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M. J. FLYNN.
DOOR CHECK AND CLOSER.
APPLICATION FILED APR. 30, 1910.

Patented Mar. 12, 1912.

2 SHEETS—SHEET 1.

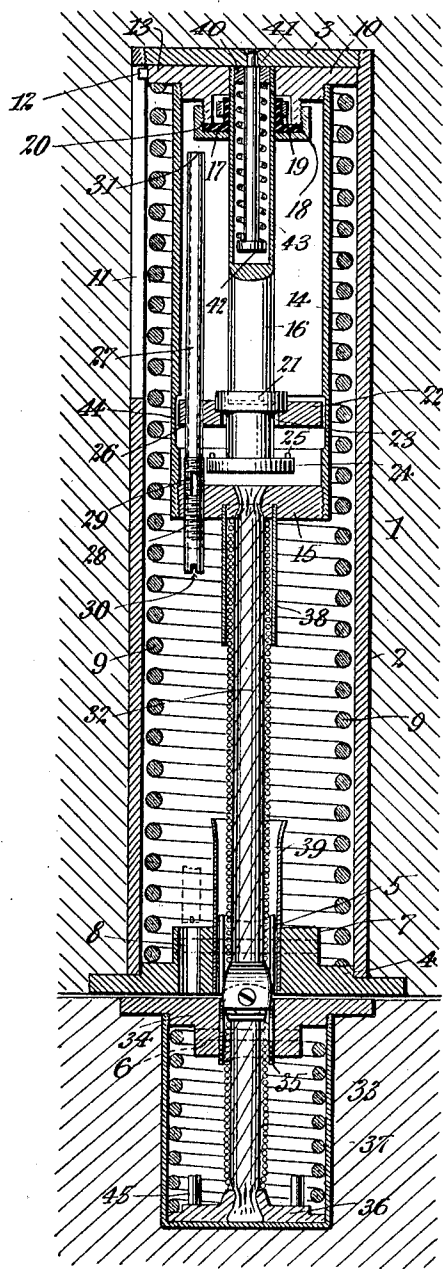
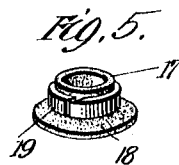
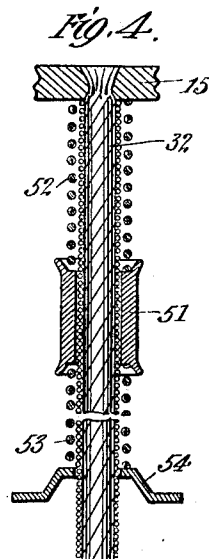


FIG. 1.



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DOOR CHECK AND CLOSER.

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Specification of Letters Patent.

Patented Mar. 12, 1912.

Application filed April 30, 1910. Serial No. 558,627.

To all whom it may concern:

Be it known that I, MICHAEL J. FLYNN, a citizen of the United States, residing at New Brunswick, in the county of Middlesex and State of New Jersey, have invented certain new and useful Improvements in Door Checks and Closers, of which the following is a full, clear, and exact description.

This invention relates to a door closing and checking apparatus; the arrangement of parts shown in the particular embodiments of my invention illustrated in the accompanying drawings being more particularly adapted for use with fluid pressure means; the door being allowed to close at certain predetermined rates in different parts of its path of travel, and the flow of fluid from one compartment to another being accurately controlled to effect this desirable result. Devices of this character are frequently applied to the outside surfaces of doors, where they are objectionably conspicuous and unsightly; whereas devices made in accordance with my invention are adapted to be positioned directly within the door jamb and the door proper, so as to act upon the inside edge of the door; the door check hence being located substantially entirely out of sight.

The mechanism herein described is simple, convenient and easily adjusted; it is furthermore inexpensive of manufacture, and overcomes various objectionable features that are usually present in devices of this character. The use of a flexible connection between the operative parts is of course old; but I have found in practice that this flexible element, one end of which is secured to the edge of the door and the other to the checking means and which passes over small rollers carried by the casing which is disposed within the jamb of the door, has a tendency to permanently kink or buckle; probably due in part to the bending of the element sharply around the said rollers so that when the door is being closed, by the action of the return or closing spring, the overall length of the said flexible member is in effect shortened and as a result of this the door is prematurely closed so that the check has not time to properly act and the door slams.

The present invention embodies several features which together act to obviate this difficulty, although in many instances the

provision of one or the other of these features is sufficient.

My present invention also affords means for readily adjusting the size of the orifice through which fluid passes from one compartment to the other of the checking device, when the door is returning to its closed position. This adjustment renders it possible to predetermine the closing speed of the door to a nicety.

My invention also contemplates the provision of a novel form of packing device whereby waste of the fluid contained in the checking apparatus is substantially entirely obviated.

I have also devised means for materially shortening the overall length of the checking appliance which is intended to be disposed in the jamb of the door and this last mentioned feature also in great measure overcomes the buckling tendency of the flexible element above referred to by reason of the fact that the portion of such flexible element which is disposable within the jamb casing when the door is closed is reduced to a minimum.

Various other novel features of my invention will be hereinafter presented and more particularly pointed out in the appended claims.

Referring now to the drawings which form a part hereof and in which like reference characters designate like parts throughout the several views: Figure 1 is a vertical section taken through a portion of a door and jamb and axially through my device which is shown as positioned therein. Fig. 2 is a horizontal axial section of a modified form of my device. Fig. 3 is a fragmentary section taken at right angles to the section shown in Fig. 2. Fig. 4 is a fragmentary detail of a modification of the kink preventing means. Fig. 5 is a perspective view of the packing ring and spring therefor; and Fig. 6 is a section of the flexible element connecting device taken at right angles to the section of such device shown in Fig. 2.

Referring now to Fig. 1, the casing which is adapted to be inserted into the jamb has been broadly designated 1, this casing comprising a section of cylindrical tubing 2 into the innermost extremity of which is screwed a flat disk or plug 3, while the outer extremity of the casing is closed by a frame

which has pivotally mounted thereupon two small rollers 5 which run in an elongated slot or groove which extends through the center of the frame. Each of the rollers is supported by a pin 6 which is driven laterally through a lug or projection upon the side of the frame, this lug being preferably circular and of the same diameter as that of the interior of the tube 2, but flattened as at 7 upon opposite sides thereof. This flattening of the lug is merely to facilitate drilling the holes for the reception of the pins 6. The frame has also a hole 8 drilled there-through parallel to the axis thereof, and the orifice of this aperture should preferably be positioned on a line extending substantially at right angles to the slot above referred to. A fairly strong spring 9 is disposed in the casing and this spring bears at its outermost extremity upon the inner face of the frame 4 and at its other end upon a flange of a collar or washer 10. It is desirable to slot one side of the tube 2 as shown at 11 for the reception of a pin 12 or the like which extends out from the side of the flange 13 so that the collar 10 does not tend to rotate but is merely translatable along the axis of the casing. In the form of device shown in Fig. 1, this collar carries an inner tubular member 14 which is preferably secured thereto by threading, and the outer end of this tube is in turn closed by a threaded plug 15. The washer 10 is apertured at the center thereof for the reception of a smooth cylindrical stem 16 which neatly fits the aperture in the collar 10 and for the present may be regarded as secured to the plug 3. The rod or stem 16 has disposed therearound a suitable packing ring 17 which has a flange 18 extending therearound. Outside of the packing ring proper, which ring may be formed of any suitable material such as leather or composition, is an annular spring 19; this spring being obliquely split as shown in Fig. 5, so that it normally tends to close in the packing snugly around the stem. The object of this construction is to maintain the packing in close contact with the surface of the stem so that even if the device has been in use for some time a tight closure is assured and no leakage of the fluid hereinafter referred to can occur. The packing is maintained in position by means of a gland 20 which has a threaded engagement with an extension or boss on the side of the collar 10.

The interior of the inner casing formed by the tube 14, the collar 10 and plug 15 above referred to, is preferably filled with fluid or liquid. I prefer to use glycerin for this purpose but other suitable fluid or liquid may be substituted therefor. The outer end of the stem 16 carries a valve 21 which is adapted to sit in a recess formed upon one side of a preferably slidably mounted valve

ring or partition 22. This ring neatly fits the tube 14 but is movable therein and may be forced away from its engagement with the valve by the pressure of the fluid, thereby affording a large opening for the passage of said fluid, which opening is indicated at 23 and through which extends a portion of the stem which carries upon the extremity thereof a disk shaped abutment 24, such part preferably having several pins 25 laterally projecting therefrom and adapted for engagement with the side of the ring 22. The ring 22 hence is adapted for movement back and forth between the valve proper and the said pins, and this ring has an aperture 26 therein to one side of the valve, the walls of which are adapted to neatly engage a tube 27. This tube is shown in Fig. 1 as being of reduced diameter for the greater portion thereof and the larger portion is threaded at 28 for neat engagement with a threaded aperture in the plug 15. A narrow slit 29 is preferably longitudinally disposed through a portion of the threaded part of this tube and the outer end 30 of the tube is plugged so that fluid which enters at the open end 31 of the said tube may only escape through the slit 29. The plugged end is preferably slotted for engagement with a screw driver so that the tube may be screwed into or out of the casing, and the extent of the slit 29 exposed will determine the size of the orifice through which fluid is adapted to pass when the door is closing; said fluid passing therethrough from the compartment in which is positioned the abutment 24, the fluid containing casing being normally urged toward the bottom of the outer casing by the action of the spring 9, and the fluid escaping from the end 31 of the tube and gradually filling the chamber or compartment in which is positioned the gland 20.

Plug 15 has secured in the center thereof a flexible and somewhat resilient element 32 which in this instance is composed of a cable formed of steel wire or hemp, and which cable is wound over the entire length thereof with fine piano wire. This winding of resilient wire serves to make the element more elastic or resilient, and furthermore serves to protect the strands from wear. The said element is preferably non-extensible, or in other words substantially incapable of elongation, and it is obvious that a pull thereupon will compress the spring 9 and cause the glycerin or other fluid in the fluid receptacle to pass rapidly from one compartment thereof to the other, the fluid pressure forcing the ring 22 back from its seat against the valve. The flexible element passes out of the outer casing between the rollers 5 and as shown in Fig. 1 preferably, although not necessarily, passes into a second casing which has been broadly designed

nated 33. This casing is much shorter and may be smaller in diameter than the casing 1, and is adapted to be positioned directly in the edge of the door, being of course preferably disposed in axial alinement with the casing 1. Casing 33 is closed by a frame 34 which is similar in general construction to the frame 4, except that this cap has no aperture 8 extending therethrough. Frame 34, however, carries rollers 35 between which passes the flexible element, said element having secured to the end thereof a disk or washer 36; this disk being normally adapted to seat itself against the bottom of the casing 33; being held thereagainst by a spring 37 which preferably should be of somewhat greater strength than spring 9 when the said springs are normally expanded. As shown in Fig. 1 spring 37 is of somewhat smaller diameter than the spring 9 and hence may be made of lighter material.

I have found that there is a tendency; especially when the flexible member is of considerable length, for said element to kink or buckle. This is possibly due in part to the fact that when the door is opened to its fullest extent, the said element being bent sharply around the respective rollers 5 tends to remain slightly bent, and as a result of this when the spring 9 draws the element back into the casing, the door, which is normally supposed to rapidly close to within a predetermined distance of its latching position and to thereafter close slowly for a predetermined distance almost to its latching position and then to rapidly shut in order to properly secure the latch, will be urged to close by the spring 9 before the checking device has a chance to properly operate due to the kinking or shortening of the flexible element. To overcome this difficulty therefore I may provide sections of tubing which are adapted to telescope over each other and through which passes the flexible element 32. These tubular sections have been shown respectively at 38 and 39, the section 38 being secured in any suitable manner to the plug 15 and the section 39 in corresponding fashion being secured in the cap 4. If these tubes are used I prefer to slot the section 39 upon opposite sides thereof to permit of the rollers 5 being inserted through said slots for engagement with the flexible element. Fig. 1 shows these sections as being relatively short, but they may be made as long as desired so that a greater or less extent of the flexible element may be inclosed thereby when in its withdrawn position. I find in practice that it is not absolutely necessary that they should so inclose the entire extent of such element, as the element is fairly stiff and a short span thereof may be unsupported without its kinking. The gist of this portion of my invention resides in the pro-

vision of proper support for the section of the flexible element which is liable to buckle, whereby means are provided for substantially obviating the kinking or buckling action in question. Other forms of the device will be hereinafter referred to. The provision of the casing 33 with its independent spring also coöperates to this end, in that as a result of this construction the length of the flexible element between the rollers 5 and the plug 15 is thereby materially reduced, and the tendency to kink is more or less proportional to the length of such portion.

I have also shown a means for permitting of a still greater movement of the door which may be used if desired. It will be observed that the inner end of the stem 16 is tubular; the extremity of the tube being closed by a plug 40 which is threaded thereinto and which plug is apertured centrally thereof for neat engagement with a stem or stud 41. This stud is preferably riveted to the plug 3, having a reduced extremity which extends therinto and the end of which is riveted to firmly retain the stud in place. The said stud has a head 42 formed thereupon against which bears one end of a relatively stiff spring 43. This spring surrounds the stud 41 and bears against the plug 40 so that normally the stem 16 is held firmly down against the disk 3. When, however, the door is opened beyond the amount which can be accommodated by the spring 37 and the travel of the gland through the fluid chamber, which travel is limited by the engagement of the gland 20 with the valve 21, spring 43 will yield and the stem 16 will then be drawn away from the disk 3 and allow the flexible element to be drawn still farther out from the casing. It will hence be seen that I have provided several means for taking up slack in the flexible element, which means all coöperate to this end. The tube 14 is recessed or slightly enlarged in its interior diameter as at 44, which when the disk 22 is in the position shown in Fig. 1 permits a fairly free flow of fluid therearound.

The operation of the device is as follows: When the door is opened the flexible element is drawn out of both casing 1 and casing 33, spring 9 will be compressed and the washer 10 will be drawn out over the stem 16, which action will force the ring 22 outwardly to its seat upon pins 25, fluid passing freely through the orifice around the valve, and the gland 20 finally bringing up against the said valve. During the last portion of this movement the spring 37 has also been compressed until the projections 45 carried by the washer 36 engage the inner side of the cap 34. Continued movement of the door thereafter pulls the stem 16 away from the disk 3 compressing the spring 43. The door has

now been opened to its fullest extent. Assuming now that the tube 27 has been adjusted properly, when the door is released the spring 43 will urge the stem 16 back against its seat and correspondingly the spring 37 will expand swinging the door quite rapidly to by taking up a portion of the flexible element. Thereafter the spring 9 will drive the sleeve 10 inwardly toward the disk 3, this latter action, however, occurring but slowly by reason of the fact that the fluid is forced to traverse the slit 29 of the tube 27. However, after the sleeve 10 has nearly reached its final position, the recessed portion of the tube 14 reaches the ring 22 and passes around the same thereby permitting a much freer flow of fluid back into the inner compartment, resulting in the door again more rapidly moving to effect a proper engagement of its latch. The door therefore may be swung open as widely as desired and when released will swing to rapidly at first and thereafter more slowly, the final movement being accelerated when the door is almost in its closed position. The adjustment of the tube 27 and thereby of the orifice or slit 29 is effected most conveniently by opening the door to its fullest extent or thereabout, which draws the extremity of the said tube up closely adjacent to the cap 4, when a screw driver may be inserted in the aperture 8 and engaged with the slotted end of the said tube.

In Fig. 2 I have shown a modification of my device in which the fluid receptacle is formed directly in the bottom of the containing casing. The general operation of this form of my device is similar to that above described, but in this instance, the washer 10' to which is secured the stem 16' is directly connected to the element 32. The other extremity of the stem carries slidably mounted thereon the ring or partition 22', which in this instance is adapted to abut against the abutment 24' when the stem is being drawn outwardly. The partition 22' is also preferably apertured in this case as at 46, and the valve 47 which in this instance, as in the former, when considered in combination with the valve ring actually constitutes a piston, is adapted to seat in a depression in the slidable partition or ring in similar fashion to the corresponding parts in the device shown in Fig. 1. The recess in the walls of the casing is here shown as a slot 44' or preferably a plurality of such slots; and fluid passes quite freely around the edge of the partition when the latter has been forced almost to its innermost position by the action of the spring 9. Finally the telescoping tubes are shown at 38' and 39' as being always in engagement, and the regulating device for controlling the flow of fluid from the inner to the outer receptacle, as it happens in this construction, is a fixed

tube 27' which passes through an opening in the fixed wall 48, the tube preferably having a force fit therein. Solder may also be applied if desired to effect a fluid tight joint between the tube and its supporting wall. Tube 27' extends inwardly almost up to the plug 3' and outwardly a convenient distance, so as to be freely accessible from the aperture 8 in cap 4. The outer end of this tube is threaded preferably internally as at 49 for engagement with the outer threaded extremity of a rod 50. This rod is slotted at its exposed end in similar fashion to the end 30 of tube 27, and the inner end of the rod is adapted to cover a greater or less extent of the slot 29, as the exigencies of the case may require.

In Fig. 4 I have shown a modified form of flexible element support which comprises a loose sleeve 51, disposed around the element 32 and held in proper position thereon by springs 52 and 53, the inner end of spring 52 bearing against the washer 15, and the outer end of spring 53 being seated against a bracket 54 which may be carried by the cap 4. This form of support is not so positive in its action as the telescoping tube structure above described, but is illustrated for the purpose of showing that various means may be provided for laterally supporting the flexible element to prevent the same from buckling or kinking.

As it is desirable at times to free the door from the action of the closing devices, I have shown a means whereby this may be accomplished. The flexible element may be made in two parts, one of which is adapted to be drawn into the jamb casing and the other into the door casing. One of these portions carries upon its outer end a thimble 55, which is firmly secured to said element end and which is also of just sufficient diameter to prevent it from being drawn through between the rollers 35. Correspondingly the other portion of element 32 carries a small socket 57 which is preferably wider or thicker in one direction than in the other. This socket normally seats itself between rollers 5 and is received for the reception of thimble 55. The thimble may be grooved as at 58 for the reception of the end of a small set screw 59. The faces of frames 4 and 34 are preferably recessed or grooved as at 60-61, to afford space for the insertion of a small screw driver when the door is closed and as the set screw 59 will normally be directed toward this aperture, it may be readily withdrawn from its engagement with thimble 55, permitting the separation of the respective parts of the element 32. Obviously of course the parts may be reengaged when desired. Finally it should be observed that my construction permits the introduction of fluid into the fluid chambers when in the course of time some

of the fluid therein has been dissipated. This is readily accomplished in either of the forms of device herein shown by withdrawing in the first instance the plug which is disposed in the outer extremity of the tube 27, the door of course being opened to its fullest extent to pull the end 30 of the said tube up close to the aperture 8 in the frame or cap 4. In the form of device illustrated in Figs. 2 and 3 the same result is attained by unscrewing and withdrawing the small plunger or rod 50 from the interior of the tube 27'.

Having described my invention, what I claim is:

1. In a door check, a receptacle adapted to be received in the jamb of a door, a spring in said receptacle, a checking device disposed within said spring, said device comprising a liquid-holding casing, a partition inside of said casing, said casing and partition being relatively movable with respect to each other, a valve cooperating with said partition, connections between said valve and the inner end of said receptacle, a flexible element connected to said casing, means for attaching a part of said element to the door whereby when the door is opened the casing is drawn outwardly and the liquid therein is forced from one side of the partition to the other, said spring being compressed by the movement of said casing and normally tending to close the door, a tube extending through the end of said casing adjacent the flexible element, and also extending through the partition, said tube being adapted to convey fluid from one side of the partition to the other when the door is being closed by the spring, and means for regulating the flow of fluid through said tube.

2. In a door check, a fluid holding casing, a valve therein, an apertured partition in said casing, said casing and partition being relatively movable with respect to each other, said partition being adapted to cooperate with said valve to allow fluid to pass through an aperture in the partition when movement occurs in one direction and to impede the flow of fluid therethrough when movement occurs in the opposite direction, a flexible connection between the door and one of the aforesaid movable parts for effecting movement of said part in the first mentioned direction when the door is opened, a spring for effecting movement in the second mentioned direction, a tube, extending substantially parallel to a portion of said flexible element through said casing and also through said partition, said tube being adapted to convey fluid from one side of the partition to the other when the fluid flow is impeded as above, and means for regulating the flow of fluid through said tube.

3. In a door check, a fluid pressure check-

ing appliance adapted to be attached to a door jamb and including a spring for normally closing the door, a flexible element adapted to be attached to the door and also to a part of said checking appliance, a friction reducing device cooperating with said flexible element and about which said element is adapted to bend, and means comprising a tubular member for preventing buckling of said element between said device and said appliance.

4. In a door check, a plurality of means cooperating to normally close a door, each of said means including a spring and parts connected to and actuated by said spring, said spring actuated parts each respectively comprising non-extensible elements, frames mounted on said jamb and door through which some of said elements are adapted to move, said frames being disposed side by side with a portion of one of the faces of one of said frames spaced from a corresponding portion of the opposed face of the other casing frame to form an opening therebetween when the door is in closed position, and separable means for securing portions of said elements together, accessible through said opening.

5. In combination a door check and closer adapted to normally close an opened door at substantially predetermined rates during various portions of its path of movement, comprising a fluid-holding casing, a partition therein in contact with the fluid in said casing, free movement of said partition being normally impeded by said fluid, a spring disposed around said casing, a valve which when closed impedes flow of the fluid and thereby of travel of said partition through said casing, said valve adapted to be opened when the door is being opened, and a second spring operable to allow an additional opening movement of said door after the partition has traversed its path of movement in said casing, said last mentioned means unrestrainedly tending to close said door a predetermined amount, and fluid conducting means of relatively small effective cross section as compared to that of the valve, said fluid conducting means cooperating with said valve to control the rapidity of flow of said fluid from one side of said partition to the other, the valve being closed and substantially all flow of the fluid taking place through said fluid conducting means.

6. In a door check, a fluid-pressure checking appliance adapted to be attached to a door jamb and including a spring for normally closing the door, a flexible element adapted to be attached to the door and also to a part of said checking appliance, a friction reducing device cooperating with said flexible element and about which said element is adapted to bend, and means for

preventing buckling of said element between said device and said appliance.

7. In a door check, a fluid-pressure checking appliance adapted to be attached to a door jamb and including a spring for normally closing the door, a flexible element adapted to be attached to the door and also to a part of said checking appliance, a friction reducing device cooperating with said flexible element and about which said element is adapted to bend, and means for preventing buckling of said element between said device and said appliance, said means comprising a plurality of telescoping members disposed around portions of said flexible elements.

8. In a door check, a plurality of means cooperating to normally close a door, each of said means including a spring and parts connected to and actuated by said spring,

said spring actuated parts comprising flexible elements adapted to bend in various directions, frames mounted on said door and jamb through which said elements are adapted to move, said frames being disposed side by side when the door is closed, one at least of said frames being recessed, laterally thereof with respect to the element passing therethrough, and separable means for securing portions of said elements together, accessible through the said lateral aperture when the door is substantially closed.

In witness whereof, I subscribe my signature, in the presence of two witnesses.

MICHAEL J. FLYNN.

Witnesses:

WALDO M. CHAPIN,
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."