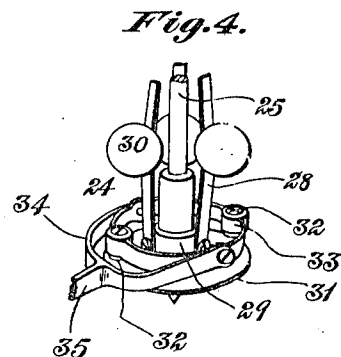
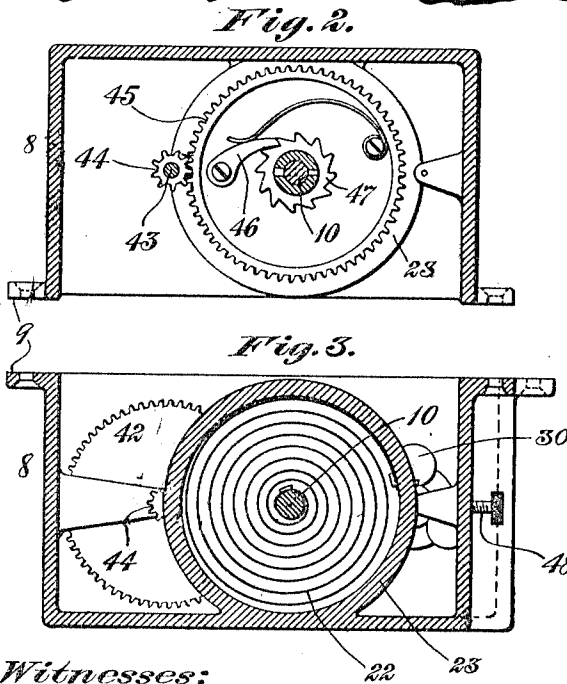
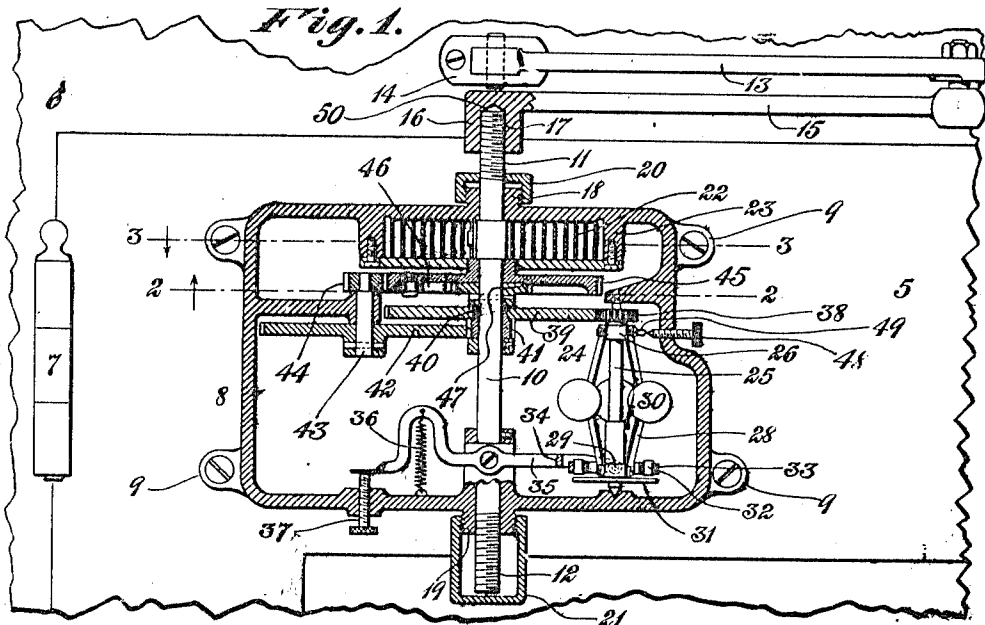


J. D. HUMPHREY.
DOOR CLOSER.
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UNITED STATES PATENT OFFICE.

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DOOR-CLOSER.

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To all whom it may concern:

Be it known that I, JOHN D. HUMPHREY, a citizen of the United States, residing at Waterbury, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Door-Closers, of which the following is a specification.

This invention relates to door-closers, the object of the invention being to provide a simple and effective device of this character having means which is positive and certain in action, for controlling the closing of the door and for also preventing injury to its parts should the door be closed very quickly or with unnecessary force. The title given has been adopted merely as a matter of convenience as said device can be employed with equal advantage in other connections, for instance for closing a gate or something of a similar nature.

In the drawings accompanying and forming part of the present specification, I have shown in detail one of the several convenient forms of embodiment of the invention, which will be set forth fully in the following description, this disclosure being to enable those skilled in the art to practice the invention. It will be obvious therefore that I do not restrict myself thereto; I may depart therefrom in several respects within the scope of the invention included in the claims following said description.

Referring to said drawings: Figure 1 is a vertical sectional view of a door-closer involving my invention, showing the same associated with a door and framing thereof both partially illustrated in said view in elevation. Figs. 2 and 3 are cross sections on the lines 2-2 and 3-3 respectively of Fig. 1 in the direction of the arrows applied thereto. Fig. 4 is a perspective view of a portion of the governor mechanism hereinafter more particularly described.

Like characters refer to like parts throughout the several figures.

Referring to Fig. 1, the numeral 5 denotes a swinging structure which may be and will hereinafter be considered as, a door, the frame thereof being designated by 6, and said door being hinged to the frame or equivalent by one or more hinges as 7.

The principal operative parts of the door-closing mechanism are housed or inclosed in a suitable casing such as that de-

noted in a general way by 8 and which may have exterior lugs or ears as 9 adapted to be fastened by screws or similar means to the door 5 generally upon the inside thereof. The device includes in its organization a suitable arbor, shaft or spindle such as 10 and which is operatively connected with the door-frame or analogous part 6. This arbor as will hereinafter appear, is spring operated, although it might be actuated in some equivalent manner, and its effect is applied through the intervention of coöperating means to shut the door. Said arbor or spindle extends entirely through the casing or housing 8, its ends being threaded as at 11 and 12 and the threads as shown being of opposite pitch. In the present instance the threads 11 are left-hand while the threads 12 are right-hand.

To the frame 6 is shown as pivotally connected the link 13, said link in the construction shown being pivoted at its inner end to the bracket 14 fastened to the frame 6. The outer end of the link 13 is loosely pivoted or otherwise jointed to the companion link 15 which has a head 16 interiorly threaded as at 17, the threads 17 being of left hand pitch to mate with and receive those already denoted by 11. The arbor or spindle 10 extends through hubs or bosses 18 and 19 upon the top and bottom of the casing 8, the upper hub being threaded externally to receive the collar 20 through which the upper threaded end of the arbor 10 projects, while the lower hub 19 is similarly threaded to removably receive the thimble or cap 21 which incloses the lower threaded end of said arbor which for the time being is not in use.

In the construction shown the device is fastened to a right-hand door. If the casing 8 be inverted and if the positions of the collar 20 and 21 be reversed, the device would then be adapted for operative connection with a left-hand door except that in such an event as this, it would be necessary to provide a link such as 15, the head or hub 16 of which has a right hand thread to receive the threads 12 already described. I, therefore, provide for the ready attachment of the closer to right or left hand doors whether the ends of the arbor or spindle 10 be threaded or not, one of the primary points of the invention being the extension of such an arbor entirely through the cas-

ing, so that either end is adapted for operative connection with a link such as 15 or some analogous member.

The particular advantage of threading one or both ends of the spindle or arbor 10 will be hereinafter set forth. The same result, however, can be obtained in other ways within the scope of my invention, although the threaded joint is highly advantageous. It will be assumed at the present time that there is a rigid connection between the arbor 10 and the link 15 and that there is a constant spring action against said arbor or spindle. Under such circumstances when the door is opened this spring is put under further tension and when the door is released the spring of the arbor with the aid of the cooperating parts will close the same. This action in itself is comparatively well-known, so that it is quite unnecessary for me to describe the same further in detail.

The operating spring for closing the door is denoted by 22, and it is inclosed by the annular flange 23 depending from the top of the housing 8, one end of said spring being fastened to said flange and the other to the arbor 10. This spring like those used in door-closers of the ordinary kind is constantly under tension, although as will be understood it is further tensioned by and on the opening of the door.

As will hereinafter appear I provide an automatically-operable governor for controlling the closing of the door, the action of the governor being such as to prevent the door being closed too rapidly either by slamming or the wind or from other causes. The means between the arbor or spindle 10 and the governor is of such a nature that the door can be freely opened without affecting the governor, but when the door is closed the governor becomes active to perform its office. The governor may vary as to type, although a centrifugal governor is quite satisfactory in this connection as will hereinafter appear.

The governor is denoted in a general way by 24, and it involves in its make-up the rotary shaft 25, the cone pointed ends of which are shown fitted in bearings in the casing 8. Fastened to said shaft 25 so as to rotate therewith, is the collar 26 to which are connected the upper ends of bowed-spring arms 28, the lower ends of said arms being connected with the collar 29 slidable on said shaft 25, the spring arms 28 between their ends having attached thereto the weights 30. To the sleeve 29 is rigidly connected the brake-member 31 which is shown as consisting of a disk. Coöperative with the brake-member 31 are one or more brake shoes as 32 which are relatively stationary and which are shown consisting of pins extending through the substantially annular body or member 33 located between and pivoted to

the branches of the yoke or fork 34 on the forward arm of the lever 35 pivotally supported between its ends for adjustment by a suitable bearing within the casing 8. The brake shoes or members 32, therefore, are adapted to bear against the brake element or disk 31 at substantially diametrically opposite points when the governor 24 is acting, and owing to the fact that the carrier for said brake shoes is supported for swinging movement at a point approximately midway between the two brake shoes the latter apply equal effects to the brake element 31 when the latter is brought into engagement with said shoes. The rear arm of the lever 35, has connected therewith a coiled pull-spring 36, the normal tendency of which is to swing the active or brake carrying end of said lever 35 away from the disk 31, said active end being adjustable toward said disk by a suitable adjusting member such as the screw 37, shown as tapped through the bottom of the casing 8 and the tip of which is adapted to engage the adjacent end of the brake lever 35 for such purpose. When the movement of the door in closing exceeds a certain speed as will hereinafter appear, the weights or balls 30 are thrown outward by centrifugal action, and on this motion the brake element or disk 31 through the outwardly-flexed arms 28, is brought into contact with the shoes 32 to thereby check the said closing movement. The degree of contact between the movable and relatively stationary members of the brake mechanism can be regulated through the agency of the screw 37.

Fixed to the governor-shaft 35 so as to rotate therewith, is the pinion 38 in mesh with the spur-gear 39 which in the construction shown is rigidly carried by the elongated hub 40 of the pinion 41, said hub 40 being loose on the arbor 10 and the pinion 41 being in mesh with the spur gear 42 rigid with the shaft 43 rotatively carried by a suitable bearing or bracket in the housing 8. Fixed to said shaft 43 is a pinion 44 in mesh with the spur-gear 45 which has on its inner side the spring-operative pawl 46 in engagement at all times with the ratchet wheel 47, rigidly connected with the arbor 10 so as to rotate therewith. It will be clear, therefore, that when the door 5 is opened, the arbor 10 turns, but no effect is transferred from said arbor to the governor 24 owing to the interposition between the two parts of the pawl-and-ratchet mechanism, the pawl 46, relatively speaking, during the opening of the door riding idly over the teeth of the ratchet-wheel 47 which at this time is being rotated. When the door, however, is closed there is a direct, positive connection between the governor and the arbor so that should said arbor be rotated at an excessive or an abnormal speed, the brake-

mechanism already described, will be thrown automatically into action to check the sudden or too-rapid closing of the door.

There may be cases in which it is desired to wholly prevent the closing of the door, for instance by throwing the door-closing mechanism out of action and a throw-out or stop-member such as 48, answers satisfactorily in this connection, said member as shown consisting of a screw tapped through the outer side of the casing 8 and adapted to be interposed in the path of movement of the projection 49 extending from the collar or sleeve 26 already described. Normally this screw 48 is outside of the path of the projection 49. By running the screw 48 in sufficiently far, however, the door can as will be understood, be held open at any desired point and will be released as soon as the screw 48 is backed out the requisite extent.

Normally the upper end of the spindle or arbor 10 bears against the roof of the cavity 50 in which the threads 17 are formed, and said bottom thus serves as a suitable stop for said arbor or spindle, although it is conceivable that some equivalent means might be utilized for the same purpose. The consequence is that the door can be opened or closed exactly after the manner now in vogue with ordinary closers either of the spring or fluid type. It will be assumed that an unusual closing force is applied to the door either by a blast of air or some object falling thereagainst. In this event the disk 31 will be carried against the brake-shoes 32 and were it not for the slip connection between the arbor 10 and link 15 the arbor 10 might snap, the gears stripped or some like accident happen. Instead of this when the door is closed at an excessive rate of speed, the arbor or spindle 10 will feed the link 15 upward, owing to the described connection between the two parts, so that no injury can result, the effect being practically like that of a slip joint between said two parts. When the door is finally shut or closed tight, the arbor 10 will be turned in the opposite direction it follows on the opening of the door and owing to this, the link 15 will be fed downward until the roof of the cavity 50 abuts against the upper end of the arbor 10.

What I claim is:

1. A door-closer comprising a power operable door closing arbor, a governor, means for transferring the effect of the arbor to the governor on a predetermined movement of the door to thereby operate the governor, a brake member, a pair of brake members for engaging the companion brake member

at different points, and a movably mounted member rigidly carrying said pair of brake members, and means whereby said pair of brake members will be caused to engage the companion brake member when the governor moves at a predetermined speed.

2. A door-closer comprising a power-operable door-closing arbor, a governor, means for transferring the effect of the arbor to the governor on a predetermined movement of the door to thereby operate the governor, a brake member connected with the governor for movement therewith, a pair of brake members for engaging the companion brake member at approximately-diametrically opposite points, an annular member carrying said pair of brake members at substantially diametrically-opposite points, and means for pivotally supporting said annular member.

3. A door-closer comprising a power-operable door-closing arbor, a governor, means for transferring the effect of said arbor to said governor on a predetermined movement of the door to thereby operate said governor, a brake member connected with and movable by the governor, an annular member, a pair of brake members carried by said annular member and adapted to engage the first mentioned brake member at substantially diametrically opposite points, and when said first mentioned brake member has moved a certain distance, a lever having a fork between the branches of which said annular member is pivotally supported, and means acting against said lever to hold said pair of brake members in position to engage the companion brake member.

4. A door-closer comprising an arbor, means for positively rotating said arbor, means for checking the rotation of said arbor during the closing of the door, and a link connected with said arbor said link and arbor being constructed for relative movement about each other, one of said two last-mentioned parts being provided with means for limiting the movement of the link in the direction of the axis of rotation of said arbor.

5. A door-closer comprising a power-operable door-closing arbor having a threaded extremity, and a link having a correspondingly-threaded portion to receive said threaded extremity.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN D. HUMPHREY.

Witnesses:

HEATH SUTHERLAND,
L. L. MARKEL.