Sept. 27, 1966 L. J. KUOPPAMAKI ET AL 3,275,800

ELECTRIC HEATER FOR USE IN A SAUNA BATH

Filed June 28, 1963 3 Sheets-Sheet 1

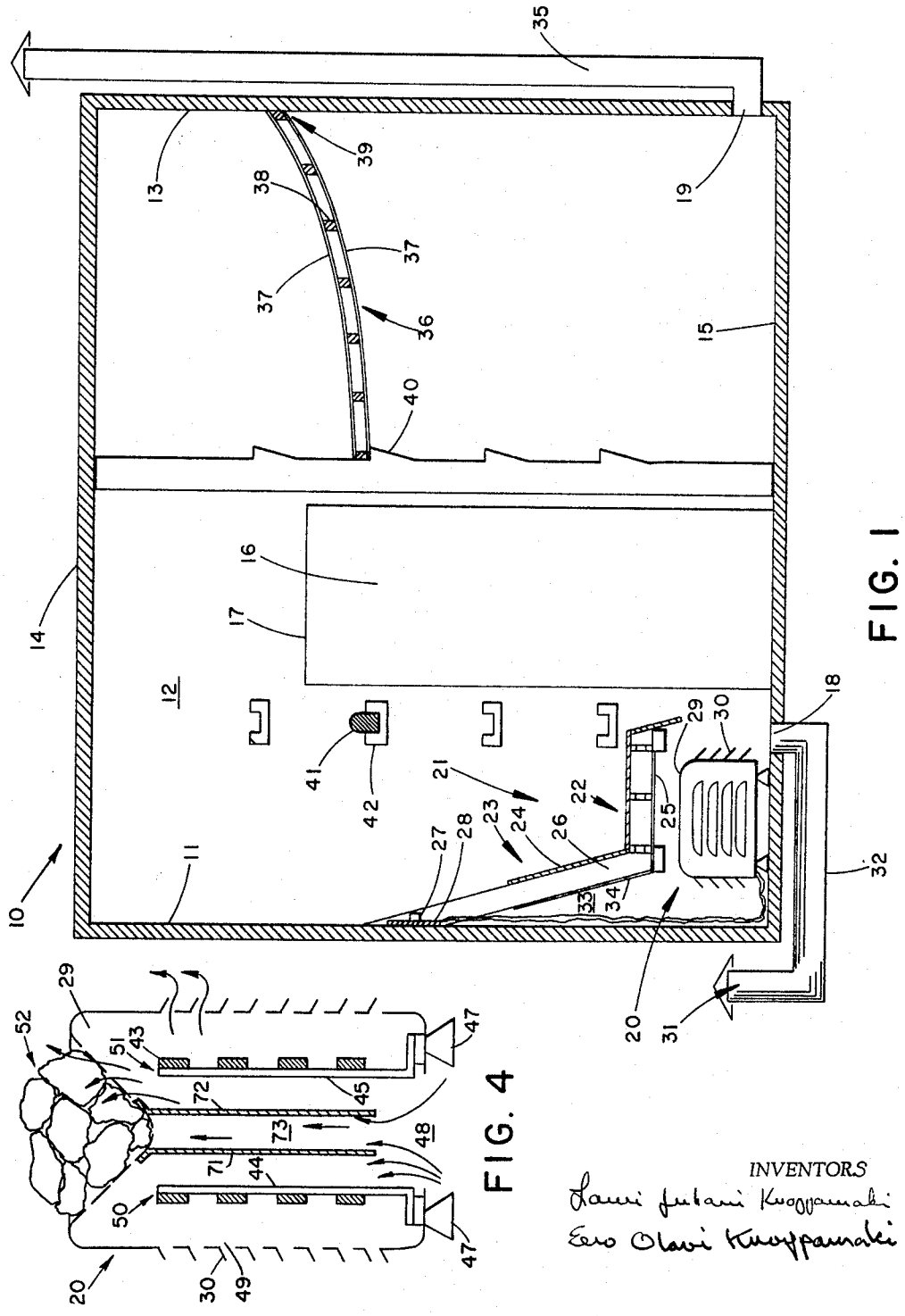

FIG. 1

FIG. 4

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ELECTRIC HEATER FOR USE IN A SAUNA BATH

Filed June 28, 1963 3 Sheets-Sheet 2

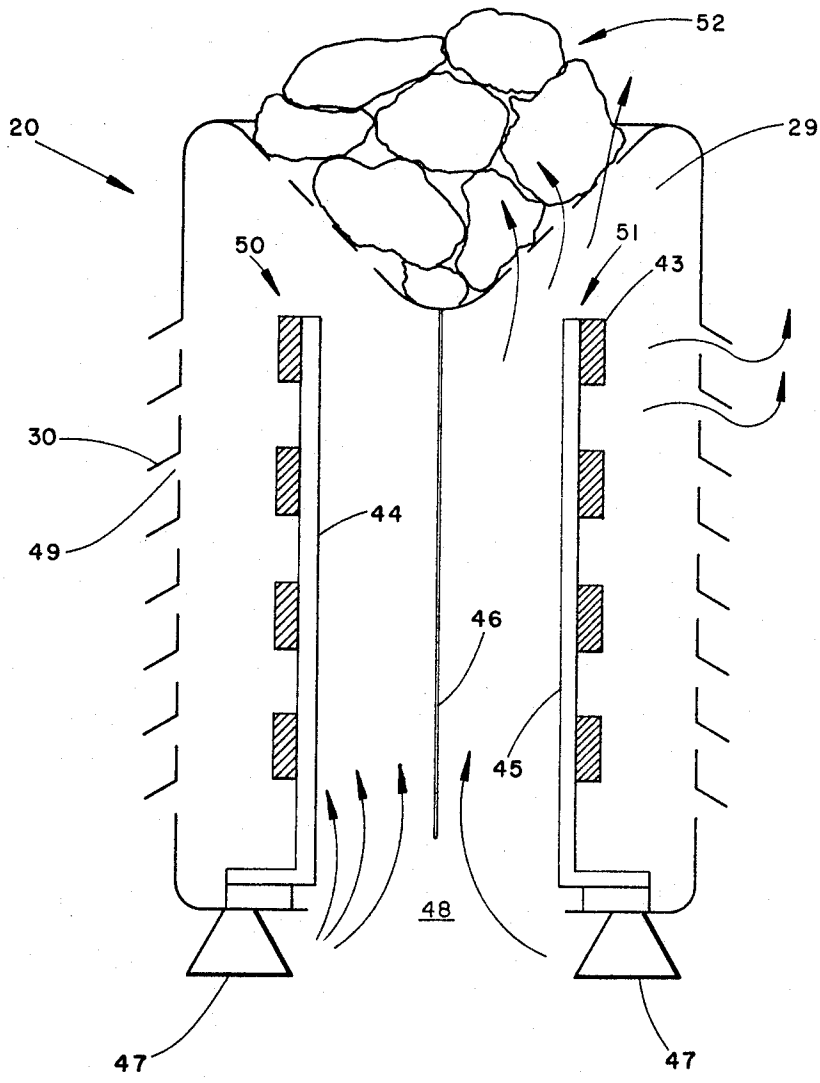

FIG. 2

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Filed June 28, 1963 3 Sheets-Sheet 3

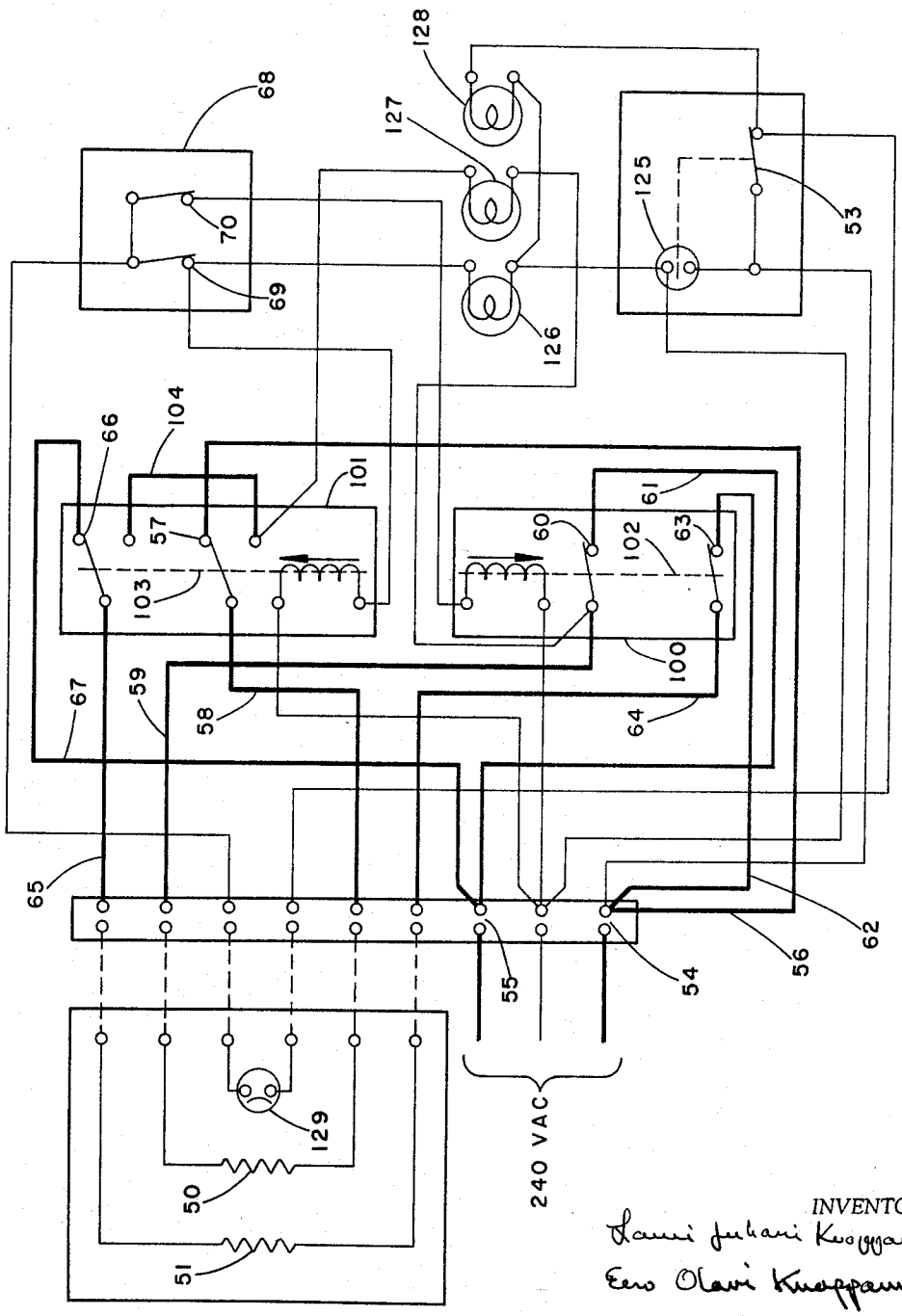

FIG. 3

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ELECTRIC HEATER FOR USE IN A SAUNA BATH

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1 Claim. (Cl. 219—367)

This invention relates to a sauna bath and, more particularly, to an electrically heated sauna bath which maintains comfortable conditions without sacrificing economy of operation.

Although the desirable characteristics of sauna baths are well known, heretofore no suitable units have been made which would provide the flexibility of permitting the realization of desired comfort levels when accommodating either a multitude of bathers or only a few bathers.

The present invention provides a sauna bath which, by its unique design and arrangement of components, provides an even supply of heat to the bather while placing a minimum demand on the electrical heating unit. The sauna bath is heated in a uniform manner to form a hot pocket that gradually extends from the top of the sauna room to the floor, thereby maximizing bathing comfort. The comfort level of a sauna bath is basically dependent upon the thermal conditions of the air and the odor content of the air during bathing.

It was discovered that to achieve the desired thermal comfort, direct radiant heating of the bather from the heat source must be kept to a minimum while the soft radiant heating from the walls, ceiling, and floor of the sauna chamber must be maximized. But, before the inside surfaces of the chamber can produce the soft radiation, it was found that it was necessary to heat these surfaces to a predetermined level by the convective flow of heated air. This heating of the surfaces by flowing air must, however, be accomplished without setting up such heavy air flow that this in itself becomes unbearable to the bather. Consequently, the sauna bath of the present invention is designed to achieve a rapid heating of the sauna bath surfaces to provide a hot pocket by means of soft radiation without setting up uncomfortable air turbulence in creating the conditions necessary for the soft radiation. In addition, it was found that in creating these desirable conditions only a relatively small amount of heat input is required resulting, as a consequence, in decreased operating costs.

Moreover, the sauna bath of the present invention is of such flexibility that it permits an increase in the air flow when a relatively large number of bathers use the sauna room and the odor content of the air increases accordingly without reaching an uncomfortable level of air turbulence.

It is, therefore, an object of the present invention to provide a sauna bath that achieves a high level of comfort by minimizing harsh, direct radiation from the heat source.

It is a further object to provide high sauna bath comfort level by maximizing the soft radiation from the sauna bath interior surfaces without creating excessive air turbulence.

It is still a further object to provide a sauna bath with sufficient flexibility to permit operation at high economy for use by a few bathers and permit operation at comfortable thermal and odor levels for use by a large number of bathers.

Other and further objects of the invention will be understood from a consideration of the description which follows as shown in the drawings wherein:

FIG. 1 is a sectional view of the sauna bath chamber of the present invention illustrating the general arrangement of the heater and other components.

FIG. 2 is a sectional view of the electrical heater unit.

FIG. 3 is a schematic diagram of the control means for regulating the sauna bath temperature.

FIG. 4 is a sectional view of a preferred embodiment of the electrical heating unit.

In FIG. 1 is shown a sauna chamber **10** having wall portions **11**, **12**, and **13** and top closure **14** and bottom closure **15**. A door **16** in wall **12** permits ready ingress and egress of the sauna bathers to the chamber and extends to a predetermined height defined by top sill **17**. Located in proximity to the bottom closure are two ports **18** and **19** permitting air to flow into and out of the chamber respectively. In close spaced relationship to the air entry port **18** is an electric heater **20** powered by any convenient electric power source not shown. Located directly over the heater **20** is a bench **21** having a seat portion **22** and a back portion **23** which portions are made up of a front or top section **24** consisting of a material such as wood having relatively good thermal insulating qualities and a back or bottom portion **25** having, preferably, relatively high thermal conductivity and reflectivity. Between portions **24** and **25**, a space **26** is defined to permit air to flow through the hollow seat **21** keeping it relatively cool in spite of the location of the heater **20** thereunder. In most instances it is preferred to have the bench extending the full width of wall **11**.

When the heater **20** is turned on by switch means **27** located on the thermostatic control box **28**, the resistive heating elements described in greater detail hereinbelow are supplied with current to produce heat. The enclosure **29** of the heater **20** has louvers **30** at an angle such that all direct radiation from the heat element passing out of the enclosure **29** impinges directly on the floor or bottom closure **15** to heat same making it a secondary emitter of soft radiation. The heat produced by the heater elements warms the air in proximity to it drawing air **31** into duct **32** out port **18** and through the heater **20**. Air heated thusly rises and is channeled into the flue **33** formed by the back portion **34** of seat **21** and wall **11**. The hot air so directed initially sets up a flow across the top of the sauna room heating the top closure or ceiling **14** and all walls before finally returning to the exit port **19**. Exit port **19** is provided with standpipe **35** that rises above the level of ceiling **14** to create a chimney effect necessary to promote air circulation in the chamber. As desired, appropriate damper means can be connected to port areas **18** and **19** to vary the quantity of air circulating through the chamber.

By this consistent even flow of heated air across the inner surface of the chamber, the chamber surfaces are soon heated to the point whereby they become emitters of soft radiation that produces the unique comfort experienced by the bathers in the sauna bath of the present invention. Once the sauna bath has reached operating temperatures in the range of 200° F., opening of door **16** to permit entry or exit of bathers does not drastically effect the comfort level since a hot pocket of air is retained above the level of top sill **17** and this hot pocket quickly extends to the floor level by the effect of soft radiation from all the heated chamber surfaces.

To permit maximum bathing comfort, it is desirable to provide the sauna with the adjustable recliner **36** made of two layers of steamed plywood **37** and spacing blocks **38**. The height of the recliner is adjusted by lifting end **39** where it bears on wall **13** in order to clear the cogs **40**. To allow support of bather's feet and legs, a suitable wood beam **41**, likewise extending from wall to wall, is adjusted to a suitable height by placing in support **42**.

In FIG. 2 the heater **20** is shown in cross section and is comprised of eight heating elements **43**, bus-bar supports

44 and 45, partition 46, enclosure 29 with louvers 30 and supports 47. The heater is designed to permit the free flow of air into the enclosure 29 via port 48 while at the same time avoiding direct radiation of sauna bathers by element emission or detrimental inter-heating of element banks. The direct radiation of the elements either strikes the inside surfaces of enclosure 29 or partition 46 whereupon air passes over these surfaces to gather heat energy to heat the sauna chamber or else projects downwardly through slots 49 to the sauna floor. The inter-radiation of the two element banks 50 and 51 would cause warping and premature failure of the individual element 43 if it were not for the partition 46. In same cases partition 46 is made from two parallel sheets of metal such as 71 and 72 as shown in FIG. 4 whereby a space 73 is defined between them to permit air to extract heat as it flows up the channel into the rock chamber 52.

To control the current flowing through heating elements 43, FIG. 3 shows the preferred wiring diagram of the present invention. By manually closing switch 53, relays 100 and 101 are energized to drive solenoid 102 down and solenoid 103 up whereby the 240 volt current source at power pole 54 flows into wire 56, through relay contact 57, into wire 58 and into element bank 50, out wire 59 to the relay contact 60 and finally to power pole 55 through wire 61. In a similar manner, parallel connected element bank 51 is supplied with power from power poles 54 and 55 through wires 62, contact 63, wires 64 and 65, contact 66 and wire 67.

However, once the temperature sensing means in control box 68 breaks the electrical connection at contact 69, solenoid 103 returns to normal making electrical connection between wires 58 and 65 through wire 104 whereupon banks 50 and 51 are placed in series to reduce the power requirement while at the same time extending potential heating element life.

Once the sauna has reached operating temperature, temperature sensing elements break contact 70 causing solenoid arm 102 to return to normal thereby breaking contacts 63 and 60 turning off all heating elements. As the high limit contact 70 makes and breaks during temperature changes the heating elements operate in series only whereby the life of the heater unit is substantially increased. Also incorporated into the circuit of FIG. 3 is a timer 125 which can be set to start the heater 20 according to a desired schedule. To prevent overheating of the heater 20, a high limit temperature sensing switch 129 is placed in series with the control circuit. Lamps 126, 127, and 128 give the bather an indication of whether the heater is on and, if so, to what degree.

Various other modifications of the sauna bath and its components will be apparent to those skilled in the art upon study of the accompanying disclosure. Such modifications are believed to be clearly within the spirit and scope of this invention.

We claim:

An electric heater for use in a sauna bath comprised of a plurality of resistive heating elements deposed in a horizontal attitude and arranged in first and second columns; an enclosure surrounding said heating elements and having four faces, of which a first face and a second face are substantially parallel to said first and second vertical columns of resistive heating elements, respectively, and contain a multiplicity of louvers forming air outlets whereby all radiant energy passing out of said enclosure is directed in a downwardly direction said enclosure having an opening at the bottom as an air inlet and means in the enclosure forming an open top chamber adapted to receive a plurality of rocks, the rock receiving chamber means having a perforated bottom wall and a vertical partition comprised of first and second panels which are substantially parallel to said first and second vertical faces of the enclosure respectively defining therebetween first and second cavities respectively wherein said first vertical column of resistive heating elements is located within said first cavity and said second vertical column of heating elements is located within said second cavity and said first and second panels defining therebetween a third cavity devoid of heating elements in fluid communication with said opening in the bottom of said enclosure and said perforations in the bottom wall of the rock receiving chamber so as to provide an air circulation channel to mitigate overheating of the first and second vertical columns of resistive heating elements.

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