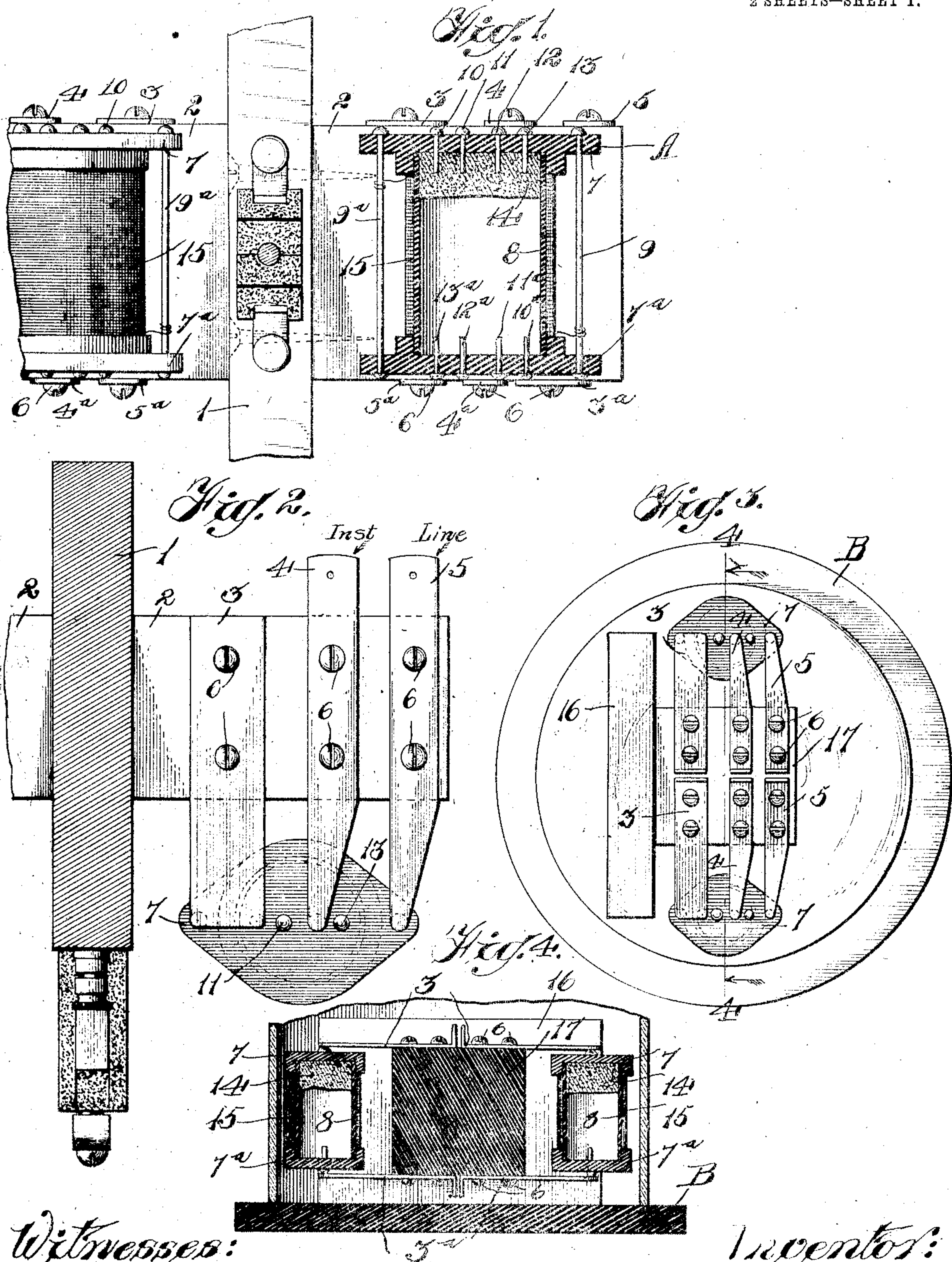


R. WIESINGER.  
ELECTRICAL CIRCUIT PROTECTOR.  
APPLICATION FILED DEC. 29, 1903.

946,413.

Patented Jan. 11, 1910.

2 SHEETS—SHEET 1.



Witnesses:  
G. V. Domarus.  
J. C. Ler.

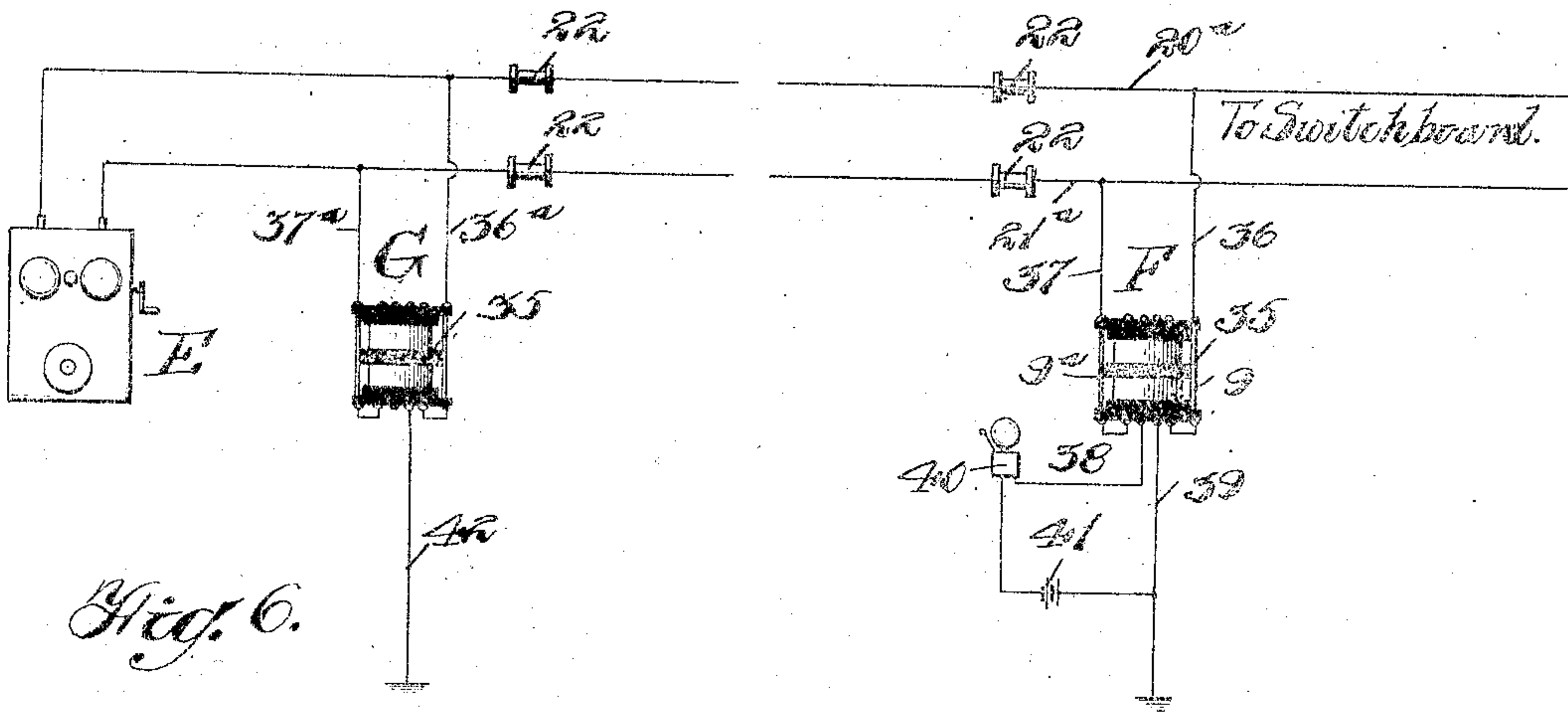
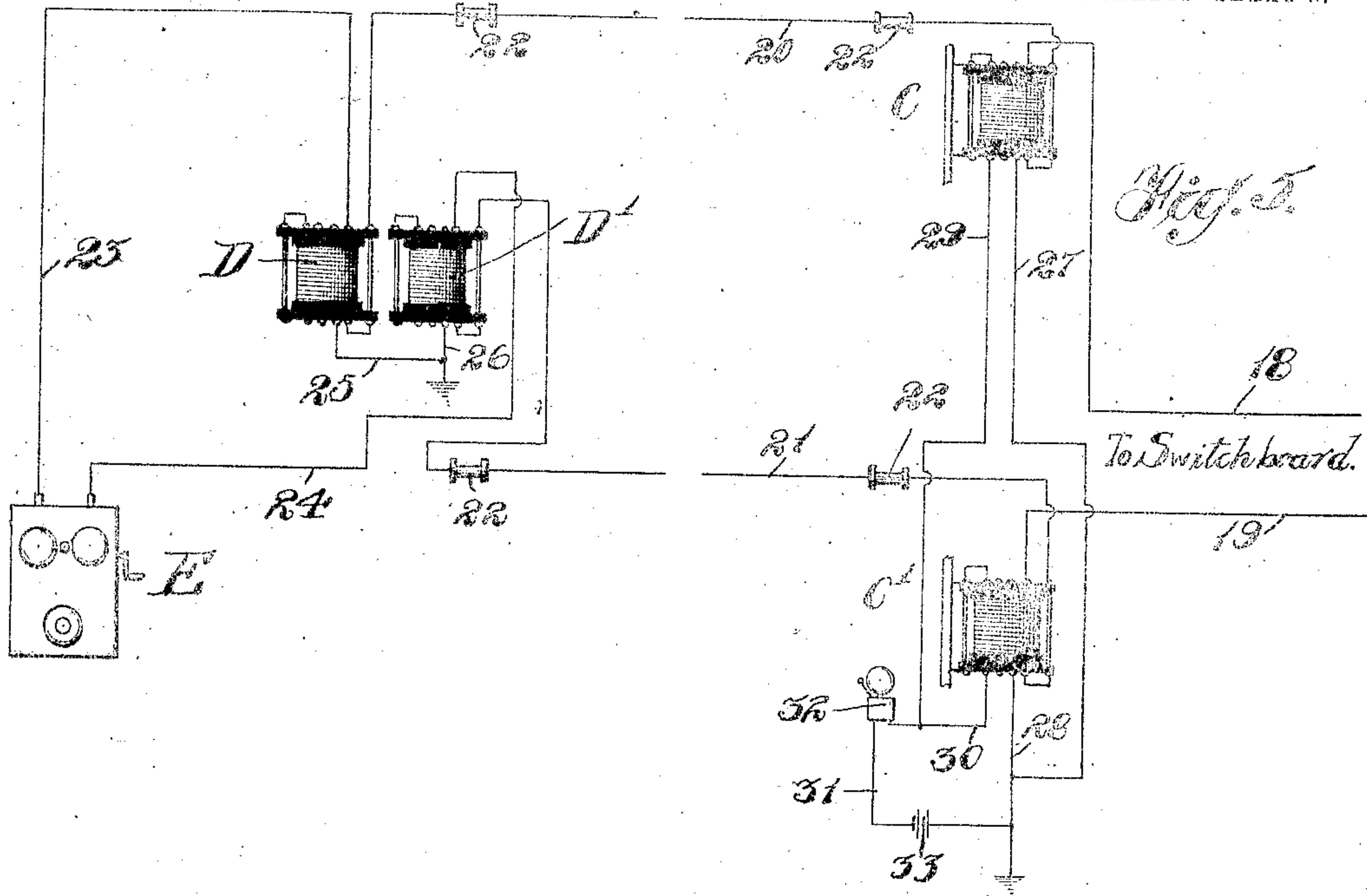
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G. V. Domarus  
J. C. Lee

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Attorney.



# UNITED STATES PATENT OFFICE.

RICHARD WIESINGER, OF ADRIAN, MICHIGAN, ASSIGNOR TO WILLIAM G. NAGEL, OF TOLEDO, OHIO.

## ELECTRICAL-CIRCUIT PROTECTOR.

946,413.

Specification of Letters Patent.

Patented Jan. 11, 1910.

Application filed December 29, 1903. Serial No. 187,029.

*To all whom it may concern:*

Be it known that I, RICHARD WIESINGER, a citizen of the United States, residing at Adrian, in the county of Lenawee and State of Michigan, have invented a certain new and useful Improvement in Electrical-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 apparatus for protecting electrical circuits such as telephone, police telegraph, fire alarm and the like from the injurious effects of unduly strong currents such as are likely to escape from power and lighting circuits.

Prominent objects of the invention are to provide a simple, practical and inexpensive device of this kind; and to avoid the necessity of having to repair or replace the same or any of its parts after operation.

In the accompanying drawings, Figure 1 is a view partly in elevation and partly in section, of a portion of protective apparatus adapted for use at a central exchange, embodying my present invention; Fig. 2 is a plan view of a portion of the same; Fig. 3 is a plan view of a protective device embodying my invention, adapted for use at an outlying or subscriber's station; Fig. 4 is a cross section taken on line 4-4 in Fig. 3; Fig. 5 is a diagrammatic view showing a telephone system protected by protectors embodying my present invention; Fig. 6 is a diagrammatic view of a modified form of construction.

Referring first to Figs. 1 and 2, 1 is a vertically arranged flat standard or upright on which the various protective devices are mounted in bank at a central exchange. Two blocks 2, 2 made of insulating material, are shown secured to the opposite sides of the upright 1. Each of these blocks supports a protective device embodying my present invention, and as these are the same, a description of one will suffice for both. The block is provided with three clips 3, 4 and 5 on its upper face, and three similar clips 3<sup>a</sup>, 4<sup>a</sup> and 5<sup>a</sup> on its lower face, all of which clips are fastened to the block by screws 6, 6. A barrel cartridge A is removably mounted between the upper and lower sets of clips 3, 4 and 5 and 3<sup>a</sup>, 4<sup>a</sup> and 5<sup>a</sup>.

This cartridge comprises upper and lower insulating disks 7, 7<sup>a</sup>, and a cylinder 8 arranged between the disks 7 and 7<sup>a</sup> and made of insulating material such for example as glass. The disks 7 and 7<sup>a</sup> are held together by end rods 9 and 9<sup>a</sup>. The disk 7 is provided with four pins 10, 11, 12 and 13, and the disk 7<sup>a</sup> is provided with pins 10<sup>a</sup>, 11<sup>a</sup>, 12<sup>a</sup> and 13<sup>a</sup>, all of which pins extend through the disks or heads to which they are applied, and project a short distance into the interior of the cylinder 8. A quantity of solder 14 is confined in the cylinder 8 and under normal conditions is maintained in the upper end of the cylinder by engaging with the projecting ends of the pins 10, 11, 12 and 13. A coil of wire 15 is wound about the cylinder 8 and has its opposite ends connected with the rods 9 and 9<sup>a</sup>. The clips 3 and 3<sup>a</sup> are wider than the other clips, and the latter are tapered at their ends, all as shown in Fig. 2, so that when the barrel cartridge is inserted between the clips as shown in Fig. 1, the rod 9<sup>a</sup> and pin 10 connect with the clip 3; the pin 11 is between the clips 3 and 4; the pin 12 is in contact with the clip 4; and the rod 9 in contact with the clip 5. And at the lower end of the device the clip 3<sup>a</sup> is in contact with the rod 9 and pin 10<sup>a</sup>; the clip 4<sup>a</sup> with the pin 11<sup>a</sup>; and the clip 5<sup>a</sup> with the pin 13<sup>a</sup>. The device thus constructed is arranged as shown, one on each side of the upright 1, and other devices of the same sort are arranged upon this upright in bank to any desired number.

The individual device,—that is the one intended for use at the outlying or subscriber's station,—is shown in Figs. 3 and 4. This device has a base B provided with an upright 16 to which is secured an insulating block 17. Two sets of clips similar to those previously described in connection with the bank apparatus, are secured to the upper and lower faces of the block 17. These two devices are shown connected in a telephone circuit in Fig. 5. In this figure are shown two conductors 18 and 19 which are understood to come from the switch-board of the exchange. They run to two protective devices C and C' at the exchange, which devices are understood to be a pair of protectors such as previously described and shown in Figs. 1 and 2, conveniently mounted on opposite sides of an upright 1.



for opposite sides of the same circuit. These conductors 18 and 19 are connected with the clips 4, 4 (Figs. 1 and 2) of the two protective devices C and C', so that these clips may be said to be connected with the instrument. Line wires 20 and 21 are extended from the two protective devices to a subscriber's station where they are connected with the clips 5, 5 of two protective devices D, D', which together form an individual protective device such as shown in Figs. 3 and 4. These line wires 20 and 21 are desirably provided with fuses 22, 22 which it will be seen are between the two protective devices and therefore outside of each set. A telephone E is shown at the subscriber's station, and is connected by conductors 23, 24 with clips 4, 4 of the devices D, D'. The clips 4<sup>a</sup>, 4<sup>a</sup> of the devices D, D' are connected by conductors 25, 26 with ground. The clips 4<sup>a</sup>, 4<sup>a</sup> of the devices C, C' at the central station, are connected by conductors 27, 28 with ground, and the clips 5<sup>a</sup>, 5<sup>a</sup> of these devices are connected by conductors 29 and 30 with an alarm circuit 31 having an alarm device 32 and local battery 33, the alarm circuit 31 being formed in part by the ground connection 28. The circuit and device connected up in this way operate as follows. Under ordinary conditions the two sides of the subscriber's circuit are made continuous through the two sets of protective devices, the mass of solder 14 being in an uppermost position in each protective device, and forming connections between the various pins at the tops of the devices. For instance, referring to Fig. 1, the circuit is made from the conductor connected with the clip 5, which on reference to Fig. 5 will be seen to be the line wire 20; from said clip 5 to the rod 9; thence through the coil 15 to the rod 9<sup>a</sup>; thence to the clip 3 and by way of the same to the pin 10; thence through the mass of solder 14 to the pin 12; thence to the clip 4 and from the latter to the switchboard. In a similar way connection can be traced through the other protective devices. When now an unduly strong current traverses the circuit, one or more of the coils 15 will become heated to such an extent as to soften the mass of solder 14 of the device of which such coil is a part. This solder finally becomes so soft that it loses its grip on the pins 10, 11, 12 and 13 and also loses frictional contact with the inner surface of the cylinder 8, whereupon it drops to the bottom of the barrel cartridge. In so doing it breaks the electrical connection between the pins 10 and 12 and thereby opens the circuit between these pins and the clips 3 and 4 with which they are connected. Thus the circuit becomes opened between the line and the instrument in the device where this opera-

tion has occurred. If it occurs in more than one device, the circuit becomes opened at a plurality of points, according to the number of devices operated. Any mass of solder 14, on falling to the bottom of the device, rests upon the lower head thereof and embeds the projecting ends of the pins 10<sup>a</sup>, 11<sup>a</sup>, 12 and 13<sup>a</sup> in itself, thereby making connection electrically between said pins. In the case of the devices C, C' at the central station, this brings about a connection between the pins 11<sup>a</sup> and 13<sup>a</sup>, and thereby, by means of the clips 4<sup>a</sup>, and 5<sup>a</sup>, grounds the line side of the circuit and also operates the local alarm device 32. In the case of the devices D, D' at the subscriber's station, the line side of the circuit is connected with the pins 11<sup>a</sup>, 11<sup>a</sup> and thus by means of the clips 4<sup>a</sup>, 4<sup>a</sup>, the line is connected with ground. Thus it will be seen that the arrangement above described operates to open the circuit and also to ground the same at either the subscriber's or the central station, and also operates an alarm device at the central station. The grounding of the line will, as is customary in protective systems of this kind, allow the fuses 22, 22 to become blown. After the operation of any one of the devices the barrel cartridge A thereof will be taken out and turned upside down and replaced again in position between the clips of the device. Upon doing so the circuit is again restored to its original condition and is ready for another operation.

In Fig. 6 a slightly modified form of device is shown in a somewhat modified arrangement. The protective devices F and G are the same as the devices previously described, except that in place of the wire coils 15, a ring of graphite 35 is substituted as the heating or heat concentrating medium or device. And these graphite rings make connection with the metal rods extending between the ends of the barrel cartridge just as the coils 15 were connected therewith. Two line wires 20<sup>a</sup> and 21<sup>a</sup> are shown extended from the switchboard to the subscriber's instrument E. From these line wires conductors 36, 37, 36<sup>a</sup> and 37<sup>a</sup> are extended in shunt and connected with the rods 9 and 9<sup>a</sup> of the two protective devices, it being understood that suitable clips are provided in the mounting of these devices for such purpose. From the central station protective device F, conductors 38 and 39 are extended, the same being connected with the middle pins 11<sup>a</sup> and 12<sup>a</sup> of the device. The conductor 39 extends to ground and at the same time with the conductor 38 forms an alarm circuit including an alarm device 40 and a local battery 41. From the subscriber's protector G a conductor 42 extends to ground, the same being connected with the pin 11<sup>a</sup>. In the mountings of both protectors, clips are provided to connect the rods 9 and 9<sup>a</sup> with the



pins 10<sup>a</sup> and 13<sup>a</sup> as shown diagrammatically in the figure. In this arrangement, therefore, the protective devices are connected in circuit in shunt, and when either one of them operates, it opens the shunt in which it is included. At the same time the line is grounded by each device, so that the unduly strong current is shunted away from the instrument to ground, and if of sufficient intensity, the fuses 22, 22 are operated. In addition the device F at the central station closes the alarm circuit so as to call the attention of an attendant to the fact that the device has operated.

From the foregoing it will be seen that the device is exceedingly simple and easy and inexpensive to construct; that it operates with efficiency and effectiveness; and that there is no necessity after operation of repairing the device or replacing any of its parts, the barrel cartridge simply being inverted. It will also be seen that the device can be connected in any desired manner so as to operate in series or in shunt or in other ways.

It will be understood that changes and modifications can be made both in the protective device proper and in the circuit arrangements without departing from the spirit of my invention.

What I claim is:—

1. In an electric circuit, a heat cartridge provided with a body or mass of softenable or fusible material normally held in suspense but released under an excess of heat, and means whereby the circuit conditions are changed on the descent of said body or mass and then restored by a reversal of the cartridge.

2. In an electric circuit, a reversible member provided therein with a mass of softenable or fusible material held normally in suspense but permitted to fall under an excess of heat, means whereby the circuit conditions are changed on the descent of said mass, and means whereby the device is placed in condition for another operation on being reversed after such descent.

3. In apparatus of the class specified, a heat cartridge provided with a body or mass of softenable or fusible material normally held in suspense but released on the passage of an unduly strong current, and means whereby the circuit conditions are temporarily changed and then restored on the descent of said body or mass and the reversal of the cartridge, substantially as described.

4. In apparatus of the class specified, a reversible heat cartridge provided with a body or mass of softenable or fusible material held normally in suspense but permitted to fall on the passage of an unduly strong current, means whereby the circuit conditions are changed by the descent of said body or mass, and means whereby the device

is placed in condition for another operation on being reversed after such descent, substantially as described.

5. In apparatus of the class specified, a heat cartridge comprising a tubular member containing a body or mass of heat susceptible material, a heat concentrating device associated with said cylinder, and contacts at the top and bottom of the tubular member for making connection with the body or mass of heat susceptible material, substantially as described.

6. In apparatus of the class specified, a heat cartridge comprising a bodily reversible tubular member, a conductor entirely confined in said tubular member and held normally in suspense therein but adapted to be released to permit it to fall by a moderate excess of heat, a heat concentrating device associated with such member, and contacts at the top and bottom of said member for making connection with the conductor at either end of the tubular member, substantially as described.

7. In apparatus of the class specified, a heat cartridge comprising a bodily reversible tubular member, a conductor comprising fusible or softenable material confined therein, a heat concentrating device associated with said member, and contacts in the top and bottom of the member for making connection with the softenable or fusible material at either end of the tubular member, substantially as described.

8. In apparatus of the class specified, the combination of a tubular member having insulating head or end pieces, contacts in said head or end pieces projecting into the interior of the tubular member, a body or mass of conducting material softenable or fusible under a moderate excess of heat, said body or mass being confined within the interior of the tubular member, and arranged to make connection with the contacts projecting into the opposite ends of the same, and a heat concentrating device associated with said tubular member, substantially as described.

9. In apparatus of the class specified, a heat cartridge comprising a tubular member having insulating head or end pieces, metallic contact-pins inserted in and projecting through said head or end pieces, a body or mass of solder confined within the tubular member, and a heat concentrating device associated with said tubular member, in combination with metallic clips or contacts arranged to make connection with the outer ends of said contact pins or projections, substantially as described.

10. In apparatus of the class specified, a heat cartridge comprising an insulating tube, insulating end pieces attached thereto, rods extending between said end pieces, a heat concentrating device arranged about



the insulating tube, a body or mass of solder confined therein, and metallic pins 10, 11, 12 and 13, and 10<sup>a</sup>, 11<sup>a</sup>, 12<sup>a</sup> and 13<sup>a</sup> inserted in the insulating end pieces and projecting into the interior of the tube, substantially as described.

11. The combination with an electric circuit, of protective devices included therein, each of said devices comprising a reversible heat cartridge having a body or mass of softenable material confined therein, held normally in suspense but released upon the passage of an unduly strong current, and means whereby said body or mass, on descending, changes the condition of said circuit, substantially as described.

12. The combination with an electric circuit, of protective devices included therein, each of said devices comprising a reversible heat cartridge having a body or mass of softenable material confined therein, held normally in suspense but released upon the passage of an unduly strong current, and means whereby said body or mass, on descending, opens said circuit, substantially as described.

13. The combination with an electric circuit, of protective devices included therein, each of said devices comprising a reversible heat cartridge having a body or mass of softenable material confined therein, held normally in suspense but released upon the passage of an unduly strong current, and means whereby said body or mass, on descending, opens and grounds said circuit, substantially as described.

14. The combination with an electric circuit, of protective devices included therein, each of said devices comprising a reversible heat cartridge having a body or mass of softenable material confined therein; held normally in suspense but released upon the passage of an unduly strong current, and means whereby said body or mass, on descending, grounds said circuit, substantially as described.

15. The combination with an electric circuit, of protective devices included therein, each of said devices comprising a reversible heat cartridge having a body or mass of softenable material confined therein, held normally in suspense but released upon the passage of an unduly strong current, and means whereby said body or mass, on descending, shunts said circuit, substantially as described.

16. The combination with an electric circuit, of protective devices included therein, each of said devices comprising a reversible heat cartridge having a body or mass of

softenable material confined therein, held normally in suspense but released upon the passage of an unduly strong current, and means whereby said body or mass, on descending, opens and shunts said circuit, substantially as described.

17. A device of the class described, comprising a shell having a bodily descendible element entirely inclosed therein and adapted to resolder itself similarly to its former operative position in its descended condition.

18. A device of the class described, having a bodily descendible element entirely confined therein and arranged for release under undue external heat conditions, said device also resoldering itself similarly to its former operative condition in its descended position.

19. A device of the class specified, having a reversible member provided with a bodily descendible element which operatively resolders itself in descended position, whereby on reversal of said member said element is in position to redescend said element being entirely confined within said member.

20. A device of the class specified, comprising a reversible heat cartridge provided with a bodily descendible element which operatively resolders itself in descended position, whereby on reversal of said cartridge said element is in position to redescend said element being confined within said cartridge.

21. A device of the class specified, comprising a heat cartridge having a bodily descendible element entirely confined therein which operatively resolders itself in descended position, and also provided with a heat concentrating device whereby said heat concentrating device will release said element and permit the same to descend, and also whereby said element will be resoldered in such descended position.

22. A reversible device of the class described, having a movable element entirely confined therein adapted in alternative positions to effect like circuit connections, and means whereby said element under the influence of gravity is permitted to assume its alternative position upon the passage of currents of undue strength through said circuit connections.

In witness whereof, I hereunto subscribe my name this 22nd day of December A. D., 1903.

RICHARD WIESINGER.

Witnesses:

JNO. E. BIRD,  
CARL D. ROLFE.