projecting downwardly from the crank portion 3 of the spindle is a boss or projection 3^a which extends into an opening provided in the disk 27 whereby to form a driving connection between the spindle and the disk.

Preferably formed on the bottom of the casing 1 is an upstanding boss 28 and fitting thereover is a link 29 which is provided with a hardened shouldered portion 30. The opposite end of the link 29 is pivottally connected to the links 25 and 26 by means of a pin 31 which serves to pivottally connect the three links 25, 26 and 29 together. The spring 21 is placed under tension by turning the upper spring retainer and adjusting member 20 by means of a suitable tool applied in the openings 24. After the spring has been placed under tension, the screws 23 are screwed home to engage in the peripheral recesses 22 so as to hold the same against movement. It will thus be seen that the spring 21 is always under tension and tends to move the lower spring retainer 18 counter-clockwise or in the direction of the arrow in Fig. 2.

The door spindle 2 extends through an opening provided in the top of the casing and secured thereto is a door supporting bracket 32 which is non-rotatably secured to the upper end of the door spindle by means of a knurled key 32^a which is held in place by a set screw 33. The door-supporting bracket is provided with suitable openings adapted to receive screws therethrough for securing the door thereto. The entire casing is adapted to be filled with a suitable checking fluid such as glycerine or lubricating oil. In order to prevent leakage around the door

spindle 2 I provide a packing 34 which is disposed about the projecting end of the spindle and held in place by a washer 35 pressed over the upper end of the spindle. Secured over the washer 35 is a finished cover plate 36 and over which is disposed a second washer 37.

In Fig. 4 the parts are shown in the position which they will occupy when the door is in the closed position. Upon opening movement of the door, the door spindle 2 will be moved clockwise. The piston 12, being connected with the crank 3 of the door spindle, will be moved toward the left as seen in Fig. 4. Liquid will pass through the bore 12^a and 12^b in the piston and past the check valve 12^c, and the spring 21 will be placed under tension. As the door is opened, the links 25, 26 and 29 will be gradually moved to the position shown in Fig. 3. As the door is moved open farther, the links 25, 26 and 29 will approach the position shown in Fig. 2 which is the wide-open position of the door. Should the door be released before the parts reach the position shown in Fig. 3, the spring 21 will urge the door toward its closed position, the liquid in front of the piston serving to cushion and check the closing of the door. Should the door be moved past the position shown in Fig. 3, the spring will urge the door toward the open position and hold the door in the open position. It will thus be seen that the links are so arranged as to produce a toggle action as the door is moved from the closed to the open position. After the links pass the dead center position shown in Fig. 3, the spring tends to hold the door open. Prior to this time the spring tends to close the door. The rapidity at which the door is closed by the spring is controlled by means of the check valve 15 which controls the flow of liquid through the bores 14 and 14^a. It will thus be seen that I have provided a non-rigid connection between the spring retainer 18 and the door spindle 2 which will give a very positive action and which will permit a wide opening of the door.

In Fig. 7 there is disclosed a slightly modified form of door spindle in which the disk 27 is omitted and the lower portion of the spindle is provided with a portion 7^a formed integral therewith and to which the link 26 is pivottally connected. This form of door spindle is identical with the construction hereinbefore described except that the disk is omitted and the lower portion of the door spindle is formed in one piece.

It will now be clear that I have provided an improved checking floor hinge which will accomplish the objects of the invention as hereinbefore stated. Various changes may be made in the arrangements of parts and details of construction without departing from the spirit of my invention and the form

of the invention herein disclosed is to be considered merely as illustrative and not in a limiting sense as the invention is limited only in accordance with the scope of the appended
5 claims.

Having thus described my invention, what I claim is:

1. In a door check of the character described, the combination of a door supporting spindle, door cushioning means connected with said spindle adapted to check the movement of the door toward closing position, a door closing spring, a non-rigid connection between said spring and said spindle
15 including three links pivotally connected so as to produce a toggle action as the door moves from closed to open positions, and means constraining one of said links to move about a fixed pivot.

2. In a door check of the character described, the combination of a door supporting spindle, door cushioning means connected with said spindle adapted to check the movement of the door toward closing position, a door closing spring, a non-rigid connection between said spring and said spindle
25 including a plurality of pivotally connected links one of which is constrained to move about a fixed pivot.

3. In a door check of the character described, the combination of a casing, a spindle arranged within said casing and having a portion shaped to provide a crank, door cushioning means connected with said crank,
35 a door closing spring arranged within said casing, operative connections between said spindle and spring adapted to be moved by said spindle in such a manner that the spring functions to hold the door open and to close
40 the door, said connections comprising three links pivotally connected, one of said links being pivotally connected with said casing.

4. In a door check of the character described, the combination of a casing, a spindle arranged within said casing and having a portion shaped to provide a crank, door cushioning means connected with said crank,
45 a door closing spring arranged within said casing, operative connections between said spindle and spring adapted to be moved by said spindle in such a manner that the spring functions to hold the door open and to close the door, said connections comprising
50 three links one of which is pivotally connected to said casing at one end, the other two links being pivotally connected with said first link and having pivotal connection with said spindle and spring.

In testimony whereof, I hereunto affix my
60 signature.

HENRY E. HUBBS.