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J. L. SHROYER

ELECTRIC HEATER

Filed Dec. 9, 1924

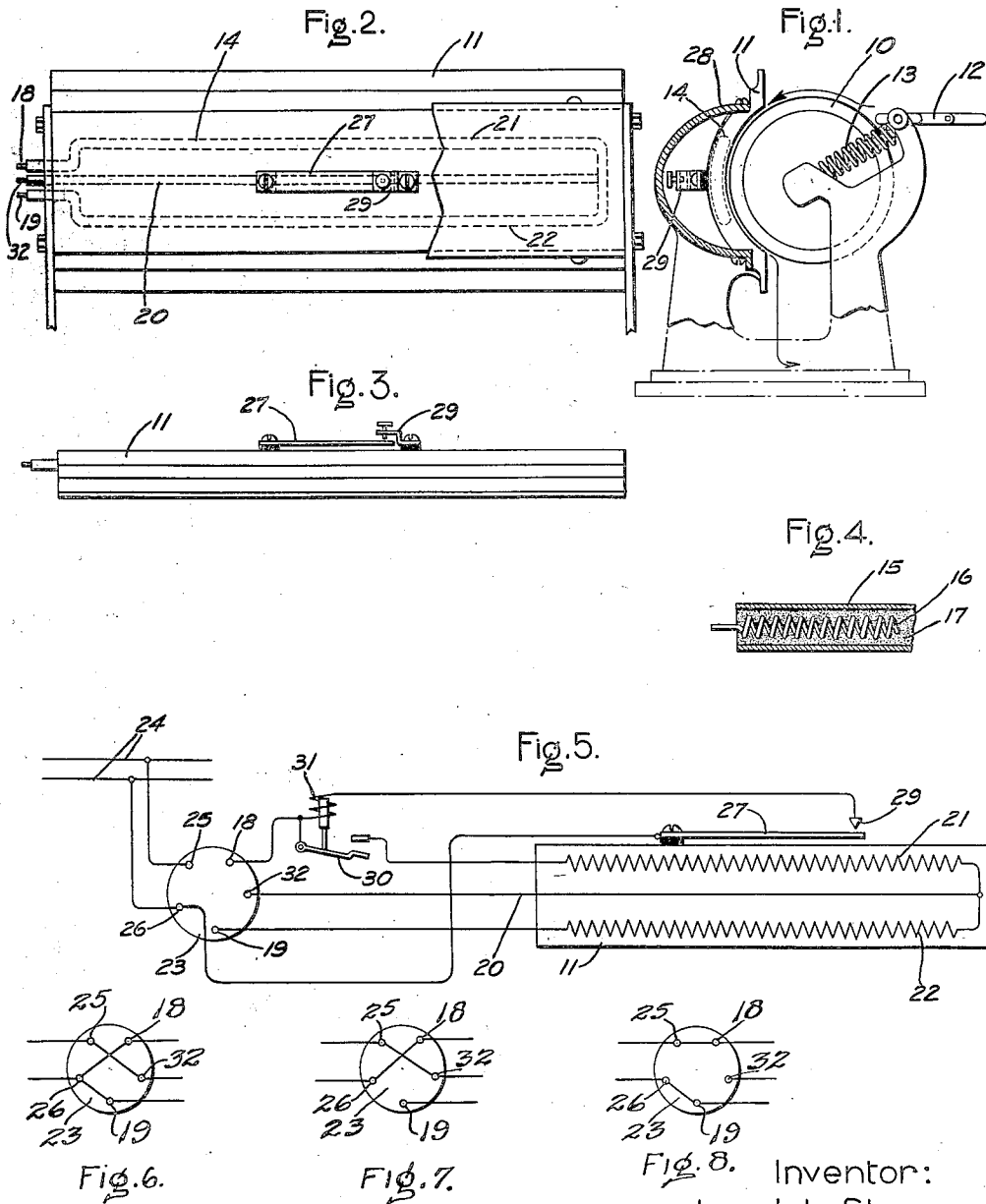


Fig. 8. Inventor:
Jacob L. Shroyer,
by *Alexander S. Lane*
His Attorney.

UNITED STATES PATENT OFFICE.

JACOB L. SHROYER, OF OAK PARK, ILLINOIS, ASSIGNOR TO EDISON ELECTRIC APPLI-
ANCE COMPANY, INCORPORATED, OF CHICAGO, ILLINOIS, A CORPORATION OF NEW
YORK.

ELECTRIC HEATER.

Application filed December 9, 1924. Serial No. 754,843.

My invention relates to electric heaters, more particularly to control means for electric heaters, and has for its object the provision of manually and automatically operated control means.

My invention has special application to electric heaters which are arranged to give different rates of heat output as desired to correspond with the conditions of operation. This is sometimes effected by dividing the heater into a plurality of sections and providing suitable switching means, usually a three-way switch, for varying the connections of these sections to the supply source. When a high rate of heat output, or high heat, is required the sections of the heater are connected in parallel. For low heat the sections are connected in series; and for medium heat one section only is connected.

In carrying out my invention I provide manually operated means for connecting the sections in various combinations and temperature responsive means for controlling the energization of a section which is connected in each of the various combinations.

For a more complete understanding of my invention reference should be had to the accompanying drawing in which Fig. 1 is an end elevation view partially in section showing an electric ironing machine embodying my invention; Fig. 2 is a side elevation view of Fig. 1 with the cover removed; Fig. 3 is a view looking upward of the pressure shoe showing the thermostat; Fig. 4 is a fragmentary sectional view showing the heating unit; Fig. 5 is a diagrammatic view showing the various electrical connections while Figs. 6, 7 and 8 are diagrammatic views showing the electrical connections for the high intermediate and low heats respectively.

Referring to the drawing I have shown my invention in one form as applied to an electrically heated ironing machine of conventional form comprising a rotating cylinder 10 and a pressure shoe 11 between which the articles to be ironed are fed from a suitable table or support 12. It will be understood that the shoe 11 is adjustable with relation to the cylinder by suitable means (not shown) to permit the insertion of the work. The cylinder 10 is held in place resiliently on its supports, for example by means of a spring 13 at each end so

that it may give or spring away from the shoe to prevent jamming and tearing of the clothing.

The ironing machine is heated by means of an electric heater 14 which is mounted on the shoe 11. It may and preferably is cast in the metal of the shoe. Any suitable form of heater may be used although preferably a helical coil sheathed wire heating unit is used, such as described and claimed in Patent No. 1,367,341 to Abbott dated February 1, 1921. As shown in Fig. 4, this unit may consist of an outer metallic sheath 15 in which is a helical resistance conductor 16 embedded in powdered heat refractory insulating material 17 which is compacted to a hard dense mass so as to thoroughly insulate the resistance conductor from the sheath and also form a good conductor of heat. As shown in Fig. 2 the heater may consist of a U-shaped length or loop of this unit which is cast in the shoe, its ends projecting to form terminals 18 and 19 for connection with an electric circuit. An insulated conductor 20 connects with the resistance conductor of the unit at some point between its ends, preferably at an intermediate point, forming a central tap and dividing the heating unit into two equal sections 21 and 22.

Where the heating unit is thus divided in two sections a three-way switch 23 is usually provided as shown in Fig. 5 by means of which the connection of the sections with a suitable source of supply 24 can be manually controlled. When the conditions of operation of the device are such that a maximum amount of heat is required for example when ironing heavy, wet articles, the switch 23 is turned to such position that the terminal 32 is electrically connected to a switch terminal 25 leading to one side of the supply source 24 and the terminals 18 and 19 are both connected to a switch terminal 26 leading to the other side of the supply source as shown in Fig. 6. This places the two sections in parallel. When the demand for heat is not as great, for example when ironing medium or dry work, the switch may be turned to the medium heat position in which terminals 18 and 32 are connected to terminals 26 and 25 respectively as shown in Fig. 7. This connects the section 21 only to the supply

source. Again, when the heat requirements are still smaller, for example, when ironing very light fabrics, the switch 23 is turned to such position that the terminals 18 and 19 are connected to the terminals 25 and 26 respectively as shown in Fig. 8. This connects the two sections in series to the supply source. It will be understood that the same method of controlling the heat output may be used in various other electrically heated devices, for example electric ranges, electric ovens, etc.

In accordance with my invention I provide a temperature responsive device for controlling the connection and disconnection of the section 21 of the heater, i. e., the section which is normally energized for medium heat. It will be observed that this section is energized for all three heats and therefore by providing automatic means for controlling it, the temperature may be controlled regardless of the position of switch 23. In other words the temperature responsive device will maintain a predetermined temperature regardless of whether the heater is operating on high, medium or low heat.

This temperature responsive device is shown as a bimetallic thermostatic bar 27 which is mounted on the shoe 11 so as to be in good heat exchange relation therewith. For example, the thermostat may be mounted on the back of the shoe 11 as indicated in Figs. 1, 2 and 3, a suitable cover 28 being provided to enclose it. The thermostat is thus maintained at very closely the same temperature as the shoe and is therefore subject to any changes in temperature of the shoe. Cooperating with the movable end of the bar 27 is an adjustable contact 29 with which the end of the bar engages upon the occurrence of a predetermined minimum temperature. The bar and contact 29 are mounted in insulated relation with each other and with relation with the shoe.

In the circuit of heater section 21 is a suitable electromagnetically operated switch 30, the operating coil 31 of which is controlled by the bar 27. As shown, the bar 27 is electrically connected to the central terminal 26, while the contact 29 is electrically connected through the operating coil 31 to the terminal 18.

It will thus be observed that when the switch 23 is turned to any one of the heating positions, the switch 30 will be closed by the engagement of the bar with the stationary contact as long as the shoe is below the predetermined maximum temperature. When the predetermined maximum temperature is reached, however, the end of the bar is

moved to disengage the stationary contact, thereby opening the circuit of operating coil 31 and allowing the switch 30 to open. This disconnects the heater section 21 when the two sections are connected in parallel on high heat, and opens the heating circuit when section 21 only is connected for medium heat and when the two sections are connected in series for low heat. The temperature of the device then decreases to the predetermined minimum when the thermostat bar again engages contact 29, whereupon the heater is again connected and the control cycle repeated.

While I have described my invention as embodied in concrete form and as operating in a specific manner in accordance with the provisions of the patent statutes, it should be understood that I do not limit my invention thereto, since various modifications thereof will suggest themselves to those skilled in the art without departing from the spirit of my invention, the scope of which is set forth in the annexed claims. What I claim as new and desire to secure by Letters Patent of the United States is:—

1. The combination with an electric heater divided into a plurality of sections, of a source of electrical supply therefor, manually operated means for connecting said sections to said supply course in various combinations, a predetermined one of said sections being connected in each of said combinations, and temperature responsive means for controlling the energization of said latter section.

2. The combination with an electric heater divided into a plurality of sections, of a source of electrical supply therefor, means for connecting said sections to said supply source in parallel and series for high and low heats respectively and for connecting one of said sections to said supply source for medium heat, and temperature responsive means for controlling the energization of the latter of said sections.

3. The combination with an electric heater divided into a plurality of sections, of a source of electrical supply therefor, a switch for connecting said sections to said supply source in parallel and series for high and low heats respectively and for connecting one of said sections to said supply source for medium heat, a thermostat, and a switch controlled by said thermostat in circuit with the latter of said sections.

In witness whereof, I have hereunto set my hand this fourth day of December 1924.

JACOB L. SHROYER.

CERTIFICATE OF CORRECTION.**Patent No. 1,658,692:****Granted February 7, 1928, to****JACOB L. SHROYER.**

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 93, claim 1, for the word "course" read "source"; 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 6th day of March, A. D. 1928.

Seal.

**M. J. Moore,
Acting Commissioner of Patents.**