

J. W. JENSEN

ELECTRIC CIRCUIT AND CONTROL FOR IRONER SHOES

2 Sheets-Sheet 1

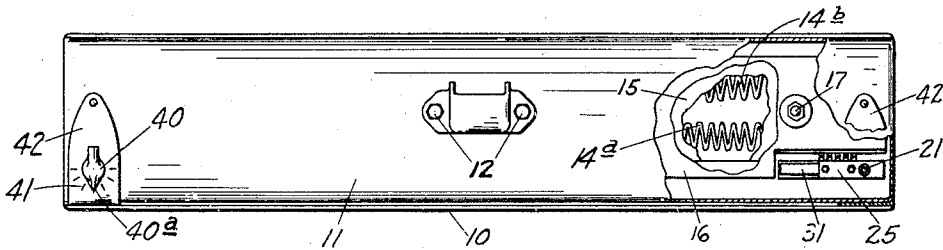
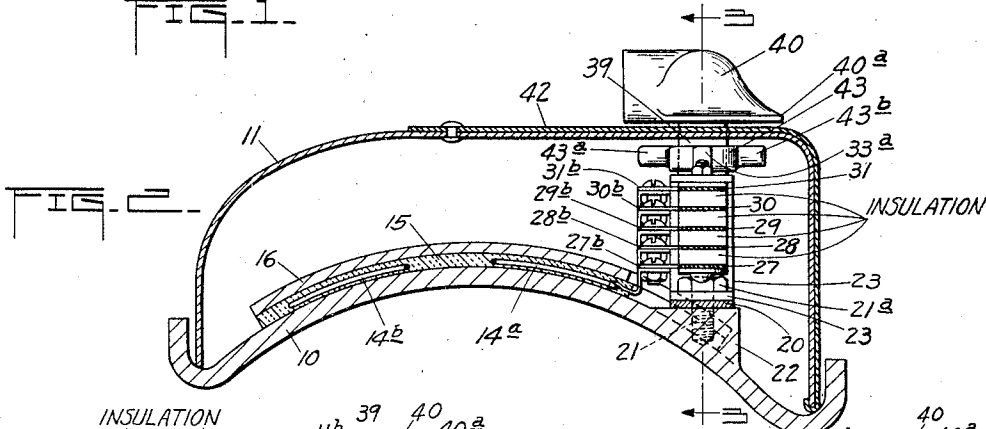


FIG-1-



10-11-12

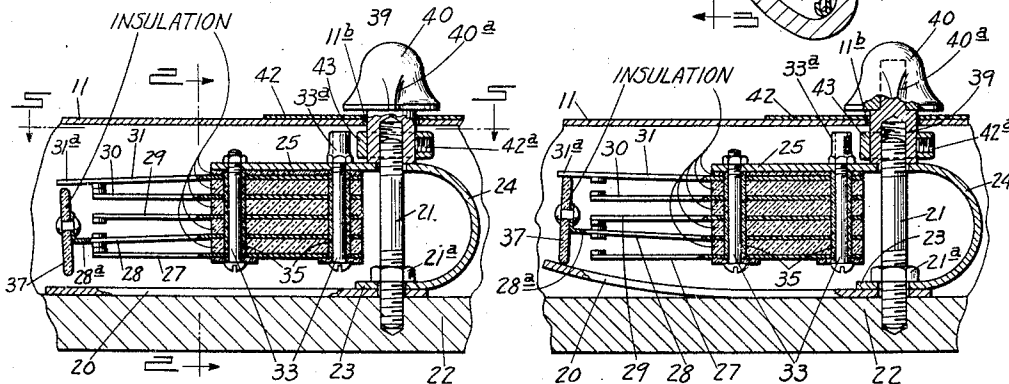
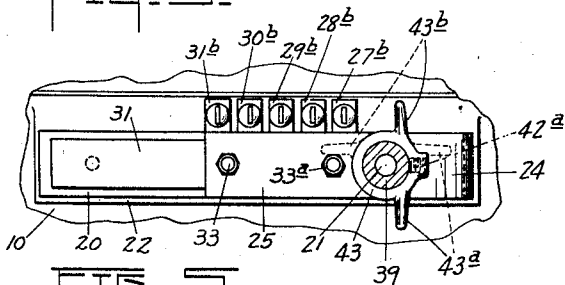


FIG-4-



IS-5

INVENTOR.
BY *Joseph W. Jensen.*
Attorney.
ATTORNEY.

July 8, 1941.

J. W. JENSEN

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ELECTRIC CIRCUIT AND CONTROL FOR IRONER SHOES

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2 Sheets-Sheet 2

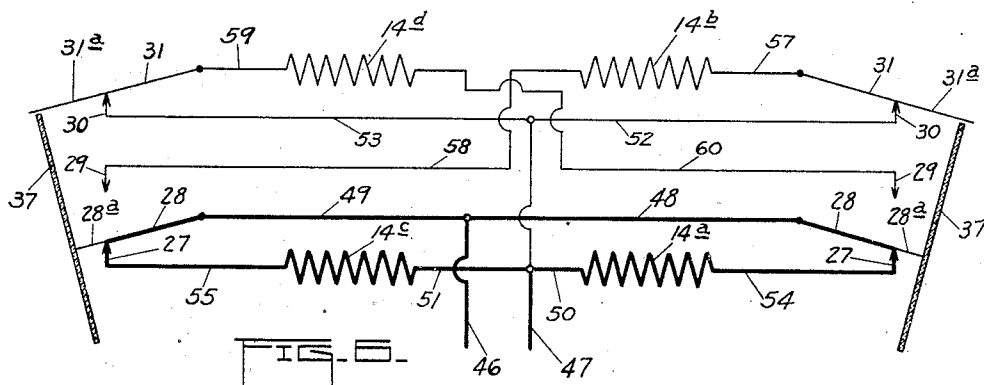


FIG. 6-

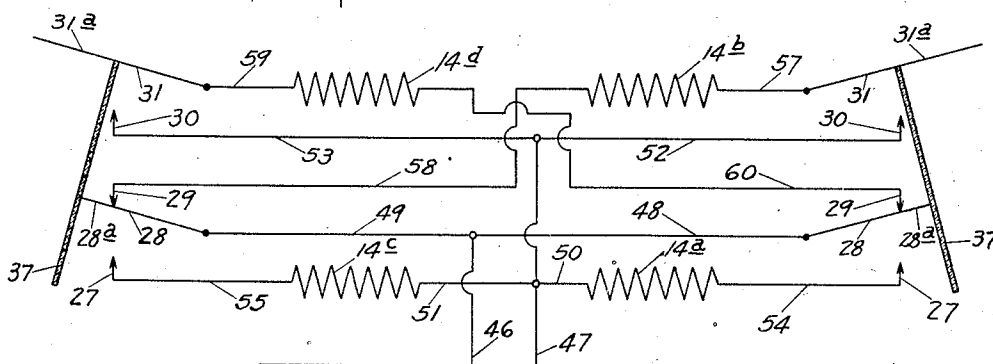


FIG. 7-

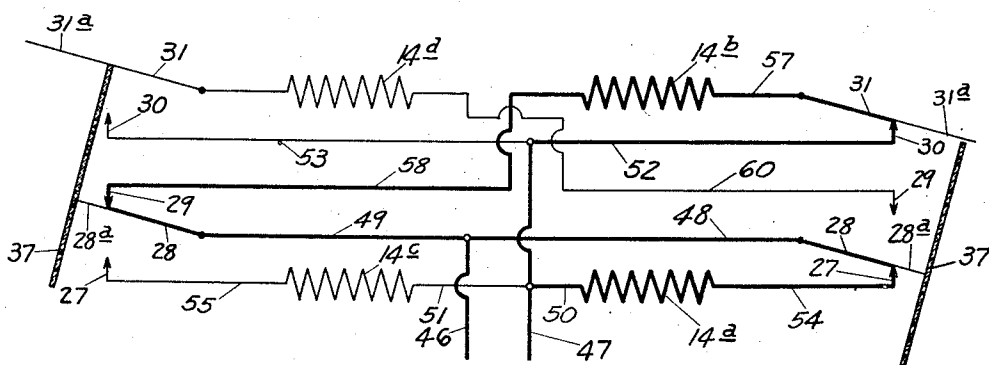


FIG. 8-

INVENTOR.
Joseph W. Jensen.
BY *W. M. Molins*
ATTORNEY.

UNITED STATES PATENT OFFICE

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ELECTRIC CIRCUIT AND CONTROL FOR
IRONER SHOESJoseph W. Jensen, Berwyn, Ill., assignor to Elec-
tric Household Utilities Corporation, Chicago,
Ill., a corporation of Illinois

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4 Claims. (Cl. 219—20)

This invention relates to certain novel and useful improvements in shoes of ironing machines and, more particularly, ironing machines of the domestic type adapted for use in the household.

In recent times, ironing machines for household use have, in the main, been constructed for heating of the shoe electrically. It is well recognized that in machines so constructed, there are periods when the ironing shoe does not properly and efficiently perform upon fabrics being ironed. More specifically, the difficulty resides in the fact that in electrically heated shoes, it is difficult to maintain a more or less uniform temperature on the face of the sole plate of the shoe, and particularly when the articles being ironed are relatively damp and when said articles are being passed over a limited surface area of the shoe, such as at one end thereof. This difficulty is due to the fact that in electrically heated shoes, the recovery of the heat loss is not rapid, which results in a substantial differential in temperatures at different portions of the face of the sole plate of the shoe. Hence, at such times, when an article such as a large piece of linen, is then passed through the machine, a proper ironing operation is performed on only a portion of the article due to this substantial difference in temperature in different areas of the sole plate.

It is recognized that various attempts have heretofore been made to overcome the foregoing difficulties by the provision of a plurality of heating units, the operation of which may be selectively controlled either by a manually operated switch, or an automatic switch, such as disclosed respectively in United States Patents Nos. 1,583,369 and 1,594,158. The arrangement which must be manually controlled obviously is impractical and presents several objectional characteristics. Such an arrangement requires the operator of an ironing machine to possess the ability to determine adequacy of the temperatures of the sole plate of the shoe and necessitates frequent manipulation so as to maintain energization of the proper number or location of heating units, depending upon the character of the article being ironed. Furthermore, it may frequently happen that the operator would adjust the control switch so as to render available the entire electrical current consumption in only one end portion of the shoe and when it is desired to utilize the entire surface of the shoe, readjustment of the manual control might be overlooked and it would then be found that only a portion of the shoe is substantially heated to perform a proper ironing operation.

One of the primary objects of the present invention is to obviate the foregoing difficulties and by virtue of which the temperature of the face of the sole plate of the shoe is maintained more uniform than has heretofore been possible.

Another object of the present invention is to provide a novel and improved means for electrically heating an ironer shoe, and control therefor, by virtue of which certain portions of the shoe, under certain conditions, are automatically supplied with an increased amount of electrical energy for expediting recovery of the heat loss during ironing of relatively damp articles.

A further object is to provide an improved control and heating circuit for ironer shoes comprising a plurality of heating units at opposite end portions of the shoe together with control means for the circuits thereof, by virtue of which said plurality of heating units at one end portion of the shoe may, under certain conditions, receive the total permissible electrical current.

Other objects and advantages of the present invention will be apparent from the following description, taken in connection with the accompanying drawings, in which:

Fig. 1 is a top plan view of an ironer shoe, provided with my improved heating and control arrangements, with portions of the housing broken away to show details of construction.

Fig. 2 is an enlarged transverse sectional view through the shoe taken adjacent one of the control devices, substantially as indicated at line 2—2 on Fig. 3.

Fig. 3 is a fragmentary longitudinal vertical section through the shoe and control device, taken as indicated at line 3—3 on Fig. 2.

Fig. 4 is a sectional view similar to Fig. 3 showing the control device in an operated condition.

Fig. 5 is a fragmentary sectional view looking down upon the control device, taken as indicated at line 5—5 on Fig. 3.

Fig. 6 is a wiring diagram of my novel electrical circuit for the shoe; the circuit being shown as representing a condition at which the shoe is either cold or wherein the shoe temperature throughout the length of the face thereof is relatively uniform and not in excess of the amount for actuating the thermostat controls.

Fig. 7 discloses the wiring diagram, in a condition at which the controls have been actuated to cut off the total electrical current supply, and corresponds to a condition when the shoe has arrived at maximum temperatures throughout the length.

Fig. 8 is a view of a wiring diagram showing

a condition at which the circuit is closed for energizing a plurality of heating units at only one end of the shoe.

As is well known, in various vicinities or localities the current consumption of certain types of electrical appliances is limited either by ordinance or electrical codes and hence the maximum available electrical current for use in connection with ironing machines is definitely limited.

It frequently happens that in ironing various types of articles, and particularly relatively damp articles, the heat energy of the shoe is often extracted at a very rapid rate from a limited surface area of the sole plate of the shoe, such as when ironing handkerchiefs, napkins, or other articles which, for convenience, are usually ironed at one end of the shoe. By virtue of the present invention, which presently will be described in detail, it is possible to concentrate the total available or permissible electrical energy for use at either end of the shoe when it happens that said end of the shoe is being used substantially more than the other end portion of the shoe, in which case said other end portion of the shoe remains at a maximum temperature while the first mentioned end portion is rapidly reduced in temperature due to contact with wet articles being ironed. Due to such an arrangement, it will be apparent that the temperature of the total over-all face of the sole plate of the shoe will be maintained relatively uniform, and thus in general results in an improved ironing operation at all times.

Referring now in detail to the drawings, the ironer shoe, which is of elongated form, includes a metal sole plate 10, the surface of which is curved transversely of its length and its longitudinal edges are upturned to provide a seat for the edges of a sheet metal housing 11 which may be understood to be connected to the sole plate in any convenient manner, such as by the bolts 12. Mounted within the chamber formed by the housing and sole plate are electrically energized heating units; and in the present invention, I employ two dual sets of heating units located in opposite end portions of the shoe. Said heating units, which are herein designated at 14^a, 14^b, 14^c, and 14^d are arranged in sets as 14^a, 14^b, and 14^c, 14^d respectively, at opposite end portions of the shoe. For convenience and illustration, the respective heating units of each set are herein shown in separated or transversely spaced-apart relation; but it is to be understood that said units of each set may be disposed in superimposed relation or may be intertwined with proper insulation interposed therebetween.

The respective heating units, as shown in Fig. 2 of the drawings, are enclosed in a body of heat resistant material 15 which, together with the heating unit, are held in place firmly in contact with the inner surface of the sole plate 10 by means of a retainer plate 16, which is rigidly attached to the sole plate by a plurality of bolts, such as indicated at 17. For convenience in describing the function and operation of the heating units, it may be assumed that the heating units designated at 14^a and 14^c are the main heating units at opposite end portions of the shoe and which are normally in operation, while the heating units designated at 14^b and 14^d are for convenience termed auxiliary heating units and are only occasionally and individually utilized, such as when the main heat-

ing unit at the opposite end portion of the shoe is cut off from its current supply due to the fact that the sole plate of the shoe at said end portion has acquired the maximum temperature for which the thermostat is set.

Located at each end of the shoe, within the housing 11, is a specially constructed thermal-responsive device or thermostat which is connected in circuit with the main heating unit at said adjacent end portion of the shoe, and with the auxiliary heating unit at the opposite end portion of the shoe connected as a branch of the electrical circuit for the main heating unit. Each of these thermostats includes a bimetallic strip 20 disposed in direct contact with the inner surface of the sole plate as seen in Fig. 3, to which it is firmly secured by a stud 21 threaded into a boss 22 formed on the inner surface of the sole plate as seen in Fig. 2. Mounted on the attached end of the bimetallic strip is a short leg 23 of a U-shaped carrier member 24, which leg together with the bimetal strip is clamped tightly against the sole plate by a nut 21^a. The upper leg 25 of said carrier, which is loosely mounted on said stud extends a substantial distance above and in substantially parallel relation to the bimetallic strip 20, and supported from said leg 25 of the carrier are a plurality of switch members, designated at 27, 28, 29, 30, and 31, which members are secured to the carrier 25 by bolts 32, with blocks of insulating material 34 interposed between the end portions of said switch members, and with tubular bodies 35 of insulating material surrounding said bolts 32. The switch member 28 is provided with an extension 28^a to which is riveted a block of insulating material 37 which, as may be seen in Fig. 3, is normally disposed out of contact with the bimetallic strip 20 and out of contact with the extension 31^a of the top switch member 31. It is to be understood that the insulating elements 33, 35, and 37 possess both characteristics of thermal and electrical resistance.

Each of the switch members are provided with laterally extending lugs designated respectively at 27^b, 28^b, 29^b, 30^b, and 31^b, which, as will be presently described, are connected by conductor wires to the two dual sets of resistances or heating units designated at 14^a, 14^b, and 14^c, 14^d respectively. Threaded on the upper end of the stud 21 is a control member 36 which projects through an aperture 11^b in the top of the housing. Press fitted onto the upper end of said member 36 is a manually operable adjustable control handle 40, seated in close proximity to the top of the housing 11, and is formed with an indicator 40^a adapted to be aligned with graduations designated at 41, on escutcheon plate 42, attached to the top of the housing, for designating various positions of adjustment of the thermostat, corresponding to certain pre-determined temperature ranges which said corresponding end portions of the shoe may acquire. The lower end of the control member 36 abuts against the upper leg 25 of the carrier 24 and it will be apparent that by rotating the handle 40, together with member 36, said upper leg 25 of the spring carrier member 24 is caused to move toward or away from its shorter leg member 23 and thereby moving as a unit the entire bank of switch members, toward or away from the bimetallic strip 20, and which adjustment varies the position of the actuator member 37 relatively to the bimetallic strip. By virtue of this construction, it is possible to vary the opera-

tion of the switch members by engagement of the actuator 37 by the bimetallic strip 20 so as to cause actuation of the switch members at different temperature ranges of the sole plate. Mounted on the lower end portion of the control member 39, by means of a set screw 42^a, is a collar 43 having a pair of oppositely extending legs 43^a and 43^b, which serve as stops when the handle 40 is rotated in either direction, by engagement with the upstanding nut 33^a of the bolt 33 located adjacent the stud 21. In Fig. 5, the collar 43 is also indicated with its arms in a dotted line position of adjustment which corresponds to one limiting position of temperature adjustment of the control handle 40, and it may be understood that when the handle is rotated in opposite direction, the opposite stop arm 43^a will be disposed in contact with the upstanding nut 33^a for limiting rotation in said opposite direction.

Referring now to the wiring diagrams, there is shown current supply conductor wires 46 and 47, with the conductor wire 46 being connected by conductor wires 48 and 49 to the switch members 28 of the respective thermostats; while current supply conductor wire 47 is connected by conductor wires 50 and 51 to opposite ends of the main resistances or heating units 14^a and 14^b and also by conductor wires 52 and 53 to the switch members 30 of the respective thermostats. The opposite ends of the main resistances or heating units 14^a and 14^b are connected by conductor wires 54 and 55 to the switch members 27 of the respective thermostats. The auxiliary heating unit 14^c is connected at one end by conductor wire 57 to the switch member 31 while its opposite end is connected by conductor wire 58 to the switch member 29 of the thermostat in the opposite end of the shoe, and the auxiliary heating unit 14^d is connected at one end by conductor wire 59 to the switch member 31 of the adjacent thermostat, while its opposite end is connected by conductor wire 60 to the switch member 29 of the thermostat at the opposite end of the shoe.

It will be apparent that the control handle 40 of the thermostats may be adjusted in a manner well understood in the art for obtaining desired temperatures of the face of the sole plate at the corresponding end portions of the shoe for the purpose of obtaining a proper temperature for ironing certain types of articles or articles fabricated of certain materials. It is further recognized that the respective thermostats are independently adjustable so that if desired, different temperatures may be obtained at opposite end portions of the shoe; but usually the thermostats are similarly adjusted and it may be understood that in the wiring diagram illustrated in Fig. 6, the two main heating units 14^a and 14^b located at opposite ends of the shoe are being energized or adapted to be energized by the closing of the switch composed of the members 27 and 28, and such a circuit is represented in Fig. 6, by heavy lines. If the sole plate of the shoe acquires the temperature for which the thermostats are adjusted, the free end of the bimetallic strip will be contracted in an upward direction so as to engage and move the actuator 37, and thereby cause separation of switch contact members 27 and 28. Simultaneously upon separation of switch members 27 and 28, switch members 30 and 31 are also separated, and switch members 28 and 29, as may be seen in Fig. 7 of the drawings, are caused to engage. In this condition of the electrical circuits, no electrical energy is being utilized for

the respective heating resistances or units, and when the temperature of the sole plate again drops below the pre-determined amount corresponding to the adjustment of the thermostats, the bimetallic element 20 expands, permitting the actuator 37 to again return to the position seen in Fig. 3 for re-establishing circuit connections for the respective resistances or heating units 14^a and 14^b, as represented in Fig. 6. As is apparent, the thermostats and the respective main heating units or resistances at each end of the shoe are independent of each other and may operate at different times. If it happens that one end portion of the shoe acquires the temperature for which the thermostat is adjusted, the electrical circuit, including the main heating unit or resistance, will be broken such as illustrated in Fig. 8. The current which was available for said main heating unit is then made available for energizing the auxiliary heating unit or resistance at the opposite end portions of the shoe. As seen in Fig. 8, the current is then supplied to a branch electrical circuit including the switch members 28 and 29 at the lefthand end portion of the wiring diagram, together with the auxiliary heating unit 14^b, at the righthand end portion, during which time current is being supplied to the portion of the main electrical circuit including the main heating unit or resistance 14^a in the righthand end portion of the wiring diagram. It will be apparent that if the temperature at the end of the shoe including the main heating unit 14^a arrives at the amount corresponding to the adjustment of the thermostat, all the circuits become open and none of the heating units are supplied current. If the lefthand end of the shoe cools sufficiently to operate the left end thermostat, then the converse arrangement of electrical circuits would result, namely that the main heating element 14^b would become energized and that the auxiliary heating unit 14^d would, if required, also be energized.

For purposes of illustrating the importance of applicant's invention, it may be understood that each of the heating units or resistances 14^a, 14^b, 14^c, and 14^d, are of 700 watt capacity; and normally in ironing machines heretofore constructed, the shoes were made with two 700 watt heating units at opposite end portions of the shoe. As above mentioned, the amount of current consumption of an ironer is more or less limited by various electrical codes and ordinances. Therefore, to comply with certain ordinances and codes and still obtain the advantage of a shoe of substantially double permissible wattage, the present invention permits an arrangement by virtue of which it is possible to obtain, at certain times, a maximum of 1400 watts in one end portion of the shoe, if the conditions require same. Manifestly, by virtue of this invention, it is possible to practically double the speed of recovery of the heat loss at the end portion of the shoe, which, as it often happens, is being used more than the total face of the shoe, such as when ironing relatively wet articles. Such an arrangement also tends to maintain a substantially uniform temperature throughout the entire face of the sole plate of the shoe.

Although I have herein shown and described a preferred embodiment of my invention, manifestly it is capable of modification and rearrangement of parts without departing from the spirit and scope thereof. I do not, therefore, wish to be understood as limiting this invention to the

precise embodiment herein disclosed, except as it may be so limited by the appended claims.

I claim:

1. The combination of an elongated ironer shoe, an electrically energized main heating unit at one end portion of said shoe, a second electrically energized main heating unit at the other end portion of the shoe, an electrically energized auxiliary heating unit at said last mentioned end portion of the shoe, said auxiliary heating unit being connected in a normally open branch of a normally closed electrical circuit including said first mentioned main heating unit, and thermally responsive means connected in said circuit of the first mentioned main heating unit and operable at a pre-determined temperature range of the shoe adjacent said means for opening said electrical circuit of the first mentioned heating unit and closing the branch electrical circuit including said auxiliary heating unit.

2. The combination of an elongated ironer shoe, an electrically energized main heating unit at one end portion of said shoe, a second electrically energized main heating unit at the other end portion of the shoe, an electrically energized auxiliary heating unit at said last mentioned end portion of the shoe, said auxiliary heating unit being connected in a normally open branch of a normally closed electrical circuit including said first mentioned main heating unit, and thermally responsive means connected in said circuit of the first mentioned main heating unit and operable at a pre-determined temperature range of the

shoe adjacent said means for simultaneously opening the circuit of said first mentioned main heating unit and closing the branch circuit including said auxiliary heating unit.

3. The combination of an elongated ironer shoe, electrically energized main and auxiliary heating units at each end portion of the shoe, each of said auxiliary heating units being connected in a normally open branch of a normally closed electrical circuit including the main heating unit at the opposite end of the shoe, and thermally actuated control means connected in each of said combination circuits and responsive to a pre-determined temperature range of the shoe adjacent the main heating unit for opening the respective electrical circuit of said main heating unit and closing the branch circuit including the auxiliary heating unit.

4. The combination of an elongated ironer shoe, electrically energized main and auxiliary heating units at each end portion of the shoe, each of said auxiliary heating units being connected in a normally open branch of a normally closed electrical circuit including the main heating unit at the opposite end of the shoe, and thermally actuated control means connected in each of said combination circuits and responsive to a pre-determined temperature range of the shoe adjacent the main heating unit for opening the respective electrical circuit of said main heating unit and simultaneously closing the branch circuit including the auxiliary heating unit.

JOSEPH W. JENSEN.