May 20, 1952 C. V. STARKEY 2,597,759

THERMAL OVERLOAD CUTOUT FOR ELECTRICAL APPARATUS

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FIG. 1.

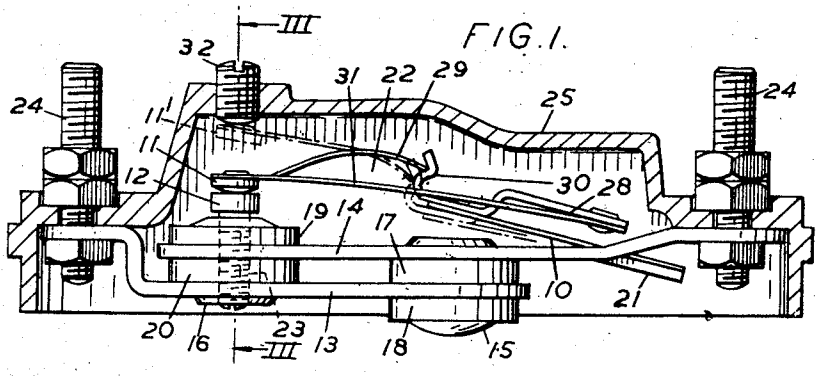


FIG. 2.

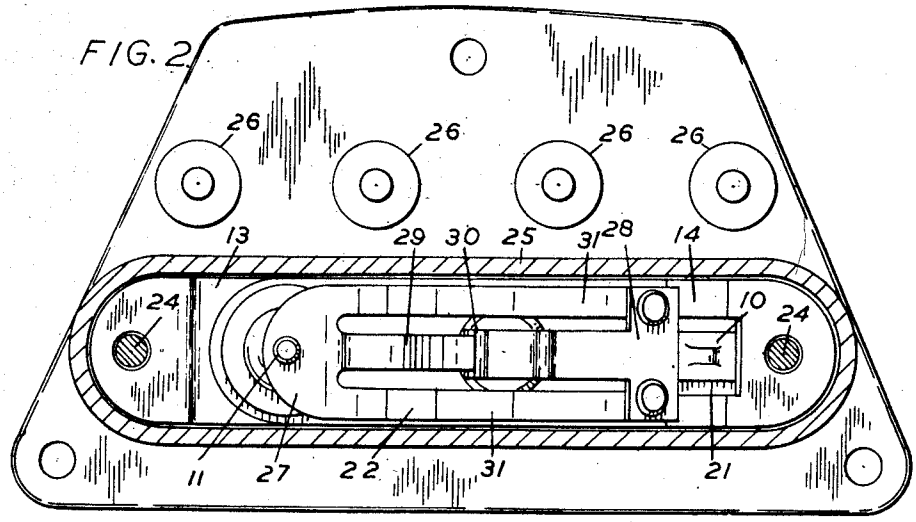
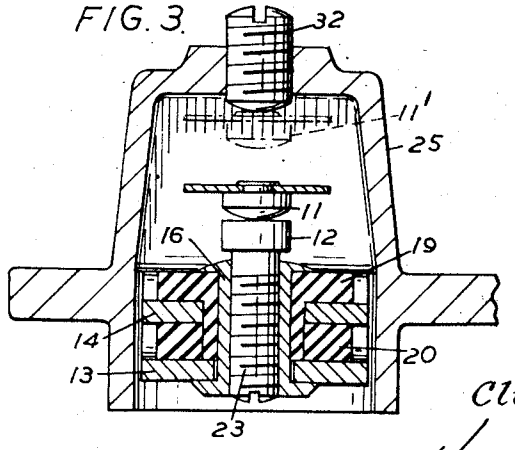


FIG. 3.



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THERMAL OVERLOAD CUTOUT FOR ELECTRICAL APPARATUS

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5 Claims. (Cl. 200—113)

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This invention relates to thermal overload cut-outs for electric motors or other electrical apparatus, in which a bimetallic strip is arranged to be heated by the load current and, when distorted by heat generated by excessive load current or otherwise, causes an associated pair of electric contacts to open and thereby interrupts the load current. The invention is concerned with a method of mounting the bimetallic strip and associated contacts.

According to the present invention a thermal overload cut-out of the type specified includes a pair of overlapping metal strips rigidly joined together but electrically separated by insulating material, which strips support the bimetallic strip and associated contacts of the cut-out. By this means the cut-out is mounted on a rigid support which, being mainly composed of metal, does not suffer from the warping associated with insulating materials such as synthetic resin and consequently does not upset the adjustment of the cut-out.

Preferably the electric current controlled by the cut-out passes from one of the metal strips to the other by way of the bimetallic strip and its associated contacts, and the electric supply leads may be connected for use respectively to the outer ends of the overlapping metal strips, if desired by terminals which are also used to mount the metal strips.

One or both of the overlapping metal strips may be stepped for the purpose of alignment of associated parts, for example in order to align the outer ends of the two strips in a common plane for mounting purposes.

The invention may be carried into effect in various ways, but one specific embodiment will now be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a side elevation of a thermal overload cut-out,

Figure 2 is a plan of the cut-out of Figure 1, and

Figure 3 is a section on the line III—III of Figure 1 on a slightly larger scale.

In the embodiment shown in the drawings, a thermal overload cut-out comprising a bimetallic strip 10 and a pair of associated contacts 11 and 12 is mounted on a support formed by a pair of overlapping metal strips 13 and 14 rigidly joined together by two metal rivets 15 and 16, but electrically separated by washers 17, 18, 19 and 20 made of insulating material and surrounding the rivets. The metal strips 13 and 14 are stepped as shown in Figure 1 so as to bring the various parts into correct alignment.

One end of the bimetallic strip 10 is welded to a tongue 21 punched out from the metal strip 14 near its outer end, and the other end of the bimetallic strip supports a snap-over spring ar-

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rangement 22 which carries at its outer end the contact 11. The other contact 12 is mounted on the head of the securing rivet 16 by means of a screw 23 passing into the rivet, as shown best in Figure 3, so that the contact 12 is electrically connected to the strip 13 while being insulated from the strip 14 by the bushed washer 19. The outer ends of the overlapping metal strips 13 and 14 are fastened by terminals 24 to a cover 25 of moulded synthetic resin or other insulating material which supports and protects the whole structure and which forms a part of the cover of associated electrical apparatus, the electric supply leads (not shown) carrying the load current of the latter being connected by the terminals 24 to the two metal strips 13 and 14. Thus the load current of the associated electrical apparatus passes from one to the other of the metal strips 13 and 14 by way of the bimetallic strip 10, the spring arrangement 22 and the electric contacts 11 and 12, and can only flow when the latter are closed. The cover 25 also carries further terminals 26 for the various connections of the associated electrical apparatus.

The snap-over spring arrangement 22 carried by the bimetallic strip 10 comprises a three-legged strip 27 of springy material such as beryllium-copper, carried by a T-shaped support 28 which in turn is welded to the free end of the bimetallic strip 10. The centre leg 29 of the strip 27 is bowed slightly and is placed in axial compression, its foot resting in a trough 30 formed in the foot of the T-shaped support 28. The outer legs 31 are longer than the inner leg 29 and are tide to the ends of the cross-bar of the T-shaped support 28. Thus the inner leg 29 acts as a bowed strut and tends to straighten itself and thereby to bend the outer legs 31 in one direction or the other way from the dead-centre position. The head of the three-legged spring 27, where the three legs meet, supports the movable electric contact 11.

The arrangement is such that at normal temperatures the two contacts 11 and 12 are held closed by the spring arrangement 22. Should the bimetallic strip 10 become hot, through carrying an excess current for example, it will bend until the three-legged spring 27 passes over its dead-centre position and abruptly opens the contacts with a snap, moving the contact 11 to the position 11' shown in chain lines in Figures 1 and 3.

An adjusting screw 32 mounted in the insulating cover 25 limits the extent to which the movable contact 11 can move in opening, that is to say determines the position 11', and hence also determines the temperature at which the bimetallic strip 10 in cooling again will cause the three-legged spring 27 to pass once more over its dead-centre position and to snap the contacts 11 and 12 closed again.

It will be observed that the operation of the cut-out depends upon the surrounding temperature as well as upon the heating effect of the current carried by the bimetallic strip 10. Thus if for any reason the motor or other associated apparatus is running hot and thereby raises the temperature of the bimetallic strip, a smaller value of the load current will serve to heat the bimetallic strip further to its critical temperature and thereby to open the cut-out.

What I claim as my invention and desire to secure by Letters Patent is:

1. In an electrical cutout, a casing of insulating material, said casing having one side open and being adapted to form a closure for an opening in the casing of an electrical device, a shoulder formed interiorly of said casing at each end thereof, said shoulders being spaced upwardly from the open side of said casing, an electrically conducting support secured to each of said shoulders, said supports lying in superimposed relationship to each other within said casing and being insulated from each other, a bimetallic element having one end secured to the uppermost of said supports with its free end overlying said uppermost support, a first electrical contact carried by the free end of said bimetallic element and a second electrical contact electrically connected to the lowermost of said supports, said second contact extending above said uppermost support and normally being in contact with said first contact, said bimetallic element being constructed to move said first contact away from said second contact upon a rise in temperature.

2. In an electrical cutout according to claim 1 in which said bimetallic element is secured to a tang struck from said uppermost support.

3. In an electrical cutout according to claim 1 in which the means for connecting said supports to said shoulders extends through said casing and forms terminal connections for connecting electrical conductors to the ends of said supports.

4. In an electrical cutout according to claim 3 in which said uppermost support, said bimetallic element, said first and second contacts and said lowermost support forms an electrically conducting path from one end of said casing to the other.

5. In an electrical cutout according to claim 1 in which said shoulders are positioned the same distance above the open side of said casing, the ends of said supports are secured to said shoulders and at least one of said supports is of stepped formation so as to position the main bodies of said supports in overlapping superposed relationship.

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