

March 4, 1952

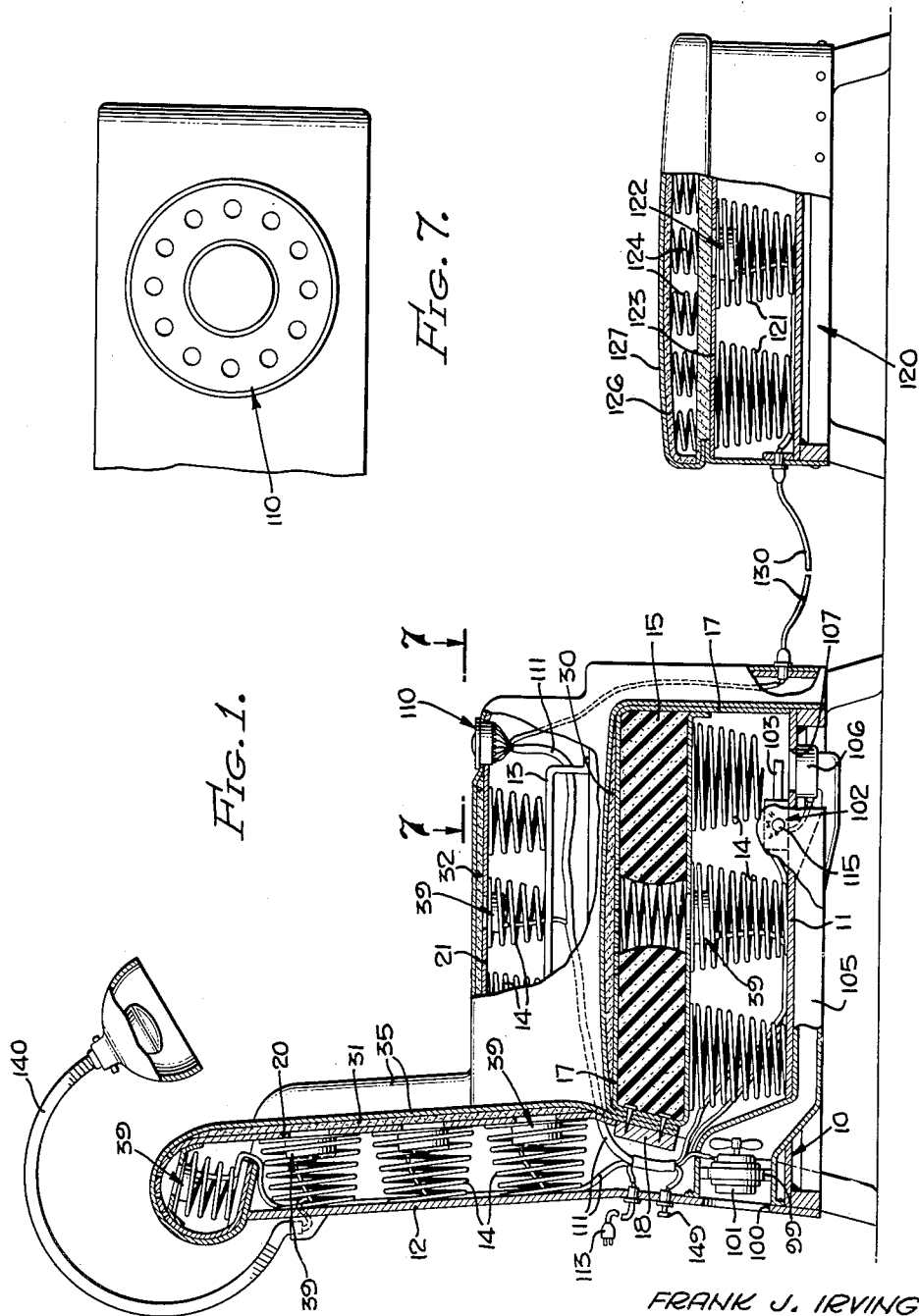
F. J. IRVING

2,587,731

ELECTRICALLY HEATED CHAIR

Filed June 19, 1950

2 SHEETS—SHEET 1



FRANK J. IRVING,
INVENTOR.

BY

Hazard & Miller
ATTORNEYS

March 4, 1952

F. J. IRVING

2,587,731

ELECTRICALLY HEATED CHAIR

Filed June 19, 1950

2 SHEETS—SHEET 2

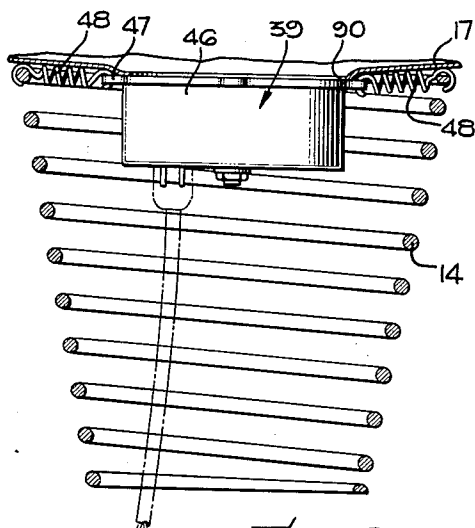


FIG. 2.

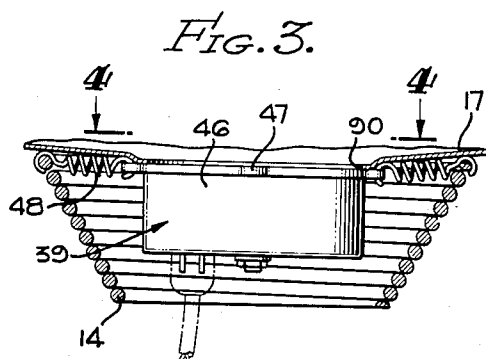


FIG. 3.

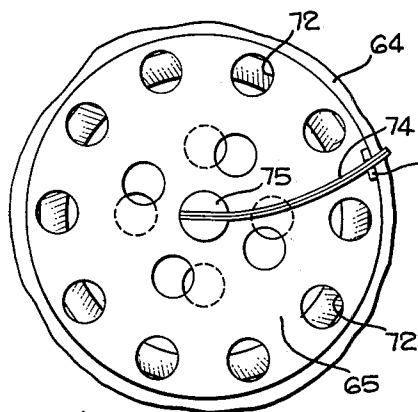


FIG. 6.

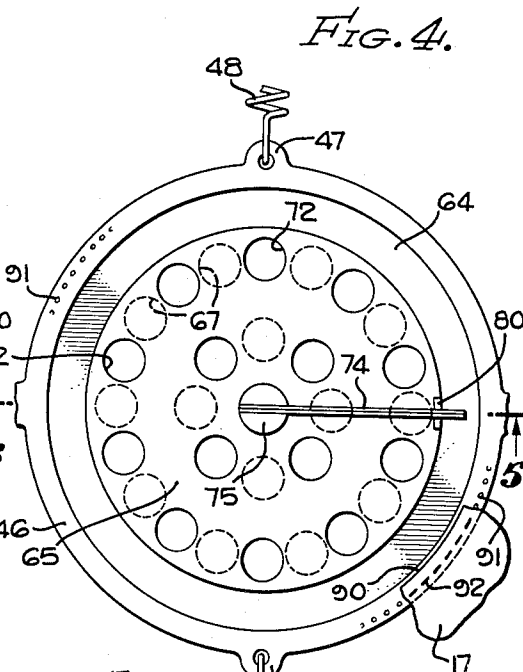


FIG. 4.

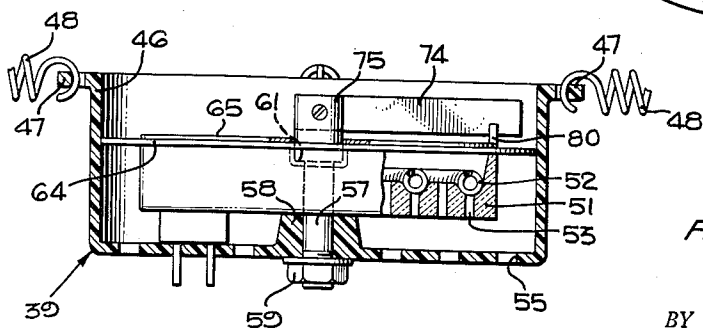


FIG. 5.

FRANK J. IRVING,
INVENTOR.

BY

Hazard & Miller
ATTORNEYS

UNITED STATES PATENT OFFICE

2,587,731

ELECTRICALLY HEATED CHAIR

Frank J. Irving, San Gabriel, Calif.

Application June 19, 1950, Serial No. 169,029

5 Claims. (Cl. 219-19)

1

This invention relates to improvements in articles of furniture and may be incorporated in the construction of chairs, beds, cribs, ottomans, and the like.

An object of the invention is to provide an improved article of furniture, such as a chair, bed, crib, or the like which may be electrically heated by heating elements.

More particularly, an object of the invention is to provide an article of furniture having a collapsible hollow body urged into distended position by springs and wherein there are heating elements movable with the springs for heating the body.

Another object of the present invention is to provide an article of furniture comprising a collapsible hollow airtight body urged into distended position by springs, heating elements movable with the springs, mechanism for creating an air pressure within the body, the body being provided with vents to allow egress of air from the body.

Another object of the invention is to provide a collapsible hollow airtight body as above described wherein there are means for heating the air within the body and for creating an air pressure within the body and wherein mechanism is provided for allowing and controlling egress of air from the body.

Another object of the present invention is to provide an article of furniture comprising a collapsible hollow, substantially airtight body urged into distended position by coil springs, and in which heating elements are suspended within the coil springs to be movable therewith and wherein the hollow body is apertured in alignment with the heating elements and wherein there are mechanisms responsive to the temperature of the air for opening and closing the apertures in the body.

Another object is to provide an article of furniture which is heated by drawing air into the article of furniture, heating, and discharging the air through the covering of the article of furniture, which article of furniture is provided with control mechanism whereby the temperature of the discharged air can be automatically controlled at selected predetermined temperatures regardless of the temperature of the air drawn into the body.

Another object of the invention is to lower the range of operating temperatures of the thermostat control mechanism used in connection with a thermostatically controlled heated article of furniture.

With the foregoing and other objects in view, which will be made manifest in the following detailed description and specifically pointed out

2

in the appended claims, reference is had to the accompanying drawings for an illustrative embodiment of the invention, wherein:

Figure 1 is a sectional view in side elevation of a chair and footstool incorporating the present invention;

Fig. 2 is an enlarged sectional view through one of the coil springs of the chair depicted in Fig. 1 showing a heating element suspended within the coil spring and showing in dot-dash lines an electric supply line to the heating element;

Fig. 3 is a view similar to Fig. 2 showing the spring being collapsed;

Fig. 4 is a plan view along lines 4-4 of Fig. 3 showing the air control plates out of alignment;

Fig. 5 is a sectional view in elevation along lines 5-5 of Fig. 4 showing the receptacle for the heating element;

Fig. 6 is a view in plan of a portion of the arrangement depicted in Fig. 4, wherein the air control plates are shown in aligned position to permit egress of air from the device; and

Fig. 7 is a view in plan along line 7-7 of Fig. 1, showing the control mechanism for the heating elements.

Referring to the accompanying drawings wherein similar reference characters designate similar parts throughout, in Fig. 1 the embodiment of the invention comprises a chair having a frame generally indicated at 10 including a base member 11, a back supporting member 12, and arm supporting members 13 on which coil springs 14 are supported. There is a sheath or covering 17 for the coil springs in the seat and for the centrally apertured sponge rubber cushion 15 of the seat of the chair and this covering 17 is of some airtight material and is secured or attached to the frame and to the base member 11 and to a cross supporting member 18, the manner of securing being such as to prevent the escape of air thereby. There is a similar airtight covering or sheath 20 for the springs of the back of the chair and covering 20 is secured to cross member 18 and to the back supporting member 12 for the chair. There are similar airtight coverings 21 for the springs in the arms of the chair, so that coverings 17, 20, and 21 in conjunction with frame 10 and the various parts of the frame form an airtight body. There are openings to be described, through coverings 17, 20 and 21, to permit the passage of air therethrough but the passage of air through these openings is controlled in a manner to be described so that free flow of air through the chair is prevented.

The sheath, back, and arms of the chair may be provided with cushions 30, 31, and 32, respectively. There is an outer covering 35 for the

chair but this covering allows air to readily pass therethrough as does the cushioning means 30, 31, and 32 so that once the air has passed through the openings in the airtight covering pieces 17, 20, and 21, little resistance is offered to the passage of the air through the cushions and outer covering 35. Heating elements 39 are provided for the seat, back and arms of the chair and each of these heating elements is supported within a coil spring in the manner as shown in Fig. 2 in the case of the heating element for the seat. In Fig. 2 it can be seen that heating element comprises a receptacle 46 having ears 47 and tension springs 48 hook into ears 47 and over the upper convolute of the coil spring 14 thereby suspending the receptacle 46 within the coil spring 14 and from coil spring 14 so that the heating element 39 is movable with the coil spring and so will not come into contact with the covering of the chair and thereby damage to the chair will be avoided. As shown in Fig. 3, wherein the coil spring 14 is depressed or collapsed the heating element is still not any closer to the covering of the chair than it was in Fig. 2, and therefore it will be appreciated that one of the main objects of the invention, which is to avoid damage to the covering of the chair by the heating elements, is achieved by the novel construction of suspending the heating elements from and within the coil springs of the chair.

Each of the heating elements has a heat-resistant base 51 having electrically energized heating coils 52 supported therein. There are apertures 53 through heat-resistant base member 51 to allow for the passage of air through the heat-resistant base 51 and there are apertures 55 through the base of receptacle 46 to allow for the passage of air therethrough. There is a central heat conducting supporting member 57 received by a boss 58 on receptacle 46 and secured to the receptacle by nut 59. A shoulder 61 is provided on member 57 and this shoulder bears against a central boss on heat-resistant base 51 to retain the base member in the receptacle.

There is a lower air-control plate 64 which is fixed with relation to the receptacle 46 and the heat-resistant base member 51 and is provided with a plurality of apertures 67 located over member 57, compare Figs. 4 and 5. It can be seen that lower air-control plates 64 extend to the side walls of the receptacle 46 and therefore, all the air entering through apertures 55 in receptacle 46 must pass through the base member 51 and through the apertures 67 in air-control plate 64. There is an upper air-control plate 65 movable with regard to plate 64 and provided with apertures 72 which are adapted to be brought into alignment with apertures 67 on control plate 64, compare Figs. 4 and 6. There is a bimetallic strip 74 for each of the heating elements and bimetallic strip shown in Fig. 5 is secured by a sleeve 75 to the central supporting member 57 and heat is adapted to be transferred through member 57 to the bimetallic strip 74 whereby the bimetallic strip is adapted to be deformed upon changing temperatures of air below the receptacle and within the receptacle. It is obvious that heat can be transferred from the heating elements proper 52 through the plates 64 and 71 to the bimetallic strips 74. The outer end of the bimetallic strip fits within a clevis or fork member 80 fixed to the upper air-control plate 65 to enable control thereover.

Bimetallic strips 74 serve the important pur-

pose of closing the receptacles to the passage of air and maintaining the receptacles closed until a predetermined temperature is obtained so that cold air will not be allowed to pass through the receptacles and through the covering of the chair and onto the occupant of the chair. Therefore, the occupant of the chair will know at all times that only warm air will be allowed to pass through the chair and therefore will be confident that he will not be subjected to cold blasts of air even though the chair has not been in operation prior to the occupant's use of the chair. The bimetallic strips 74 are so arranged that when the temperature of the air within the chair is room temperature the bimetallic strips will be positioned as shown in Fig. 4, where the apertures 67 and 72 will be out of alignment and therefore, no air can be forced through the chair. When the heating elements have been energized and the temperature has risen to a predetermined comfortable point, the bimetallic strips will be deformed to the position shown in Fig. 6 so that apertures 67 and 72 are aligned and therefore the air within the chair which has had a chance to be warmed, may now be forced through the receptacles and out through the chair.

As previously mentioned, the coverings 17, 20, and 21 are airtight but each of the coverings is provided with apertures or openings 90, see Fig. 4, in alignment with the receptacles 46 and the receptacles are provided with peripheral perforations 91 to receive stitching 92 for fastening the airtight coverings 17, 20, and 21 to the receptacles. The air within the chair therefore, in order to escape from the chair, must pass through the heating elements 39 and since the heating elements are adapted to control the flow of air therethrough, the air passing through the chair is controlled and heated properly.

There is an opening 100 in the rear of the chair shown in Fig. 1, and there is an air pressure-providing means 101 which may take the form of any suitable fan or the like and is secured in alignment with the opening by mounting 99, and the fan 101, when energized will serve to create a pressure within the chair. There is a temperature control mechanism generally indicated at 102 which includes a settable thermostat 103. Thermostat 103 is responsive to the temperature of air which is drawn into the chair by the fan 101 and forced through conduit 105 which leads to a thermostat controlled heating element 106 which is secured to the under side of the chair. There is an opening 107 in alignment with heating element 106 to allow the heated air to pass over the thermostat 103. The heating elements 39 are adapted to be energized or deenergized by means of a push button control mechanism 110 and there is a wiring system 111 which connects the heating elements 39 to the push button control 110 and to the thermostat 103 whereby the heating elements 39 can be turned off and on by means of the push button control 110 and be regulated by the thermostat 103, which is connected to the heating elements by virtue of the wiring system 111. The wiring system 111 is adapted to receive current through a wall socket connection 113 and fan 101, is also connected to circuit 111 to be energized thereby. The circuit 111 is so connected that the heating element 106 for controlling the thermostat is in series with the thermostat and the thermostat and heating element 106 are connected in series with heating elements 39, said heating elements being connected in parallel with one another and each

heating element being adapted to be energized or deenergized through a suitable push button of the push button control 110, it being obvious that each push button will be connected in one of the parallel circuits containing a heating element 39. The fan 101 is connected into circuit 111 in a manner such as not to be affected by the operation of the thermostat or heating elements but is controlled by a switch to be described.

All the air drawn into the chair is forced through conduit 105 and through heating element 106 where it is preheated and thereafter passes into the chair and out through whichever of the heating elements 39 that have been energized by operating the push button control 110. By conducting all the incoming air through the heating element 106 and across thermostat 103 the temperature of the air discharged from the chair can be regulated independently of the temperature of the incoming air so that the settable thermostat 103 can always be set at a predetermined position and the temperature of the outgoing air will always correspond to the setting regardless of the temperature of the incoming air. This is so because the thermostat 103 will open and close in accordance with the temperature of the incoming air, and if the temperature of the incoming air is low the contacts of the thermostat will be closed longer, and if the temperature of the incoming air is relatively high the contacts of the thermostat 103 will be open longer and therefore the contacts of the thermostat are closed for periods of time, the extent of which is in inverse proportion to the temperature of the incoming air.

Another advantage of having the control mechanism 102 being subjected to the incoming air is that the heating element 106 to which the thermostat is responsive operates at a much lower temperature than if the heating element 106 were not subjected to the incoming air. Therefore, two very important advantages are obtained by subjecting the control mechanism, including the thermostat 103 and the heating element 106 to the incoming air. First, the thermostat 103 may be set at a high, low, or medium position, and the temperature of the air discharged from the chair will correspond to the setting regardless of the temperature of the incoming air. Secondly, the operating temperature of the control mechanism 102 will be much lower than the operating temperature of a control mechanism not subjected to the flow of incoming air since the heating element 106 is cooled by the incoming air.

In Fig. 1 it can be seen that there are high, low, and medium indications around the control knob 115 for the thermostat 103 and the occupant of the chair may set the control knob 115 at a desired position and the temperature of the discharged air will be controlled accordingly.

There is no control plate system for the heating element 106 but the air is allowed to flow freely through the element 106 at all times. With regard to the control discs for the heating elements 39 it will be noted that the thermostats for only the energized heating elements will be to any extent operative. It is true that the temperature within the chair will increase when any of the heating elements are energized but since the thermostat for any particular heating element is so close to the heating coil therein it is much more responsive to the temperature of the heating coil than are the thermostats or bimetal-

lic strips for the other heating elements. Therefore the bimetallic strips for the unenergized will keep the control plates in substantially closed position.

A footstool, generally indicated at 120, may be used in conjunction with the chair 10 and is provided with main supporting springs 121, a heating element 122, an airtight covering 123, and auxiliary springs 124 covered by suitable coverings 126 and 127. The footstool 120, therefore includes an airtight hollow body urged into distended position by the coil springs 121 and there is a heating element 122 suspended within and by the central coil spring 121. Footstool 120 is adapted to have its heating element energized through electrical supply line 130 which is connected to circuit 111, as shown in Fig. 1.

Although the concepts of the present invention are best embodied in a device in which the hollow body is collapsible, it is obvious that the arrangements for controlling the flow of air through the heating elements can be applied to a non-collapsible hollow body.

There may be a suitable heating lamp 140 secured to the back of the chair and curved to direct the rays therefrom onto the occupant of the chair.

There is a motor control switch 149 mounted on the back of the chair and this motor control switch enables the fan 101 to be deenergized, although the heating elements are energized, therefore allowing the heating of the chair without forced draft and enabling an optional operation of the chair.

Various changes may be made in the details of construction without departing from the spirit and scope of the invention as defined by the appended claims.

I claim:

1. An article of furniture comprising means providing a collapsible hollow, substantially airtight body urged into distended position by springs, means for creating an air pressure within the body, means movable with the springs for heating the air within the body, the body having vents therein to allow egress of air from the body, and means responsive to temperature change of the air in one direction for closing the vents and in the opposite direction for opening the vents.

2. An article of furniture comprising a collapsible, substantially airtight body urged into distended position by coil springs at least some of which have heating elements suspended there-within to be movable therewith, means for creating an air pressure within the body, there being vents in the body aligned with the heating elements, and means associated with the heating elements and responsive to temperature change for opening and closing the vents to control egress of the air from the body.

3. An article of furniture comprising a collapsible, substantially airtight body urged into distended position by coil springs at least some of which have heating elements suspended there-within to be movable therewith, means for creating an air pressure within the body, there being vents in the body aligned with the heating elements, means associated with the heating elements and responsive to temperature change for opening and closing the vents to control egress of the air from the body, and means for optionally rendering the last-named means operative or inoperative.

4. An article of furniture comprising a hollow

body, means for drawing air from without the body to within the body for creating an air pressure within the body, means allowing the escape of air from the body at a plurality of places and including an electrically heated element for each place for heating the air, means for selectively energizing the heated elements, and means arranged to have all the incoming air pass there-through and being responsive to changes in the temperature of the incoming air for varying the current through the energized heating elements.

5. An article of furniture comprising a hollow body, means for drawing air from without the body to within the body for creating an air pressure within the body, means allowing the escape of air from the body at a plurality of places and including an electrically heated element for each place for heating the air, means for selectively energizing the heated elements, and means arranged to have all the incoming air pass there-through and to preheat the incoming air and being responsive to the temperature of the preheated air for varying the current through the energized elements.

FRANK J. IRVING.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

	Number	Name	Date
5	1,669,683	Temple et al.	May 15, 1928
	1,817,277	Uhlig	Aug. 4, 1931
	1,936,960	Bowman	Nov. 28, 1933
10	1,957,401	Wiedenmann	May 1, 1934
	1,989,582	Becker	Jan. 29, 1935
	2,094,575	Arostegui	Oct. 5, 1937
	2,185,692	McCleary	Jan. 2, 1940
	2,259,712	Sweetland	Oct. 21, 1941
15	2,400,790	Tolen	May 21, 1946
	2,461,432	Mitchell	Feb. 8, 1949
	2,488,964	Conrad	Nov. 22, 1949
	2,493,067	Goldsmith	Jan. 3, 1950
	2,493,303	McCullough	Jan. 3, 1950

FOREIGN PATENTS

	Number	Country	Date
	65,555	Norway	Nov. 30, 1942
	312,825	Great Britain	June 6, 1929
25	429,326	France	July 13, 1911
	782,410	France	Mar. 18, 1935