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C. W. APPELBERG

1,935,762

THERMAL SWITCH

Filed April 24, 1931

Fig. 1.

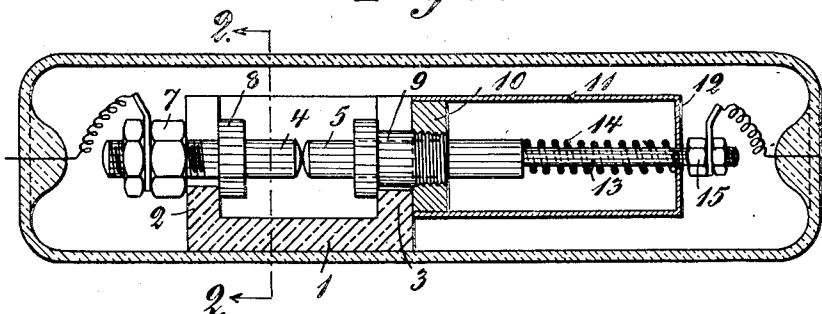
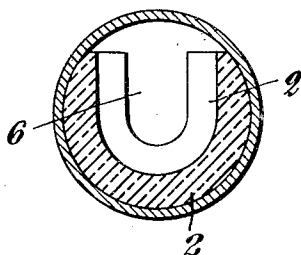


Fig. 2.



C. W. Appelberg
INVENTOR

By: *Max Allen*
ATTY.

UNITED STATES PATENT OFFICE

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THERMAL SWITCH

Carl Wilhelm Appelberg, Stockholm, Sweden, assignor to Aktiebolaget Birka Regulator, Stockholm, Sweden, a company of Sweden

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6 Claims. (Cl. 200—137)

The present invention relates to an arrangement in thermal switches. More particularly the invention relates to thermal switches of the kind, which are adapted to be enclosed in an evacuated container of glass or the like or in such containers filled with an inert gas, and which for the purpose of obtaining as small dimensions as possible and thereby increased sensitivity are made with coaxially disposed contact electrodes displaceable in relation to each other in an axial direction. The invention has for its object to facilitate the manufacture of such thermal switches in as small sizes as possible while maintaining a satisfactory insulation, and also to render possible a convenient assembly of the thermal switch to a self-contained aggregate which may be inserted as a unit in the container whereafter said container may be evacuated or filled with gas and sealed by fusing. The said object is according to the invention obtained by constructing a frame of insulating material, by way of example steatite, adapted to support the thermal switch in its entirety and fitting into the gas receptacle, said frame preferably forming a housing or the like, preferably of cylindrical or half-cylindrical shape, enclosing the thermal contact, the two end walls of said frame forming supports for the two contact electrodes, which are coaxially disposed in relation to each other and, if desired, also in relation to the housing and one of which is adapted to be displaced in an axial direction under the influence of a heat sensitive member disposed outside of one end wall.

The invention will be more closely described with reference to the accompanying drawing showing an embodiment of the invention. Figure 1 is an axial section of the thermal switch. Figure 2 is a cross section through the contact housing proper along the line 2—2 in Figure 1.

The metal parts of the thermal switch are carried on a frame or holder 1 of insulating material, by way of example steatite, having a horse-shoe shaped cross section, said frame forming a contact housing about the thermal contact proper, which housing is open towards one end. The two end walls 2, 3 of the contact housing each serve as supports for one of the two coaxially disposed contact rods 4, 5, of which the one, 4, is rigidly secured to the appertaining end wall 2. Said end wall 2 is for assembling purposes provided with a laterally open recess 6, in which the contact rod 4 has been inserted from the side whereafter the same has been secured in position by the tightening of a nut 7 bearing

against the outside of the end wall whereas an annular collar 8 on the rod 4 bears against the inside of said end wall. The opposite contact 5 is displaceably supported in a metal bushing 9 mounted in the end wall 3 in the same manner as the rod 4 in the end wall 2. The fastening of the bushing 9 is effected by means of the nut 10 threaded on to its projecting end.

The displacement of the contact rod 5 in an axial direction is effected under the influence of heat expansion and heat contraction respectively in an axial direction of a tubular thermal member 11 disposed coaxially in relation to the contact rods and outside the end wall 3. The thermal member 11 is at its inner end soldered to the nut 10 and at its outer end provided with an end wall 12 through which passes a reduced portion 13 of the contact rod 5. Between the end wall 12 and a thicker portion of the contact rod 5 a helical spring 14 enclosing the portion 13 is disposed under tension, said helical spring normally keeping the contact rod 5 elastically pressed against the fixed contact 4. Onto the outer end of the portion 13 is threaded a nut 15 forming an adjustable stop cooperating with the member 11, through shifting of which stop the switch opening current may be altered.

At a low temperature there is a small clearance space between the end wall 12 and the abutment 15. When the temperature exceeds a certain predetermined limit the rod 12, on account of the fact that the tube shaped thermal member 11 has a higher coefficient of expansion than the rod 5, presses against the abutment 15 and, at the continued expansion, brings along the contact rod 5, whereby the contact is opened. At a decreasing temperature the contact rods approach each other and the contact is restored.

If desired the supports in the two end walls of the contact housing, or at least one of them, may be made in the form of central apertures in the end walls. The work of assembling the parts is, however, considerably facilitated if the supports, as in the shown embodiment, are open laterally, because in such a case the parts carried by the end walls may be removed or mounted respectively simply by loosening the nuts 7 and 10 respectively, whereafter the parts may be inserted or taken out sideways.

The contact housing 1 may, if desired, be made of metal, it being of course in such a case necessary to provide special insulation for one or both of the contacts.

I claim:—

1. A thermal switch comprising two coaxial

- contact electrodes relatively axially reciprocable, a steatite channel-shaped contact housing extending axially of and partially surrounding said electrodes, two contact housing steatite end walls integral with said housing each for carrying one of said electrodes, a thermal member disposed outside one of said end walls for operating one of said electrodes, and a sealed glass receptacle containing said elements and directly surrounding the housing.
2. A thermal switch comprising two coaxial contact electrodes relatively axially reciprocable, a steatite channel-shaped contact housing extending axially of and partially surrounding said electrodes, two opposite contact housing steatite end walls integral with said housing and each having a laterally accessible recess for carrying one of said electrodes, and a thermal member disposed outside one of said end walls for operating one of said electrodes, and a sealed glass receptacle accommodating all of said elements and closely surrounding the housing.
3. A thermal switch comprising two coaxial contact electrodes relatively axially reciprocable, a channel-shaped contact housing of insulating material extending axially of and partially surrounding said electrodes, two contact housing end walls of insulating material integral with said housing each for carrying one of said electrodes, a thermal member disposed outside one of said end walls for operating one of said electrodes, and a sealed glass receptacle containing said elements and directly surrounding said housing.
4. A thermal switch comprising two coaxial contact electrodes relatively axially reciprocable, a laterally accessible contact housing of insulating material, a contact housing end wall of the same material integral with said housing having a laterally open recess for supporting one of said electrodes, an opposite contact housing end wall of the same insulating material integral with said housing carrying the other electrode, a thermal member disposed outside one of said end walls for operating one of said electrodes, and a sealed glass receptacle accommodating said elements and closely surrounding said housing.
5. A thermal switch comprising two coaxial contact electrodes relatively axially reciprocable, a laterally accessible contact housing of insulating material, two opposite contact housing end walls of the same insulating material integral with said housing each having a laterally open recess for carrying one of said electrodes, a thermal member disposed outside one of said end walls for operating one of said electrodes, and a sealed glass receptacle accommodating said elements and tightly surrounding said housing.
6. A thermal switch comprising two coaxial contact electrodes relatively axially reciprocable, a channel-shaped contact housing of insulating material extending axially of and partially surrounding said electrodes, two opposite contact housing end walls of the same insulating material integral with said housing each having a laterally accessible recess for carrying one of said electrodes, a thermal member disposed outside one of said end walls for operating one of said electrodes, and a sealed glass receptacle accommodating said elements and closely surrounding said housing.
- CARL WILHELM APPELBERG.

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