

Oct. 9, 1951

J. G. CHILDERS
DOOR CONTROL MECHANISM

2,570,643

Filed May 4, 1948

2 Sheets-Sheet 2

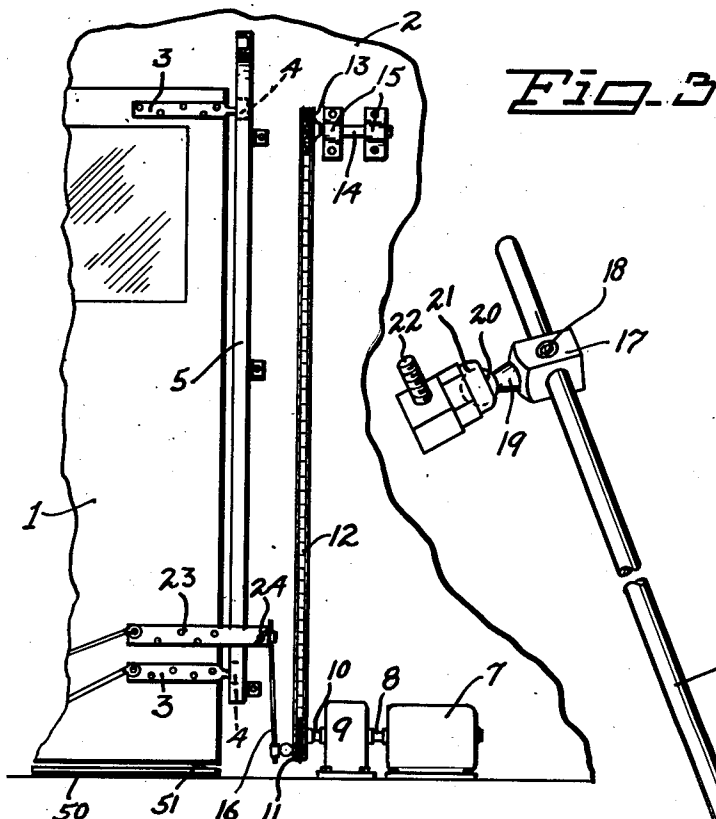


Fig. 3

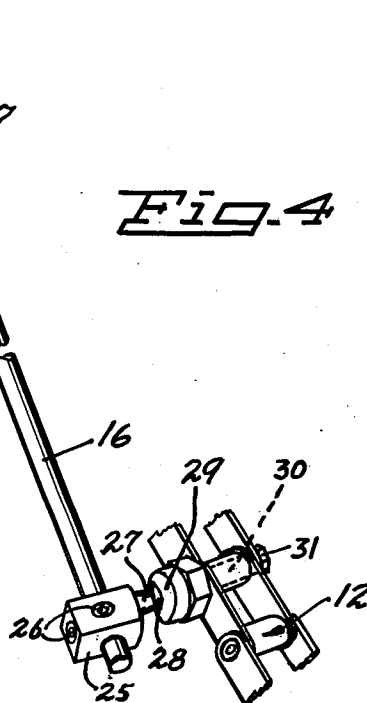


Fig. 4

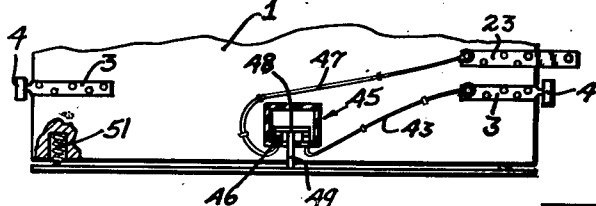


Fig. 5

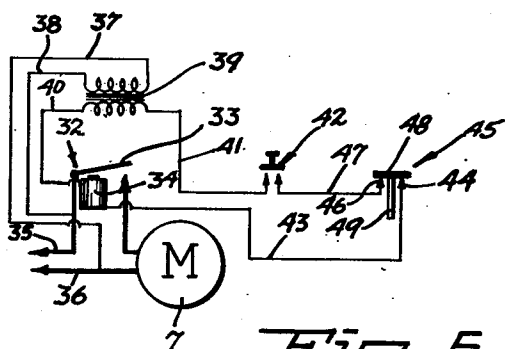


Fig. 6

INVENTOR.
John G. Childers
BY
Glenn L. Fish
ATTORNEY

UNITED STATES PATENT OFFICE

2,570,643

DOOR CONTROL MECHANISM

John G. Childers, Spokane, Wash.

Application May 4, 1948, Serial No. 25,051

1 Claim. (Cl. 268—59)

1

This invention relates to an improved door opening and closing mechanism and it is one object of the invention to provide a mechanism which is mounted in operative connection with a door of a garage, or other structure, and serves to cause the door to be opened and closed by power derived from an electric motor.

Another object of the invention is to provide a door opening and closing mechanism wherein a chain trained about pulleys and having its flights moved longitudinally during an opening or closing operation has one flight connected with the door by a bar which is adjustable longitudinally so that it may be accommodated to the height of a doorway and to movements of the door.

Another object of the invention is to provide a door opening and closing mechanism wherein the bar has one end passing through a block pivotally connected with a shaft or pin which serves as a cross pin for the chain.

Another object of the invention is to provide a door operating mechanism of this character including a switch mounted near the bottom of a door so that when the door moves downwardly and strikes a foreign object this switch will be opened and the motor shut off and further downward movement of the door stopped.

Another object of the invention is to provide a door operating mechanism which is simple in construction, easy to apply to a door mounted in a conventional manner, and very sturdy in construction and efficient in operation.

The invention is illustrated in the accompanying drawings herein:

Fig. 1 is a front elevation of a garage having doors equipped with the improved operating mechanism.

Fig. 2 is a fragmentary vertical sectional view upon an enlarged scale taken along the line 2—2 of Figure 1.

Fig. 3 is a view in elevation looking at a side portion of the inner face of the door and showing the operating mechanism operatively connected with the door.

Fig. 4 is a perspective view of the bar which connects the door with the endless sprocket chain of the operating mechanism.

Fig. 5 is a view looking at the inner face of the lower end of the door.

Fig. 6 is a wiring diagram.

The improved door operating mechanism is particularly intended as a means for opening and closing the door 1 of a garage 2 but it will be understood that the garage may represent any

2

building, or other structure, having a door which is mounted for movement to opened and closed positions. This door moves vertically and to opposite side edge portions are secured upper and lower brackets 3 carrying rollers 4 which engage in tracks 5 mounted vertically adjacent opposite sides of the doorway 6 and having upper portions curved rearwardly, as shown at 5^a and extended horizontally in the building over the doorway, as shown at 5^b.

The electric motor 7 which constitutes the power unit for the door operating mechanism is mounted upon the floor and has a shaft 8 connected with conventional reduction gearing in a gear box 9. A shaft 10 extends from the gear box and to this shaft is firmly secured a sprocket wheel 11 about which is trained a sprocket chain 12. This chain extends vertically and its upper portion is trained about an idler sprocket wheel 13 mounted upon a shaft 14 which is rotatably mounted through bearings 15, and it should be noted that the sprocket chain extends substantially the full height of the doorway but are spaced downwardly from the upper ends of the vertical tracks 5. When the motor is in operation one flight of the chain 12 moves upwardly as the other flight moves downwardly.

In order to connect the door with the sprocket chain there has been provided a bar 16 which is formed of strong metal and has its upper portion passed through a block 17 which is secured in fixed position upon the rod by a set screw 18. A neck 19 projects from the inner end of the block and terminates in a ball 20 which fits into a socket 21. This socket carries a stem 22 which passes through an opening in the outer end of a strap 23 which is mounted horizontally against the inner face of the door above the lower bracket 3, and when the winged nut 24 on the stem is tightened the socket will be firmly held to the strap but the block 17 will be permitted to have universal tilting and pivotal movement relative to the socket. A second block 25 fits about the lower portion of the bar 16 and is secured by set screws 26. A neck 27 extends from the block 25 and terminates in a ball 28 which fits into a socket 29 carrying a stem or shaft 30 which is passed through the sprocket chain and is secured by a nut 31. This shaft may take the place of a bolt customarily used for holding ends of the chain together or it may be passed through openings drilled through links of the chain to receive it. When the bar 16 is passed through the blocks and the set screws tightened it serves as a link which has pivotal connection with the strap 23

3

and the sprocket chain and from an inspection of Figure 3 it will be readily understood that when the sprocket chain is in motion the bar will be moved vertically with it and the door shifted upwardly or downwardly, according to the chain flight to which it is secured.

A switch 32 which is a magnetic switch and has an armature, or switch blade 33, and an electro-magnet 34 is interposed in the power wire 35 of the motor 7 with which the second power wire 36 is also connected and since the switch blade is pivotally mounted and normally in a raised position the motor will remain inactive until the switch 32 is closed. The current for the electro-magnet is supplied from the main power wires 35 and 36 by wires 37 and 38 leading to a transformer 39 and from this transformer lead wires 40 and 41, the wire 40 being connected with one end of the coil of the magnet 34 and the wire 41 being connected with one terminal of a manually operated switch 42. A wire 43 leads from the other end of the coil of the magnet and is connected with the terminal 44 of a switch 45 which has its other terminal 46 connected with the manually operated switch by a wire 47. The switch 45 is mounted in the door close to the lower end thereof and the bridging bar or movable contact 48 of this switch has a depending stem 49 which projects from the lower edge face of the door and rests upon a bar 50 which extends along the door for the full width thereof. This bar 50 is slidable vertically upon the door and is yieldably held in a lowered position by springs 51 so that the movable contact of the switch 45 is normally in a closed position. When the manually operated switch is closed the coil of the magnet 34 is energized and the movable contact 33 drawn to a closed position in which it bridges the stationary contacts of the switch 32 interposed in the power wire 35 and the motor will be started. The motor may be provided with a conventional timing or counting mechanism which opens the circuit and stops operation of the motor after the desired number of revolutions. During operation of the motor, the door will be shifted vertically from a raised position to a lowered or closed position and as the door reaches its lowered position, the conventional mechanism will stop operation of the motor and the door will cease its downward movement. The switch 42 may be then closed and as before described, the motor energized carrying the socket 29 about sprocket 11 and in the upward flight of chain 12, thus shifting the door from the lowered or closed position to the upward or open position shown in dotted lines in Figure 2. It can be seen that the motor may be of the type which rotates in one direction only, carrying the rod 16 with the chain up in one flight and down in the other flight, thus opening and closing the door. The motor being adjusted to give the required number of revolutions to raise the socket 29 from its lowered position to its extreme upward position before operation ceases. It will be understood that any type switch such as magnetically energized, radio active, electric eye, etc., may be inserted in place of switch 42 to automatically operate the door. The bar 50 extends horizontally across the bottom of the door 1 and when any foreign object is beneath the door to prohibit its descent, the bar 50 will contact

4

the object and cause the stem 49 of switch 45 to be shifted upwardly. During upward movement of the stem, the movable contact 48 will be moved out of engagement with the stationary contacts of the switch 45 and the switch will be opened to break the electric circuit through the magnet and the movable contact 33 of switch 32 will move to its open position and shut off supply of current to the motor, therefore, operation of the motor will stop and the door will cease its downward movement until the obstruction is removed and switch 45 again closed.

Having thus described the invention, what is claimed is:

A device for connecting a sliding door with a sprocket chain by means of which the closure is moved to open and closed position, said connection comprising a bracket of a length adapting it to be secured against a door transversely thereof and project outwardly from a side edge thereof, the outer end portion being formed with an opening, a socket, a threaded stem projecting laterally from a side of said socket and passing through the opening in the outer end position of said bracket a nut upon said stem securing the stem in place through the opening, a bar circular in cross section, a block formed with a transverse bore circular in cross section through which one end position of said bar passes, the block being thereby mounted for movement along and circumferentially of the bar to adjusted positions, a set screw threaded through an opening formed in said block transversely of the bore and releasably securing the block in an adjusted position upon the bar, a neck projecting from said block and having a ball at its end rotatably and tiltably mounted in said socket, a second block formed with a transverse bore circular in cross section and through which the other end portion of said bar passes, a set screw threaded through an opening formed in the second block transversely of the bore and releasably holding the same in an adjusted position upon the bar, a neck projecting from the second block at the opposite side of the bar from the neck of the first block and having a ball at its end, a second socket into which the ball of the second block is rotatably and tiltably mounted, a threaded stem projecting from the second socket and being of a length adapting it to pass through meeting links of a sprocket chain and connecting the said ends of the chain and a nut screwed upon the outer end of said stem.

JOHN G. CHILDERS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
842,895	Lovell	Feb. 5, 1907
949,813	Washburn	Feb. 22, 1910
1,122,953	Lamb	Dec. 29, 1914
1,632,237	Lemon	June 14, 1927
1,745,990	Goldman	Feb. 4, 1930
1,829,964	Randall	Nov. 3, 1931
1,972,695	Staudé	Sept. 4, 1934
2,221,216	Gregor	Nov. 12, 1940
2,346,346	Anderson	Apr. 11, 1944