

March 3, 1970

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3,497,904

DOOR REGULATING DEVICES

Filed Dec. 29, 1966

3 Sheets-Sheet 1

FIG. 1

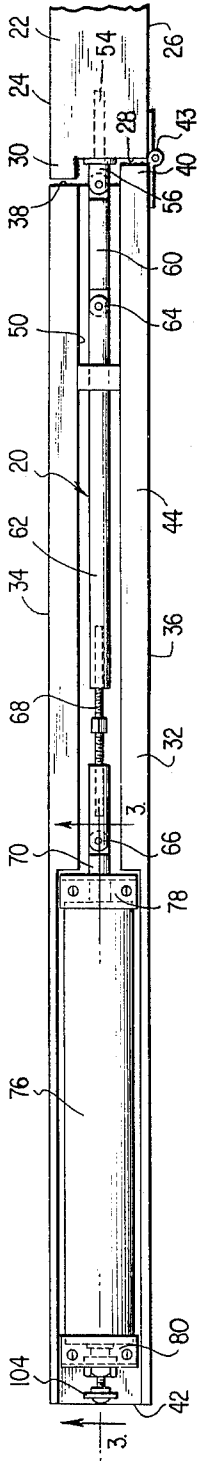


FIG. 2

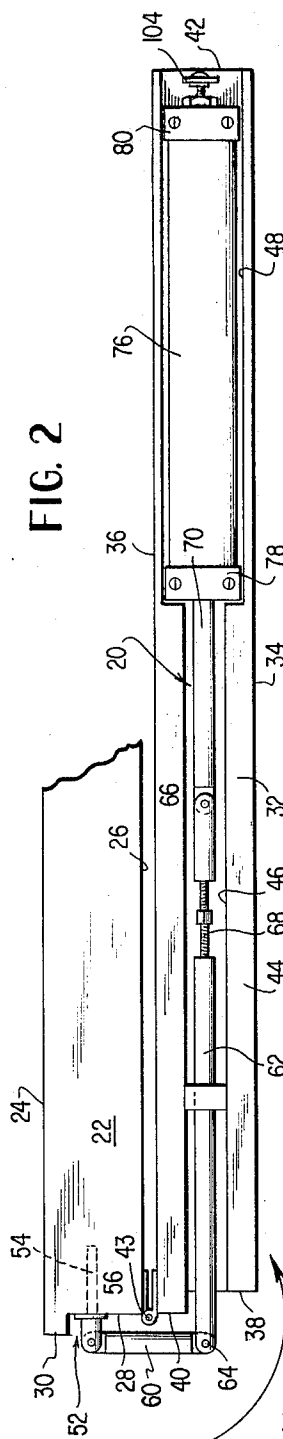
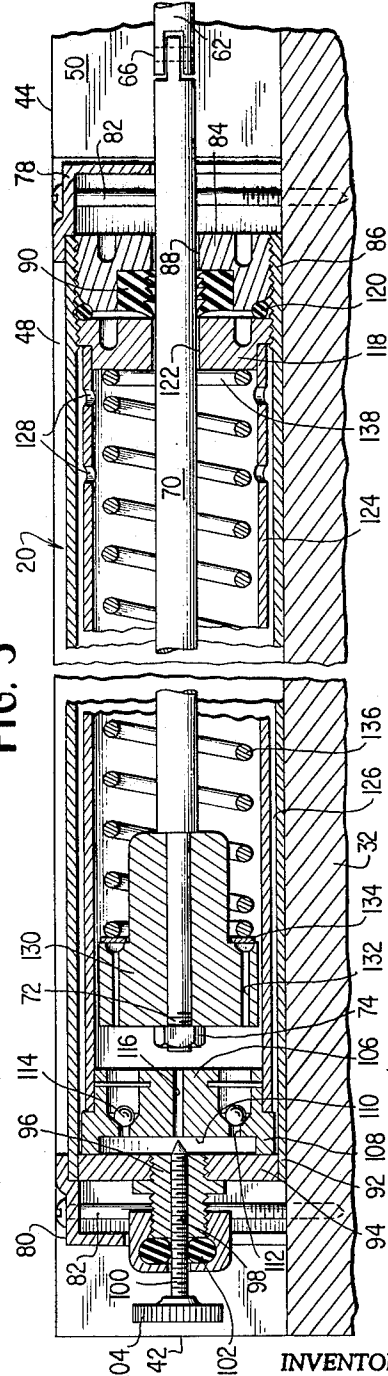


FIG. 3



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FIG. 8

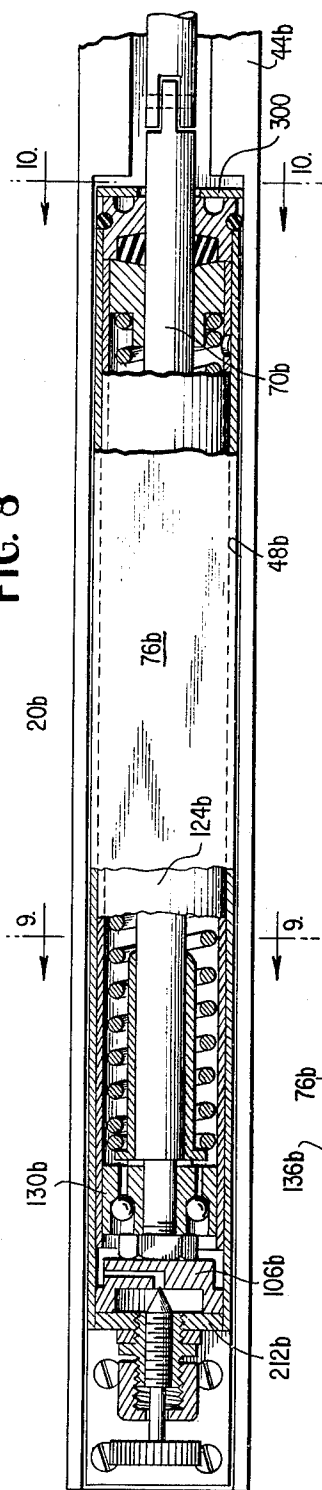


FIG. 9

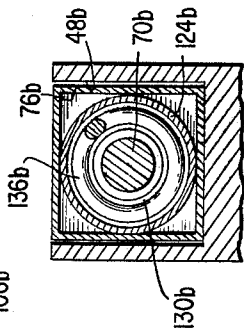


FIG. 10

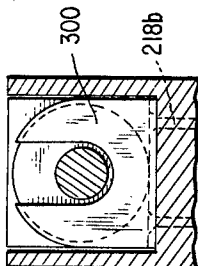


FIG. 12

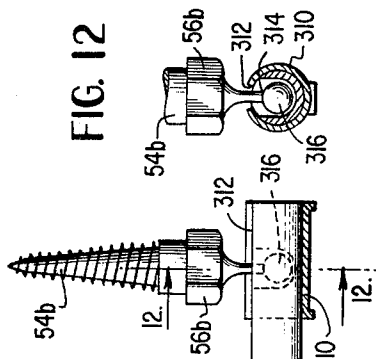


FIG. 11

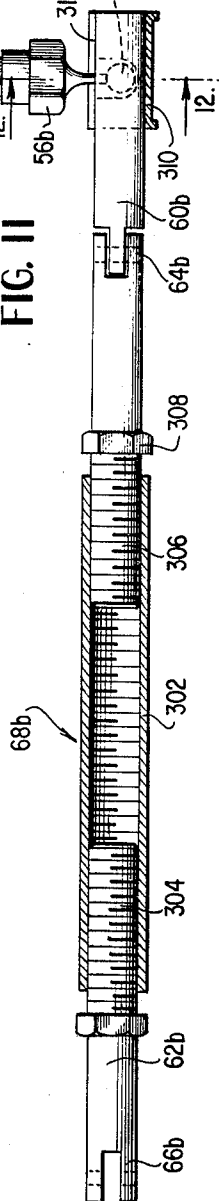


FIG. 14

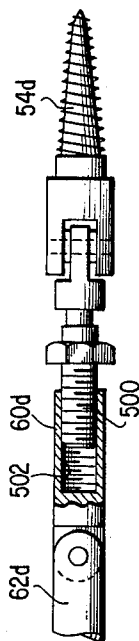
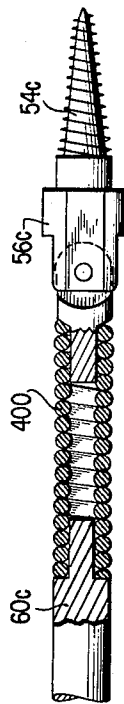


FIG. 13



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DOOR REGULATING DEVICES

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Int. Cl. E05f 3/10

U.S. Cl. 16—52

1 Claim

ABSTRACT OF THE DISCLOSURE

Door closing and position regulating devices having articulated bar means connected to a piston within a dual, fluid containing chamber, and having means for changeably controlling the fluid pressure, the devices being substantially concealed within the door.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to improvements in devices for the control of movement of doors of various types, the devices including means for regulation of the closing tension and speed of the doors. The devices hereof include a bar or rod articulated at two locations to allow the door to pivot or to remain in an open position up to a swing of substantially 180°, and the closing speed as well as the magnitude of the swing and tension are controlled by regulating screws.

Description of the prior art

In prior devices for regulation of the swing of doors, it has been conventional to employ exposed spring action or hydraulic mechanisms which resist the opening or closing motion of the door and/or constantly urge the door to a closed position.

SUMMARY OF THE INVENTION

It is a basic objective of the present invention to provide door regulation devices which are adapted for concealment within a door structure and which have improved operational characteristics. Concealed mechanisms of the type hereinafter disclosed are considered advantageous in that they do not detract from the appearance of the completed door structure, and are less likely to become contaminated by dust and dirt.

The invention relates to door closing and regulating assemblies which include jointed rod sections in association with hydraulic restraining means and return springs, all concealed within the door structure.

Additional objects and advantages of the invention will occur to those skilled in the art from a consideration of the following specification when read in conjunction with the annexed drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a top view of a door with a regulating device constructed and assembled in accordance with the teachings of this invention in place thereon;

FIGURE 2 discloses the door of FIGURE 1 in an open position;

FIGURE 3 is an enlarged scale, foreshortened sectional view taken substantially on the section line 3—3 of FIGURE 1, looking in the direction of the arrows;

FIGURE 4 is a partial top plan view showing a modification;

FIGURE 5 is a longitudinal sectional view on the line 5—5 of FIGURE 4, looking in the direction of the arrows;

FIGURE 6 is a transverse sectional view showing details, taken on the line 6—6 of FIGURE 5, looking in the direction of the arrows;

FIGURE 7 is another detail view, here taken on the line 7—7 of FIGURE 5, looking in the direction of the arrows;

FIGURE 8 is a top plan view, partially broken away, of a third form of the invention;

FIGURES 9 and 10 are transverse sectional views on lines 9—9 and 10—10, respectively, of FIGURE 8;

FIGURE 11 is an enlarged view, partially in cross section, of the rod means in one form;

FIGURE 12 is a detail view substantially on the line 12—12 of FIGURE 11, looking in the direction of the arrows;

FIGURE 13 shows a further modification of the rod means; and

FIGURE 14 discloses still another form of the rod assembly.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In FIGURES 1 through 3 a door regulating assembly 20 hereof is shown in the environment of a door frame 22 having a first side 24, a second side 26, and an inner edge 28 stepped outwardly at 30 to conceal portions of the assembly. The assembly 20 is also mounted on a door 32 with first and second sides 34, 36 corresponding to the first and second sides of the frame and having an inner edge 38 with a step 40 arranged oppositely with respect to the step 30 and having an outer edge 42. As shown, the door is hinged to the frame at 43 and the respective steps define an open space for a portion of the mechanism. The door has a top edge 44 with a compound chamber 46 opening thereon. If desired, the chamber may be located at the bottom of the door, or alternatively, chambers may be at both the top and the bottom of the door. The chamber 46 includes an enlarged portion 48 extending from the edge 42 to an intermediate location, and a reduced portion 50 of the chamber extends to the door edge 38.

Bolt means 52 for anchorage of the assembly 20 to the frame 22 includes an imbedded stud 54 with a projecting clevis 56. The bolt means is connected to rod means 58 comprising a first, short link 60 pivoted to the clevis 56 at one end. An elongated main rod section 62 has a clevis 64 pivoted to the short link and has an inner clevis 66. Intermediate its ends, the main section has an interposed bolt 68 for selective variance of its length. The rod means further includes a piston rod 70 pivoted to the main rod at the clevis 66 and including a threaded outer end 72 with a nut 74 thereon for a purpose appearing below.

Mounted within the enlarged section 48 of the chamber is a casing 76 retained in place at its ends by bracket clips 78, 80 each secured to the door by elongated screws 82. The bracket 78 is of inverted U-shape to admit the piston rod 70 between its legs, and bracket 80 is similarly formed for a purpose appearing below. A closure wall 84 is threadedly engaged in the casing adjacent its proximal end 86, and has a central bore 88 therein admitting the piston rod 70. The bore 88 has a fluid retaining packing element 90 therein which permits the rod to reciprocate without fluid loss. The opposite or distal end 92 of the casing is closed by a closure wall 94 having a plug body 96 therein with a threaded aperture 98. A needle valve stem 100 is mounted in the aperture 98 and has suitable packing 102 thereabout and an operating handle 104.

A valve body 106 is disposed against the closure wall 94 within the end 92 of the casing and has an end

108 defining a chamber 110. Relief passageways 112, with closure walls 114, are formed in the body 106, and the latter also has a main passageway 116 therein which is linearly aligned with the valve 100 and may be closed, or partially restricted in opening diameter, by movement of the valve thereinto.

A plug body 118 is threadedly engaged in the end 86 ahead of the closure wall 84 and is spaced therefrom by a spring 120. The body has a central opening 122 admitting the piston rod 70 therethrough.

A sleeve or liner 124 of reduced length and volume with respect to the outer casing is supported between the plug body 118 and the valve body 106. Fluid communication from the space 126 between the liner and the casing is provided by plural openings 128 formed in the liner adjacent the plug body 118. A measured quantity of oil, or some other fluid material of suitable viscosity, is disposed within the liner and casing.

Slidably mounted within liner 124 is a piston 130 which is retained on the piston rod end 72 by the nut 74. The piston has laterally spaced relief openings 132 extending longitudinally therethrough. The openings are normally closed by a ring 134 against which an enlarged coil spring 136 is seated. The opposite end 138 of the spring is seated against the plug body 118. In that position, the spring constantly urges the piston to the position shown in FIGURE 3.

With the components in the relation shown in FIGURE 1, the bias of the spring 136 against the piston tends to maintain the elements in extended position wherein the door remains in its closed position. Deflection of the door upon opening compresses the spring and forces fluid through the openings 128 into the space 126. Return of the spring is resisted by fluid pressure, and the closing of the valve 98 thereby blocking the chamber 110 may be effective to lock the door in a selected position. It will further be observed that the articulation of the rods as shown in FIGURE 2 results in a tendency of the door to remain in its extreme open position therein shown.

In FIGURES 5 through 7, a first modified embodiment of the invention is shown, similar and analogous elements being differentiated from corresponding elements of the first described form of the invention by the appending of the letter "a" to the reference numerals thereof. In this form of the device, the casing 76a is of substantially square cross section and its end 92a is sealed by a closure valve body 106a having an L-shaped passage 200 therein comprised of a narrow section 202 and a wide section 204 which extends through a neck section 206. The neck section supports a valve stem 100a the movement of which is controlled by a handle 104a. The opposite end of the casing 76a is closed by a closure wall 84a with a passageway 88a therein to admit passage of the piston rod 70a. A liner 124a of circular cross section is supported between a reduced forward portion 208 of the wall 84a and a corresponding portion of the valve body 106a. A spring retainer 210 is mounted within the casing ahead of the wall 84a, and a wall backing plug 212 is extended about the neck 206 of the valve 106a.

The plug 212 is provided with a plugged opening 213 for filling the casing with oil. The casing 76a is secured, as by welding or otherwise, to plates 214 and 216 secured by wood screws 218, or the like, in the enlarged section 48a of the chamber 46a. The piston 130a, retained by the rod 70a by a nut 74a, has relief openings 132a therein with closure balls 220 restricting fluid passage in a fore-to-aft direction, but permitting such flow in an opposite direction.

FIGURES 8 through 12 show still another embodiment 20b of the invention in which the casing 76b has a casing 130b mounted on a rod 70b as before described. As shown in FIGURE 10, the retainer plate

216 has an upstanding yoke 300. The forward valve body 106b is held in place by a flat wall 212b.

In FIGURE 11, the main rod 62b is shown. The rod 62b has a clevis 66b at one end and a similar connection 64b at its opposite end. Intermediate these ends, a length adjustment means 68b is disposed. The means 68b comprises an internally threaded sleeve 302 engaging the externally threaded ends 304, 306 of the rod end section, each of which has a limit nut 308 thereon. As is clear from the drawing, rotation of the sleeves serves to effect a change in the length of the rod. As further shown in this view, the rod link section 60b is pivoted to the inner section at the clevis 64b and has a tube 310 about its opposite end with a slot 312 formed therein. The section 60b has a socket 314 formed therein receiving a captive ball 316 on the end 56b of an anchor stud 54b whereby a pivotal connection is effected.

FIGURE 13 discloses a modification wherein a spring 400 comprises a section of the link 60c, employed where flexibility of this joint is necessary, while in FIGURE 14 the link 60d is longitudinally adjustable by virtue of the threaded engagement of a first, externally threaded section 500 in the open, internally threaded second end 502.

Operation of the latter forms of the invention basically involves the principles discussed above with respect to that shown in FIGURES 1 through 3. In each form of the invention, the operating components are concealed within the door frame and the door, the mechanism being characterized by the incorporation of a hydraulic spring body within the door with an articulated rod system, and having means to regulate the tension or closing speed of the door.

What is claimed is:

1. A door regulating device comprising, in combination, an elongate rectangular casing adapted to be recessed within a door and having opposite end closures, a cylindrical liner within said casing having opposite end walls and defining a reservoir chamber within said casing exterior to said liner, a piston slidably received in said liner defining first and second chambers on opposite sides thereof and having a piston rod projecting through one of said end walls and a corresponding end closure of said casing, the other of said end walls and the corresponding end closure of the casing defining and end chamber therebetween in communication with said reservoir chamber, adjustable bleed valve means communicating said end chamber and first chamber, port means communicating said reservoir chamber with said second chamber, spring means normally urging said piston in the direction toward said end chamber, second port means communicating said end chamber with said first chamber, and check valve means in said second port means for freely filling said first chamber from said reservoir chamber through said end chamber upon movement of said piston in opposition to said spring means.

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