(No Model.)

A. WURTS.

THERMOSTATIC FUSE DEVICE.

No. 492,547. Patented Feb. 28, 1893.

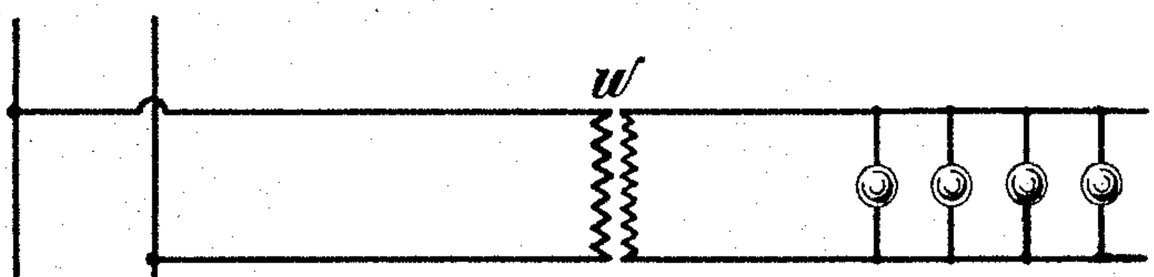


Fig. 1.

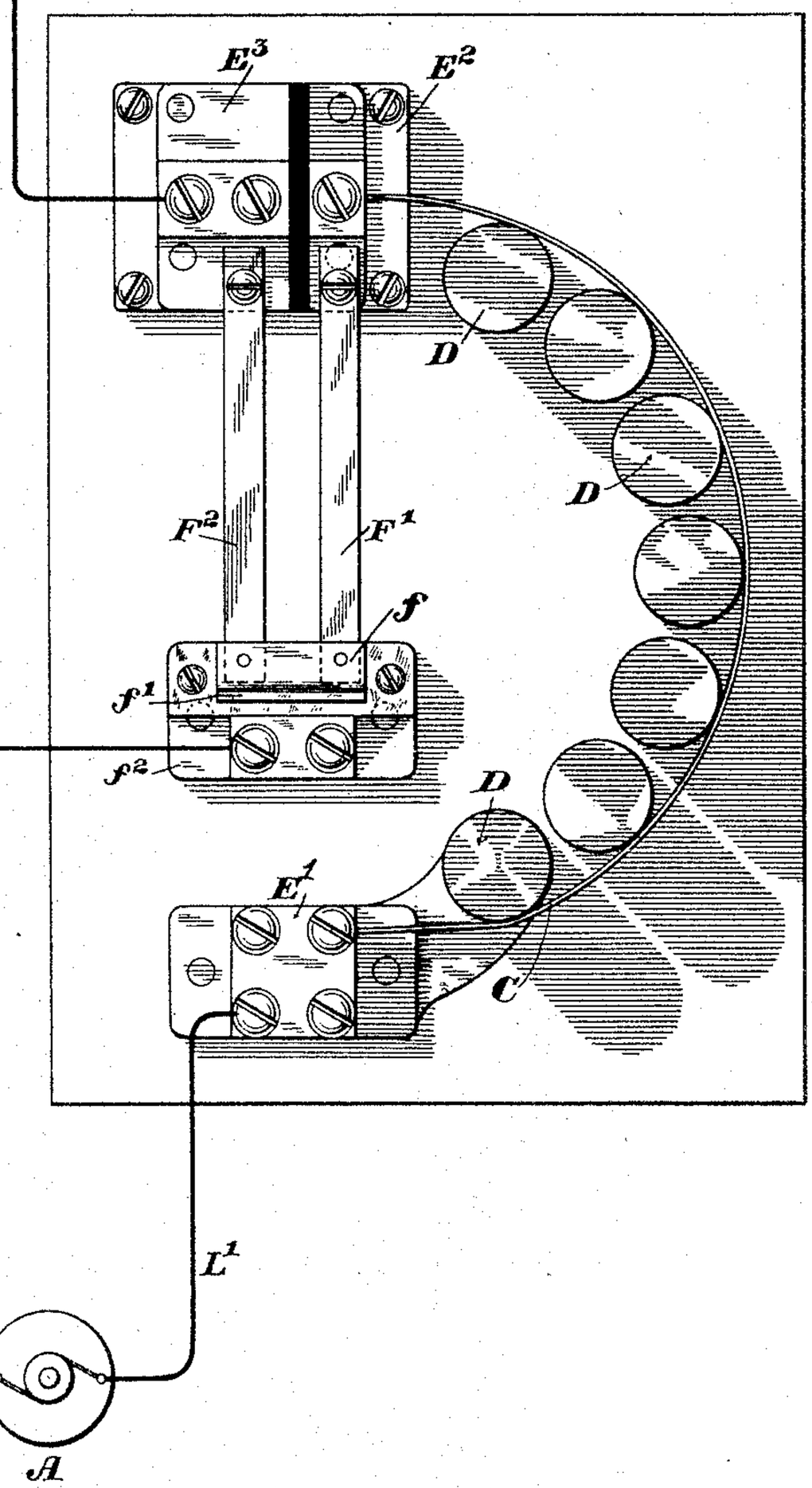
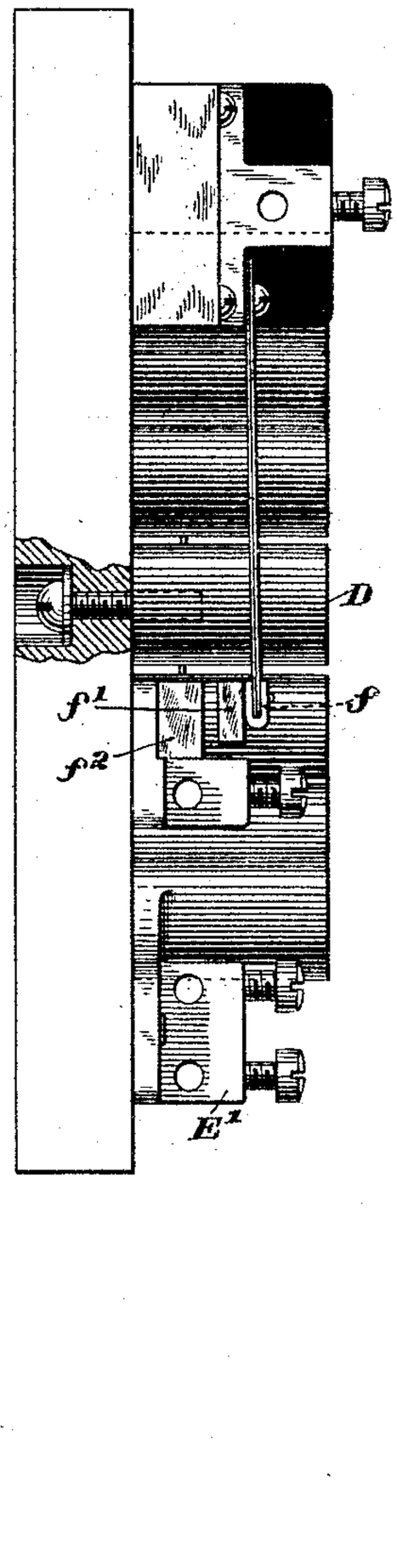


Fig. 2.



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UNITED STATES PATENT OFFICE.

ALEXANDER WURTS, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO THE WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, OF SAME PLACE.

THERMOSTATIC FUSE DEVICE.

SPECIFICATION forming part of Letters Patent No. 492,547, dated February 28, 1893.

Application filed January 14, 1892. Serial No. 418,063. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER WURTS, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Automatic Circuit-Breakers, (Case No. 475,) of which the following is a specification.

The invention relates to the construction of apparatus for interrupting an electric circuit upon the passage of currents of predetermined or abnormal strength and for preventing the formation of destructive arcs when such interrupted circuit is supplied by a dynamo electric generator.

I have found that certain metals when employed for forming electrodes have to a marked degree the property of extinguishing or failing to maintain an arc when formed between them. The metals which I have thus found to contain this property to the most marked extent are zinc, cadmium, mercury, antimony and bismuth. I have also found that certain compounds of these metals, for instance, zinc and copper, forming brass, likewise copper amalgam and zinc amalgam, contain this property. The cause of this peculiarity may be the generation of non-conducting vapor of metal by the first arcing which in turn prevents the continuance of the arc. It may be that certain electrolytic effects occur, or it may be due in a measure to some effect of counter-electromotive force; but whatever may be the true cause of this is not material to the present invention, and I do not advance the above as being necessarily the true explanation, but have enumerated the best metals thus far found to produce the result for the purpose of fully disclosing my invention. In general these metals might be called non-arcing metals. Where other materials are employed for forming similar electrodes, an arc is liable to be maintained between the electrodes, yet with the metals above-mentioned such an arc will not be maintained. By the present invention I utilize this property in connection with an electric fuse for interrupting the connections of an electric circuit without forming or maintaining a destructive arc.

The invention may be generally stated to consist in introducing into the circuit to be protected a fuse which will be melted by the passage of currents of abnormal strength, and placing adjacent to this fuse a series of electrodes of one or more of the above-mentioned metals or compounds, and in providing means operated by abnormal or predetermined currents to close a local or short-circuit through this fuse and thus occasion a flow of sufficient current to instantly melt it. The arc which might otherwise then tend to form and be maintained between the melted ends of the fuse is distributed along the series of electrodes and immediately extinguished by reason of the above-mentioned properties of these electrodes.

In the accompanying drawings, Figure 1 is a plan of the device and Fig. 2 is a side view of the same.

Referring to the figures, A represents an electric generator, and L', L^2, main line conductors leading therefrom to a work-circuit W of a suitable character. In the main line conductor L' there is included the circuit-interrupting device forming the subject of this invention. This device consists of a strip, rod, or wire C, of copper or other suitable conducting material capable of being fused by the passage of currents of considerable strength. This strip C is shown as being bent around a series of electrodes D, which are of zinc or antimony or cadmium or bismuth, or compounds of the same or amalgams. These electrodes are electrically insulated from each other and separated by very short spaces.

In practice I have found from one thirty-second to one-eighth of an inch to serve the purpose, although in general it may be stated that the electrodes should be as close together as practicable, but yet insulated from each other. One end of the strip C is electrically connected with a suitable binding-plate or post E', which is shown as being connected with the first one of the series of electrodes D. The other end of the strip C is connected with a binding-plate E^2 and a corresponding plate E^3 is connected with the continuation of the line L'.

A suitable automatic circuit closing device

is employed for temporarily short-circuiting the generator such for instance as the thermostatic device now to be described. Two thermostatic strips F′, F², are respectively supported from the plates E², E³, and their remote ends are connected by conducting plate *f*, so that electric currents traversing the strip C pass through the thermostatic strip F′ across the connecting plate *f* and through the thermostatic strip F² to the plate E³, and thus on to the line L′. The ends of the thermostatic strips F′, F², carry a contact plate *f′* which is normally separated from the resting contact plate *f²*. This plate *f²* is eletrically connected with the line L², so that if the plates *f′ f²* are brought into contact with each other, a short-circuit will be completed between the pole of the generator A through the fusible strip C. So long as only normal currents traverse the main line circuit, the thermostatic strips F′, F², will hold the contact-plate *f′* away from the resting plate *f²;* but when currents of more than normal strength traverse the circuit L′, then the heat developed in the thermostatic strips F′, F², by the passage of the current will cause them to bend forward and bring the plates *f′*, *f²* into contact with each other. The sudden increase of current then caused to traverse the strip C will fuse that strip and immediately interrupt the circuit connections. There is always, however, a tendency for the current from a generator when thus interrupted to follow the path established, and the fumes or vapor of the metal of the fuse serve as a more or less perfect conducting path for the same, and thus a destructive arc is liable to be maintained for a longer or shorter period. By placing the strip C along the series of electrodes D, the tendency is for the arc to establish itself through the series from one electrode to another instead of through the air carrying the vapor of the melted strip C; but owing to the property of extinguishing arcs formed between electrodes of the character mentioned, even if an arc is formed from one end of the series of electrodes D to the other, such arc will be immediately interrupted, and thus the circuit of the machine will be effectually opened.

By placing the electrodes D in the form of a semicircle as indicated, not only is the device made more compact but also the path of the electrodes D is thrown out of a straight line, and moreover the fusible strip may be more easily strained against the electrodes D.

It is evident that various other specific arrangements of the electrodes may be adopted as found convenient, but that described will serve to illustrate the invention and its mode of application.

It should be observed that in practice it is found desirable that the electrodes D should present either curved or diverging faces to each other, as in practice flat extended faces are found not to act satisfactorily. I have therefore shown the electrodes D as being of cylindrical form, this construction having proved to be effective in operation.

I claim as my invention—

1. The combination of two or more electrodes of non-arcing metal and a fusible strip connected in shunt upon and placed in close proximity to said electrodes.

2. The combination with a series of electrodes of zinc or antimony or amalgam or other non-arcing metal presenting to each other diverging faces, and a fusible strip laid against the same, substantially as described.

3. The combination with a series of electrodes of a fusible strip laid against the same and a thermostatic circuit-closing device connected in series with the fusible strip.

4. The combination with a series of electrodes presenting curved faces to each other and composed of arc-preventing metal, of a fusible strip bridging the successive electrodes, substantially as described.

5. The combination with a circuit-closing device and a fuse connected in series therewith, of a series of electrodes insulated from each other against which said fuse is placed, substantially as described.

6. The combination with a series of cylindrical electrodes arranged in a curved line, of a fusible strip bent around the same, a thermostatic device connected in series with the same, and a shunt-circuit having its terminals connected with the respective terminals of the said thermostatic device, substantially as described.

7. The combination with the armature of an electric generator, of a fusible strip connected with one terminal of the armature, two contact-plates, one connected with the remote terminal of the fusible strip and the other connected with the other terminal of the armature and an automatic circuit-closing device for short-circuiting the armature through said fusible strip.

8. The combination with the armature of an electric generator, of a fusible strip connected with one terminal of the armature, two contact-plates, one connected with the remote terminal of the fusible strip and the other connected with the other terminal of the armature, an automatic circuit-closing device for short-circuiting the armature through said fusible strip, and an automatic arc-rupturing device consisting of non-arcing electrodes arranged in proximity to said fusible strip.

9. The combination of a source of electric currents, an electric fuse included in said circuit adapted to carry the full normal current in said circuit for an indefinite period, a local circuit and means for supplying said local circuit with heavy currents, and a circuit controlling device actuated by an abnormal increase of the current flowing from said source through the fuse, to complete the connections of said local circuit through the fuse.

10. A source of electric current and a fusible strip in the main circuit thereof adapted to carry the full normal current in said circuit for an indefinite period, in combination with a normally open short-circuit through said source of current, and a device in the main circuit adapted to close said short-circuit on the passage of an abnormal current.

In testimony whereof I have hereunto subscribed my name this 12th day of January, A. D. 1892.

ALEXANDER WURTS.

Witnesses:
JAMES WM. SMITH,
CHARLES A. TERRY.