

1,322,704.

A. R. LOCKE.
SYSTEM FOR OPERATING DOORS.
APPLICATION FILED FEB. 14, 1919.

Patented Nov. 25, 1919.

2 SHEETS—SHEET 1.

Fig. 1.

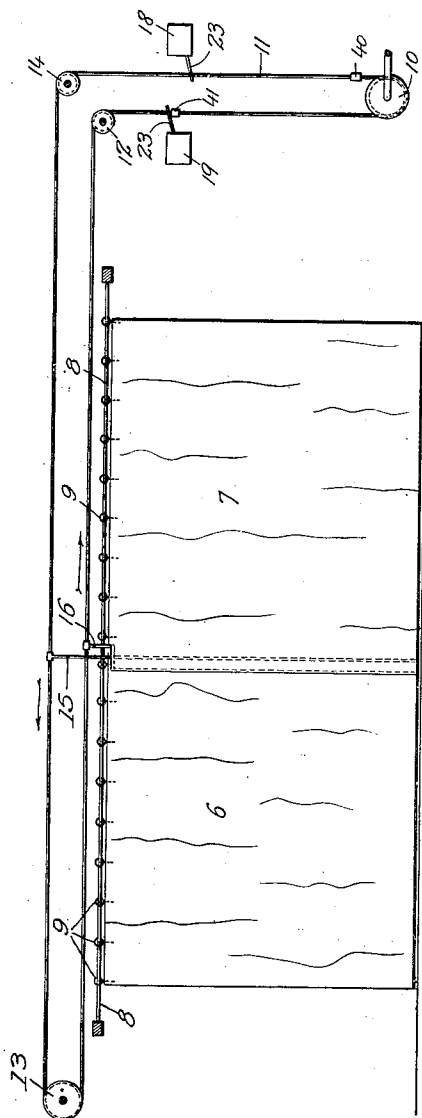
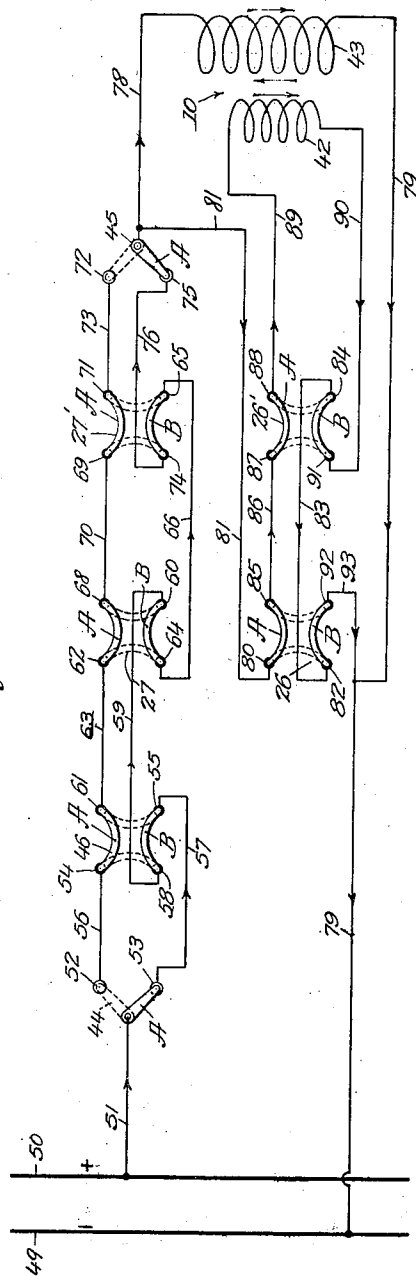


Fig. 2.



WITNESSES:

Robert H. Weir
Arthur W. Carls

INVENTOR
Albert R. Locke
BY Jones, Bain & Ryan
ATTORNEYS

1,322,704.

A. R. LOCKE.
SYSTEM FOR OPERATING DOORS.
APPLICATION FILED FEB. 14, 1919.

Patented Nov. 25, 1919.
2 SHEETS—SHEET 2.

Fig. 3.

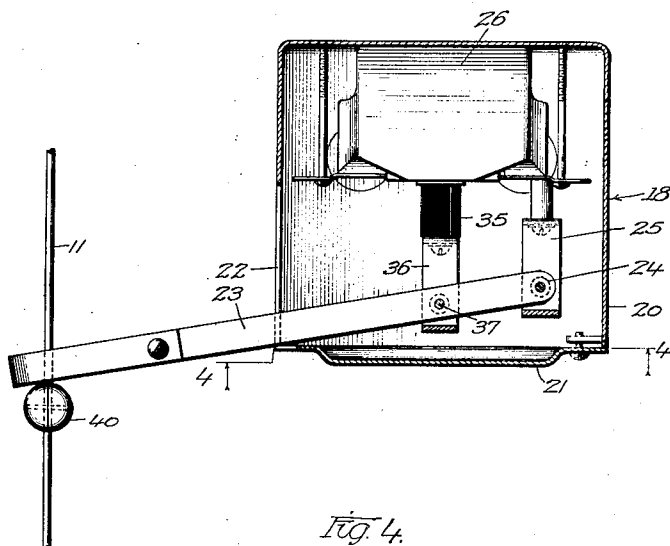


Fig. 4.

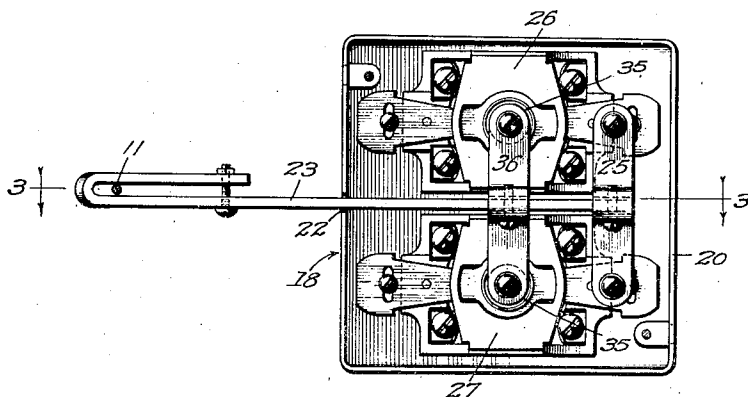
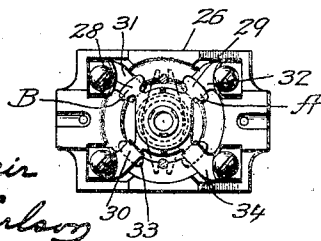


Fig. 5.



WITNESSES:

Robert H. Weir

Arthur W. Carlson

INVENTOR

Albert R. Locke

BY *Toné Rain Bean*
ATTORNEYS

UNITED STATES PATENT OFFICE.

ALBERT R. LOCKE, OF CHICAGO, ILLINOIS.

SYSTEM FOR OPERATING DOORS.

1,322,704.

Specification of Letters Patent.

Patented Nov. 25, 1919.

Application filed February 14, 1919. Serial No. 276,941.

To all whom it may concern:

Be it known that I, ALBERT R. LOCKE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Systems for Operating Doors, of which the following is a specification.

My invention relates to improvements in automatically operable mechanism for opening and closing doors, curtains and the like.

One of the objects of my invention is to provide means for automatically operating doors to open and close them, such as doors of a garage, ware-house, etc., and curtains, such as those used in theaters and other assembly-halls.

Another object of my invention is to provide such a means, controllable from a plurality of remote points, by simply closing an ordinary standard electric switch, the same switch being operable for causing the alternate opening and closing of the doors. The switch, or any one of a number of such switches, being operable to initiate the operation of the device, which device will automatically shift similar switches, by the door moving means, when the doors have reached, or are about to reach, the limit of their movements in either direction to condition the mechanism for reverse movement.

And still another object of my invention is to provide such a system of operation by means made up or constructed of standard devices and machines, without requiring especially contrived mechanisms, and which will infallibly perform their conjoint and combinative functions to produce the desired results.

Other and more specific objects of my invention will become readily apparent to persons skilled in the art from a consideration of the following description when taken in conjunction with the drawings, wherein:

Figure 1 shows an elevation of the device in general outline.

Fig. 2 is a diagrammatic representation of the circuits.

Fig. 3 is a section taken on line 3—3 of Fig. 4, showing housing containing two like switches and the switch-operating mechanism.

Fig. 4 is a section taken on line 4—4 of Fig. 3, showing the housing and two contained four-pole double-throw, standard switches.

Fig. 5 is a plan view of one of the switches.

In all the views the same reference characters are employed to indicate similar parts.

In Fig. 1, I have shown two curtains 6 and 7 adapted to be moved along the track or rod 8. The curtains are supported on the rod by rings 9. An electric motor 10, capable of being reversed in its direction of rotation, for driving a rope, or cable 11, is employed for moving the doors. The rope, or cable 11, passes over a pulley 12, then around the pulley 13, at the remote end of the curtains and over a pulley 14. When the rope is moved in one direction the curtains 6 and 7, or doors, will thereby be moved toward each other. The arrangement is such that when the rope, or cable is moved in the direction shown by the arrows, the curtain 6 being connected to the rope, as by means of a connection 15, and the curtain 7, being connected by a similar connection 16, the curtains, or sliding doors as the case may be, will be moved with the rope to open the doors or to pull back the curtains and exposing an opening, closable by either, and moved in the opposite direction when rotation of the motor is reversed.

If doors are to take the place of the curtains, 6 and 7, then the rod 8 will give place to a track and the rings 9 will be substituted by suitable trolleys on wheel hangers, but in other respects the same mechanism is employed for moving the doors as required for moving the curtains.

Located at a convenient point, along the traverse of the cable, are switch-containing housings 18 and 19, each housing containing a pair of switches, a switch in one housing adapted, one to be operated when the cable is moving in one direction and a switch in the other one to be operated when the cable is moving in the opposite direction. In other words, one group of switches controls the movement of the doors, or curtains, in one direction, and the other group of switches controls the movement in the opposite direction. Each switch containing housing is provided with a removable cover 21 and has a slot 22 in one side wall thereof for the operating lever 23, which is pivoted, as at 24, to a proper support 25. The switches 26, 27, and 26', 27' are provided with independent, rotatable circuit closing blades 28 and 29. The switches, shown in Figs. 3, 4 and 5 are of a standard type, wherein the segmental blades 28 and 29—A and B of

Fig. 2—are coincidentally rotated by moving the push button 35 inwardly, the push button being automatically returned when pressure is removed, to place it in position to again rotate the blades. When the blades are simultaneously rotated, in the manner described, circuit between the terminal contacts or poles 31 and 32 will be closed by one blade, say blade 28, and terminal contacts 30 and 34 by the other blade, 29. The next operation will open the circuit between these contacts and close circuit between contact terminals 32 and 34 and coincidentally between contact terminals 30 and 31, and thus, as the switch blades (28 and 29 Fig. 5 or A and B Fig. 2) are rotated, the circuits described are progressively closed and opened between the respective terminals. Each switch is provided with an operating push button 35, to which is secured a cross bar 36, pivoted to the lever 23, as at 37, so that when the lever 23 is raised, as shown in Fig. 3, the push buttons 35 of the two switches are pushed inwardly and this has the effect of rotating the blades 28, 29, 32 and 33 for respective contact with the stationary terminals 30, 31, 32 and 34, joining them progressively in pairs as more fully hereinafter explained. The pivoted arm 23 is returned to its normal position, as shown in Fig. 3, by springs contained within the switches, there being a spring in each of the switches 26, 27 and 26', 27'. The operation of the rope or cable 11 is to raise the arms 23 to operate the switches and each of them, by an abutment 40 and 41, respectively, which are fixed thereto. In Fig. 1, the abutment 41 has lifted the arm 23 of the housing 19 and operated the switches therein, while the arm 23 of the housing 18 is in its depressed or lowermost position, having been so moved, when released, by the switch springs ready to be lifted by the abutment 40 when said abutment has been raised into position to do so, after the curtains have been moved in the opposite direction. The housing 18 contains the switches 26 and 27 while the housing 19 contains the switches 26' and 27', as shown in Fig. 2.

In the schematic diagram, 42 represents the armature of a direct current electric motor and 43 the field of the same, or 42 may represent the starting coil for an alternating motor and 43 the field and armature, either or both. The terminal, current-initiating switches 44 and 45, preferably, are single pole double throw type, while another current-initiating switch 46, which is intermediate the switches operated by the curtain or door and the terminal current-initiating switch, is a double-throw double pole-switch, see Fig. 5, of the same type or character as the switches 26 and 27. There may be as many switches, 46, to be hand manipulated, to initiate the current flow, located in the

circuit as shown, between switches 44 and 46 or between switches 27' and 45, as may be desired. I prefer to use terminal switches of the type of switches 44 and 45 because they serve the purpose and are cheaper in cost than the intermediate switches.

The operation of the mechanism and circuits is as follows: 49 and 50 are the wires from which the current for operating the motor is supplied. The wire 50 is connected to the switch 44, by a wire 51, and the poles 52 and 53, of the switch 44, are connected to the terminals 54 and 55 of the current initiating switch 46, by wires 56 and 57, respectively. The four pole switches of the diagram are of the standard type shown in Fig. 5. The terminal 58 of the switch 46 is connected by wire 59 to the terminal 60 of the switch 27; the terminal 61, of the switch 46 being connected to the terminal 62 of the switch 27, by the wire 63. The terminal 64 of the switch 27, is connected to the terminal 65, of the switch 27', by the wire 66, while the terminal 68, of the switch 27, is connected to the terminal 69 of the switch 27', by the wire 70. The current initiating terminal switch 45 is connected to the switch 27', in the same manner that the switch 44 is connected to the switch 46. The terminal 71, being connected to the terminal 72 of the switch 45, by the wire 73, and the terminal 74 of switch 27' is connected to the terminal 75 of the switch 45, by the wire 76. This produces two independent parallel circuits between said switches, one on each side, as shown, or capable of being formed into two composite independent circuits, a part of one circuit being joined to a part of the other parallel circuit when either of the switches 27 or 27' is moved to bring its blades into a position at right angles as shown by dotted lines. Both composite circuits will, however, be completed through the switches.

The blade A, of the switch 45, is connected by a wire 78 to the motor element 43 and by wire 79 direct to the main 49.

The current reversing switches 26 and 26' are connected as follows: The terminal 80 of the switch 26 is connected by wire 81 to the wire 78. The terminal 82, of the switch 26, is connected by wire 83 to the terminal 84, of the switch 26'. The terminal 85, of the switch 26, is connected by wire 86 to the terminal 87, of the switch 26', while the terminal 88 of the switch 26' is connected by wire 89 to the starting coil, or armature 42, of the motor, which, in turn, is connected by a wire 90 to the terminal 91, of the reversing switch 26'. The terminal 92 of the switch 26, is connected by wire 93 to the wire 79 and thus all of the circuits may be completed through the switches.

Now the operation of the device is as follows: The starting or current-initiating

switches 44, 45, and 46, of which the switches 44 and 45 are preferably terminal switches and of which there are two, but of the 46 type, for the same purpose, there
 5 may be as many as desired connected in the manner described. Each of the intermediate switches has a blade A and B. Assuming now that it is desirable to open the curtains or doors 6 and 7, from a remote
 10 point. The switch 44, for example, is operated, so that its blade A will make contact with the switch terminal 53, as shown. The circuit will then be over the wires 51, 57, 59, 66, 76, 78 and 79, through 43, back
 15 to the negative feed wire 49, through the blades B of the intermediate switch. The current cannot pass on the opposite side, because the blade A, of the initiating switch 44 is not in electrical connection with the
 20 contact 52. The circuit will now be through the reversing switches, 26 and 26' over the wire 81 through the blades A of the reversing switch 26 and through the starting coil or armature 42 of the motor and back
 25 through the blade B of the switches 26, 26' to the wire 79, thus producing a change of polarity in the armature or starting coil of such a character as to rotate the motor in the direction required to open the curtains.
 30 Now assuming that the curtains have been opened, then the button 40 on the rope, will have operated, say for example, switches 26 and 27, so that their respective blades A and B are at substantially right angles, as
 35 shown in dotted lines. This will open the main circuit at switch 27 and the reversing circuit at switch 26, so that the motor will then stop. Now if it is desired to start the motor again, to close the curtains, from the
 40 same switch, to wit, switch 44, it is only necessary to shift the blade A of the switch so that it makes connection with the contact 52. The circuit will then be from the positive main 50, over the wire 51, the wire 56,
 45 blade A of switch 46, wire 63, and over the blade B shown in dotted lines, in switch 27, to the contact 64, over wire 66, through the blade B, shown in full lines in switch 27' over the wire 76 and through the switch 45
 50 and as before, through the coil 43, wire 79, back to the negative main of the supply wire 49. The reversing circuit now will be in condition to cause current to pass through it in the opposite direction, passing from
 55 wire 78 over the wire 81 to the contact 80 and by dotted lines to the contact 82 of switch 26 and thence by wire 83 through the blades B (full lines) of switch 26', over the wire 90 and through coil 42 in the opposite direction to that heretofore, and
 60 thence through wire 89, switch blade A, of switch 26', and wire 86 back to contact 85 and crossing over to contact 92 of the switch, because this switch has now been
 65 operated so that the blade A occupies, or

makes connection with, the terminals 85 and 92, then back over the wire 79 to the negative main of the supply wire 49. So soon as the doors or curtains have been moved to the desired position once more, the switches in the housing 19, of Fig. 1 will be operated, this time by the button 41 on the cable 11.

It is apparent, by tracing the circuits, that when terminal switch 45, is operated in the same manner that terminal switch 44 is operated, that the same effects are produced.

Now if the intermediate, current-initiating switch 46, which is of a different type from the switches 44 and 45, be operated so that the blades A and B will occupy the dotted line position, then when other switches are as just described, the circuit will be through wire 51, blade A, switch 44, contact 52, the switch 44 having been moved to this position in the previous example, over the wire 56 to the contact 54 of the current initiating switch 46, over the blade B in dotted line position to the contact 58 and through the circuit, as heretofore described. In installing another intermediate, switch, similar to the switch 46, it is only necessary to place the circuit in the manner shown with the relation to this switch, and the particular location of the switch is unimportant, so long as the wires or circuits are of a similar nature.

In the diagram, there are shown two parallel circuits, one on each side of the switches 27—27', 44, 46 and 45. When the switches are as shown, each circuit is independent of the other, but when either switch 27 or 27' is shifted, then these two independent circuits are converted into two independent composite circuits, one operative and the other conditioned for operation when any one of the current initiating switches are shifted.

While I have herein shown a single embodiment of my invention, for purposes of full disclosure it will be apparent to those skilled in the art that many changes might be made in the embodiment thereof without departure from the spirit of my invention and within the scope of the appended claims.

Having described my invention, what I claim is:—

1. An automatic door-operating mechanism, having in combination, an electric motor capable of being reversed, to move a door, curtain or the like, alternately, in opposite directions; two groups of double-throw switches, one group near the limit of movement in each direction; means, operable by the door-moving means, to alternately operate said groups of switches; a circuit, connected to a switch of each group for reversing the polarity of a motor element; a circuit, connected to a switch of each group for energizing the other element of

said motor and a current initiating switch for completing circuit through both groups of switches.

2. An automatic door-operating mechanism having in combination an electric motor capable of being reversed, to move a door, curtain or the like, alternately, in opposite directions; two double-throw switches and a plurality of manually operable current-initiating switches, having two blades, one of the latter switches connected to a source of current supply and the other connected to an element of the motor; two parallel, independent circuits connected to all said switches, said circuits adapted to be divided and cross-connected by said double-throw switches to complete one composite circuit when one of the current-initiating switches is moved to one of

its poles, leaving the other two parts of said circuit connected through said switches so that when either of the current-initiating switches is moved to its other pole, a circuit, through said switches and said dynamo element, will again be closed; current-reversing switches connected to the other element of the dynamo, and means, operable by the door moving means to shift two of said switches near the termination of its movement in each direction, whereby to change the circuit relation in the parallel circuits and to reverse the direction of current through one of the dynamo elements, to move the doors in opposite directions.

In testimony whereof I hereunto subscribe my name.

ALBERT R. LOCKE.