United States Patent [19]

Chrisman

[11] **3,721,802**

[45] **March 20, 1973**

[54] **STEAM GENERATOR**

[75] Inventor: **Ernest L. Chrisman,** Downey, Calif.

[73] Assignee: **Nordic Cloud Corporation,** El Monte, Calif.

[22] Filed: **Jan. 17, 1972**

[21] Appl. No.: **218,232**

[52] **U.S. Cl.**.....**219/273,** 219/275

[51] **Int. Cl.**.....**F22b 1/28**

[58] **Field of Search**.....219/271–273, 275, 219/538, 362, 378, 544, 548; 122/40; 239/136; 21/118, 119; 4/160

[56] **References Cited**

UNITED STATES PATENTS

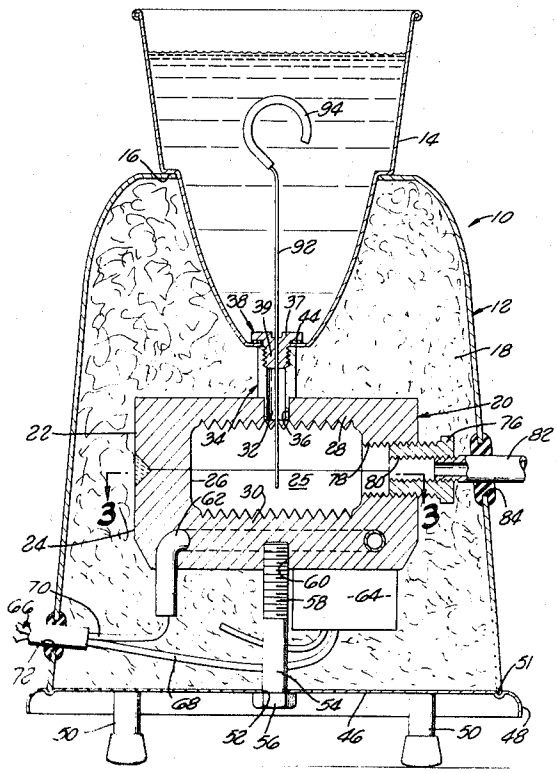
1,828,702	10/1931	Foo	219/273
2,624,828	1/1953	McCracken et al.	219/273
2,662,332	12/1953	McIntire	21/119 X
3,192,167	6/1965	Ogawa et al.	219/362 X

Primary Examiner—C. L. Albritton
Attorney—R. Welton Whann et al.

[57] **ABSTRACT**

A portable, freestanding, fully automatic ancillary steam generator unit for use with sauna baths, steam rooms, or the like. The steam generator is disposed exteriorly of the sauna bath or steam room and comprises a housing, a body having an electrically heated, thermostatically controlled internal steam chamber disposed within and insulated from the housing, a water reservoir and a connector element for interconnecting the steam chamber and the water reservoir and for metering the flow of water to the steam chamber. The upper and lower walls of the steam chamber are provided with a plurality of uniformly spaced, generally V-shaped grooves for efficiently dispersing and vaporizing the water entering the steam chamber.

5 Claims, 3 Drawing Figures



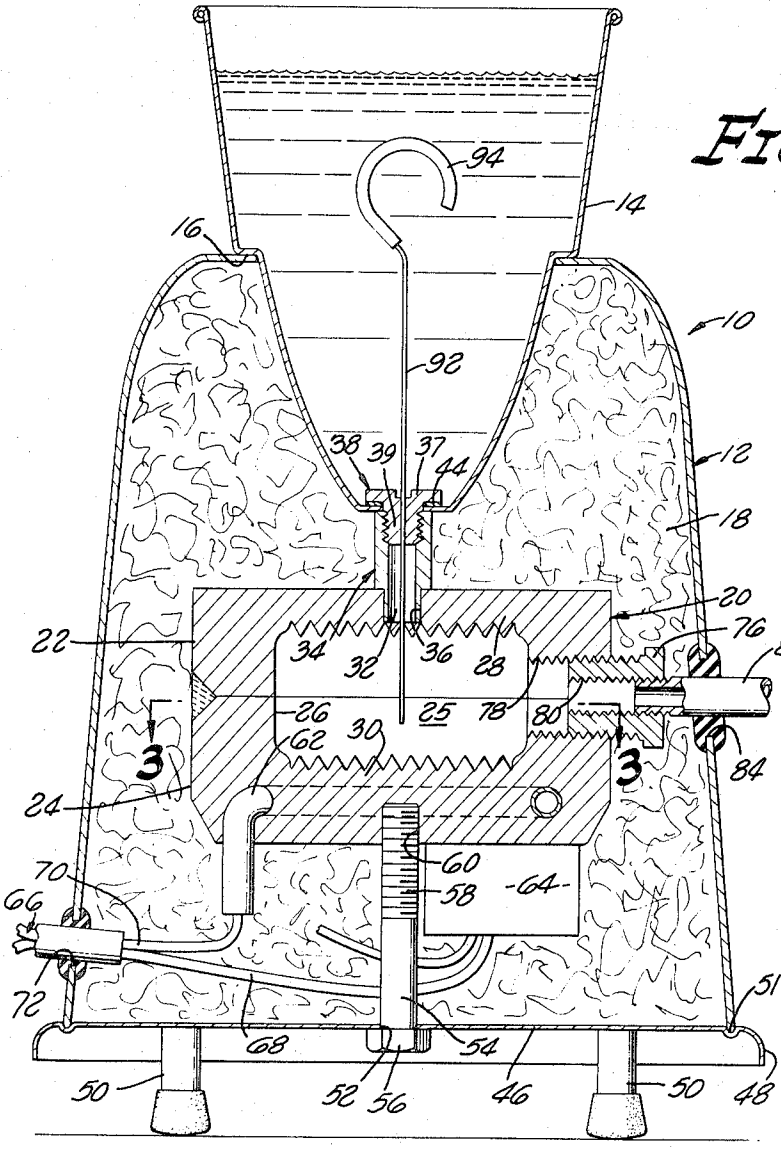


FIG. 1.

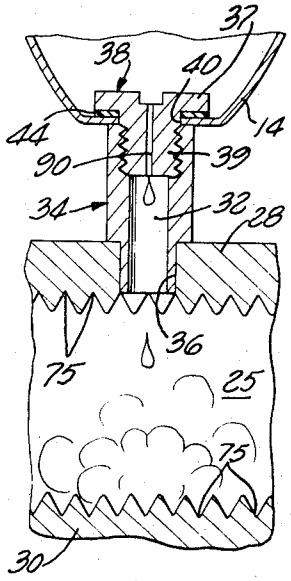


FIG. 2.

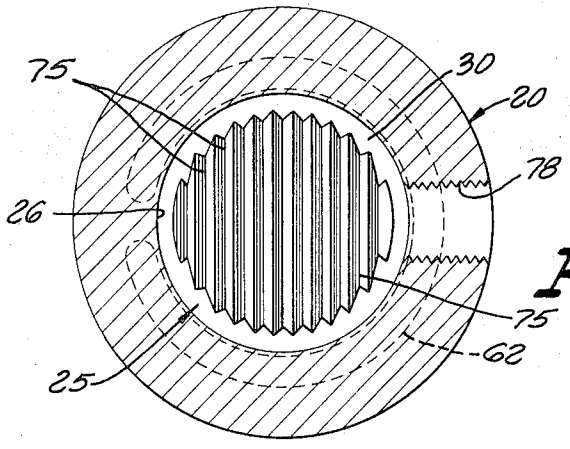


FIG. 3.

STEAM GENERATOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to steam generators and more particularly to portable steam generators for use in conjunction with steam rooms, sauna baths and the like.

2. Description of the Prior Art

In recent years sauna baths and small steam rooms for home use or for use in private club facilities and the like, have become increasingly popular. Since separate sources of steam are rarely available in most houses or clubs, a small steam generator is usually sold along with sauna bath or steam room. Typically these steam generators are self-contained, electrically heated units which are disposed within the interior of the sauna bath or steam room. Often the units are of very simple construction somewhat resembling an electric frying pan, and steam for the sauna bath or steam room is produced by boiling water contained in an open vaporization chamber located within the steam room.

This type of arrangement offers several serious disadvantages. Foremost of these is the safety hazard involved in incorporating electrical circuitry into an enclosure such as a sauna bath where electrical shocks can be highly dangerous and possibly fatal. Additionally, since the exterior of many types of steam generating units often becomes extremely hot, there is a potential likelihood that the user of the bath can be seriously burned by inadvertently contacting the unit when entering or leaving the steam bath. Typically, the water boiler steam generators of the type used in sauna baths or small steam rooms are inherently inefficient, slow to produce usable quantities of steam, and inconvenient to use. Because of the novel and unique construction of the steam generator of my invention, however, the drawbacks of prior art units as previously described are successfully avoided. Recognizing the safety hazards involved in installation of the steam generator inside the bath, the unit of my invention has been specifically designed for external mounting and, additionally, is completely insulated so that the outside of the unit does not become dangerously hot. Once filled with water and activated, the generator is totally automatic and requires no adjustment by the occupant of the bath. Due to the unique steam chamber design and the novel cooperating means for metering the flow of water to the chamber, the unit of my invention is also highly effective in producing the necessary quantities of steam for an extended period in an efficient manner with a minimum of start up time delay. Additionally, the unit is compact, lightweight and easy and safe to operate.

Small auxiliary steam generators have also been developed in the past for use with steam pressing irons. Applicant is familiar with one such device, as described in U.S. Pat. No. 2,624,828 issued to C. P. McCracken, et al. The device disclosed in this patent, however, neither describes nor suggests the novel water vaporization and dispersion means, nor the automatic water metering means of my invention.

SUMMARY OF THE INVENTION

It is one object of my invention to provide an electrically heated auxiliary steam generator for use with

sauna baths, steam rooms and the like which is adapted to be located exteriorly of the steam chamber, is completely automatic and requires no adjustment during the steam generation cycle.

It is another object of my invention to provide a steam generator of the type described which has its own water reservoir and cooperating means for controllably metering the flow of water to the steam chamber of the unit in a manner as to efficiently and uniformly generate steam for immediate transmission to the sauna bath or steam room. The metering means is quickly and easily activated by the user prior to entering the sauna bath and requires no adjustment or manipulation thereafter.

It is another object of my invention to provide a steam generator as described which embodies novel heat conductive water dispersion and vaporization elements adapted to uniformly disperse and efficiently vaporize the water entering the steam chamber so as to produce steam in a highly effective manner.

It is still another object of my invention to provide a steam generator for use with sauna baths and the like which is simply constructed, effectively insulated, highly reliable and extremely safe to use.

In summary, the steam generator of my invention comprises a body having an internal steam chamber defined by side walls and spaced upper and lower walls, the latter walls being provided with water dispersion and vaporization means in the form of a plurality of spaced V-shaped grooves, a water inlet passage leading to the steam chamber, a steam outlet passage leading from the steam chamber, means for electrically heating the chamber, a water reservoir, and a connector element interconnecting the water reservoir and the inlet passage to the steam chamber including means for metering the flow of water to the steam chamber.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a cross-sectional view of a preferred embodiment of my invention showing the general arrangement of the component parts of the steam generator.

FIG. 2 is a fragmentary cross-sectional view of the steam chamber in the area of the water inlet, illustrating the manner in which water is controllably metered to the steam chamber, and is then efficiently dispersed and vaporized.

FIG. 3 is a view taken along line 3—3 of FIG. 1 showing the construction of the lower wall of the steam chamber.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, the steam generator of my invention is generally designated by the numeral 10 and includes a housing 12 which has an opening at both ends and is generally circular in cross-section at any plane. The steam generator housing tapers from a large diameter at its base or lower end to a reduced diameter at its upper portion. Supportably received in the opening at the upper portion of the housing 12 is a water reservoir 14 which has an open upper end and, like housing 12, is generally circular at any plane. Water reservoir 14 tapers from a large diameter at its open upper end to a reduced diameter at its lower end, and has an intermediate stepped portion which forms a

downwardly facing surface **16** adapted to engage the outer surface of the upper end of housing **12** when the reservoir is in operative position with its lower portion depending into the housing.

Positioned interiorly of housing **12** and thermally insulated therefrom by insulation **18**, which may be of any suitable type of insulating material such as glass wool, is an electrically heated, generally cylindrically shaped body **20** constructed from a suitable heat conductive material such as, for example, aluminum. Formed within body **20** is an internal cavity or steam chamber **25** defined by side walls **26** and opposing upper and lower walls **28** and **30**, respectively.

A water inlet passage **32** leading to steam chamber **25** is formed by a generally cylindrically shaped tubular member **34** having a reduced diameter lower portion which is fixedly received within a centrally disposed bore **36** formed in the upper wall of body **20**. Tubular member **34** has an enlarged diameter head portion **37** and is internally threaded at its upper extremity to receive a connector **38** which is provided with an externally threaded shank portion **39** adapted to be received in an aperture **40** provided in the lower end of water reservoir **14**.

Connector **38** serves to interconnect the water reservoir and the tubular water inlet member **34** and also forms a part of the water metering means of my invention, the function of which will presently be described. A gasket **44** is provided between the lower face of connector head **37** and the inner surface of water reservoir **14** to prevent leakage of water around the connector when the parts are assembled together in the manner illustrated in FIG. **1**.

The lower end of housing **12** is closed by a generally circularly shaped base plate **46** which has a downwardly depending peripheral flange **48**. Plate **46** carries a plurality of downwardly extending legs **50** provided to support the steam generating unit in a normally upright position and is provided with a circular groove **51** in its upper surface to receive the lower end walls of housing **12**. An opening **52** is formed near the center of the base plate to receive a bolt **54** which has a head **56** and a threaded shank portion **58** adapted to be threadably received in an internally threaded bore **60** formed in the lower wall of body **20**. Bolt **54**, when threadably connected to body **20**, serves to hold plate **46** securely in place relative to the housing and also exerts a downward force on body **20**, tending to firmly seat water reservoir **14** into the upper opening in housing **12**.

The lower wall **30** of body **20** is appropriately formed to receive an electrical heating element **62** for heating body **20** and cavity **25**. The heating element is controlled by a thermostat **64** so as to maintain the temperature of body **20** within a predetermined range. For energization of the heating element, an electric cord **66** is provided, the conductors **68** and **70** of which pass through an opening **72** in housing **12** and are connected to the heating element and the thermostat in the manner shown. The details of construction of the heating element and the thermostat are not shown since these devices are well known in the art and the specific construction thereof is not a part of the present invention.

An important feature of my invention is the novel configuration of the steam chamber of body **20**. As can best be seen by referring to FIGS. **1** and **3**, opposing internal surfaces of upper and lower walls **28** and **30** are provided with water dispersion and vaporization means in the form of a plurality of uniformly spaced generally V-shaped grooves **75**. These grooves serve the important function of efficiently dispersing or scattering the droplets of water entering the steam chamber through the water inlet **32**. Additionally, as will be more fully described in the section entitled "Operation," the sloping side walls of the grooves encourage the efficient vaporization of the water droplets which become fragmented upon striking the heated V-shaped grooves in the lower surface of the chamber.

A steam outlet passage for conveying the steam generated within the steam chamber to the sauna bath or steam room is provided in the form of an externally threaded plug **76** which is threadably received in a threaded bore **78** formed in the side wall of body **20**. Plug **76** has a centrally located threaded bore **80** therethrough adapted to threadably accommodate one end of length of tubing **82**. Tubing **82** passes through a grommeted opening **84** in the side wall of housing **12** and is connected at its remote end to a sauna bath, steam room or the like (not shown).

OPERATION

With the steam generator of my invention assembled into the configuration shown in FIG. **1** and with the remote end of tube **82** connected to the sauna bath or steam room, the reservoir **14** is filled with water and the electric heating element **62** is energized. The thermostat **64** is typically preset prior to the assembly of the unit so as to maintain a temperature of approximately **400°** to **450°F.** within the steam chamber and requires no adjustment by the operator. After a period of time of on the order of ten minutes, the chamber will reach the desired elevated temperature and the steam generating cycle can be commenced.

Referring to FIGS. **1** and **2**, the water metering means of my invention for metering the water flow from the reservoir into the steam chamber is shown as including connector **38** which is provided with a capillary-like bore **90** therethrough. This bore or water passageway is closed prior to the start of the steam venerating cycle by a closure means in the form of an elongated wire **92** which closely fits within the bore and prevents the flow of water therethrough. The upper extremity of wire **92** is shaped into a hook **94** so as to facilitate the manual removal of wire **92** upwardly through the open top of the water reservoir. To begin the steam generating cycle, wire **92** is withdrawn so as to open the capillary-like bore and permit water to start flowing a drop at a time into the steam chamber as shown in FIG. **2**.

It is important that bore **90** be of a size as to permit water to flow into the steam chamber at a rate sufficient to produce a continuous supply of steam, but not so great as to unduly cool the chamber and cause an undesired build up of water therein. As diagrammatically illustrated in FIG. **2**, if the flow of water into the chamber is properly controlled, when the water droplets strike the lower grooved surface of the steam chamber which is maintained at an elevated tempera-

ture by the heater element they will be partially vaporized and partially fragmented into numerous small particles which will scatter in all directions within the chamber. These smaller particles will strike the sloping sides of the grooves in the heated walls of the chamber, and will either be vaporized or further fragmented. The relatively large heated surface area provided by the grooved surfaces at the top and bottom of the steam chamber results in the highly efficient vaporization of the water droplets entering the steam chamber and allows the efficient and rapid production of ample quantities of steam for continuous transmission to the sauna bath or steam room.

It is to be appreciated that once the steam cycle is commenced by the operator's removing the closure means, the steam generator will function automatically without further adjustment. Since the generator is positioned exteriorly of the steam room or sauna and requires no adjustment or manipulation, the risk to the operator of electrical shock or skin burns is totally eliminated. Additionally, since the water reservoir will empty in a period of approximately 20 minutes causing the flow of steam to automatically cease, potentially serious burns due to inadvertent oversteaming are not possible.

I claim:

1. An auxiliary steam generator for use with sauna baths, steam rooms and the like, comprising:
   a. a body having an internal chamber defined by side walls and spaced upper and lower walls, said upper and lower walls being provided with water dispersion and vaporization means in the form of a plurality of spaced generally V-shaped grooves on their opposing faces, said body having a water inlet passage leading to the internal chamber and a steam outlet passage leading from the internal chamber and adapted to convey steam to a sauna bath, steam room or the like;
   b. a thermostatically controlled electrical heating element contiguous to said lower wall of said internal chamber adapted to heat said upper and lower walls of said chamber to a temperature above the boiling point of water;
   c. a water reservoir having an outlet opening; and
   d. a water metering means interconnecting said water reservoir outlet opening and said water inlet passage of said body for metering the flow of water from said water reservoir to the internal steam chamber.

2. An auxiliary steam generator as defined in claim 1 in which said water metering means comprises:
   a. a connector for interconnecting said water inlet passage of said body and said outlet opening of said water reservoir, said connector having a capillary-like bore therethrough; and
   b. a manually removable closure means for closing said capillary-like bore in said connector.

3. An auxiliary steam generator for use with sauna baths, steam rooms and the like, comprising:
   a. a housing;
   b. a body disposed within said housing and thermally insulated therefrom, said body having:
      1. an internal chamber defined by side walls and spaced upper and lower walls, said upper and lower walls being provided with water dispersion and vaporization means in the form of a plurality of spaced generally V-shaped grooves on their opposing faces;
      2. a water inlet passage leading to the internal chamber; and
      3. a steam outlet passage leading from the internal chamber and adapted to convey steam to a sauna bath, steam room, or the like;
   c. a thermostatically controlled electrical heating element contiguous to said lower wall of said internal chamber adapted to heat said upper and lower walls of said chamber to a temperature above the boiling point of water;
   d. a water reservoir having an outlet opening; and
   e. a water metering means interconnecting said water reservoir outlet opening and said water inlet passage of said body for metering the flow of water from said water reservoir to the internal steam chamber, said water metering means comprising:
      1. a connector for interconnecting said water inlet passage of said body and said outlet opening of said water reservoir, said connector having a capillary-like bore therethrough; and
      2. a manually removable closure means for closing said capillary-like bore in said connector.

4. An auxiliary steam generator as defined in claim 3 in which said housing is provided with an opening in the upper portion thereof, in which said water reservoir is carried by and has its lower end depending into said housing through the opening therein, and in which said closure means comprises an elongated wire adapted to be closely received in the capillary-like bore in said connector so as to prevent the flow of water therethrough.

5. An auxiliary steam generator as defined in claim 4 in which said water reservoir is open at its upper end and said elongated wire is manually removable through said opening.

* * * * *