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THERMAL SWITCH UTILIZING A HOUSING WITH AN OPENING
IN WHICH A THERMAL ELEMENT SUPPORTS
A SPRING BY A CONTACT MEANS
Filed May 15, 1961

3,201,549

Fig. 1.

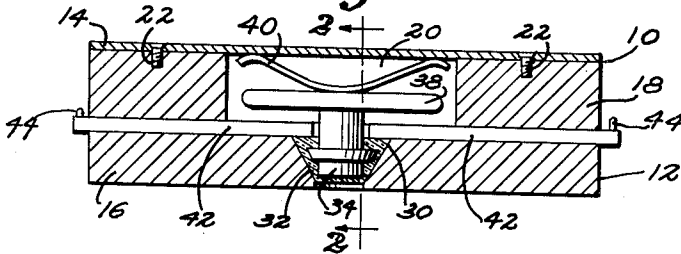


Fig. 2.

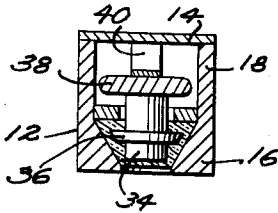


Fig. 3.

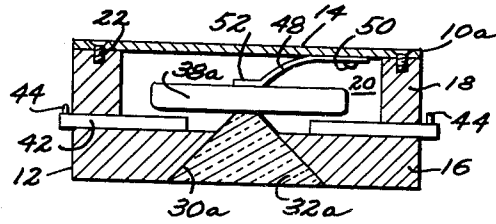


Fig. 4.

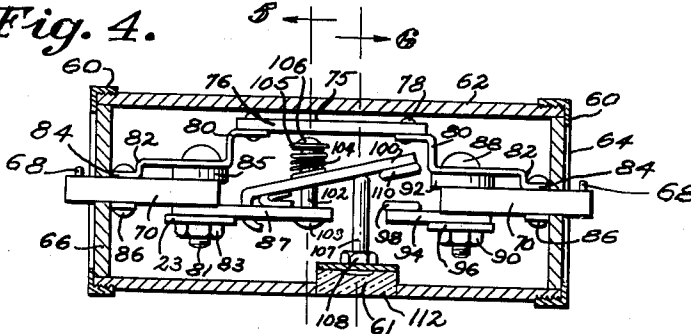


Fig. 5.

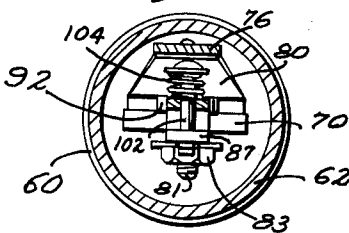
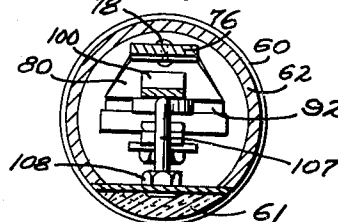


Fig. 6.



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THERMAL SWITCH UTILIZING A HOUSING WITH AN OPENING IN WHICH A THERMAL ELEMENT SUPPORTS A SPRING BY A CONTACT MEANS

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2 Claims. (Cl. 200-142)

This invention relates to a new and useful improvement in circuit closers and breakers particularly of a type for signal or alarm circuits.

In the field of fire alarms and signals there is a need for a simple and inexpensive circuit closer which will be adapted to activate an alarm or other signal device whenever a predetermined or excessive temperature occurs in the location in which the circuit closer is placed.

Many complex devices have been designed to activate an alarm or other signal; however, the prohibitive cost of such devices prevents its general use for the purpose for which it was designed.

It is therefore an important object of my invention to provide a circuit closer which will activate an alarm or other signal device whenever an excessive or predetermined temperature occurs in the area in which it has been placed.

Another object of my invention is to provide a circuit closer which is adapted for operation by thermal conditions to cause an alarm or signal to be set off.

Another important object of my invention is to utilize a fusible element in combination with an open electrical connection for closing a circuit and activating it when the fusible element is melted.

Another important object of my invention is to provide a device of this character which is of simple and practical construction, which is efficient and reliable in operation, easy to install in any desired location and which is inexpensive to manufacture.

Other objects and details of my invention will become apparent from the following description as more fully explained and claimed, reference being had to the accompanying drawings forming part hereof, wherein like characters refer to like parts throughout, and in which:

FIGURE 1 is a vertical elevational view showing the circuit closer in the open circuit position of one form of my invention;

FIGURE 2 is a side sectional view of the circuit closer of FIGURE 1, taken on the line 2-2 thereof;

FIGURE 3 is a vertical elevational view of a modification of the circuit closer shown in FIGURE 1;

FIGURE 4 is another vertical elevational view of a modification of the circuit closer of my invention;

FIGURE 5 is a side sectional view of the modification shown in FIGURE 4, taken on the line 5-5 of FIGURE 4; and

FIGURE 6 is a side sectional view of the modification shown in FIGURE 4, taken on the line 6-6 of FIGURE 4.

The device according to this invention is adapted for attachment to any structural member or the like.

Reference is again made to FIGURE 1 in which the character 10 designates the housing of a preferred form of a circuit closer of my invention. From FIGURES 1, 2 and 3, it is seen that the circuit closer of my invention is of a generally rectangular box-like formation.

The circuit closer housing is formed in two sections, a base section 12 and a flat plate-like section 14. The base section 12 is provided with a flat portion 16 and an upright generally rectangular recessed portion 18. The recess 20 of the portion 18 is provided to house the operating parts of the circuit closer of this form of my invention. Screws 22, 22 extend through recessed openings

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in the plate section 14 arranged in cooperative relation with threaded holes provided in the portion 18 of the base section, to securely fasten the members together.

At this point it is pointed out that a friction type latch arrangement could be provided to fasten the top section to the base section in either an outside or inside relation in a manner well known in the art. Also, the portion 16 of the base section 12 could be formed separate from the recessed portion 18 and thus provide a three section housing.

In the central portion of the base section 12 a truncated opening 30 has been provided. The opening is adapted to seat a fusible member 32 to be inserted or molded therein.

A rod 34 provided with a ring 36 carries a flat disc conductor 38. The disc conductor 38 is formed of any known metal having properties best suited for the conduction of electric currents therethrough. The conductor disc 38 may be connected to the rod 34 by any suitable means known in the art or it may be kept separate from the rod.

The fusible member 32 is molded about the rod 34 and the ring 36 and is shaped in a manner to be complementary to the opening 30 provided in the base section. As shown in cross section in FIGURES 1 and 2, the fusible member is also truncated in this form. A generally U-shaped leaf spring 40 is provided within the housing, and is placed between the top of the disc conductor 38 and the bottom of the plate 14 in the assembled position.

Provided in the bottom of the recess 20 on opposite sides of the base section is a bar member 42. The opposed internal ends of the bar members are separated a distance sufficient to clear and keep out of contact with the rod 34 when the rod is seated within the truncated opening 30. The external opposite ends of the bars 42 extend outwardly from the base section of the housing and are provided with terminal posts and screws 44 for electrical connection in a manner well known in the electrical art.

In the assembled position of the modification shown in FIGURES 1 and 2, the fusible element is first molded or inserted over the bottom of the rod 34. The rod, with the disc conductor 38 previously applied, and the fusible element is then seated in the opening provided in the center of the base section 12. The arrangement of parts is such that the disc conductor is out of contact or engagement with the bars 42. The leaf spring 40 is then placed with its bottom portion in contact with the disc conductor, so that as plate 14 is connected to the base section by the screws 22, 22 the upper portion of the spring will be placed in pressure contact with the inner bottom portion of the plate 14 in a manner to urge the disc conductor 38 and the rod 34 downwardly.

Thus as appears obvious, when the fusible element 32 melts due to a minimum predetermined temperature for which it is designed (or other thermal condition), the spring 40, in pressure engagement with the plate 14 and disc conductor 38, will force the rod and the disc conductor downwardly so as to make the disc conductor contact the rods 42 and close the circuit to which the terminals 44, 44 are connected. It is believed also obvious that my circuit closer shown in FIGURE 1, provides an open circuit arrangement when the current is connected thru the terminals 44, 44.

In the modification of my invention shown in FIGURE 3, the fusible element 32a is shown to be molded into the opening 30a provided in the housing 10a. The fusible element 32a is arranged with its inner upper portion extended above the floor of the recess 20 to a height that will maintain the disc conductor 38a out of contact with the rods 42 in the assembled position. It is to be noted that the truncated cone-like fusible element is formed with the smaller diameter end portion positioned inside the recess 20 and the larger diameter end portions positioned outwardly from the recess.

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A spring 48 is riveted or suitably attached at 50 to the bottom face of the top section of the modification shown in FIGURE 3; and at its opposite end, the spring is provided with an outwardly turned foot portion 52 which is adapted to seat on the disc conductor 38a in pressure engagement when the top section has been attached to the base section of the housing. Thus the spring 48 functions to hold the disc conductor 38a on the smaller end of the fusible element 32a and to also urge the disc conductor into contact with the rods 42, 42 when the fusible element is melted.

As in the modification shown in FIGURES 1 and 2, when the fusible element 32a of the FIGURE 3 modification is melted due to outside temperature change or other thermal condition, the spring 48 will urge the disc conductor downwardly, as shown in FIGURE 3 (or upwardly, if in the reverse position) into engagement with the rods 42, 42 to close the electrical circuit and activate an alarm or other signal device.

In FIGURES 4, 5 and 6, I have shown another preferred embodiment of my invention. As seen in these figures, the housing 60 of the circuit closer of this form is cylindrical in cross section. The ends of the housing cylinder 62 are closed by means of circular end walls 64 provided with a circular flange 66 which is adapted to engage over and frictionally hold the end walls on the housing cylinder.

Extending inwardly from the end walls, into the cylinder housing are rods 70, 70 connected by terminals 68 to a source of power. Fixing the rods 70, 70 in spaced rigid position is an insulated bridging connection 75. The bridge connection is formed of a flat insulated plate 76 (such as a non-conducting plastic material). Plate 76 at each of its opposite ends is connected by a bolt and nut 78 to a downwardly formed substantially Z-shaped bar 80. At its end opposite to the connection with the plate 75, the Z-bar is stepped downwardly at 82 to form a foot portion 84. Foot portion 84 is rigidly attached to its associated rod 70 by a bolt and nut 86 positioned intermediate the ends of the bar 70.

Intermediate its ends, one of the Z-bars 80 is connected to the inner end of its associated bar 70, at a point intermediate the inner end of the bar 70 and the connection of bolt and nut 86, by a bolt 88 and a nut 90. An insulating washer 92 maintains the Z-bar 80 and the bar 70 in spaced relation with one another. Carried under the bar 70, by the bolt 88 is a metal plate 94. Plate 94 is rigidly held against the bar 70 in direct contact therewith by means of a nut 90 tightened upwardly against a metal washer 96 positioned between the plate and the nut. A metal conductor pad 98 is provided on the end of the plate 94 in direct contact therewith.

The other Z-bar is connected to its associated bar 70 intermediate its ends, at a point between the inner end of the last named bar 70 and the connection of bolt and nut 86, by a bolt 81 and a nut 83. An insulating washer 85 maintains the Z-bar 80 and its associated bar 70 in spaced relation. Carried under the bar 70 by the bolt 81 is a metal plate 87. Plate 87 is rigidly held against its associated bar 70 in direct contact therewith by means of nut 83 tightened against a metal washer 23 positioned between the plate 87 and the nut 83.

Plate 87 extends inwardly from the bar 70 and carries at its inner end, in pivoted relation, an inwardly extending arm 100. Upwardly extending from a slot in the inner end of the plate 87 is a bolt 102. Bolt 102 is maintained in contact with the plate by means of a head 103 which prevents the bolt from separating from the plate 87. The bolt extends through a slot provided intermediate the ends of the arm 100. A spring 104 is provided about the upper end of bolt 102 and is maintained in pressure engagement against the arm 100 by means of a washer 105 and nut 106.

Depending from the arm 100 is a rod 107 which at the outer end is provided with a base member 108. A metal

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conductor pad 110 is provided on the inner end of the arm 100 for connection with the metal conductor pad 98 in the closed circuit position of the circuit closer.

The base 103 of the rod 107 is positioned to extend through an opening 112 formed in the cylindrical housing 60. A fusible element 61 is provided to close the opening 112 in the assembled relation of my circuit closer.

As seen in FIGURE 4, when the device of my invention has been assembled, the fusible element has been inserted to cover opening 112. The bridge connection and the circuit closer assembly is positioned so that the base 103 of the assembly is resting on the fusible element 61. Thus when the fusible element is melted by reason of either a predetermined change in temperature or other thermal condition, the rod 107 will be forced through the opening 112 by the action of the spring 105 and the conductor pad 110 will lower into contact with the conductor pad 98 to close the electrical circuit and activate an alarm or other signal device to which it is connected.

Numerous modifications and variations of the present invention will occur to those skilled in the art after a careful study of the invention which I have here disclosed. All such modifications and variations which come within the spirit and scope of the present invention are intended to be included herein as fully and completely as if they had been specifically illustrated, described and claimed herein.

The embodiment specifically described and claimed here is exemplary only and is not intended to limit the scope of this invention. For example the circuit closer of either one of the modifications shown could be formed with the spring action working upwardly instead of downwardly without affecting in any manner the desired operation and function of my invention. Also, as was noted previously, the housing 10 could be formed in three sections such that the rod with the ring and the fusible element could be assembled with the lower section 16; the disc conductor 38 and the spring 40 could be assembled with the center section 18; and with the plate section the entire device of my invention could be assembled with long machine bolts extending through all 3 sections.

As is also believed obvious, the fusible element could be formed of any desired material having the necessary property of quickly melting at predetermined high temperatures, in order to effect the desired result for which my invention is designed.

The exact construction and relative positioning of the various component parts of this invention is by way of example and may be modified substantially within the scope and spirit of my invention.

What I claim as new is:

1. A thermal switch for an electrical circuit or the like comprising a closed housing, bars projecting outwardly from opposite ends of said housing, circuit terminals fixed on the outer ends of said bars, a truncated opening in said housing, a fusible element positioned within said opening, a rod with a ring attached intermediate its ends supported by said fusible element between and in spaced relation with respect to said bars, said ring having an outer diameter larger than the smallest diameter of the truncated opening and moveable in a direction towards said smallest diameter, a flat disc conductor mounted on said rod in spaced relation from said bars, and a means connected to said conductor including generally U-shaped spring means urging said conductor into contact with the ends of said bars for closing the electrical circuit to which said circuit closer is attached, said ring cooperating with said opening to guide said rod through said opening to assure electrical contact between said flat disc and said conductors.

2. A thermal switch for an electrical circuit or the like comprising a closed housing, bars projecting outwardly from opposite ends of said housing, circuit ter-

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minals fixed on the outer ends of said bars, a truncated opening in said housing, a bridge connection fixing said bars in rigid space relation to each other, a fusible element positioned in said housing and opening, a rod mounted on said fusible element between and in spaced relation with respect to said bars, a conductor mounted on said rod in spaced relation with respect to said bars, a plate connected to one of said bars, a bolt extending upwardly from said plate, said bolt passing through a slot in said conductor, spring means mounted on said bolt and connected to said conductor to force said rod into said fusible element and through said opening and said fusible element and bring said conductor into engagement with said other bar to close said circuit and a means pivotally connecting said conductor to said plate.

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