

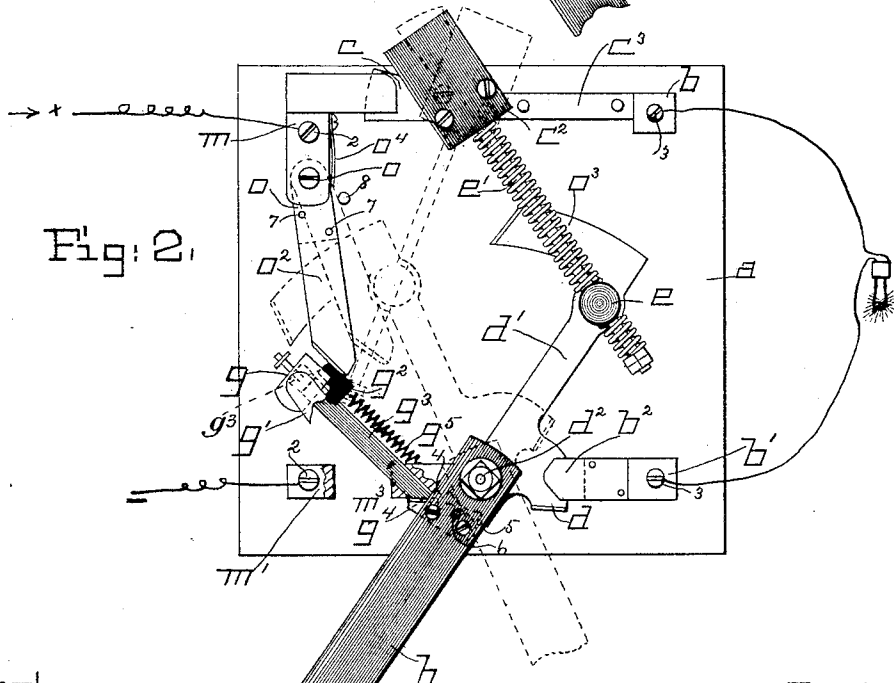
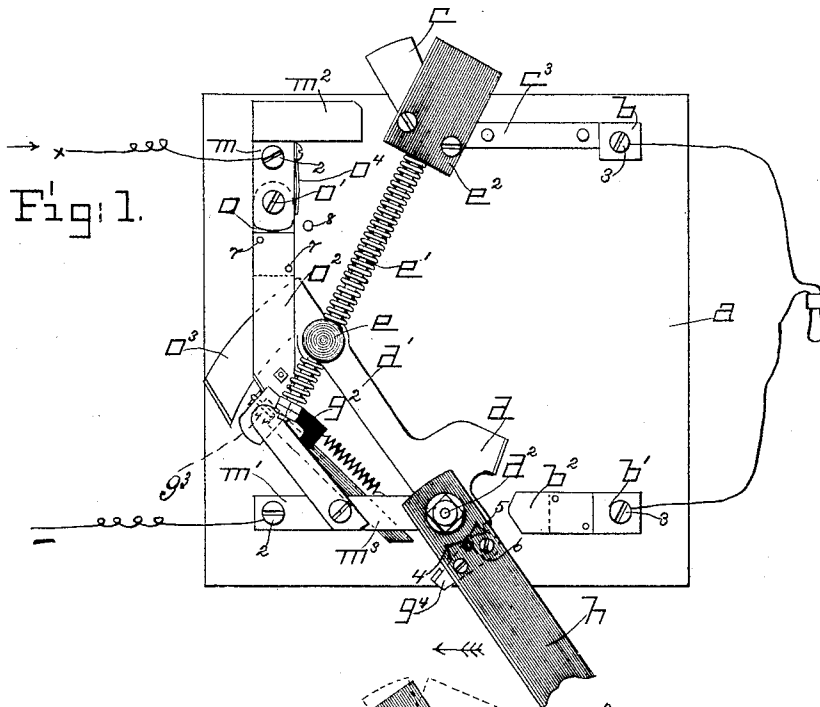
(No Model.)

2 Sheets—Sheet 1.

G. R. LEAN.
ELECTRIC SWITCH.

No. 461,761.

Patented Oct. 20, 1891.



Witnesses:

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(No Model.)

2 Sheets—Sheet 2.

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Fig: 3.

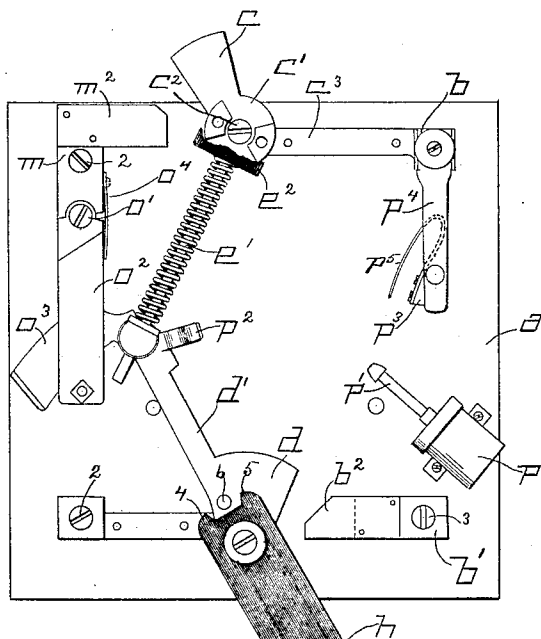
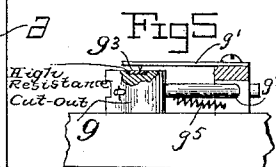
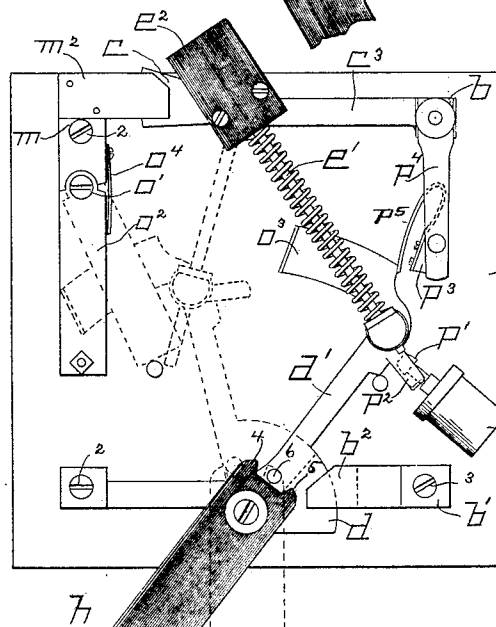


Fig. 4.



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UNITED STATES PATENT OFFICE.

GEORGE R. LEAN, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE BERNSTEIN ELECTRIC COMPANY, OF PORTLAND, MAINE.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 461,761, dated October 20, 1891.

Application filed January 17, 1891. Serial No. 378,077. (No model.)

To all whom it may concern:

Be it known that I, GEORGE R. LEAN, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Electric Switches, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention has for its object to improve the construction of electric switches such as shown and described in my application, Serial No. 345,125, filed March 24, 1890. The electric switch shown in the said application was constructed and arranged so that when the loop or branch wire is connected to the main-line wire a closed shunt is formed or maintained for said loop or branch wire between its connecting-points, which shunt is thereafter opened, so that the entire current may pass through the loop or branch wire, and when the loop or branch wire is disconnected from the main line said loop or branch will be opened or disconnected before the main line is closed.

In accordance with this invention, two main-line-wire blocks and two branch-line-wire blocks are employed, and a switch between each main-line-wire block, and also a switch between each branch-line-wire block and the main-line-wire blocks. The branch-line switches are designed to operate to make or break electric connection in advance of the main-line switch in both directions, so that the branch-line switches may be closed before the main-line switch is opened and the branch-line switches may be opened before the main-line switch is closed.

One part of my invention has especial reference to the construction of the main-line switch, it comprising two members, one of which is moved by a hand-lever and the other of which is spring-controlled and follows the hand-lever-operated member when the latter is moved in one direction and remains at rest when said lever is moved in the opposite direction. When the main-line switch is open, the main-line blocks are connected by a cut-out switch of suitable construction, it preferably being one of very high resistance, which while affording a path for the current, practically prevents such passage, and as the

strength of the current on the main line is known the resistance of the cut-out switch will be gaged accordingly. When the main-line switch is closed, this high-resistance cut-out switch is disconnected, and hence I preferably employ the same means for including and excluding the cut-out switch as for opening and closing one of the other switches. When the loop or branch wire is first connected to the main-line wire, its resistance is very high, rapidly decreasing, however, as the lamps therein begin to glow, and it sometimes happens that the resistance of such loop or branch wire is so high that when it is connected to the main-line wire the main-line current will pass through the cut-out switch and destroy it, instead of taking said loop or branch circuit, and hence I provide suitable means whereby the cut-out switch is included in the circuit only after the loop or branch wire has been connected some little time, thereby allowing ample time for the resistance of said loop or branch wire to decrease. Various ways may be devised for carrying out this part of my invention; so I do not desire to limit myself to the particular ways herein shown.

Various forms of cut-out switches are now on the market; so I do not desire to limit myself to any particular kind.

Figure 1 shows in front view an electric switch embodying this invention, the parts being in position whereby the loop or branch wire is disconnected from the main-line wire and the main-line circuit is intact; Fig. 2, a similar view, the parts being in position whereby the loop or branch line is connected to the main line and the main-line switch open; Fig. 3, a front view of a switch, showing a modified form of controlling device for the cut-out switch; Fig. 4, a similar view with the parts in a different position, and Fig. 5 a detail of the cut-out switch.

The base *a* is of any usual or suitable construction, preferably of slate or equivalent. Two main-line-wire blocks *m m'* are mounted on the base *a* and are provided with suitable screws, as 2, by which the line-wires may be secured to the blocks. Two branch-line-wire blocks *b b'* are also mounted on the base *a* and are provided with suitable screws, as 3,

by which the branch wires may be secured to the blocks. Two contact-pens, as m^2 , one just above the other, are secured to the main-line-wire block m , which are adapted to receive
 5 between them a blade c , secured to a hub c' , (see Fig. 3,) placed loosely on a stud c^2 , which is attached to or rises from the plate c^3 , which is connected with the branch-line-wire block b . The contact-pens m^2 and blade c constitute one of the branch-line switches, by which
 10 one terminal of the branch wire may be connected to and disconnected from the main line. Two contact-pens b^2 are secured to the branch-line-wire block b' , one just above the other, which are adapted to receive between
 15 them a blade d , formed integral with an arm d' , mounted loosely on the stud or pivot d^2 . The contact-pens b^2 and blade d constitute the other branch-line switch, by which the other terminal of the branch line may be connected with the main line. The stud or pivot
 20 d^2 is in electrical connection with the main-line-wire block m' by a connecting-plate m^3 . The lower end of the arm d' is cut away or
 25 formed to present two projections 4 5, (see dotted lines,) and the hand-lever h , of insulating material and mounted loosely on the stud d^2 , has on its under side a pin 6, which enters said cut-away portion and is designed
 30 to engage one or the other projections 4 or 5 to move the arm d' in one or the other direction. The arm d' has secured to it a post or stud e , of insulating material, through which the rod e' passes freely, which rod is attached
 35 to a block e^2 , of insulating material, arranged on the post or stud c^2 , and a spring encircles the rod e' , one end of which bears against the block e^2 and the other end against the post or stud e , which acts to normally hold the arm
 40 d' in one or its other extreme positions to the left or to the right, as represented in full lines, Figs. 1 and 2. By the aid of this spring the arm d' will be moved independent of the hand-lever after the hand-lever has been
 45 moved a certain distance, thereby constituting a quick-acting or jump switch.

The plate o is pivotally connected to the main-line-wire block m at o' , to which two contact-pens o^2 , arranged one just above the
 50 other, are secured, as by rivets 7, said contact-pens being adapted to receive between them and hold frictionally a blade o^3 , formed integral with the arm d' . The contact-pens o^2 are held in their normal position by a spring
 55 o^4 , which bears against the plate o . The contact-pens o^2 and the blade o^3 , formed on the arm d' , constitute the main-line switch by which the main line is opened and closed between the main-line blocks $m m'$.

60 With the parts in the position shown in Fig. 1, the main-line switch is closed and the branch-line switch open. As the hand-lever h is moved in the direction of the arrow the arm d' will be turned on its pivot d^2 until the
 65 branch-line switch closes. The member $o o^2$ of the main-line switch follows the blade o^3 as the arm d' is moved, as represented by

dotted lines, Fig. 2, owing to the friction being greater than the strength of the spring o^4 , and as soon as said branch-line switch is closed
 70 the blade o^3 will be withdrawn from its connection with the contact-pens o^2 , and hence open the main-line switch. The member $o o^2$ will follow the blade o^3 until it strikes the stop-pin 8, after which the blade o^3 will be
 75 withdrawn. As soon as the blade o^3 is withdrawn the spring o^4 restores the member $o o^2$ to its normal position, and hence when the hand-lever h is moved in the opposite direction the branch-line switch will be opened
 80 before the main-line switch is closed or before the blade o^3 will make connection with the member $o o^2$. A metallic block g is mounted on the base a , against which the lower end of the member $o o^2$ bears when in
 85 its normal position, the said block g being socketed to contain a cut-out switch of any suitable construction, (see Fig. 5,) and on the operating member of said cut-out switch the plate g' bears, which plate is attached
 90 to the main-line-wire block m' . This cut-out switch is composed, essentially, of any suitable high-resistant material or insulating material known in the arts. A block g^2 , of insulating material, is attached to the rod
 95 g^3 , having its bearings in the block g and in the main-line-wire block, said rod g^3 being movable longitudinally. The block g^2 is designed to control the operation of the member $o o^2$ of the main-line switch, and when in one
 100 position said block g^2 obstructs the path of movement of said member and prevents it from making contact with the block g and when in its other position allows such contact to be made. The block g^2 is moved into po-
 105 sition to obstruct the path of movement of the member $o o^2$ by a projection g^4 , secured to the hand-lever h , which strikes the lower end of the rod g^3 when the hand-lever is moved in one direction, and said block g^2 is withdrawn
 110 to allow the member $o o^2$ to return to its normal condition by means of the spring g^5 , which acts as soon as the hand-lever h is released by the operator, the hand-lever being
 115 moved at such time by said spring-actuated rod and also by gravity of the rod g^3 . By means of this spring-actuated controlling device the member $o o^2$ may be made to include the cut-out switch in circuit only after the
 120 branch wire has been connected a desired length of time, which, it will be understood, is a sufficient length of time to allow the resistance of said branch-line wire to decrease.

By referring to Figs. 4 and 5 a similar switch to that above described is shown; but, instead
 125 of employing the spring-actuated controlling device for the member $o o^2$ of the main-line switch, a dash-pot p is provided, the piston-rod p' of which is struck by a projection p^2 on the arm d' , and the cut-out switch is placed
 130 on or contained in the block p^3 , upon which will rest the plate p^4 , attached to the branch-line-wire block b , and a spring-arm p^5 , projecting from the block p^3 and electrically con-

nected to the cut-out switch, (see Figs. 3 and 4,) the blade o^3 contacting with said spring-arm to avoid a jar of the parts. In this instance the dash-pot will retard the progress of the member d' , so that the cut-out switch will not be included in the circuit until after the branch-line wire has been connected to the main-line wire some little time.

The controlling device shown in Figs. 1 and 2 is governed by the operator, while that shown in Figs. 3 and 4 is automatic; yet I do not desire to limit my invention specifically to either form.

I claim—

1. In an electric switch, two main-line-wire blocks and two branch-line-wire blocks and a switch between each branch-line-wire block and the main-line-wire blocks, combined with a switch between the main-line-wire blocks, comprising the member $o o^2$ and the operating member d' , adapted to engage and disengage it, said member $o o^2$ following the member d' a short distance when the latter is being disengaged therefrom, substantially as described.

2. In an electric switch, two main-line-wire blocks and two branch-line-wire blocks and a switch between each branch-line-wire block and the main-line-wire blocks, combined with a switch between the main-line-wire blocks, comprising the spring-controlled member $o o^2$ and the hand-operated member d' , adapted to engage and disengage it, said member $o o^2$ following the member d' a short distance when the latter is being disengaged from the former, substantially as described.

3. In an electric switch, two main-line-wire blocks and two branch-line-wire blocks and a switch between each branch-line-wire block

and the main-line-wire blocks, and a main-line switch between the two main-line-wire blocks, combined with a cut-out switch, means for including it in circuit, and a retarding device for said cut-out switch, whereby it will not be included until an interval of time after the branch-line wire has been connected to the main-line wire, substantially as described.

4. In an electric switch, two main-line-wire blocks and two branch-line-wire blocks and a switch between each branch-line-wire block and the main-line-wire blocks, combined with a switch between the main-line-wire blocks and a cut-out connected to one of the main-line-wire blocks and in engagement with one member of the main-line switch at all times, except while said switch is being operated, substantially as described.

5. Two main-line-wire blocks and a switch between them, combined with a cut-out permanently connected to one of the main-line-wire blocks and in electric connection with the other main-line-wire block during the time the said switch is closed and opened, but not in electric connection during the time said switch is being operated, substantially as described.

6. A cut-out and a hand-operated switch for disconnecting it from the circuit at will, combined with a restoring device for automatically connecting said disconnected cut-out with the circuit, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEO. R. LEAN.

Witnesses:

BERNICE J. NOYES,
ANNIE S. WIEGAND.