Jan. 8, 1935. R. VALVERDE 1,987,166

THERMOSTAT

Filed Nov. 17, 1930

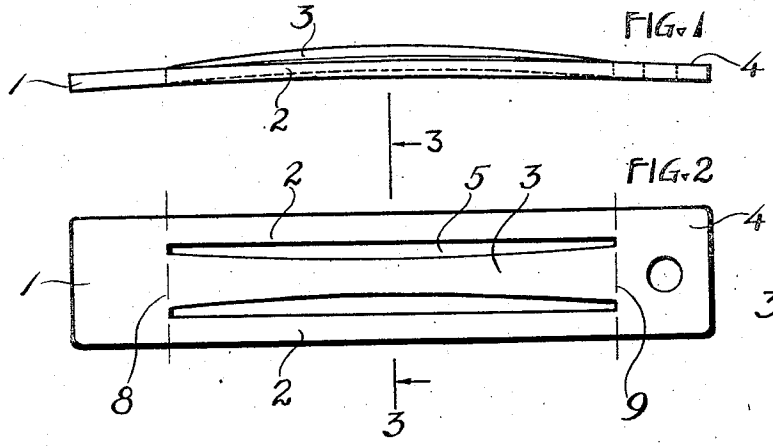


FIG. 1

FIG. 2

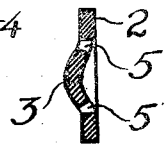


FIG. 3

INVENTOR
ROBERT VALVERDE
BY
ATTORNEY

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Robert Valverde, New York, N. Y.

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4 Claims. (Cl. 297—15)

This invention relates to the bi-metal elements of automatic snap-action thermostats.

It is an object of this invention to provide an improved bi-metallic element, for a snap-action thermostat, which has extensive displacement as the result of its snap-action, and which is compact and capable of repeating a heat cycle in a very short period of time.

In the accompanying drawing:

Fig. 1 is a side elevation of a thermostat element embodying the invention.

Fig. 2 is a plan view of the thermostat element shown in Fig. 1.

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2 looking in the direction of the arrows.

My thermostat element P is made from an initially flat bi-metallic plate, pierced with two slots 5 extending through the greater part of the length of said plate but leaving the ends 1 and 4 intact. Said slots 5 divide the part of my thermostat element between the ends 1 and 4 into a central strip 3 and two lateral strips 2, all joined to the ends 1 and 4.

I obtain the snap action in my thermostat element by making the central strip 3 longer than the lateral strips 2 so that said central strip 3 approximates an arc of a circle. The lateral strips 2 may also take a similar curve but of greater radius.

In operation the metal on the concave side of the strips tends to expand more than the metal on the other side of the strips. This action tends to flatten the side strips 2 so that they increase the convexity of the central strip 3, putting it as a whole under compression and said lateral strips 2 as a whole under tension. But the central strip 3 is also exerting a force from the differential expansion of the bi-metal and resists this tendency to increase its convexity. The net result to the thermostat element is a decreasing rate of its change of shape as the temperature rises, until the strip 3 overcomes the strips 2, stretching them until the center of mass of strip 3 passes the center of the mass of strips 2, whereupon a sudden unbalancing of the forces occurs and the strip 3 suddenly reverses its curvature with a snap action.

When the end 4 is fixed, and the end 1 free to move, an extensive displacement of the free end takes place when the snap action occurs.

This extensive displacement of the free end 1, which is peculiar to my thermostat, is caused by the forces exerted by the center strip 3 at 8 and 9 to bow the side strips in an opposite direction when the snap action occurs and the center strip reverses its curvature, and by the additional forces, resulting from the differential expansion in the side strips, which are suddenly released at the moment of snap action.

The central strip 3 is given a curved sectional outline, as shown in Fig. 3. The curved central strip 3 is narrowest and thickest at its middle and it diverges therefrom to the sections 8 and 9 and tapers to a flatness at said sections. This economically increases the mass of the strip 3, at its center, and thus increases the useful deflection, that is, the deflection obtained during the snap action.

This invention is suitable for various kinds of thermostats, and the illustrated embodiment can be changed within the scope of the claims.

I claim as my invention and desire to secure by Letters Patent:

1. A snap action thermostat element comprising a bi-metallic plate having slots therein integrally forming a central strip and two lateral strips, said central strip being expanded longitudinally and transversely curved at the center to increase the effective thickness at said center and tapering to transverse flatness where said central strip joins said plate.

2. A snap action thermostat element comprising a slotted bi-metallic plate having a central strip and two lateral strips, said central strip being expanded longitudinally and transversely curved at its middle part, the degree of curvature from the middle of said central strip progressively diminishing toward its ends.

3. A snap action thermostat element comprising a bi-metallic plate having a central strip and two lateral strips, said central strip being expanded longitudinally and transversely curved at its middle part, the degree of curvature from the middle of said central strip progressively diminishing toward its ends.

4. A snap action thermostat element comprising a slotted bi-metallic plate having a central strip and two lateral strips, said central strip being expanded longitudinally and transversely curved with the degree of curvature diminishing from its center to its ends.

ROBERT VALVERDE.