United States Patent

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[54] **PORTABLE STEAM GENERATING UNIT**
10 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **239/136,** 126/271.1, 126/369
[51] **Int. Cl.** **B05b 1/24**
[50] **Field of Search** ..... 239/136, 338; 126/271.1, 369; 219/271—275; 122/40

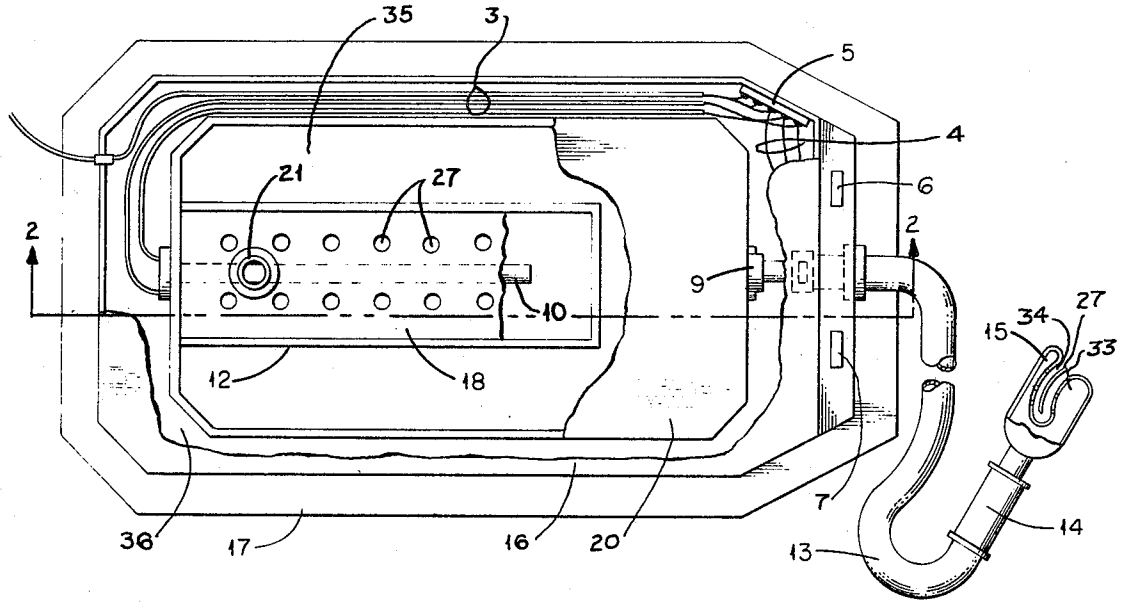
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ABSTRACT: A unit with no moving parts adapted to generate steam in response to an electric heating element, wherein the water chamber is separated from a steam chamber which, in turn, is separated from the atmosphere by a further protective chamber. Means are provided for the selective use of a plurality of steam-emitting heads in order to permit utilization of the device for diverse operations.



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FIG. 1

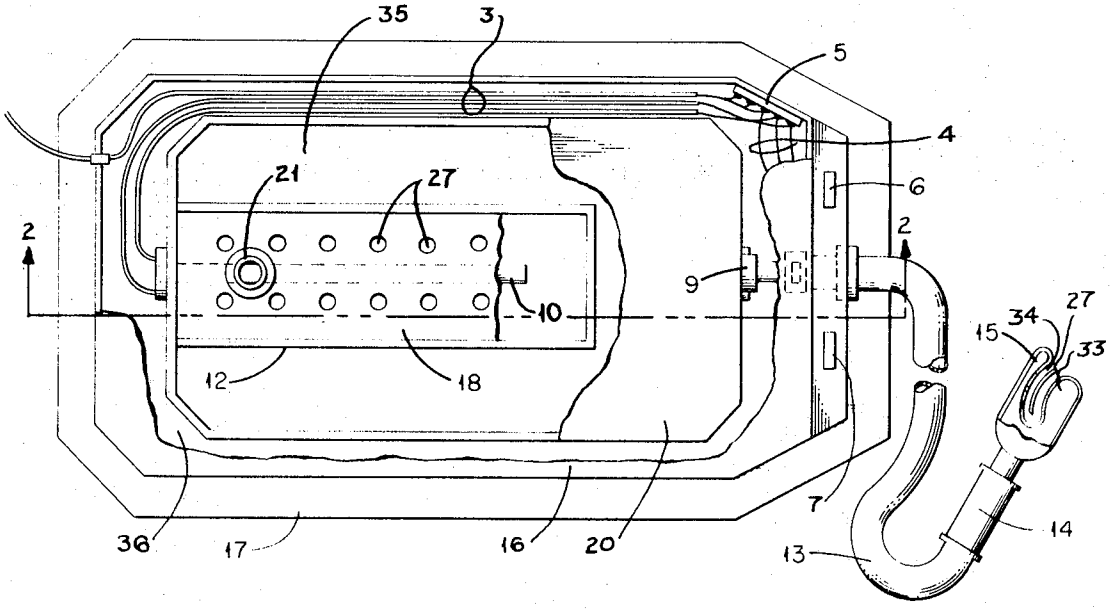
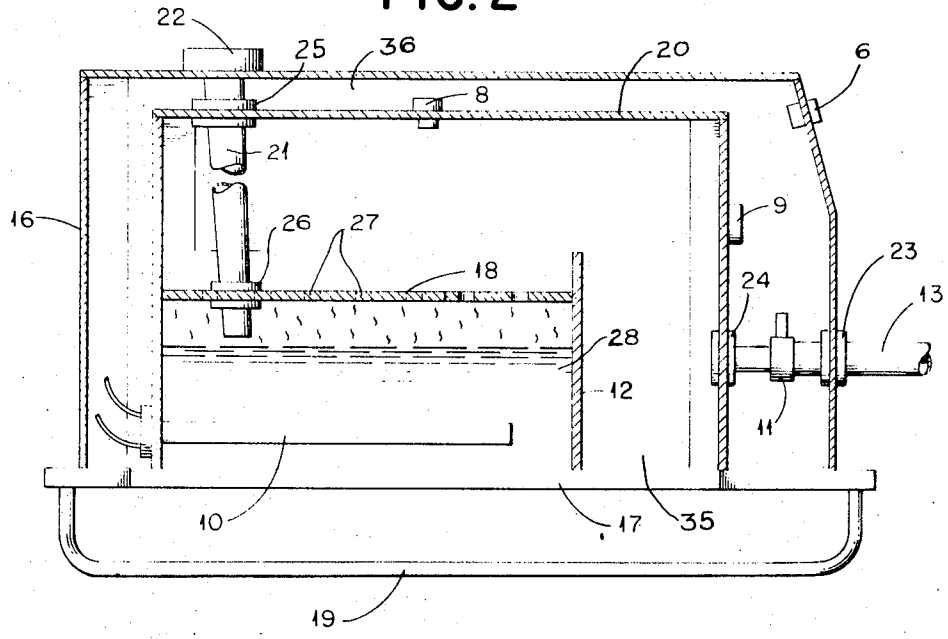


FIG. 2



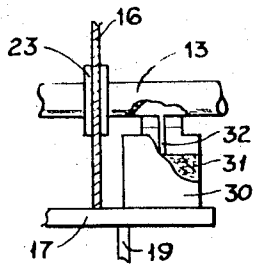


FIG. 3

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PORTABLE STEAM GENERATING UNIT

FIELD OF THE INVENTION

The present invention relates to steam generating apparatus; more particularly, it relates to portable steam generating apparatus that can be used in the home by non-professional operators for a multitude of housekeeping functions.

There is a need for a portable steam cleaning unit that can be employed by private home owners much in the fashion that vacuum cleaners are employed. It is well appreciated that the cleaning functions around a house or apartment often require more than simply suction to effect the necessary results. On the other hand, the use of water is frequently prohibited because of the direct damage it causes and the ancillary damage and mess in surrounding areas.

Among the many chores around the usual household that could be improved by the use of an appropriate steam generating appliance are the cleaning of venetian blinds, rugs, and furniture. Private automobile engines and similar greasy machines also benefit from periodic steam cleaning. In another area of activity, portable steam generating units can be, and are, employed to assist in the removal of wallpaper. Finally, where an appropriate unit is available, steam can be adapted to provide the health-giving benefits of humidification.

DESCRIPTION OF THE PRIOR ART

The prior art has illustrated a number of units which are individually capable of either humidification of a room or of being used to provide minor cleaning advantages. In general, these units are either too cumbersome to permit of portable utilization, too expensive to provide economical operation in the normal household, or too complex to enable the average housewife to use them.

From another aspect, devices which do not employ steam have been provided for performing all of the cleaning functions to be described hereinafter. Such devices as contoured brushes and water ejecting mechanisms may be used, for example, in the cleaning of venetian blinds and furniture. Almost without exception, these devices are of a complex nature and rely upon moving parts in order to effect the desired results.

SUMMARY OF THE INVENTION

The present invention relates to a portable unit adaptable for household use and having no moving parts. More particularly, it relates to a portable steam generating unit easily adaptable to effect a plurality of functions.

It is an object of the invention to provide an improved portable steam generating unit.

It is another object of the invention to provide an improved portable steam generating unit adaptable to receive a plurality of steam emitting heads.

It is another object of the invention to provide an improved steam cleaning unit particularly effective for cleaning venetian blinds, rugs, and furniture.

It is still another object of the invention to provide an improved portable steam cleaning unit capable of providing a detergent with the steam in order to effect cleansing.

It is yet another object of the invention to provide an improved portable steam generating unit having individual control over the heating and steam emitting elements of the apparatus.

In accordance with the invention there is provided a portable steam generating unit comprising an internal water chamber having a heating element therein, a partially surrounding steam chamber, a further protective chamber completely surrounding said steam chamber, and controlled exit means for the steam; said exit means being adapted to receive a plurality of steam emitting heads.

Further objects and features of the invention will become apparent from the following detail description of particular

embodiments. These embodiments are explained in conjunction with the drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a top view with a portion broken away illustrating a portable steam generating unit in accordance with the invention;

FIG. 2 is an elevational cross section taken along the line 2–2 in FIG. 1; and

FIG. 3 is a partial view of the steam exiting portion of an illustrated embodiment of the invention wherein means are provided for adding a detergent to the emitted steam.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The specific structure of a particular embodiment of the invention can be understood by reference to FIGS. 1 and 2. As shown in these FIGS., a water chamber **12** is provided within the internal portion of a rail-supported unit. Water chamber **12** contains a heater coil, or coils, **10** which are electrically energized via usual electrical conductors **3**. Surrounding the water chamber on three sides and the top, is a steam chamber **35**. The walls and floor of the water chamber **12** are solid and watertight, and the upper portion **18** is a baffle unit containing a plurality of perforations **27**. In the preferred embodiment of the invention, these perforations are sufficiently small to impede the flow of water therethrough in a liquid state, yet provide free passage of steam.

Steam chamber **35** is a pressure-tight chamber. A blowoff valve **8** is provided and may be set, for example, to open at approximately 5 pounds/square inch of pressure. In addition, an overload switch **9** is provided to open the heater electrical circuit at a particular steam pressure, for example, 5 pounds/square inch.

Completely surrounding steam chamber **35** is a further chamber **36**. The function of chamber **36** is two-fold. First, it protects the operator of the equipment in the event of excess steam pressure and similarly protects the surrounding area. Secondly, it makes possible the improved appearance of the entire unit.

The external housing **16** which defines the outer limits of chamber **36** is suitably mounted upon base plate **17** to provide a watertight joint. Any suitable gasket or similar arrangement may be provided. With respect to the mounting of the internal housing **20** which defines steam chamber **35**, a similar mounting arrangement to the base plate **17** may be provided. It would also be acceptable to establish a more permanent connection with respect to the steam chamber in order to insure both safety and moisture proofing.

The filling of the disclosed unit with water is effected through a filler pipe **21** having cap **22** thereon. This filler pipe penetrates chambers **35** and **12** through grommets **25** and **26**, respectively. These grommets insure a steamtight connection and prevent the escape of steam around the filler pipe **21**.

It will be seen that the entire unit is mounted upon rails **19** (one rail only shown). These rails may be positioned on opposite sides of the unit and provide sliding contact with the floor. Of course, the rails could be replaced by suitable substitutes, such as wheels. The unit is capable of easy movement throughout a household and is sufficiently light to permit vertical movement when required. Suitable lifting handles may also be provided on the sides of the unit if desired.

Two switches, **6** and **7**, are provided on the beveled front facing of external housing **16**. These switches are wired to provide an initial on/off control and a steam control. The electrical wiring of the system includes a single-pole switch for applying power to the heater element **10**. This power is applied through the pressure overload switch **9** which is in a normally closed state. Accordingly, in the event of excessive steam pressure, overload switch **9** automatically opens and disconnects the power from the heating element **10**. In parallel with the heater and pressure switch **9**, the second single-pole switch **7** is provided in series with a solenoid valve **11**. When switch **7**

is closed, solenoid valve **11** is actuated to an open position and permits the emission of steam from chamber **35** to a hose **13**. It will be noted that hose **13** is connected via rigid couplings and through grommets **24** and **23** to the steam chamber. Thus, in the event of excess pressure, power will continue to be applied to the solenoid valve **11** in order to reduce the pressure by permitting continued emission of steam therethrough until the control switch **7** is opened; simultaneously, the heating coil **10** will be deenergized in order to permit immediate cooling of the water.

Hose **13** is of a conventional nature and is contemplated as being entirely flexible. The length of this hose is optional; however, it should be at least sufficiently long to permit the operator easy access to the upper corners of a room. As shown in FIG. **1**, a solid pipe portion **14** is connected to the end of the hose. This pipe portion may effectively serve as a handle grip in some applications. On other applications, it may be an elongated cylindrical member of the telescoping type which will permit extension of the effective length of the hose.

Affixed at the outer end of pipe **14** is a nozzle **15**. This nozzle may be one of a plurality of nozzles, each of which are suitable for use with the steam generating unit of the present invention. The function of the nozzle **15** is to emit steam in directed jets at the particular object to be cleaned. In FIG. **1**, a venetian blind slat **27** is illustrated between upper and lower projections **34** and **33** respectively of nozzle **15**. These projections provide perforations on the inner surface which direct steam at both the upper and lower surfaces of the venetian blind being cleaned. The width of the nozzle (not illustrated) is sufficient to provide coverage of a short length of blind and it is contemplated that the nozzle would be moved horizontally along each blind slat as it is hung in an opened position on a window. The inner surfaces of nozzle **15** may advantageously be covered with a spongelike material in order to accumulate dust and moisture as it is driven off the surface of slat **37**.

In addition to the venetian blind nozzle illustrated in FIG. **1**, it is contemplated that spray-type nozzles may be employed in order to emit the steam in a spray directly in front of the nozzle. The diameter and number of perforations provided in such a nozzle is a function of the steam pressure provided in the chamber and the intensity with which the steam is to be applied to the material being cleaned or moistened. It will be appreciated that where this unit is employed for moistening wallpaper prior to removal, the pressure in the steam chamber and the rate of emission will be greater than when it is being employed as a humidification unit. Suitable controls may be provided for effecting various operations of the unit and it will be immediately apparent that rather than a single heating coil, several individually controlled coils may be provided in the water chamber in accordance with the desired operating conditions.

When the invention is being employed as a cleansing apparatus, it may be advantageous and desirable to include a detergent along with the steam that is emitted via hose **13**. A particularly efficacious manner of providing a detergent when utilizing the present invention is illustrated in FIG. **3**. In this FIG., a portion of the base plate **17** and exterior housing **16** is shown. Base plate **17** is extended somewhat in order to provide a mounting surface for a container **30**. As shown by the breakaway view of element **30**, it contains a liquid detergent **31** and a pipet **32** extending upward to the hose **13**. In any suitable manner, container **30** may be affixed to hose **13**; of course, the point of connection would be solid and a simple T-coupling may be employed. When operating, the steam passing through hose **13** will serve to provide the necessary vacuum for sucking up a prescribed amount of detergent **31**, carrying this detergent along with it, and applying it to the surface being cleaned. Obviously container **30** may be transparent and preferably is provided with markings to indicate the amount of detergent that is to be inserted for particular jobs.

Of course, it is also permissible and, in some instances, desirable to include additives in the fluid of the water chamber in order to improve vaporization and enhance the cleansing or other operative effects of the vapor produced.

As a particular example of a unit constructed in accordance with the teaching of this invention, water chamber **12** may have the dimensions of 4 × 6 × 12 inches. Such a chamber provides for a gallon of water with sufficient additional room for air and steam generation. Steam chamber **35** may have dimensions of 5 × 10 × 16 inches. With such dimensions, and an appropriate nozzle, the unit may operate for a running time of approximately 2½hours without refilling.

Particular embodiments of the invention have been described and suggestions for the possible modification of these embodiments in order to obtain improved versatility and additional features have been made. It is contemplated that those skilled in the art will immediately recognize further modifications and it is intended that the appended claims cover all variations coming within the spirit and scope of the invention as described above.

I claim:

1. A portable steam generating apparatus comprising in combination, a first chamber containing heating means and a liquid, a substantially vapor-tight second chamber at least partially surrounding said first chamber, a third substantially liquid-tight chamber at least partially surrounding said second chamber, each of said chambers having at least one common wall, said first chamber having a portion thereof through which vapor may penetrate into said second chamber, conduit means for transmitting vapor connected at one end to said second chamber, and nozzle means at the other end of said conduit means adapted to emit said vapor in a predetermined pattern.

2. A portable steam generating apparatus according to claim **1**, wherein said nozzle has projecting portions in facing relationship spaced apart by a narrow channel, and perforations in the opposing faces of said portions adapted to eject steam into said channel from both sides.

3. A portable steam generating apparatus comprising in combination; a first chamber containing electrically energized heating means, a second chamber at least partially surrounding said first chamber, said first chamber having a portion thereof through which vapor may penetrate into said second chamber, conduit means for transmitting vapor connected at one end to said second chamber, an electrically controlled valve for closing said conduit means, said valve and said heating means being energized in parallel circuits, and nozzle means at the other end of said conduit means adapted to emit said vapor in a predetermined pattern.

4. A portable steam generating apparatus according to claim **3**, wherein the circuit containing said heating means includes a normally closed pressure-responsive switch operative to open when the vapor pressure in said second chamber exceeds a predetermined value.

5. A portable steam generating apparatus according to claim **4**, wherein the circuit containing said valve includes a manually controlled switch.

6. A portable steam generating apparatus according to claim **3**, including a third chamber at least partially surrounding said second chamber, said second chamber being substantially vapor-tight and said third chamber being substantially liquid-tight.

7. A portable steam generating apparatus according to claim **6**, including pressure-sensitive valve means between said second and third chambers, operative to open when the pressure in said second chamber exceeds that in said third chamber by a predetermined value.

8. A portable steam generating apparatus according to claim **7**, wherein each of these chambers has at least one common wall.

9. A portable steam generating apparatus according to claim **8**, including vapor-tight conduit means penetrating said second and third chambers and affording fluid access between

the outside of said third chamber and the inside of said first chamber.

10. A portable steam generating apparatus according to

claim **9**, including means connected to said conduit means for adding detergent to the vapor as it passes therethrough.