

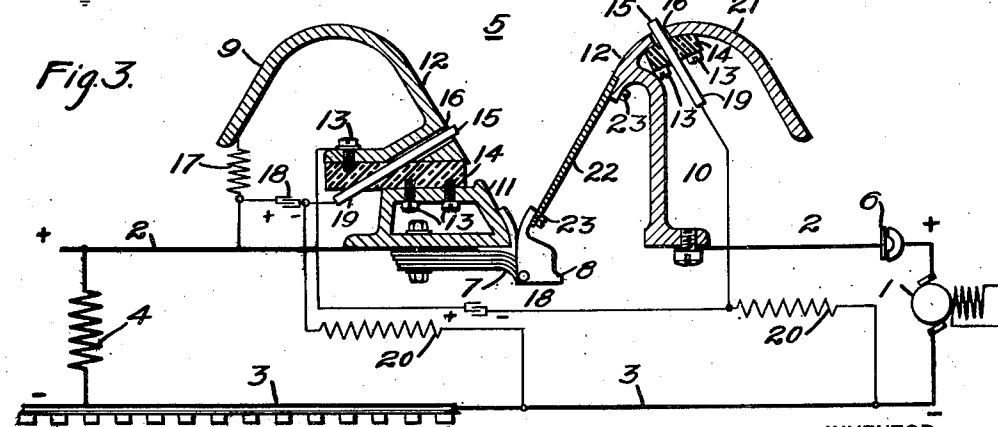
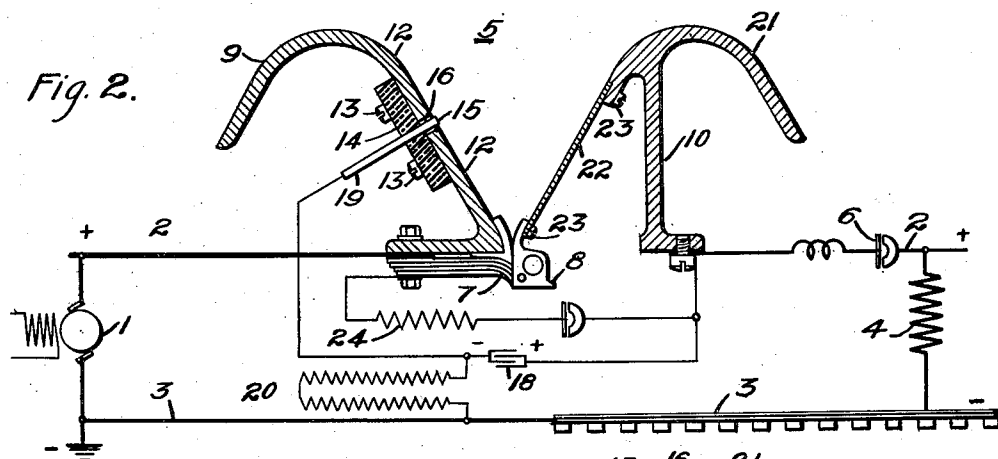
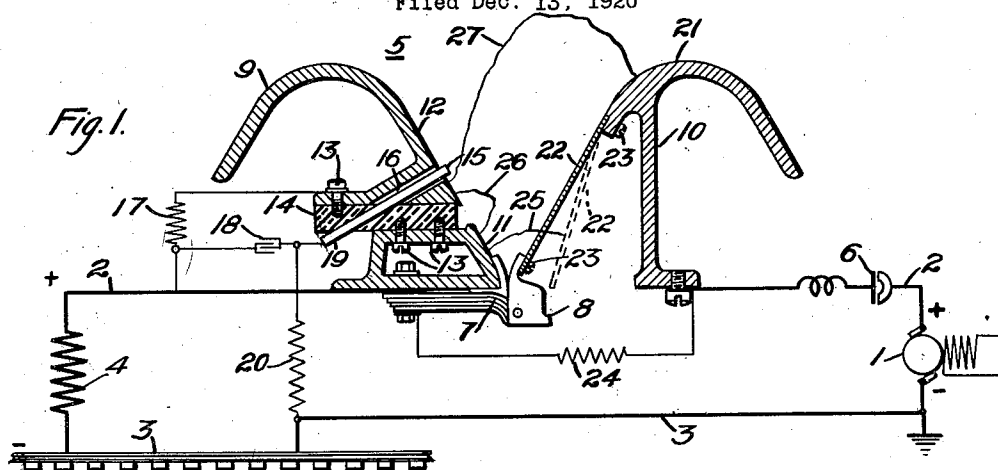
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1,574,979

J. W. LEGG

CIRCUIT INTERRUPTER

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WITNESSES:

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CIRCUIT INTERRUPTER.

Application filed December 13, 1920. Serial No. 430,156.

To all whom it may concern:

Be it known that I, JOSEPH W. LEGG, a citizen of the United States, and a resident of Wilksburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Circuit Interrupters, of which the following is a specification.

My invention relates to circuit interrupters and other devices between which electric arcs are adapted to form and particularly to means for disrupting the arcs thereof.

One object of my invention is to provide a device of the above indicated character that shall automatically discharge a condenser into an arc in response to movement of the latter.

Another object of my invention is to provide means for automatically inserting a resistor in series with an arc during the movement of the latter.

Other objects of my invention will be hereinafter more particularly pointed out.

In practicing my invention, I provide a pair of arc horn structures for receiving the arcs incident to the separation of the contact members of an interrupter. One of the arc horn structures is divided into spaced sections. A condenser and a resistor are so connected between the sections of the sectional horn structure and to an electrode or plug disposed between the sections as to automatically momentarily reverse the current of the arc and to insert the resistor into the circuit therewith.

Figures 1, 2 and 3 of the accompanying drawings are diagrammatic views showing modified forms of electric systems and arcing structures, the latter being partially in section, embodying my invention.

As shown in Fig. 1, the system comprises, in general, a direct-current generator 1, supply and return conductors 2 and 3, respectively, a lead 4, a main circuit interrupter 5 and an auxiliary slow-acting circuit interrupter 6.

The main circuit interrupter 5 comprises stationary and movable contact members 7 and 8, respectively, that may be supported and actuated by any suitable structures (not shown) and connected to co-operating arc-horn structures 9 and 10, respectively. The structure 9 is divided into spaced sections 11 and 12 that are connected, as by screws

13, to an insulating member 14. An electrode or conducting plug 15 extends diagonally through an opening 16 in the section 12 and through the insulating member 14. The opening 16 is of somewhat larger diameter than the plug 15 to electrically isolate the latter from the section 12.

The sections 11 and 12 of the horn structure 9 are electrically connected or shunted by a resistor 17 connected between the section 12 and the conductor 2. A condenser 18 is connected between the lower end 19 of the plug 15 and the section 11 and is adapted to be charged through a resistor 20 connected, at one side, between the condenser 18 and the plug 15 and, at the other side, to the return conductor 3.

The horn structure 10 comprises a stationary member 21 and a yieldable member 22 that is connected, at one end, to the movable contact member 8 and, at the other end, to the member 21, as by screws 23. A resistor 24, may be connected in shunt to the contact members 7 and 8, as a measure of safety, to ensure the interruption of the arc. With this arrangement, the interrupter must be added to clear the circuit.

In operation, when the contact members 7 and 8 are separated, the member 22 of the horn structure 10 will be moved to the position indicated by dotted lines to draw an arc, indicated by a line 25, that will travel outwardly, at one end, along the members 22 and 21. The other end of the arc will travel outwardly on the section 11 and bridge the space between the sections 11 and 12, as indicated by a line 26, and the arc circuit will be completed to the horn structure 10, as indicated by a line 27.

By reason of the voltage drop across the resistor 17, the arc, indicated by the line 26, will persist temporarily but, when the end of the arc passes over the plug 15, it will be temporarily at nearly the same potential as the section 12 and thus, the condenser 18 will discharge through the arc 26 to reverse or nullify the potential of the section 12. This action permits the arc indicated by the line 26 to be extinguished and places the resistor 17 in series with the arc 27. The arc will then move outwardly along the horn structures 9 and 10 and be extinguished in a manner similar to that with a usual arc-horn but more quickly, with less force and

not at so great a distance from its origin. The slow-acting interrupter 6 will operate to clear the resistance circuit 24.

As shown in Fig. 2, in which similar parts are designated by similar reference numerals, the arrangement is substantially the same with the exception that the resistor 17 is omitted. In this form, the resistor 24 performs the functions of the resistor 17, the horn 11 is cut out of circuit and the structure 10 replaces the horn 11 electrically.

In operation, in this form of device, as the arc stream moves along the horn structures 9 and 10, it will pass over the plug 15 to ionize the space in the opening 16 and to discharge the condenser 18 which will, thus, cause a drop of potential between sections 9 and 10. If the voltage drop, thus caused, is sufficient or is reversed, the arc will be extinguished and the reduced current will pass through the shunt resistor 24. The slow-acting interrupter 6 will ensure the ultimate interruption of the circuit on lower current value and with less likelihood of damage than in a usual horn-gap structure.

As shown in Fig. 3, the arrangement is a combination of the two above-described forms, with the horn structure 9 arranged and connected as in Fig. 1 and the horn structure 10 arranged and connected as in Fig. 2.

In each form, the condenser 18 takes the line current, momentarily, to bring the arc current momentarily to zero, during which period the arc may go out. The condenser may be extremely small in capacity relatively to the current of the circuit opened.

While I have shown and described particular forms of my invention, changes may be effected therein without departing from the spirit and scope thereof, as set forth in the appended claims.

I claim as my invention:—

1. The combination with arc-forming terminal members, one of which is formed in two separate spaced parts that have insulation interposed therebetween, of a resistor disposed between the said parts of one terminal and connected to the other terminal so as to be automatically inserted in circuit with the arc as the arc terminals move along the said terminal members.

2. The combination with arc-forming terminal members for a direct-current circuit, of means for automatically reversing the current of the arc in response to movement thereof.

3. The combination with arc-forming terminal members, of a condenser, and means for automatically discharging the condenser into the arc in response to movement of the latter.

4. An arcing device comprising a pair of

arc-horn members one of which consists of separate spaced sections and a condenser connected to the other member and having a terminal between the sections and adapted to be discharged through a circuit including an arc between the arc-horn members.

5. An arcing device comprising a pair of arc-horn structures one of which consists of spaced sections and means for reversing the potential of the outer section.

6. An arcing device comprising a pair of arc-horn structures one of which consists of spaced sections, a resistor connected between said sections and means for reversing the potential of the outer section.

7. An arcing device comprising a pair of arc-horn structures one of which consists of spaced sections, a condenser and means for discharging the condenser to reverse the potential of the outer section when an arc passes from section to section.

8. An arcing device comprising a pair of arc-horn structures, one of which consists of spaced sections, and a condenser connected between a position intermediate said sections and the outer section.

9. An arcing device comprising a pair of arc-horn structures one of which consists of spaced sections and a condenser and a resistor connected in series between a position intermediate said sections and the outer section.

10. An arcing device comprising a pair of series-related arc-horn structures connected to one side of a circuit and one of which consists of spaced sections, a condenser connected between a position intermediate said sections and a conductor joining said sections, and a resistor connecting both sides of said circuit through the condenser.

11. A circuit interrupting device comprising a movable contact member, a pair of stationary arcing members and a flexible conductor connecting the movable contact member to one of the stationary members for conducting an arc between said members and permitting relative movement thereof.

12. An arcing device comprising a pair of arc-horn members, one of which consists of separate spaced sections adapted to be progressively traversed by an arc between the members, a terminal between the sections disposed in the path of the arc and adapted to be traversed by the arc, and a condenser and a resistor connected in parallel between the said terminal and the other arc-horn member.

In testimony whereof, I have hereunto subscribed my name this 3rd day of December 1920.

JOSEPH W. LEGG,