(No Model.)

# E. W. RICE, Jr.

## ELECTRIC CUT-OFF APPARATUS.

No. 455,800. Patented July 14, 1891.

*Fig. 1.*

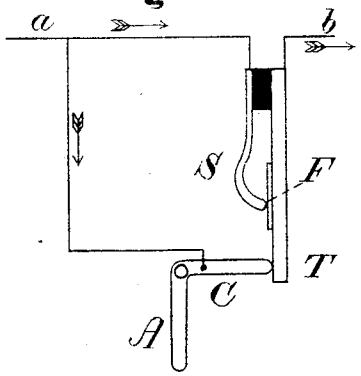



*Fig. 2.*

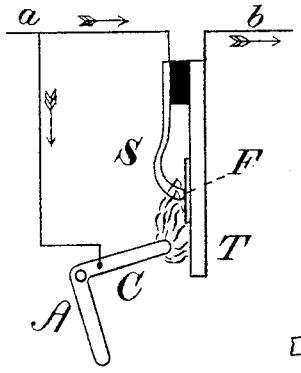



*Fig. 3*

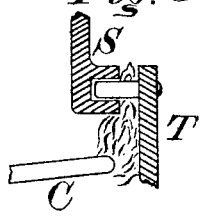



*Fig. 4.*

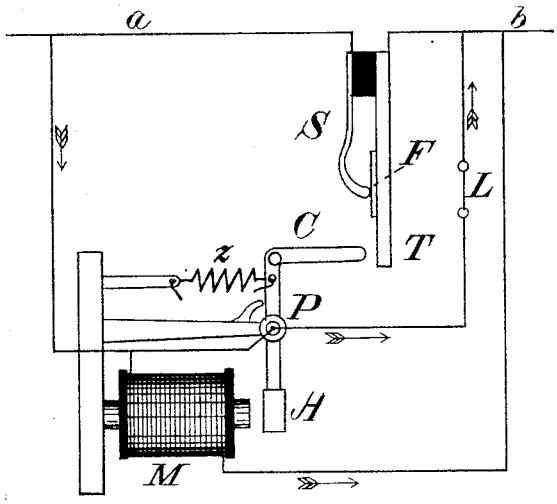
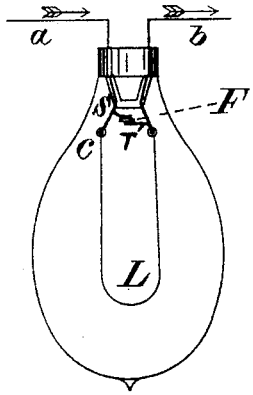



*Fig. 5.*

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# UNITED STATES PATENT OFFICE.

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## ELECTRIC CUT-OFF APPARATUS.

SPECIFICATION forming part of Letters Patent No. 455,800, dated July 14, 1891.

Application filed December 15, 1886. Serial No. 221,676. (No model.)

*To all whom it may concern:*

Be it known that I, EDWIN WILBUR RICE, Jr., a citizen of the United States, and a resident of Lynn, in the county of Essex and State of Massachusetts, have invented a certain new and useful Electric Cut-Off Apparatus, of which the following is a specification.

The present invention relates to improved means of closing an electric circuit following its rupture or threatened rupture due to sudden breaking of an arc or to rupture of the carbon of an incandescent lamp. My invention, however, is for a new combination of parts which may be applied variously in electric circuits.

It consists in placing a film cut-out (two metal surfaces connected, respectively, to the opposite sides of a resistance in circuit with a film or layer of air, paper, &c., between) in such relation to that part of the circuit at which a rupture or arcing may take place as to have the film destroyed by the heat of the arc abnormally established.

In Figure 1 the simple elements of my invention are shown. Fig. 2 shows the action of destroying the insulating-film. Fig. 3 shows a substitute film. Fig. 4 shows one of the ways in which my invention can be applied. Fig. 5 shows still another application.

In Fig. 1 from point *a* to point *b* is any part of a circuit upon which electric currents flow or may flow from *a* to *b* or reversely through a contact at the surfaces C T, which contact or conductor may be opened by any means, as by an armature A, Fig. 4.

In electric connection to the point *a* is a spring-contact S, bearing on a film F, as a piece of paper, mica, or other insulator, the other side of which is upheld by a surface T, connected to point *b*. Now, as shown in Fig. 2, should a rupture of circuit at the surfaces C T be made in any way, as by moving the surface C from the surface T, and an arc or large spark be produced, the heat from the same will destroy the film at F and the circuit will be closed through the spring-contact S and the surface T by their coming together.

While the device, Figs. 1 and 2, embodies my invention, it will be well to show its modified forms.

Instead of using a mica or a paper film, a thin air film may exist between the pieces S and T, Fig. 3, in which case one or the other piece may be made to inclose its companion in whole or in part in such way, one piece being easily fused, that the establishment of an arc between them may unite them metallically. The establishment of the arc may be the result of transfer from the surfaces C T to the pieces S T, as before. If one of the pieces, as T, be made of oxidizable metal and be rusted or scaled by heat, the piece S may rest thereon without electrical contact until the flame of the arc is transferred.

In Fig. 4 the parts are arranged as before, with the addition of an electro-magnet M, whose armature A, when attracted, places the piece C and surface T in contact, the spring Z serving to open the contact, as in Fig. 2. Connections from point *a* are made to contact-spring S, to piece C, to one terminal of the magnet-coil M, and to one terminal of a resistance L, which resistance may be an electric-arc lamp whose arc may become abnormally extended, or which may be the carbon conductor of an incandescent lamp subject to rupture or an electro-motor or other electro-receptive device. The end of the wire of magnet-coil M not connected to point *a* is carried to point *b*, as is also the other terminal of resistance L, and a connection to surface T is also made. The magnet-coil of M is of high resistance, comparatively, and its armature is adjusted by the spring Z, so as not to be attracted to close the pieces C T unless a rupture or very high resistance is established at resistance L, the magnet-coil being in shunt thereto. When, however, such high resistance exists or rupture takes place, the magnet-coil M is energized and brings the pieces C T together, thus shunting the resistance L completely and the magnet-coil M at the same time. The spring Z now reasserts itself and withdraws piece C from piece T, forming an arc between them, as in Fig. 2, and causing the establishment of a connection between the contact-spring S and surface T above by destroying the insulating-film.

In Fig. 5 the parts are combined in an incandescent-lamp globe, the magnet M being

dispensed with, so that a rupture of the resistance L, causing an arc to spring from one of the wires of the lamp to piece T, attached to the other wire, will result in the removal of an insulating-film of mica, asbestus, or paper or other insulator F, so that a good contact may be formed between the pieces S and T, S being an extension of lamp-wire C, resting on piece F.

Having described my invention, what I claim is—

1. In a circuit-closing device for an electric circuit, the combination of a set of contacts separated by an insulating-film with a device traversed by the current of said circuit, whereby upon the separation or rupture of the circuit through said device an arc is established in proximity to the insulating-film, so as to burn or destroy the film and allow said contacts to come together.

2. In a circuit-closing device for an electric circuit, the combination of a set of opposing strips or wires connected, respectively, to the positive and negative terminals of the resisting path traversed by the current, and an interposed insulating-film between said strips or wires, with a device whereby an arc may be produced in proximity to the film for the purpose of destroying the film and bringing the strips or wires into electric connection with each other.

3. In a circuit-closing device for an electric circuit, the combination of two opposed electric conductors connected, respectively, to the positive and negative terminals of a resisting path traversed by the current, said conductors being close to but not in actual contact with each other, with means whereby an arc may be produced in proximity to said conductors for the purpose of fusing the conductors together, and thereby forming a path of low resistance for the electric current.

4. The combination, with a portion of electric circuit at which a rupture may take place, of two conducting bodies or electrodes forming opposite poles of the circuit and normally separated by a thin layer of insulating material, said electrodes being located in proper proximity to the arc forming on rupture of the circuit, as described, so that the insulating-layer may be destroyed by the arc, as and for the purpose described.

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