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THERMOSTAT AND OTHER THERMOMOTIVE MEANS

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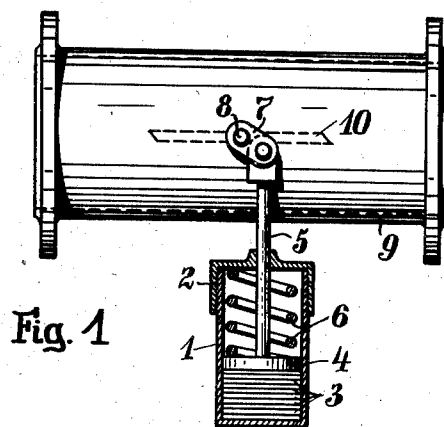


Fig. 1

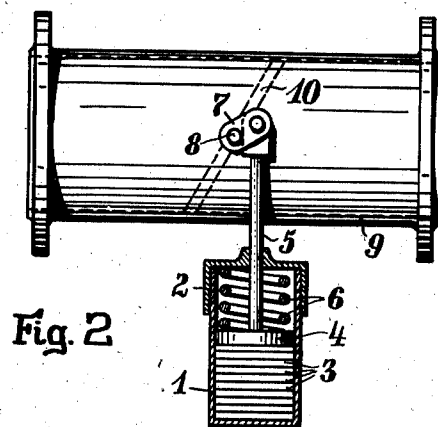


Fig. 2

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THERMOSTAT AND OTHER THERMOMOTIVE MEANS

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10 Claims. (Cl. 297—12)

This invention relates to thermostats and other thermomotive means.

An object of the invention is to provide thermomotive means which will offer very large effective expansion, will be capable of taking a considerable load, and may without detriment be heated to high temperatures—even to 1200° C.

Thermomotive means in accordance with the invention comprises individual plates of minerals, especially individual plates of mica, assembled to form a pile expansible under heat transversely of the plates for exerting a mechanical force.

The pile may be held at one end in a suitable casing so as to be expansible from said end in a direction transversely of the plates for exerting a force on a force-transmitting member engaging the other end of the pile, preferably under the action of a spring or springs.

As the result of extensive experiments, I have ascertained that muscovite (potassium mica)—also known in the trade as clear mica—is suitable for temperatures up to 600° C., and that phlogopite (magnesium mica)—also known in the trade as amber mica—is suitable for temperatures up to 1200° C. For instance, a pile of amber mica plates 36 mm. long at ordinary temperature is found to undergo an actual linear expansion of 79 mm. when heated, as by a gas flame, to 640° C.; and a pile of clear mica plates 37 mm. long at ordinary temperature is found to undergo a linear expansion of 24 mm. when similarly heated—the expansive force developed being capable of breaking a wire of 3 mm. diameter and of a strength of 700 kg. per square cm. There is no analogy to this enormous expansion of mica and so far there is no scientific explanation. Upon cooling down the pile resumes its original length, and the heating and cooling process may be repeated any number of times without the mica becoming fatigued.

In one constructional embodiment of the invention individual mica plates, preferably discs of 6 to 25 mm. diameter and 0.5 to 1 mm. thick, are assembled to form a pile which is inserted into a casing closed at one end. The mica plates or discs of the pile are then pressed together by means of a spring-pressed bolt. Said casing is made of a heat-resisting material, such as metal, glass, porcelain or ceramic material, suitable for the intended use of the device.

If the described device is exposed to a source of heat, the encased mica pile, held against one end of the casing, expands in a direction from this end and presses against the spring-urged

bolt, which transmits the linear expansion of the pile to the member to be operated.

It will now be apparent that a thermostat or thermomotive means in accordance with the invention may advantageously be used for divers purposes wherever a large movement and/or a great force is necessary for the operation of a member such as a valve, cock, slide valve, contact, switch and so forth, or for lifting, lowering and displacing masses—assuming, of course, that a suitable source of heat is available. The transmission of the linear expansion of the mica pile to the member to be operated may be effected in any suitable manner, for example, by means of rods or levers and so forth.

One constructional form of thermomotive means in accordance with the invention and as applied to the control of a throttle valve is illustrated on the accompanying drawing, to which reference will now be made.

Fig. 1 is a side view of the arrangement, partly in section.

Fig. 2 is a similar view but after the thermomotive means has acted, under heat, to close the valve.

A pile of mica plates 3 is disposed in a casing 1 closed by a screw cap 2. Resting on the pile is a disc 4 provided with a push rod 5 which projects through an aperture in the cap 2. A spring 6 surrounds the rod 5 within the casing 1 and bears at one end against the cap 2 and at the other end on the disc 4.

As shown the rod 5 is connected to a crank 7 on the spindle 8 of a throttle valve 10 turnable in a conduit 9.

At normal temperatures the parts assume the positions shown in Fig. 1 and the valve 10 is open. However, when the pile of mica plates 3 is heated they undergo extraordinary expansion as hereinbefore stated from the bottom end of the casing in a direction transversely of the plates of the pile and thereby exert an upward thrust on the rod 5 (in opposition to the spring 6) which turns the crank 7 in a direction to close the throttle valve (Fig. 2).

I claim:

1. Thermomotive means, for regulating purposes, comprising an assembly of juxtaposed, individual plates of mica, a support for said assembly permitting its expansion under heat transversely of said plates for exerting a mechanical force, and a force-transmitting member engaging an end of the pile.

2. Thermomotive means, for regulating purposes, comprising a heat-resisting casing, indi-

vidual plates of mica assembled in the casing to form a pile having freedom for expansion therein under heat in a direction transversely of the plates thereby to exert a force, and a force-transmitting member engaging an end of the pile.

3. Thermomotive means, for regulating purposes, comprising a heat-resisting casing, individual plates of mica assembled in the casing to form a pile expansible under heat from one end of said casing and in a direction transversely of the plates, for exerting a force, an apertured closure for the other end of the casing, and a force-transmitting member slidable in the aperture of the closure and engaging the other end of the pile.

4. Thermomotive means according to claim 1, the individual plates being of muscovite.

5. Thermomotive means according to claim 2, the individual plates being of muscovite.

6. Thermomotive means according to claim 3, the individual plates being of muscovite.

7. Thermomotive means according to claim 1, the individual plates being of phlogopite.

8. Thermomotive means according to claim 2, the individual plates being of phlogopite.

9. Thermomotive means according to claim 3, the individual plates being of phlogopite.

10. Thermomotive means comprising a laminated assembly expansible under heated conditions in a direction normal to the laminations and consisting of individual mica elements disposed in surface contact, resilient means engaged with the opposite ends of said laminated assembly for maintaining the contact relation of said mica elements under varying temperature conditions, and means connected with one end of said laminated assembly for utilizing the expansion produced in said assembly under heated conditions.

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