United States Patent [19]

Wehl

[11] **3,789,339**

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[54] **THERMOSTATIC SWITCH**

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[52] **U.S. Cl.** **337/95,** 337/38, 337/335, 337/397

[51] **Int. Cl.** **H01h 61/00**

[58] **Field of Search** . 337/89, 38, 95, 335, 336, 368, 337/390, 397

[56] **References Cited**

UNITED STATES PATENTS

2,820,870	1/1958	Moksu	337/368
3,443,259	5/1969	Wehl et al.	337/89
3,609,618	9/1971	Wells	337/95
3,624,579	11/1971	Carlson	337/95

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[57] **ABSTRACT**

A thermostatic switch having a bimetallic electric-contact-carrying blade with a dish-shaped snap portion is provided. "Creep" opening of the contacts prior to snap-open action is substantially eliminated by forming the terminal arm that carries the bimetallic blade and the fulcrum for the dish-shaped portion of a bimetal positioned to deflect in response to temperature change in a direction opposite to the direction in which the bimetallic blade deflects.

5 Claims, 2 Drawing Figures

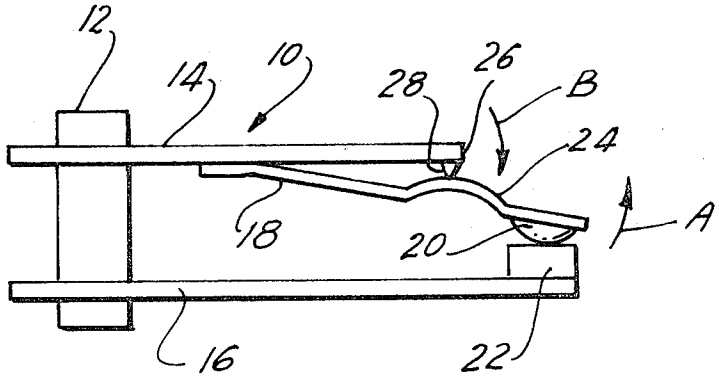


FIG. 1

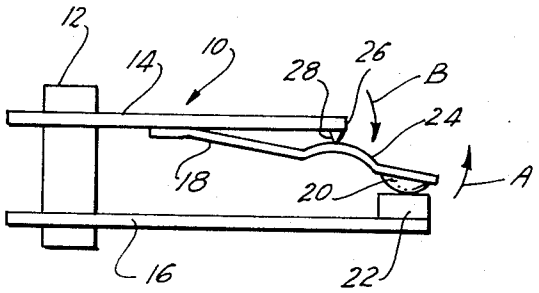
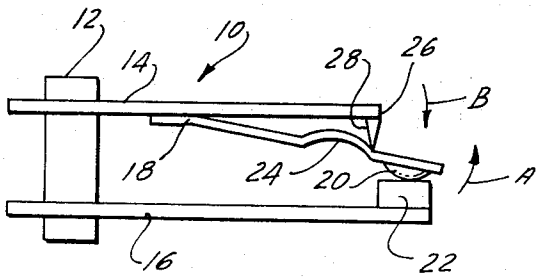


FIG. 2



THERMOSTATIC SWITCH

BACKGROUND OF THE INVENTION

The present invention relates to thermostatic switches such as those used for overload protection purposes with small electric motors, home appliances, etc. Heretofore, attempts have been made to secure positive, quick-opening (and closing) action in thermostats of this general type by providing a dish-shaped portion in the contact carrying, bimetallic blade (see U.S. Pat. No. 2,820,870). Such assemblies, however, are subject to "creep" which is the tendency for the electric contacts to separate slightly as temperature increases prior to the snap action occurring. Such creep action can cause sparking which is destructive to the contacts and destroys the intended beneficial effect of the snap action, which is to rapidly separate the electric contacts when a predetermined temperature has been reached.

In the past, thermostatic switches of the type described were formed with a pair of rigid arms with one arm carrying a fulcrum designed to bear down on the dish-shaped portion of the bimetallic blade. Various attempts were made to minimize and compensate for the tendency of the contacts to creep by varying the relationship between the fulcrum and dish-shaped portion (see U.S. Pat. No. 3,443,259). The present invention provides a novel approach at solving this same problem.

The principal object of the present invention is to provide an inexpensive thermostatic switch which may readily be mass-produced and is virtually creepless.

SUMMARY OF THE INVENTION

In accordance with the present invention, a thermostatic snap switch is provided comprising a mounting member having first and second terminal arms extending out therefrom in spaced relationship with each other. An elongated, bimetallic blade adapted to deflect in response to temperature change has one end coupled to the first arm and the other end free. The blade extends along the side of the first arm directed toward the second arm and carries a contact at its free end. An intermediate portion of the blade is dished to provide a snap-acting portion. The blade carrying arm includes a fulcrum means adapted to bear on the strip and is formed of a bimetal positioned to deflect in response to temperature change in a direction opposite the direction in which the bimetallic blade deflects in response to the same temperature change.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings:

FIG. 1 is a simplified sectional view of a switch in accordance with the present invention; and,

FIG. 2 is a view similar to FIG. 1 showing an alternative form of construction of the present switch.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Reference is now made to the drawings wherein the thermostatic switch of the present invention is illustrated and wherein similar components bear the same reference numerals throughout both views. Accordingly, the switch **10** comprises a mounting member **12** formed of a suitable insulating material through which a pair of arms **14** and **16** extend in spaced relationship with each other. The first arm **14** has coupled thereto one end of a bimetallic blade **18**. The other end of blade **18** is free and carries a contact **20**. If desired, a suitable electrical contact **22** may also be provided on arm **16** for engagement with contact **20**.

Intermediate the ends of arm **18** is a dished-out portion **24** of blade **18** which is located fairly close to the center of the blade. Arm **14** carries at its forward end **26** a fulcrum **28** which in the primary embodiment of the present invention contacts the convex side of the dished-out portion. As is well known in the art, and as described in the above cited patents, as the blade **18** heats up, the fulcrum exerts increasing pressure on the convex side of the dished-out portion **24** of blade **18** until the dished-out portion snaps into a concave position at which time contacts **20** and **22** separate. To this end, the bimetallic material chosen for blade **18** is positioned such that an increase in temperature causes it to curl upwardly in the direction indicated by arrow A.

In accordance with the present invention, the first arm **14** which carries blade **18** is formed of a bimetal positioned to creep in the direction indicated by arrow B opposite to the direction of the blade's creep. The second arm **16** is formed of a rigid material which remains relatively unchanged by temperature changes. The bimetallic material for arm **14** is chosen so that its creep toward arm **16** is at a rate equal to or greater than the creep of blade **18** away from arm **16**. In this manner, the blade contact **20** is maintained in engagement with contact **22** virtually up until the moment the dished portion **24** reverses itself so as to minimize and virtually eliminate any creep and hence sparking at the contacts.

The construction of the alternate embodiment of FIG. 2 is virtually identical with that of the primary embodiment except that in the alternate embodiment the point of fulcrum **28** contacts blade **18** at the forward edge of the dished-out portion **24**. The operation of the switch, however, is identical with that described for the primary embodiment.

In operation, as the temperature sensed by the switch increases, the bimetal blade tends to curve upwardly while the bimetal arm tends to curve downwardly at a rate equal to or greater than that at which the blade is curling up thereby causing an increased pressure to be exerted by the fulcrum on the blade. Eventually the pressure of the fulcrum on the dished-out portion causes it to reverse itself so that the contacts open. However, up until virtually the moment of reversal, the contacts are maintained in good electrical engagement. Accordingly, the above objective is effectively attained.

Having thus described the invention, what is claimed is:

1. In a thermostatic snap switch of the type comprising: a mounting member; first and second terminal arms supported by said mounting member extending out therefrom in spaced relationship with each other; an elongated bimetal blade adapted to deflect in response to a temperature change having one end coupled to the first arm and the other end free extending along the side of the first arm directed toward the second arm, said blade having a part thereof dished to provide a snap-acting portion; and fulcrum means carried by the first arm and bearing on the strip; the improvement wherein said one arm is formed of a bimetal positioned to deflect in response to temperature change in

a direction opposite to the direction in which the bimetal blade deflects in response to the same temperature change.

2. The thermostatic switch in accordance with claim 1 wherein the first arm deflects at a rate equal to or greater than the rate at which the blade deflects.

3. The switch in accordance with claim 1 wherein the first arm deflects toward the second arm with an increase in temperature and said bimetal blade deflects toward the first arm with the same increase in temperature.

4. The switch in accordance with claim 1 wherein the fulcrum bears on the dished snap-acting portion of the blade.

5. The switch in accordance with claim 1 wherein the fulcrum bears on the dished snap-acting forward edge of the dished snap-acting portion.

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