

(No Model.)

2 Sheets—Sheet 1.

R. C. SMITH.

TESTING SWITCH FOR ELECTRIC CIRCUITS.

No. 458,961.

Patented Sept. 1, 1891.

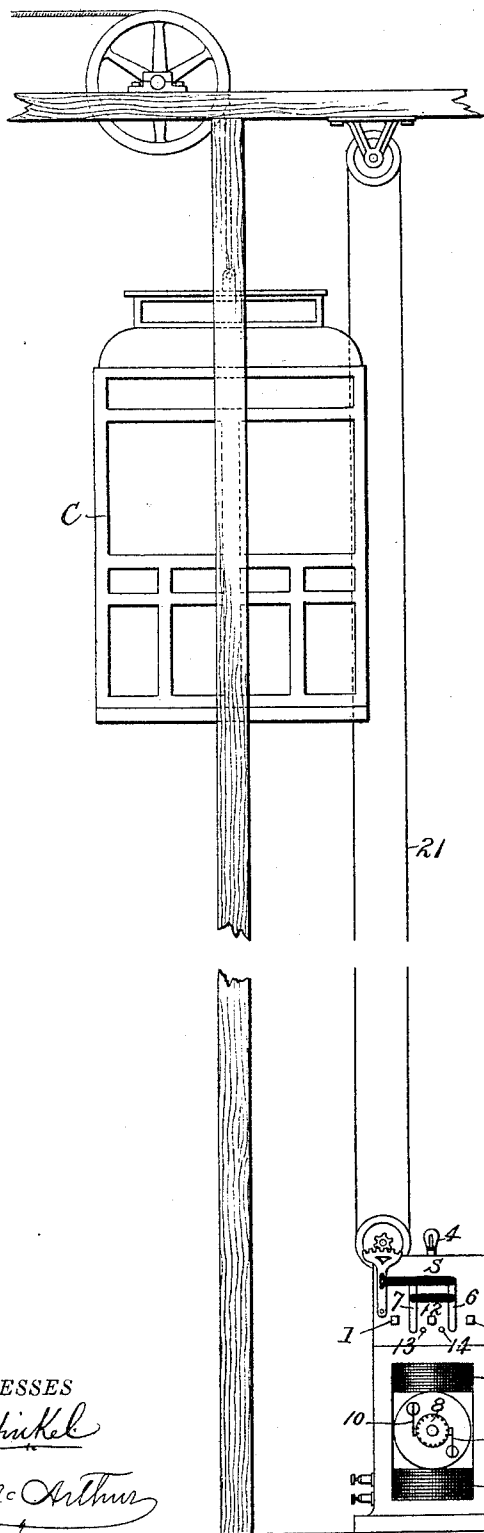


Fig. 1.

WITNESSES
Jno. G. Hinkel
Ch. S. McArthur

INVENTOR
Rudolph C. Smith
By *Foster S. Freeman*
Attorneys.

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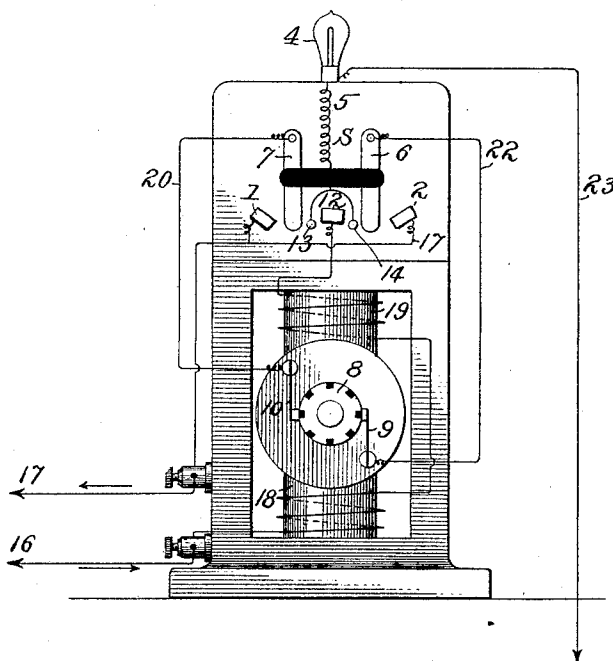
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Fig. 2.



WITNESSES

Geo. G. Hinkel.
H. S. McArthur

INVENTOR

Rudolph C. Smith
By Foster Freeman
Attorneys

UNITED STATES PATENT OFFICE.

RUDOLPH C. SMITH, OF YONKERS, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE NATIONAL COMPANY, OF ILLINOIS.

TESTING-SWITCH FOR ELECTRIC CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 458,961, dated September 1, 1891.

Application filed December 10, 1890. Serial No. 374,171. (No model.)

To all whom it may concern:

Be it known that I, RUDOLPH C. SMITH, a citizen of the United States, residing at Yonkers, Westchester county, New York, have invented certain new and useful Improvements in Safety-Switches for Electric Circuits, of which the following is a specification.

In the extended use of electricity especially applied to devices and apparatus subject to exposure of persons not skilled in manipulation or handling of electric currents there is always danger of the operator or others being shocked or hurt by coming in contact with the conductors carrying the current or the devices utilizing the current. It is well known that contact with a conductor or device carrying a current of electricity is only dangerous when the current passes through the human body from a point of high potential to one of considerably lower potential. This point, however, is liable to occur in the use of metallic circuits which are connected to operate motors, lamps, and other translating devices, owing to a leak to ground from some portion of the circuit, so that when a person comes in contact with any other portion of the circuit the current passes through the person from the point of contact to the ground and through the earth to the place where the line is grounded through the leak or other means.

The prime object of my invention is to lessen this danger of injury to a person so situated and to indicate that the line or devices connected thereto are in a dangerous condition.

It is the further object not only to prevent the danger to human life, but the waste of current which is liable to occur when through any accident or otherwise any portion of the circuit is grounded, so that it can be readily repaired and all danger to the person and all leakage of current prevented.

In the use of electrical motors adapted for operating elevators, which are generally attended by persons unskilled in electricity, the danger of being hurt is especially great; and while my invention may be applied to any electric circuits using any translating devices, it is especially designed for use with

electric-motor-operating elevators, and I have illustrated my invention in this connection.

In the accompanying drawings I have represented in Figure 1 an electric motor provided with my improvements, and in Fig. 2 a diagrammatic view of the motor.

The motor, which may be of any desired type, receives the current from the conductor 16, which passes around the field-magnet cores 18 19 to the contact-plate 12. Arranged adjacent to said contact-plates are the contacts 1 and 2, each of which is connected with the outgoing conductor 17; also mounted on the motor in this instance, although it may be in any other convenient position, is a current-reversing switch S, having arms 6 and 7, the latter of which is connected to a conductor 20, passing to the brush 10, bearing on the commutator 8, while the other arm 6 is connected by a conductor 22 to the opposite brush 9, also bearing on the commutator 8.

It will be understood that in the position shown in the drawings no current passes to the motor as the circuit is opened, but moving the switch to the one side or the other by a hand-rope 21 or other device from the cage C will close the circuit, so that the current will pass through the armature in one or the other direction and reverse the direction of rotation of the armature in the well-known way. This arrangement so far described is the usual one and is only illustrated as typical of any other well-known arrangement of circuits, and the circuit-reverser may be used without departing from the principles of my invention. Arranged between the contacts of this circuit reverser or switch are placed contacts, as 13 14, which in this instance are shown as smaller than the ordinary contacts and as being connected together and to a conductor 23, leading to ground. Interposed in this conductor is a high-resistance coil 5, which will prevent the too rapid discharge of the current for the circuit to the ground, and also located or connected to the circuit is some sort of a signal device or indicator, shown in the present instance as an incandescent lamp 4, although it may be a bell or other equivalent signal device or indicator.

This signal device may be located at the motor or in any other convenient position where it can be readily distinguished by the operator.

5 It will be understood that a continued ground connection would be undesirable for many reasons, and on this account I use any suitable means for automatically momentarily grounding the current at short intervals.
 10 Thus I preferably make the contacts connecting the ground-line small and so arrange them that they will be in connection with the moving arms of the switch for a moment, but sufficiently long to indicate to the operator that
 15 there is danger of leakage from the line. By this arrangement it will be seen that each time the switch is moved to the one side or the other to cause the motor to stop or to rotate to one direction or another a momentary
 20 contact is made with the ground-circuit, and if anywhere on the line there is a leakage or accidental ground this fact will be indicated by the signal device. Thus, for instance, supposing there was a leak to ground from
 25 the conductor 16, entering the motor, and the motor-switch should be operated, for instance, by moving it to the right, so that the lever 6 would bear upon the contact 2 and the lever 7 upon the contact 12, and the
 30 motor would be set in operation thereby, as the switch-arm 7 is moved it would momentarily bridge the contacts 13 and 12, and the signal in the high-resistance line would be operated. The current from the leak
 35 might be traced from the line 16 through the field-magnets to the contact 12, thence by the arm 7 to the contact 13, thence through the resistance 5, the signal 4, wire 23 to ground, and through ground back to the
 40 leak in line 16, and the same effects will occur, although the circuit would be slightly different, if there should be a leak on the conductor 17.

45 It will be understood that the specific construction of the switch device is immaterial, as I have only indicated diagrammatically the circuits in one operative arrangement, the essential feature being that in the ordinary movement of the switch from open circuit to
 50 close the circuit through the motor to operate it in either direction a momentary circuit shall be completed through the artificial ground, including the signal.

This device in no way interferes with the operation of the motor or other device connected with the switch, but I have found it effective in indicating danger or derangement of the circuit, and at the same time it is exceedingly simple and inexpensive and may be applied to any circuit-closing switch,
 60 the essential feature being that it shall be arranged so that in the movements or operation of the switch a momentary circuit shall be completed through the high-resistance ground-circuit having the signal. 65

I am well aware that numerous test-lines for determining leakage or ground connections have been provided, and I do not claim, broadly, applying a test-circuit to a working electric circuit. 70

Without limiting myself to the precise construction and arrangement of parts shown and described, I claim—

1. The combination, with the electric motor in a main-circuit conductor and the stopping, starting, and reversing switch of an elevator, of a grounded circuit, including electric signal, and means for connecting said signal-circuit with the main circuit on the shifting of the switch, substantially as set forth. 75 80

2. The combination, with a motor and a starting and stopping switch, of a high-resistance line to ground, including a signal device, and contacts connected to said high-resistance line and arranged within the limits of movements of the switch, substantially as described, so that the circuit will be completed through the high-resistance ground-line momentarily in the operation of the switch, substantially as described. 85 90

3. The combination, with an electric motor and current-reversing switch therefor, of a supplementary contact arranged between the circuit-contacts of the switch, the said supplementary contacts being connected to a high-resistance ground-line, including a signal device arranged in the path of the arms of the switch, substantially as described. 95

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses. 100

RUDOLPH C. SMITH.

Witnesses:

EDW. K. ANDERTON,
 LOUIS F. GOLDMANN.