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FLEXIBLE THERMOSTATIC ELEMENT

Filed Sept. 27. 1924

Fig. 1.

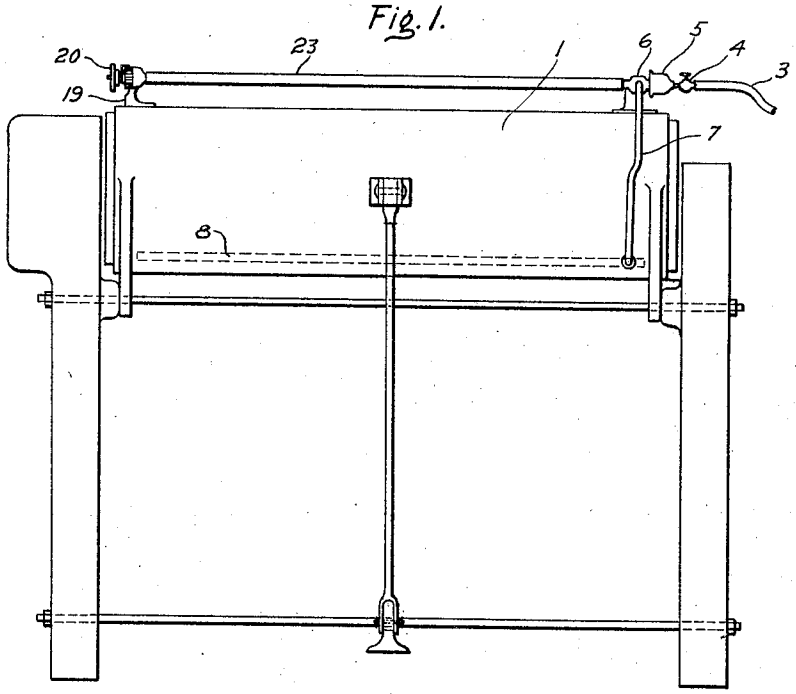


Fig. 2.

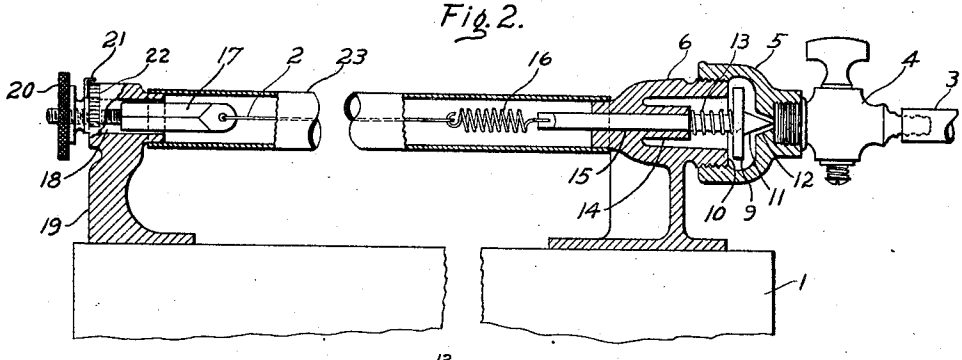
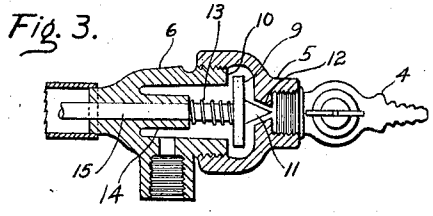


Fig. 3.



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UNITED STATES PATENT OFFICE.

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FLEXIBLE THERMOSTATIC ELEMENT.

Application filed September 27, 1924. Serial No. 740,188.

My invention relates to thermostats and it has special relation to thermostats for the heated members of ironing machines.

An object of my invention is to provide a thermostatic couple in which a nonexpansible substance constituting an element of the couple is economically used.

Another object of my invention is to provide a thermostat adapted to withstand blows and shocks without being rendered inaccurate or inoperative.

A further object of my invention is to provide a safety device for cutting off heat in the event of breakage of a thermostat.

Other objects and advantages will appear as the description proceeds.

Referring to the accompanying drawings, Figure 1 is a rear elevational view of an ironing machine with a thermostat embodying my invention applied thereto.

Fig. 2 is an enlarged view, partially in section and partially in elevation, of thermostatic parts, shown in Fig. 1, and

Fig. 3 is a sectional detail view of valve parts.

In the illustrated embodiment of my invention, a thermostatic couple is shown as comprising an ironing shoe 1 and a wire 2 mounted thereabove in a manner presently to be described.

A flexible tube 3 is secured to a control cock 4 which communicates with a cap 5 on a casing 6. The casing 6 is mounted on the shoe 1 and is connected, by a pipe 7, to a burner 8 in the shoe 1.

The cap 5 encloses a main valve 9 disposed near a seat 10 on the casing 6 and an auxiliary valve 11 carried by the main valve 9 and has a seat 12 for the auxiliary valve 11.

One end of a spring 13 engages the main valve 9 and its other end engages a guide 14 for a stem 15. The stem 15 is secured to an eye of a spring 16 which has a second eye secured to an end of the wire 2.

The wire 2 is composed of an inexpansible substance, such as invar (a nickel steel of approximately 35 per cent nickel) and is secured, at its other end, to a rod 17 which is slidably but not rotatably mounted in an opening 18 in a bracket 19 on the other end of the shoe. A nut 20, screwed on the rod 17, engages the bracket 19 and has a pointer 21 thereon to cooperate with a scale 22 on the bracket. A guard 23, housing the wire 2, is slidably secured, at one end, on the bracket 19 and, at the other end, on the casing 6.

In the operation of the device, the expansion and contraction of the shoe 1 causes relative movement between the main valve 9 and its seat 12, the tension of the wire 2 overcoming the compression of the spring 13. The valve 9 thus restricts the flow of fuel to the burner 8 on the rise of temperature of the shoe 1 and increases the flow of fuel on the lowering thereof. The temperature of the shoe 1 is thus thermostatically controlled.

When the valve 9 is not in engagement with the seat 10, the spring 16 is constant in its length because the spring 13 is considerably weaker than the spring 16. At this time, also, the distance from the valve 9 to the nut 20 remains constant, as the wire 2, as stated, is inexpansible. After the valve 9 engages the seat 10 further movement of the bracket 19 and casing 6 in directions away from each other may occur because of the expansion of the shoe 1. The expansion of spring 16 permits such movement. At all times, the wire 2 is maintained under tension. If the wire should become broken, the auxiliary valve 11 would be urged, by the spring 13, into engagement with the seat 12, and the flow of fuel would be cut off.

If the wire, for any reason, should become flexed, the spring 13 would straighten it and thus maintain accuracy of temperature regulation.

The guard 23 prevents accidental striking of the wire 2 and keeps it from being broken.

The nut 20 provides a convenient means for moving the valve 9 closer to or farther from the seat 10 and thus adjusts the temperature at which the shoe 1 will be maintained and indicates the temperature on the scale 22.

The adjustment of the nut 20 does not cause the rod 17 to rotate and, therefore, does not twist the wire 2. There is, therefore, no impairment of the sensitiveness of the thermostat by adjustment.

The wire 2 need not be made of invar but may be composed of any relatively inexpansible material. As suitable inexpansible materials are expensive, the making of the element of the thermostatic couple of a very thin piece of material effects a marked economy. If the inexpansive member of a thermostat were subjected to compression in the operation of the device, it would be im-

possible to make an operative thermostat without providing a large and strong inexpansive element.

Although I have shown and described a machine provided with means for heating a movable shoe, it will be understood that either or both of the ironing members may be heated and that either of them may be movable toward and away from the other.

It will be understood also that electrical energy may be utilized for heating one or both of the ironing members by substituting any suitable and well known resistor element for the fuel burner and by utilizing a suitable rheostat, in lieu of the control valve, in connection with the governing and adjusting devices shown and described.

The principles of the invention are of general application. It is useful in all types of thermostats having an inexpansible member, that such a member should be inexpensive. The invention, therefore, has wide application and is not limited to the details of construction of the modification illustrated. A substantial range of equivalents is contemplated within the spirit of the invention and the scope of the appended claims.

I claim as my invention:

1. A thermostat for ironing machines comprising in combination, an ironing shoe subject to changes in size upon variations in temperature, a valve carried by the ironing shoe for controlling the temperature and means for actuating the valve comprising a member substantially non-expansible at ironing temperatures, means for attaching the non-expansible ironing member to the ironing shoe at a distance from the valve and resilient means connecting the non-expansible member to the valve thereby to actuate the valve upon changes in size of the ironing shoe to maintain the temperature substantially constant.

2. A thermostat for ironing machines comprising in combination, an ironing shoe subject to changes in size upon variations in temperature, a valve carried by the ironing shoe for controlling the temperature and means for actuating the valve comprising a member substantially non-expansible at ironing temperatures, means for attaching the non-expansible ironing member to the ironing shoe at a distance from the valve and a resilient means connecting the non-expansible member to the valve thereby to actuate the valve upon changes in size of the ironing shoe to maintain the temperature substantially constant and means for setting the valve to maintain the shoe within different limits of temperature.

3. In a thermostatic device, the combination of an elongated rigid member and an elongated flexible member secured thereto and means cooperating with said members and operative by reason of their relative expansions and the tension of said flexible member to thermostatically control the temperature of the first mentioned member.

4. The combination of an ironing member, means for heating said ironing member, a flexible member, and means cooperating with said flexible member and operative by reason of tension therein for controlling said heating means.

5. The combination of an ironing member, a flexible member secured to one end thereof, a valve member secured to the other end thereof, a valve, resilient means connecting said valve to said flexible member and a spring urging said valve and said valve member away from each other, said resilient means being operative upon seating of said valve against said valve member to maintain a connection between said valve and said flexible member.

6. The combination of a heated ironing member, a wire secured thereto, means cooperating with said wire to thermostatically control the temperature of said member and a guard for said wire.

7. The combination of two mechanically related elements constituting a thermostatic couple, one of said elements being flexible, and means cooperating with said elements for controlling the temperature of one of said elements, said elements being adjustable to vary the temperature at which the last mentioned elements will be maintained.

8. The combination of an ironing member, a flexible member adapted to be maintained under tension, means cooperating with said members for thermostatically controlling the temperature of said ironing member and adjustable means at one end of said flexible member for determining the position of the other end, the first mentioned means being adjustable on the adjustment of said adjustable means, whereby the temperature of thermostatic adjustment is varied.

In testimony whereof, I have hereunto subscribed my name this 18th day of September, 1924.

W. H. HIMES.