April 28, 1925. 1,535,751

W. J. TURENNE

THERMOSTATICALLY CONTROLLED IRON

Filed Aug. 9, 1921

Fig. 1.

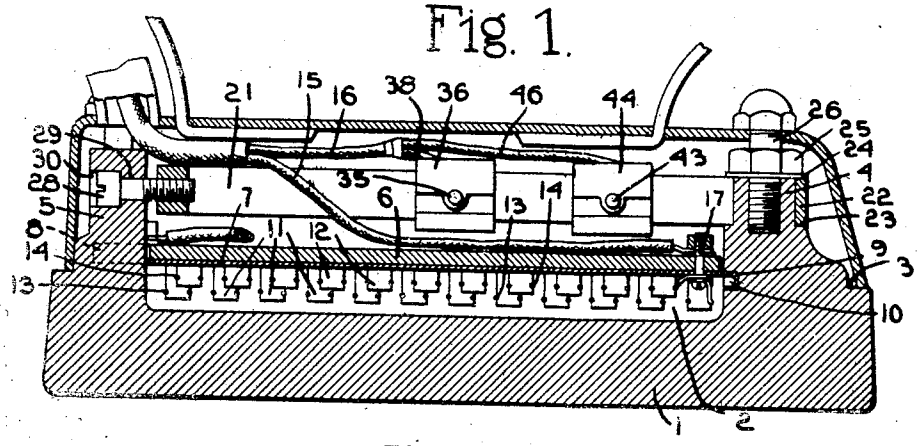


Fig. 2.

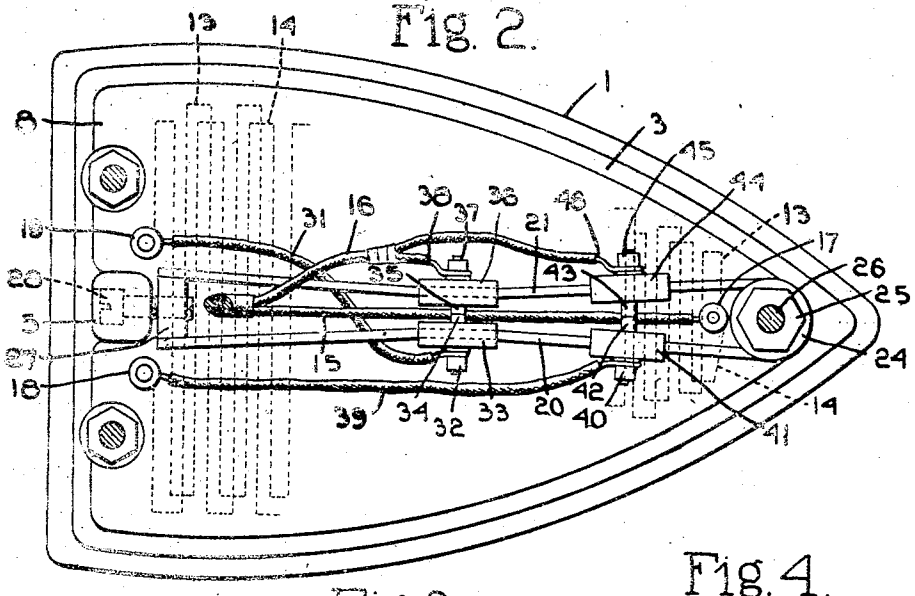


Fig. 3.

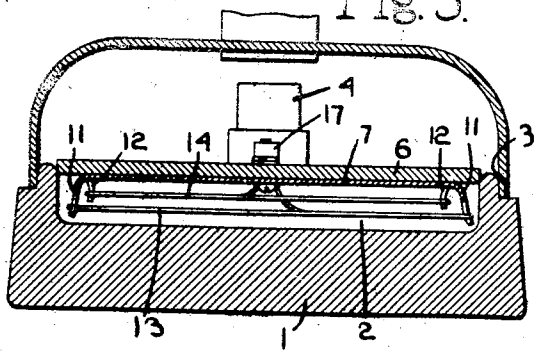
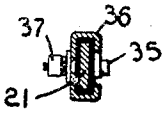


Fig. 4.



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Patented Apr. 28, 1925. 1,535,751

UNITED STATES PATENT OFFICE.

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THERMOSTATICALLY-CONTROLLED IRON.

Application filed August 9, 1921. Serial No. 491,051.

To all whom it may concern:

Be it known that I, WILFRED J. TURENNE, a citizen of the United States, and resident of Danvers, county of Essex, State of Massachusetts, have invented an Improvement in Thermostatically-Controlled Irons, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention relates to improvements in electrically heated irons such as are used for ironing laundry and other purposes, and the object of the invention is to provide thermostatic regulating means adapted to maintain the iron at a substantially uniform temperature.

More specifically, the invention relates to improvements in thermostatic regulating means for irons and other devices operable by variations in the temperature of the iron to control the electric circuit through which current is delivered to the heating unit of the device.

A further object of the invention is to provide thermostatically controlled means for the electric circuit leading to the heating unit of an iron, or other device, which is operable by the relative expansive movements of the iron or device and a member connected thereto having a different coefficient of expansion from that of said iron, or other device.

A further object of the invention is to provide means for adjusting the thermostatic regulating means in order that the temperature of the iron, or other device, may be regulated.

Another object of the invention is to provide a novel form of base member for a flat iron provided with a cavity to receive the heating unit, with suitable means for supporting the heating unit in said cavity whereby the number of parts usually employed in electrically heated flat irons may be reduced.

A further object of the invention is to provide a novel means for supporting the heating unit or units of a flat iron, means preferably being provided for automatically controlling the current which is delivered to said unit or units.

Other objects and features of the invention will more fully appear from the following description and the annexed drawings and will be pointed out in the claims.

In the drawings:

Fig. 1 is a vertical, longitudinal, sectional view through a flat iron embodying the preferred form of my invention;

Fig. 2 is a plan view of the same, the cover plate having been removed and the electric units being shown diagrammatically in dotted lines;

Fig. 3 is a transverse sectional view illustrating particularly the form of the base member, the heating unit and means for supporting the same, certain portions of the iron construction being omitted; and,

Fig. 4 is a vertical sectional view through one of the thermostatic members and the bracket for supporting the binding post which is mounted thereon.

A preferred embodiment of the invention is illustrated in the accompanying drawings as applied to a flat iron of the usual domestic type, but it will be understood that the invention may be embodied in other types of flat irons and also in other electrically heated devices to which it may be applicable.

In the construction illustrated herein the flat iron comprises a base member 1 having a smooth, flat under surface which desirably is plated in the usual manner. A cavity 2 is provided for the heating unit. This cavity may be formed by providing a separate hollow plate section, but preferably is formed as a chamber in the upper portion of the base member to receive the electric heating unit by which heat is transmitted to the base portion of the iron. The base desirably is also provided near its point with an upwardly extending boss 4, and another boss 5 also preferably integral with the base of the iron extending upwardly from the central rear portion thereof.

The cavity 2 is provided with a suitable cover 6, preferably a sheet of asbestos, which is secured to and supported upon a plate 7, preferably of sheet metal, which is provided with downwardly extending insulated members to support the heating unit. The surface of the plate adjacent the heating unit preferably is coated throughout with enamel and acts to reflect the heat upon the base member. The rear end portion of said plate and cover, which desirably is coextensive therewith, rests upon the upper surface 3 of the body portion of the iron, while the tapered front end portion of the plate 7 desirably is provided with a reversely bent end portion 9 which extends into a suitable

recess 10 in the end wall of the cavity 2. The plate 7 desirably is provided along its lateral edges with a series, or preferably a plurality of series, of downwardly bent tabs 11 and 12, formed integral with the plate 7 and coated with insulating material after having been bent into position.

The series of tabs 11 are located in proximity to the side walls of the cavity 2, while the series of tabs 12 are located at a greater distance from the side walls of the cavity and preferably are shorter. Desirably the members of the series of tabs 11 and 12 are disposed in staggered relation, as illustrated in Fig. 1.

The heating unit or units may be of the usual character comprising wires 13 and 14, of high resistance, such as "nichrome" wires supported in suitable recesses in the sides of the tabs 11 and 12 and arranged to pass back and forth transversely of the iron, as illustrated in Fig. 2.

By reason of the staggered arrangement of the members of the tabs of the different series the transverse wires 13 and 14 of the different heating units may be caused to alternate.

While two heating units are illustrated in the present construction it is obvious that a greater or lesser number of heating units may be employed.

Any suitable means may be provided to supply a proper electric current to the heating units. Preferably, electric circuits may be employed which are provided with thermostatically operated controlling means by which the current supplied to one, or preferably all, of the heating units may be automatically regulated by thermostatic means which is responsive to the variations in the temperature of the iron so that the iron may be continuously maintained at a predetermined temperature.

Desirably means are also provided for adjusting the thermostatic controlling means in order that the temperature of the iron may be regulated in accordance with the work for which it is used.

In the preferred embodiment of the invention disclosed herein the electric circuit comprises two conductors 15 and 16 leading from a suitable generator or power circuit, one of said conductors 15 being connected to a binding post 17 which extends through the front end portion of the insulated cover 6 and plate 7 and is connected to the respective ends of the wires 13 and 14 of the heating units. The opposite ends of the wires 13 and 14 of the heating units are connected respectively to binding posts 18 and 19 which likewise extend through the plate 7 and insulating cover 6 and are connected at their upper ends respectively to branches of the conductor 16, suitable thermostatically operable switches or contact members being provided in said branches to control the current which is delivered to the respective heating units.

In the preferred embodiment of the invention disclosed herein the contact members of said branches of the electric circuit are carried by thermostatically controlled members or bars, having different coefficient of expansion than that of the base member, which are mounted upon the bosses 4 and 5 of the base or body member, the thermostatic members being so constructed and mounted upon the base member that the difference in expansion of said thermostatic members and the base member will cause said contact members to be closed or opened when the iron has been heated to certain predetermined temperatures.

In the preferred construction disclosed herein the thermostatic device comprises a bar, preferably of "invar" steel which, as is well known, has practically no coefficient of expansion. This bar is bent centrally of its length to form a somewhat U-shaped or hair pin shaped construction, the members or legs 20 and 21 of which are substantially parallel, but curved centrally for purposes which will hereinafter be described, and are connected by a loop 22. The looped portion 22 of the bar desirably is formed to fit a cylindrical portion of the boss 4 and desirably rests at its lower edge upon a shoulder 23 and is clamped upon said boss by a washer 24 and a nut 25 which is mounted upon a stud 26 which is screwed into a central socket in the boss 4. The ends of the members 20 and 21 of the thermostatic bar are connected rigidly to a cross head 27 which is provided with an aperture having screw threaded walls which are engaged by a screw 28 rotatably mounted in a journal 29 in the boss 5. The boss 5 desirably is provided with a countersunk recess 30 to receive the head of the screw 28.

As before stated the members or legs 20 and 21 of the thermostatic bar are curved. Preferably the curvature is such as to cause the members to converge somewhat at their central portion as illustrated in Fig. 2. It will be obvious that by reason of the fact that the members 20 and 21 of the thermostatic bar are anchored to the bosses 4 and 5, any greater expansion of the body portion of the iron, than that of the members 20 and 21 of the bar, will cause the curved portion of the bar to straighten. Inasmuch as the bar of "invar" steel has substantially no coefficient of expansion, the expansion of the body portion of the iron will serve to straighten the members 20 and 21 and consequently to separate the central portions thereof.

In the present construction the members of the switches or contact members, for controlling the circuit or circuits leading to the

heating unit or units, are mounted upon the members 20 and 21 and are actuated by the latter to complete or break the circuit or circuits leading to the heating units. As illustrated in Fig. 2 a conductor 31, which is connected at one end to the binding post 19 of the inner or minor heating unit, is connected at its opposite end to a binding post 32 which is mounted in a bracket 33 which is secured to the thermostatic member 20, the bracket 33 being insulated from the member 20 and provided with a contact member 34. A complementary contact member 35 is similarly mounted upon a bracket 36 which is provided with a binding post 37 which is connected to a branch 38 of the conductor 16 which leads to the generator or power circuit.

The contact members 34 and 35 are normally in engagement, or closed, so that the current from the generator or power circuit passes through the conductor 15 and the binding post 17 and heating unit 14 to the binding post 19, thence through the conductor 31 and the binding post 32, contact members 34 and 35, to the binding post 37 and thence through the branch 38 and conductor 16 to the return wire of the generator or power circuit. When the circuit is thus completed the resistance of the heating unit will generate heat which will be transmitted to the body portion of the iron. As the temperature of the iron increases the body portion of the iron will expand while the members 20 and 21 of "invar" steel will not expand to any appreciable extent; consequently, the tension is gradually placed upon the bars 20 and 21. This tends to straighten the bars 20 and 21 and when said bars are sufficiently straightened the contact members 34 and 35 will be separated, thus breaking the electric circuit to the heating unit. As the temperature of the body portion of the iron decreases said body portion will contract. This will permit or cause the members 20 and 21 to resume gradually their curved position and eventually to cause the contact members 34 and 36 again to engage, thus completing the circuit through the heating unit, thereby energizing the same and causing the iron again to be heated. The expansion and contraction of the base or body member of the iron will thus serve automatically to break or make the circuit through the heating unit as a result of a variation of relatively few degrees in temperature of the iron, so that the iron will be automatically maintained at a substantially uniform temperature.

The mechanism thus described provides for the automatic regulation of the temperature of the iron by a single unit. Where a plurality of heating units is employed, as is illustrated herein, the contact members are so arranged that the circuits leading to the heating units will be progressively broken. This is accomplished by placing the contact members of one of the pairs of contact members substantially centrally of the length of the members 20 and 21 and the other pair of contact members more closely adjacent the ends of said members or more nearly the looped portion as illustrated in Fig. 2.

In the construction illustrated herein the conductor 15 is also connected through the binding post 17 to one end of the wire 13 of the major heating unit, the other end of said wire being connected to the terminal 18. A conductor 39 leads from the binding post 18 to a binding post 40 which is mounted in a bracket 41 mounted upon but insulated from the thermostatic member 20 and is provided with a contact member 42, which is positioned to engage a complementary contact member 43 carried by a bracket 44 having a binding post 45 which is connected to the branch 46 of the conductor 16, which leads to the generator or power circuit. The actuation of the contact members 42 and 43 to make and break the circuit through the major heating unit is the same as that above described in reference to the actuation of the contact members which control the electric circuit to the minor heating unit.

By reason of the fact that the supports for the contact members 42 and 43 are closer to the end of the thermostatic members than the supports for the contact members 34 and 35, they will not be separated until the members 20 and 21 are considerably more nearly straightened than is required to separate the contact members 34 and 35. Consequently, the heating units will be progressively rendered inoperative as the temperature of the iron increases. By thus eliminating the effectiveness of the minor heating unit, when a predetermined temperature is reached, the amount of heat imparted to the iron is decreased and if the major heating unit is sufficient to maintain a desired temperature the minor heating unit will no longer be effective. If, however, the temperature decreases below the predetermined amount contacts will be made between the contact members 34 and 35 and additional heat imparted to the iron. By properly arranging the contact members for the major and minor heating units upon the bars 20 and 21, a very accurate degree of regulation may be obtained since if the temperature of the iron increases above another predetermined temperature, which may readily be determined, the contact members 42 and 43 will be separated, thus cutting off the current from both heating units, whereupon the iron will rapidly cool until the contact between the members 42 and 43 is again completed and the major heating unit energized.

In order that the thermostatic mechanism may be set to maintain the iron at any desired temperature, means are provided for adjusting the thermostatic device. This is accomplished in the present construction by the adjustment of the screw 28 which may be screwed inwardly or outwardly to impose more or less initial tension upon the members 20 and 21 of the non-expansible bar.

Obviously theremostatic members having a greater coefficient of expansion than that of the body of the iron may be similarly utilized and said thermostatic means may be given various other forms than that illustred herein, it only being essential that the device shall be so constructed that the contact members shall be actuated by the movement of the thermostatic member when the body of the iron has reached a predetermined temperature or temperatures.

It will be obvious that other forms of switch mechanism may be employed in the circuits leading to the heating units and that the thermostatic control may be caused to vary the resistance of the current supplied to the heating units instead of interrupting such currents, and that various other changes in construction, operation and arrangement of parts may be made within the spirit and scope of the following claims.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is:

1. An electrically heated device comprising a base member, a heating unit, a circuit for supplying electric current to said heating unit, a curved member having a different coefficient of expansion than that of the base member, rigidly anchored to said base member at points remote from each other, co-operating switch members to said circuit one of which is mounted upon the curved portion of said curved member and normally arranged to contact with the other switch member, but operable by the relative expansion of said base member and curved member to separate said switch members and thereby interrupt the electric circuit.

2. An electrically heated iron comprising a base member, a plurality of heating units, an electric circuit having branches for supplying an electric current to the respective heating units, co-operating pairs of contacts in each of said branches, a unitary thermo-expansible member operable by variations in temperature progressively to open or close said pairs of contacts and thereby control the electric current supplied to the respective heating units so as to maintain said base member at a substantially uniform temperature and means for adjusting said thermostatically controlled means.

3. An electrically heated device comprising a base member, a plurality of heating units, an electric circuit having branches for supplying an electric current to the respective heating units, co-operating pairs of contact members in each of said branches, a unitary thermo-expansible bar carrying said contact members and operable by variations in the temperature of said base member to progressively open and close said contact members, whereby one of said pairs of contact members will be actuated at predetermined temperatures and another pair of contact members will be actuated at different predetermined temperatures of said base member.

4. An electrically heated iron comprising a base member, a plurality of heating units, an electric circuit having branches for supplying an electric current to the respective heating units, co-operating pairs of contact members in each of said branches, thermostatically controlled means operable by variations in the temperature of said base member to progressively open and close said contact members, whereby one of said pairs of contact members will be actuated at predetermined temperatures and another pair of contact members will be actuated at different predetermined temperatures of said base member and means for simultaneously adjusting the relative positions of the contact members of all of said pairs of contact members whereby the temperature at which said base member is maintained may be regulated.

5. An electrically heated iron comprising a base member, a plurality of heating units, a circuit having branches for supplying an electric current to the respective heating units, contact members in the branches of said electric circuit, a circuit-controlling member having a different coefficient of expansion than that of said base member, connected to said base member, and operable by the relative expansive and contractile movements of said base and circuit-controlling members to actuate said contact members progressively in response to different predetermined temperatures.

6. An electrically heated device comprising a base member having a heating unit, a circuit for supplying an electric current to said heating unit, a switch in said circuit having contact members, a circuit-controlling member having a different coefficient of expansion than that of said base member, secured to the latter, and having branches supporting said contact members in juxtaposition and operable by the relative expansive movement of said base member and circuit-controlling member, under different temperatures, to cause said contact members to close or separate.

7. An electrically heated iron comprising a base member having a heating unit, a cir-

cuit for supplying an electric current to said heating unit, a switch in said circuit having contact members, a circuit-controlling member having a different coefficient of expansion than that of said base member, secured to the latter, and having branches supporting said contact members in juxtaposition and operable by the relative expansive movement of said base member and circuit-controlling member, under different temperatures, to cause said contact members to close or separate and means for regulating the normal proximity of said contact members, whereby the effective actuation of said switch for different temperatures of said base member may be obtained.

8. An electrically heated device comprising a base member provided with oppositely disposed anchoring members, metallic members having a different coefficient of expansion than that of said base member, secured to said anchoring members and having curved central portions at a different distance apart than the portions which are secured to said anchoring members, a heating unit, a circuit for supplying an electric current to said heating unit and contact members in said circuit carried respectively by the curved central portions of said metallic members, whereby the relative expansive and contractile movements of said base and metallic members, under different temperatures, will cause said contact members to close and separate.

9. An electrically heated iron comprising a base member provided with oppositely disposed anchoring members, metallic members having a different coefficient of expansion than that of said base member, secured to said anchoring members and having curved central portions at a different distance apart than the portions which are secured to said anchoring members, a heating unit, a circuit for supplying an electric current to said heating unit and contact members in said circuit carried respectively by the curved central portions of said metallic members, whereby the relative expansive and contractile movements of said base and metallic members, under different temperatures, will cause said contact members to close and separate and means for applying tension to said metallic members whereby their curvature may be adjusted.

10. An electrically heated iron comprising a base member provided with oppositely disposed anchoring members, a bar of metal, having a different coefficient of expansion than that of said base member, adjustably secured at its ends to one of said anchoring members and looped about and secured to the other anchoring member, the central portion of the members of said bar converging toward each other between said anchoring members, a heating unit, a circuit for supplying an electric current to said heating unit having contact members carried respectively by the converging central portions of the members of said metallic bar, whereby the relative expansive and contractile movements of said base and metallic bar will cause said contact members to close and open.

In testimony whereof, I have signed my name to this specification.

WILFRED J. TURENNE.