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STEAM BATH AND GENERATOR THEREFOR

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2 Sheets-Sheet 2

Fig. 4.

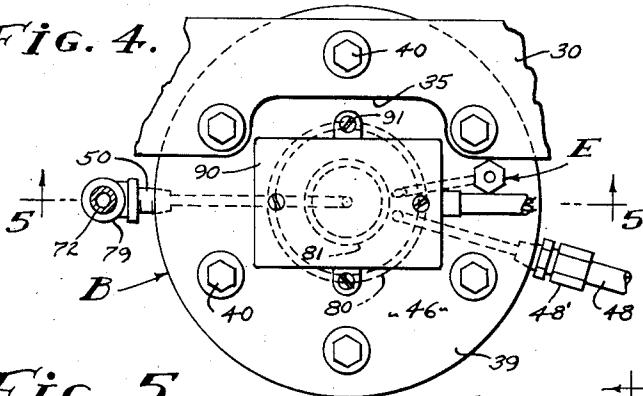


Fig. 6.

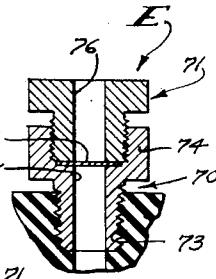


Fig. 5.

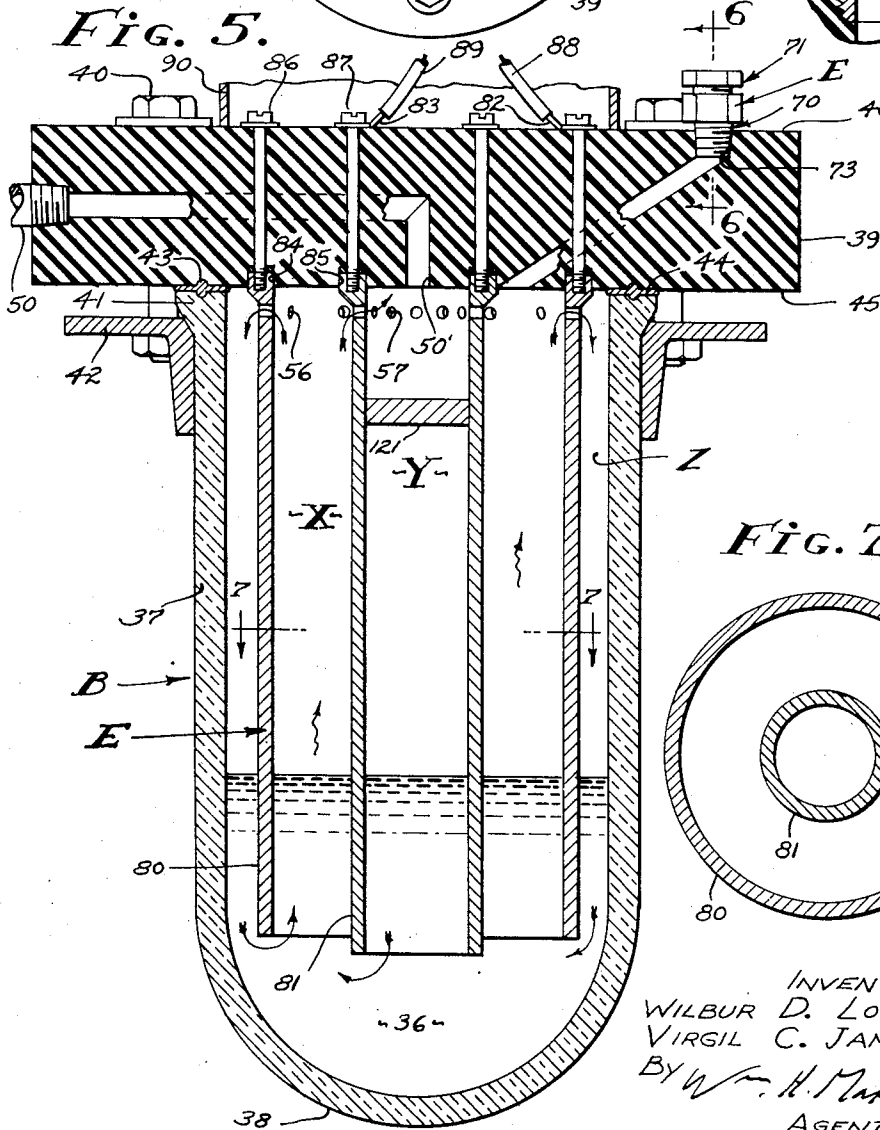
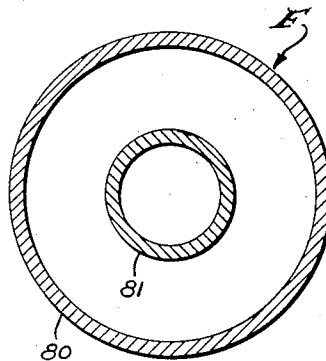


Fig. 7.



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STEAM BATH AND GENERATOR THEREFOR

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8 Claims. (Cl. 219—40)

This invention relates to steam baths and in particular it relates to an apparatus for generating steam in the proper quantity and at the proper pressure for use in a bath, for example in a shower bath or in a steam cabinet, or in any other like enclosure. It is a general object of this invention to provide a simple, foolproof and practical apparatus of the character referred to that is inexpensive to manufacture and which is easily installed and put into working condition.

This application is filed as a continuation in part of our application entitled "Steam Bath Apparatus," filed June 22, 1956, Serial Number 593,095, now abandoned.

Steam baths have long been used for their hygienic effectiveness and relaxation, and persons who enjoy the use of said baths realize considerable benefit therefrom. Heretofore, however, steam baths have not been commercially practical or available, and in fact are limited in number and are regarded as a specialty. Furthermore the usual equipment and apparatus involved in operating a steam bath is cumbersome and space-consuming, in that rather large water heaters or boilers are employed in order to continuously generate the large quantities of steam required to supply steam to a room or like chamber, or to a plurality of individual cabinets, as the case may be. The presently available structures are satisfactory only for large installations or in commercial establishments and are entirely unsuited and are much too costly for small individual installations as in private homes and the like.

It is an object of this invention to provide a steam generator that is particularly useful as a single unit adapted to economically supply steam to a single bath, for example a small bath or chamber that accommodates a single person. The instant generator provides an adequate supply of steam for a single bath and can be controlled if desired to continuously deliver steam to supply additional quantities thereof when desired.

It is also an object of this invention to provide a very compact steam bath apparatus that is easily and conveniently installed in a building structure or the like, and which is versatile so that said installation may be varied as circumstances require.

It is another object of this invention to provide a steam bath apparatus that operates to generate a given quantity of steam adequate to properly fill a normal single bath. The apparatus that we provide is filled with water through manual control of a valve and then automatically operates to deliver a certain quantity of steam.

It is also another object of this invention to provide a steam bath apparatus that automatically goes into instant operation to generate steam when the manual control is operated. With the structure that we provide, steam is immediately generated to fill the bath and is continuously generated until a predetermined amount thereof has been delivered.

It is still another object of this invention to provide a steam bath apparatus that operates under pressure and includes safety means in order to prevent explosion of the apparatus.

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It is still another object of this invention to provide an electrically operated device of the character under consideration wherein improved and efficient heating of water is accomplished. With the structure that we provide there are substantially large electrodes for making contact with the water and said electrodes are formed and related to each other in order to cause pre-heating of the water.

It is still another object of this invention to provide a steam bath apparatus of the character above referred to that is electrically operated without the use of switches and other like expensive electrical devices. A high degree of safety is obtained with the structure that we provide since there is no manual contact or control of the electrical elements involved.

The various objects and features of this invention will be fully understood from the following detailed description of a typical preferred form and application of this invention, throughout which description reference is made to the accompanying drawings, in which:

Fig. 1 is a vertical sectional view taken through a typical installation of the generator of the present invention. Fig. 2 is an enlarged detailed sectional view of a portion of the generator taken as indicated by line 2—2 on Fig. 1. Fig. 3 is an enlarged view taken as indicated by line 3—3 of Fig. 1, and showing portions of the apparatus. Fig. 4 is a plan view taken substantially as indicated by line 4—4 on Fig. 3. Fig. 5 is a sectional view taken substantially as indicated by line 5—5 on Fig. 4. Fig. 6 is an enlarged detailed sectional view of a portion of the structure taken as indicated by line 6—6 on Fig. 5, and Fig. 7 is a sectional view of a portion of the structure taken as indicated by line 7—7 on Fig. 5.

The steam generator of the present invention is particularly adapted to be installed in dwellings or in private homes and is such that it can be advantageously installed within the confines of a wall. A shower bath offers a very good and adequate enclosure or chamber for a steam bath, and therefore we have illustrated our invention applied in such a bath. It is to be understood, however, that the enclosure or chamber may vary widely without altering or changing the structure that we provide. In fact, our structure is versatile and can therefore be installed in connection with a wide variety of enclosures or chambers.

The particular shower bath S illustrated in the drawings involves vertically disposed walls 10, a ceiling 11, a floor 12, and a closure or door 13. The walls 10 are shown as being of frame construction having vertical studs 14 secured to upper and lower plates 15 and 16. The walls 10 may be plastered at 17 and may be tiled at 18 as circumstances require, leaving a cavity between the two sides or surfacings of the wall. The ceiling 11 may be plastered at 19 and the floor 12 tiled at 20. Access to the shower bath S is gained through an opening 21 in one of the walls 10, the opening being closed by the door 13. When a shower bath S is employed as a steam bath in accordance with the present invention it is preferred that the door 13 substantially close the opening 21 in order to retain the steam within the enclosure.

A usual shower bath S is equipped with hot and cold running water supplied by pipes 25 and 26, respectively, and control valves that direct the desired quantity of said water to a shower head 27. In accordance with the invention we provide a connection 28 in the pipe 25 in order to draw hot water to supply the apparatus herein-after described. As shown, the connection 28 is under control of a valve 29 conveniently located along with the other valves that are related to the shower head 27.

The steam generator that we provide is a compact unit and preferably occupies the space within the wall 10 between the two surfacings thereof, and involves, generally, a support A, a vessel B, a water inlet C, a steam

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outlet D, a pressure release E, and steam generating means F. The support A is provided to carry the other elements involved, while the vessel B is provided to receive water delivered by the inlet C. Steam generated by the means F is handled by the outlet D and is under protection of the pressure release E, which prevents explosion, for example, should the outlet D become clogged or fouled. In addition to the foregoing elements, the apparatus involves a power supply G that supplies energy to the means F for producing the steam.

The support A may, of course, be varied widely and is illustrated as a simple header type element that extends horizontally between spaced studs 14. The support A is adjustable and involves a beam 30 and a bracket 31. The beam 30 is a flat plate-like part with a leg 32 at one end thereof, the leg being secured to a stud 14 by fasteners 33. The other end of the support A is provided with a slotted opening (not shown) and is movably secured to the bracket 31 so that the bracket can be secured to a stud 14 by fastener 34. Suitable fasteners 34' are carried by the bracket and engaged in said slotted openings to adjustably secure the bracket to the beam-like support. The beam 30 is suitably recessed at 35 in order to accommodate the vessel B hereinafter described.

The vessel B provides a closed chamber 36 adapted to house the steam generating means F and to receive a supply of water and adapted to entrap steam that is generated by the said means F. The configuration of the vessel B may vary and is preferably a vertically disposed vessel cylindrical in shape and round in cross section. The vessel B has a cylindrical side wall 37, a bottom 38, and a top 39. The side wall 37 and bottom 38 are integrally formed, the top 39 being a separate part closing the vessel B to establish a closed chamber 36. As shown, the bottom 38 is spherically shaped and merges with the side wall 37 in order to withstand pressures from within the chamber 36. In practice, the side wall 37 and bottom 38 are formed of a tempered glass, for example, of "Pyrex" or the like, which is a heat-treated annealed glass having considerable structural strength. It will be readily seen that the dielectric properties of the glass afford the highest degree of safety to protect the structure against electrical harm to persons handling the same. Since only relatively low pressures are involved in the operation of the instant steam generator a glass vessel B is adequate under all normal operating conditions.

The top 39, in accordance with the invention, is made of a plate-like piece of dielectric material in order to handle and to receive the other elements of the structure, especially the electrical elements thereof. The top 39 is secured in working position by circumferentially spaced fasteners 40 engaged through openings in the periphery of the top that projects laterally of the side 37. The top 39 may be formed of a phenolic or of molded "Bakelite," or like material. There is a rim 41 at the upper end portion of the vessel B and which projects radially from the periphery of the side wall 37. The rim 41 presents an inclined face that is downwardly disposed, and a clamp ring 42 is provided at the underside of the rim 41 to engage the face thereof, the fasteners 40 being engaged through the ring 42 and peripheral portion of the top 39. A suitable gasket or seal 43 is placed between the top 39 and upper face 44 of the vessel B so that the chamber 36 is leakproof. In the case illustrated, there are continuous annular grooves in both the face 44 and underside 45 of the top 39, there being annular rib-like parts projecting from the seal 43 and fitted in the grooves for sealing engagement.

The top 39 is secured to the support A beneath the recess at 35 so that the upper side 46 of the top 39 is exposed and accessible, and so that the vessel B depends from the support. The recess at 35 may be suitably shaped

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so that some of the fasteners 40 may be employed to secure the vessel B in operating position.

The water inlet C is provided to supply or fill the vessel B with water and involves, generally, a fluid line 48 that extends between the vessel B and the connection 28 above referred to. The line 48 is under control of the valve 29 at the connection 28 and is preferably a length of tubing that can be easily bent and directed from the connection 28 to the vessel B, as circumstances require. The line 48 is secured to the vessel B by a suitable connector 48' threaded into the top 39, so that water is directed through the top 39 and into the chamber 36, as shown. A connector 48' secures the other end of the line 48 to the valve 29, so that the water inlet C is under control of said valve.

The steam outlet D is provided to handle the exhaust of steam from the chamber 36 in the vessel B, and involves, generally, a pressure connection 50, a nozzle 52, and a line 53. The pressure connection 50 is a tubular element that communicates with the chamber 36 and it receives steam that is generated within the chamber. The pressure connection 50 may be secured to the vessel B in various ways and in accordance with the invention it is located at the top 39 of the vessel. As shown, the connection 50 is threadedly engaged in an opening in the top 39 at one side thereof. The connection 50 is in communication with the chamber 36 through a passage 50' formed in the top 39 and entering the chamber 36 at the center thereof.

The nozzle 52, as illustrated in Fig. 2 of the drawings, is provided to exhaust steam from the vessel B into the shower bath S, and is a tubular fitting that passes through the surfacing of the wall 10. Since the interior surfacing of shower baths is usually of tile, we have shown the nozzle 52 extending or passing through a tile surfacing, in which case the nozzle 52 involves a head 62 and a stem 63. The head 62 is in the nature of and in the form of an enlargement having a lateral port 64 for exhausting and directing steam downwardly into the shower bath S. The stem 63 is an extended part round in cross section and with a bore 65 and a threaded exterior. The head 62 has a shoulder 67 engaged with the exterior of the wall 10, while the stem 63 extends through the surfacing of the wall to receive a clamping means 68 at the inside of the wall 10. The clamping means may involve a simple washer and a nut 69 is threaded onto the stem and is used to draw the shoulder 67 into tight clamped engagement with the wall 10.

The line 53 extends between the pressure connection 50 and the nozzle 52 and is preferably a length of tubing that can be easily bent and directed from the nozzle to said connection. The line 53 is secured to the connection 50 by a suitable connector 53' and is secured to the nozzle 52 by a suitable connector 53''. The nozzle 52 is preferably located at or near the bottom of the shower bath S and the port 64 in the head thereof is directed downwardly to discharge steam toward the bottom of the bath.

The pressure release E is provided to give way under excessive pressure within the chamber 36 to exhaust steam therefrom. There is always the possibility of failure in a pressure handling device of the type under consideration and, therefore, we provide the release E which involves a release connection 70 and a safety valve 71. The connection 70 is a tubular element that communicates with the chamber 36 and it receives steam that is generated within the chamber. The connection 70 may be secured to the vessel B, the same as the connection 50 above described, and is preferably threaded into the top 39 of the vessel B. As shown, the connection 70 is threadedly engaged in an opening 73 in the top 39 at one side thereof. The connection 70 is preferably a straight fitting and carries the safety valve 71. The safety valve 71 is adapted to release steam from the chamber 36 when excess pressure develops therein, and has a body

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74, an inlet passage 75, an outlet passage 76, and a frangible disc 77. The passages 75 and 76 are formed in separate portions of the body 74 that are held in alignment with each other by means of a threaded joint. The said portions of the body 74 are drawn together by the threaded joint and the disc 77 is clamped and held in working position by the opposed parts of the two body elements.

In accordance with the invention, means is provided to handle and dispose of condensation so that moisture is delivered to a point suitable for the exhaust thereof. In the case illustrated, a line 72 is connected into or related to the line 53 above described, in order to cause separation of condensation from the dry steam delivered by the line 53. As shown, a T-fitting 79 is provided in the line 53 at the pressure connection 50. The line 72 is an exhaust line connected to the T-fitting 79 by a suitable connector and extends to the point suitable for the exhaust of moisture, preferably to the drain trap 51. In practice, the T-fitting is vertically disposed, as shown, so that the line 53 projects vertically upward therefrom and so that the line 72 projects vertically downward therefrom. The lines 53 and 72 are in alignment with each other and the vertically disposed portions thereof are of substantial extent, to the end that condensation drops into the lower line 72 and only dry steam enters the upper line 53.

The steam generating means F that we provide acts to produce steam from the water that is delivered into the chamber 36. The means F is an electric means that heats and boils the water into steam, and involves, generally, electrodes 80 and 81, and electrical connections 82 and 83, respectively. The electrodes 80 and 81 are spaced from each other and depend into the water contained in the vessel B. The vessel is vertically disposed, and likewise the electrodes 80 and 81 are vertically disposed and are uniformly spaced from each other, as indicated in Fig. 5 of the drawings. In accordance with the invention, the electrodes are cylindrically shaped parts of conducting material, preferably of copper or the like, that depend from the top 39 to hang within close proximity of the bottom of the vessel B. For example, the electrodes may be made of carbon formed to the desired shape. The electrodes 80 and 81 are substantially co-extensive with each other and closely approach the bottom 38 of the vessel B.

As best illustrated in Fig. 5 of the drawings, the cylindrical electrodes 80 and 81 are concentric tubular elements that join with and depend downwardly from the face 45 of the top 39. In accordance with the invention we provide means for locating the electrodes 80 and 81 to the end that they are accurately positioned relative to each other. As shown, we form concentric annular channels 84 and 85 in the face 45 of the top 39, and the upper terminal ends of the electrodes 80 and 81 engage in said channels, respectively, to be positioned thereby.

A feature of construction that we provide, is the provision of ports 56 and 57 in the electrodes 80 and 81, respectively. The ports 56 and 57 are provided in order to direct the flow of fluid throughout the chamber 36 and to the end that efficient circulation thereof is established. One or more ports 56 and 57 are provided in each of the electrodes 80 and 81, respectively, and they are located at or near the top of the electrodes. That is, the ports extend through the wall of the electrodes adjacent the face 45 of the top 39. With the ports that we provide, fluid or steam rising in the annulus X between the two electrodes passes either into the passage Y within the tubular electrode 81 or into the annulus Z between the outer electrode 80 and wall 37 of the vessel B. Thus, usable steam enters the passage 50' to be delivered to the line 53 while excess steam is retained in the chamber 36 and returned to the lower end thereof at the exterior of the electrode 80. Excess steam may also return to the lower end of the chamber via the passage Y in the electrode 81. However, in practice we in-

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stall a partition 121 that closes the passage Y, preferably just below the ports 57 (see Fig. 5). It will be apparent that the circulation of excess steam results in pre-heating of water in the chamber 36 and that the partition 121 prevents percolating water from entering the passage 50'.

In order to secure the electrodes in position, to depend from the top 39 and into the chamber 36, we prefer to enlarge the upper periphery of the electrodes which are carried in the locating channels 84 and 85. By enlarging said upper ends thereof, the electrodes 80 and 81 can be engaged by screw fasteners, or the like, and held in proper working position. As shown, the electrodes are secured to the top 39 of insulating material by means of terminal posts 86 and 87 that fasten the electrodes to the under side of the top 39, and which extend through the top to project from the upper side thereof. Glands or seals are provided to surround each of the terminal posts, for example O-ring seals. Electrical leads 88 and 89 provide the electrical connections 82 and 83 respectively, and connect with the electrodes 80 and 81, and extend to the power supply G.

In carrying out the invention we provide insulating means in the nature of a cover or cap 90 that encloses the electrical connections. The cap 90 accommodates the said electrical connections and is held in place by fasteners 91 threaded into the upper face 46 of the top 39.

The power supply G directs electric current to the leads 88 and 89 and involves a junction box 95 supplied from a power conduit 96. The junction box houses a fuse 98 for the protection of circuitry and a switch 99 for on and off control of the apparatus. The power from the conduit 96 is suitably handled by wiring within the junction box 95 and is under control of the fuse 98 and switch 99 to feed the electrodes 80 and 81 through the leads 88 and 89. Suitable ground straps may be provided as required to insure proper grounding of the electric circuit and so that the apparatus is safe during operation thereof. As shown in Figs. 1 and 5 of the drawings, an access opening 105 is provided in one side of the wall 10 and is covered by a suitable panel 106 so that the elements of the apparatus are open to inspection and easily worked upon.

In Fig. 3 of the drawings we have illustrated means R adapted to supplement the volume of water to be acted upon the steam generator hereinabove described. The means R involves, generally, a reservoir 110 connected in the steam delivery line 53, and a fluid return line 111 joining the fluid supply line 48 with the reservoir 110. The reservoir 110 is a closed vessel, similar in shape and construction to the vessel B of the generator, and has a side wall 112, a bottom 113, and a top 114. The line 53 has an inlet section 115 that extends from the connection 53' to a connection 115' that enters the reservoir 110 through the top 114, and the line 53 has an outlet section 116 that extends from a connection 116' that enters the reservoir 110 through the top 114. The line connection 116 extends to the nozzle 52.

The fluid return line 111 is in communication with the reservoir 110 through the bottom 113 thereof by means of a connection 111' and extends to the vessel B. In practice, the line 111 joins to inlet line 48 through a suitable connection 111'', for example a T-fitting, as shown. It is to be observed that all of the fluid connections are open, there being no valves, checks, or other such devices therein. However, a check valve 120 may be employed between the generator and the valve 29 in order to prevent reversal of flow into the water supply pipe 25.

From the foregoing it will be apparent that the apparatus that we provide is simple to install and easy to operate, and is free of complex devices. In order to operate the apparatus it is merely necessary to open the valve 29 so that water flows from the pipe 25 through the line 48 and into the chamber 36. When the means R is employed the reservoir 110 is also filled when the valve 29 is opened, and it will be seen that use of the reservoir

materially increases the capacity of the apparatus. If the chamber 36, and the reservoir 110 when employed, is filled with water it will be discharged through the line 53 and enter the shower bath S through the nozzle 52. Thus it is easily detected when the chamber 36, and reservoir 110, is full, and further, with some experience the valve may be opened for timed intervals in order to partially fill the chamber 36, etc. When the desired amount of water occupies the chamber 36, the valve 29 is closed. During operation, water will be discharged from the reservoir 110 before being displaced from the vessel B, by employing the fluid connections as shown.

In practice, the apparatus may safely operate at pressures up to about sixty pounds per square inch, and therefore the safety disc 77 is made to fail at a substantially lower pressure, say for example, five pounds, thus providing a safety factor.

When fluid enters the chamber 36, the electrodes 80 and 81 are immersed in water and the electric current supplied by the leads 88 and 89 is immediately put into use. The switch 99 may be left on and the circuit is protected by the fuse 98. The electric current in effect flows between the electrodes 80 and 81, and this causes extreme heat to be developed, resulting in the water rapidly turning into steam. When the water level drops below the lower ends of the electrodes 80 and 81, the above mentioned action ceases and the apparatus is automatically put out of operation. It is, therefore, unnecessary to operate electrical controls with the apparatus that we provide, and the valve 29 is the only manually operated element required to be controlled. Further, the valve 29 has no connection with the electrical parts of the apparatus, thus eliminating personal contact with electrical elements and resulting in an apparatus that is safely operated by electric current.

Having described only a typical preferred form and application of our invention, we do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to ourselves any variations or modifications that may appear to those skilled in the art and fall within the scope of the following claims.

Having described our invention we claim:

1. A steam generator of the character described including, a vertically disposed vessel having a closure at the top thereof and forming a closed chamber, a pair of cylindrically shaped electrodes one within the other and depending freely from the closure and entering the chamber and connected with an electrical power supply, there being a port through the outer electrode at the upper end portion thereof, means supplying water to said chamber, and means exhausting steam from between the inner and outer electrode and at the closure.

2. A steam generator of the character described including, a vertically disposed vessel having a closure at the top thereof and forming a closed chamber, a pair of cylindrical electrodes depending freely from the closure and entering the chamber and concentric with each other and connected with an electrical power supply, there being a port through the outer electrode at the upper end portion thereof and a partition closing the inner electrode below the level of said port, and means supplying water to said chamber, and means exhausting steam from within the inner electrode.

3. A steam generator of the character described including, a vertically disposed vessel having a closure at the top thereof and forming a closed chamber, a pair of cylindrically shaped electrodes depending freely from the closure and entering the chamber concentric with each other, said electrodes being connected with an electric power supply, there being ports through the electrodes at the upper end portions thereof and a partition closing the inner electrode below said ports, means supplying water

to said chamber, and means exhausting steam from within the inner electrode.

4. A steam generator of the character described including, a vertically disposed vessel having a closure of insulating material at the top thereof and forming a closed chamber, a pair of cylindrically shaped electrodes depending freely from the closure and entering the chamber concentric with each other, said electrodes being electrically insulated by said closure and connected with an electrical power supply, there being ports through the electrodes at the upper end portions thereof and a partition closing the inner electrode below the ports through said inner electrode, means supplying water to said chamber, and means exhausting steam from within the inner electrode.

5. A steam bath generator of the character described including, a vertically disposed vessel having a closure at the top thereof and forming an elongate vertically disposed chamber, means for generating steam within the chamber and comprising a pair of concentric cylindrically shaped electrodes depending from the closure and extending longitudinally of the chamber to open at the lower portion thereof, ports extending through the inner electrode at the upper end portion thereof, a water supply for directing water into the chamber, and an exhaust for directing steam out of the chamber from within the inner electrode.

6. A steam bath generator of the character described including, a vertically disposed vessel having a closure at the top thereof and forming an elongate vertically disposed chamber, means for generating steam within the chamber and comprising a pair of concentric cylindrically shaped electrodes depending from the closure and extending longitudinally of the chamber to open at the lower portions thereof, ports extending through the outer electrode at the upper end portion thereof, a water supply for directing water into the chamber, and an exhaust for directing steam out of the chamber from within the inner electrode.

7. A steam bath generator of the character described including, a vertically disposed vessel having a closure at the top thereof and forming an elongate vertically disposed closed chamber, means for generating steam within the chamber and comprising a pair of concentric cylindrically shaped electrodes depending from the closure and open at the lower portions thereof, ports extending through the electrodes at the upper end portions thereof, a water supply for directing water into the chamber, and an exhaust for directing steam out of the chamber from within the inner electrode.

8. A steam bath generator of the character described including, a vertically disposed vessel having a closure of insulating material at the top thereof and forming an elongate vertically disposed closed chamber, an electrical means for generating steam within the chamber and comprising a pair of concentric cylindrically shaped electrodes depending from the closure and open at the lower portions thereof, ports extending through the electrodes at the upper end portions thereof, a water supply for directing water into the chamber between the electrodes, and an exhaust for directing steam out of the chamber from within the inner electrode and including a duct entering the chamber at the center thereof.

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