

Oct. 11, 1966

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3,278,705

THERMOSTATIC SWITCH

Filed March 26, 1964

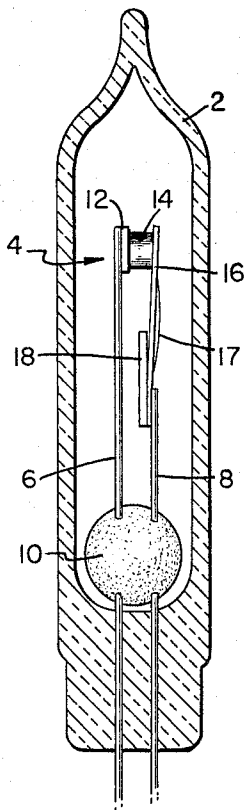


FIG. 1

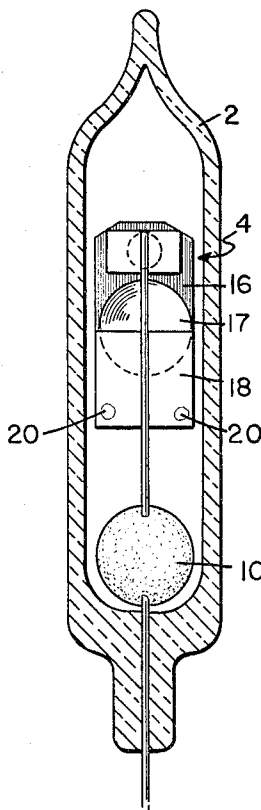


FIG. 2

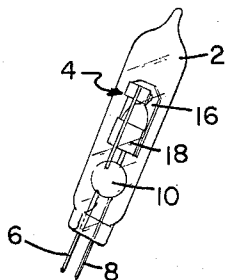


FIG. 3

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3,278,705

THERMOSTATIC SWITCH

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Filed Mar. 26, 1964, Ser. No. 354,896
2 Claims. (Cl. 200—113)

This invention relates to thermostatic switches and more particularly to those employing temperature sensitive metal plates of the snap action type. The switch is designed and is particularly suited for use as an ambient temperature detecting and/or current sensitive device in connection with the operation of electrical equipment, such as motors for example. Early detection of abnormal ambient temperature conditions in the operations of electrical equipment, such as motors for example, is quite important because the electrical equipment itself is quite expensive and any substantial malfunction thereof usually results in serious interruptions of operations associated therewith.

In my copending application, Serial Number 282,786, filed May 23, 1963, entitled "Thermostatic Switch," an improved form of snap action temperature sensitive device is disclosed. It comprises a hermetically sealed glass envelope enclosing a switch assembly comprising a glass bead, a pair of posts, a pair of contacts, one movable and the other stationary, and a thermostatic plate having a dimple formed therein. The present invention is an improvement thereover in that it features means for removing heat from the thermostatic member to improve the breaker characteristics.

A switch of the type disclosed in my copending application uses a plain dish thermosensitive blade to sense a temperature rise and to snap open when the temperature exceeds the natural snap point of the particular combination of material and blade shape. Switches of this type are quite sensitive to temperature and current changes and as a result they are limited in their application as a protective device to use with relatively small motors.

In view of the foregoing, the principal object of this invention is to provide a thermal switch capable of withstanding much greater current before it opens.

This and other objects, advantages and features are attained, in accordance with the principles of this invention, by a heat sink in the form of a metal plate integrated into the switch assembly in a manner described in detail below. The stiffening effect of the metal plate on the thermal snap blade results in cleaner snap action.

One of the features of the heat sink type of switch of this invention is the reduction in derating experienced during the sealing operation. During assembly of the switch envelope and the switch assembly, some of the components of the switch assembly reach a fairly high temperature which, if it exceeds the treatment temperature previously used, will cause a derating of the breaker by virtue of the stress relieving effect of the heat.

The increased temperature tolerance of the unit is due to the heat sink effect of the metal plate during sealing and operation, resulting in a lower temperature being attained by the thermal snap blade and thus reducing the stress during sealing and sensitivity during operation. Thermal snap blades, or any thermostatic element, tends to move slowly during heating so that if a contact is attached thereto, the contact pressure slowly increases or decreases depending upon the arrangement, until the critical point is reached, at which time the snap action or contact opening takes place. This change in pressure may result in contact burning or contact resistance chang-

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ing to an extent detrimental to the operation. With the metal plate added, however, the lower corners of the thermal snap blade are restrained and the premovement is restricted considerably.

5 In the accompanying drawing,

FIGURE 1 is a side elevational sectional view of an embodiment of the switch of this invention.

FIGURE 2 is a front elevational sectional view of the switch of FIGURE 1.

10 FIGURE 3 is a perspective view on a smaller scale of the switch of FIGURES 1 and 2.

The specific embodiment of the thermostatic switch of this invention illustrated in the accompanying drawing comprises a glass envelope 2 within which a switch assembly 4 is hermetically sealed. The switch assembly 4 comprises a pair of Dumet posts 6 and 8 supported by and maintained in spaced relationship with respect to one another by a glass bead 10 through which the posts extend and in which the posts are embedded. The Dumet posts 6 and 8 are springy enough to allow a fixed contact 12 on post 6 to follow a moving contact 14 during its premovement and to a position slightly beyond the snap point. A thermostatic plate 16 having a centrally located dimple 17 is mounted on the post 8, the upper end of the post 8 terminating adjacent to the lower peripheral edge of the dimple 17. The moving contact 14 is mounted on the upper end of the thermostatic plate 16 with the lower edge thereof tangent to the upper peripheral edge of the dimple 17.

30 A heat sink, in the form of a metal plate 18, is secured to the lower front face of the thermostatic plate 16 and is of substantially the same width and is long enough to extend about to the center of the dimple 17. The metal plate 18 lies substantially parallel to the axis of the supporting post 8 and thus does not actually touch the thermostatic plate 16 except at the lower end where it is welded thereto. Pressure on the contacts 12 and 14 also contributes to this separation. As may be noted in FIG. 2, welds 20 are located in the area of the lower corners of the thermostatic plate 16 below the line of a tangent to the lowest point of the dimple 17 and at a right angle to the axis of post 8.

The glass envelope 2 is provided with a filling of gas, such as helium, hydrogen, nitrogen or dry air for example, to provide for heat transfer thereto from the switch assembly 4, to improve the contact insulation when open, and to eliminate moisture and other contaminants.

What I claim is:

1. A thermostatic switch comprising: a hermetically sealed glass envelope; a pair of posts supported in spaced relationship and substantially parallel to one another within said envelope; a thermostatic plate, having a centrally located dimple formed in the front face thereof, mounted on one of said posts; a first electrical contact member mounted on said thermostatic plate; a second electrical contact member mounted on the other of said posts, said first and said second electrical contact members being disposed in operative relationship with respect to one another; and a heat sink in the form of a metal plate secured to the lower front face of said thermostatic plate, said heat sink lying substantially parallel to the said one of said posts on which said thermostatic plate is mounted and spaced from said thermostatic plate except in the immediate area where it is attached thereto.

2. A thermostatic switch comprising: a hermetically sealed glass envelope; a pair of posts supported in spaced

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relationship and substantially parallel to one another within said envelope; a thermostatic plate, having a centrally located dimple formed in the front face thereof, mounted on one of said posts; a first electrical contact member mounted on said thermostatic plate; a second electrical contact member mounted on the other of said posts, said first and said second electrical contact members being disposed in operative relationship with respect to one another; and a heat sink in the form of a metal plate secured to the lower front face of said thermostatic plate, said heat sink overlying substantially about one-half of said dimple, and lying substantially parallel to the said one of said posts on which said thermostatic plate is mounted and spaced from said thermostatic plate except in the immediate area where it is attached thereto.

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