Dec. 7, 1943. JEAN-LÉON REUTTER 2,335,886

THERMOSTATIC SWITCH

Filed Jan. 28, 1938

Fig. 1.

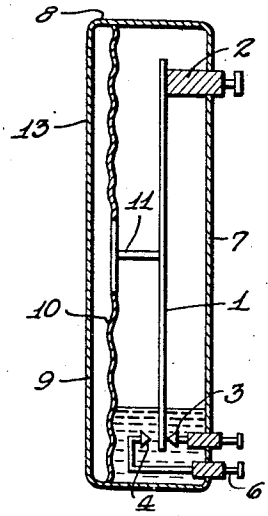
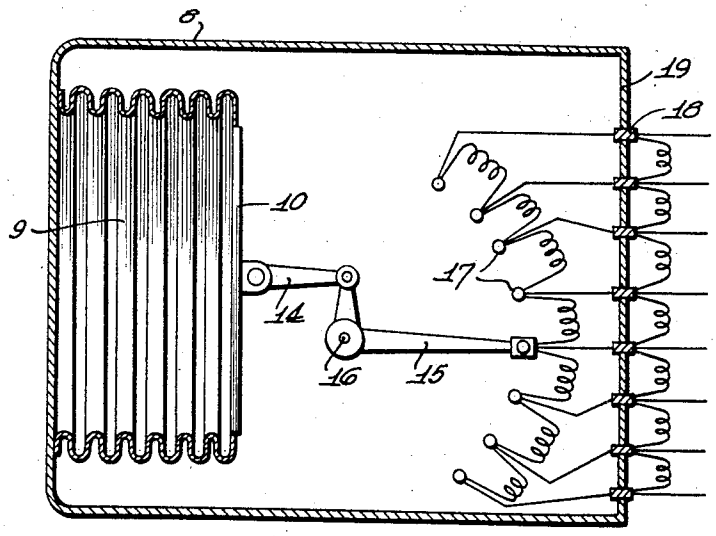


Fig. 2.



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THERMOSTATIC SWITCH

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6 Claims. (Cl. 200—140)

The present invention, Reutter's system, relates to heat engines which have a movable wall which is common to two fluid-tight chambers each containing a different fluid. The displacements of said wall, which are utilized for producing work, are produced by the variations of the temperature which is common to the two fluids. If the variations of pressure are small, the thrust on the movable wall can be as great as desired since, other things moreover being equal, it is proportional to its area.

Taking advantage of this possibility which enables considerable mechanical energy to be obtained for small variations of temperature of the fluids, the invention relates to the novel application of the heat engines of the kind indicated to the construction of thermostats for the direct operation of electric switches in which the resistance energy to be overcome is considerable.

Thus, without decreasing the sensitiveness, considerable strokes and forces can be obtained for relatively small differences of temperature. In the known thermostats operating by the expansion of a gas when the temperature of said gas varies, atmospheric pressure acts upon the walls of the box in which the gas is enclosed. The accuracy of the apparatus is not maintained because atmospheric pressure does not vary according to the temperature of atmospheric air. The invention has for object to provide thermostats the operation of which depends only on the surrounding temperature. Such thermostats are influenced by temperature variations of less than $\frac{1}{100}$ of a degree C.

The invention consists in a thermostat having a rigid enclosure in which is provided a chamber having a movable or deformable wall and containing a gas or a dry vapour. The rigid enclosure is filled with a saturated vapour distinct from that contained in the chamber, an electric switch device being provided in said rigid enclosure and operated by the displacements of the movable wall. The saturated vapour is suitably chosen so as to prevent break sparks and arcs and the oxidization of the electric contacts of the switch device.

The accompanying drawing shows, only by way of examples, embodiments of the above-defined improvements and novel applications.

Fig. 1 is an axial section of a heat engine applied to the control of an electric contact-breaker.

Fig. 2 is a similar view to Fig. 1, for a modification of construction.

In Fig. 1, the group of elements of the contact-breaker is arranged in one of the chambers of the engine, said group comprises a deformable resilient blade 1 which is fixed to a terminal 2 and can oscillate between two contact studs 3 and 4 connected respectively to terminals 5 and 6 which are electrically insulated and are fluid-tightly fixed, as the terminal 2, on the wall 7 of the box 8. The second chamber of the engine is provided at 9 and is separated from the first chamber 8 by a deformable wall 10 which acts, by means of a central push rod 11, on the resilient blade 1 which is mounted in such a manner that, in the absence of any constraint, it touches the stud 4. The chamber 8 contains a saturant vapour, the generating liquid of which is advantageously a transformer oil in sufficient quantity to cover the studs 3 and 4 constantly. The chamber 9 contains a gas or a non-saturant vapour and the respective pressures in the chambers 8 and 9 may be so chosen that, for a temperature less than that at and beyond which the contact 1—4 is to be broken, the wall 10 is pressed against the end 13 of the box 8. The pressure in the chamber 9 being assumed to increase much faster than that in the chamber 8, the sudden break of the contact 1—4 with immediate closing of the contact at 1—3 will be obtained at and beyond a predetermined temperature, or the closing of this latter contact for a predetermined higher temperature.

In the embodiment shown in Fig. 2, the movable wall 10, which separates the two chambers 8 and 9 of the heat engine, is connected by a connecting rod 14 to a friction contact arm 15 which is pivoted at a fixed point 16 and which, for predetermined temperatures, touches the contacts studs of a series 17 which is arranged in the box 8 and surrounded by a suitable atmosphere for preventing break sparks and for ensuring the preservation of the contacts (and such, for example, as carbon dioxide under a pressure of 50 to 60 kgs. per square centimeter). It is thus possible to control electric circuits for obtaining, through the intermediary of relays, any desired effects (remote control of temperatures for example). The connection with the contact studs 17 and the outside circuits is effected by means of terminals 18 which are electrically insulated and are fluid-tightly fixed on the end 19 of the box 8.

What I claim as my invention and desire to secure by Letters Patent is:

1. In a thermostatic electric switch, a gas-tight rigid enclosure filled with a saturated vapour under pressure, a gas-tight chamber located wholly within said enclosure and filled with a

gaseous fluid under pressure distinct from said saturated vapour, an inflexible movable wall closing one end of said chamber, an electric switch device in the enclosure and having fixed and movable contacts, and means for connecting the movable contact with the inflexible movable wall in order to operate said movable contact by the variations of the temperature applied to the rigid enclosure.

2. In a thermostatic electric switch, a gas-tight rigid enclosure filled with transformer oil and vapour of the same under pressure, a gas-tight chamber located wholly within said enclosure and filled with a gas under pressure, an inflexible movable wall closing one end of said chamber, an electric switch device in the enclosure and having fixed and movable contacts and means for connecting the movable contact with the inflexible movable wall in order to operate the said movable contact by the variations of the temperature applied to the rigid enclosure.

3. A thermostatic electric switch according to claim 1, having the gas tight chamber surrounded and determined upon its sides by an expansible wall projecting freely upon all sides into the rigid enclosure from one bounding wall of the latter, and having the inflexible movable wall mounted upon and closing the inner end of said expansible wall which projects into said rigid enclosure.

4. A thermostatic electric switch according to claim 2, having the gas tight chamber surrounded and determined upon its sides by an expansible wall projecting freely upon all sides into the rigid enclosure from one bounding wall of the latter, and having the inflexible movable wall mounted upon and closing the inner end of said expansible wall which projects into said rigid enclosure.

5. A thermostatic electric switch according to claim 1, having the gas tight chamber surrounded and determined upon its sides by an expansible wall projecting freely upon all sides into the rigid enclosure from one bounding wall of the latter, and having the inflexible movable wall mounted upon and closing the inner end of said expansible wall which projects into said rigid enclosure, and having the stationary contacts within the rigid enclosure arranged in a series interconnected to intervening circuits which may optionally be resistances, so that variations and changes in the current switched will be obtained according to the greater or less expansions or contractions of the expansible wall.

6. In a thermostatic electric switch, a gas-tight rigid enclosure filled with a saturated vapour under pressure, a gas-tight chamber located wholly within said enclosure and filled with a gaseous fluid under pressure distinct from said saturated vapour, a partition means having at least a portion associated therewith which is movable in response to variations in the vapour pressure of said saturated vapour, said partition means closing one end of said chamber, an electric switch device in the enclosure and having fixed and movable contacts and means for connecting the movable contact with the movable portion associated with said partition means in order to operate said movable contact by the variations of the temperature applied to the rigid enclosure.

JEAN-LÉON REUTTER.