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C. W. APPELBERG ET AL

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THERMAL SWITCH

Filed April 24, 1931

Fig. 1.

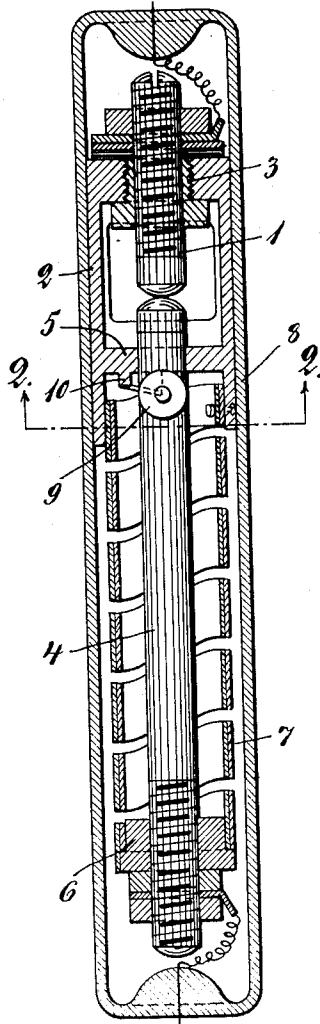
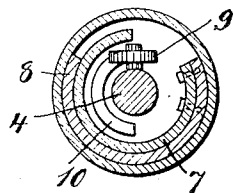


Fig. 2.



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THERMAL SWITCH

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The present invention refers to thermal switches in which the separation or bringing together of the contacts is effected through a change in form or dimensions of heat sensitive members under the influence of temperature fluctuations. More particularly the invention relates to such thermal switches which for the purpose of increasing the efficiency of the heat sensitive members are enclosed in evacuated receptacles of glass or the like or in such receptacles filled with an inert gas. In such enclosed thermal switches it is of particular importance to obtain a rapid contact movement at the moment of opening and, especially, at the moment of closing the contacts.

According to the present invention an improved operation in such thermal switches and, particularly, an increased contact movement is obtained by transforming, by means of an inclined cam surface having a suitably selected ratio of slope, a movement in a certain direction caused by a change in form or dimensions of the heat sensitive member to a preferably increased movement in a direction substantially perpendicular to the former, said latter movement being directly or through the intermedium of a gearing transferred to a movable contact member. According to the invention the heat sensitive element is, by way of example, made in such a form, for instance in the form of a helix, that the deformation upon a change in temperature results in a turning movement of a portion of the heat sensitive member which turning movement through co-operation with a helical cam surface is transformed to a more or less simultaneous axial movement. Such a construction is particularly adapted for use in connection with such thermal switches in which the contact is formed by coaxially disposed metal rods which are displaceable in an axial direction in relation to each other and the adjacent ends of which normally bear against each other. The two ends of the helical heat sensitive member may then, for example, each be connected with one of the two contact rods, one of said rods being in turn connected with the inclined cam surface formed as a part of a screw surface or the like

whereas the other contact rod is provided with an abutment or the like bearing against said cam surface, said abutment sliding along said cam surface while the said rods are twisted in relation to each other whereby the turning movement is transformed to an axial movement.

The invention will be more closely described with reference to the accompanying drawing, in which Figure 1 is a longitudinal section through a thermal switch according to the invention having a helical heat sensitive member and Figure 2 is a section on the line 2—2 in Figure 1.

In the shown embodiment a fixed contact rod 1 is tapped into an insulating bushing 3 disposed in one end wall of a metal receptacle 2. The opposite contact consists of a longer rod 4 coaxial with the rod 1 and extending through a central aperture in the opposite end wall 5 of the receptacle 2, said aperture serving as a guide for the rod 4 when the latter is moving in an axial direction. The rod 4 is at its outer end tapped into a round plate 6 secured to the one end of a bimetallic helical spring 7 the opposite end of which is rivetted to the inside of an annular extension 8 of the receptacle 2. Immediately outside the end wall 5 the rod 4 is provided with an abutment 9 in the shape of a roller or the like engaging a semi-cylindrical cam surface 10 extending from said end wall 5.

The contacts are normally held pressed together through the spring tension in the helical heat sensitive member 7, which thus here serves a double purpose. When heated the heat sensitive member 7 is deformed in such a way that its outer end together with the plate 6 and the rod 4 is subjected to a turning about the axis of said heat sensitive member. The roller or abutment 9 then runs up on the inclined cam surface 10 which has such a slope that the rod 4 in addition to the turning movement obtains a comparatively large axial movement in an outwards direction whereby the contact is rapidly broken. Upon a subsequent cooling the outer end of the heat sensitive member is turned in an opposite direction, causing the abutment to

slide down the cam surface 10 whereby the contact rods are powerfully pressed against each other under the influence of the spring pressure.

5 Thermal switches according to the invention may be made with comparatively very small dimensions, and especially with small transverse dimensions, and are particularly suitable in such cases, when the thermal
10 switch is intended to be enclosed in an evacuated glass receptacle or in a glass receptacle filled with an inert gas. In thermal switches of this kind it is generally particularly desirable to be able to reduce the dimensions as
15 far as possible because the sensitivity is increased hereby.

We claim:—

1. A thermal switch comprising a receptacle, mutually reciprocable contact members
20 disposed in said receptacle, a heat sensitive member, and cam means for transforming heat deformation movements of said heat sensitive member into contact member re-
25 ciprocations perpendicular to said deformation movements.

2. A thermal switch comprising a receptacle, mutually reciprocable contact members disposed in said receptacle, a torsional heat
30 sensitive member, and cam means for transforming torsional heat deformations of said heat sensitive member into axial reciprocations of said contact members.

3. A thermal switch comprising a receptacle, a stationary contact member, a rotatable
35 and axially reciprocable rod-shaped contact member, a stationary support, a bi-metallic heat sensitive helical spring coaxial with said rod-shaped member and at one end secured
40 to said support and at the other end connected to said rod-shaped member, and cam means for transforming reciprocal rotary movements of said rod-shaped member into axial reciprocations thereof.

4. A thermal switch comprising a receptacle, a stationary contact member, a rotatable
45 and axially reciprocable rod-shaped contact member cooperating therewith, a bi-metallic heat sensitive helical spring connecting said rotatable and reciprocable member with
50 said stationary member and being biased to normally hold said two contact members in mutual elastic contact, and cam means for transforming rotary movements of said rod-shaped member into axial displacements
55 thereof.

In testimony whereof we affix our signatures.

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