

[72] Inventor **Walter S. Vargas**
North Kingstown, R.I.
 [21] Appl. No. **855,809**
 [22] Filed **Sept. 8, 1969**
 [45] Patented **Oct. 19, 1971**
 [73] Assignee **Elmwood Sensors, Inc.**
Cranston, R.I.

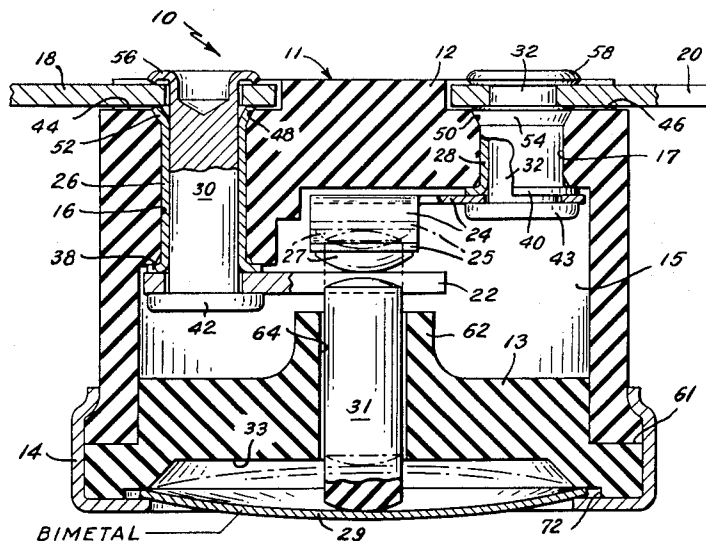
[56] **References Cited**
UNITED STATES PATENTS
 3,317,693 5/1967 Bolesky 337/354 X
 3,236,977 2/1966 Huffman 337/354 X
 2,233,124 2/1941 Furnas 200/166 CT
FOREIGN PATENTS
 356,188 9/1961 Switzerland 337/112

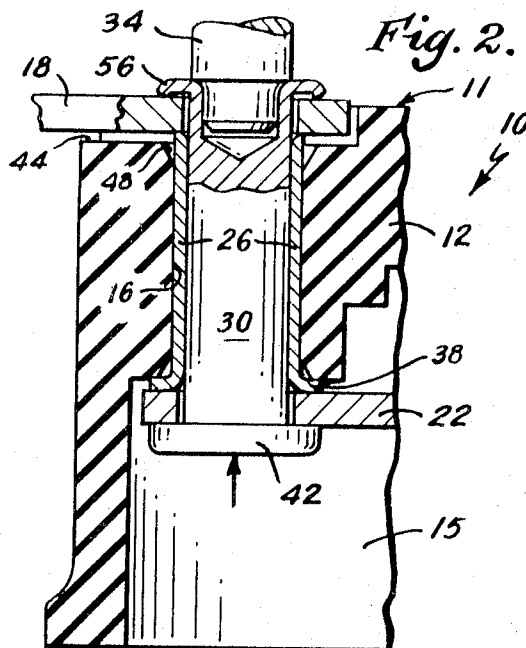
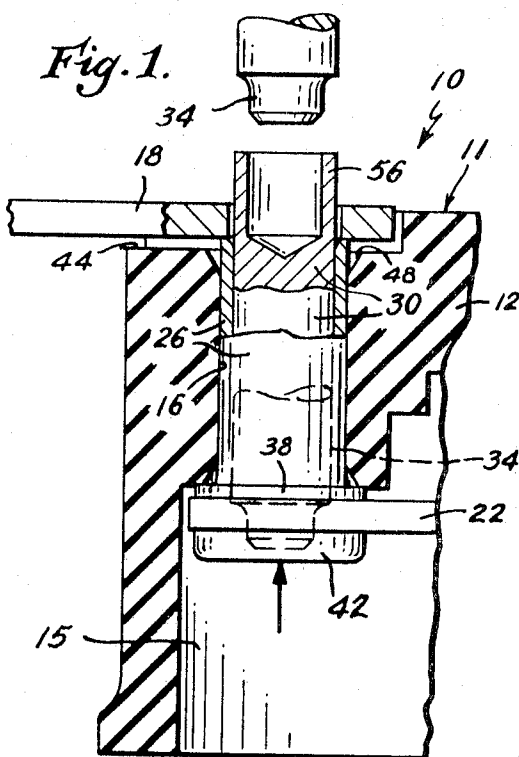
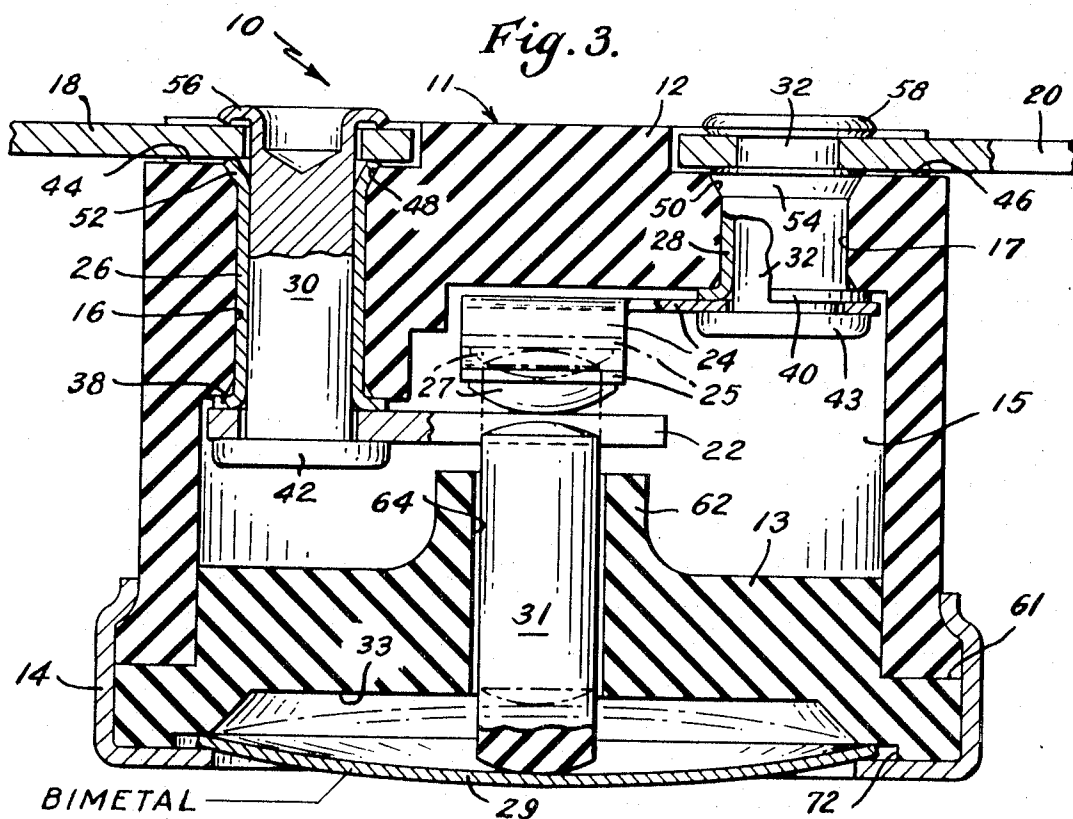
Primary Examiner—Bernard A. Gilheany
Assistant Examiner—DeWitt M. Morgan
Attorney—Salter and Michaelson

[54] **TERMINAL-CONTACT RIVET CONSTRUCTION
 AND METHOD OF ASSEMBLY THEREOF**
 6 Claims, 3 Drawing Figs.

[52] U.S. Cl. 337/381,
 200/166 CT, 337/354, 339/219 R
 [51] Int. Cl. H01h 37/04,
 H01h 37/52, H01r 9/20
 [50] Field of Search 337/112,
 113, 347, 348, 349, 354, 372, 380, 381; 200/166
 CT, 168 A; 339/219, 220

ABSTRACT: A terminal contact rivet construction for use in a thermostatic switch and including a sleeve that cooperates with a rivet for securing a terminal strip and contact element to the housing of said switch, said sleeve and rivet further acting to prevent loosening of the terminal strip and contact element upon expansion or contraction of the switch housing due to temperature differentials experienced in the operation of said switch.





Inventor,
Walter S. Vargas,
by Salter & Michaelson
Att'ys.

TERMINAL-CONTACT RIVET CONSTRUCTION AND METHOD OF ASSEMBLY THEREOF

BACKGROUND OF THE INVENTION

The present invention has application in thermostatic switch constructions that are employed in small appliances such as coffee percolators and the like.

The thermostat switch as used in a small electrical appliance is normally constructed with interior contact elements that are electrically interconnected to terminal strips that are secured to the switch housing exteriorly thereof. A bimetallic element is usually employed in such a switch and is heat responsive to make or break contact between the contact elements within the switch housing. Prior to the instant invention, the terminal strips were interconnected to the contact elements by means of a rivet that projected through an opening formed in the housing of the switch. However, after a period of use, the terminal strips and interior contact elements had a tendency to become loosened on the rivet because of the temperature differentials experienced in the operation of the switch as contained in the electrical appliance. When such a situation occurred, proper electrical contact between the interior contact element and the external terminal strip was difficult to obtain, thereby resulting in malfunction of the thermostat.

SUMMARY OF THE INVENTION

The present invention relates to a thermostatic switch construction that includes a housing formed of a nonconducting material and which has an interior chamber formed therein. At least one opening is formed in the housing that communicates with the interior chamber and a terminal strip is located at the outer end of the opening exteriorly of the housing and a contact element is located at the inner end of the opening in said chamber. Fixed within the opening in the housing is a metallic sleeve, the metallic sleeve cooperating with a metallic rivet projecting therethrough to anchor the terminal strip exteriorly of the housing and to fix the contact element within the chamber. The terminal strip and the contact element are permanently and securely fixed in position by deforming the outer ends thereof and providing a flange on the inner end of the sleeve that cooperates with the head of the rivet, wherein the terminal strip and contact element are secured between the sleeve and rivet. Thus, since the contact strip and element are sandwiched between the sleeve and rivet, they cannot be dislodged therefrom and even if the housing of the thermostatic switch is subjected to temperature changes which results in loosening of the terminal-contact assembly in the housing, the terminal switch and contact element are still maintained in firm position between the rivet sleeve.

Accordingly, it is an object of the invention to provide a thermostatic switch construction that includes a terminal strip and contact element that are securely held in position in the housing of the switch.

Another object of the invention is to provide a sleeve and rivet for use in a thermostatic switch construction that cooperate to permanently secure a terminal strip and contact element in place, the rivet and sleeve thereby preventing loosening of the terminal strip and contact element in their fixed position regardless of the temperature differentials experienced by the switch in the operation thereof.

Still another object is to provide a thermostatic switch construction that includes sleeve and rivet that are deformed at the outer ends thereof to fix a terminal strip therebetween, and that further cooperate to lock a contact element between a flange of the sleeve and the head of the rivet.

Still another object is to teach a method of securing a terminal strip and contact element in place in a thermostatic switch construction, the steps of the method including the deforming of the outer ends of the sleeve and rivet to lock a terminal strip therebetween.

Other objects, features and advantages of the invention shall become apparent as the description thereof proceeds

when considered in connection with the accompanying illustrative drawing.

DESCRIPTION OF THE DRAWING

In the drawing which illustrates the best mode presently contemplated for carrying out the present invention:

FIG. 1 is a partial sectional view of a body portion of a thermostatic switch construction showing a terminal strip and contact element prior to the assembly thereof to the switch housing;

FIG. 2 is a partial sectional view similar to FIG. 1 showing the assembly operation of a terminal strip and contact element; and

FIG. 3 is an amplified sectional view of FIG. 1, illustrating the finished assembly of the terminal strip and contact element to the housing of the switch construction.

DESCRIPTION OF THE INVENTION

Referring now to the drawing, the thermostatic switch construction embodied in the present invention is illustrated and is generally indicated at 10. As contemplated for use, the thermostatic switch construction 10 of the present invention has application in small electrical appliances such as a coffee percolator or the like. However, it will be understood that the concept of the invention that embodies the securement of a terminal strip and contact element in place between a sleeve and rivet as will be described hereinafter, is not limited to thermostatic switches, although the purpose of the invention does contemplate the use of a terminal contact rivet assembly in an environment that is subject to temperature differentials.

As shown in FIG. 3, the thermostatic switch construction embodied in the present invention includes a housing generally indicated at 11 that is defined by a body portion 12 and a base 13 that is secured to the body portion by an annular clamping member 14, as will be described hereinafter. The body portion 12 of the housing 11 is formed of a heat resistant phenolic resin and has a generally circular cross-sectional configuration, an interior chamber 15 being formed therein. Extending through the body portion 12 and communicating with the interior chamber 15 is a passage or opening 16, while a passage or opening 17, having a smaller axial dimension, is also formed in the body portion 12 in spaced relation with respect to the opening 16. As will be described, terminal strips 18 and 20 are fixed to the body portion 12 exteriorly thereof, and are adapted to be electrically interconnected to interior contact elements 22 and 24. The contact element 24 is formed with an integral spaced parallel portion 25, a contact button 27 being joined to the portion 25 and normally making contact with the contact element 22. As will be set forth hereinafter, a temperature responsive bimetallic element 29, located in a recess 33 of the base 13, is adapted to urge a plunger 31 into engagement with the parallel portion 25 of the contact element 24 for moving the contact button 27 out of engagement with the contact element 22, thereby breaking the electrical circuit as established between the terminal strips 18 and 20 through their respective contact elements 22 and 24.

In order to provide for permanent electrical communication between the terminal strips 18 and 20 and their respective contact elements 22 and 24, metallic sleeves 26 and 28 are located in the openings 16 and 17 and cooperate with rivets 30 and 32 for securing the terminal strips and contact elements to the housing 11. As indicated in FIGS. 1 and 2, the assembly of the terminal strips 18 and 20 and the contact elements 22 and 24 to the housing 11 is initiated by inserting the terminal strips 18 and 20 over the ends of pins 34, only one of which is illustrated in FIGS. 1 and 2. The body portion 12 is placed over the pins which are received in openings 16 and 17, the terminal strips 18 and 20 being oriented in channels 44 and 46 that are formed in an end wall of the body portion. The metallic sleeves 26 and 28 are inserted over the pins 34 in the openings 16 and 17 respectively and, as illustrated in FIG. 1, the outer-

most end of each sleeve engages the corresponding terminal strip. The contact elements 22 and 24 are then placed over the ends of the pins 34 within the chamber 15.

It is understood that the diameter of the pins 34 is somewhat less than the openings 16 and 17 through which they extend, and thus the sleeves 26 and 28 are receivable on the pins 34 as located within the openings 16 and 17. The sleeves 26 and 28 are each formed with an interior flange 38 and 40 respectively, the flanges cooperating with heads 42 and 43 respectively of the rivets 30 and 32 to secure the contact elements 22 and 24 in place within the switch housing, as will be described.

It will also be noted that the outer end of the body portion 10 is provided with the channels 44 and 46 in which the terminal strips 18 and 20 are received, the channels 44 and 46 being adapted to prevent lateral shifting of the terminal strips 18 and 20 after they have been locked in place on the body portion 10 by the rivets 30 and 32. As further illustrated in FIG. 1, the openings 16 and 17 are countersunk as indicated at 48 and 50 at the outer ends thereof, the countersunk portions 48 and 50 communicating with the channels 44 and 46 respectively. With the sleeves 26 and 28 mounted in position within the openings 16 and 17, the outermost ends of the sleeves are located slightly above the countersunk portions 48 and 50, and, as will be described, are deformed to conform to the countersunk portions when the rivets 30 and 32 are inserted in place.

In the assembly operation, the rivets 30 and 32 are inserted within the sleeves 26 and 28 respectively in the direction of the arrows as seen at the bottom of the rivets in FIG. 1. As the rivets are fed into the sleeves 26 and 28 they displace the pins 34, which are shown in FIG. 1 in the full-line position as being removed entirely from the body portion 12 when the rivets are fully inserted into their respective sleeves. As the rivets 30 and 32 displace the pins 34, the pins reach a stop position and, as continued pressure is exerted on the rivets (see FIG. 2), the outermost ends of the sleeves 26 and 28 are deformed by flaring outwardly as indicated at 52 and 54 in FIG. 3. The outermost end of each of the rivets 30 and 32 is formed with a shell configuration having a relatively thin wall as indicated at 56 and 58 in FIG. 1, and when the pressure is applied to the thin walls of the shells against the pins 34, the walls are deformed so as to be bent over the terminal strips 18 and 20 through which the rivets 30 and 32 extend. As illustrated in FIG. 3, annular bent over wall portions 56 and 58 cooperate with the deformed portions 52 and 54 of the sleeves 26 and 28 to lock the terminal strips 18 and 20 therebetween. At the same time that the rivets 30 and 32 eject the pins 34, the heads of the rivets 42 and 43 capture the contact elements 22 and 24 therebetween and the flanges 38 and 40 of the sleeves 26 and 28 respectively. Thus when the pins 34 have been completely ejected from the body portion 10 and the pressure is applied to the rivets to bend over the thin wall portions of the rivets as indicated at 56 and 58, the locking of the rivets 30 and 32 in place against the terminal strips 18 and 20, also locks the contact elements 22 and 24 between the heads 42 and 43 of the rivets and the flanges 38 and 40 of the sleeves 26 and 28 respectively.

The assembly of the thermostatic switch is completed by locating the base 13 in engagement with the body portion 12, a shoulder 61 of the base being located against the adjacent edge of the body portion 12. The base 13 is formed with an interiorly projecting portion 62 that is received within the chamber 12 of the body portion, an opening 64 being formed in the projecting portion 62. The recess 33 that is formed in the base 13 receives the pin 31 therein which also projects through the opening 64 for engagement with the contact element 24. The bimetallic element 29 is received in an annular groove 72 formed in the base 13 and is locked in place by the annular locking member 14 that is secured to the body portion 12 and the base 13. It is seen that in the operation of the device, the bimetallic element 29 is responsive to changes in the temperature, and is flexed upwardly to the dotted line position as illustrated in FIG. 2 to move the pin 31 upwardly,

thereby causing the contact element 24 to be removed from electrical engagement with the contact element 22. This breaks the circuit between the terminal strips 18 and 20 and will control the temperature of the appliance in which the thermostatic switch is located.

It is also contemplated to assemble the terminal strips and contact elements by preassembling the sleeves in the housing and partially deforming the outer ends of the sleeves prior to inserting the rivets therein. The rivets are then inserted in place and the outer shell walls rolled over as indicated above.

It is understood that the thermostatic switch construction 10, as embodied in the present invention is subjected to temperature differentials during the operation thereof. Should the body portion 12 expand or contract during this operation, the effect thereof will not in any way influence the securement of the terminal strips 18 and 20 to the sleeves 26 and 28 and rivets 30 and 32. Thus proper electrical communication between the terminal strips 18 and 20 will be maintained with their respective contact elements 22 and 24 at all times. Should the sleeves 26 and 28 become loose within the openings 14 and 16 upon expansion of the body portion 12, the contact elements 22 and 24 and the terminal strips 18 and 20 will still remain effectively locked between their respective sleeves and rivets.

I claim:

1. A thermostatic switch construction, comprising a housing having a body portion formed of a nonconducting material and in which an interior chamber is formed, at least on opening formed in said body portion that communicates with said interior chamber, a terminal strip located at the outer end of said opening exteriorly of said body portion and a contact element located at the inner end of said opening in said chamber, a metallic sleeve fixed in said opening, and a rivet projecting through said contact element, said sleeve and said terminal strip, and having an inner end located in said chamber and an outer end located at the outer end of said opening, the outer end of said rivet being free from engagement with any externally applied fastener, said sleeve and rivet being deformable at their outer ends for engaging relation with said terminal strips on opposite sides thereof and cooperating together at their outer ends to anchor said terminal strip therebetween exteriorly of said body portion, said sleeve having an outwardly extending flange at its inner end cooperating with the inner end of said rivet to fix said contact element therebetween within said chamber, wherein said terminal strip and contact element are permanently and securely fixed in position regardless of the expansion or contraction of said body portion due to temperature differentials in the operation of said switch construction.

2. In a thermostatic switch construction as set forth in claim 1, said sleeve having a flange formed on the inner end thereof and said rivet including a head, said contact element being captured between the head of said rivet and the flange of said sleeve.

3. In a thermostatic switch construction as set forth in claim 1, the outer end of said sleeve being flared outwardly and the outer end of said rivet being turned over, wherein said terminal strip is anchored between the flared outer end of said sleeve and the turned over end of said rivet.

4. In a thermostatic switch construction, a housing having a body portion formed of a nonconducting material and in which an interior chamber is formed, at least one opening formed in said body portion that communicates with said interior chamber, a terminal strip located at the outer end of said opening exteriorly of said body portion and a contact element located at the inner end of said opening in said chamber, a metallic sleeve fixed in said opening, and a rivet projecting through said sleeve and cooperating therewith to anchor said terminal strip exteriorly of said body portion and to fix said contact element within said chamber, wherein said terminal strip and contact element are permanently and securely fixed in position regardless of the expansion or contraction of said body portion due to temperature differentials in the operation

5

6

of said switch construction, the outer end of said sleeve being flared outwardly and the outer end of said rivet being turned over, wherein said terminal strip is anchored between the flared outer end of said sleeve and the turned-over end of said rivet, the body portion being countersunk at the outer end of said opening, the flared portion of said sleeve being received in the countersunk area of said body portion.

5. In a method of securing a terminal strip in a thermostatic switch construction, wherein the terminal strip is interlocked between a sleeve and a rivet that extend through an opening formed in the body portion of said switch construction, comprising the steps of locating a pin in said opening, mounting

said terminal strip on said pin exteriorly of said body portion, inserting said sleeve around said pin in said opening, and feeding said rivet through said sleeve simultaneously displacing the pin from said opening and deforming the outer ends of said rivet and sleeve to anchor said terminal strip therebetween.

6. In a method as set forth in claim 5, said sleeve being deformed by flaring the outer end thereof, and said rivet being deformed by turning over the outer end thereof wherein said terminal strip is captured between the flared end and turned over end as said rivet displaces said pin from said opening.

15

20

25

30

35

40

45

50

55

60

65

70

75

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,614,702 Dated October 19, 1971

Inventor(s) Walter S. Vargas

It is certified that error appears in the above-identified patent
and that said Letters Patent are hereby corrected as shown below:

Claim 1, line 3, "on" should be --one--.

Signed and sealed this 16th day of April 1974.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents