

THERMOSTATIC SWITCH

It is known in the prior art to manufacture thermostatic switches comprising a housing of electrically nonconductive material having a cap of nonconductive material attached thereto so as to provide a closed chamber, a fixed contact member within the chamber, and a movable contact also within the chamber normally in engagement with the fixed contact to close the switch, and a transfer pin projecting through the cap into the chamber for engagement with the movable contact to force the latter away from the fixed contact to open the switch. Movement of the transfer pin is controlled by a bimetallic disc mounted to the cap exteriorly of the chamber so as to engage the protruding end of the transfer pin to move the latter axially to disengage the movable contact from the fixed contact responsive to a predetermined temperature condition. The switch as thus constructed makes or breaks the flow of current between two live conductors, one of which is electrically connected to the fixed end of the movable contact and the other of which is connected to a terminal which is in turn connected to the fixed contact.

There are, however, situations wherein only one live conductor is used to pass current to the switch, that is, the switch is connected to ground rather than having a second live conductor which carries away the current. If such is the situation, it would be necessary to electrically shunt the terminal which extends from the fixed contact to the metallic peripheral cap that is normally used to maintain the housing, cover, and disc in assembled relation, it being understood that the cap is connected to ground by virtue of the mounting of the switch assembly in a member or device that is in turn grounded. It is obviously impractical to connect such a shunt between the fixed contact and the cap member and so thermostatic switches have been specifically designed for grounded application. For example, the bimetallic disc may be provided with a contact member centrally secured to its upper surface whereby when the disc snaps upwardly to its closed position, the contact engages a fixed contact to close the switch. Since the peripheral edge of the bimetallic disc is retained by and hence is in engagement with the metallic cap, the switch will automatically be grounded because, when the switch is closed, current will flow through the disc to the cap to effect grounding.

The problem with this type of arrangement is that the flow of current through the bi-metallic disc generates heat which adversely affects the thermostatic action of the switch. For example, the heat so generated causes the switch to prematurely close or open, as the case may be. The purpose of the present invention is to provide an improved thermostatic switch for connection to ground which enables continued use of standard parts of a conventional thermostatic switch as much as possible and which reduces the flow of current through the bi-metallic element to a sufficient extent to eliminate adverse effects in the thermal accuracy of the switch, as would happen in the switch referred to above.

Accordingly the present invention consists in a thermostatic switch comprising a housing defining an open ended chamber, said housing being formed of electrically non-conductive material; a cover of electrically conductive material secured to the housing to close said chamber; a movable contact of electrically conductive material situated in the chamber and biased into engagement with said cover, the cover thereby serving as a fixed contact; a bi-metallic element mounted exteriorly of the chamber and a non-conductive transmitter extending from the bi-metallic element into the chamber for engagement with the movable contact, said transmitter being movable by the bi-metallic element to separate the movable contact from the fixed contact.

The invention will now be described by way of example with reference to the accompanying drawings in which:-

Fig. 1 is a plan view of one side of a thermostatic switch according to this invention;

Fig. 2 is a plan view of the other side of the switch shown in Figure 1;

Fig. 3 is a diametral section taken on the line 3-3 of Fig. 1 with the movable contact spring-biassed into engagement with the fixed contact; and

Fig. 4 is a section corresponding to Fig. 3 with the movable contact disengaged from the fixed contact.

Referring to the drawing, the thermostatic switch comprises a housing 10, a cover 12 which, as will appear hereinafter, functions as a fixed contact, a movable contact 14 and a bimetallic element 16. The housing is comprised of a non-conductive material, is preferably of circular cross section and defines an open-ended chamber 18 at the open end of which there is a rim 20 provided with an outwardly-protruding lip 22. The cover 12 is comprised of conductive material such as brass and is in the form of a disc 24 dimensioned to enclose the chamber 18 and provided with an annular flange 26 dimensioned to seat against the rim 20 of the housing 10 and to be attached thereto

by a metallic retaining cap or ring 28. It is important to note that both the cover and the cap are comprised of conductive metal and that the cover actually functions as the fixed contact of the switch.

The movable contact 14 is fixed to the end of a spring arm 29, the other end of which is mounted to the housing by means of a terminal pin or rivet 30 which has at its inner end a head 32 engaged with the spring member and at its other end a head 34 engaged with a lead member or terminal 36. The spring member resiliently

biases the movable contact 14 into engagement with the inner surface of the fixed contact 24.

The bimetallic element 16 is in the form of a circular disc and is mounted externally of the cover 12 with an annular recess 38 formed in its outer side, by means of flange portion 40 of the retaining cap 28. Movement of the bimetallic element in response to a temperature change is transmitted to the spring arm of the movable contact to move the latter away from the fixed contact by a transmitter element or transfer pin 42 mounted in bore 44 extending through the cover, with one end extending into the chamber in engagement with the spring arm and the other end protruding from the cover into a position closely adjacent to the inner side of the bimetallic element. Desirably, the outer face of the cover is recessed at 46 to allow the bimetallic element some freedom of play. The pin 42 is of nonconductive material.

As thus constructed, the thermostatic switch has only one live contact, that is, the movable contact 14 which is connected by the spring arm 29 to the terminal 30 and lead 36.

When the switch is closed, i.e. the movable contact 14 is in engagement with fixed contact 24, connection to ground is accomplished by the flow of current through the cover 12 to annular flange 26 and then to retaining cap 28 which is grounded by virtue of the mounting of the switch in a member or device that is in turn somehow grounded. The result is a highly simple, low resistance connection to ground because the path of current flow from contact 24 to cap 28 is minimal, and since no appreciable current flows through this bimetallic disc 16, no heat is generated therein such as would adversely affect the thermal accuracy of the switch.

Preferably, the inner surface of the fixed contact is coated with a thin layer 48 of silver or other suitable metal of high electric conductivity so as to effect a better contact.

It will be understood that the thermostatic switch of the present invention has particular utility in connection with various hand held electric appliances where it is desired to automatically shut off current to the device when the temperature of the device reaches a predetermined limit.

While there is shown and described herein certain specific structure embodying the invention, it will be manifest to those skilled in the art that various modifications and rearrangements of the parts may be made without departing from the underlying inventive concept and that the same is not limited to the particular forms herein shown and described except insofar as indicated by the scope of the appended claims.



CLAIMS

1. A thermostatic switch comprising a housing defining an open ended chamber, said housing being formed of electrically non-conductive material; a cover of electrically conductive material secured to the housing to close said chamber; a movable contact of electrically conductive material situated in the chamber and biased into engagement with said cover, the cover thereby serving as a fixed contact; a bi-metallic element mounted exteriorly of the chamber and a non-conductive transmitter extending from the bi-metallic element into the chamber for engagement with the movable contact, said transmitter being movable by the bi-metallic element to separate the movable contact from the fixed contact.
2. A thermostatic switch according to Claim 1, wherein said transmitter extends through the cover.
3. A thermostatic switch according to Claim 1 or Claim 2, wherein the movable contact is yieldably supported from the housing.
4. A thermostatic switch according to any one of the preceding claims, wherein said housing is of generally cylindrical form and said cover takes the form of a disc covering the open end of the housing, there being provided retaining means for securing the cover to the housing.
5. A thermostatic switch according to Claim 4, wherein said retaining means is formed of electrically conductive material whereby when said retaining means is connected to ground, said fixed contact will automatically be grounded by virtue of its engagement with said retaining means.
6. A thermostatic switch according to any one of the preceding claims, wherein the outer face of the cover is recessed to accommodate



7. A switch according to Claim 4, wherein the outer side of the cover has at its periphery a recessed groove for receiving the peripheral edge of the bi-metallic element, and the retaining means for securing the cover to the housing comprises a ring, a part of which overlies the housing and a part of which overlies the peripheral edge of the bi-metallic element to maintain the latter in assembled relation.
8. A thermostatic switch according to Claim 7, wherein the cover comprises a circular central portion of smaller cross section than the open end of the housing so that it fits into the housing, and a peripheral flange generally corresponding in diameter to the outer diameter of the housing, said flange being held in engagement with the open end of the chamber by said ring.
9. A thermostatic switch according to any one of the preceding claims, wherein the surface of the fixed contact which is in engagement with the movable contact has a coating thereon of metallic material that has a higher electrical conductivity than the material of which said fixed contact is constructed.
10. A thermostatic switch according to Claim 9, wherein said coating is silver and said fixed contact is constructed of brass.
11. A thermostatic switch according to any one of the preceding claims, wherein a hair spring supports the movable contact in spring biased engagement with the fixed contact.
12. A thermostatic switch substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

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