May 3, 1938. G. L. SHERWOOD 2,115,968

DOOR CHECK

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Fig. 1.

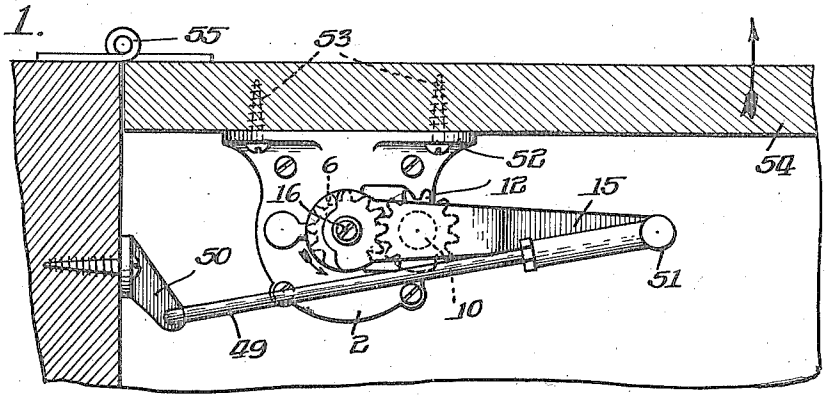



Fig. 2.

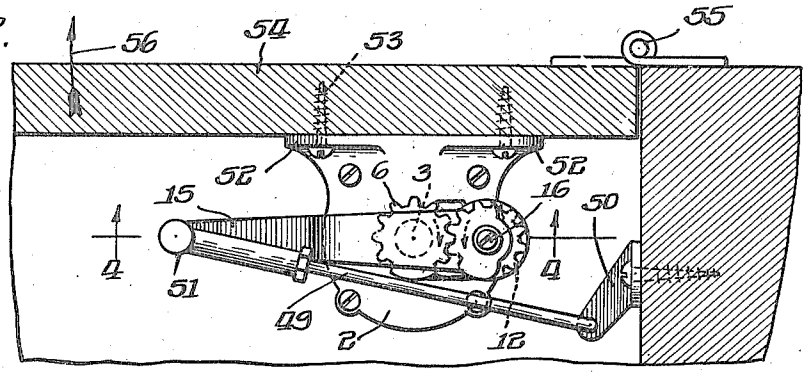



Fig. 3.

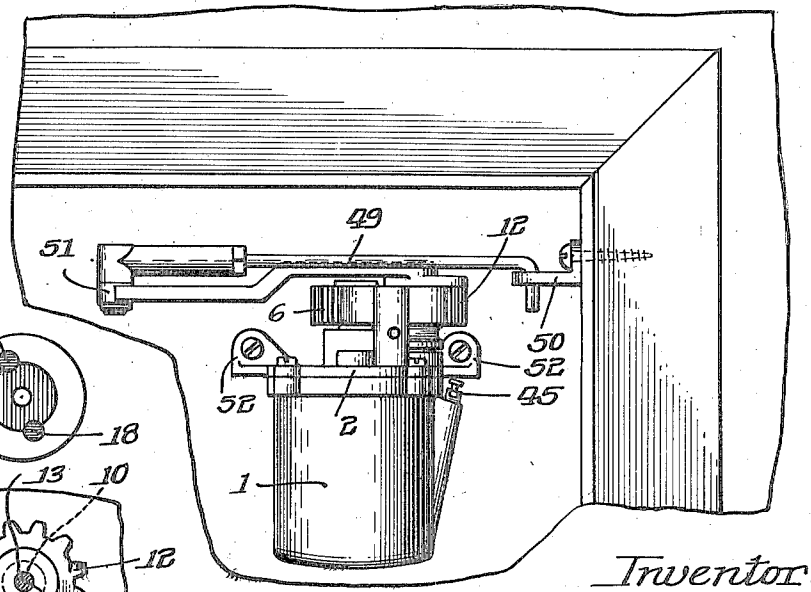
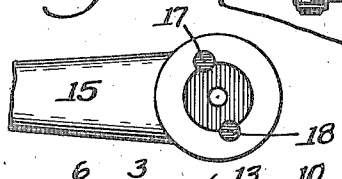



Fig. 10.



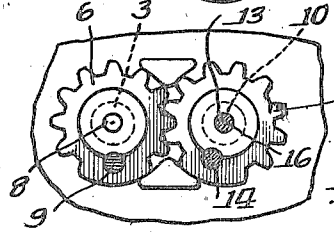




Fig. 11.

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Fig. 4

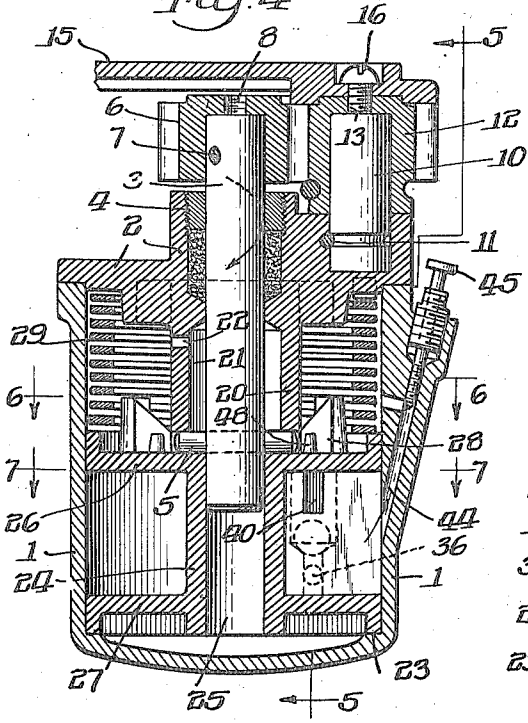



Fig. 5

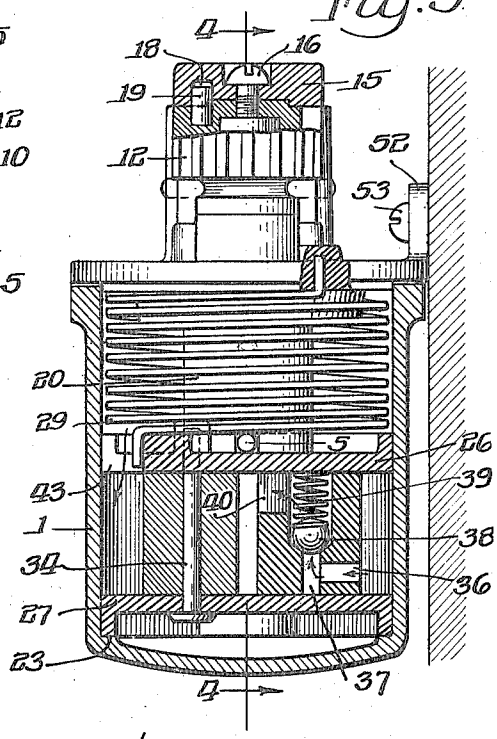



Fig. 6.

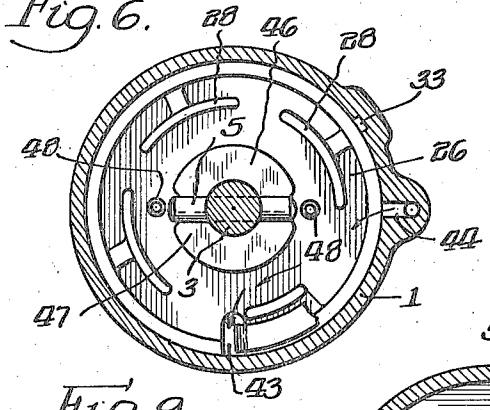



Fig. 7.

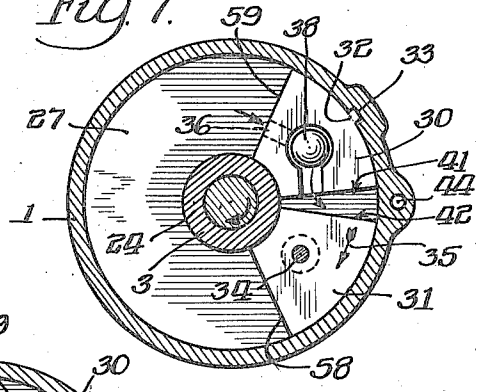
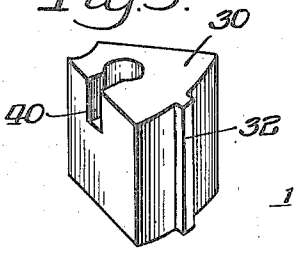



Fig. 9.



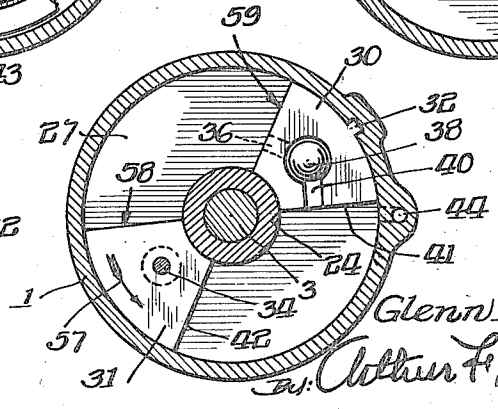




Fig. 8.

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Fig. 18.

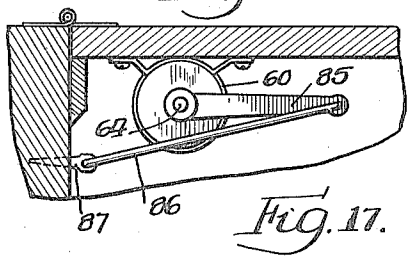



Fig. 16.

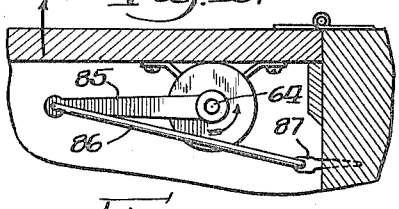



Fig. 17.

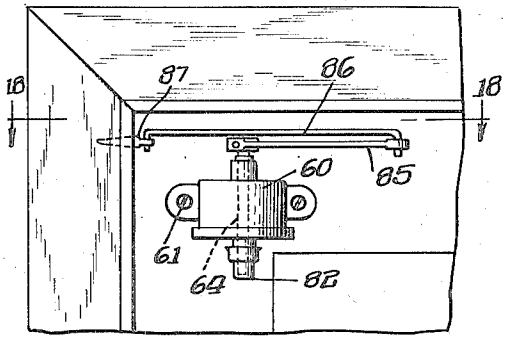



Fig. 15.

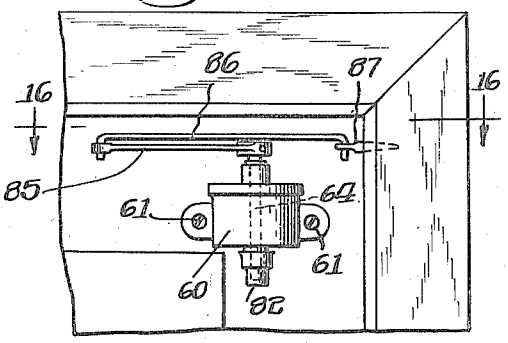



Fig. 13.

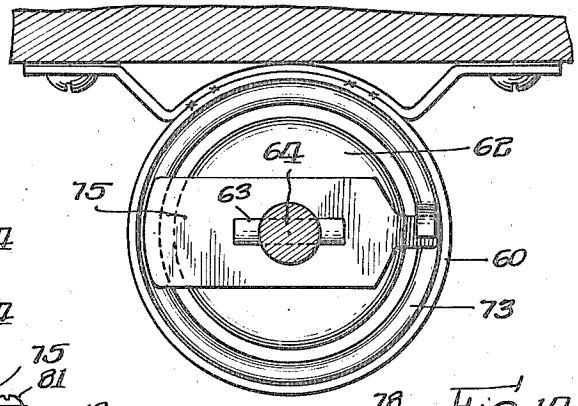



Fig. 12.

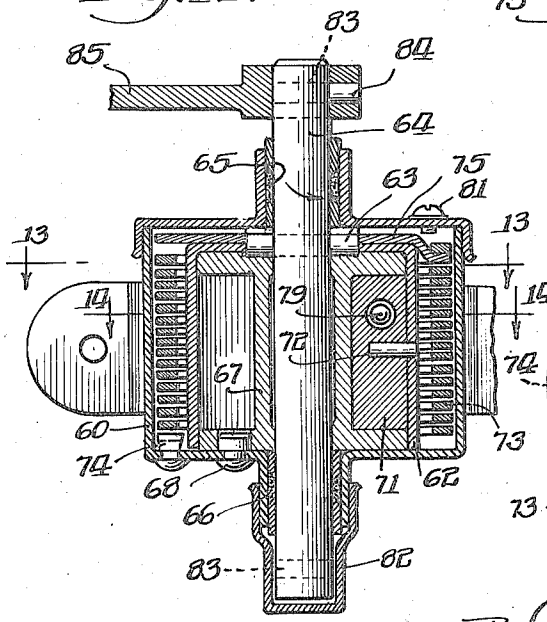
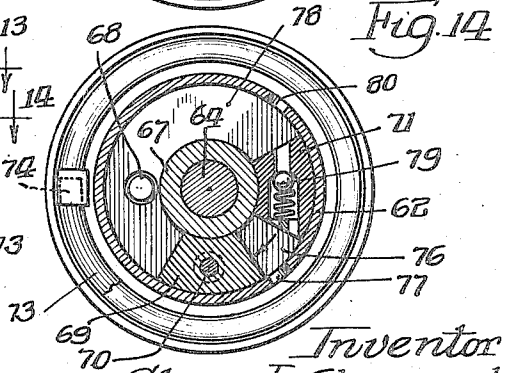



Fig. 14.




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Patented May 3, 1938

2,115,968

# UNITED STATES PATENT OFFICE

2,115,968

## DOOR CHECK

Glenn L. Sherwood, Benton Harbor, Mich., assignor to Kaywood Corporation, Benton Harbor, Mich., a corporation of Michigan

Application July 6, 1936, Serial No. 88,998

20 Claims. (Cl. 16—52)

This invention relates to door checks, and more particularly to those that are operative to gently close the door, in addition to preventing the door from being slammed or violently closed.

Generally stated, the object of the invention is to provide a novel and improved construction and arrangement whereby a device of this kind is usable on doors of different kinds, that swing one way or the other, with the crank arm and pull rod always at the top of the device, by a comparatively simple adjustment thereof, and which is simple and comparatively inexpensive to manufacture, and which is easily installed and adjusted for use.

It is also an object to provide certain novel features of construction tending to increase the general efficiency and the desirability of a door check and closer of this particular character.

To the foregoing and other useful ends, the invention consists in matters hereinafter set forth and claimed and shown in the accompanying drawings, in which—

Fig. 1 is a plan view of a door check and closer embodying the principles of the invention, showing the same applied to a door that is hinged and arranged to swing one way, as indicated by the arrow.

Fig. 2 is a similar view, showing the device applied to a door that is hinged at its other edge, to swing in the other direction, one door sometimes being called a "right-hand" door, and the other a "left-hand" door, although the applicability of these expressions depends upon which side of the door the person is standing when the door is opened, for any door that is pulled open by the right hand, from one side of the door, is then pushed open by the left hand from the other side.

Fig. 3 is a front elevation of the structure shown in Fig. 2 of the drawings.

Fig. 4 is an enlarged detail section on line 4—4 in Fig. 2 of the drawings.

Fig. 5 is a vertical section on line 5—5 in Fig. 4 of the drawings.

Fig. 6 is a transverse horizontal section on line 6—6 in Fig. 4 of the drawings.

Fig. 7 is a similar view on line 7—7 in Fig. 4 of the drawings.

Fig. 8 is a view similar to Fig. 7, showing the parts in a different position.

Fig. 9 is a perspective of one of the parts of the device.

Fig. 10 is a view of the under side of one of the portions of the device.

Fig. 11 is a plan view of the two pinions of said device.

Fig. 12 is a view similar to Fig. 4, showing a different form of the invention.

Fig. 13 is a horizontal section on line 13—13 in Fig. 12 of the drawings.

Fig. 14 is a horizontal section on line 14—14 in Fig. 12 of the drawings.

Fig. 15 is a front elevation of the device shown in Fig. 12 of the drawings, on a smaller scale, showing the device in use on a door that is hinged at the right-hand edge thereof.

Fig. 16 is a horizontal section on line 16—16 in Fig. 15 of the drawings.

Fig. 17 is a view similar to Fig. 15, but showing the device in use on a door on the left-hand edge thereof.

Fig. 18 is a horizontal section on line 18—18 in Fig. 17 of the drawings.

As thus illustrated, the invention comprises a cup-shaped casting 1, forming the bottom and side walls of the casing or housing of the device, and a removable top casting 2 that forms a cap or cover of said housing. A vertical shaft 3 is mounted to rotate in the stuffing-box 4, and its lower end portion is provided with a transverse pin 5, as shown. A pinion or gear wheel 6 is held by a key pin 7 on the upper portion of the shaft 3, and this gear is provided with a threaded bore 8 and a small socket 9 in the top thereof. A vertically disposed cylindrical member 10 is held against vertical displacement in the casting 2 by the key pin 11, or by any suitable means. A similar pinion or gear 12 is mounted on the upper end portion of the vertically disposed member 10 and is provided with a bore 13, similar to the bore 8, and with a socket 14, similar to the socket 9, previously mentioned. As shown in Figs. 2, 3 and 4, the horizontally swinging lever arm 15 is held in place on the top of the pinion 12 by a screw 16, inserted in the bore 13 in the manner shown. On its under side, the arm 15 is provided with sockets 17 and 18 for engagement with the pin 19, which latter is adapted to engage either the socket 9 or the socket 12, depending upon the position of the arm 15, as illustrated in Figs. 1 and 2 of the drawings. Below the stuffing-box 4, the casting 2 has a depending cylindrical portion 20, forming a chamber 21, with an opening 22 therefrom into the interior of the casting 1, as shown in Fig. 4 of the drawings. Resting upon the seat 23, at the bottom of the casting 1, inside thereof, is a rotary member 24, having a bore 25 that receives the lower end portion of the shaft 3, and provided with upper and lower walls

26 and 27, with space between them, forming a liquid chamber. The top wall 26 is provided with upwardly projecting portions 28 for centering the spiral spring 29, which latter has its upper end secured to the casting 2, and its lower end suitably secured to the member 24, as shown in Fig. 5 of the drawings, thus yieldingly holding the latter against rotation about its vertical axis. The two similarly shaped members 30 and 31 are disposed between the upper and lower walls 26 and 27, and between the hub of the member 24 and the inner surface of the casting 1, and while the member 30 is held against movement by its key 32, which engages the groove 33 in the casting, the member 31 is held rigid with the member 24 by a pin 34 inserted downwardly through the wall 26 into said member, whereby the member 31 in effect forms a rotary piston, as it is free to rotate with the member 24, toward and away from the stationary member 30, which latter functions like a cylinder head, when the fluid is pushed out of the space between the members 30 and 31, by the movement of the latter, when the member 31 revolves in the direction indicated by the arrow 35, as indicated in Fig. 7 of the drawings. This will cause the fluid to enter the member 30 through the port 36 into the vertical passage 37, which latter is open at its upper and lower ends, and is enlarged at its upper end to receive a ball check valve 38, normally held in closed position by the spring 39, and a passage 40 connects the upper end of the passage 37 with the interior of the casing,—that is to say, with the space between the two surfaces 41 and 42 of the members 30 and 31, as shown in Fig. 7 of the drawings. The upper wall 26 has a peripheral opening 43 therein, to permit the fluid to pass from above said wall to a space between this wall and the lower wall 27, as indicated in Fig. 5 of the drawings. The space between the two surfaces 40 and 42 is connected, by a passage 44, with the space above the wall 26 of the rotary member 24, as shown in Fig. 4 of the drawings, and the turn or angle in this passage 44 is controlled by a needle valve 45, whereby the passage of the fluid from between the walls 26 and 27, when the surfaces 40 and 42 relatively approach each other, to the space occupied by the spring 29, may be controlled or governed or adjusted to insure the desired opening and closing action of the door.

The pin 5 has its end portions in engagement with the segment-like projections 46 and 47 on the top of the wall 26, as indicated in Figs. 4 and 6 of the drawings, whereby oscillation of the shaft 3 will oscillate the member 24 in the desired manner. The pin 5 is held against endwise displacement by the small lugs 48, formed on the top of the wall 26.

The pull rod 49 has one end hooked into the bracket 50, secured to the door frame, and has its other end pivoted or hinged at 51 to the outer end of the arm 15, previously described. As shown in Fig. 2 of the drawings, the casting 2 is provided with upstanding bracket portions 52, which are secured by screws 53 to the door 54, so that when the latter swings about its hinges 55, in the direction indicated by the arrow 56, the pinion 12 is rotated in one direction, while the pinion 6 is rotated in the other or clockwise direction, which causes the member 31 to travel in the direction indicated by the arrow 35, in Fig. 7 of the drawings. This causes the fluid, which is usually a thin oil, to be forced through the passage 36 into the passage 37, lifting the ball valve 38, and causing the liquid to discharge from the passage 40 into the space between the surfaces 41 and 42, shown in Fig. 7 of the drawings. Then, when the door is allowed to close, the member 31 will travel in the direction indicated by the arrow 57, as shown in Fig. 3 of the drawings, and the fluid will be forced from between the surfaces 41 and 42 into the passage 44, and from the latter into the space occupied by the spring 29, and from this space the fluid will flow downwardly through the opening 43 into the space between the surfaces 58 and 59 of the members 31 and 30, so that the door is then ready to be opened again, thereby repeating the action described.

As shown in Figs. 12 to 18 of the drawings, the construction is as follows:

The outer shell or casing 60 is secured to the door by screws 61 in the manner shown. Within this casing there is a cylindrical member 62 of inverted cup shaped form, keyed by a transverse pin 63 to the vertical shaft 64, which latter is supported for rotation in the stuffing box bearings 65 and 66 at the top and bottom of the housing or casing. The spool shaped member 67 is secured to the casing 60 by a screw 68, or by other suitable means, so that this member 67 is rigid with the casing 60, and with the swinging door. The door check is of the rotary type, and within the chamber between the member 62 and 67 there is a movable segment 69, the latter being rigidly secured to the spool shaped member 67 by the vertical pin 70, as shown in Fig. 14 of the drawings. The said chamber contains a similar segment 71 which is keyed to the member 62 by the pin 72, as shown in Fig. 12 of the drawings. The helical spring 73 occupies the space between the side walls of the casing 60 and the cylindrical member 62, the lower end of said spring being secured to the outer casing at 74 as indicated in Figs. 12 and 14 of the drawings. The upper end of said spring is secured to or arranged in engagement with a horizontal bar 75 that rests on top of the member 62 and that is keyed to the shaft 64 by the pin 63 previously mentioned. The space 76 between the movable segment 71 and the stationary segment 69 has an opening 77 communicating with the space between the side walls of the casing 60 and the member 62, and this space 76 is connected to the space 78 by means of a passage through the segment 71, with a check valve 79 therein, whereby oil or other fluid in the device can pass from the space 78 into the space 76, when the door is opened, but cannot flow back again through this check valve when the door slowly closes. Also, an opening 80, in the side wall of the member 62, connects the space 78 with the space between the side walls of this member and the casing 60, whereby the oil or other fluid is free to pass back and forth from one space to another, in the operation of the device. A screw 81 may be removed from the top of the outer shell or casing, which latter can be made in upper and lower sections, as shown, to permit oil or other fluid to be poured into the device, after it is assembled, and whenever the oil or other fluid becomes depleated thereafter. A tight cap 82 is provided and forced over the lower end of the device, over the stuffing box bearing 66, and it will be seen that this cap can also be pushed up over the upper stuffing box bearing 65 when the device is used in the position shown in Fig. 17 of the drawings. The upper and lower ends of the shaft 64 are provided with transverse holes 83 to receive a pin 84 by which the crank arm 85 is keyed to either end of the shaft, depending upon

whether the device is used as shown in Fig. 15, or as shown in Fig. 17 of the drawings. The end of the crank arm **85** engages the pull rod **86** which latter is pivoted in an eye **87** inserted inside of the door frame, as shown in Figs. 15 and 16 of the drawings.

With the construction of the device shown in Figs. 12 to 18 of the drawings, the device is usable on a door hinge at either the right or left thereof. If it is desired to use the device as shown in Figs. 17 and 18 of the drawings, then the drum or casing part of the device is turned upside down and secured to the door. The arm **85** is removed from the end of the shaft to which it is shown attached in Figs. 12, 15 and 16 of the drawings, and the cap **82** is removed and the crank arm is then attached to the other end of the shaft, as shown in Figs. 17 and 18 of the drawings, and the cap is then placed over the bottom end of the shaft. Thus, by simply changing the crank arm from one end to the other of the shaft, the device can be used on either door, and the removable cap **82** will prevent leakage at the lower end of the device, regardless of which end is lowermost when the device is in use.

It will be seen therefore that in either form of the invention the crank arm and the pull rod are always at the top of the device, regardless of which form of door is used. In Figs. 1 to 11 of the drawings, the entire mechanism is always right side up, and the adjustment, from one door to the other, is made by merely transferring the crank arm from one vertical axis to the other. In Figs. 12 to 18 of the drawings, the crank arm and pull rod are always at the top of the device, for either form of door, but in this case the adjustment involves the turning of the casing and its shaft end for end, but regardless of which end is uppermost the crank arm and the pull rod are always at the top of the device. In each form of the invention, the construction is such that the door can be opened quickly, by free circulation of the oil or other fluid; in each form of the invention the circulation is retarded sufficiently, under the tension of the spring, to cause the door to close slowly and without slamming, as in each form of the invention the spring is constructed and tensioned to practically terminate its power when the door is in final or closed position. In Fig. 4 of the drawings the spool shaped member **27** is keyed to the main vertical shaft **3**, but in Fig. 12 of the drawings the spool shaped member **67** is keyed or fastened to the bottom of the outer casing, while the inverted cup shaped member **62** is keyed to said shaft. But in each form of the invention two segment shaped members occupy the space between the upper and lower flanges of the spool shaped member, and have movement toward and away from each other, about the vertical axis of the mechanism, to force the fluid from one place to another within the housing, whereby the opening of the door is retarded to some extent, by the circulation of the fluid, while the closing of the door under spring power is retarded enough to prevent slamming of the door.

What I claim as my invention is:

1. In a door check and door closing device, the combination of a crank arm, a pull rod for connecting the crank arm to the door frame, and door check and door closing mechanism whereby the crank arm is supported on the door, said crank arm being detachable and adjustable from one point of attachment to another on said mechanism, whereby the crank arm and pull rod are always at the top of the device, for doors hinged either at the right or the left.

2. A structure as specified in claim 1, in which the adjustment of said crank arm is from one vertical axis to another on the top of said mechanism.

3. A structure as specified in claim 1, in which said adjustment of the crank arm is from the upper to the lower end, and vice versa, of said mechanism.

4. A structure as specified in claim 1, in which said mechanism has a vertical main axis, and an auxiliary vertical axis, together with gearing between said axes, and the adjustment of said crank arm being from the upper end of one axis to the upper end of the other.

5. A structure as specified in claim 1, in which said mechanism has a vertical shaft projecting a distance at its upper and lower ends, with means for detachably securing said crank arm to either end of said shaft, depending upon which end is uppermost on the door.

6. A structure as specified in claim 1, said mechanism having a stationary outer casing or housing, and having a vertical shaft, a spool shaped member keyed to and rotatable with said shaft, together with stationary and movable segments relatively movable toward and away from each other within said spool shaped member, and a helical spring having one end fastened to said spool shaped member and the other end fastened to said casing.

7. A structure as specified in claim 1, said mechanism comprising a vertical shaft, an outer stationary casing, an inverted cup shaped member within said casing, keyed to said shaft, and a spool shaped member within said cup shaped member, secured to the bottom of said casing.

8. A structure as specified in claim 1, comprising an outer casing containing said mechanism, and containing a fluid, with means whereby the fluid is circulated by the opening and closing of the door.

9. A structure as specified in claim 1, comprising an outer casing containing said mechanism, and containing a fluid, with means whereby the fluid is circulated by the opening and closing of the door, together with an adjustable valve for regulating said circulation, thereby to control the closing of the door.

10. A structure as specified in claim 1, comprising a vertical main shaft, a counter-shaft parallel with said vertical main shaft, gears between the upper ends of said shafts, and means whereby said crank arm may be secured to the upper end of either gear.

11. A structure as specificed in claim 1, said mechanism comprising a spool shaped member mounted to rotate about the central vertical axis of said device, a casing containing said mechanism, and a helical spring having its lower end secured to the top of said spool shaped member and having its upper end secured to said casing.

12. A structure as specified in claim 1, comprising a spool shaped member mounted to rotate about the central vertical axis of said device, a casing containing said mechanism and a helical spring encircling said spool shaped member and having its upper end connected to the top of said member and having its lower end fastened to the bottom of said casing.

13. In a door check and door closing device, the combination of a crank arm, a pull rod for connecting the crank arm to the door frame, and door check and door closing mechanism whereby

the crank arm is supported on the door, in which said mechanism has a vertical main axis, and an auxiliary vertical axis, together with gearing between said axes.

14. A structure as specified in claim 13, said crank arm being disposed on said main axis.

15. A structure as specified in claim 13, said crank arm being disposed on said auxiliary axis.

16. In a door check and door closing device, the combination of a crank arm, a pull rod for connecting the crank arm to the door frame, and door check and door closing mechanism whereby the crank arm is supported on the door, said mechanism comprising a vertical shaft, an outer stationary casing, an inverted cup shaped member within said casing, separably keyed to and rotatable by said shaft, and a spool shaped member within said cup shaped member, secured to the bottom of said casing.

17. In a door check and door closing device, the combination of a crank arm, a pull rod for connecting the crank arm to the door frame, and door check and door closing mechanism whereby the crank arm is supported on the door, said mechanism having a stationary outer casing or housing, and having a vertical rotary shaft, a spool shaped member separably keyed to and rotatable by said shaft so that said shaft is removable axially from the casing and from said spool shaped member, while the latter is in position within the casing, means for connecting said crank to the upper end of said shaft, together with stationary and movable segments relatively movable toward and away from each other within said spool shaped member, and a helical spring having one end fastened to said spool shaped member and the other end fastened to said casing.

18. In a door check and door closing device, the combination of a crank arm, a pull rod for connecting the crank arm to the door frame, and door check and door closing mechanism whereby the crank arm is supported on the door, comprising an outer casing containing said mechanism, providing an upper chamber and a lower chamber in said casing, with a spring in the upper chamber, and containing a fluid, with means whereby the fluid is circulated from one chamber to the other and back, by the opening and closing of the door, including a by-pass leading from one chamber to the other and an adjustable valve therefor in the side of said casing for regulating said circulation, thereby to control the closing of the door, said valve having an outer end exposed on the exterior of the casing, for the adjustment thereof.

19. In a door check and door closing device, the combination of a crank arm, a pull rod for connecting the crank arm to the door frame, and door check and door closing mechanism whereby the crank arm is supported on the door, said mechanism comprising a rotary spool shaped member mounted to rotate about the central vertical axis of said device, a casing containing said mechanism, having a cap formed with a rigid depending concentric sleeve bearing at its lower end on the top of said rotary member, and a helical spring surrounding said sleeve and having its lower end secured to the top flange of said spool shaped member and having its upper end secured to said cap, the latter being removable and thereby disengageable from said spring.

20. In a door check and door closing device, the combination of a crank arm, a pull rod for connecting the crank arm to the door frame, and door check and door closing mechanism whereby the crank arm is supported on the door, comprising an inverted cup shaped member, a spool shaped member mounted to rotate within the cup shaped member, about the central vertical axis of said device, a removable vertical shaft keyed to the top of said cup-shaped member, a casing containing said mechanism, and a helical spring encircling said cup-shaped member and having its upper end connected thereto and having its lower end fastened to the bottom of said casing.

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