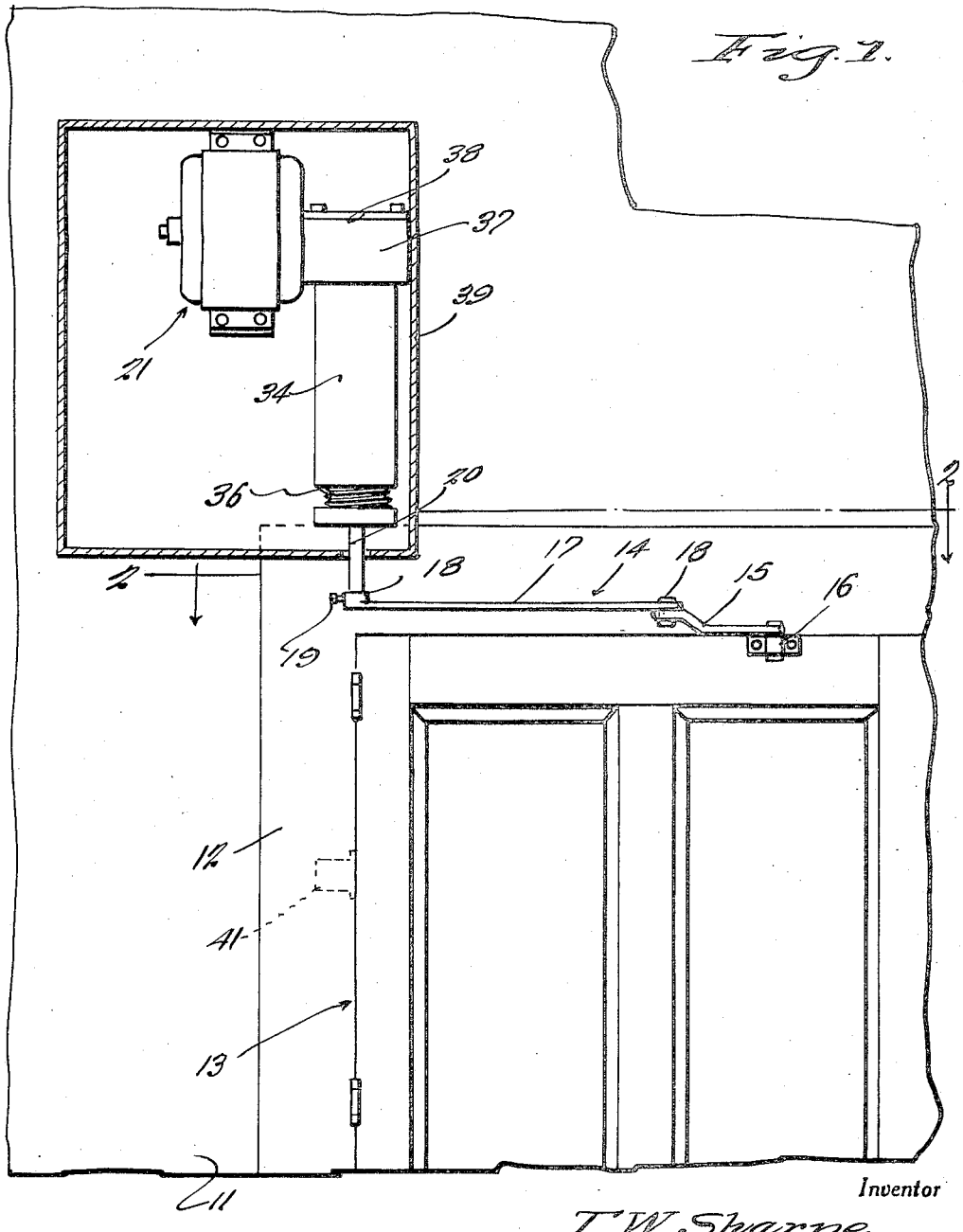
March 3, 1936. T. W. SHARPE 2,032,724

DOOR OPERATING DEVICE

Filed Aug. 13, 1934 4 Sheets-Sheet 1

Fig. 1.



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DOOR OPERATING DEVICE

Filed Aug. 13, 1934 4 Sheets-Sheet 2

Fig. 2.

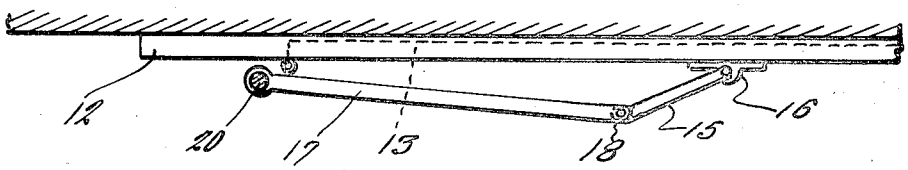
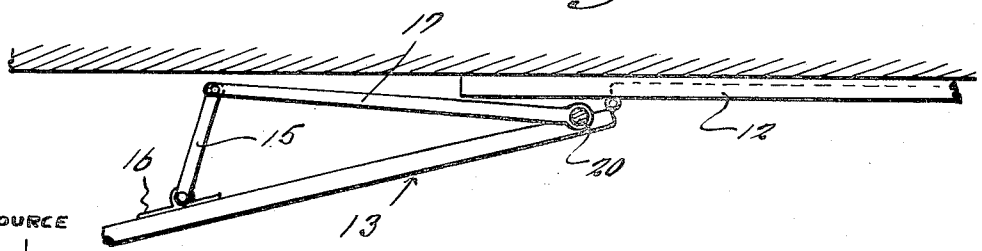


Fig. 3.



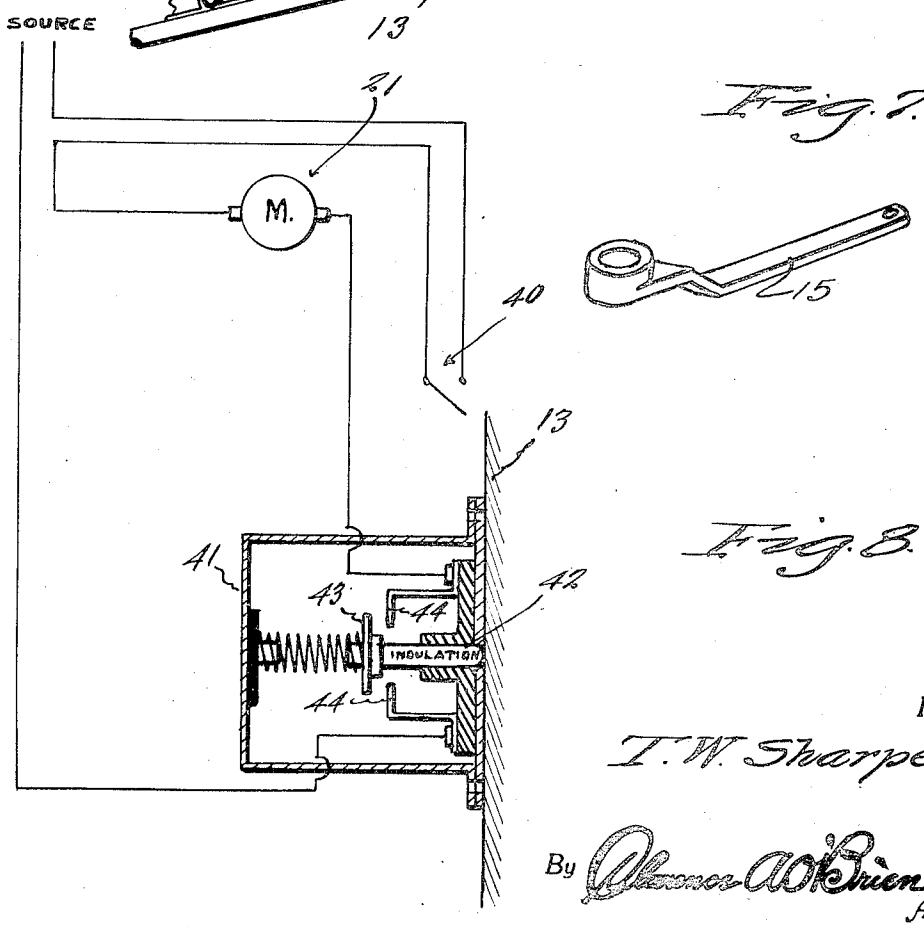


Fig. 7.

Fig. 8.

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DOOR OPERATING DEVICE

Filed Aug. 13, 1934 4 Sheets-Sheet 3

Fig. 4.

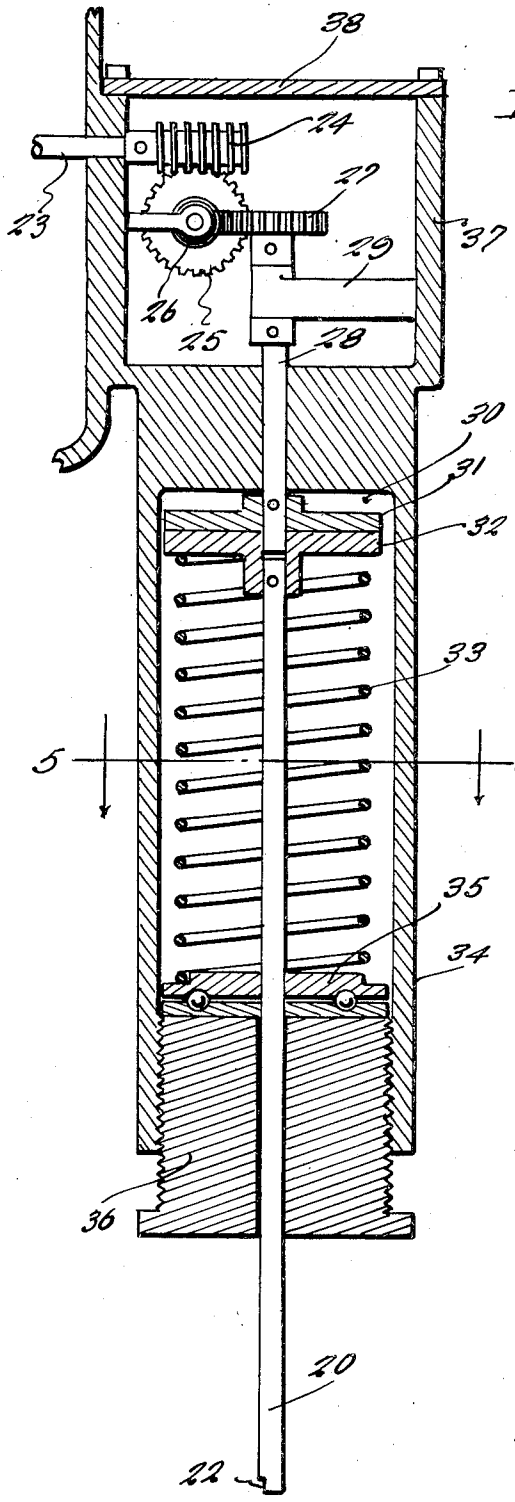


Fig. 5.

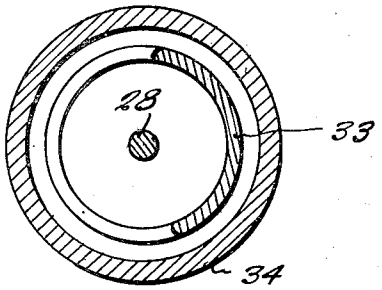
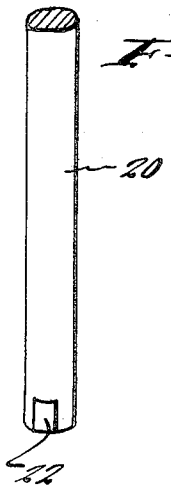


Fig. 6.



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DOOR OPERATING DEVICE

Filed Aug. 13, 1934 4 Sheets-Sheet 4

Fig. 9.

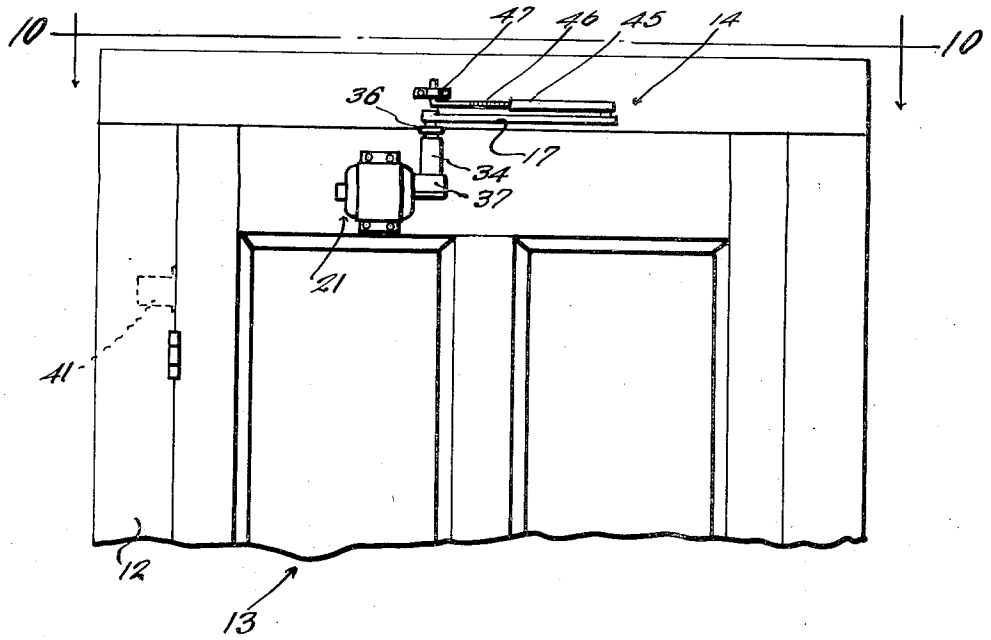
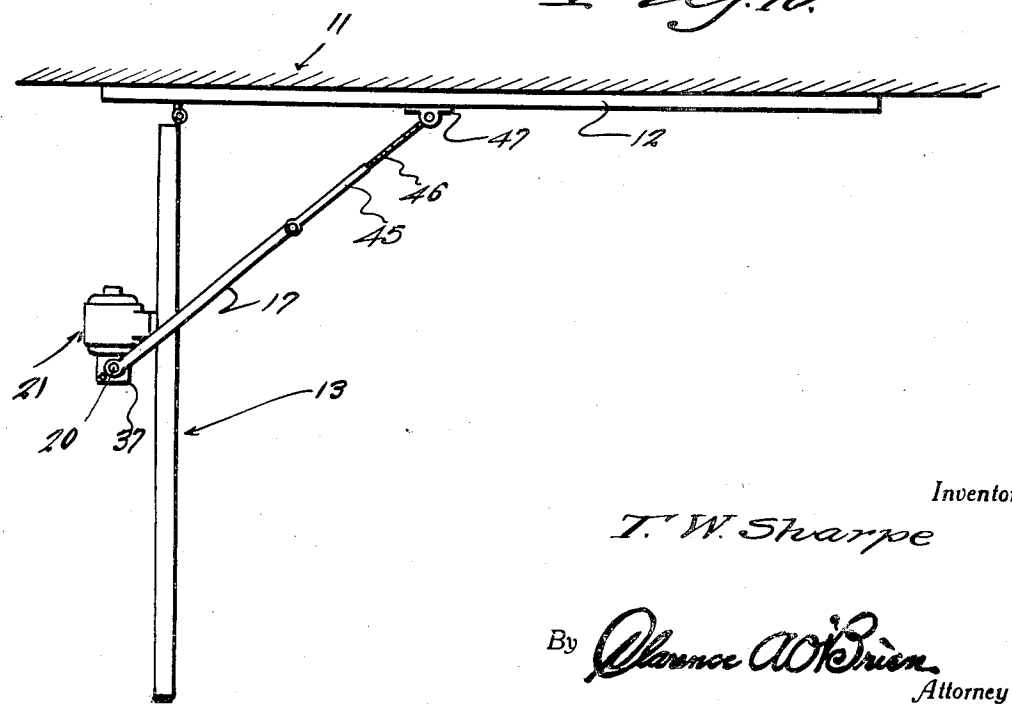


Fig. 10.



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UNITED STATES PATENT OFFICE

2,032,724

DOOR OPERATING DEVICE

Thomas W. Sharpe, Austin, Tex.

Application August 13, 1934, Serial No. 739,666

1 Claim. (Cl. 268—65)

This invention relates to the broad class of closure operators and has more particular reference to a structural assembly particularly adapted for use in conjunction with swinging doors, that is a hinged door swingable in a horizontal plane.

As perfected in accordance with the principles of the present invention the device serves a number of different purposes. First it functions as a motor actuated means for both opening and closing a swinging door. Secondly it can be used for merely closing the door, or just for opening the door. In addition it is capable of utilization as a shock absorbing door check or stop.

Stated otherwise I have evolved and produced a switch control motor operated structure embodying a toggle arrangement which may be employed to serve selectively in different capacities in the manner above stated.

The particular construction and arrangement adopted for use in carrying the principles of invention into actual practice will become more readily apparent from the following description and drawings.

In the drawings:

Figure 1 is a fragmentary view in elevation and section showing the manner in which the structure is utilized as a door opening device.

Figure 2 is a section taken approximately on the plane of the line 2—2 of Figure 1, the door being shown closed.

Figure 3 is a view like Figure 2 showing the position of parts when the door is swung to open position.

Figure 4 is a detail sectional and elevational view showing the gear driven sectional shaft construction and clutch and adjusting means.

Figure 5 is a cross section on the line 5—5 of Figure 4.

Figure 6 is an enlarged perspective view of one end portion of the main oscillatory or crank operating shaft.

Figure 7 is a perspective view of one of the links or arms of the toggle construction.

Figure 8 is a diagrammatic view showing the wiring arrangement, particularly that portion which serves to supply current to the automatic motor cut out switch.

Figure 9 is a view showing the manner in which the invention is attached to serve as a door opening and closing device, that is the means for swinging the door to open position as well as swinging it to closed position.

Figure 10 is a sectional view taken approximately on the plane of the line 10—10 of Figure 9.

So far as the principle of construction of the invention is concerned the details are the same whether the invention is used for opening, closing or both, and it all depends on how the invention is applied as to whether it serves simply as a means for closing the door, opening the door or serving both functions simultaneously. The succeeding description should be interpreted accordingly. It is believed however that it will be more systematic to consider first Figure 1 wherein the invention is first applied as a means for closing the door. In this figure the wall is denoted by the numeral 11, the door frame or jamb is indicated at 12 and the hingedly mounted door at 13. The numeral 14 designates a toggle arrangement which embodies a relatively short link 15 pivotally attached by brackets 16 to the door adjacent the free swingable edge thereof. A complemental or companion link is indicated at 17 and is pivotally attached to the first link as at 18 and is itself connected by a collar 18 and set screw 19 to the motor oscillated shaft, that is the main shaft section 20. It is desired however to operatively connect this shaft 20 to the motor 21 by way of improved adjustable means and this means is shown in particular in Figure 4. In Figure 4 it will be observed that the lower end portion of the main shaft section 20 is of flat faced construction as indicated at 22 so as to allow it to be rigidly attached to the link or arm 17 and this makes the arm 17 function as a crank. Thus as this arm 17 swings in a limited arc it exerts the requisite pivoting and pulling action on the link 15 for door closing operation. In Figure 4 it will be observed that the motor shaft is denoted by the numeral 23 and is connected by a worm 24 to a worm gear 25 which in turn operates a second worm 26 to operate the power take-off gear or pinion 27. This is attached to a stub shaft 28 mounted in a bearing bracket 29. The shaft 28 together with the shaft 20 make up a sectional shaft arrangement and these shaft sections are rotated in unison through the instrumentality of a friction or sliding clutch 30. This clutch comprises a disk 31 on the shaft 28 and a complemental disk 32 on the adjacent end of the shaft 20. The numeral 33 is merely a tensioning or adjusting spring which surrounds the shaft and is contained in a protective casing 34, bearing at its lower end against a ball bearing wear plate 35. This wear plate cooperates with a tensioning nut 36 which is threaded into the lower end of the cylinder 34 so as to permit the spring to be compressed to regulate the frictional contact between the clutch

disks 31 and 32. It is further noted that the gears are contained in an enclosure which may be designated as a gear box 37 having a removable cover plate 38. The motor and its associated parts are contained in a protective housing 39 which is mounted on the wall as shown in Figure 1 when the device is used as a door closing means.

The operation of this door closing means will be understood by referring to Figure 8 wherein it will be noted that any suitable source of power is applied to supply the motor, the power line containing a manually controlled cut-out switch 40. Then there is an automatic switch which is mounted in the door jamb, this being contained in a casing 41 which includes a spring pressed plunger 42 which cooperates with the edge of the door as here shown and carries a contact or circuit closing disk 43 for cooperation with a relatively stationary contact 44. It will be seen therefore that as the door swings open and the plunger 42 is projected under the action of the spring the contacts 43 and 44 come together to start the motor in operation. The motor in this arrangement is operable in a direction to turn the shaft 20 in a direction to close the door. It is obvious however that the door must be pushed open by manual pressure against the closing tendency of the clutch. This is not difficult however since the clutch disks 31 and 32 slide upon each other. In other words the door can be pushed open without interference from the clutch and as soon as the door is released the clutch comes into action so that the two shafts 28 and 20 turn together through the action of the gearing and motor to swing the door to closed position in an obvious manner.

In the preceding portion of the description it has been mentioned that the invention serves also as a door stop or check device and this is accomplished simply by throwing the switch 40, that is the manually controlled switch in Figure 8 to its open position. At this time the motor is thrown out of operation entirely and therefore the driving disk 31 of the clutch remains stationary. Consequently the door can still be pushed open at which time the disk 32 rides on the disk 31. When however the door is released there is sufficient frictional contact between the two disks to hold the door in any set position.

Referring now to Figures 9 and 10 wherein the invention is utilized both as a door closing and opening means it will be observed that this is accomplished by simply reversing the position of the parts. In other words the motor is simply attached to the door and the toggle 14 is attached to the door frame. In this arrangement a slightly different toggle arrangement is utilized. That is to say in addition to the crank arm or link 17 the toggle includes an adjustable link composed of the sections 45 and 46 telescopically connected together, the part 46 being connected pivotally to an attaching bracket 47 secured to the door frame. The application of the device for opening is, as is obvious, obtained by placing the motor on the swinging door and attaching the arm or crank to the wall. The motor is set in motion by a push button and continues to rotate in the same direction and will by making a complete revolution of the arm to open and close the door at one operation, opening the switch in the door jamb and leave the door closed. If, however, another person desires to enter while the door is closing it must be pushed back manually to admit the person but will continue to close until the closure is completed. The motor only operates in one direction and does not need to be started as a closure device when opened by the device, but will complete and open jamb switch as in closure operation.

Generically stated the gist of the invention is found in the provision of a toggle arrangement having suitable attaching brackets for connection either to the door or door frame as the case may be wherein one part, that is the part 17 serves as a crank arm and is operatively connected to an oscillatory shaft, this shaft being actuated through the instrumentality of a motor driven clutch arrangement, preferably a friction or sliding clutch. In both forms of the invention (see Figure 1 and Figures 9 and 10) it will be observed that I utilize the structure detailed in Figure 4, that is slidably mounted spring pressed main shaft section 20 mounted in the cylinder 34 and operatively connected with the stub shaft 28 by way of the clutch disks 31 and 32. Moreover the gear box 37 is also utilized as well as the gearing for transmitting the motion from the motor to the two shafts 28 and 20 respectively. It is further evident that since the construction and principle the invention is the same throughout the figures the difference in operation is merely accomplished according to the manner in which the structure is hooked up in association with the door. In other words the motor can be on the door or on the building whichever is desired and a toggle construction arranged accordingly so as to permit the invention to function in the several different ways already described.

It is thought that persons skilled in the art to which the invention relates will be able to obtain a clear understanding of the invention after considering the description in connection with the drawings. Therefore, a more lengthy description is regarded as unnecessary.

Minor changes in shape, size, and rearrangement of details coming within the field of invention claimed may be resorted to in actual practice, if desired.

Having thus described my invention, what I claim as new is:

In combination with a door and a door frame, an electric motor carried by one of said members, linkage pivotally connected with the other member, a gear box connected with the motor and into which the motor shaft extends, a cylinder having one end connected with the box and its other end open and internally screw threaded, a sectional shaft and a plug threaded in said open end of the cylinder, said sectional shaft passing through the cylinder and the plug and into the box, gearing located in the box and connecting the motor shaft with the sectional shaft, said gearing including worm gearing, means for connecting the outer end of the sectional shaft with the linkage, friction disks located in the cylinder and connected with the adjacent ends of the shaft sections, spring means in the cylinder for pressing one disk against the other disk, the tension of the spring means being adjusted by the plug.

THOMAS W. SHARPE.