

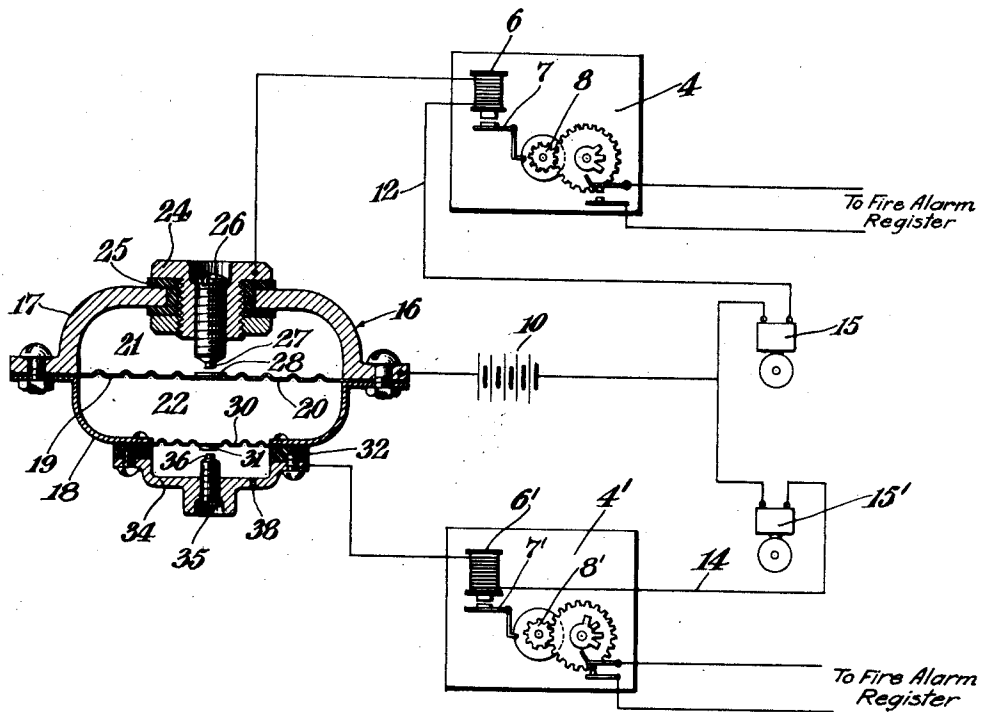
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COMBINED RATE OF RISE AND FIXED TEMPERATURE ELECTRIC THERMOSTATS

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COMBINED RATE OF RISE AND FIXED
TEMPERATURE ELECTRIC THERMO-
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This invention relates to a double acting or duplex pressure operated circuit controller designed especially for use and operation under changes of temperature affecting the same.

5 It is a primary object of the invention to provide a device of this character which will be operated either by a rate of rise of temperature or by a fixed predetermined temperature irrespective of the rate of rise thereof.

10 It is a further object to simplify the construction of the controlling unit so that economy of construction and uniformity of results will be obtained.

15 These and other objects will appear more fully from the following description when considered in connection with the drawing showing one form of my invention.

20 The figure of the drawing illustrates diagrammatically the preferred form of my invention the controlling unit being shown in section.

25 The present invention is adaptable for use with any desired type of signal, that shown in the drawing being the usual electrically operated code box 4 which may be spring actuated and released for actuation by means of the electromagnet 6 and pivoted latch 7 the latter normally engaging the ratchet teeth of the mechanism 8 to restrain the parts against movement. It will be understood that when the mechanism 8 is released a prearranged signal is sent to the fire alarm register of any known type.

30 The above devices are merely typical illustrations of one type of fire alarm it being understood that any other such devices may be substituted for that shown.

35 Since the present invention contemplates signals for different conditions namely, one in response to a rate of rise of temperature and one in response to a fixed predetermined temperature it is preferred to have separate signals controlled respectively by the two conditions so as to indicate which condition exists, that is, as to whether there is a sudden increase or rise of temperature or whether a predetermined abnormal temperature condition exists. To this end there is shown a second code box or other signalling apparatus 4' similar to that illustrated at 4 and also of a usual construction suitable for conveying a definite code to a distance. The signalling device 45 4' is likewise shown as controlled by an electromagnet 6', latch 7 and mechanism 8' functioning the same as the corresponding parts described above.

50 The circuits for the signals 4, 4' may utilize the same battery or other source of electrical energy

10, conductors 12 and 14 leading respectively to the electromagnets or other release mechanism 6, 6'. The conductors 12 and 14 may include any other type of signal such for example as the electrically actuated bells 15, 15' for giving a visible or audible signal on the actuation of the mechanism and completing of the signal circuit.

The circuits to the signalling devices are constructed to be closed by the controlling unit 16 shown as an enclosed chamber formed with walls 17 and 18 of relatively greater and less thickness or otherwise formed so as to be of greater and less conductivity respectively for the purposes referred to below.

70 The interior of the unit 16 is divided transversely by means of the flexible diaphragm 20 secured within the unit at the junction of the casings 17 and 18. The diaphragm 20 is provided with a relatively small vent 19 for slowly equalizing the pressure between the compartments 21 and 22. The compartments 21 and 22 formed by the diaphragm 20 are thus surrounded by portions of the outer casings 17 and 18 having greater or less conductivity so that on an occurrence of a fire condition the medium within the chamber 22 will expand first to cause a corresponding movement of the diaphragm 20 toward or into the compartment 21.

80 The casing 17 is closed at its upper portion by means of the nut 24 separated from the metal of the casing 17 by means of the insulating washers 25 so as to provide a tight joint but without the capability of conducting electricity from the nut to the casing 17. A contact screw 26 is adjustable within the nut 24 and is provided with a contact point 27 adjustable toward or away from the diaphragm. The diaphragm 20 carries a similar contact member 28 movable toward or away from the contact member 27.

95 The casing 18 is broken away to accommodate a second flexible diaphragm 30 provided with a contact member 31, said diaphragm being secured to the wall of casing 18 by means of the insulating disk 32. The insulating member 32 also carries a lower outer casing 34 provided with an adjustable contact screw 35 formed with a contact point 36 adjustable toward or away from the contact member 31. It is preferred to form a relatively small vent in the casing 34 as indicated at 38 although this is not entirely essential. The diaphragm 30 is of smaller proportion than the diaphragm 20 and may be made of relatively stiffer material since this diaphragm is intended to be actuated only by a greater increase in pres- 110

sure in the chamber 22 than that which actuates the diaphragm 20.

With the construction described above the contact screws and points 26, 27, 35 and 36 are insulated from the body of the unit 16. One terminal of the battery 10 may thus be connected to the casing of the unit 16 arranged in current conducting relation to the diaphragm carried contact members 28 and 31, the return circuits including the contact members 27 and 36 and the conductors 12 and 14 as will be readily understood.

The operation of the apparatus is as follows:

Any suitable number of units 16 are distributed throughout the area to be protected. Upon the occurrence of a fire condition there is a sudden increase in the pressure of the actuating medium (preferably air) in the compartment 22 due to the relatively thin enclosing wall 18 for this compartment. If the fire is of sufficient intensity and has developed suddenly the increase of temperature and pressure in the chamber 22 cannot be accommodated by the vent 19, the result being that the diaphragm 20 is moved into the chamber 21, carrying contact member 28 against the member 27 thus completing the circuit through the signal 15 and alarm control magnet 6 with the result that a fire alarm is turned in at the corresponding register.

If the condition of heat has arisen slowly the vent 19 is sufficient to accommodate the difference of pressure between the chambers 22 and 21 so that the circuit through the contacts 27 and 28 will not be closed. However, if the relatively slow heat condition continues to a fixed predetermined degree, for which the mechanism has been previously set, the pressure within the chambers 21 and 22 becomes sufficient to flex the relatively stiff diaphragm 30 thus moving the contact member 31 against the contact point 36 and completing the circuit through the signal 15' and magnet 6' for turning in the alarm 4'.

It will thus be seen that the present invention provides a simple mechanism for giving an alarm when there is a relatively high rate of rise of temperature and for completing a different alarm when there is a slow rise of temperature continued to a significant and predetermined degree.

Having now described my invention I claim:

1. A thermostatic duplex control unit comprising a chamber divided into compartments having walls of different heat conductivity and provided with two diaphragms of relatively different resistance to pressure, one of said diaphragms being vented and forming a division between said compartments, and circuit controlling devices cooperating respectively with said diaphragms one acting upon sudden increase of pressure acquired in the compartment having the wall of greater heat conductivity and acting upon the vented diaphragm and the other upon an accumulated pressure sufficient to actuate the diaphragm having the greater resistance.

2. In a fire alarm mechanism, an enclosed chamber having walls of relatively high heat conducting capacity, a plurality of pressure responsive devices of greater and less flexibility dividing the chamber into compartments and subject on one face of each to the pressure in one compartment, a chamber wall having relatively lower heat conducting capacity than said first named wall and enclosing the rearward face of said diaphragm of greater flexibility, restricted means for equalizing the pressures on the opposite faces of said last named diaphragm and circuit closing means controlled by the movements of said diaphragms.

3. A thermostatic pressure operated duplex circuit controlling device comprising an enclosing chamber having a pressure responsive device separating said chamber into compartments and having a pressure equalizing hole between them, a cooperating contact upon which circuit is closed by said pressure responsive device acting in response to uncompensated quickly rising pressure in one of said compartments and a second pressure responsive device and cooperating contact therefor responsive to a greater pressure accumulated in both of said compartments and greater than that which brings the first named pressure responsive device into action.

4. A thermostatic pressure operated duplex circuit controller comprising a chamber sub-divided into two compartments by a pressure responsive diaphragm having a pressure equalizing hole, the outer heat exposed walls of said compartments being of different heat conducting sensitivity, a contact cooperating with said diaphragm to control the conditions of a circuit upon rapid increase of pressure in the compartment having the more sensitive wall, a diaphragm closing a wall of said chamber and less readily responsive to pressure than the first named diaphragm and a cooperating contact for the latter diaphragm.

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