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AUTOMATIC THERMOSTAT DEVICES

Filed March 20, 1953

Fig. 2.

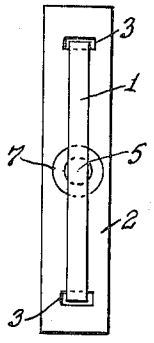


Fig. 1.

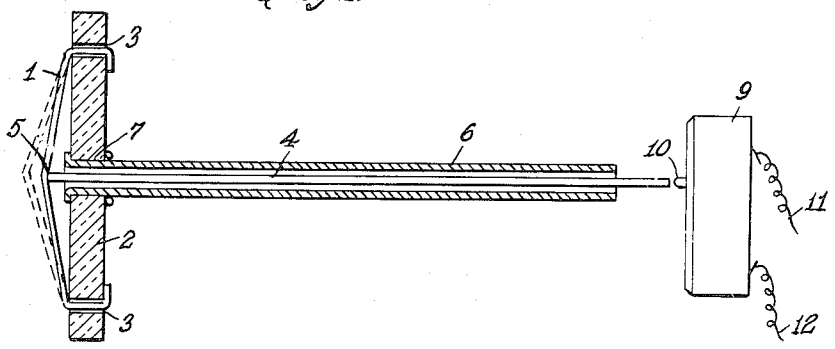
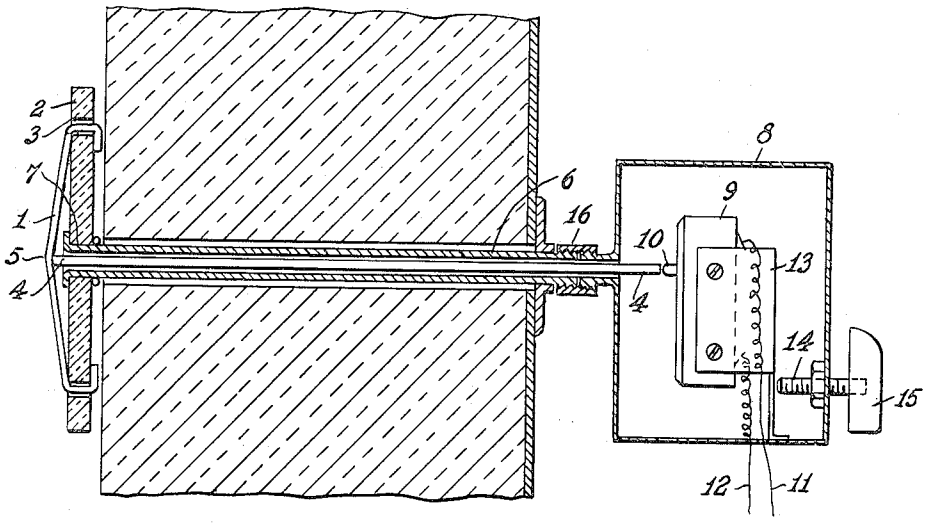


Fig. 3.



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AUTOMATIC THERMOSTAT DEVICES

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6 Claims. (Cl. 200—137)

This invention relates to new and useful improvements in an automatic thermostat device which has for its object to regulate and maintain a specific predetermined temperature, or to cut off the heat source when a specific predetermined temperature has been attained in high temperature kilns and heat treating ovens.

For high temperatures e. g. 1,000–2,000° F., there are at present many such heat holding and shut off controls operating from thermo-couples, which are in turn, connected to galvanometers that operate tuned radio frequency circuits, photo electric electronic tubes, or minute electric current high sensitive relays.

However, any or all of the above mentioned devices are expensive and complicated in construction and operation, and easily subject to maladjustment or frequent breakdowns, and voltage fluctuations, which adversely affect their efficient or precise operation.

In addition, such devices all operate from and are dependent upon a thermo-couple which deteriorates rapidly and loses its calibration in high temperatures.

Thus the object of this invention is to provide a device for regulating and maintaining a specific high temperature, or to cut off the source of heat at a specific high temperature, of simple construction and operation, which is not dependent upon a thermo-couple, and is much less expensive to construct and maintain than the above mentioned devices, and, in addition, more consistent in maintaining its calibration.

The inventor is well aware of the fact that there are many thermostat controls for lower temperatures than 1,000° F., and that the art is old for thermostats in this lower temperature field.

The present invention possesses distinct novelty, inasmuch as a high temperature resistant metal strip or ribbon, such as nickel, or a nickelchrome alloy, especially a patented alloy known in the trade as "Inconel," or an aluminum, chrome iron alloy known in the trade as "Kanthall" is utilized as a heat expanding and lengthening unit, which is connected to a rod so as to actuate an electric switch that requires but a very minute movement for its operation. The expanding ribbon of metal shuts off the switch and the electric current, and, when said ribbon contracts and permits the switch again to turn on the current there will be maintained the specific heat temperature required, or the expanding ribbon of metal will shut off the current at a predetermined temperature, and by a specially arranged switch, the current will remain off.

The Inconel or high temperature resistant metal ribbon is stretched across a porcelain or metal slab of a lower coefficient of expansion than said ribbon and secured to the ends of said slab. Upon becoming heated the metal ribbon expands, and being securely fastened to the slab at its ends, it rises or "buckles" up in an outward direction from the latter. A heat resistant metal rod is secured to the middle of the metal ribbon, and at right angles to the latter, so that the rising metal ribbon imparts a reciprocating motion to the rod. The rod moving longitudinally in one direction when the metal ribbon is expanding, and in the opposite direction when the metal ribbon is contracting, thus, accordingly operating an electric switch by alternately turning it off or on.

With the above and other objects in view, this invention consists of the novel features of construction, combination and arrangement of parts, hereinafter fully described, claimed and illustrated in the accompanying drawings forming part of this application, and in which similar characters of reference indicate corresponding parts in all views, and in which:

Figure 1 is a side elevation in cross section of a thermostat mechanism.

Figure 2 is a front elevation of the slab and metal ribbon.

Figure 3 is a partial cross section of a side elevation, showing the device installed through the wall of a kiln or heat treating oven.

Referring particularly to the drawing, the description of the said device, and control of same is as follows:

The numeral **1** designates a ribbon or string of a high temperature resistant metal secured at its ends to a porcelain slab, or metal slab **2**, of a relatively low coefficient by being inserted and bent-over in the holes or slots **3** in the slab **2**.

The numeral **4** designates a high temperature resistant metal rod having one end secured at a right angle to the center of the metal ribbon, as at **5**, and the other end pressing against the operating plunger **10** of switch **9**.

The numeral **6** designates a high temperature resistant metal or ceramic tube adapted to slidably receive the rod **4**; said tube **6** has one end secured to the slab **2** through a hole **7** at the center of the latter, and the other end by means of a coupling **16** secured to a casing or housing **8**, in which an electric switch **9** is also secured; said switch is shut off by releasing the plunger **10**.

The said switch **9** is connected to a source of current (not shown) by the wires **11** and **12**, and is, in turn, supported by a spring mounted holder **13** secured to the housing **8**. The numeral **14** shows a thread-mounted bar, which is turned by a knob **15**.

In operation the metal or ceramic tube **6**, containing the rod **4** and secured to the slab **2**, is inserted through the wall of the kiln or oven from the inside or heating chamber and is then secured to the housing **8** by means of a threaded coupling **16**. The electric switch **9** is then connected into the electric circuit supplying the kiln heating electric coils, or to a remote control relay, if the electric current required to operate the oven is greater than the capacity of the switch, or the electric switch **9** may be connected to an electric solenoid valve on the fuel line of a gas or oil heated kiln.

The threaded bar **14** is adjusted, to press against the switch holder **13** and holds the switch in a predetermined position, so that the rod **4** upon being actuated by the expanding and contracting metal ribbon will upon expanding of the latter, shut off the switch **9** by releasing the plunger **10**; while said ribbon upon contracting will cause the rod **4** to press against the plunger **10** and turn on the switch **9**, and thus operate the latter at the required temperature.

It is obvious that changes may be made in the form, construction and arrangement of the several parts, as shown, within the scope of the appended claims, without departing from the spirit of the invention, and I do not, therefore wish to limit myself to the exact construction shown and described herein.

What I claim, as new and desire to secure by Letters Patent of the United States, is:

1. A thermostat for temperature control comprising a ceramic slab formed with a central opening therein, a ribbon having its ends secured to said slab, said ribbon being of high temperature resistant metal of a high co-

efficient of expansion, an electric switch, a rod slidable through said opening and having one end secured to the center of said ribbon at a right angle, and the other end actuating said switch.

2. A thermostat for temperature control comprising a porcelain slab formed with a central opening therein, a high temperature resistant metal tube mounted in said slab through said opening, a ribbon having its ends secured to said slab, said ribbon being of high temperature resistant metal of a high coefficient of expansion, an electric switch, a rod slidable through said metal tube and having one end secured to the center of said ribbon at a right angle, and the other end actuating said switch.

3. A thermostat for temperature control comprising a porcelain slab formed with a central opening therein, a porcelain tube mounted in said slab through said opening, a ribbon having its ends secured to said slab, said ribbon being of high temperature resistant metal of a high coefficient of expansion, an electric switch, a rod slidable through said porcelain tube and having one end secured to the center of said ribbon at a right angle, and the other end actuating said switch.

4. A thermostat for temperature control comprising a porcelain slab formed with a central opening therein, a porcelain tube mounted in said slab through said opening, a ribbon having its ends secured to said slab, said ribbon being of high temperature resistant metal of a high coefficient of expansion, an electric switch, a rod slidable through said porcelain tube and having one end secured to the center of said ribbon at a right angle, and the other end actuating said switch, a housing, a spring-mounted holder secured to the latter and adapted to support said switch.

5. A thermostat for temperature control comprising a porcelain slab formed with a central opening therein, a porcelain tube mounted in said slab through said opening, a ribbon having its ends secured to said slab, said ribbon being of high temperature resistant metal of a high coefficient of expansion, an electric switch, a rod slidable through said porcelain tube and having one end secured to the center of said ribbon at a right angle, and the other end actuating said switch, a housing, a spring-mounted holder secured to the latter and adapted to support said switch, and an adjustable threaded bar adapted to press against said switch holder, whereby to secure the switch in a predetermined position, substantially as and for the purpose set forth.

6. In a device, as claimed in claim 4, and wherein said slab is near both ends thereof formed with slots adapted to receive the ends of said ribbon.

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