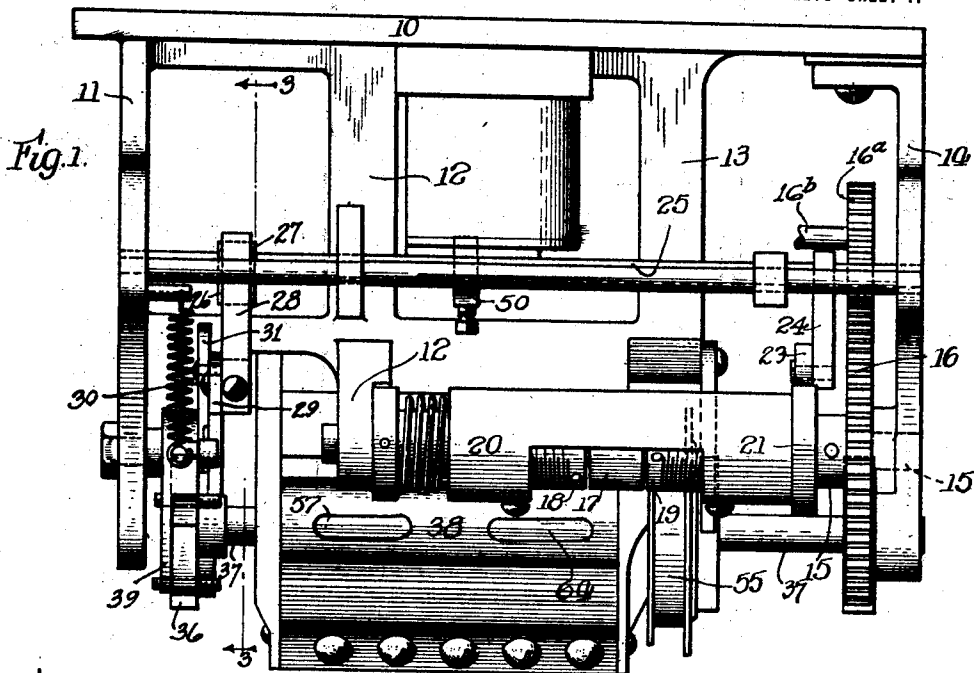
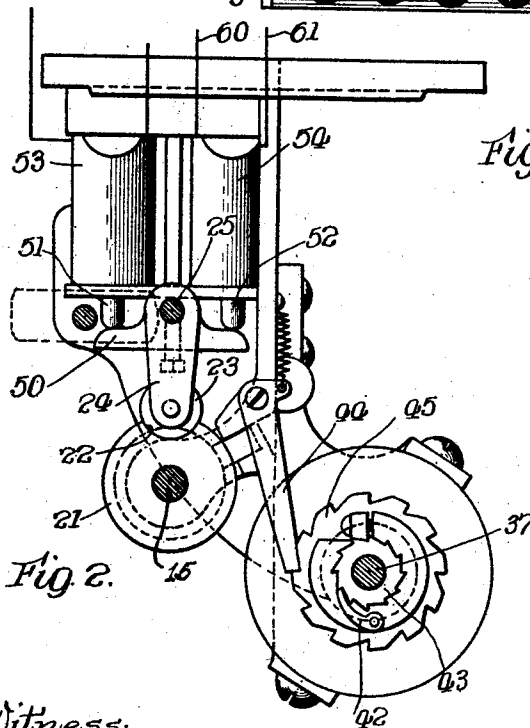
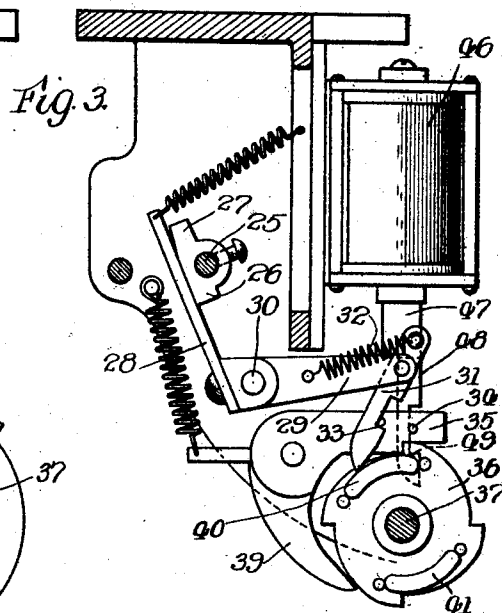


1,422,931.

H. W. CRANE.
DOOR CONTROLLING DEVICE.
APPLICATION FILED OCT. 1, 1919.

Patented July 18, 1922.

2-SHEETS-SHEET 1.

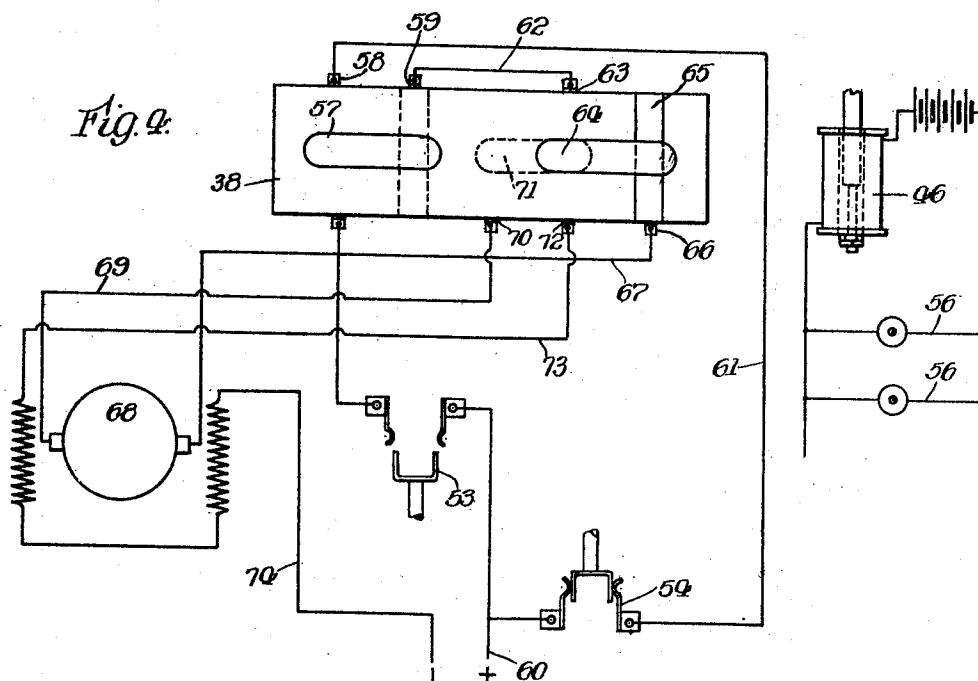


Witness:
A. J. Sausser.

Inventor:
Herbert H. Crane
By *Chas. J. Murray* atty.

H. W. CRANE.
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2 SHEETS—SHEET 2.



Inventor:
Herbert H. Crane

By *Chas F Murray* Atty.

UNITED STATES PATENT OFFICE.

HERBERT W. CRANE, OF CHICAGO, ILLINOIS.

DOOR-CONTROLLING DEVICE.

1,422,931.

Specification of Letters Patent.

Patented July 18, 1922.

Application filed October 1, 1919. Serial No. 327,785.

To all whom it may concern:

Be it known that I, HERBERT W. CRANE, a citizen of the United States, and resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Door-Controlling Devices, of which the following is a specification.

My invention relates to means for controlling the operations of doors or similar closures and particularly to an improvement on the construction shown in my Patent No. 1,290,718 of Jan. 7th, 1919, and in my co-pending application, Serial No. 295,568, filed May 8th, 1919.

The improvement herein described and shown has for its object the provision of means whereby the actuation of the mechanism is made more positive and in which any element of uncertainty is removed. To that end I have provided means in connection with a spring-actuated pole changer and switch for mechanically actuating said switch and simultaneously, by the use of a second switch, shutting off the supply of current to the motor. The mechanism shown in my application referred to has been considerably simplified and the operation thereof rendered more certain and sure.

The invention will be more readily understood by reference to the accompanying drawings, wherein,

Fig. 1 is a side elevation of a controlling device constructed in accordance with my invention, the motor being omitted;

Fig. 2 is an end view partly in section showing the device for mechanically actuating certain movable parts;

Fig. 3 is a sectional view on the line 3—3 of Fig. 1, and,

Fig. 4 is a wiring diagram.

In the drawings it will be seen that I provide a base plate 10, to which the motor (not shown) is adapted to be secured, and from which depend certain frame members 11, 12, 13, 14, which provide bearings for the different transverse shafts. It will be understood that the operating motor is mechanically connected to the door to be operated and therefore that the door is mechanically connected to the switch operating mechanism, later to be described. A shaft 15, is mounted in suitable bearings in the depending mem-

bers 12, 14, and has secured thereto a gear 16, adapted to be connected to the motor through a pinion 16^a and shaft 16^b and to rotate in opposite directions in unison therewith. This shaft is threaded at an intermediate point and a nut 17, is mounted on the threaded portion between adjustable abutments 18, 19, mounted in a sleeve 20, loosely mounted on the shaft 15. The sleeve 20, has a disk 21, secured thereto, the disk being provided with a notch 22, in its periphery, best shown in Fig. 2. The arrangement is such that as the shaft 15, is rotated it causes the travel of the nut 17, between the abutments. When the nut reaches a predetermined point it is caused to jam against one of the abutments 18, 19, which serves to effect the rotation of the sleeve 20, with the shaft, thus changing the angular position of the notch 22, in the disk 21. Normally a roller 23, is seated in the notch 22, the roller being carried by an arm 24, fixed to a shaft 25, extending longitudinally of the device, as shown in Fig. 1. When the disk is rotated the roller is displaced, thus causing oscillation of the arm 24. The shaft 25, best shown in Fig. 3, carries a rocker having short and long arms 26, 27, respectively, which bear against a relatively flexible arm 28. This arm is secured to a rigid arm 29, thus forming a bell crank adapted to oscillate on a pin 30, as a center. At the outer end of the arm 29, is mounted a trip member 31, held in position by a tension spring 32, the trip member having a notch 33, adapted to engage with a pin 34, carried by a pawl 35. The pawl engages a ratchet wheel 36, mounted on a shaft 37, which carries a pole changer 38, shown in Fig. 1 and indicated diagrammatically in Fig. 4. This multiple switch or pole changer is adapted for step-by-step rotation in one direction, as permitted by the mechanism described. The pawl 35, is in effect a bell crank, the other arm 39, of which overlies a side opposite to that which is engaged by the pawl 35, and prevents the pawl from advancing more than a step at a single actuation. The face of the ratchet 36, is provided with two arcuate deflectors 40, 41, adapted to engage the depending trip member 31, and in certain positions prevent the engagement of the notch 33, in the trip member with the pin 34. In other words, the parts are so arranged that actua-

tion of the trip member will serve to cause advancement of the pole changer through 90° when the ratchet attached to the pole changer is in two positions and to prevent such actuation when the ratchet is in two other positions. While in the position shown in the drawing the lifting of the trip member 31 would have no effect on the arm 35 as the notch 33 cannot engage with the pin 34. When, however, the ratchet has advanced one notch the arcuate projection 40 will be out of the way and the member may swing into a vertical position. The arm 28, is constructed of flexible material in order to avoid the possibility of breakage due to any disarrangement of the parts which would prevent normal actuation. The arm 27, is longer than the arm 26, because of its greater distance from the center of oscillation of the bell crank. It will be understood that the shaft 25, and therefore the rocker having the arms 26, 27, will oscillate in opposite directions due to the opposite rotation of the motor and the consequent opposite oscillation of the arm 24, which carries the roller 23.

The pole changer or multiple switch 38 is rotated by a coil spring 55, as described in my application heretofore referred to, the spring being wound when the motor is rotating in one direction and being unaffected during opposite rotation of the motor. This result is secured by means of the pawl and ratchet 42, 43, and the pawl and ratchet 44, 45, best shown in Fig. 2. A solenoid 46, is suitably secured to the frame, its core 47, being provided with an oscillating tongue 48, having a notch 49, adapted to lie beneath the pin 34, on the pawl 35. Upon actuation of the solenoid core it will be seen that the pawl is lifted and the pole changer is rotated.

Also mounted on the shaft 25, is a rocker 50, the two arms of which are adapted to contact and actuate plungers 51, 52, forming a part of two snap switches 53, 54. The switches are so arranged that in the position shown in Fig. 2, both are in a circuit-closed position. It will be seen that upon the arrival of a door to which the motor is connected to its limit of movement, which limit is fixed by the adjustment of the nuts 18, 19, on the shaft 15, the rocker 50, will be moved in one direction or the other due to the oscillation of the arm 24 and one or the other of the switches 53, 54, will be opened. By this means I provide for a positive mechanical shut-off of the current to the motor irrespective of the action of the multiple switch 38. This is to avoid the possibility of any misoperation due to the unwinding or breaking of the multiple switch spring 55.

Referring now to the diagram shown in Fig. 4, the parts are shown in a position such as they will occupy at a limit of movement of the device to be operated. In that position the pole changer will be in a neutral

position and one of the switches 53, 54, will be in an open position the other being closed. For convenience this is shown differently from the position indicated in Fig. 2, in which both of the switches 53, 54, are closed. In that view the motor has been stopped with the door in an intermediate position.

Assuming the parts in the position of Fig. 4, upon actuation of one of the circuit closures 56, the solenoid 46, is energized, which effects the rotation of the pole changer through 90° in a direction indicated by the arrow. This places contact pieces 57, in engagement with contacts 58, 59, whereby current received through the line 60, the switch 54, and line 61, is delivered to the line 62. From there it is delivered to contact 63, thence through contact piece 64, which is cross connected by the band 65, to contact 66. A line 67, carries the current to the brushes of the motor 68, and a line 69, returns the current to contact 70, thence through contact piece 71, to contact 72. It then travels through line 73, to the fields of the motor, thence by line 74, to a ground.

The motor is then in operation and immediately upon the starting of the motor in a reverse direction from that at which it was stopped, the arm 24, will return to the position shown in Fig. 2, whereupon both of the switches 53, 54, will be closed. Rotation will continue if uninterrupted until the door reaches its opposite limit of movement, whereupon the arm 24, will be oscillated in a reverse direction, due to the rotation of the sleeve 20, and the displacement of the roller 23, from the notch 22, thus serving to oscillate the rocker 26, 27, and the tripping of the pole changer, whereby the current is shut off from the motor. Simultaneously, one of the switches 53, 54, through which current is being supplied to the motor, is opened. Thus there is a double shut-off of the power to the motor. Of course, if the motor is interrupted in its travel toward an extreme position of the door both the switches 53, 54, will remain in closed position. The stoppage of the motor at any point may be effected by actuating the solenoid and causing the rotation of the multiple switch.

One of the important features of my invention is that of providing a spring-actuated multiple switch together with automatic means for permitting the actuation thereof as required, said mechanism being associated with means for positively and mechanically disconnecting the source of power from the motor at an extreme point in the movement of the closure which is being actuated. This avoids all possibility of injury to the parts due to the burning out of the motor.

Obviously modifications may be made in the structure shown and such modifications

as will suggest themselves to those skilled in the art are considered to be within the scope of my invention.

I claim:

5 1. In door operating means, the combination of a switch member adapted to be rotated by a step-by-step movement in one direction, and to shut off a supply of current to a motor, a spring for effecting rotation of
10 said switch member, a motor, and mechanical means operated by the motor at a desired limit of movement for effecting power shut-off simultaneously with the interruption of power by said switch member, substantially as described.

15 2. In a door controlling device, the combination of a motor, a spring-rotated pole changer adapted to interrupt the supply of current to the motor at a desired limit of movement, and mechanical means operated
20 by the motor for positively shutting off the supply of current to the motor simultaneously with the operation of said pole changer, substantially as described.

25 3. In door controlling means, the combination with a motor of a multiple switch, means including a spring for imparting a step-by-step rotation to said multiple switch, an electric circuit and a solenoid therein
30 for actuating said switch, means operable by the motor at a desired limit of movement for actuating said switch to shut off the supply of current to the motor, and additional means also operated by the motor for
35 positively shutting off the supply of current to the motor simultaneously with the actuation of said multiple switch, substantially as described.

40 4. In door controlling means, the combination with a reversing motor, of a combined multiple switch and pole changer, electrical means for effecting the actuation

of said multiple switch and pole changer, mechanical means for automatically actuating said multiple switch and pole changer
45 at predetermined limits of movement of the device actuated by the motor, a second switch for interrupting the supply of current to the motor, and mechanical means for positively actuating said second switch upon
50 arrival of the device to be operated at a predetermined limit of movement, substantially as described.

5. In a door operating device, the combination with a motor, of a cylindrical pole
55 changer, spring means for rotating said pole changer by a step-by-step movement, a low voltage solenoid for tripping and permitting the advancement of said pole changer, mechanical means for automatically tripping
60 said pole changer, and additional mechanically operated means for interrupting the supply of current to the motor independently of the operation of said pole changer, substantially as described.

6. In door controlling mechanism, the combination with a motor, of a multiple
65 switch, a low voltage solenoid, means operable by the actuation of said solenoid for operating said multiple switch, mechanical means operable by the motor for actuating
70 said multiple switch, a second switch for controlling the passage of current to the motor, and mechanical means operated by the motor for actuating said second switch
75 whereby a double break in the current-supplying line is effected upon arrival of the motor operated device at a predetermined point, substantially as described.

Signed at Chicago, Illinois, this 27th day 80 of September, 1919.

HERBERT W. CRANE.

Witness:

T. D. BUTLER.