March 9, 1965 M. ACHNER 3,173,123

ELECTRIC HEATING APPARATUS

Filed Sept. 26, 1962 2 Sheets-Sheet 1

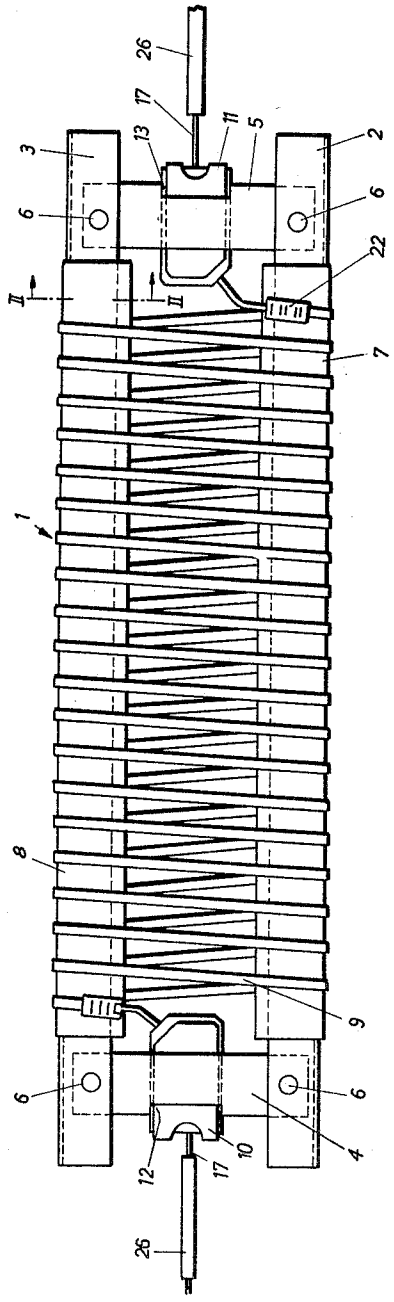


Fig. 1



Fig. 2

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ELECTRIC HEATING APPARATUS

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Fig.8

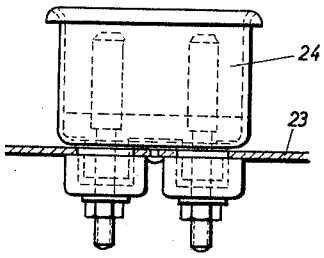


Fig.9

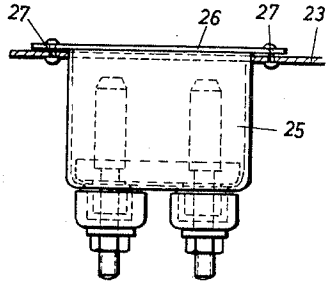


Fig.5

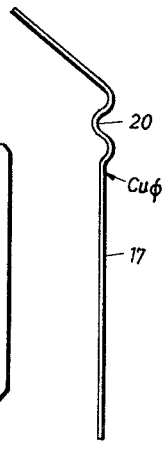


Fig.6

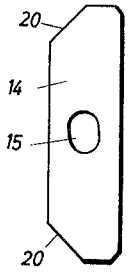


Fig.3

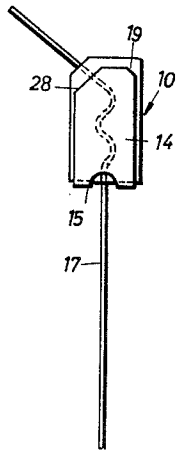


Fig.4

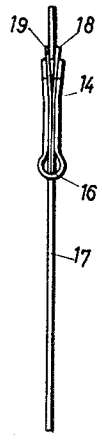
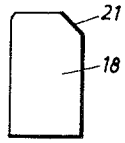


Fig.7



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ELECTRIC HEATING APPARATUS

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6 Claims. (Cl. 338—304)

The present invention relates to an improved configuration and insulation of electric heaters for sauna apparatuses.

The reliable insulation of the current paths is particularly important in sauna apparatuses because a considerable quantity of water vapor is present due to perspiration of the bathing person and because the devices are arranged frequently in humid bath rooms or cellar rooms, near water pipes, central heating pipes, etc.

It is known in sauna apparatuses to effect the electric insulation of the heaters and of the current connection by means of ceramic bodies arranged usually in the stool of the device.

These ceramic bodies are, however, very fragile. Broken ceramic insulating bodies in the region of the current admission to the electric heating body or in the electric heater itself represent a danger because the electric insulation is in danger if not even eliminated completely, all the more so as the insulating bodies crumble often in such a manner that they fall off completely from their holders.

It is the object of the invention to avoid these disadvantages.

This problem is solved with electric resistance heaters for sauna devices in which the resistance heating tape is would around a carrying body and the carrying body consists of a frame of metal having a longitudinal rail or rails provided with an insulating covering made particularly of mikanite.

The metal longitudinal rails of the frame provide sufficient mechanical strength. The insulation covering made particularly of mikanite does not break as easily as is the case with ceramic insulating bodies. Thus a sure insulation is guaranteed.

According to the invention, the current feed lines are shaped, in order to avoid the cited dangers, in a break-proof manner and are connected to the heater by means of a U-shaped bent clamping plate, between the legs of which the feed line is clamped, and with insulating plates consisting preferably of mikanite being inserted therebetween.

Thus a perfect break-proof insulation is likewise obtained which has, furthermore, the advantage of simple production.

The fastening of the current feed line is obtained according to a feature of the invention in a simple and safe manner by the fact that the transverse rails of the frame have a U-shaped bent sheet metal profile and that within the back of this U-profile a perforation is arranged into which the current feed line is introduced and is clamped by the legs of the transverse rail.

A further feature of the invention is that the current feed lines and conductors are connected to the extremities of the heating tape by means of notched clamping tubes, particularly of brass. This applies also for all the other wires of the electric wiring. Thus a sure connection of the wires is obtained which withstands also a continuous temperature change of about 20° to 400° C., in the prior art devices screw clamps were used for this purpose but these become gradually loosened, as is proved by the experience. The loose wires can, however, contact the metal parts of the apparatus so that by the use of the known screw clamps the danger of accidents arises.

A further source of danger is eliminated by the invention in that the electric plug for the apparatus, which was arranged in the known sauna apparatuses on the outside of the steel sheet metal jacket surrounding the heating chamber, is according to this invention sunk into this outer jacket. Thereby a mechanical damage to the plug by a blow or fall of the device is impossible. An essential advantage of the apparatus according to the invention is that the plug can no longer be moistened, as was the case with the devices known up to now, by falling drops of sweat. In the known devices ceramic beads are used for the insulation of the current feed lines respectively with other conductors. According to this invention elastic glass tubes are used which give a shorter assembling time and a considerable saving in weight.

One embodiment of the invention from which further advantageous features can be seen is explained hereinafter with reference to the accompanying drawings.

FIG. 1 shows a heating element embodying the invention,

FIG. 2 shows a section through the longitudinal rail of the frame of the heating element taken along the line II—II in FIG. 1,

FIGS. 3 and 4 show a front and a side elevation of the terminals of the heating element,

FIGS. 5 to 7 are plan views of the components of the terminals,

FIG. 8 shows a known arrangement of the electric plug for the apparatus mounted on the steel sheet metal jacket, and

FIG. 9 shows the improved mounting for the electric plug provided by this invention.

The heating element represented in FIG. 1 is designated by the numeral 1. It has a steel sheet metal frame consisting of longitudinal rails 2 and 3 of U-shaped transverse section and also of bent transverse rails 4, 5, the longitudinal and transverse rails are connected with each other by rivets 6. The bases of the U-shaped rails 2, 3, 4 and 5 face toward the outside of the frame. The longitudinal rails 2 and 3 are provided on the outside, as can be seen from FIG. 2 with applied parts 7 and 8, respectively which are likewise of U-shaped section and made of soft mikanite. The legs of the parts 7 and 8 extend over and beyond the ends of the legs of the longitudinal rails 2 and 3.

A resistance heating tape 9 is wound around the frame with a spiral configuration. It rests on the rounded bases of the elements 7 and 8 so that it is insulated from the frame and so that there cannot arise any kinks within the heating tape.

Because of the free and open construction of the frame and the heating tapes crossing themselves FIG. 1 up to 75% of the tape surface becomes effective for radiating heat. The U-shaped transverse rails 4 and 5 are each provided with a perforation 12 and 13 in the base thereof, through which is passed terminal or connection device 10 and 11. By pressing together the legs of the rails 4 and 5 the current feed lines are connected to the transverse rails in such a manner that they cannot be displaced.

The terminal arrangements 10 and 11 are identical so only arrangement 10 is described in detail herein. The terminal arrangement 10 is shown in detail in FIGS. 3 and 4. It consists of a U-shaped bent clamping plate 14 of steel sheet metal which is shown in FIG. 6 in its unbent state. It has an opening 15 which lies in the rounded web 16. The current feed line or conductor 17 is made of copper or brass. It is passed through the opening 15 of the clamping plate. Two insulating plates 18 and 19 of mikanite, one of which is shown in FIG. 4 are inserted between the legs of the clamping plate 14, and the conductor and said plates are clamped in place by said legs as is shown particularly in FIG. 4. In order to

obtain a good fastening of the wire, said wire is provided, in the region received between the legs of the clamping plate, with undulations 20 which provide a resistance against pulling out and rotating of the wire with respect to the clamping plate.

The clamping plate has chamfered corners 28 and the insulating plates have chamfered corners 21. Over these corners the current feed line 17 is led away from the terminal arrangement 10. The extremities of the conductors 17 are connected with the extremities of the resistance tape by means of notched clamping tubes 22. The conductors 17 are enclosed for insulation by flexible glass tubes 26, as is shown in FIG. 1.

This novel terminal arrangement is very simple to manufacture and to assemble. It provides a first-class insulation and prevents removal of the current feed lines and is, above all, absolutely break-proof, so that accidents caused by insulation damage are excluded with absolute security. In the FIGS. 8 and 9 a part of the steel sheet metal jacket 23 surrounding the heating body can be recognized.

The electric plug 24 for the apparatus is arranged in the known apparatuses on the exterior of the jacket as is shown in FIG. 8. FIG. 9 shows the new more advantageous arrangement of the plug 25 on the jacket sheet metal. The plug 25 is sunk in the jacket. A front sheet metal flange 26 arranged on the plug is connected by means of the rivet 27 with the jacket. The plug is thereby protected against mechanical thrusts and no sweat drops can fall on it.

I claim:

1. An electric heating element, especially for sauna equipment, comprising:

a metal frame formed of two proposed longitudinal rails each having an outer arched bight portion and a pair of legs extending inwardly toward the other of said longitudinal rails, said frame further including a pair of transverse rails of generally U-shaped cross section affixed to and extending between said longitudinal rails to keep said longitudinal rails spaced from each other, each of said transverse rails having a bight portion and a pair of legs;

an insulation layer mounted on and overlying the entire outer surface of each of said longitudinal rails and protruding inwardly past the inner edges of said longitudinal rail toward the other longitudinal rail;

a heating tape wound around said longitudinal rails and contacting only said insulation layers;

a pair of terminal means clamped respectively between said legs of said transverse rails, each terminal means comprising metal clamp plate means and a pair of opposed insulation strata disposed within said metal clamp plate means;

a conductor extending between the insulation strata of each terminal means and being held in place thereby out of contact with said clamp plate means and said transverse rails; and

means connecting said conductors to the ends of said heating tape.

2. The electric heating element defined in claim 1 wherein said metal clamp plate means of each of said terminal means comprises a piece of sheet metal bent around a rounded web, said sheet metal having an opening through said web through which said conductor passes.

3. The electric heating element defined in claim 1, including an opening through said bight portion of each of said transverse rails into which said terminal means is inserted.

4. The electric heating element defined in claim 1, wherein the portion of said conductor located between said insulation strata is generally sinuous in shape.

5. The electric heating element defined in claim 1, wherein each of said metal clamp plate means consists of a generally rectangular piece of sheet metal folded about a bulbous web portion adjacent the middle thereof to form a pair of substantially parallel legs disposed in closely spaced relation and connected by said bulbous web portion, and including an opening through said bulbous web portion intermediate the ends thereof, said legs each having at least corresponding corners thereof chamfered;

said insulation strata being identical, generally rectangular plates lying in closely spaced relation between and in firm contact with the inner faces of said legs of said clamp plate means, said insulation plates having chamfered corners corresponding to those of the legs of said clamp plate means;

said conductor entering said terminal means through said opening in said web portion, lying between and in close contact with said insulation plates for being firmly held thereby and extending outwardly therefrom at said chamfered corners, the portion of said conductor between said plates being of sinuous shape to prevent rotation thereof and to increase the efficiency of the frictional holding of said insulation plates thereon.

6. The electrical heating element defined in claim 1 wherein said insulation strata extend outwardly beyond the edges of said metal clamp means at said points of passage.

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RICHARD M. WOOD, *Primary Examiner.*

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,173,123 March 9, 1965

Martin Achner

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the heading to the printed specification, between lines 5 and 6, insert:

Claims priority, application Germany, Sept. 29, 1961, A 38447

column 1, line 33, for "would" read -- wound --; column 2, line 51, after "themselves" insert -- as shown in --; column 3, line 34, for "proposed" read -- opposed --.

Signed and sealed this 18th day of May 1965.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents

UNITED STATES PATENT OFFICE

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