

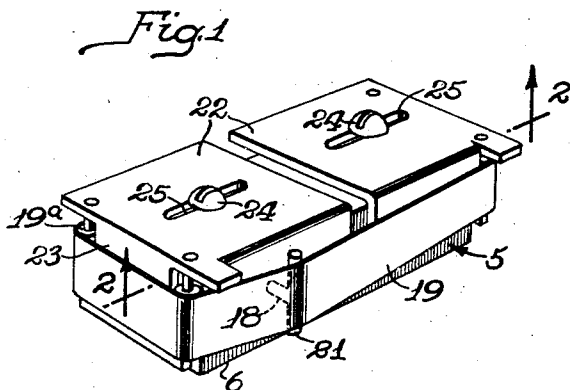
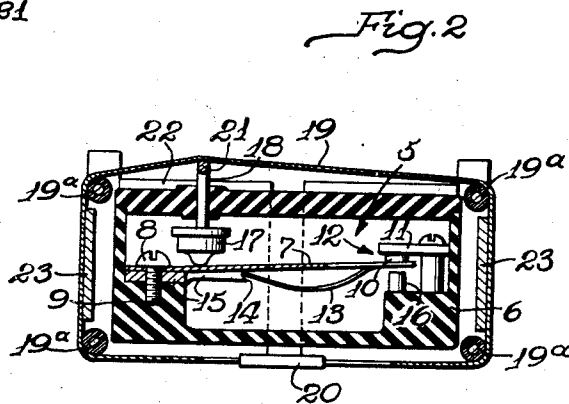
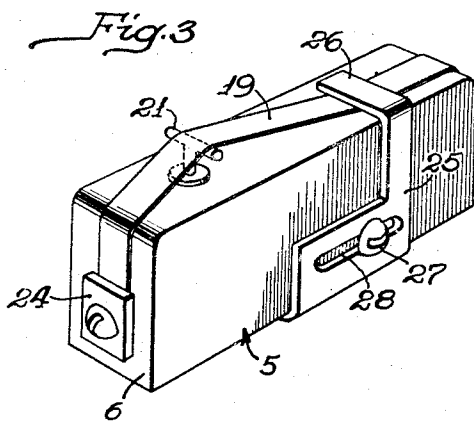
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CONDITION RESPONSIVE CONTROL DEVICE

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CONDITION RESPONSIVE CONTROL DEVICE

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3 Claims. (Cl. 200—137)

This invention relates to condition responsive control devices such as humidostats, and the primary object is to construct such a device simply by the addition of a condition responsive element to a switch unit of standard construction.

A more detailed object is to utilize the casing of a standard self-contained sensitive switch unit as a mounting for a condition responsive element extending partially around the casing and moving the switch actuator of the unit as the element expands or contracts with condition changes.

The invention also resides in the novel manner of mounting the condition responsive element and of providing for adjustment of the instrument control point.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawing, in which

Figure 1 is a perspective view of a device embodying the novel features of the present invention.

Fig. 2 is a section taken along the line 2—2 of Fig. 1.

Fig. 3 is a perspective view of a modification.

As illustrated in the drawing, the improved control device is built around an extremely sensitive standard switch unit 5 manufactured by the Micro-Switch Corporation of Freeport, Illinois. The unit comprises generally a rigid synthetic resin casing 6 of box-like form having therein a flexible resilient metal arm 7 one end of which is anchored by a screw 8 to a ledge 9. The free end of the arm carries a contact 10 co-acting with a stationary contact 11 to form a switch 12. Spring arms 13 integral with the free end of the arm 7 are bowed and project reversely with their free ends seated in notches 14 in the edge of a plate 15. The arms 13 produce an over-center or detent action that causes the arm 7 to move the contact 10 between the contact 11 and a stop 16 with a snap action. A button 17 bearing against the arm 7 near its anchored end carries a pin 18 projecting through a hole in one wall of the casing. Movement of the pin of about .001 of an inch is sufficient to open or close the switch.

The present invention contemplates utilizing the casing 6 as a mounting for a sensitive condition responsive element disposed externally of the casing and operable to actuate the pin 18. The element is of a type which expands and contracts with opposite changes of an ambient condition and comprises a band or ribbon 19 en-

circling the casing 6 lengthwise in the form shown in Figs. 1 and 2 with its ends united by adhesive or by a suitable clip 20 so as to form a complete loop. To minimize friction, the band 19 may be extended around rollers 19^a which hold the band spaced from the sides of the casing and are mounted on the latter in a manner to be described later. One side of the loop is spaced from the casing and bears against a cross-bar 21 on the pin 18 so as to press the latter inwardly and open the switch 12 as the loop contracts. If desired, the cross-bar may carry an anti-friction roller. The loop permits outward movement of the pin over the bias of the spring arms 13 as the loop expands, this resulting in closure of the switch.

It will be observed that the projecting portion of the pin 18 constitutes the altitude of two right triangles each having a hypotenuse formed by the length of the band between the cross-bar and one corner of the casing. Thus a very small change in the length of this hypotenuse will produce a comparatively large change in the altitude which latter change is represented by the switch actuating motion of the pin 18. In this way, the elongation or contraction of the band is magnified many times and applied to the switch. This coupled with the small motion that is required to actuate the switch makes the instrument very sensitive.

Where the instrument is to respond to changes in relative humidity, the band may be composed of a series of strands of hair or of any other material such as so-called Cellophane which will absorb moisture from the air and expand proportionately. For use of the device as a thermostat, the band would be formed of metal or the like so as to elongate in response to an increase in temperature.

Various means may be provided for adjusting the control point of the instrument, that is, the condition value at which the position of the switch contact 10 changes. In the form shown in Fig. 1, plates 22 lying against one side of the casing 6 have flanges 23 disposed adjacent the ends of the casing and carrying the rollers 19^a that define the ends of the band loop. By varying the spacing of the plates, the tension on the band for a given ambient condition may be varied to produce the desired control point of the instrument. Screws 24 projecting through slots 25 and threading into the casing serve to clamp the plates into their adjusted positions.

In the modification shown in Fig. 3, the band 19 extends only partially around the casing 6

having the ends anchored to the casing ends by clamps 24. Adjustment of the control point may be effected by shifting a plate 25 longitudinally of the casing. This plate has an arm 26 disposed externally of and bearing against the unsupported side of the band 19 so as to vary the tension on the latter. The plate position is maintained by a clamping screw 27 projecting through a slot 28 and threading into the casing in this instance.

The control instrument thus provided is simple in construction and very inexpensive because it utilizes a standard switch unit and in addition employs the casing of this unit as a mounting for the condition responsive element and the parts of the adjusting mechanism. It will be observed that the members 17 and 18 which transmit the transverse movement of the condition responsive element 13 to the switch actuating member 7 incorporate a bearing connection which permits the member 7 to move ahead of the condition responsive element so that the switch member may be moved from one position to another with the desired snap action.

I claim as my invention:

1. A condition responsive instrument having, in combination, a switch, a casing enclosing said switch, a member projecting through a wall of said casing and movable in and out to actuate the switch, a flexible element supported by said casing and stretched around said member to move the latter in and out during contraction and expansion of the element in a direction transversely of the direction of movement of said member, and means mounted on said cas-

ing and selectively adjustable to vary the tension on said element and thereby change the control point of the instrument.

2. A condition responsive instrument having, in combination, a switch unit comprising a rigid casing and a switch-actuating member projecting from one wall of the casing and movable back and forth therethrough, and a flexible element stretched along said wall with its opposite ends anchored to said casing and an intermediate portion engaging said member to effect movement of the latter in and out of said casing by elongation and contraction of said element longitudinally of said wall, said element being expandable and contractible with ambient condition changes.

3. A condition responsive instrument having, in combination, a rigid casing, a switch unit within said casing having a member movable between switch closed to switch open positions with a snap action, said member normally tending to move to one of said positions, a flexible element extending along a wall of said casing and secured at opposite ends to the casing, said element being expandable and contractible longitudinally with ambient condition changes whereby to cause transverse movement of an intermediate portion of the element toward and away from the wall, and means including a bearing connection for transmitting said transverse movement in one direction to initiate said snap acting movement of the member, said bearing connection permitting of movement of said member ahead of the element.

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