

No. 613,177.

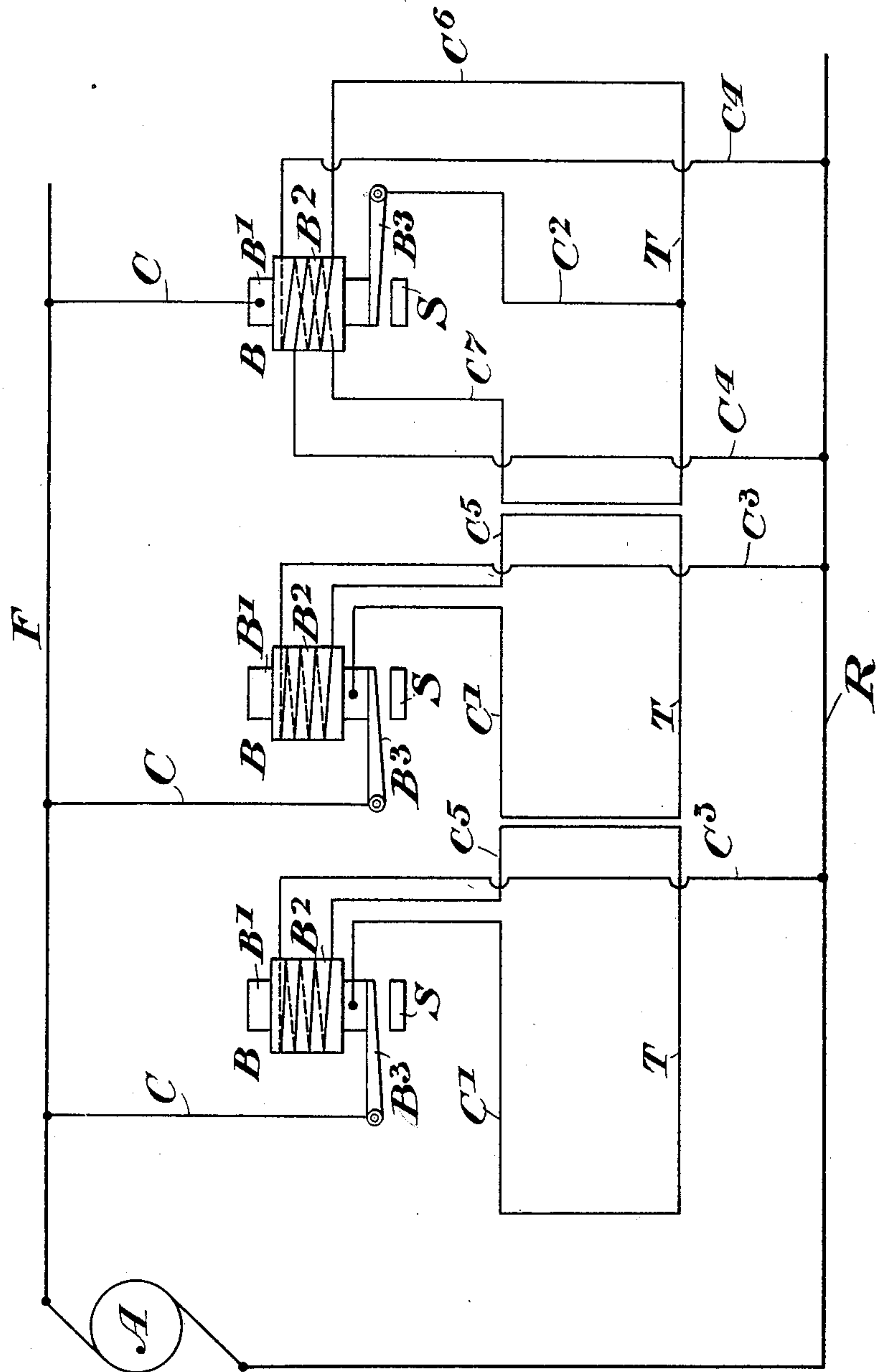
Patented Oct. 25, 1898.

J. N. THOMAS.

SAFETY DEVICE FOR SUSPENDED CONDUCTORS.

(Application filed Jan. 20, 1898.)

(No Model.)



WITNESSES:

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# UNITED STATES PATENT OFFICE.

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## SAFETY DEVICE FOR SUSPENDED CONDUCTORS.

SPECIFICATION forming part of Letters Patent No. 613,177, dated October 25, 1898.

Application filed January 20, 1898. Serial No. 667,271. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH N. THOMAS, of Johnstown, in the county of Cambria and State of Pennsylvania, have invented a new and useful Safety Device for Suspended Conductors, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, which forms a part of this specification.

My invention is designed to prevent accidents from the breaking and subsequent falling of suspended electrical conductors. It is especially applicable for use on what are known as "overhead" electric railways. In this class of railways there is a main source of current-supply, one side of which is usually in connection with the track-rails, while the other side is connected to insulated feed-wires which convey current from the power-house along the line of way. The overhead naked conductor is arranged in sections of considerable length, each section being insulated at its end from the neighboring section. At intervals the sections are connected to one or the other of the main feed-wires. The difference of potential in electric railways is ordinarily about five hundred volts, so that if the conductor, which must of necessity be bared, breaks and falls upon man or beast a very decided shock is given them, which may be even sufficient in some cases to cause death.

The object of my invention is to provide simple means for automatically opening the circuit between the main feed-wires and a section of the bared conductor, said automatic means being put into operation by the formation of an open circuit in the conductor due to the breakage thereof. To this end I place between the main feed-wire and the conductor-section an electromagnetic switch. The energizing-coil of this switch receives a shunt-current, which passes through the entire length of the conductor-section and magnetizes the core of the magnet, so as to attract the switch-armature and maintain a closed circuit. With this arrangement an open circuit in the conductor-section will prevent the flow of current through the energizing-coil, and the switch will automatically open.

The drawing is an electrical diagram and shows two modified forms of my invention.

I have represented the source of electric supply as A, the main feed-wire as F, the rail or return side of the circuit as R, and the various conductor-sections as T. It is of course clear that instead of the single feed-wire shown there may be any desired number, and each conductor-section T may be connected to a different feed-wire, if it is deemed desirable.

The electromagnetic switches are represented as B. Each of these is composed of a core B', coil B<sup>2</sup>, pivoted armature B<sup>3</sup>, and fixed stop S. The switch is connected to F by connection C and to T either by connection C' or connection C<sup>2</sup>, according to which modification of my invention may be used.

Referring now exclusively to the modification shown on the left-hand side of the diagram, the wire C' from the switch to the conductor-section connects with the latter at the extreme end thereof. At the other extreme end of the conductor T a shunt connection C<sup>5</sup> is carried to the energizing-coil B<sup>2</sup> of the switch B. The other end of the coil B<sup>2</sup> is connected by wire C<sup>3</sup> to the rail or return side of the circuit. The mode of operation of this arrangement is obvious. As long as the conductor T remains intact throughout its length it receives current from A through F, through C, through B<sup>3</sup>, through B', and through C', and a car having one terminal engaging T and the other engaging R may receive the necessary power. The current for the energizing-coil evidently takes the same path and must in addition pass through the whole length of the conductor T before reaching the energizing-coil. The moment therefore an open circuit occurs at any point in the length of the conductor T current can no longer be received by the energizing-coil and the armature B<sup>3</sup> must fall upon the stop S. Thus before the conductor T falls sufficiently to do any damage it is no more than a dead wire. It is clear that this is an extremely simple arrangement for the purpose specified, and it is also clear that the scope of my invention is not dependent upon any special mechanical construction of the parts. It is also clear that I am not limited in its use to electric railways. It is obvious also that resistances may be inserted in line with the energizing-coil, if de-



sired, without affecting the principle of my invention.

Referring now to the modification shown at the right hand of the drawing, I here show  
 5 an arrangement which is preferable when the conductor T is one of considerable length. In this case I connect the electromagnetic switch B by connection C<sup>2</sup> with a central part of the conductor-section T. I also form the coil B<sup>2</sup>  
 10 with a pair of cumulative windings, one of which is connected by wire C<sup>6</sup> with one end of the conductor-section, while the other is connected by wire C<sup>4</sup> with the rail or return side of the circuit. In this each winding mag-  
 15 netizes the core B' and tends to attract the armature B<sup>3</sup>. In this arrangement, however, I so arrange the strength of the winding in comparison to the weight of the armature that if current is not passing through both wind-  
 20 ings the armature B<sup>3</sup> will fall. In this case it is clear that a break of the conductor-section T at any point in the length thereof must render inoperative one or other of the wind-  
 25 ings, and therefore the same practical results will be attained. The advantage of this arrangement is that under the same relative conditions of load and conductor resistance twice as long a conductor-section may be used and the expense of supplying the safety de-  
 30 vices cut in half.

Having thus described my invention, what I claim, and desire to protect by Letters Patent, is—

1. The combination with a feeder in con-  
 35 nection with one side of the main circuit, a suspended bared conductor, an electromagnetic switch normally connecting the same, said switch being normally maintained in a closed position by current passing from the  
 40 conductor through the energizing-coil of the electromagnet, to the opposite side of the circuit, said energizing-coil being in multiple relation with the regular working circuit.

2. The combination of a feeder in connec-  
 45 tion with one side of the main circuit, a sus-

pended bared conductor, an electromagnetic switch having its terminals connected respectively to the main feeder and the conductor, and an energizing-coil for said switch comprising a single winding connected at one end  
 50 to one end of the suspended conductor and at the other end to the opposite side of the circuit, armature of said switch being normally magnetized by current passing through the entire length of said conductor.

3. The combination of a main feeder in connection with one side of the circuit, a bared conductor, an electromagnetic switch connected to the main feeder and to a central portion of said conductor and an ener-  
 60 gizing-coil composed of two windings, one of which is connected to one end of the conductor and the other to the other end of the conductor.

4. The combination of a main feeder in  
 65 connection with one side of the circuit, a bared conductor, an electromagnetic switch connected to the main feeder and to a central portion of said conductor and an ener-  
 70 gizing-coil composed of two cumulative windings, one of which is connected to one end of the conductor and the other to the other end of the conductor.

5. The combination of a feeder in connec-  
 75 tion with one side of the main circuit, a suspended bared conductor, a return-conductor, an electromagnetic switch having its terminals connected respectively to the said feeder and to a central portion of the bared con-  
 80 ductor, and an energizing-coil for the switch having two cumulative windings each connected to the return-conductor at one end and connected to the opposite ends of the said bared conductor at the other end.

In testimony whereof I have affixed my sig-  
 85 nature in presence of two witnesses.

JOSEPH N. THOMAS.

Witnesses:

RICHARD EYRE,  
 H. W. SMITH.