Jan. 2, 1940. G. C. HEINRICH 2,185,197

AUTOMATIC ELECTRIC HEATING IRON

Filed Oct. 21, 1937 2 Sheets-Sheet 1

Fig. 1.

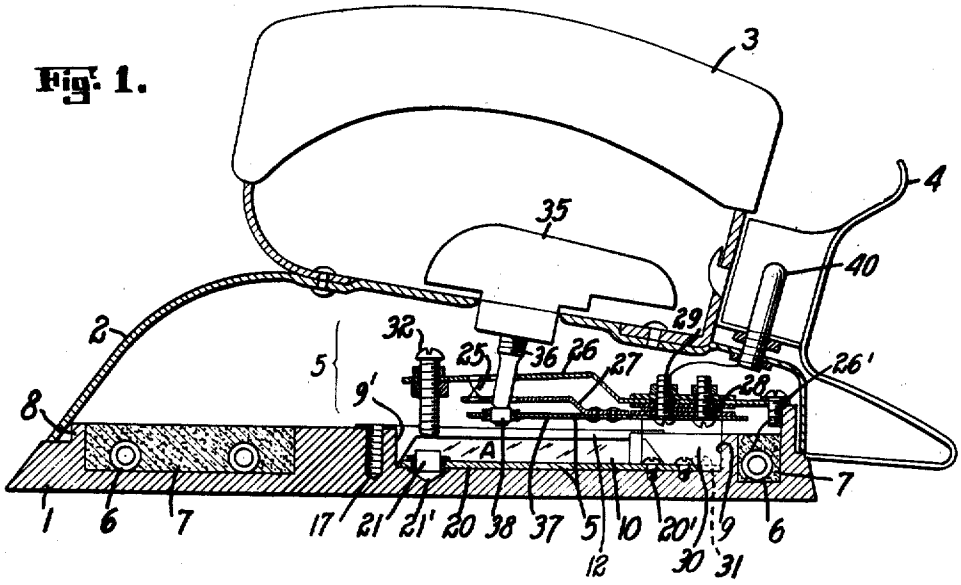
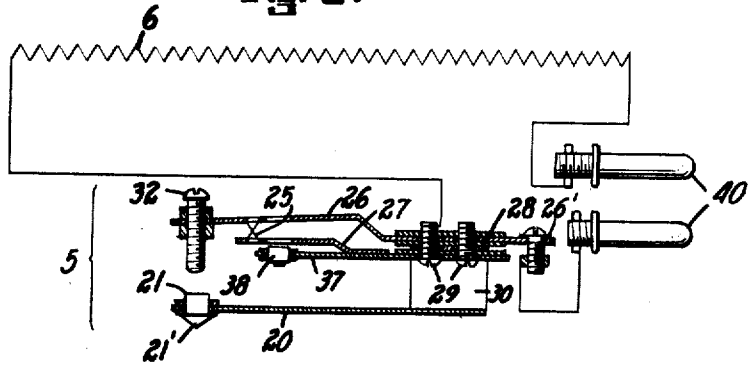


Fig. 2.



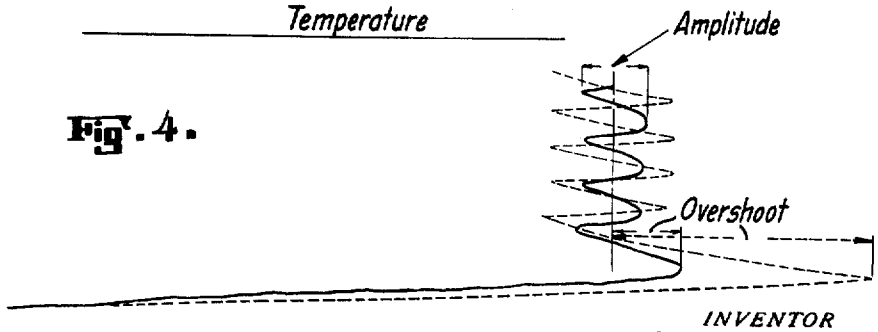


Fig. 4.

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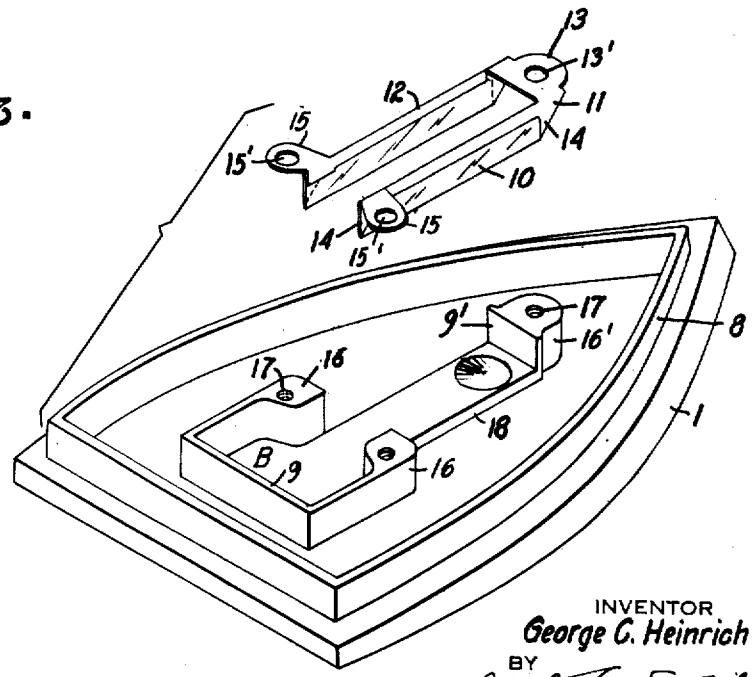
Bartlett Greene Smith & Hee
ATTORNEYS

Jan. 2, 1940. G. C. HEINRICH 2,185,197

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Filed Oct. 21, 1937 2 Sheets-Sheet 2

Fig. 3.



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Patented Jan. 2, 1940 2,185,197

UNITED STATES PATENT OFFICE

2,185,197

AUTOMATIC ELECTRIC HEATING IRON

George C. Heinrich, Meriden, Conn., assignor to Manning, Bowman & Co., Meriden, Conn., a corporation of Delaware

Application October 21, 1937, Serial No. 170,236

12 Claims. (Cl. 219—25)

This invention relates to automatic electric heating irons.

One object of the invention is an automatic iron in which the initial overshoot of temperature, when the iron is initially connected in circuit, is very substantially reduced as compared with conventional irons.

A further object of the invention is an automatic iron wherein the amplitude of the temperature curve resulting from the operation of the thermostat is reduced as compared with the amplitude of the curve of conventional irons.

A further object of the invention is an automatic iron which is more sensitive to temperature changes and in which better and more efficient temperature regulation is obtained than with conventional irons.

A further object of the invention is an automatic iron embodying a novel regulating mechanism.

A further object of the invention is an automatic iron characterized by the simplicity of its structure and its regulating mechanism.

Further objects of the invention will hereinafter appear.

For a better understanding of the invention reference may be had to the accompanying drawings forming a part of this application wherein:

Fig. 1 is a part elevational and sectional view of an iron embodying the invention;

Fig. 2 is the circuit diagram;

Fig. 3 is a perspective exploded view showing parts of the sole plate of Fig. 1 in the process of assembly; and

Fig. 4 is a graph indicating the reduced initial overshoot and the reduced amplitude of the temperature curve.

Referring to the drawings the invention is illustrated as embodied in an iron having a sole plate 1, an upper casing or cover 2, a handle 3, a heel rest 4, and a thermostatic regulating unit 5, the sole plate being tapered in thickness from the nose to the rear and being thicker at the nose.

The invention is particularly applicable to automatic irons wherein a resistance unit 6 is embedded in a body of cementitious material 7 carried by the sole plate base. The sole plate casting is provided with an integral metallic flange 8 near the border or peripheral edge thereof for retaining in place the cementitious body 7 which forms the upper surface of the sole plate base and which has embedded therein the resistance unit 6. The upper surface of the cementitious body 7 is on a level with the upper edge of the flange 8. The cementitious body covers the whole of the upper surface of the sole plate within the confines of the retaining flange 8, except that a narrow elongated chamber A is formed centrally thereof for the reception of the thermostatic element 20 of a regulating unit 5 and the sole plate casting is provided at points adjacent this narrow elongated chamber A with integrally formed upwardly extending projections or parts 16 and 16' for fastening the casing or upper part of the iron to the sole plate. These supporting and fastening parts 16 and 16' are, in the particular embodiment shown, of the same height as the outer retaining flange 8 and the upper surfaces thereof are on a level with the upper surface of the cementitious body. At its rear end the narrow elongated chamber A for accommodating the thermostatic element 20 is slightly enlarged laterally into a part B, the latter accommodating a U bracket 28 having legs 30 and attaching feet 31.

In the particular embodiment of Figs. 1 and 4 the slightly laterally enlarged part B of the elongated chamber A is defined by a flange 9 formed integrally with the sole plate casting and the projecting fastening parts 16 and of the same height as the projections 16, while the fastening part 16' is formed with a flat side 9' which defines the other end of the narrow elongated chamber A. The chamber A is slightly wider than the thermostatic element 20 in order to facilitate the mounting of the element therewithin, but the thermostatic element is thus closely and directly exposed to the cement body 7 having the heating units 6 embedded therein. This element 20 is also fastened flat against the bottom of the chamber A, namely, directly in contact with the iron of the sole plate, that is, the anchored end of the member 20 is thus fastened, as for example by the screws 20'. The thermostatic element 20 is thus rendered very sensitive to the temperature conditions of the sole plate 1 and also to the heat radiations from the cement embedded heater element 6, to both of which the element is directly exposed. When the cementitious body 7 is of a character to relieve or give off small particles of sand, grit, dust, and the like which may interfere with the adjustment and operation of the thermostatic regulating unit it is preferred that the sides of the narrow elongated chamber A be also provided with thin separating partitions so as to have the whole chamber partitioned off on all sides, but such side partitions should be thin enough and preferably of a character not to impede or hinder the transmission of radiant heat

rays from the cement embedded resistance element 6 to the thermostatic element 20. I have indicated such thin side partitions or walls at 10 which may be of glass or mica, preferably mica. These mica windows or partitions do not need to become heated up before they transmit the radiant heat energy along to the thermostatic element, as is the case with cast iron and other metallic partitions, with the result that the thermostatic element responds very quickly to the heat generated by the unit. These thin side partitions or walls 10 may be supported and fastened in position in any suitable manner.

As indicated above, the thermostatic element 20 extends substantially throughout the length of the narrow chamber A and at one end is fastened flat against the iron of the sole plate by the screw bolts 21' in the part B of the chamber A. The free end of the element 20, which is a bi-metallic element, carries on the end thereof a push actuating button or pin 21, this button or pin 21 having a conical head 21' disposed in a conical recess or depression formed in the base plate and being insulated from the thermostatic element 20 and fastened thereto in any suitable manner.

The thermostatic element regulates the temperature by opening and permitting the closure of the circuit at the contacts 25. One of these contacts is carried by a spring finger 26 and the other by a spring finger 27, both preferably of stainless steel, the two fingers 26 and 27 being fastened respectively to the upper and lower sides of a U bracket 28 by means of the screws 29, the U bracket comprising legs 30 which extend down into the cross part of the housed chamber and are provided with feet 31 for fastening to the bottom of the chamber. For this purpose the feet 31 are provided with openings or slots for the reception of fastening screws 32. The spring finger 26 carries at its outer end an adjustable actuating screw 32 which is engaged by the push button 21 and this finger 26 is spring biased to cause the screw 32 to approach the actuating button 21 of the thermostatic element. The spring finger 27 has an opposite bias tending to hold the screw 32 from out of engagement with or from approaching the button 21. By actuating the spring 27 against its bias, the bias spring 26 tends to bring the actuating screw 32 more closely to the thermostatic element 20, 21 and through the adjustment of screw 32, the adjustments of the tensions of spring fingers 26, 27 and the adjustment of spring finger 27 against its bias the temperature to be maintained by the iron may be accurately determined. The adjustment or actuation of the spring 27 against its bias may be effected in any suitable manner, as for example by means of a rotary handle 35 which is operated by the operator and is in operative engagement with a pin 36 which moves upwardly and downwardly, passing through registering openings in the spring fingers 26 and 27, to engage an arm or finger 37 fastened to and projecting forwardly beneath the finger 27. This projecting finger 37 carries an insulated bearing surface member 38 which is engaged by the end of the regulating pin 36. The temperature to be maintained may be lowered by lowering the pin and raised by elevating the pin 36. Plug terminals for the iron are indicated at 40. For the purpose of maintaining a permanently unimpaired contact with the spring finger 26 there is shown a layer of silver 26' welded onto the terminal end of this member 26. This is particularly advantageous in irons of the character illustrated, the temperature and operating conditions of which are severe.

As indicated above, when the sides of the chamber A are provided with thin walls or partitions 10 of mica, these thin partitions or walls may be mounted and fastened in position in any suitable manner and in the embodiment of Fig. 4 these side walls or partitions 10 are formed into a separate unit which is fastened and anchored to the fastening parts 16 and 16'. The frame 11 of this unit is formed of an integral piece of readily formable sheet metal having a pair of side members 12 crimped over to engage and firmly hold the mica walls 10 at their upper edges and these two side members are bridged by a part 13 for resting upon the part or projection 16', 9' forming the end wall of the chamber. The side members 12 have lateral extensions 14 at either end thereof which extend downwardly and engage the outer surfaces of the mica walls 10 to give support thereto. The parts 12 also have ears 15 formed on their outer ends for resting upon projections 16. The parts 16, 16' have formed therein screw-threaded openings 17 for the reception of screw bolts which fasten the upper part of the iron structure to the sole plate and the parts 13 and 15 of the mica unit frame are provided with openings 13' and 15' for registering with these fastening screw bolts. The sole plate casting is formed with elongated shoulders 18 which are engaged by the mica partitions 10 when the unit is in assembled position. The mica partition unit is preferably positioned and fastened to the cast iron parts 16, 16' prior to pouring the cement 7 and molding therein the heater elements 6.

In Fig. 4 I have illustrated in full lines the general character of the temperature curve obtainable by an iron embodying the invention, while in the dotted lines I have indicated a similar curve obtained from conventional irons of the same general type operating under the same conditions. A comparison of these curves indicates the very substantial reduction of the initial overshoot by the use of the invention as well as the reduction in the amplitude of the variations of temperature during operation.

The windows or partitions 10, when employed, may be made of any suitable material which does not tend to impede, or does not seriously impede, or which readily permits the passage therethrough of the heat rays, such for example as the infra red rays. For example, any suitable silicious material of the general character of glass and mica may be used, but clear, transparent, single layers of mica are at present the preferred partitions as this material stands up under the high temperature conditions of the iron, is readily mounted and fastened in position and is found to offer little hindrance, if any, to the passage of the heat rays therethrough.

I claim:

1. In an automatic electric heating iron a sole plate casting having a body of cementitious material on the upper surface thereof, said cementitious body having formed centrally thereof a narrow elongated chamber whose bottom is a part of the sole plate casting, a temperature regulating unit comprising an elongated thermostatic element fastened at one end flat against the bottom of said chamber and extending substantially throughout the length thereof and a heating element embedded in said body of cementitious material, said thermostatic element being

directly exposed to the radiant heat rays from said cementitious body.

2. In an automatic electric heating iron a sole plate casting having a body of cementitious material on the upper surface thereof, said cementitious body having formed centrally thereof a narrow elongated chamber whose bottom is a part of the sole plate casting, a temperature regulating unit comprising an elongated thermostatic element fastened at one end flat against the bottom of said chamber and extending substantially throughout the length thereof and a heating element embedded in said body of cementitious material, the sides of said elongated chamber being provided with partitions between the cementitious body and the thermostatic element which offer little resistance to the passage of the heat rays from the cement embedded heating element and the thermostatic element.

3. In an automatic electric heating iron a sole plate casting having a body of cementitious material on the upper surface thereof, said cementitious body having formed centrally thereof a narrow elongated chamber whose bottom is a part of the sole plate casting, a temperature regulating unit comprising an elongated thermostatic element fastened at one end flat against the bottom of said chamber and extending substantially throughout the length thereof and a heating element embedded in said body of cementitious material, and thin partitions of a silicious material being disposed along the sides of said chamber and between the cement embedded heating element and the thermostatic element.

4. In an automatic electric heating iron a sole plate casting having a body of cementitious material on the upper surface thereof, said cementitious body having formed centrally thereof a narrow elongated chamber whose bottom is a part of the sole plate casting, a temperature regulating unit comprising an elongated thermostatic element fastened at one end flat against the bottom of said chamber and extending substantially throughout the length thereof and a heating element embedded in said body of cementitious material, and thin partitions of clear transparent mica being disposed along the sides of the said chamber and between the cement embedded heater element and the thermostatic element.

5. In an automatic electric heating iron, a temperature regulating unit comprising a thermostatic element, a heating element embedded in a cementitious base and disposed about said thermostatic element, said thermotatic element being enclosed in a chamber defined by walls separating the cementitious base and the embedded heating element therein from the thermostatic element, certain sections of said walls being formed of cast iron and certain other sections which are disposed immediately between the movable portion of the thermostatic element and said embedded heating element being formed of a material which offers less resistance to the passage of the heat rays therethrough than the said cast iron wall sections.

6. An automatic iron of the character set forth in claim 5 wherein the second named sections of said wall are formed of mica.

7. An automatic iron of the character set forth in claim 5 wherein the second named sections of said wall are formed of a silicious material.

8. In an automatic electric heating iron a regulating unit comprising a thermostatic element, a heating element disposed in proximity to said thermostatic element and embedded in a cementitious base, and a partition disposed between the thermostatic element and the cement embedded heating element formed of a material which permits the passage of heat rays unhindered therethrough.

9. In an automatic electric heating iron, a sole plate having a regulating unit chamber centrally located on the upper side thereof and defined by a wall at least a part of which is formed of a material which permits heat rays to pass therethrough at a more rapid rate than a metallic wall, a cementitious base disposed about said chamber and having molded therein a heating element, a temperature regulating unit comprising a thermostatic element disposed in said chamber with the aforementioned part of the wall disposed immediately between said heating element and said thermostatic element.

10. An iron of the character set forth in claim 9 wherein part of said wall includes a window of a material offering no greater resistance to the passage of heat rays therethrough than windows of mica and glass.

11. In an automatic electric heating iron, a temperature regulating unit comprising a thermostatic element, a heating element embodied in a cementitious base and disposed about said thermostatic element, said thermostatic element being enclosed in a chamber defined by walls separating the cementitious base and embedded heating element from the thermostatic element, said walls including windows immediately between the movable part of the thermostatic element and the adjacent part of the cement embedded heating element, said windows being of a material which offers no greater resistance to the passage of heat therethrough than thin walls of mica and glass.

12. In an automatic electric heating iron having an electric heating element embedded in a body of cementitious material disposed on the sole plate casting thereof, said cementitious body having formed centrally thereof a relatively small chamber whose bottom is part of the sole plate casting, an automatic temperature regulating unit comprising a thermostatic element disposed within said chamber and in close heat exchange relation with the sole plate casting and the cementitious body, and said thermostatic element being directly exposed to the radiant heat rays from said cementitious body.

GEORGE C. HEINRICH.

CERTIFICATE OF CORRECTION.

Patent No. 2,185,197. January 2, 1940.

GEORGE C. HEINRICH.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, second column, line 22, for "Figs. 1 and 4" read Figs. 1 and 3; page 2, second column, line 7, for "Fig. 4" read Fig. 3; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 12th day of March, A. D. 1940.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.