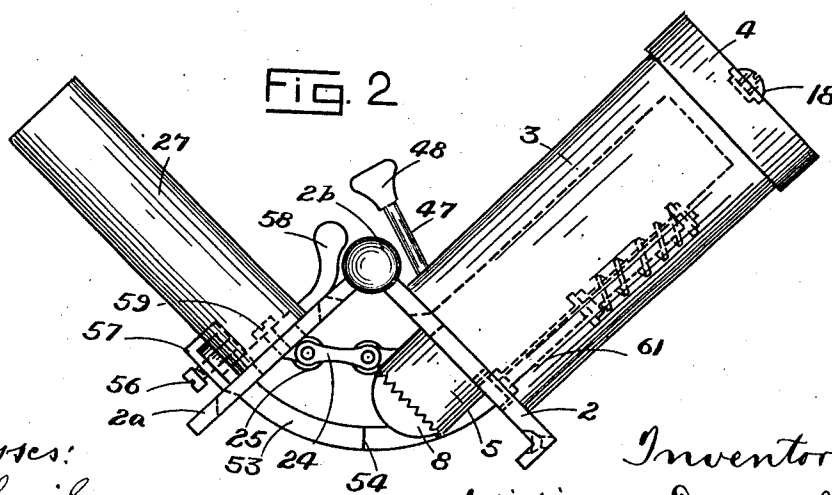
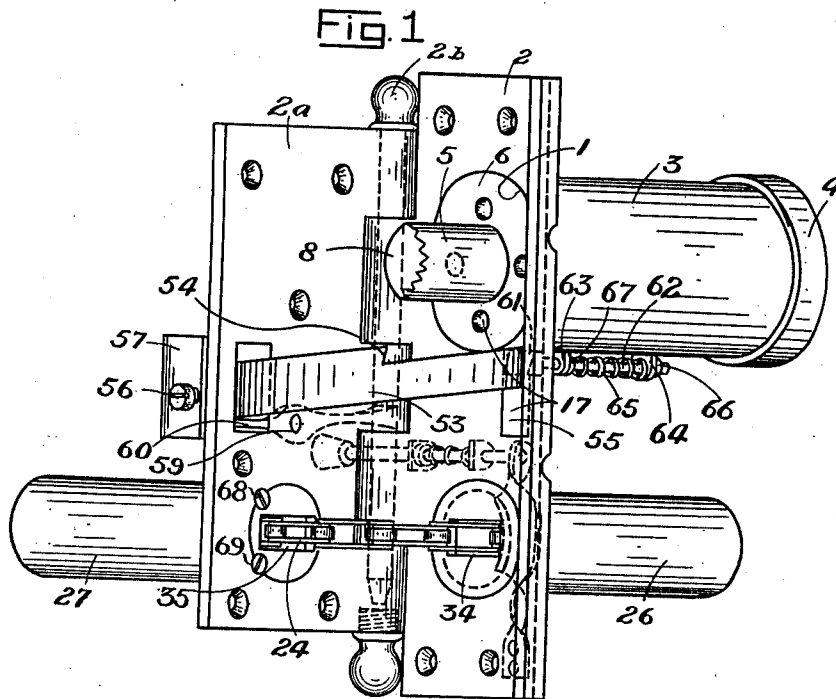


W. DUGGAN, JR.
DOOR CLOSING APPARATUS.
APPLICATION FILED SEPT. 10, 1910.

1,026,155.

Patented May 14, 1912.

2 SHEETS—SHEET 1.



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by B. Singer atty.

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2 SHEETS—SHEET 2.

Fig. 3

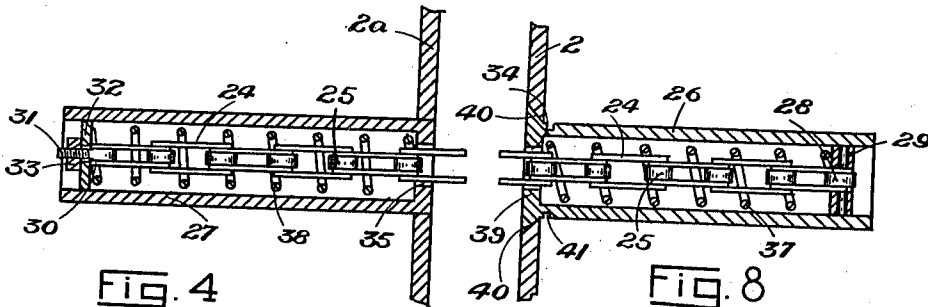


Fig. 4

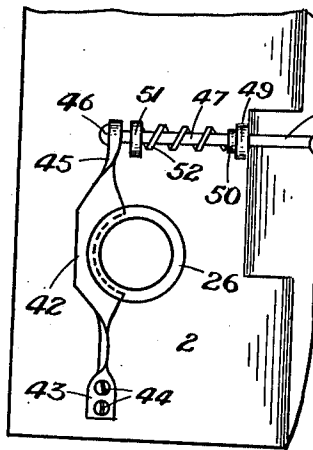


Fig. 5

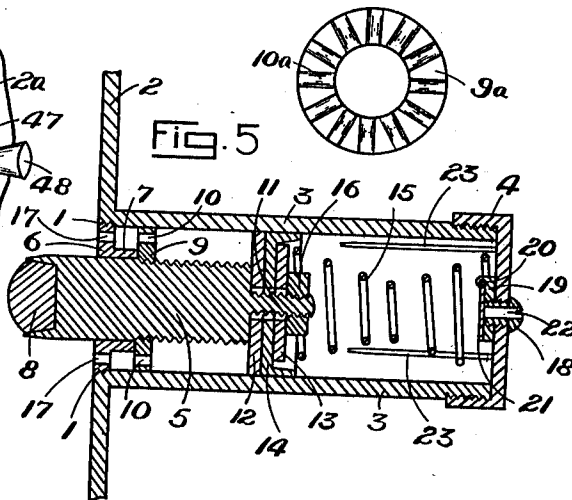


Fig. 6

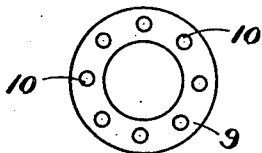
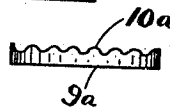


Fig. 7



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UNITED STATES PATENT OFFICE.

WILLIAM DUGGAN, JR., OF DUNEDIN, NEW ZEALAND.

DOOR-CLOSING APPARATUS.

1,026,155.

Specification of Letters Patent.

Patented May 14, 1912.

Application filed September 10, 1910. Serial No. 581,384.

To all whom it may concern:

Be it known that I, WILLIAM DUGGAN, JR., a subject of the King of Great Britain, residing at Dunedin, New Zealand, have invented new and useful Improvements in Door-Closing Apparatus, of which the following is a specification.

The present invention relates to door and gate closing apparatus of the kind described in the specification of my application for Letters Patent Serial Number 517188 filed 11th September 1909.

With the checking device of the apparatus described in my prior specification, and with others of similar type, it has been found impossible to prevent slamming of the door when opened widely, for the reason that such checking devices, if constructed with a resisting power sufficient to properly check a widely opened door, are so strong as to overcome the impulse given by the closing spring when the door has only been slightly opened, the result being that in the latter case the door remains a little ajar.

One of the objects of my present invention is to remedy this defect.

It has also been found that when the closing spring is arranged with an end secured at the back of each of the casings attached to the hinge plates, as described in my said specification, the bending to which it is subjected as the door opens tends to strain it and impair its resiliency.

A further object of my present invention is to remedy this defect.

It has also been found desirable that the apparatus should be capable of being readily dismantled, as for instance when it is desired to remove the door, and my present invention provides means whereby this can be effected.

Other improvements in the apparatus described in my said prior specification are also hereinafter described and more particularly pointed out in the claims.

Referring to the accompanying drawings illustrating my invention, in which similar numerals of reference indicate similar parts, Figure 1 is a front view of a door-closing apparatus according to my present invention. Fig. 2 is a plan thereof. Fig. 3 is a detail section of the closing springs in their casings and the connecting chain. Fig. 4 is a detail view of the means for securing the removable chamber to the hinge leaf. Fig. 5 is a longitudinal sectional view on a larger

scale of the checking device. Fig. 6 is a view of the adjusting washer of the checking device. Fig. 7 is an edge view of an alternative form of adjusting washer, and Fig. 8 is a face view of the same.

According to this present invention there are the two hinge-leaves (2) (2^a) adapted to be secured to the hinge-post and the door respectively and preferably of the type provided with a removable hinge-pin (2^b) to facilitate removal of the door to which the leaf (2^a) is secured. There is a threaded hole (1) (see Figs. 1 and 5) in the hinge-leaf (2) that is to be fitted to the hinge-post, behind which hole (1) extends the casing (3) for the checking device, this casing (3) being preferably formed integral with the hinge-leaf (2) and having an open rear end provided with a removable closure cap (4) that is adapted to be screwed thereon. The cap (4) is fitted with a central air-valve consisting of a short screw (18) screwed in a hole in the cap (4) and having a central hole (22) in it communicating with the interior of the casing (3). A nut (19) is screwed on the end of the screw (18) that projects within the casing (3) and has a horizontal pivot pin (20) at its upper end from which hangs a valve (21) of leather, which permits the ingress of air through the hole (22) but prevents the escape of air outward. A plunger (5) having its rear portion threaded works within the casing (3), its socketed front end projecting through a central hole in the threaded plug (6) which is screwed into the threaded hole (1) in the hinge leaf (2). This plug (6) has a rearward extension or flange (7) projecting within the casing (3) and embracing a portion of the plunger (5) as shown in Fig. 5. This plug (6) and the plunger (5) are preferably made of gun metal. The socketed front end of the plunger (5) is fitted with a plug (8) of cork, rubber or the like as in my said prior specification Number 517188. On the threaded portion of the plunger (5) there travels a threaded disk or washer (9) which has a series of small holes (10) (see Figs. 5 and 6) perforated in its face. The rear end of the plunger (5) has a threaded shank (11) which has screwed up thereon a metal disk (12) and a metal washer (13) between which is clamped a rubber or leather washer (14) which makes airtight contact with the inside of the casing (3). A nut (16) se-

cures the whole in position on the shank (11). A double volute coiled spring (15) lying behind the washer (13) normally keeps the plunger (5) thrust forward and protruding through the central hole in the plug (6) as far as is permitted by the washer (9) which bears on the flange (7) of the plug (6). A series of small holes (17) are formed in the plug (6) around the central hole thereon through which the forward end of the plunger (5) protrudes, so that by means of a nail or the like passed through one of the small holes (17) into one of the small holes (10) in the washer (9) the latter may be held from moving while the outer end of the plunger (5) is rotated by hand in order to decrease or increase the extent to which it protrudes from the casing (3).

Figs. 7 and 8 illustrate an alternative form of washer (9^a) formed with radial corrugations (10^a); when this form is used similar radial corrugations are formed on the inner rim or face of the extension (7) of the plug (6), which corrugations engage the corrugations on the washer (9^a) and prevent the latter rotating, so that the plunger (5) can be turned as desired to adjust it. The plunger is adjusted by the means before described according to the weight of the door to be closed, in such a way that when the door, under the influence of the closing spring, hereinafter described, first strikes the plug (8) at the end of the plunger (5) it does so rather at the side thereof, so that the peripheral side of the plunger opposite the point of impact is momentarily jammed against the surface of the hole in the plug (6), and this checks the door from slamming violently. As soon as the momentary jam is automatically relieved the closing is completed gently against the influence of the coiled spring (15) in the plunger casing (3), and the compressed air therein, which is prevented from escaping by the leather flap (21) closing the hole (22) in the cap (4) of the casing (3). There are a plurality of longitudinal grooves (23) formed in the interior surface of the casing (3) and so arranged that the rear end of the plunger (5) must be nearly at the back of the casing (3), the air therein being consequently greatly compressed, before the forward ends of the grooves (23) come in front of the rubber disk (14). As soon as this happens the air escapes along the grooves (23) and through the holes (10) (17). When the air has thus escaped, the next opening of the door allows the plunger (5) to emerge from the casing (3) and air enters the rear end of the latter through the hole (22) in the screw (18).

The door-closing means instead of consisting of a coiled spring having its ends attached respectively at the back of its cas-

ings as in my said prior specification Number 517,188 consists of a length of roller chain (24) (see Figs. 1 and 3) having the rollers (25) enlarged so as to project beyond the links for easy running; the rear ends of the casings (26) (27) are made open, and one end (28) of the chain is secured to a disk (29) which slides within one casing (26) while the other end (30) of the chain has a threaded pin (31) connected to it on which is another disk (32) which slides in the other casing (27) and is secured on the pin (31) by a nut (33). The holes (34) (35) in the hinge leaves (2) (2^a) respectively that open into the casings (26) (27) are made smaller in diameter than the latter, thereby forming flanges, between which and the disks at the end of the chain respectively are two coiled springs (37) (38) one in each casing. The holes (34) (35) are rectangular in shape so that the chain cannot turn. When the door is opened the springs are compressed to a degree which is adjustable by the manipulation of the nut (33).

In order to facilitate the removal of the door, the casing (26) on the hinge leaf (2) that is fixed to the hinge post, is not made integral with the hinge leaf (2) as the other casing (27) is with respect to the hinge leaf (2^a), but this casing (26) is made with a flanged outer end (39) the rear face (40) of which is beveled to fit a corresponding hole countersunk in the hinge leaf (2). An annular groove (41) is formed around the neck of the casing (26) at its junction with its flanged end (39) and this groove (41) is adapted to be engaged by the semi-circular central portion (42) of a twisted metal plate (see Fig. 4) acting as a spring, one end (43) of which is secured by screws (44) to the back of the hinge leaf (2) while its upper end (45) is fixed to the inner end (46) of a push rod (47) having a thumb-piece (48) at its outer end adapted to project within the room through a suitable opening in the door-frame when the apparatus is fixed in position. The push rod slides in lugs (49) (51) fixed on the back of the hinge leaf (2) and has a collar (50) fixed on it. A spring (52) is coiled around the rod (47) between the collar (50) and the lug (51) and tends to keep the push rod (47) normally thrust outward. The spring piece (42) normally engages the groove (41) in the neck of the casing (26) and holds the latter in position, but on pushing in the thumb-piece (48) the spring piece (42) is disengaged from the groove (41) and allows the casing (26) and its attachments to be drawn out and away from the hinge leaf (2) so that on removing the hinge pin (2^b) the door can readily be removed without entirely dismantling the closing apparatus. Two screws (68) (69) (see Fig. 130

1) are fitted in holes on the opposite leaf (2^a) which screws are normally screwed in flush with the surface of the hinge plate (2^a) but when it is desired to replace the casing (26) after same has been removed as before described, these screws (68) (69) are unscrewed so that their heads project from the surface of the leaf (2^a) and when the door is closed push the casing (26) back into its proper position, after which the screws are screwed up flush again.

The latch (53) to hold the door open in desired position is of the kind described in my said prior specification Number 517,188, but has the series of shoulders or notches (54) on its upper edge undercut as shown, and it normally hangs about horizontal so as to pass freely through the slot (55) in the opposite hinge leaf (2). Its rear end is pivoted by a pin (56) on a small bracket (57) attached to the back of the hinge-leaf (2^a). A lever (58) having a flat portion is pivoted on the back of the hinge leaf (2^a) by a pin (59) so that its point (60) lies under the butt end of the latch (53) but in front of the pivot (56) thereof. When it is desired to keep the door open at a desired position, the lever (58), a portion of which projects from the door within the room, is depressed when the appropriate notch on the upper surface of the latch (53) is about to pass through the slot (55) in the hinge leaf (2) as the door closes. This tilts up the latch and causes the notch 54 to engage the inclined face of a spring buffer (61) carried on the end of a rod (62) which slides in lugs (63) (64) fixed on the casing (3), a spring (65) being coiled around the rod (62) between the lug (64) and a collar (67) fixed on the rod (62). A collar (66) fixed on the rear end of the rod (62) is so arranged that the lower and foremost edge of the inclined face of the buffer (61) is normally flush with the face of the hinge plate (2) and the line of movement of the rod 62 tangent to the path of movement of the member 52. When the latch (53) has been tilted as before described the shoulder thereof impinges on the buffer (61) which yields before it so as to prevent jar and straining of the door, and also supports the latch so as to keep the door open, but the door may be manually closed by pushing hard, which causes the latch (53) owing to its curved shape to pass the buffer (61) which yields before it. As soon as the door is opened wider the latch (53) drops by gravity into its normal position.

Having now described my invention, what

I claim as new and desire to secure by Letters Patent is:—

1. In combination, a hinge-post, a door hung to said hinge-post by a hinge having two leaves, means for closing said door automatically when it has opened, a latch 53 having a notched surface pivoted at one end on one leaf and adapted to enter a slot formed in the other leaf, a spring buffer 61 lying with its front end in the upper part of said slot, and means 58 for setting said latch so as to cause its notched surface to pass below or engage said buffer.

2. In combination, a hinge-post, a door hinged to said post by a hinge having two leaves, means for closing said door automatically when it has opened, a curved latch 53, provided with a plurality of notches, pivoted at one end to one leaf and adapted to enter a slot formed in the other leaf, a buffer 61 normally lying with its front end in the path of movement of said latch and displaceable in a line tangent thereto, and mechanism 65 for retaining said buffer in a normal position but yieldable relative to movement of the door responsive to the said first mentioned means for retarding movement thereof, and responsive to manual closing of said door, permitting the front end of said buffer to be forced in a tangential direction sufficiently to allow the said latch to pass thereby.

3. In combination, a hinge-post, a door hinged to said hinge-post by a hinge having two leaves, means for closing said door automatically when it has opened, a curved latch 53 provided with a notch, pivoted at one end to one leaf, and adapted to enter a slot formed in the other leaf, a buffer 61 normally lying with its front end in the path of movement of said latch for engagement with said notch, and displaceable in a line tangent thereto, and mechanism 65 for retaining said buffer in a normal position, but yieldable relative to movement of the door responsive to said first mentioned means for retarding movement thereof, and responsive to manual closing of said door, permitting the front end of said buffer to be forced in a tangential direction sufficiently to allow the said latch to pass thereby.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM DUGGAN, JUNR.

Witnesses:

ANDREW JOHN PARK,
JOHN RUTHERFORD PARK.