DOOR CLOSING DEVICE

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Application March 23, 1937, Serial No. 132,545

9 Claims. (Cl. 16—80)

This invention relates to a door closing device. More particularly, it relates to spring hinges for insertion in swinging doors and door frames for normally retaining the doors in closed position and for normally closing the same when open. The invention furthermore relates to the general type of hinges shown and described in the applications of Giuseppe Cerami dated July 5, 1935, and January 16, 1936 and bearing serial numbers, 29,985, and 59,645, respectively.

One of the objects of the present invention is to provide a novel locking device as an improvement on the inventions described in the above cited, filed applications by Giuseppe Cerami. Another object of the present invention is to provide a simply constructed, effective and operable device adapted for operatively closing doors and other swinging structure parts to be normally retained in closed position.

Still another important object of my invention is to provide a device which can be automatically machined at a relatively low cost of production and easily assembled and mounted in the doors of the type commonly used.

Another object of my invention is to provide a compact door closing device which can be adjustable to effectively operate the usual type of door.

With the above and other objects in view, the invention in its preferred form, generally includes a novel combination of cooperative parts and details of construction hereinafter fully described and illustrated in the accompanying drawings.

The accompanying drawing shows a preferred embodiment of my invention in which like characters of reference relate to like parts throughout.

Fig. 1 is a sectional elevation of the embodiment hereinafter described.

Fig. 2 is a vertical section showing the device in open operative position.

Fig. 3 is a section taken in the direction of arrows on lines 3-3 of Fig. 1.

In the preferred embodiment of my invention as shown in the accompanying drawing, a face or front plate 10 is provided with a plurality of spaced, aligned openings 11 and 12, respectively. Extending from the rear of the face plate are top and bottom parallel walls 13 and 14, respectively, and a side wall 15, all integral with the face plate.

Said walls and face plate form a rectangular casing with one side and the end open, while the face plate is provided with a partly restricted preferably rectangular opening 16.

The side wall 15 of the casing is further provided with spaced lateral extensions 17 and 18 forming longitudinal open compartments or bores 19 and 20, respectively with the top and bottom walls 13 and 14. It is to be noted that the extensions are parallel with the top and bottom walls and are of the same width as the wall. Lateral extensions 17 and 18, furthermore, have a partly restricted section 21 and 22 respectively, and are also provided adjacent the rear of the face plate 10 and in which are horizontally fixed pins 23 and 24, respectively.

Intermediate the extensions 17 and 18 is an open compartment 25 in which a hollow plunger 26 is slidable. Said plunger has a forward reduced end portion 27 adapted to pass through central rectangular opening 10 of face plate 10. Said reduced end portion is furthermore, provided with a bore 28 into which fits a pin 29 connecting the same with spaced lugs 30 and 31 of a door plate 32. It is to be noted, that said lugs are preferably integral with the door plate 32 and are adapted to fit above and below the restricted end portion 27 and form a pivot connection therewith. The upper lug 30 is grooved at 33 for accommodating a pivotal pin 34, when the door plate is at right angles to the face plate. Said pin is pivotally mounted in the plunger by means of a cross member 35 and is automatically brought into engaging position with the groove of the door plate lug by means of a tensioned spring member 36, as shown in Fig. 2 of the drawing.

Said face plate and door plate when in use, normally would be in a flush face to face position as shown in Fig. 1 and are normally retained in such position by means of the cooperation of parts hereinafter described.

Pivoted to pins 23 and 24 in restricted sections 21 and 22 are leverage arms 37 and 38, respectively, whose rear terminal longitudinal portions each extend into compartment 25 and have one edge slidably abutting against roller members 39 and 40 respectively. It is to be noted that said arms are of the same construction and that while in contact with roller members 39 and 40 they cross each other as shown in Figs. 1 and 2 of the drawing. Said rollers are disposed at the middle of the terminal portion of the plunger 25 and are held in position by means of a cross pin 41 extending thru the parallel walls 42 and 43 of the plunger. The forward ends of the leverage arms 37 and 38 are provided with claws 44 and 45 respectively which form an abutment against respective cams 46 and 47. Said cams are slidably mounted on screw rods 48 and 49. It is to be noted that the rods respectively extend from the openings 11 and 12 thru longitudinal bores 19 and 20.

Each of the rods is furthermore provided with a coaxial tensioned spring member 50 and 51 respectively, one end of which engages the cam members while the other end abuts against re-
pective screw nuts 52 and 53 mounted on the terminal portions of the screw rods. The side edges of said nuts are adapted to form a contact with wall 15 to permit their adjustment on the screw rods. As to be noted that the tension of springs 50 and 51 may be adjusted by regulating the distance of the nuts 52 and 53 on the screw rods. In this manner the necessary or desired pressure may be exerted by the springs against claws 44 and 45, to obtain the best results and facilitate movement of the door plate against front plate 10.

Door plate 32 being of less width than front plate 10 is provided at its central portion with a pair of spaced horizontal roller members 54 and 55 adapted to form a rolling contact with the front plate when there is angular relative movement of the plates. Said roller members are mounted in a lug or lateral extension 56 integral with the door plate 32 and retained therein by means of individual pins 57 and 58 for the respective roller members 54 and 55. It is to be noted that door plate 32 can be swung thru 180° with respect to the plunger and can be easily fixed on a door, while the casing with the plunger is mounted in a door frame, not shown.

In operation of the embodiment, when a door carrying the door plate 32 is opened, the plunger 26 will be pulled out. The lever arms 37 and 38 are actuated and roll along members 39 and 40, while the claw ends exert pressure against the springs 50 and 51 by way of cams 44 and 45 and compress the same on rods 48 and 49, while the other ends slide against rollers 39 and 40. When the door is released the springs cause the levers to resume their normal position as shown in Fig. 1 and draw the plunger to close the door.

From the foregoing description taken in connection with the accompanying drawing it will be noted that my invention possesses many advantages not heretofore found in devices of the prior art. According to my invention, the device may be mounted in a frame with a door constructed to swing through 180°. The device can be easily installed in a door frame and attached to a door. Furthermore, the tension of the spring compression members may be easily varied to suit the different types of doors now on the market. The parts of the preferred form as described herein can be easily swung open and retained in locked position.

While one preferred form of my invention has been disclosed and shown, it is to be noted that modifications as to arrangement and operation of parts, use of materials and their construction may be made without departing from the spirit and scope of the claims herein.

I claim:

1. A door closing device, comprising an open casing, spaced parallel compression members slidably in the casing, a reciprocable member intermediate the compression members, a plate member in connection with the reciprocable member, and coacting means pivoted in the casing adapted to actuate the compression members upon movement of the reciprocable member.

2. An automatically closing hinge device, comprising a casing, a plurality of spaced compression members in the casing, a reciprocable plunger intermediate the compression members, slidably in said casing, a pair of lever members pivotally mounted in the casing and extending into the plunger, one end of the members forming a contact with the respective compression members, and a door plate forming a hinged connection with the plunger.

3. A door closing device, comprising an open casing for a door frame, a plurality of spaced retention members extending thru the casing, a compression member for each of the retention members, a reciprocable plunger intermediate the compression members, a door plate abutting one end of the casing hingedly connected with the plunger, a pair of lever members pivotally adjacent one end to the casing and abutting the compression members, a pair of roller members coaxially mounted in the plunger for frictionally engaging the other end of the lever members, whereby upon movement of the plunger the leverages members are actuated by the compression members to retain the door plate in abutting position.

4. A door closing device according to claim 3, in which one end of each compression member is provided with a cam member slidable along the retention members and adapted to abut against one end of the lever arms.

5. A door closing device according to claim 3, in which the plunger has a restricted terminal portion adapted to move outwardly of the casing when the door plate is actuated angularly of the abutting face of the casing.

6. A door closing device according to claim 3, in which the plunger is provided with a tensioned, depressing member for engaging the door plate when the latter is disposed at 90° of the casing and retaining the same in such position.

7. A door closing device comprising an open casing, a plunger slidable in and out of said casing, a compression member on either side of said plunger, leverages members pivoted to the casing having one end adapted to actuate the compression members, means mounted in the plunger forming a rotary contact with the other end of the leverages members, and a door plate hingedly connected to the plunger adapted to draw the latter from the casing.

8. A door closing device, comprising an open casing for insertion in a door frame, a plunger slidable in and out of said casing, a spring member on each side of the preferred form as described herein in connection with one side of said casing adapted to compress the spring member on each side of the plunger when the plunger is drawn out of the casing, and a door plate member hingedly connected to the plunger adapted to be drawn into flush position against the adjacent edge of the casing by the actuation of the spring members.

9. An automatic door closing device, comprising a casing adapted to fit in a door frame, a pair of spaced shaft members, a compression member for each shaft member having one end provided with a contacting cam, a plunger reciprocable in and out of the casing, a pair of diagonally opposed leverages members pivoted adjacent one end to the casing forming a contact with the cams, and having their other ends extending into the plunger, for normally forcing the same into the casing, and a door plate hingedly connected to the plunger adapted upon actuation of the door to pull out the plunger against the action of the compression members.

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