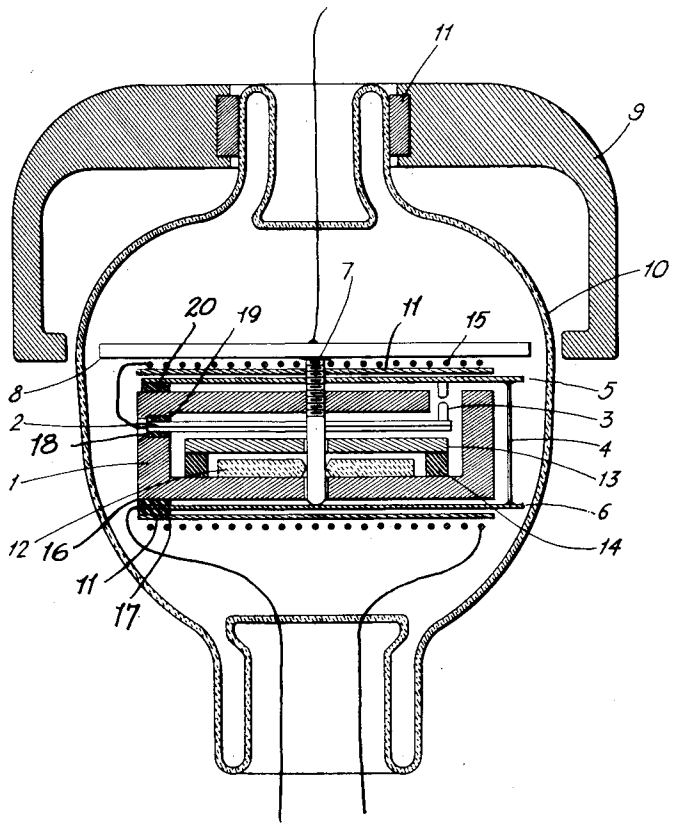
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THERMOSTATICALLY CONTROLLED PIEZO-ELECTRIC CRYSTAL HOLDER

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THERMOSTATICALLY CONTROLLED PIEZO-ELECTRIC CRYSTAL HOLDER

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5 Claims. (Cl. 171—327)

This invention relates to a thermostatically controlled heating element for a piezo-electric crystal holder with short heating period and contact control.

It is an object of this invention to simplify and improve thermostats as are used to control the heating elements in mountings for piezo-electric crystal holders. In thermostats whose heating current is controlled by a periodically opened and closed contact it is difficult to secure a short heating period since the heat inertia must thereby be very small. A small heat inertia however, causes the temperature variations produced by the controlling action to be transmitted into the interior of the instrument. With shorter contact periods such transmission will be less noticeable.

In accordance with the present invention the closing of the electrical contacts is determined by two movements of contacting elements, the two movements comprising main and auxiliary actuating elements. Whereas the one movement would cause the closing and opening of the heating current over a relatively long period, the second movement produces a periodical closing and opening of the contacts in rapid succession. In this manner it is possible to prevent an appreciable transmission of temperature variations into the interior of thermostats.

The auxiliary movement referred to may be produced in various ways. Although any mechanism by which a pendulum motion is obtained, would practically be suited for this purpose, there is a particular advantage obtained when this movement is produced by thermal expansion.

An arrangement by which this will be realized is shown in the accompanying drawing, in which the thermostat body is designated as 1. This body has a bi-metal strip 2 tightly clamped thereon and insulated by insulating pieces 18 and 19. The bi-metal strip causes the actual movement of contact 3. The body is surrounded by an electric heating element 15. The auxiliary movement is produced by the thermal expansion of a thin metal thread 4 passed by the heating current of the thermostat. Two spring-like members 5 and 6 are arranged each side of the bi-metallic strip and are insulated from the body 1 by strips 16 and 20. Due to this thermal expansion the spring 5 is permitted to open contact 3. The spring 6 being tensioned by the screw 7 and supporting the other end of the metal thread 4, is first considered to be a fixed point. Due to the opening of contact 3, the heating current of the thermostat is interrupted. The thread 4 cools off very quickly on account of its small heat capacity so that the contact 3 closes again. If due to an outer cause, the temperature of the thermostat would somewhat increase, then the bi-metal strip 2 bends towards such a direction so as to cause the contacting surfaces to open. The thread 4 due to cooling off, contracts and reestablishes the contact, but requires a comparatively longer time than in the first case. Consequently, the time during which the contact is closed is shortened as regards the time during which the contact is open. The smaller heating energy of the thermostat thereby produced avoids the previously assumed heat variation.

Since in general the amount of heating energy is several watts, the contact 3 would in time burn out if it were normally exposed to the outside atmosphere. This can be prevented if this contact instead of directly controlling the heating energy, controls an external relay for interrupting the heating energy. A still simpler arrangement is shown by the drawing in which the load capacity of the contact is increased by having the heater contacts arranged within the thermostat assembly which is then sealed into an evacuated bulb 10.

The arrangement shown by the drawing represents a thermostat particularly suited for the control of a tube transmitter. As it is of an advantage for such transmitters when the conling temperature can be varied at will, the arrangement shown by the drawing is provided with a screw 7, an iron rod 8 and a permanent magnet 9. This magnet placed at the outside of the bulb 10 can be rotated around bushing 11. This rotation due to the magnetic attraction, causes a rotation of the iron rod 8 and therefore also a rotation of the screw 7 which adjusts the spring 6, thus varying the temperature at which the contact 3 will be opened.

The arrangement shown by the drawing is particularly suited for the temperature control of quartz crystals for the wireless telegraphy. The bushing 11 is spaced from the spring 6 by an insulation spring 17. 12 represents the annular quartz crystal, 13 designates its upper electrode, and 14 is an insulating ring between the upper and the lower electrode.

I claim:

1. A thermostatically controlled piezo-electric crystal holder comprising an enclosing chamber, a bi-metal strip arranged with an electrical contacting element located within said chamber and adapted to control the temperature of a piezo-electric crystal, an upper and lower electrode spaced by insulating means, a piezo-electric crys-

tal interposed between said electrodes, heating means surrounding said electrodes and said bi-metal strip, the temperature of said heating means being controlled by the contact on said bi-metal strip.

2. A temperature controlled piezo-electric crystal holder comprising an enclosing chamber, a bi-metal strip arranged with an electrical contacting element located within said chamber and adapted to control the temperature of a piezo-electric crystal, spring-like members arranged each side of said bi-metal strip, one of said spring-like members having an electrical contact, a thread-like member retaining said spring-like members in a predetermined position with respect to the contact on said bi-metal strip, an upper and lower electrode spaced by insulating means, a piezo-electric crystal interposed between said electrodes, heating means surrounding said electrodes and said bi-metal strip, the temperature of said heating means being controlled by the contact on said bi-metal strip.

3. A temperature controlled piezo-electric crystal holder comprising an enclosing chamber, a bi-metal strip arranged with an electrical contacting element located within said chamber and adapted to control the temperature of a piezo-electric crystal, spring-like members arranged each side of said bi-metal strip, one of said spring-like members having an electrical contact, a thread-like member retaining said spring-like members in a predetermined position with respect to the contact on said bi-metal strip, an upper and lower electrode spaced by insulating means, a piezo-electric crystal interposed between said electrodes, heating means surrounding said electrodes and said bi-metal strip, the temperature of said heating means being controlled by the expansion and contraction of both the bi-metal strip and the thread-like metallic member.

4. A temperature controlled piezo-electric crystal holder comprising an enclosing chamber, contact actuating means comprising a bi-metal strip arranged with an electrical contacting element located within said chamber and adapted to control the temperature of a piezo-electric crystal, spring-like members arranged each side of said bi-metal strip, one of said spring-like members having an electrical contact, a thread-like member retaining said spring-like members in a predetermined position with respect to the contact on said bi-metal strip, an upper and lower electrode spaced by insulating means, a piezo-electric crystal interposed between said electrodes, heating means surrounding said electrodes and said bi-metal strip, the temperature of said heating means being controlled by the expansion and contraction of both the bi-metal strip and the thread-like metallic member, and adjustable control for said actuating means located outside of said enclosing chamber for varying the temperature to be controlled by said contacts.

5. A temperature controlled piezo-electric crystal holder comprising an enclosing chamber, contact actuating means comprising a bi-metal strip arranged with an electrical contacting element located within said chamber and adapted to control the temperature of a piezo-electric crystal, spring-like members arranged each side of said bi-metal strip, one of said spring-like members having an electrical contact, a thread-like member retaining said spring-like members in a predetermined position with respect to the contact on said bi-metal strip, an upper and lower electrode spaced by insulating means, a piezo-electric crystal interposed between said electrodes, heating means surrounding said electrodes and said bi-metal strip, the temperature of said heating means being controlled by the expansion and contraction of both the bi-metal strip and the thread-like metallic member, and magnetic means for adjusting said actuating means located outside of said enclosing chamber for varying the temperature to be controlled by said contacts.

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