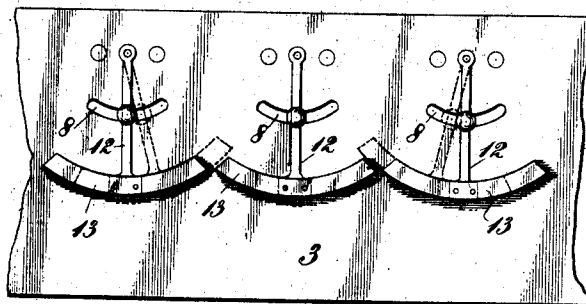
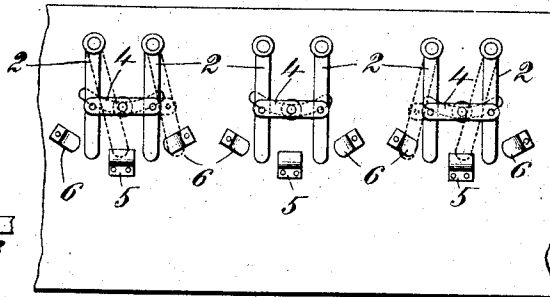
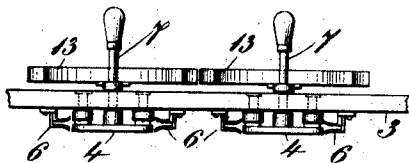
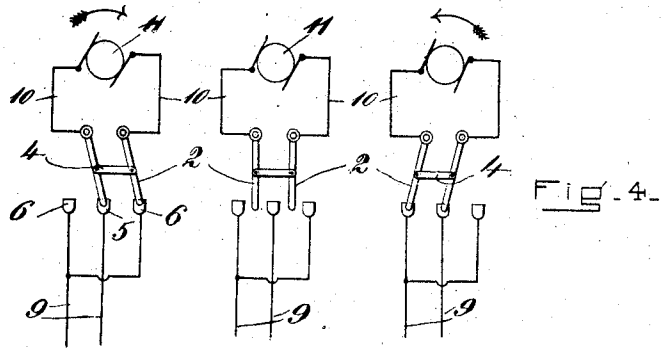


P. LORILLARD.
 DEVICE FOR CONTROLLING ELECTRIC CIRCUITS.
 APPLICATION FILED JAN. 29, 1907.

980,541.

Patented Jan. 3, 1911.



WITNESSES:

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UNITED STATES PATENT OFFICE.

PIERRE LORILLARD, OF TUXEDO PARK, NEW YORK.

DEVICE FOR CONTROLLING ELECTRIC CIRCUITS.

980,541.

Specification of Letters Patent.

Patented Jan. 3, 1911.

Application filed January 29, 1907. Serial No. 354,702.

To all whom it may concern:

Be it known that I, PIERRE LORILLARD, a citizen of the United States, and resident of Tuxedo Park, in the county of Orange and State of New York, have invented new and useful Improvements in Devices for Controlling Electric Circuits, of which the following is a specification.

My invention is intended to provide an arrangement of switches by means of which a multiplicity of electric circuits may be controlled in accordance with a predetermined manner or sequence of operation of the mechanisms which utilize such circuits, and is herein represented as embodied in a set of pole-changing or reversing switches adapted for use in connection with the conveyer shown and described in another application for U. S. Letters Patent filed by me on the 16th day of April, 1907 Serial No. 368,462 to which use my arrangement is particularly applicable.

In the accompanying drawings,—Figure 1 is a face view of a switch board carrying a number of switches constructed and arranged in accordance with my invention; Fig. 2 is a rear view of the switch board; Fig. 3 is a top plan view of a portion of the same; and Fig. 4 is a diagrammatic view illustrating various positions which may be assumed by the switches, in use.

In carrying out my invention any desired number of switches may be employed, according to the requirements of the installation of which they are to form a part, and these switches may have any usual or suitable construction capable of embodying or being combined with the parts or features by which their operation is controlled in the intended manner. By way of example I have illustrated in the drawing a well known form of pole-changing switch comprising a pair of similar metallic arms 2 each pivoted at one end to the switch board 3, independently of the other arm, and suitably insulated from the latter, said arms being connected and compelled to move in unison by means of a connecting link 4 made of insulating material and pivoted thereto. A pair of contact members are provided for each arm 2, one of which members may serve as such for both of said arms, and these contact members are so arranged that when either of the arms 2 is in contact with that member, shown at 5, which is common to both of them the other

arm will be in contact with one or the other of the two other contact members, which are shown at 6, 6. As herein represented, each of the members 5 and 6 consists of a pair of jaws adapted to receive the free end of one of the arms 2 between them and hold the same in such position by frictional engagement therewith, this being a common construction in the art. The limited pivotal movements of the arms 2 which are involved in the operation of the switch are imparted thereto by means of an operating handle 7, which may conveniently be carried by the link 4 and preferably extends laterally from said link through an arc-shaped slot 8 cut in the switch board. The contact members 6, 6 are electrically connected to each other and also to one of the pair of circuit wires 9 which lead to the switch, and the contact member 5 is connected to the other circuit wire 9, while the circuit wires 10 which lead away from the switch are connected respectively to the arms 2, preferably at their pivotal axes. It will be assumed herein that said circuit wires 10 lead to the poles of an electric motor, indicated diagrammatically at 11 in Fig. 4, and that this motor is reversible by reversing the current which operates it. This reversal of the current may evidently be effected by moving the switch from one of its extreme contact positions to the other, while in any intermediate position of the switch the circuit will be broken and the motor will not operate at all.

The embodiment of my invention herein represented contemplates the employment of a series of switches capable of operating as above described and mounted side by side on a common switch-board, each switch being adapted to control the operation of a corresponding motor. In the drawing three such switches and motors are shown, although the series may consist of any desired number of them, not less than two, and the direction of rotation of each motor corresponding to the illustrated position of the switch which controls it is indicated by the arrow placed above the motor. It will be seen that each arrow points in the direction in which the corresponding switch has been thrown, and it is to be assumed that it is desired to prevent the possibility of so operating any two adjacent switches that the motors controlled thereby will rotate in such direction that the corresponding ar-

rows will point toward each other,—a condition which may exist when the arrangement illustrated is employed in connection with the conveyer above referred to.

5 In order to control the operation of the switches in such manner as to secure the result just described, each of the switches is provided or combined with a device so constructed and arranged that when any switch
10 has been thrown into either of its circuit-closing positions, the adjacent switch toward which the first-named switch has been moved will be automatically locked or restrained against being thrown into the opposite circuit-closing position, and this is
15 accomplished, according to my preferred construction, by causing each of the handles 7 to pass freely through an arm 12 pivoted at one end to the switch board 3 at the center of curvature of the corresponding slot
20 8, but on the opposite side of the switch-board from the switch arms 2, and carrying at its opposite end a bar or stop 13 rigidly secured thereto, each bar 13 being arranged
25 in parallelism with the plane of movement of the switch arms and formed on an arc of a circle having as its center the pivotal axis of the arm 12 which carries said bar. All of these bars 13 are located in the same
30 plane and at the same distance from their respective centers of curvature, and each bar is of such length that when the switch arms of any pair of adjacent switches are in the open-circuit position shown in Fig. 2 the
35 adjacent ends of the corresponding bars 13 will be located a short distance outside of the curved paths of movement of each other, this position being shown in full lines in Fig. 1. The arms 2 and 12 corresponding to
40 each switch are compelled to move in unison by the handle 7 which connects them, and in the particular arrangement illustrated said arms extend vertically when in their open-circuit position and are pivoted to the switch-
45 board at their upper ends, so that each switch is maintained in the open-circuit position by the weight of its bar 13 and other pivotally supported parts and in either closed-circuit position by the frictional grip of the jaws
50 5 and 6 on the respective arms 2. As thus constructed, in case any switch is thrown into either one of its circuit-closing positions the bar 13 which is connected to and moves
55 with said switch will be carried in front of the adjacent end of the similar bar corresponding to one of the next switches in the series and will thus be located in such position as to form a stop or obstacle which
60 will prevent a movement of the latter bar in the opposite direction to that in which the first-mentioned switch has previously been moved. For example, assuming that the dotted-line positions of the right and left
65 hand bars 13 shown in Fig. 1 correspond respectively to the positions of the right and

left hand switches represented in Fig. 4, it will be seen that the bars 13 which are connected to said switches will block any movement whatever of the bar 13 connected to the middle switch, so that the latter will
70 be locked in its open-circuit position and the central motor represented in Fig. 4 will necessarily stop or remain stationary. It will be evident, however, that if the left hand switch only were moved into the closed-
75 circuit position indicated in Fig. 4, then the central switch would be free to be moved into the corresponding closed-circuit position, and if so moved it would cause the right hand switch to be locked against move-
80 ment into the opposite closed-circuit position, while if the central switch were left in its open-circuit position, then the right hand switch could be thrown into either one of its closed-circuit positions. It will thus ap-
85 pear that with the construction shown in the drawing any switch may be brought at any time into its vertical or open-circuit position, regardless of the position of any other switch, and that all the switches may oc-
90 cupy at the same time either one of the closed-circuit positions, but that no way exists for so closing the circuits through any two adjacent switches that the correspond-
95 ing motors will run in such directions that the indicating arrows will point toward each other.

It will be apparent from a study of the foregoing description in connection with the construction illustrated that the amount of
100 control which each switch is capable of exerting upon the adjacent switches will depend to some extent upon the lengths of the bars 13 which move therewith, and that by
105 varying the lengths of the bars corresponding to one or more of the switches the freedom of movement of the adjacent switches may be controlled in a variety of ways to suit various conditions of use. My inven-
110 tion, therefore, is not to be regarded as limited to the particular construction illustrated, as various changes may be made therein, within the scope of the appended claims, without departing from my inven-
115 tion.

I claim as my invention:

1. The combination with a series of independently movable switches, each adapted to control an electric circuit, of means operative with each of the intermediate switches
120 in the series for limiting the movement of either of the two adjacent switches only.

2. The combination with a series of independently movable switches, each adapted to control an electric circuit, of a series of in-
125 dependently movable stops, and connections between each switch and the corresponding stop for moving the latter into position to limit the movement of either of the two adjacent switches in the series.
130

3. The combination with a series of independently movable switches, each adapted to control an electric circuit, of a series of independently movable switch-obstructing stops, and connections between each switch and the corresponding stop for moving the latter into and out of operative position concurrently with the movement of the switch into and out of circuit-closing position.

10 4. The combination with a series of independently movable switches, each adapted to control an electric circuit and movable into circuit-closing position in either direction from an intermediate open-circuit position, 15 of a series of independently movable switch-obstructing stops, and connections between each switch and the corresponding stop for moving the latter from inoperative into operative position concurrently with the movement of the switch from its open-circuit into either of its closed-circuit positions.

5 5. The combination with a series of independently movable switches, each adapted to control an electric circuit, of a series of stops connected to said switches respectively and individually movable therewith from an intermediate inoperative position into the path of movement of one or the other of the stops carried by the adjacent switches in the 30 series.

6. The combination with a series of switches, each comprising a pivotal arm, of a series of stops connected to the pivotal arms of said switches respectively, each stop 35 being movable into the path of movement of the stop or stops corresponding to the adjacent switch or switches and being located outside said path of movement when its switch is in the open-circuit position.

40 7. The combination with a series of pole changing switches, each movable from an intermediate open-circuit position into contact with pole-changing terminals located at the opposite limits of its movement, of 45 a corresponding series of independently-movable stops, and connections between each switch and its stop for moving the latter

into position to limit the movement of one or the other of the adjacent switches only.

8. The combination with a series of independently movable pole-changing switches, 50 each adapted to control an electric circuit, of a corresponding series of independently movable stops, and connections between each switch and its stop for moving the latter 55 into position to limit the circuit-reversing movement of an adjacent switch.

9. The combination with a series of independently movable pole-changing switches, each adapted to control an electric circuit, 60 of a corresponding series of independently movable stops, and connections between each switch and its stop for moving the latter from an intermediate inoperative position across the path of movement of either of the stops corresponding to the adjacent switches. 65

10. The combination with a series of pole-changing switches each adapted to control an electric circuit and comprising a pivotal arm, of a series of arc-shaped stops connected to said arms respectively, each of 70 said stops being movable into the path of movement of the stop or stops corresponding to the adjacent switch or switches and being located outside of said paths of movement 75 when its switch is in the open-circuit position.

11. The combination with a switch board of a series of switches each pivotally mounted thereon and comprising an operating 80 handle passing through the switch board and a stop connected to said handle on the opposite side of the switch board from the contact portions of the switch, said stops being movable with the corresponding contact 85 portions into the path of movement of the adjacent switch or switches.

In testimony whereof, I have hereunto subscribed my name this twenty-third day of January, 1907.

PIERRE LORILLARD.

Witnesses:

D. G. SHANKS,
FRANK A. RISTON.