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F. H. PITTENGER
SLIDING DOOR CLOSER

2,992,450

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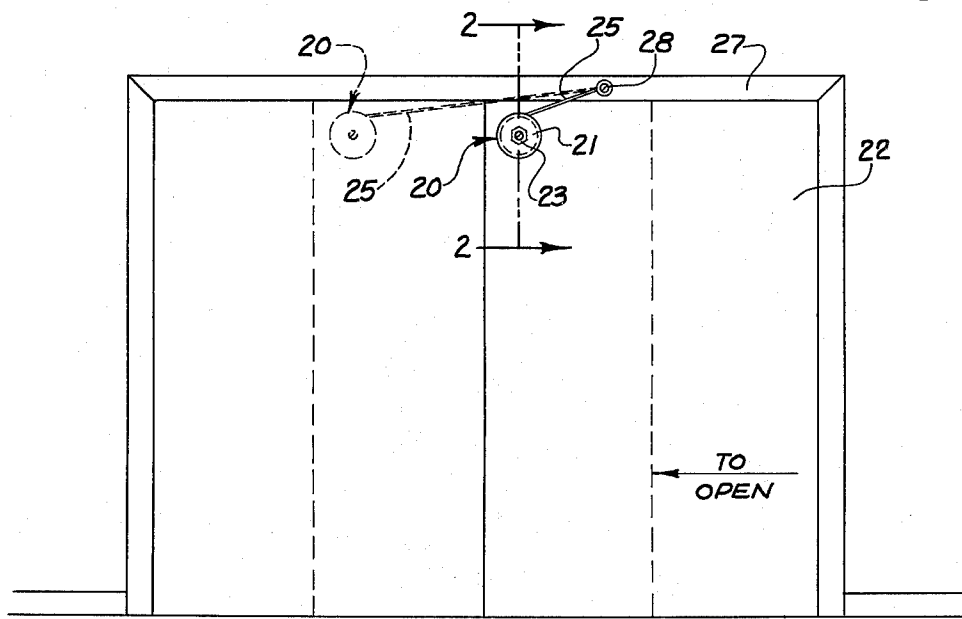
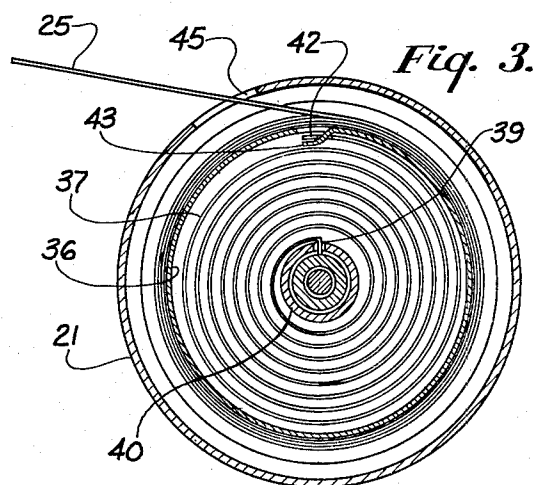
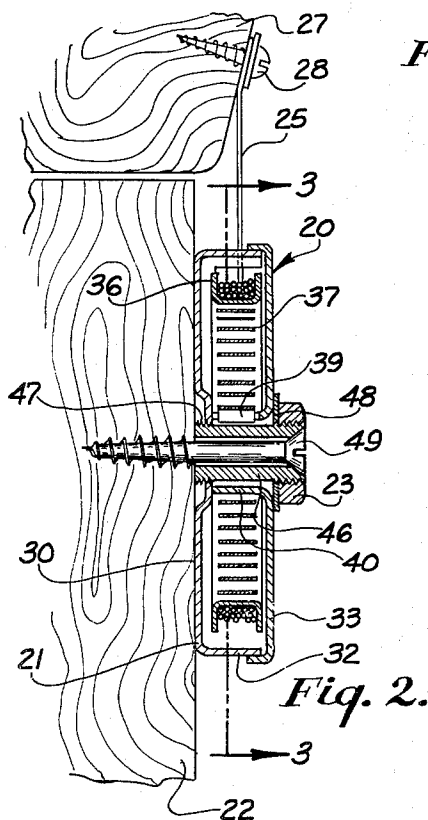


Fig. 1.



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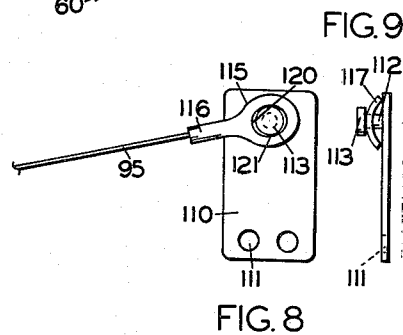
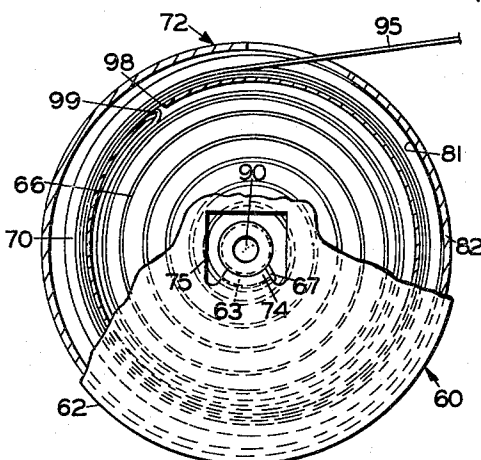
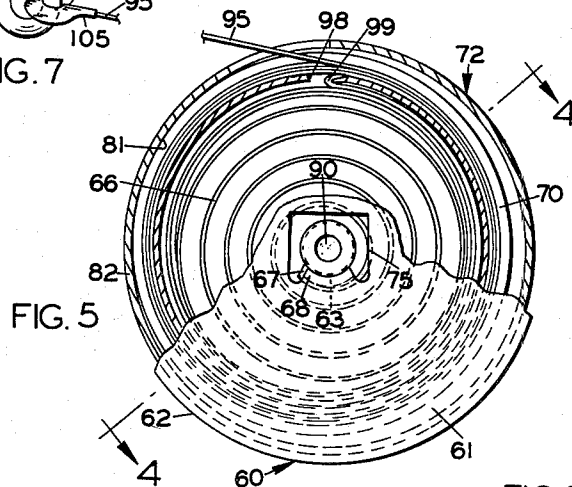
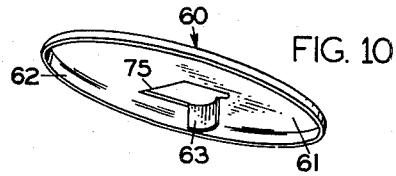
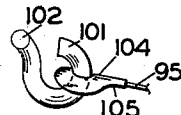
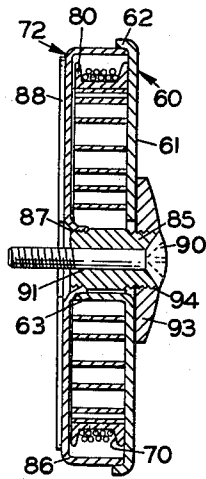
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2 Sheets-Sheet 2



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SLIDING DOOR CLOSER

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5 Claims. (Cl. 16—78)

This invention relates to door closer mechanisms and particularly to a closer mechanism for use with sliding doors.

This application is a continuation-in-part of my co-pending application Serial No. 724,091, filed March 26, 1958, and now abandoned.

In general, the mechanism of the present invention comprises a housing containing a rotatably mounted reel. The housing is adapted to be mounted on a sliding door and the reel carries a cable which extends from the housing for attachment to the frame of the door. The reel is operatively connected to a spring which is wound when the cable plays off the reel upon opening of the sliding door. Upon release of the door the spring serves to wind in the cable and pull the door to the closed position.

It is an object of the present invention to provide a closer mechanism for a sliding door of simple, inexpensive construction which can be readily installed with conventional tools.

It is another object of the present invention to provide a spring driven closer mechanism for a sliding door which is provided with means for selectively varying the force exerted by the spring that drives the mechanism.

It is another object of the present invention to provide a closer mechanism for a sliding door, the angle of the component of force exerted by said mechanism being automatically varied as the door progresses along its path of travel whereby the door is caused to close gently without slamming.

It is another object of the present invention to provide a closer mechanism for a sliding door which includes a spring biased reel disposed in a casing with an inner annular wall of said casing and a periphery on said reel cooperating, in a novel manner, to form a bearing for rotation of the reel in the casing.

It is another object of the present invention to provide a closer mechanism for a sliding door which is readily convertible from right handed to left handed operation by merely inverting the reel and its associated spring means relative to the casing.

It is another object of the present invention to provide a closer mechanism for a sliding door which mechanism includes a spring biased cable and novel fastening means for detachably securing the cable to a door frame.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein preferred forms of embodiments of the invention are clearly shown.

In the drawing:

FIGURE 1 is a front elevational view showing the mechanism of the present invention installed on a conventional door;

FIGURE 2 is a side sectional view of the closer mechanism of FIGURE 1, the section being taken along the line 2—2 of FIGURE 1;

FIGURE 3 is a rear sectional view of the closer mechanism of FIGURES 1 and 2, the section being taken along the line 3—3 of FIGURE 2;

FIGURE 4 is a side sectional view of a second closer mechanism constructed according to the present invention and constituting a second aspect thereof, the section being taken along the line 4—4 of FIGURE 5;

FIGURE 5 is a broken front elevational view, partially

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in section, of the closer mechanism of FIGURE 4, with the mechanism being disposed in a configuration for left handed door closing movement;

FIGURE 6 is a second broken front elevational view, partially in section, showing the mechanism of FIGURES 4 and 5 disposed in a configuration for right handed door closing movement;

FIGURE 7 is a front elevational view of a detachable cable anchor means constructed according to the present invention;

FIGURES 8 and 9 are front and side sectional elevational views of a second cable anchor means constructed in accordance with another aspect of the present invention; and

FIGURE 10 is a perspective view of a novel spring adjusting means or cover plate comprising a portion of the mechanism constituting one modification of the present invention.

Referring in detail to the drawings, the closer mechanism of the present invention is indicated generally at 20 in FIGURE 1. A housing 21 is secured to a sliding door 22 by means of a screw 49. A cable extends from housing 21 and is secured to frame member 27 by a threaded fastening 28.

Referring next to FIGURE 2 it will be noted that housing 21 includes a bottom wall 30 and out-turned flange 32 and rotatable cover 33 which serves as a spring mounting member. Housing 21 contains a reel 36 around which cable 25 is wound and a coil spring 37 is mounted within reel 36. The inner end of spring 37 includes a tab 39 that is secured to an in-turned cylindrical flange 40 on rotatable cover plate 33. The outer end 42 of spring 37 is anchored to reel 36 at an in-turned tab 43. It will now be understood that when cable 25 is drawn outwardly through an opening 45 in casing 21 reel 36 is rotated and coil spring 37 is wound and tensioned to provide motive force for closing the door. A bushing or hub means 46 is mounted to the central portion of the casing at a threaded junction 47. The screw 49 is tightened against the outer end of bushing 46 which in turn urges a wall 30 of casing 21 into frictional engagement with frame member 22. When threaded element 23 is tightened it forces a washer 48 to urge cover plate 33 against the out-turned flange 32 whereby cover plate 33 is frictionally restrained from turning. When threaded element 23 is loosened cover plate 33 can be rotated to various positions of adjustment whereby coil spring 37 can be pre-tensioned.

In operation, when door 22 is moved to the left to an open position cable 25 plays out through opening 45 whereby reel 36 is rotated and energy is stored in coil spring 37. Upon release of door 22 reel 36 is rotated by the stored energy in spring 37 whereby the door is returned to the closed position.

It should be pointed out that when door 22 is in the left or open position, as illustrated by dotted delineation, cable 25 forms a smaller angle with the axis of movement of the door than the angle formed by such cable 25 when the door is in the closed position illustrated by solid delineation. This arrangement causes the component of force, exerted along the axis of cable 25, to change and lessen in magnitude as the door approaches the closed position. Hence the effective closure force exerted on the door is automatically decreased as it approaches the jamb, due to the changing geometry of cable, with the result that the door is gently closed without slamming.

Reference is next made to FIGURES 4 through 6 which illustrate a second closer mechanism constructed in accordance with a second aspect of the present invention.

The mechanism of FIGURES 4 through 6 differs from the mechanism of FIGURES 1 through 3 in that it in-

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cludes a modified spring adjusting means or cover plate indicated generally at 60. Spring adjusting means 60 includes a front wall 61, a peripheral locating flange 62, and a tab shaped spring anchor flange 63.

As seen in FIGURE 5, coil spring 66 includes an in-turned shoulder 67 that engages a left edge 68 on spring anchor flange 63 when the mechanism is disposed in the right-handed configuration of FIGURE 5.

With reference to FIGURE 6, the reel 70 and spring 66 have been inverted in the casing indicated generally at 72 to adapt the mechanism for left-handed operation. In this configuration, shoulder 67 on the inner end of spring 66 engages a right edge 74 on spring anchor flange 63.

The tab shaped spring anchor flange 63 is preferably formed integrally with spring adjusting means 60 by punching a straight-sided hole 75 in the front wall 61 and by leaving a tab shaped portion 63 which is in-turned relative to wall 61 by a suitable die means. Tab shaped spring anchor flange 63 is clearly illustrated in the perspective view of FIGURE 10.

It should be pointed out that reel 70 is devoid of any central bearing means and, instead, the peripheral edge 80 of the reel forms a first bearing portion in contact with an inner bearing surface 81 formed by casing side wall 82. In FIGURES 5 and 6, bearing contact between reel 70 and side wall 82 occurs approximately at the contact of the leader of figure 81 with the bearing surface on the casing wall. It will be understood that when the mechanism is disposed in right-handed configuration the point of bearing contact will occur at one side of the casing and when the mechanism is disposed in left-handed configuration the point of bearing contact will occur at the other side of the casing.

Casing 72 includes a centrally located cylindrically shaped hub 85 fastened to rear wall 86 at a threaded junction 87. An abrasive sheet 88, such as sand paper, is cemented to rear wall 86 to increase the frictional engagement between casing 72 and the door frame or door at which it is fastened by means of a screw 90 extended through a hole 91 in hub 85. The outer end of hub 85 carries a nut 93 at the threads 94. To adjust the tension in spring 66 it is only necessary to loosen nut 93 and rotate spring adjusting means 60 relative to casing 72 whereby the spring 66 is prewound. When the proper amount of preloaded tension is applied to the flexible member or cable 95, nut 93 is tightened down against the front wall 61 of spring adjusting means 60.

As is best seen in FIGURE 6, reel 70 is provided with an aperture 98 for receiving a hooked outer end 99 on spring 66. Aperture 98 and hooked portion 99 form the anchor connection between the spring and the reel.

FIGURE 7 illustrates one form of cable anchor means particularly useful in adding the mechanism to old door installations. The anchor means of FIGURE 7 includes a hooked portion 101 and a threaded shank portion 102 the latter being screwed into the door frame or wood door depending on whether the casing means 72 is to be carried by the door or door frame. The fastening means of FIGURE 7 further includes an eyelet 104 which is secured to cable 94 at crimped portion 105.

A second type of cable anchor means particularly suitable for new door installations is illustrated in FIGURES 8 and 9. This cable anchor means includes a base 110 provided with hole 111 for receiving screws for anchoring the base to the door or door frame. Base 110 carries a stud 112 having an enlarged head 113. An eyelet 115 is secured to the end of cable 95 at the soldered crimp portion 116 and includes a convex flange 117 provided with a hole 120. The straight across diameter between the in-turned sides 121 of hole 120 is slightly less than the diameter of head 113 of stud 112. In order to place eyelet 115 over head 113 of stud 112, it is necessary to first place one side 121 down under the head and then

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the other side 121 down under the head. The eyelet then cannot be pulled straight off the stud 112 but can only be removed by first moving one side 121 of the hole past its respective side of the head and by next moving the other side 121 of the hole past its respective side of the head.

In operation of the device of FIGURES 4 through 10, the abrasive surface 88 on the rear wall of the mechanism is placed against the surface of the door and screw 90 is screwed into the wood to hold the mechanism in place with casing 72 being restrained against rotation by abrasive surface 88. One of the cable anchor means of FIGURE 7 or FIGURE 8 is then secured to the door frame and eyelet 104 or 115 is next connected to the hook 101 or stud 112. Spring adjusting means 60 is next rotated, upon loosening of nut 93, and when the proper amount of rewinding of spring 66 is achieved, nut 93 is tightened down against front wall 61 of spring adjusting means 60. When the door is pushed open, tension in cable 95 will pull reel 70 into bearing contact with inner bearing surface 81 of casing means 72. When the door is released, restored energy in spring 66 will wind reel 72 and urge the door closed.

While the forms of embodiments of the present invention as herein disclosed constitute preferred forms, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

I claim:

1. A closer mechanism for moving a sliding door member relative to a frame member, said mechanism comprising, in combination, casing means including a base wall for engagement with one of said members, a tubular element within said casing means and extended outwardly of said wall, and a peripheral wall forming an inwardly facing bearing surface; a reel freely surrounding said tubular element and including a rim forming a bearing engageable with said bearing surface; flexible means on said reel and including an end for attachment to the other of said members; spring adjusting means including a flange rotatable about said tubular element for locking said spring adjusting means in various positions of adjustment relative to said casing means; and spring means operatively connected between said reel and said flange; and a threaded element extended through said tubular element and in threaded engagement with one of said members for mounting said casing means thereto.

2. A closer mechanism for moving a sliding door member relative to a frame member, said mechanism comprising, in combination a casing including a bottom wall forming a mounting surface for engagement with one of said members, an element extended outwardly from the center of said bottom wall and provided with a bore, and side wall means extended outwardly of said bottom wall; a first fastener member in said bore for attaching said casing to said one of said members; a cover plate including a peripheral portion rotatably engaging said side wall means; a tubular portion surrounding said element and in engagement with said bottom wall; a second fastening member carried on said element and in engagement with said cover plate for locking said cover plate against said casing; a reel in said casing and in surrounding relationship with said tubular portion; a coil spring connected between said tubular portion and said reel; and a cable on said reel.

3. The mechanism defined in claim 1 wherein said spring adjusting means forms a rotatable cover for said casing means.

4. A closer mechanism for moving a sliding door member relative to a frame member, said mechanism comprising, in combination, casing means including a base wall for engagement with one of said members, a tubular element within said casing means and extended outwardly of said wall, and a peripheral wall forming an inwardly facing bearing surface; a reel freely surrounding

said tubular element and including a rim forming a bearing engageable with said bearing surface; flexible means on said reel and including an end for attachment to the other of said members; spring adjusting means including a flange rotatable about said tubular element for locking said spring adjusting means in various positions of adjustment relative to said casing means; and spring means operatively connected between said reel and said flange; and a fastener member extended through said tubular element for mounting said casing means to one of said members.

5. The mechanism defined in claim 4 wherein said

spring adjusting means forms a rotatable cover for said casing means.

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