June 9, 1942. E. BLETZ 2,286,053

THERMOSTAT

Filed Sept. 10, 1940

Fig. 1.

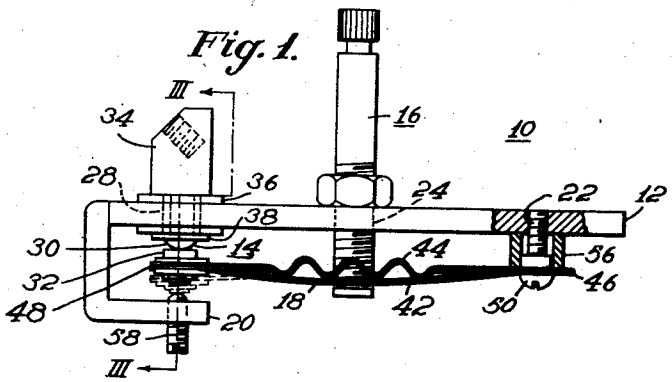


Fig. 2.

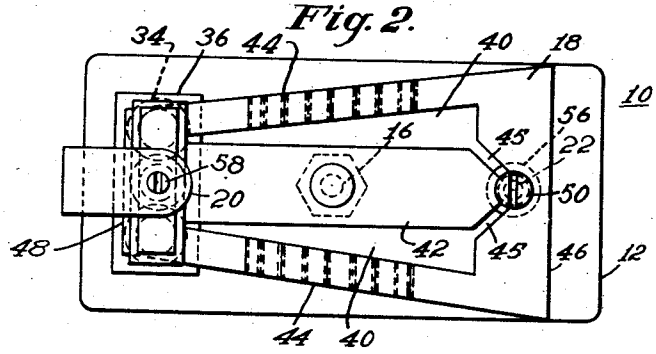


Fig. 3.

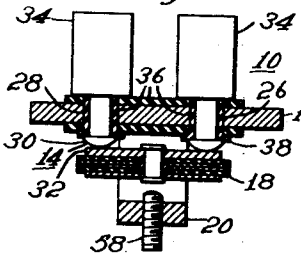


Fig. 4.

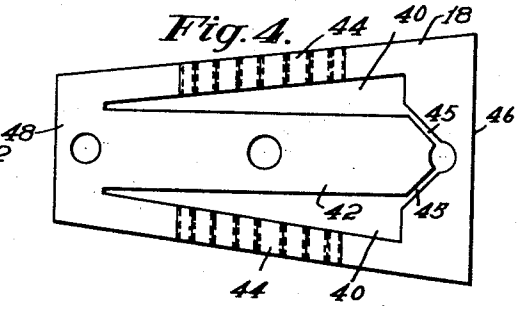
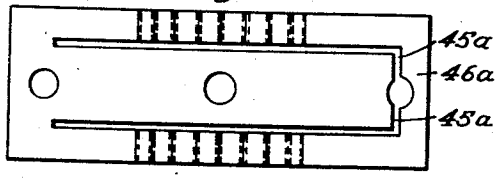


Fig. 5.



WITNESSES:

Edward Michaels

K. G. Kepler.

INVENTOR

Edward Bletz.

BY

W. R. Coley

ATTORNEY

Patented June 9, 1942

2,286,053

UNITED STATES PATENT OFFICE

2,286,053

THERMOSTAT

Edward Bletz, Lexington, Ohio, assignor to Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., a corporation of Pennsylvania

Application September 10, 1940, Serial No. 356,134

5 Claims. (Cl. 297—15)

My invention relates to thermostats and more particularly to bimetallic elements and structures therefor.

An object of my invention is to provide a simple, inexpensive, efficient bimetallic thermal responsive element adapted to be attached to a supporting structure so as to move from one operative position to another with a snap action.

A further object of my invention is to provide a bimetallic element for a thermostat having a relatively transverse slot therein for receiving a mounting device for attaching such element to the thermostat supporting structure.

Another object of my invention is to provide an elongated bimetallic element which is normally flat and in a stable condition and which upon being attached to a supporting structure is maintained in an unstable condition due to such attachment.

Other objects of my invention will either be pointed out specifically in the course of the following description of a device embodying my invention, or will be apparent from such description.

In the accompanying drawing:

Figures 1 and 2 are side elevational and bottom views, respectively, of a thermostatic structure embodying my invention;

Fig. 3 is a sectional view taken along the line III—III of Fig. 1; and

Figs. 4 and 5, respectively, show plan views of bimetallic elements which may be used in the thermostat embodying my invention.

Referring to the accompanying drawing, in which like reference characters indicate like parts in the several figures, I show a thermostat 10 comprising a supporting structure 12, cooperating contacts 14, an adjusting member 16 and a bimetallic thermal responsive element 18 which is rigidly attached at one end thereof to the supporting structure.

The supporting structure 12 is in this instance a flat rectangularly shaped metallic bar-like member having a depending inwardly extending ledge portion or flange 20. A plurality of apertures 22, 24, 26 and 28 are located within the flat supporting structure 12 to receive various parts of the thermostatic structure, as hereinafter described. The apertures 22 and 24 are located along the longitudinal axis of the structure 12 with the aperture 24 being positioned substantially at the midpoint thereof, and the aperture 22 is located within the supporting structure 12 at a point opposite to that at which the ledge 20 is located. The apertures 26 and 28 are located along a transverse line which is above the ledge 20. These apertures 26 and 28 are adapted to receive the stationary contacts and terminal structures for the thermostat, as hereinafter described.

The cooperating contacts 14 comprise, in this instance, a plurality of stationary contacts 30 and a movable bar-like jumper contact 32. The stationary contacts 30 constitute the lower ends of suitable metallic terminal structures 34 which are adapted to be passed through the apertures 26 and 28 and to be insulated from the supporting structure 12 by means of suitable insulating members 36 (see Fig. 3). The lower end of the terminal structures 34 are then spun or peened over tightly against suitable washer-like members 38 so as to rigidly attach the terminal structures 34 to the supporting structure. The spun or peened over portions of the terminal structures 34 thus function as the stationary contacts 30.

The movable contact 32 is in this instance an elongated bar-like member rigidly attached to and insulated from the free end of the bimetallic element 18 and is adapted to engage, when in its closed or operated position, both of the stationary contacts 30. However, it is to be understood that the cooperating contacts 30 and 32 may be formed in any other suitable manner and that such contacts may be attached to the corresponding structure in any other desired manner.

The adjusting member 16 comprises, in this instance, an elongated threaded member which is adapted to be threaded through the aperture 24 located at substantially the midpoint of the supporting structure 12. The threaded member 16 engages and is rotatably attached to the midpoint of the central leg of bimetallic element 18 as hereinafter described. However, such adjusting member may be formed or attached to the bimetallic element in any other suitable manner.

The bimetallic element 18 comprises, in this instance, an elongated bimetallic strip-like member having a relatively narrow portion 48 at one end and a relatively wide portion 46 at the other end thereof so as to form substantially a frustum of an isosceles triangle. A plurality of elongated, longitudinally extending, substantially triangular apertures 40 are located within the bimetallic element 18 to form a centrally located parallel-sided strip portion 42 and an exterior strip portion having two parallel-sided lateral strips or portions 44 and a wide end strip or portion 46.

In addition, a relatively transversely extending substantially V-shaped aperture or slot **45** is disposed between the short bases of the triangularly shaped apertures **40** across the wide end portion **46** so as to completely separate the end portion **46** and the tapering end of the centrally located strip portion **42** (see Figs. 2 and 3). The exterior strips **44** may or may not have, however in this instance they do haye, a plurality of crimps therein to, in effect, reduce the length thereof. The transverse apertures **45** in cooperation with the supporting structure **12** tends to produce the required stress arrangement within the bimetallic element to produce a snap action thereof, as hereinafter described.

The transverse apertures or slots **45**, in this instance, are adapted to extend obliquely into the central portion of the wide end strip **46** to form substantially a V-shaped notch therein and a complementary outwardly extending V-shaped end of the central strip **42**. An arcuately shaped notch is formed at the apices of such a V-shaped portion to receive a suitable mounting member or screw **50**. However, such space formed by the notches is smaller than the mounting member or screw **50** to cause a buckling action of the element **18** as such element is attached to the supporting structure, as hereinafter described.

The bimetallic element **18** is rigidly attached to the supporting structure **12** by means of a suitable wedging means or shoulder screw **50** and a sleeve-like member **56** surrounding the screw **50**. The shoulder screw **50** is adapted to fit within the arcuately shaped space located between the end of the central strip **42** and wide end portion **46** adjacent the apex of the transverse aperture **45**. The gap between the end of the central strip **42** and end portion **46** is somewhat smaller than the distance across the shoulder portion of shoulder screw **50**, as noted above. In other words, as the shoulder screw **50** is forced within the space between the central strip **42** and end portion **46**, such central strip **42** will be bowed or wedged outwardly or will be put under a longitudinal compressive force, while the exterior strips **44** will have a tensile or stretching force applied thereon through the end portion **46**. This uneven force distribution through the element **18** causes such element to assume a flexed condition when in a normal operative or closed-contact position and insures the snap movement of such element as it moves from one position to another as indicated by the solid and dotted lines in Fig. 1.

When attaching the element **18** to the supporting structure **12** by means of shoulder screw **50**, such screw is threadedly engaged within the aperture **22** and is drawn tightly against the supporting structure **12** through the sleeve **56**. The movable free end of the bimetallic element **18** is then located between the ledge **20** and stationary contacts **30** so that the movable contact **32**, insulatedly attached to the free end of element **18**, may engage such stationary contacts when the element is in its upper or operated position, see Fig. 1. The lower position of the element **18** as it flexes to an open or inoperative position is selectively determined by means of a suitable set screw **58** threadedly positioned upon the ledge **20**.

It will be observed that the wide end portion **46**, being retained at its midpoint by means of shoulder screw **50**, is free to flex along the transverse line passing through such screw. This transversely flexing action, in turn, is adapted to change the overcenter snapping position of such element and, in turn, insure a minimum amplitude of operation of such element as is more clearly described and claimed in a copending application of applicant's, Serial No. 353,012, filed August 17, 1940, and assigned to the same assignee as this application.

The bimetallic element **18** need not have a wide end portion **46**, but may be of the more conventional type in which the element is a substantially rectangularly shaped member (see Fig. 5). It will be observed that the transverse slots **45***a* thus form a uniform rectangularly shaped end portion or strip **46***a*, and, in turn, upon being attached to a supporting structure, as hereinabove described, produce uneven stresses on forces within the element, buckling the middle leg and causing such member to snap from one position to another in a well known manner.

It is, therefore, obvious that I have provided a bimetallic element or snap-acting thermostat which need not have any crimping of its outer legs or strip, for example, but may have an uneven stress formation positioned therein by means of a wedging or longitudinally compressing action as the element is rigidly attached to a suitable supporting structure.

While I have shown my invention in two forms, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of further changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

I claim as my invention:

1. A thermostat element comprising an elongated bimetallic plate forming a central strip, two exterior lateral strips and end portions joining said lateral strips, one of said end portions being substantially wider than the other end portion, said central strip joined to the narrow end portion and extending relatively close to the wide end portion and mounting means disposed within the adjacent edges of the central strip and wide end portion for compressing the central strip and elongating the exterior strips.

2. A thermostat element comprising an elongated bimetallic plate forming a central strip, two exterior lateral strips and end portions joining said lateral strips, one of said end portions being substantially wider than the other end portion and having a notched portion within the inner edge thereof, said central strip joined to the narrow end portion and extending with a complementary free end portion relatively to the wide end portion and within the notched portion, and mounting means disposed between adjacent edges of the central strip and wide end portion for compressing the central strip and elongating the exterior strips.

3. In a snap-acting thermostat comprising a supporting structure, the combination of a bimetallic element forming a central strip, two exterior lateral strips and end portions joining said lateral strips, said central strip joined to one end portion and extending relatively close to the second end portion with a small gap therebetween, and means passing through said gap for attaching the element to the supporting structure and for longitudinally compressing the central strip and tensioning the exterior strips to produce an unstable condition within the element, whereby said element will move from one position to another with a snap action in response to the changes in temperature thereof.

4. In a snap-acting thermostat comprising a supporting structure, the combination of a bimetallic element forming a central strip, two exterior lateral strips and end portions joining said lateral strips, said central strip joined to one end portion and extending relatively close to the second end portion with a small gap therebetween, and means passing through said gap for attaching the element to the supporting structure and for longitudinally compressing the central strip and tensioning the exterior strips to produce an unstable condition within the element, whereby said element will move from one position to another with a snap action in response to the changes in temperature thereof, and adjusting means rotatively supported by the supporting structure engaging the central strip for selectively adjusting the operating characteristics of the bimetallic element.

5. A thermostatic element comprising an elongated bimetallic plate forming a central strip, two exterior lateral strips and end portions joining said lateral strips, said central strip being joined to one end portion and having one end extending relatively close to the second end portion to leave a gap therebetween, and means having a greater dimension than said gap in the direction of said gap disposed between said one end and said second end portion to widen said gap and thereby distort said central strip, said means also attaching said plate to a supporting structure.

EDWARD BLETZ.