June 13, 1939. T. A. RICH 2,162,589

TEMPERATURE CONTROL DEVICE

Filed Oct. 30, 1937

Fig. 1.

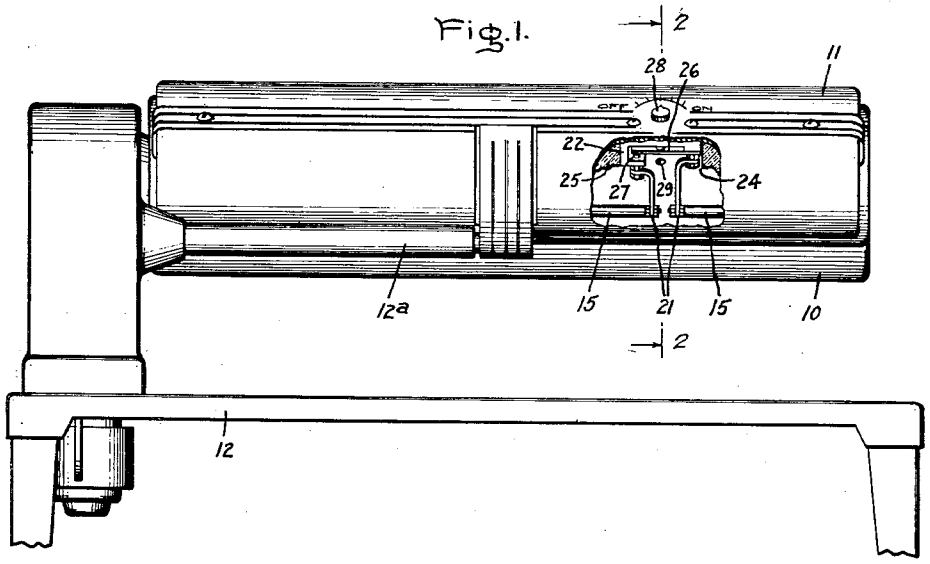
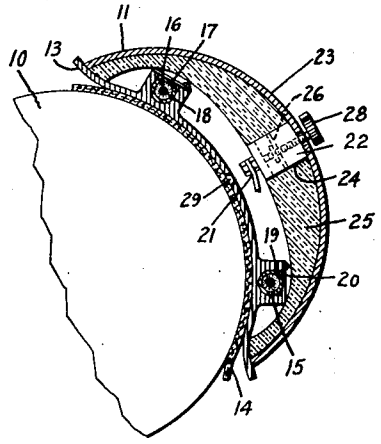


Fig. 2.



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TEMPERATURE CONTROL DEVICE

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3 Claims. (Cl. 236—7)

This invention relates to temperature control devices, more particularly to temperature control devices for ironing appliances, such as a rotary or flat-plate ironer, and it has for its object improved temperature control means for ironing devices of this character.

In ironing machines, such as rotary and flat-plate ironers there is provided a buck carrying an ironing shoe between the ironing face of which and a suitable roll or plate, the fabrics are passed to be ironed. Oftentimes these machines are provided with a thermostat for controlling the temperature of the ironing shoe. This thermostat is usually carried by the buck on the side of the ironing shoe opposite the ironing face. The thermostat is located to respond to the temperature of the shoe so as to hold this temperature as nearly constant as possible. Inasmuch as it is separated from the ironing face by at least the thickness of the shoe, it does not under certain conditions of operation follow the temperature of the ironing face with sufficient rapidity to hold an even temperature. This is particularly true when a cold wet piece of fabric is brought into contact with the ironing face. When this happens, heat is rapidly drawn from the ironing face and the moisture in the fabric is converted into steam. This causes a rapid drop in temperature in the ironing face from the desired ironing temperature. This sudden drop is not experienced by the thermostat which is remotely positioned with reference to the face. Only after the lapse of some time is the thermostat cooled so as to operate to apply heat to the plate to reestablish its ironing temperature. This results in poor regulation.

In accordance with this invention, I provide in the ironing shoe a duct, or series of ducts, opposite the thermostat and leading from the ironing face so that when steam is generated by the pressing operation, it flows through the duct or ducts to and around the thermostat. The thermostat is thereby rapidly cooled as the ironing face itself is rapidly cooled. This results in a very even temperature regulation.

For a more complete understanding of this invention, reference should be had to the accompanying drawing in which Fig. 1 is a fragmentary elevation of an ironing machine embodying this invention, parts being broken away so as to illustrate certain details of construction; and Fig. 2 is an enlarged fragmentary sectional view taken through the line 2—2 of Fig. 1 and looking in the direction of the arrows.

Referring to the drawing, this invention has been shown in one form as applied to an ironing machine having an ironing roll 10 and an ironing buck 11. The ironing roll and buck are supported on a frame 12. It will be understood that the ironing buck will be pivotally mounted, as on an arm 12a, so that it can be swung away from and toward the roll. It will also be understood that suitable mechanism will be provided for driving the roll.

The ironing buck 11 is provided with an ironing shoe 13 having an ironing face or surface that faces the ironing roll 10 and between which face and the roll the fabric 14 is directed to be ironed, the fabric being caused to pass through the machine by the rotation of the roll 10.

The ironing shoe 13 is heated by an electrical heating element 15, preferably of the sheathed type, such as described and claimed in the United States patent to Charles C. Abbott, No. 1,367,341, dated February 1, 1921. Briefly, this element comprises a helical resistance conductor 16 mounted in a metallic sheath 17 and supported in spaced relation with reference to the sheath and electrically insulated from it by a compacted mass of electrically insuating material 18, such as magnesium oxide. As shown, the heating element is mounted in channels 19, and is secured in the channels by means of barriers 20 positioned over the mouth of the channels. The heating means 15 is provided with terminals 21 positioned adjacent each other, as clearly shown in Fig. 1.

Mounted on the buck 11 on the side of the ironing shoe 13 opposite its ironing face is a temperature control device 22 for controlling the energization of the heating means 15. As shown, the temperature control device is supported on the outer casing 23 of the buck, and preferably will be mounted in a recess 24 provided in the layer of insulation 25 that usually is provided in the ironing buck to prevent heat from traveling through its outer casing. The thermostatic device, as shown, comprises a bimetallic thermostatic bar 26 which is formed of two metals having dissimilar temperature coefficients of expansion, such as invar and steel, rigidly secured together from end to end in any suitable manner, as by welding.

One end of the bimetallic thermostat bar 26 is fixed and is connected to one of the terminals 21 of the heating means 15. Its other end is free to move and carries a switch contact which cooperates with a fixed switch contact 27 that is connected with the opposite terminal 21 of the heating means. The thermostat 22, it will be observed, is located in the buck to respond to the temperature of the buck, and it controls the

temperature in the ironing shoe in accordance with this temperature. The setting of the thermostat can be varied by means of an adjusting screw 28 which bears on the thermostatic bar to vary the tension in the bar, and which, as shown, is accessible on the exterior of the buck for convenience of adjustment.

The ironing shoe is provided with a duct 29 directed through it and positioned opposite the thermostatic member 26, as clearly shown in the drawing. One duct may be used, or a plurality of ducts, as desired. The duct 26 functions to connect the ironing face of the shoe 13 with the bimetal element 26.

In the operation of the ironing apparatus, it will be understood that when the heating element is energized, the thermostatic bar 26 will operate to open the energizing circuit of the heating means 15 when the temperature of the thermostat attains a predetermined maximum, such as 450° F., and will close the switch to reapply the heat when this temperature falls to a predetermined minimum, such as 430° F. It will also be understood that the fabric 14 will be caused to travel between the roll 10 and the shoe 13 by the rotation of the roll. The roll may either be operated continuously or it may be operated intermittently to successively bring the portions of the fabric into proper ironing position of the buck. The fabric usually is moistened or dampened before it is passed through the machine and when the moistened or wet section of the fabric is brought into ironing position and the ironing shoe contacts it, the hot ironing shoe immediately generates steam of the moisture in the fabric and a portion of this steam is forced or projected through the duct or ducts 29 and into direct contact with the thermal element 26. Thus, when the temperature of the heated ironing shoe 13 rapidly decreases because of its contact with the wet fabric 14 and the absorption of heat from the shoe to generate the steam, the thermostat 26 which has approximately the initial temperature of the shoe at the instant it contacts the wet cloth will also be cooled quickly by the impact of the steam on it so that its tmperature will fall substantially at the same rate as that of the shoe. In other words, the thermostat will be caused to respond immediately to the drop in temperature of the shoe to control the heating element to maintain the desired temperature. In this manner, the thermostat will respond to variations in shoe temperature, whether they be slow or sudden, so as to hold a substantially constant temperature in the shoe with good regulation.

It will be observed that the bimetallic thermostatic blade is connected in series in the energizing circuit and that the electric current flows through it. The blade is sufficiently large to afford very little resistance to the passage of this current, and therefore the heat generated by the passage of the current through the blade affects the operation but slightly. However, even if the thermostatic blade did develop an appreciable degree of local heat due to the flow of current through it, this condition would not affect the principle of my invention. In other words, my invention is applicable equally as well to the latter case as to the former where little local heat is developed.

While I have shown a particular embodiment of my invention, it will be understood, of course, that I do not wish to be limited thereto since many modifications may be made, and I, therefore, contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

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

1. An ironing device comprising a pressing body having an ironing face, heating means for said pressing body, a temperature responsive element carried by said pressing body at a point remote from said ironing face controlling said heating means responsively to temperature changes in said pressing body, and said pressing body having a duct between said pressing body and said temperature responsive element for conducting steam generated under said face in the pressing operation into contact with said temperature responsive element when said ironing face is applied to moistened articles so as to cool said temperature responsive element as the pressing body cools when brought into contact with said articles.

2. In an ironing machine provided with a pressing shoe having on one side an ironing face, and a heating element for said shoe, temperature control means comprising a bimetallic thermostatic member located on the side of said shoe opposite said ironing face controlling said heating element responsively to the temperature in said shoe, and said shoe being provided with a duct between said ironing face and said thermostat to conduct steam generated under said face to said bimetallic member to cool it when the temperature of said ironing face is rapidly reduced by coming into contact with wet fabrics.

3. An ironing machine comprising an ironing roll, a buck having an ironing shoe cooperating with said roll to press a fabric travelling through the machine between the roll and ironing face of said shoe, an electrical heating element carried by said buck for applying heat to said shoe, a thermostatic element carried by said buck back of said ironing face of said shoe controlling said heating element responsively to temperature variations in said shoe, and said shoe having a duct arranged to deliver from said ironing face to said thermostat steam that is generated by the application of said shoe to wet fabrics so as to cool said thermostat at substantially the same rate that said shoe is cooled when applied to said fabrics.

THEODORE A. RICH.