A. H. SULSER.

DOOR CLOSING AND CHECKING DEVICE.

APPLICATION FILED NOV. 3, 1908.

913,320.

Patented Feb. 23, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

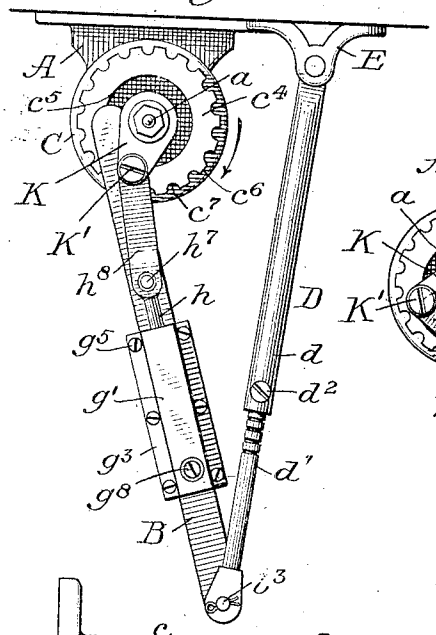


Fig. 2.

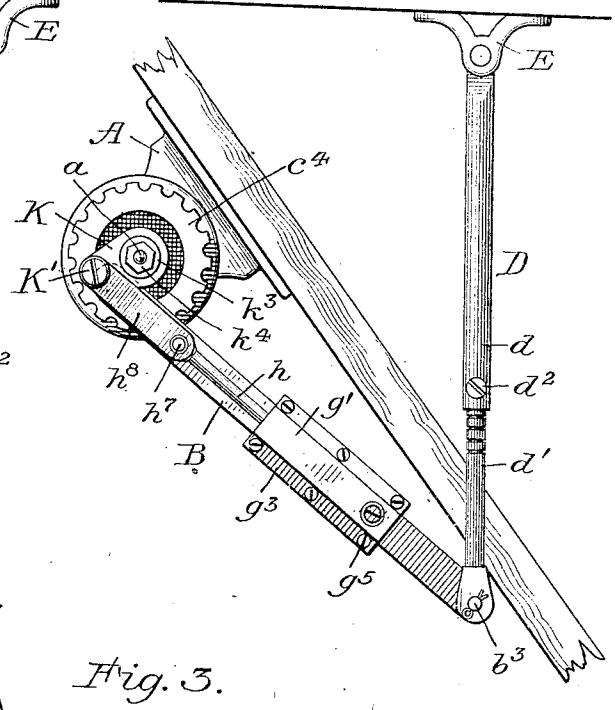


Fig. 3.

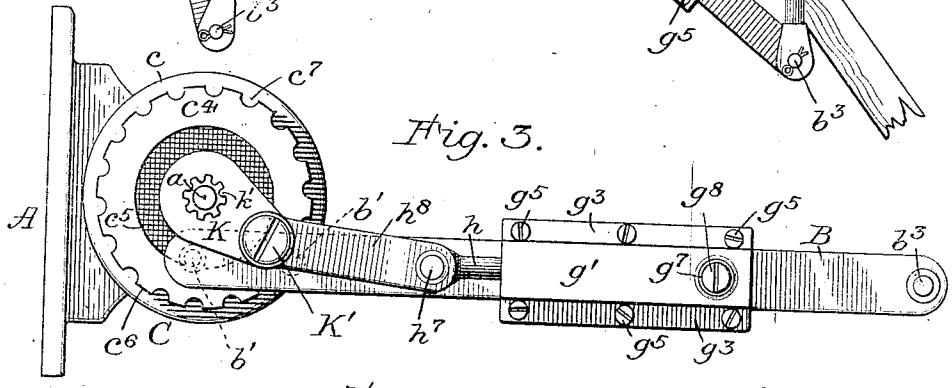
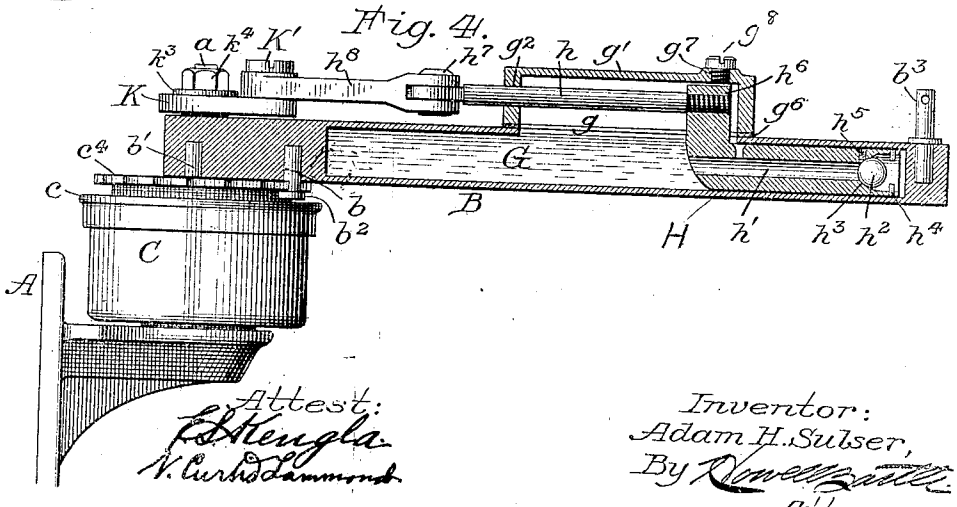


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5.

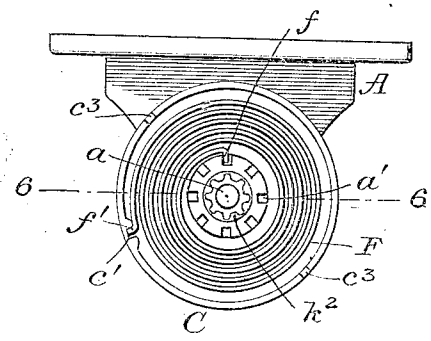


Fig. 6.

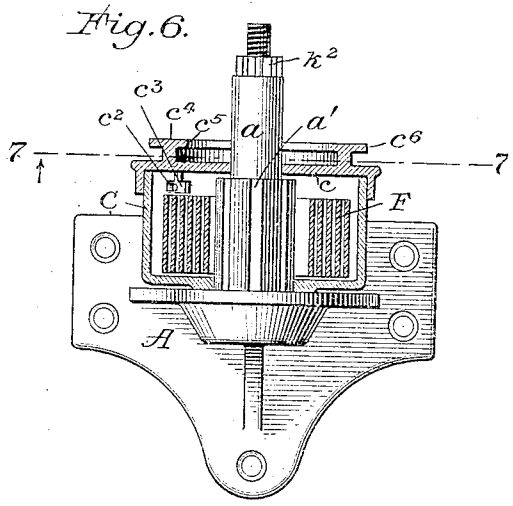


Fig. 7.

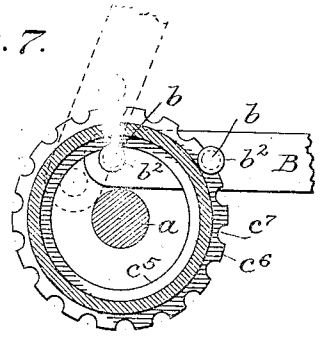


Fig. 8.

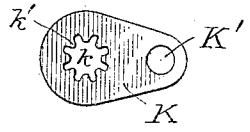
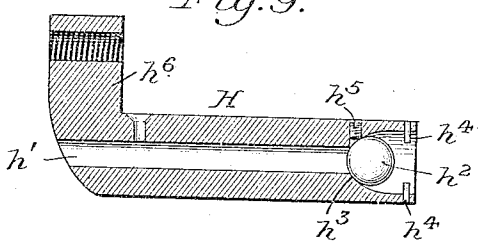


Fig. 9.



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UNITED STATES PATENT OFFICE.

ADAM H. SULSER, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR OF ONE-HALF TO AUGUST E. L. SCHWIERING, OF WASHINGTON, DISTRICT OF COLUMBIA.

DOOR CLOSING AND CHECKING DEVICE.

No. 913,320. Specification of Letters Patent. Patented Feb. 23, 1909.

Application filed November 3, 1908. Serial No. 460,888.

To all whom it may concern:

Be it known that I, ADAM H. SULSER, a citizen of the United States, residing at Washington, in the District of Columbia, have invented new and useful Improvements in Door Closing and Checking Devices, of which the following is a specification.

This invention relates to a device to be attached to a door and its casing for automatically closing the door when opened, and also to check the closing movement of the door to prevent slamming.

The main objects of this invention are to simplify and improve upon the construction of such devices in various particulars, as will hereinafter appear.

The invention consists in the matters hereinafter described and pointed out in the appended claims.

For a detail description of my invention I will refer to the drawings furnished which illustrate one embodiment of the several novel features.

Figure 1 is a plan view of a device embodying my invention as it appears when applied to a door, the several parts thereof being shown in the position assumed when the door is closed. Fig. 2 is a similar view showing the positions of the parts when the door is part-way open. Fig. 3 is an enlarged plan view of the spring-casing, the supporting bracket, and the arm which is secured to the spring-casing and which is operated on by the spring for closing the door. Fig. 4 is a side view of the bracket and spring-casing with the attached arm shown in section. Fig. 5 is a plan view of the bracket and spring-casing, the cover of the latter being removed for disclosing the spring. Fig. 6 is a sectional view of the spring and spring casing taken on line 6—6 of Fig. 5, the bracket being shown in front view. Fig. 7 is a sectional view taken on line 7—7 of Fig. 6, showing the notched ring which is engaged by pins or projections on the spring controlled arm for securing the latter to the spring casing, a portion of said arm being also shown in said figure. Fig. 8 is a plan view of the arm which connects the piston rod of the checking device to the supporting bracket, and Fig. 9 is an enlarged sectional view of the piston.

The device as a whole includes a bracket A, an arm B which is pivotally secured to said bracket through the medium of a spring casing C, the latter being rotatively mounted on the bracket A, a checking device, and an adjustable link D which is pivotally connected to the outer end of the arm B and which at its other end is pivotally secured to a bracket E. The device is secured to a door and its casing by means of the brackets A and E, the bracket A being secured to the door at or near its upper edge, say about six inches from the hinge line of the door, and the bracket E is secured to the door casing above the door, the relative positions of the brackets being about as shown in Fig. 1. When properly mounted and adjusted, the door is closed by the action of a spring F which tends to rotate the spring-casing C in the direction of the arrow shown in Fig. 1, this rotative movement of the casing carrying with it the arm B which acts to close the door in a manner common to door-closing devices of this general type. The link D is made in two telescoping sections d and d' so that the length of the link may be adjusted to suit the plane of the door casing to which it is to be attached, the sections being locked in their adjusted positions by a set screw d^2.

The bracket A is provided with a shaft or stud a upon which the spring-casing is rotatively mounted, this stud being preferably formed integral with the bracket, but which may be made separate therefrom and secured to the bracket in any suitable manner.

The stud a is provided with series of grooves a' arranged longitudinally thereof into one of which is inserted the inner bent end f of the spring F, the series of grooves being provided to facilitate assembling the parts, it being immaterial which of the several grooves is engaged by the spring. The other or outer end of the spring F is bent as at f' to engage a slot or groove c' formed on the inside of the wall of the casing C in which said spring is inclosed. Said casing is in the form of a circular box having a removable cover c, the bottom of the casing and also the cover being provided with a central opening for receiving the stud a of the supporting bracket on which said casing rotates. It is to be noted that as one end of the spring F is connected to the fixed stud a and the other end to the casing C, said spring will exert its force to return the casing to normal position whenever it is ro-

tated on said stud against the tension of said spring. The casing cover c is provided with two or more pins c^2 which project inwardly from an annular depending flange, (see Fig. 6,) said pins being adapted to enter slots c^3 formed in the upper edge of the main body of the casing. The slots c^3 are extended laterally from each side of a central opening to form shoulders with which said pins engage for locking the cover and casing together, the pins and slots forming "bayonet" connections by which the cover may be locked against direct removal by turning the cover in either direction after the pins have been inserted in the slots c^3, as will be readily understood.

On top of the cover c is a notched ring c^4 which is concentric with the bracket stud a, and to which the bar B is adjustably secured. Said ring may be made integral with the cover of the casing as shown, or it may be made separately therefrom and attached thereto in any suitable manner. The ring is arranged to form inwardly and outwardly projecting annular shoulders, one of which is formed by the inner edge c^5 and the other by the outer notched edge c^6 of the ring. The inner end of the arm B is provided on its under surface with two pins or projections b and b' adapted to engage the inner and outer edges of the ring c^4, as shown in Fig. 7. The pin b is adapted to enter one of the notches c^7 in the outer edge of the ring, and the other pin b' is located a sufficient distance therefrom to engage the inner edge c^5 of the ring some degrees distant from the notch occupied by the pin b, the latter being acted on by the ring under pressure of the spring F to force the pin b' against the inner edge of the ring and thus firmly hold the bar B to said ring. Each of the pins b and b' is provided with a head b^2 which engages with the under surface of the ring to prevent the bar B from being lifted from the ring, and on referring to Fig. 7, it will be seen that the stud a of the bracket is sufficiently close to the edge of the bar B to prevent the latter from being moved inwardly far enough to release the head b^2 of the pin b' from its engagement with the ring, so that said bar cannot be entirely separated from the ring. The bar B may however, be moved for releasing the pin b from the notch c^7 with which it may be engaged, as shown in dotted lines in Fig. 7, and said bar may then be moved around the ring and the pin b inserted in another notch c^7 for adjusting the tension of the spring F and this may be done after the device has been applied to a door by first separating the two sections of the adjustable link D. The bar B may also be entirely reversed for adapting the device to a right hand door by swinging its outer end around so that it will extend in an opposite direction from the ring, but when this adjustment is made the spring F must also be reversed, and this is accomplished by removing the cover of the spring casing, removing the spring and reinserting it in a reversed position, the ends of the spring readily engaging with the stud and casing as hereinbefore described.

The checking device is carried by or made a part of the bar B, and while I have shown a liquid checking device it is to be understood that an air check may be employed if desired without departure from the main features of my invention. The checking device preferably consists of a cylinder and piston carried by or mounted upon the arm B, and while the cylinder may be separately constructed and mounted upon said arm I prefer to form the cylinder within the arm, or in other words have the arm itself made hollow to serve as the cylinder. As shown, the arm B is provided with an interior chamber or cylinder G for a reciprocating piston H, the bar B in reality constituting a cylinder, the inner end of which is pivotally secured to the bracket A. The piston H is operated by a piston rod h which is also pivotally connected to the bracket A, but the pivotal connection of the piston rod is eccentric to the pivotal connection of the cylinder or bar B, so that a relative movement of the bar and bracket A will so vary the positions of the two pivotal connections as to cause a relative movement of the piston and cylinder.

The bar B may be made from square tubing cut to proper length and having the ends closed by plugs brazed or otherwise secured therein, said plugs being of a length sufficient to afford adequate support for the pins b and b' at one end, and for a pin b^3 at the opposite end, the latter pin being provided for pivotally connecting the outer end of the arm to the adjustable link D. The form of the arm B is not essential, and instead of being rectangular in cross-section as shown, it may be made round if desired. The piston is inserted and removed from the chamber or cylinder G through an opening g formed in the top of the bar B, said opening being slightly longer than the greatest possible stroke of the piston, and being located about an equal distance from the outer end of the chamber G, the space between said opening and the outer end of the cylinder forming the working or compression end of the cylinder in which the liquid is trapped for resisting the forward stroke of the piston. The opening g is closed by a box cover g' which projects above the bar B, and said cover is provided at its inner end with an opening g^2 for the piston rod h. The sides of said cover are each provided with a flange g^3, and similar flanges are formed on the sides of the bar B, these flanges being provided for the screws g^5 which secure the

cover to the bar for closing the opening g. A washer or packing g^6 may be inserted between the cover and bar to secure a fluid tight joint. The piston H is made to smoothly fit the interior of the cylinder and allow the liquid to be slowly forced around its edges from the front to the rear thereof during its forward stroke. A hole h' is bored through the piston from end to end to afford a passage for the liquid during the rearward stroke, said hole or passage being partially or wholly closed during the forward stroke by a ball valve h^6. The passage h' is enlarged at the forward end of the piston to form a seat h^3 for the ball h^2 and also to afford space for the passage of liquid around the ball when the latter is forced from its seat. The ball is retained in the end of the piston by pins h^4 so located as to permit a proper movement of the ball for opening and closing the passageway. In line with the valve seat h^3 is a small screw h^5 which may be moved inwardly to prevent the ball from entirely closing the passageway, this adjustment being provided in case it is desired to lessen the checking action of the device. By permitting more or less of the liquid to pass through the passageway in the piston, some of the resistance to the forward stroke will be removed, and the piston will in consequence act with less resistance to the closing movement of the door. At the rear end of the piston there is a lug h^6 which projects upwardly through the opening g into the box-cover g', and to this lug is secured the piston rod h. The cover g' is provided with a hole g^7 in its top which is normally closed by a screw g^8, and when the piston H is at the end of its rearward stroke, the small adjusting screw h^5 will be below the hole h^7 so that by removing the screw g^8 said screw h^5 may be reached for adjustment by a small screw driver. The hole g^7 may also be used for the introduction of liquid into the cylinder G.

The piston rod h is made to snugly fit the hole g^2 in the box cover g', and at its outer end said rod is pivotally connected as at h^7 to a link h^8, the other end of the link being pivotally connected at K′ to an arm K which is secured to the upper end of the bracket stud a. The arm K affords a fixed pivoted support for the piston rod, *i. e.*, fixed with reference to the bracket A; and said rod is adjustable radially on the rod a for a purpose to be explained. Said arm is provided with a hole k for receiving the end of the stud a, and around said hole is a series of projections k' adapted to enter grooves k^2 formed longitudinally of the stud, so that said arm may be non-rotatively supported on said stud in any desirable radial position. The arm K is held on the stud by means of a washer k^3 and nut k^4 as clearly shown. The position of the arm K is best determined by the requirement of the checking device. Usually said arm will be initially adjusted so that the pivotal point K′ will be just out of alinement with the stud a and the pivotal point h^7 of the link h^8, as shown in Fig. 3. If this adjustment should not meet requirements, its position with reference to the bracket may be readily changed as desired.

Now referring to Figs. 1 and 2, it will be noted that when the door is opened there is a relative movement between the bracket A and the arm B, the latter being turned around the bracket stud a, while the bracket is itself moved in an opposite direction by the movement of the door. This causes a relative movement between the piston and cylinder whereby the piston is brought to the rear end of the cylinder, the liquid in the cylinder passing from the rear to the front of the piston through the passageway h'. On the return or closing movement of the door, which is effected by the spring E as heretofore explained, the piston and cylinder move in the opposite direction, but this movement is resisted by the liquid in the forward end of the cylinder, and this resistance acts as a check upon the closing movement of the door, as the piston must reach the forward end of the cylinder before the bracket A and arm B can assume their normal relative positions. The passageway h' being partly or wholly closed by the ball-valve h^2, the liquid in the forward end of the cylinder is gradually forced around the piston, and through the passageway h' if this be partially open, and the rapidity with which the liquid is transferred from the front to the rear of the piston determines the checking action; this as before explained being to some extent controlled by the adjusting screw h^5.

The pivotal connection K′ is moved in a circular path around the pivotal connection of the arm B, and this movement affects a relative movement of the cylinder and piston which is greatest when the door is open and which gradually lessens as the door approaches the end of its closing movement. The checking action is therefore greatest when the spring is under its greatest tension, and it will be readily seen that by adjusting the radial positions of the arm K with respect to the bracket-stud a, the resistance of the checking device may be considerably lessened or entirely removed as the door reaches the end of its closing movement. This is an important feature of my invention, as the spring may be set under considerably less tension than is required in prior devices of this character and yet have sufficient force to overcome the resistance of a door latch at the end of the closing movement of the door. It is also to be noted that all of the parts of the device are readily accessible for adjustment and that it will require no spe-

cial skill to assemble the parts or to effect any desired adjustment.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is—

1. In a door closing and checking device, the combination with an arm having one end pivotally mounted upon a supporting bracket adapted to be secured to a door and the other end pivotally connected to a link adapted to be secured to a door casing, of a cylinder carried by said arm and a piston in said cylinder, the latter being pivotally connected with said bracket eccentric to the pivotal connection of said arm.

2. In a door closing and checking device, the combination with a bracket adapted to be secured to a door, a hollow arm having one end pivotally connected to said bracket, a piston operating within said arm, said piston being pivotally connected with said bracket at a point eccentric to the pivotal connection of said arm, and a link pivotally connected to the outer end of said arm, said link being adapted to be secured to a door casing.

3. In a door closing and checking device, the combination with an arm having one end pivotally mounted upon a supporting bracket adapted to be secured to a door and the other end pivotally connected to a link adapted to be secured to a door casing, of a cylinder carried by said arm, a piston in said cylinder having a pivotal connection with said bracket at a point eccentric to the pivotal connection of said arm, and a spring adapted to move said arm.

4. In a door closing and checking device, the combination with an arm having one end pivotally mounted upon a supporting bracket adapted to be secured to a door and the other end pivotally connected to a link adapted to be secured to a door casing, of a cylinder carried by said arm, a piston in said cylinder, an adjustable pivotal support carried by the bracket eccentric to the pivotal connection of said arm, and operative connections between said piston and said support.

5. In a door closing and checking device, the combination of a bracket adapted to be secured to a door, a stud carried by said bracket, a spring-casing rotatively mounted on said stud, a spring having one end connected to said stud and the other end connected to said casing, an arm having one end secured to said casing, a link pivotally connected to the other end of said arm, a cylinder carried by said arm, and a piston in said cylinder, said piston being pivotally secured to said bracket eccentric to said stud.

6. In a door closing and checking device, the combination of a bracket adapted to be secured to a door, a spring casing rotatively mounted on said bracket, a ring mounted on said casing around the pivotal axis thereof, an arm provided with projections adapted to engage the inner and outer edges of said ring, and notches in one of the edges of said ring.

7. In a door closing and checking device, the combination of a bracket adapted to be secured to a door, a stud carried by said bracket, a spring-casing rotatively mounted on said stud, an arm secured at one end to said casing, a cylinder carried by said arm, a piston in said cylinder, a radially adjustable arm mounted on said stud, and connections between the outer end of said arm and said piston.

8. In a door closing and checking device, the combination of a bracket adapted to be secured to a door, a hollow arm pivotally connected at one end to said bracket, said hollow arm being closed at its ends and being provided with an opening in its top wall, a piston adapted to be reciprocated in said arm longitudinally thereof, said piston being operatively connected through said opening to said bracket at a point eccentric to the pivotal connection of said arm, and a link pivotally connected to the outer end of said arm and adapted to be secured to a door casing.

9. In a door checking device, a cylinder, a piston operating therein, said piston having an opening therethrough for the passage of the checking fluid, a valve for controlling said opening, and a screw adapted to be projected into the valve seat for preventing the valve from entirely closing said opening.

10. In a door closing and checking device, the combination of a bracket adapted to be secured to a door, a stud carried by said bracket, a spring-casing rotatively mounted on said stud, a spring having one end connected to said stud and the other end connected to said casing, an arm secured at one end to said casing, a link pivotally connected to the other end of said arm, a cylinder carried by said arm, a piston in said cylinder, an arm non-rotatively mounted on said stud, and connections from the outer end of said arm to said piston.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ADAM H. SULSER.

Witnesses:
HOWELL BARTLE,
E. S. KENGLA.