Dec. 17, 1963 C. F. COFFEY 3,114,541

ADJUSTABLE DOOR CONTROL MECHANISM

Filed Aug. 19, 1960 2 Sheets-Sheet 1

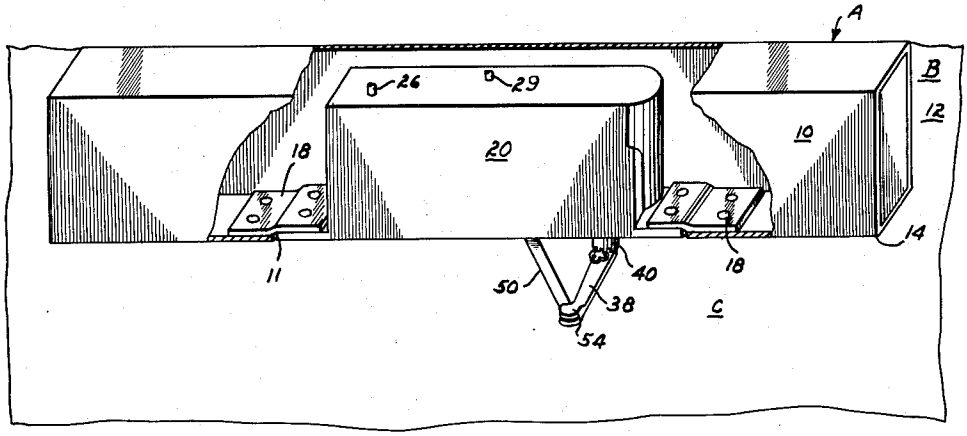


FIG. 1

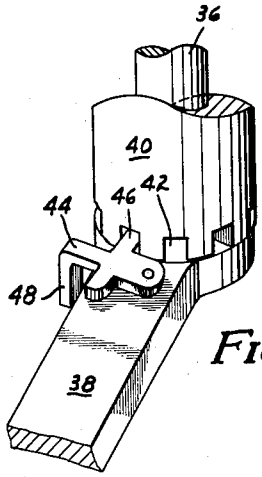


FIG. 2

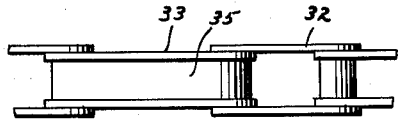


FIG. 3

FIG. 4

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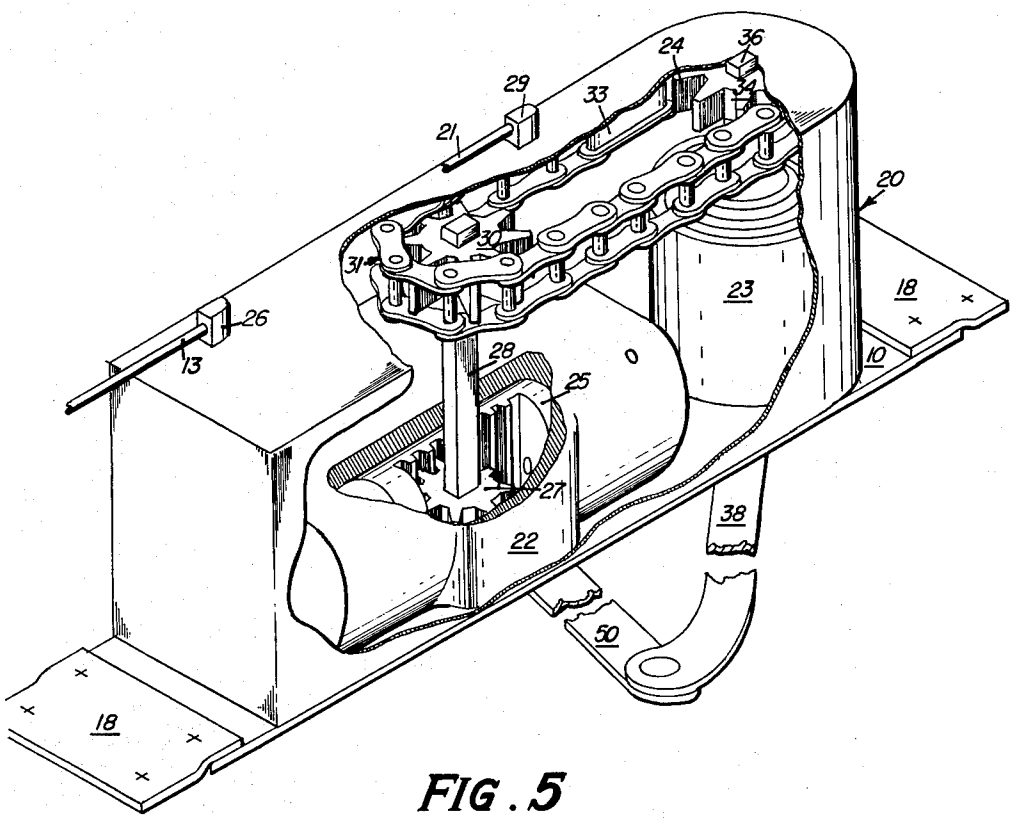


FIG. 5

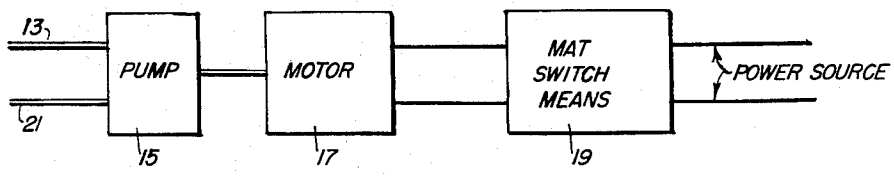


FIG. 6

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ADJUSTABLE DOOR CONTROL MECHANISM

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2 Claims. (Cl. 268—66)

This invention relates to mechanism adapted to open and close doors in cooperation with suitable control means; in particular, it comprehends an improvement in door control apparatus whereby the angular position of the door may be adjusted in response to individual needs. The invention also relates to new and improved door control apparatus adapted for mounting on the side of a door lintel or frame rather than in the lintel member itself. Specifically, the invention comprises certain improvements and modifications in the door control disclosed in my application entitled "Automatic Door Control," filed July 8, 1960, bearing Serial Number 41,672.

The automatic door control comprising the subject matter of the above mentioned application is relatively simple in function and structure as compared with various other hydraulically and electrically operated prior art devices of a similar character. As outlined in the aforementioned application, the force required to open a door is lessened by employing mechanical leverage in a novel manner with a consequent reduction in the size and expense of the necessary control assembly required for normal operation. However, the control apparatus described must be installed directly over the door in the lintel or door frame member and no means are provided for adjusting the angular amount of travel in a door.

Accordingly it is a broad object of this invention to provide an improved adjustable door control.

Another object of this invention is to provide door control mechanism adapted for installation on the side of a door frame or lintel immediately above the door.

Yet another object of this invention is to provide in a door opening and closing device novel means for adjusting the amount of angular rotation or swing of the door.

A further object of this invention is to provide in a door opening and closing device novel means for imparting kinetic energy to said device.

A still further object of this invention is to provide in a hydraulic opening and spring closing door control novel and facile means for winding the spring therein.

Another object of this invention is to provide a new and improved door control mechanism that is of simple inexpensive construction, yet highly durable, effective and easy to install and maintain.

Another object of this invention is to provide in an automatic door operator new and improved adjustable means for opening and closing a door without subjecting the door structure or related apparatus to excessive stresses.

These and other objects and advantages of the invention will become apparent from a consideration of the following detailed specification and accompanying drawing wherein a preferred embodiment thereof is shown by way of illustration only.

In the drawings:

FIGURE 1 is a perspective view, with parts broken away, of the invention;

FIGURE 2 is an enlarged fragmentary perspective view of the rewind apparatus forming part of the invention;

FIGURE 3 is a side view of a part of the link member used in the invention;

FIGURE 4 is a top view, partially in section and with parts removed, showing the invention operatively connected to a door in an open and closed position, the open position being indicated in solid lines and the closed position being indicated in dotted lines.

FIGURE 5 is a fragmentary perspective view, with

parts broken away, of the operator forming part of the invention; and

FIGURE 6 is a schematic diagram.

Referring to FIGURE 1 of the drawing, the invention, designated by the reference character A, is shown attached to a supporting structure B, which is preferably the lintel or overhead horizontal frame of a door C. The invention includes an elongated box-like housing **10** that is square or rectangular in transverse cross section and adapted for fastening by bolts or similar means (not shown) to the face **12** of structure B. The lower surface **14** of housing **10** is preferably parallel with and vertically spaced upwardly a slight distance from the top horizontal edge **16** of door C. Door C may be pivot hung, butt hung, or pivotally mounted by any suitable means. A door operator **20** is mounted by means of brackets **18** within housing **10** so that the bottom surface thereof is substantially flush with lower surface **14** of housing **10**. A suitably enlarged aperture or cutout **11** is provided in surface **14** of housing **10** to accomodate the lower surface of operator **20**.

Operator **20**, shown and described more fully in my co-pending application referred to hereinabove, is provided with a fluid pressure motor **22** for opening door C and a coil spring mechanism **23** for closing door C. As explained in said application and shown in FIGURES 5 and 6, fluid is supplied under pressure to fluid pressure motor **22** through hydraulic line **13** and entrance fitting **26** by means of a pump **15** and an electric motor **17** which is energized and controlled by mat switch means **19** located in the path of door C. The fluid returns to the pump system through exit fitting **29** and return line **21**.

The introduction of fluid under pressure to fluid pressure motor **22** drives a piston **25** therein in a reciprocal manner which, by means of a suitable rack and pinion arrangement **27**, causes motor shaft **28** to rotate. The movement of motor shaft **28** is transmitted to drive shaft **36** by means of roller chain **31** engageable by means of link plates **32** with sprockets **30** and **34** which are carried by motor shaft **28** and drive shaft **36** respectively. This results in the clockwise (as viewed in FIGURES 4 and 5) rotation of arm **38** thereby opening door C. Closing of door C is accomplished by means of a coil spring **23** coaxial with drive shaft **36** and biased therearound so as to resist the clockwise or opening rotation of arm **38**. The arrangement and operating sequence of the components making up operator **20** are fully set forth and described in my co-pending application.

As explained, arm **38** is attached to shaft **36** and rotates therewith. Further provided is a cylindrical ratchet sleeve **40** engageable with the internal coil spring of operator **20** so as to rotate therewith yet free to rotate independently of shaft **36**. FIGURE 2 illustrates in more detail the construction of sleeve **40**. As shown, sleeve **40** has at its lower edge a series of radial notches **42** extending upwardly from the upper face of arm **38**. A pivotal L-shaped dog **44** is pivotally attached to the top of arm **38** adjacent sleeve **40**. Dog **44** is characterized by a vertically downward extending leg **48** that is engageable with the side of arm **38** and a horizontally radially extending tooth **46** adapted to engage the notches **42** of sleeve **40**. By pivoting dog **44** so that tooth **46** is inserted into one of the notches **42** of sleeve **40**, a mechanical connection is afforded between the coil spring of operator **20** and arm **38**. Thus when dog **44** is engaged, arm **38** is under constant spring tension. Door C may be disengaged from spring tension by moving tooth **46** out of contact with notches **42**. For opposite hand doors dog **44** may be positioned on the other side of arm **38**.

Winding of the spring is easily accomplished by disengaging arm **38** from door C so that its entire length may be employed in exerting a considerable leverage

against the force of the spring. As shown in FIGURES 1 and 4, arm 38 is pivotally connected at its outer end to an elongated link bar 50 which is in turn pivotally carried by door C by virtue of fixed bracket 52. A curved neck 54 at the free end of arm 38 permits a proper geometrical relationship between it and link bar 50 so that a minimum of space is required to open and close the door.

Turning now to FIGURES 3 and 4, the structure and function of the adjustable feature of the invention will be explained. Roller chain 31, as described previously, transmits door opening force from motor shaft 28 to drive shaft 36 by means of sprockets 30 and 34. A corollary function of chain 31 is to transmit the return motion of drive shaft 36 to fluid pressure motor 22 to attenuate the spring action imposed upon the door during the closing cycle. To restrict the movement of roller chain 31 with respect to sprockets 30 and 34 and thus delimit the travel of door C, the individual open tooth engaging link plates 32 of chain 31 are replaced, as required, with a solid linking plate 33. This change is shown more particularly in FIGURE 3 wherein a solid link plate 33, having a solid central body 35, is provided in place of a conventional open link plate 32. It can be seen that solid linking plate 33 has no provision for receiving and engaging the individual teeth 24 of sprockets 30 and 34. When solid linking plate 33 makes contact with either sprocket 30 or 34 further motion in the direction of the travel thereof is inhibited, resulting in the limiting of the movement of door C. By positioning one or more solid linking plates 33 in chain 31, or by closing an existing link plate 32, the angular position of door C in its closed and open position can be set with a fair amount of precision. Suitable material can be selected to withstand the dynamic shock loading imposed upon teeth 24 of sprockets 30, 34, and solid linking plates 33 when the door reaches the terminal stages of opening or closing. In FIGURES 4 and 5, solid link plate 33 is shown in contact with teeth 24 of sprocket 34 just as door C reaches a position (as indicated by the solid line representation thereof) approximately 90° from the closed position. By moving chain 31 and solid link plate 33 to the left of a large opening angle (i.e. an obtuse angle) could be obtained; conversely, moving solid plate 33 to the right would result in setting the open position of door C at an acuate angle. Intermediate positions may be selected by appropriate changes in the position of solid link plate 33 in chain 31.

Thus there has been shown and described a new and improved adjustable door control mechanism; while a preferred embodiment of the invention has been set forth in the drawing and accompanying description, it must be understood that such a manner of disclosure does not imply a limitation upon the scope and breadth of the invention inasmuch as the invention is to be construed solely according to the following appended claims.

I claim:

1. A door control including a housing, a door operator of the type having fluid pressure door opening means and spring closing means mounted within said housing, a roller chain cooperatively connecting the door opening and closing means of said operator, means operatively connecting said door operator with a door, means integral with said roller chain for limiting the opening and closing movements of said door, means integral with said connecting means for removably exerting leverage upon said spring closing means to tension the same, and means for actuating said door operator.

2. The device of claim 1 wherein said limiting means consists of a solid link plate adapted to prevent the operative travel of said roller chain in a predetermined direction whenever the door is in a selected position.

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