

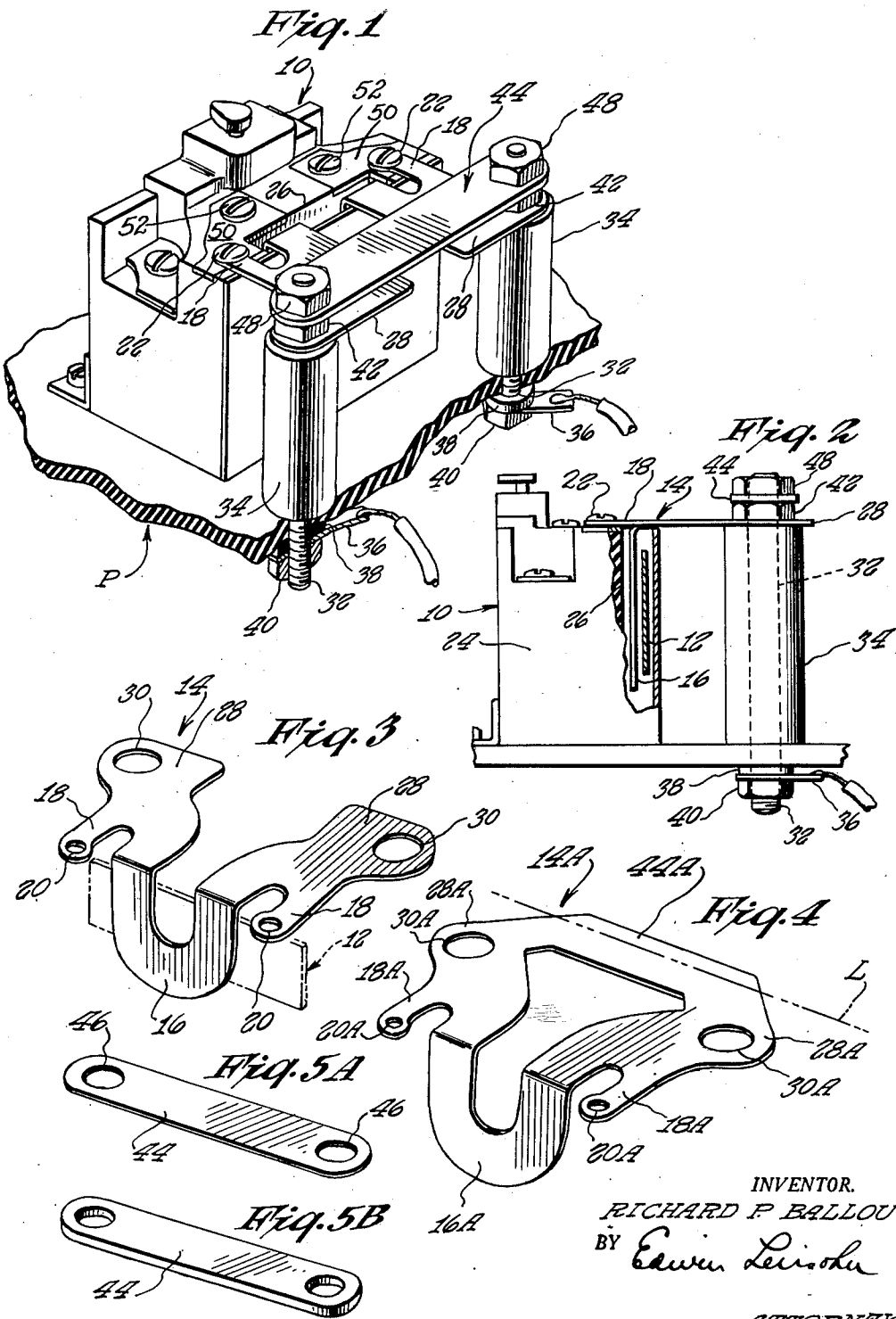
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HEATER AND SHUNT MECHANISM FOR OVERLOAD RELAYS

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HEATER AND SHUNT MECHANISM FOR
OVERLOAD RELAYSRichard P. Ballou, Hartford, Conn., assignor to
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The present invention relates to heaters for the thermo-responsive elements of overload relays or other control devices and to the provision of such heaters with shunts whereby to control the rating of the heater for controlling the operation of the overload relay or other device.

In its more specific aspects, this invention relates to heaters for overload relays of the type used to protect electric motors against excessive currents, usually according to an inverse time-current relationship. According to the present invention, and pursuant to one of the objects thereof, the relay heater is provided with a shunt whereby a heater of fixed electrical and mechanical properties may have its heating characteristic increased without alteration of the relay itself. Thus for example, a comparatively small relay which may be composed of many intricate parts requiring expensive dies for the production thereof may have its current rating considerably increased without any change in the relay itself.

Another object of the invention is the provision of a relay heater and shunt combination of such character that the heat generated in the shunt has no appreciable heating effect on the thermo-responsive element of the relay.

A further object of the invention is the provision of a heater which may be readily attached to the overload relay in accurate position and alignment in relation to the thermo-responsive element of the relay and to the points of attachment of electric terminals for the heater.

The above and other objects, features and advantages of the present invention will be fully understood from the following description considered in connection with the accompanying illustrative drawing.

In the drawing:

Fig. 1 is a perspective view of an overload relay provided with a heater with a shunt embodying the present invention;

Fig. 2 is an end view of the combination shown in Fig. 1, a part of the casing of the relay being cut away for the purpose of illustration;

Fig. 3 is a perspective view of the heater detached from the relay and with the shunt removed, illustrating the heater in relation to the thermo-responsive element of the relay;

Fig. 4 is a perspective view of a heater with an integral shunt;

Figs. 5A and 5B are perspective views of two shunts of different current ratings, respectively.

Referring now to the drawing in detail, the present invention is shown as applied to an overload relay 10 of the construction shown by U. S.

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Patent No. 2,343,862, granted March 14, 1944 to Paul M. Christensen, but it will be understood that the invention is not limited to relays of that particular construction. The thermo-responsive element of said relay comprises the bimetallic strip indicated at 12 in Figs. 2 and 3.

The heater device 14, which is formed in one piece from suitable metal includes the part 16 which constitutes the heater for the relay. Said heater device 14 includes attaching means here shown as ears 18 provided with openings 20 for screws 22 by which said heater device is secured to the insulation casing 24 of the overload relay. As shown, casing 24 is provided with an opening 26 to receive the heater part 16, and it will be understood that said part is automatically disposed in proper relation to the thermo-sensitive element 12 of the relay when device 14 is secured in position by said screws 22. The heater includes laterally spaced parts 28 and part 16 is bent therefrom so as to lie in a plane transversely of said spaced parts. The laterally spaced parts 28 of device 14 are provided with openings 30 for mounting device 14 on supporting means constituted by metal lugs 32 which, as here shown, are in the form of screw-threaded rods in screw-threaded engagement with companion internally screw-threaded sleeves or studs 34. Lugs 32 project beyond both ends of the companion studs 34, and one end of each lug projects through an opening in the insulation panel P for connection to an electric terminal 36 which is disposed between a washer 38 and a clamping nut 40. Holes 30 of device 14 are considerably larger in diameter than lugs 32, thus obviating the necessity for precise location of the relay 10 with respect to these lugs. Further in this connection it will be noted that the large size of holes 30 in relation to lugs 32 prevents distortion of the heater device in attaching it to the studs and thus obviates any modification of the characteristics of the relay and heater combination. Device 14 is secured to lugs 32 by nuts 42.

The shunt for the heater is in the form of a metal member or part here shown as a strip 44 of pre-determined thickness, said shunt being electrically and mechanically secured to lugs 32 and thus electrically connected between spaced parts 28 at points remote from heater part 16, said shunt being remotely spaced also from the thermo-element 12 whereby heat generated in the shunt will have substantially no heating effect on said element. Said shunt is provided with holes 46 through which the upper ends of the lugs 32 project, and nuts 48 are provided for

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securing the shunt in position in parallel circuit relation with heater part 16. In Figs. 5A and 5B two shunts 44 of different thicknesses, respectively, are shown, but it will be understood that a series of shunts of different thickness may be provided, so that a shunt of the desired thickness, according to the desired calibration of the relay, may be selected and applied in conjunction with the heater device 14 according to load protection requirements.

As illustrated in Fig. 4, the shunt may be formed integrally with the heater device. Otherwise, in this form of the invention the heater device 14A may be of the same construction as the heater device 14 and is secured to the relay and to the lugs 32 in the same way as heater device 14. Accordingly it will be noted that the parts of heater device 14A which correspond to the similar parts of device 14 are designated by the same reference numerals with the added reference letter A. The shunt part or member 44A, however, instead of varying in thickness as in the case of shunt 44 is of varying width as indicated by the dot-and-dash line L, in order to predetermine the current rating of the heater portion 16A for the thermo-responsive element 12 of the relay. As a result of this construction of unit 14A, the shunt 44A can be made of the desired width by supplying sheet metal stock of proper width to the die that stamps out the part, or by an auxiliary shearing operation as indicated by the dot-and-dash line L. Thus units of different ratings may be made by the same die.

It will be observed that in the form of the invention illustrated in Figs. 1 to 3, as well as in the form of the invention illustrated in Fig. 4 the mounting ears 18 are spaced from the main body of the heater device and are of restricted width for the purpose of reducing the flow of heat into the relay by thermal conduction.

It will be noted that the relay 10 is provided with terminal members 50 to which the ears 18 (or 18A) of the heater device are secured by the fastening screws 22. Said terminal members are provided with terminal screws 52 by which the electric wires may be connected to the heater when the relay is provided with a heater of the form shown in the above mentioned Patent No. 2,343,862. In other words, it will be understood that a relay such as that shown by said patent may be supplied as the manufacturer's standard form of relay, and that when it is desired to change the characteristics of the relay and heater combination, the heater supplied with the standard overload relay may be removed and replaced by the heater of the present invention. Thus, when the relay is furnished without the heater of the present invention, the mounting lugs and studs 32, 34 are not required and the wires for conducting the current through the heater instead of being connected to the lugs 32 are connected to the terminals 50 by screws 52 and the heater supplied with the standard overload relay is connected to said terminals 50 by the screws 22.

It will be understood that the present invention may be embodied in various specific constructions other than those herein illustrated or specifically described and that various changes in the details of construction and in the arrangement of parts may be made without departing from the underlying idea or principles of my invention within the scope of the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. An electric heater for a thermostatic control

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device of an automatic circuit breaker, comprising an electrically conductive heater member having a heater part adjacent one end thereof, laterally spaced terminal portions in electrically conductive relation to said heater part for connecting said member in an electric circuit, said laterally spaced terminal portions being spaced from said heater part whereby the latter may be mounted adjacent to said thermostatic control device and is thermally remote from said terminal portions so that when the latter are bridged by a shunt the heat generated by the current traversing said shunt is substantially prevented from heating said heater part, and portions disposed adjacent said end of the heater member for mounting the latter on the circuit breaker.

2. An electric heater for a thermostatic control device of an automatic circuit breaker, comprising an electrically conductive heater member having a heater part adjacent one end thereof, laterally spaced terminal portions in electrically conductive relation to said heater part for connecting said member in an electric circuit, said laterally spaced terminal portions being spaced from said heater part whereby the latter may be mounted adjacent to said thermostatic control device and is thermally remote from said terminal portions so that when the latter are bridged by a shunt the heat generated by the current traversing said shunt is substantially prevented from heating said heater part, said heater part and said terminal portions being formed in one piece of sheet metal and being disposed, respectively, in planes transversely of each other.

3. An electric heater for a thermostatic control device of an automatic circuit breaker, comprising an electrically conductive heater member having a heater part adjacent one end thereof, laterally spaced terminal portions in electrically conductive relation to said heater part for connecting said member in an electric circuit, said laterally spaced terminal portions being spaced from said heater part whereby the latter may be mounted adjacent to said thermostatic control device and is thermally remote from said terminal portions so that when the latter are bridged by a shunt the heat generated by the current traversing said shunt is substantially prevented from heating said heater part, a support provided with spaced terminal lugs, said spaced portions having apertures to receive said lugs, said apertures being larger than said lugs for clearance therebetween, and means for fastening said spaced portions to said lugs.

4. An electric heater for a thermostatic control device of an automatic circuit breaker, comprising an electrically conductive heater member having a heater part adjacent one end thereof, laterally spaced terminal portions in electrically conductive relation to said heater part for connecting said member in an electric circuit, said laterally spaced terminal portions being spaced from said heater part whereby the latter may be mounted adjacent to said thermostatic control device and is thermally remote from said terminal portions so that when the latter are bridged by a shunt the heat generated by the current traversing said shunt is substantially prevented from heating said heater part, a support provided with spaced terminal lugs, said spaced portions having apertures to receive said lugs, said apertures being larger than said lugs for clearance therebetween, means for fastening said spaced portions to said lugs, and a shunt adapted to be electrically connected to said lugs and to said

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spaced terminal portions whereby the current supplied to said terminal lugs on said support is fed to said heater part and to said shunt in parallel circuit relation.

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