May 10, 1966 B. A. QUINN 3,249,961

DOOR CLOSER

Filed Jan. 30, 1964

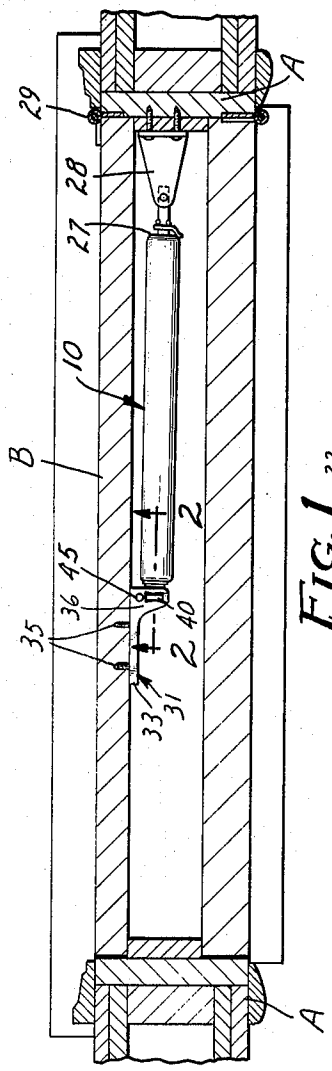


FIG. 1

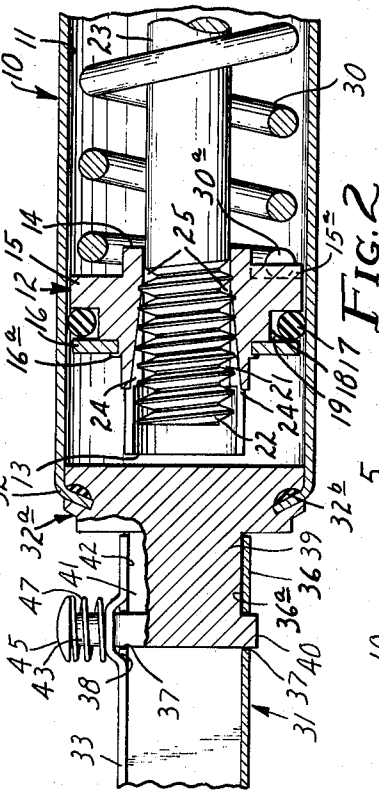


FIG. 2

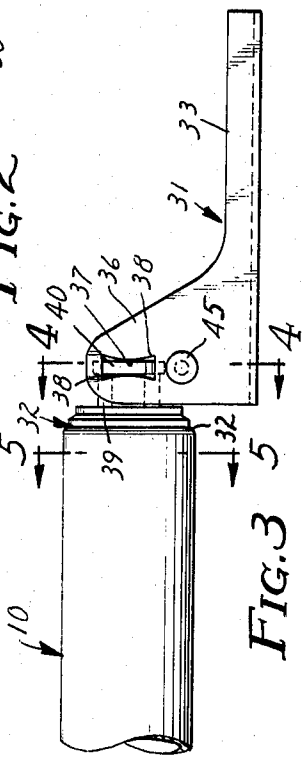


FIG. 3

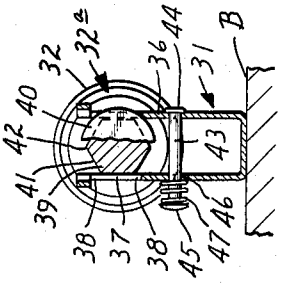


FIG. 4

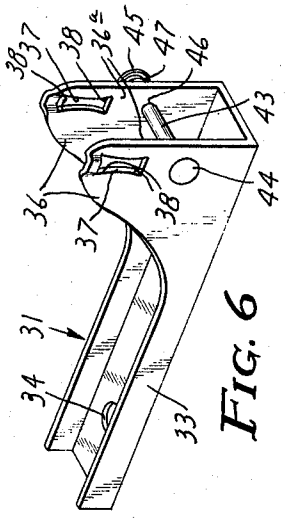


FIG. 6

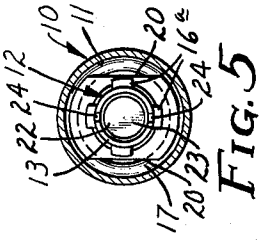


FIG. 5

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DOOR CLOSER

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5 Claims. (Cl. 16—66)

My invention relates generally to improvements in door-closing mechanisms, and more particularly to improvements in fluid (hydraulic or pneumatic) door-closing mechanisms which include an elongated cylindrical casing, a piston received within the casing for reciprocal sliding movements, an axially extended piston rod connected at one end to said piston and having its opposite end projecting through one end of the casing and having sealing relation therewith, yielding means within the casing biasing said piston toward the other end of said casing, and valve means varying the rate of flow of fluid by said piston under the bias of said yielding means, and has for its primary object the provision of means exteriorly of said casing for imparting adjustments to said valve means in well-defined increments.

A still further object of my invention is the provision of a device of the class above described wherein said piston is threadably secured to said piston rod for axial adjustments of said piston thereon, wherein said valve means is defined by cooperating portions of said piston and piston rod and adjustments may be imparted thereto through rotation of said casing, and has for an important object the provision of novel bracket means associated with the other end of said casing, and securable to a door whereby well-defined increments of adjustment of said piston with respect to said piston rod may be achieved.

A further object of my invention is the provision of a device of the class immediately above described wherein said casing is adequately held against accidental valve-varying rotation, but which permits of manual adjustment with a minimum of effort.

A further object of my invention is the provision of a device of the class above described which is extremely inexpensive to produce and involves but a minimum of working parts.

A further object of my invention is the provision of a device of the class above described which is compact in size, rugged and durable in construction, and foolproof in use.

The above and still further objects of my invention will become apparent from the following detailed specification, appended claims, and attached drawings.

Referring to the drawings wherein like characters indicate like parts throughout the several views:

FIG. 1 is a view in horizontal section through a door mounted in a door frame and showing my novel door-closer in plan;

FIG. 2 is an enlarged fragmentary view in longitudinal section taken on the line 2—2 of FIG. 1;

FIG. 3 is a fragmentary view in plan of a portion of the closer shown in FIG. 1 on an enlarged scale;

FIG. 4 is a fragmentary view in transverse section as seen from the line 4—4 of FIG. 3, portions thereof being broken away and shown in section;

FIG. 5 is a view in transverse section as seen from the line 5—5 of FIG. 3; and

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FIG. 6 is a view in perspective of a mounting bracket element associated with my novel invention.

Referring with greater particularity to the drawings, the elongated cylindrical casing of my invention is identified by the numeral **10**. Mounted for axial sliding movements within the casing **10**, in frictional engagement with the inner side wall **11** thereof, is a piston **12**. Piston **12**, as shown, is formed intermediate its opposite ends **13**, **14** to define a radially outwardly projecting annular rib **15**. Also, an annular flange **16** is secured to the piston **12**, as by peening or upsetting at **16***a*, in longitudinally spaced relation to the rib **15**. Between the rib **15** and the flange **16** is received a sealing member in the nature of an O-ring **17**. The diameter or wall thickness of the O-ring **17** is slightly less than the spacing between the rib **15** and the flange **16**, and the O-ring **17** is spaced from the bottom **18** of the channel **19** defined by said rib **15** and the flange **16**. When the piston **12** is moved from left to right with respect to FIG. 2, the O-ring **17** is pressed against the flange **16**, and fluid flows between said rib **15** and said O-ring **17**, then between the O-ring **17** and the bottom **18** and axially outwardly through circumferentially spaced ports **20** defined by the flat sides of the flange **16**. This arrangement obviously precludes movement of the fluid about the piston **12** when said piston is moved from right to left with respect to FIG. 2 since the O-ring **17** seals against the rib **15** and the inner wall **11** of the casing **10**. To permit passage of fluid during said last mentioned movements, the piston **12** is provided with a screw-threaded axial bore **21** which is threadably received upon the inner end **22** of a piston rod **23**. As shown, the piston rod **23** is provided with a pair of axially extended diametrically opposed slots **24** which cooperate with the bore **21** in the piston **12** to form a passage **25** which provides communication between the opposite ends of piston **12**. Although not clearly shown in FIG. 2, it is noted that the diameter of the piston rod **23** is smaller than the diameter of the bore **21** so as to define an annular space therebetween which is a continuation of the passage **25**. Obviously, rotative adjustment of the piston **12** on the shaft **23** increases or decreases the size of the passage **25**.

It will be noted that the piston rod **23** projects through and has sealing engagement, by means not specifically shown, with the end **27** of the casing **10**. At its outer free end, the piston rod **23** is preferably secured to a mounting bracket **28** which in turn is adapted to be secured to the frame structure A for a door B. While, as above indicated, the bracket **28** permits limited swinging movements of the piston rod **23** about a vertical axis parallel to but spaced from the axis of the swinging movements **29** of the door B, it precludes rotation of said piston rod **23** about its own axis.

Interposed between the radially projecting annular rib **15** of the piston **12** and the end **27** of the casing **10**, in encompassing relationship to the piston rod **23**, is a coil compression spring **30** which obviously yieldingly biases the piston **12** toward the piston rod-retracting position of FIG. 2. The frictional engagement exerted by the spring **30** between the piston **12** and the casing **10** is sufficient to cause the casing **10**, spring **30** and piston **12** to rotate simultaneously. In this manner, the effective dimensions of the passage **25** may obviously be varied exteriorly of the casing **10** by mere rotation thereof. Should the piston **12** stick on the piston rod **23** at the ex-

treme position thereof where the threads end, as approximately shown in FIG. 2, the end 30*a* of the spring 30 is adapted to engage a lug 15*a* defined by the piston 12 to break it loose upon rotation of the casing 10 and spring 30, so as to permit free rotation of the piston 12.

For the purpose of providing well-defined increments of adjustment to the casing 10, and consequently to the piston 12, I provide a novel bracket means, indicated generally at 31, for the end 32 of the casing 10. Bracket means 31 includes an elongated preferably U-shaped bracket element 33 having perforations on its base 34 for the reception of screws 35 for sealing same to the door B, and having enlarged upstanding laterally space flexible resilient ears 36 adjacent one end. Adjacent their free ends the ears 36 are formed to define aligned elongated slots 37, which, preferably and as shown, are enlarged at at their opposite ends, as indicated at 38, for a purpose which will hereinafter be explained.

Received within the end 32 of the casing 10 is a plug 32*a* which is formed at its axially outer end portion to define a shank element 39, which, in turn, is formed at its extreme outer end to define a diametrically enlarged head element 40. The plug 32*a* is sealed in the casing 10 by means of a gasket 32*b* and secured thereto by means of a compression of the casing end 32 into an annular groove defined in the plug 32*a*. Preferably and as shown, the head element 40 is disc-like whereas the shank 39 is hexagon in cross section to define opposed pairs of relatively flat dwell areas 41, which at their points of intersection define lobes 42.

It will be noted that the relationship of the space between the dwell areas 41 and the opposed relatively flat faces 36*a* of the ears 36 adjacent the slots 37 therein, as well as the relationship of the disc-like head 40 with respect to the slots 37, is such that when diametrically opposed portions of the head element 40 are received within said slots 37, the relatively flat areas 36*a* of the ears 36 will be in abutting coplanar relationship with opposed dwell areas 41. The resilience of the ears 36 is normally sufficient to prevent accidental rotation of the shank 39. However, if due to the flexibility of the material from which the ears 36 are formed, increased resistance may be required to prevent accidental spreading of the ears 36, then, and in that event, a pin or stud 43 having heads 44, 45 on its opposite ends, may be passed loosely through aligned apertures 46 in said ears 36. As shown, a coil compression spring 47 encompasses the pin or stud 43 and is interposed between the head 45 and the adjacent ear 36.

With the arrangement above described, when it is desired to increase or restrict the flow of fluid (either liquid or gas) through the port 26, it is but necessary to rotate the casing 10 in the desired direction with sufficient force to cause the flexible resilient ears 36 to be spread by the lobes 42. As shown particularly in FIG. 3, the size and contour of the slots 37 with respect to the head 40 is such as to permit limited rocking movements of the head therein during opening and closing movements of the door B.

My invention has been thoroughly tested and found to be completely satisfactory for the accomplishment of the above objects; and while I have disclosed a preferred embodiment thereof, the same may well be capable of modification without departure from the scope and spirit of the appended claims.

What is claimed is:

1. In a door closer mechanism of the type which includes an elongated cylindrical casing, a piston frictionally received within said casing for reciprocal sliding movements, an axially extended piston rod threadably connected at one end to said piston for axial adjustments of said piston thereon upon rotary movements being imparted to said casing, the other end of said piston rod projecting through and having sealing engagement with

one end of said casing and having bracket means thereon for anchoring the same to a door frame in a manner preventing rotation thereof about its own axis but permitting limited swinging movements thereof about an axis parallel to the axis of swinging movements of a door mounted in said door frame, means yielding biasing said piston toward the other end of said casing, means defined by said piston and piston rod restricting the flow of fluid by said piston under bias of said yielding means and variable upon relative rotary movements being imparted to said piston, the improvement which comprises:

(a) abutment means defined by the other end of said casing, and

(b) bracket means on the other end of said casing for securing said casing to a door for compound pivotal and rotary movements and said bracket means yieldingly engaging said casing abutment means to provide increments of adjustment of said piston with respect to said piston rod.

2. The structure defined in claim 1 in which

(a) said other end of said casing is formed to define an axially extended shank element and a diametrically enlarged head element, one of said elements being formed to define circumferentially spaced relatively flat dwell areas which at their points of intersection define lobes, and in which said last mentioned bracket element comprises,

(b) a bracket element adapted to be secured to said door and defining a pair of laterally spaced flexible resilient ears,

(c) said ears being formed to define aligned slots for reception of diametrically opposed portions of said head element,

(d) the spacing between said ears being such that when said head element is received within said slots, one of said ears will bear against one of said dwell areas with sufficient force to prevent accidental rotation of said casing with respect to said bracket element.

3. The structure defined in claim 1 in which

(a) said other end of said casing is formed to define an axially extended shank element having a diametrically enlarged anchoring head at its outer end,

(b) said shank defining pairs of diametrically opposed relatively flat dwell areas, and in which said last mentioned bracket means comprises

(c) a bracket elment adapted to be secured to said door and defining a pair of laterally spaced flexible resilient generally parallel ears,

(d) said ears being formed to define aligned slots for reception of diametrically opposed portions of said anchoring head,

(e) the spacing between said ears being such that when said head element is received within said slots, said ears will bear against opposed dwell areas defined by said shank with sufficient force to prevent accidental rotation of said casing with respect to said bracket element.

4. The structure defined in claim 3 in further combination with independent means interposed between said ears and increasing their resistance to spreading movements.

5. A door closer mechanism comprising an elongated cylindrical casing, a piston frictionally received within said casing for reciprocal sliding movements, an axially extended piston rod threadably connected at one end to said piston for axial adjustments of said piston thereon upon rotary movements being imparted to said casing, the other end of said piston rod projecting through and having sealing engagement with one end of said casing and having bracket means thereon for anchoring the same to a door frame in a manner preventing rotation thereof about its own axis but permitting limited swinging movements thereof about an axis generally parallel to the axis of swinging movements of a door mounted in said door

frame, means yieldingly biasing said piston toward the other end of said casing, restriction means defined by said piston and piston rod for restricting the flow of fluid by said piston under bias of said yielding means and variable upon relative rotary movements being imparted to said piston, abutment means defined by the other end of said casing, and bracket means on the other end of said casing for securing said casing to a door for compound pivotal and rotary movements and said bracket means also yieldingly engaging said casing abutment means to permit increments of adjustment of said casing with respect to said bracket means whereby to provide said variation in said restriction means defined by said piston and piston rod.

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