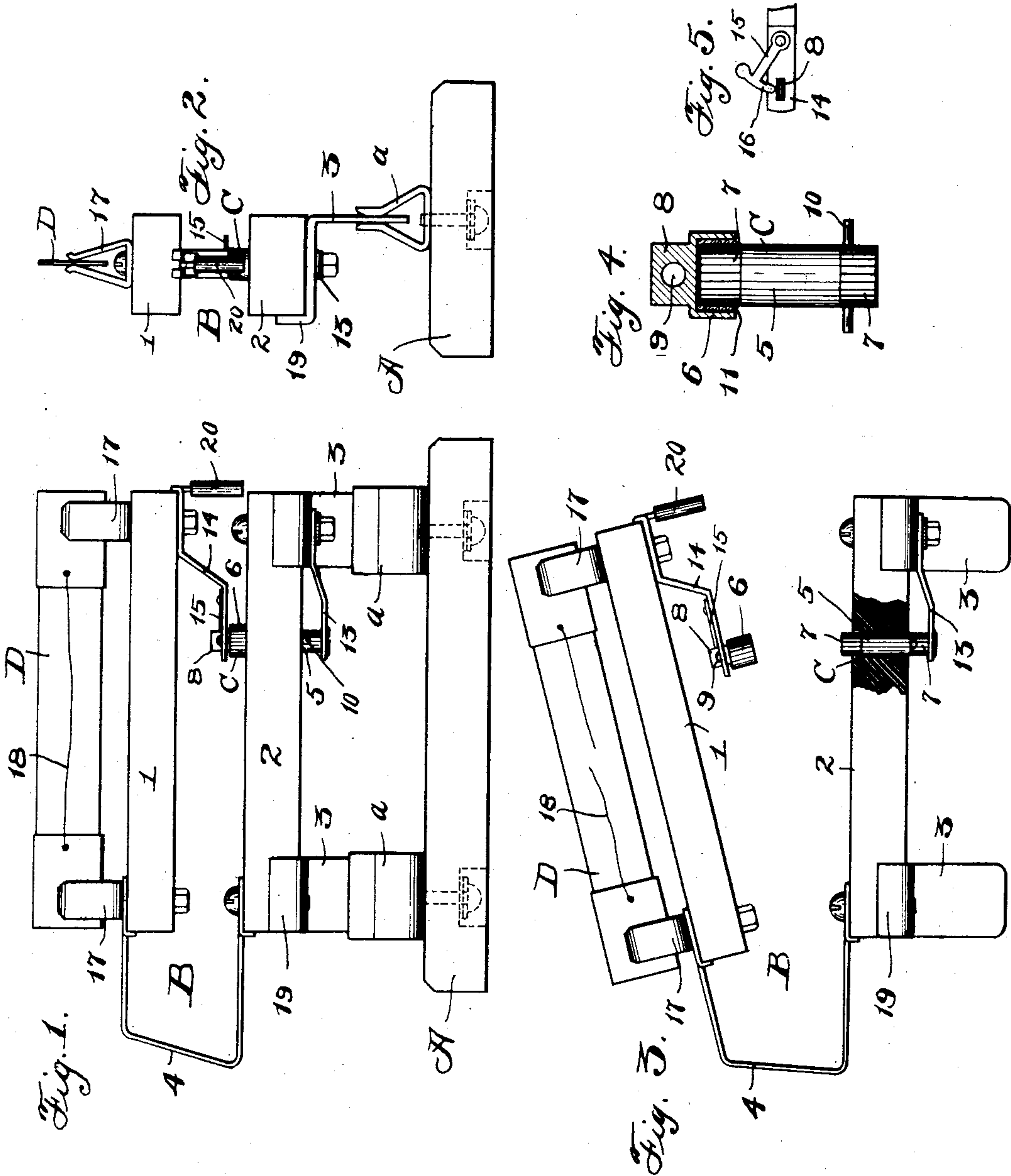


No. 866,735.

PATENTED SEPT. 24, 1907.

C. A. ROLFE.
CIRCUIT PROTECTOR.
APPLICATION FILED JAN. 2, 1902.



WITNESSES:

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CIRCUIT-PROTECTOR.

No. 886,735.

Specification of Letters Patent.

Patented Sept. 24, 1907.

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To all whom it may concern:

Be it known that I, CHARLES A. ROLFE, a citizen of the United States, residing at Adrian, in the county of Lenawee and State of Michigan, have invented a certain
5 new and useful Improvement in Circuit-Protectors, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to circuit protectors for pro-
10 tecting low tension instruments and circuits, from unduly strong currents which may intrude upon them.

My invention contemplates securing certain novel results in protective devices of this kind, among which are the procurement of an exceedingly simple, cheap
15 and inexpensive form of device, and the attainment of accuracy, effectiveness and reliability in protecting the instruments and circuits.

In the accompanying drawings, Figure 1 is a side elevation of a protector embodying my present invention; Fig. 2 is an end elevation of the same; Fig. 3 is a
20 side elevation of the operating portion of the device, removed from its base and in an operated condition; Figs. 4 and 5 are views of details of construction.

The protector which I have shown in the drawings for
25 illustrating my present invention, comprises a base A made of insulating material such, for example, as porcelain, fiber or the like. This base is provided with spring jaws *a*, *a*.

The device also comprises a bodily removable structure B, comprising the operating parts of the protector.
30 This structure B consists of two strips 1 and 2 of insulating material, preferably fiber, arranged side by side, the lower one, 2, being provided with metallic strips 3, 3, forming contacts adapted to slip into the spring jaws *a*,
35 *a*, on the base A. A bow spring 4 has its arms connected with corresponding ends of the fiber strips 1 and 2 and is adapted to exert a tendency to swing said strips apart.

A heat-responsive device C is arranged to operate upon the passage through the circuit of an unduly
40 strong current. This heat-responsive device C consists of a stick or pencil 5 of high resistance material, preferably graphite, and a metallic cap 6 secured to the upper end of the stick or pencil 5. The opposite ends of the stick or pencil of graphite are copper plated,
45 as at 7, 7, and a layer of solder 11 is arranged between the copper plated portion 7 and the cap 6 by which the latter is secured to the stick or pencil 5. The cap 6 is provided with an ear 8 having an aperture 9. The lower end of the graphite stick 5 is provided with an
50 abutment such as the pin 10. In place of this pin the end of the graphite could be enlarged or an abutment otherwise provided. This heat-responsive device is operated by the unduly strong current heating the graphite stick 5 to such an extent as to melt or fuse
55 the layer of solder 11, so that separation can take place

between the cap 6 and the stick 5. The heat-responsive device thus constructed, is arranged in an aperture in the lower strip 2 in such a way that the ear or lug 8 projects above the upper side of the strip 2 and the pin 10 in the graphite stick 5 is below the same
60 and engages the lower surface thereof. A metallic strip or contact 13 is attached to one end of the lower strip 2 as by screwing it against the contact 3 at that end and is extended to the graphite stick 5 against whose copper plated lower end it presses. Thus connection is established between the contact 3 and the heat-responsive device C. A somewhat similar contact strip 14 is secured to the corresponding end of the upper strip 1 and extended downwardly toward the
65 spring end of that strip. Its inner end is provided with an aperture into which the lug or ear 8 of the heat-responsive device C can pass, and a swinging catch 15 is pivotally mounted upon it so that this catch can be swung to cause its prong 16 to enter the aperture 9 in the ear 8 and thereby engage the contact
70 strip 14 with the heat-responsive device. In addition to this engagement, the contact strip 14 affords electrical connection between this heat-responsive device and the end of the strip 1. The strip 1 is desirably provided with spring jaws 17, 17, and into these
75 jaws is fitted a fuse block D carrying a fine fuse 18. The spring jaws 17, 17, are connected one with the contact strip 14 and the other with the spring 4. The lower end of the spring 4 is connected by a contact strip 19 with the adjacent contact 3. The strip 1 is
80 desirably provided with a stop 20 adapted to limit the movement of the strips 1 and 2 toward one another. Thus in the arrangement shown, the circuit is made from the right hand contact jaw *a* to the contact 3; thence to the heat-responsive device by way of the
85 strip 13; thence to the strip 14 and to the fuse block D and fuse 18 thereof; and thence in return through the spring 4, screw fastening the spring 4 to the block 2 and connecting with the strip 19, and strip 19 to the left hand contact 3 and jaw *a* therefor.
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The operation of the device is as follows: If an unduly strong current intrudes upon the line, it will pass through both the fuse 18 and the heat-responsive device C. If the fuse 18 is sufficiently heated by the current to become operated, it will blow and open the circuit,
100 thereby avoiding future trouble. It may be, however, that the current will not be sufficiently large to blow this fuse, or that if blown it may not be separated sufficiently to prevent arcing, in which case an arc and the unduly strong current will persist. In such case the
105 continued passage of the unduly strong current will cause the graphite stick 5 to become heated, whereupon it will heat and thereby melt or fuse the layer of solder 11 between the graphite stick 5 and cap 6. This will permit the spring 4 to lift or swing upwardly the
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upper fiber strip 1, as shown in Fig. 3, and will cause the separation of the cap 6 from the graphite stick 5, and a consequent breakage between the same. The device will remain in this operated or open condition until it is properly replaced in its original condition. This can be done by renewing the fuse by substituting a new fuse block if the fuse is blown, or by substituting a new heat-responsive device C in case the latter is operated. This latter can be done by swinging the catch 15 so as to cause it to disengage from the heat-responsive device, and also swinging the strip 13 slightly so as to bring it away from its position below the heat-responsive device. A new device can then be substituted and the engagement of the same with the contact strips 13 and 14 be made as before. It will be seen that this device involves but a few parts and can be simply and cheaply made, and easily and cheaply renewed.

The device is particularly advantageous because it can be applied to bases already in use, it being observed that there are in use for other devices large numbers of bases such as the base A with its spring jaws *a, a*. Many of these bases contain fuses and others contain cut-out devices of various kinds. These can be removed and the separable structure B of my invention can be substituted in their place.

It will be understood that the device herein shown and described can be modified and changed; also that its various parts and devices can be replaced by others. For instance, in place of the heat-responsive device C herein shown and described, any other form of heat-responsive device can be used, as for example that shown in my copending application Serial No. 38437 filed December 3, 1900 for circuit protector. It will be understood also that the different devices can be used alone or in other styles of protector; this is particularly true of the heat-responsive device C, which can obviously be employed in any form of protector of this general class. If desired the fuse block D can be omitted, in which case suitable connections will have to be made to afford a continuous circuit through the instrument. In view of the foregoing, I do not intend to limit myself to the precise arrangement and construction herein set forth.

1. The combination with a pair of strips, of a loop spring having its arms secured to corresponding ends of the strips and tending to separate the same, a heat-responsive device arranged in an aperture in one of said strips and having its outer end enlarged, whereby it cannot be pulled through the aperture, and a connection between the other or inner end of said heat-responsive device and the other strip for holding the strips together in opposition to the spring.

2. The combination with a pair of strips, of a loop spring having its arms secured to corresponding ends of the strips and tending to swing the strips away from one another, a heat-responsive device confined in an aperture formed in one of said strips, the said device comprising a stick of high resistance material and a conductor soldered thereto, and a connection between said heat-responsive device and the other strip, said connection being adapted to hold the strips together in opposition to the spring, substantially as described.

3. The combination with a pair of insulating strips 1 and 2, of a spring 4 secured to the end of said strips and adapted to separate the same, a heat-responsive device confined in an aperture in the strip 2, the said heat-responsive device consisting of a graphite stick and a metallic cap soldered to one end of said stick, said metal cap being provided with an apertured lug or ear, a metallic strip 13 affording a connection with said graphite stick, a metallic strip 14 having one of its ends secured to the other insulating strip and the other end provided with an aperture adapted to fit over the apertured lug or ear of the heat-responsive device, and a catch 15 adapted to detachably engage the heat-responsive device by passing through the aperture of the ear or lug thereon, substantially as described.

4. The combination with a pair of strips, of spring means tending to separate the same, a heat-responsive device serving to hold said spring in tension, a fuse carried by one of said strips, and circuit connections for connecting both the heat-responsive device and the fuse in circuit.

5. The combination with a pair of strips, of spring means tending to separate the same, a heat-responsive device arranged to hold the said spring in tension, a fuse block carried by one of said strips, and circuit connections whereby both the fuse of the fuse block and the heat-responsive device are connected in circuit in series.

6. The combination with a pair of insulating strips, of a loop spring having its arms secured to corresponding ends of said strips, a heat-responsive device carried by one of the strips and connected with the other so that said device holds the spring in tension, and a fuse block mounted upon the other strip and provided with contact jaws, one of which is secured to said spring, whereby the spring forms a connection with the fuse block, substantially as described.

7. A heat-responsive device comprising a block or stick of high resistance material, having one of its ends copper plated and the other end provided with an abutment, and a metallic cap adapted to inclose the copper plated end of said stick or block and soldered thereto, substantially as described.

8. A heat-responsive device comprising a stick or pencil of high resistance graphite having its opposite ends metal plated, a metallic cap having an apertured ear and adapted to inclose one of the metal plated ends of said stick or pencil, and an enlargement on the other end of said pencil, substantially as described.

In witness whereof, I hereunto subscribe my name this 21st day of October A. D., 1901.

CHARLES A. ROLFE.

Witnesses:

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HARVEY L. HANSON.