CORDLESS BATTERY OPERATED HANDHELD STEAMER AND METHODS OF OPERATION

Inventors: Benjamin Dennis Tanner, Round Rock, TX (US); Timothy Richard Hillisamer, Mesa, AZ (US)

Correspondence Address: HULSEY IP INTELLECTUAL PROPERTY LAWYERS, P.C., 919 Congress Avenue, Suite 919 AUSTIN, TX 78701 (US)

Assignee: ANTIMICROBIAL TEST LABORATORIES, LLC, Round Rock, TX (US)

Appl. No.: 12/341,614

Filed: Dec. 22, 2008

Related U.S. Application Data

Provisional application No. 61/074,667, filed on Jun. 22, 2008.

Publication Classification

Int. Cl. D06F 87/00 (2006.01)

U.S. Cl. 8/149.3; 68/222

ABSTRACT

A cordless handheld steamer comprising an interior chamber containing a steam generation unit and a water reservoir. The water reservoir generally encompasses the steam generation unit and the steam generation unit contains a heating element. A precise temperature control unit monitors the heating element's temperature to maintain an optimum steam producing temperature without overheating. The heating element is powered only by an on-board battery pack. A user determined amount of water is pumped from the water reservoir to the flash boiler chamber where the water is converted to steam and the steam travels through a plenum to a target area.
CORDLESS BATTERY OPERATED HANDHELD STEAMER AND METHODS OF OPERATION

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of priority to provisional application No. 61/074,667 filed on Jun. 22, 2008 by inventors Benjamin D. Tanner and Timothy R. Hillamer, entitled “COMPACT CORDLESS STEAM CLEANER, POWERED BY ONLY BATTERIES.”

FIELD OF THE INVENTION

[0002] The invention relates generally to steamers and more specifically to cordless handheld steamers.

BACKGROUND OF THE INVENTION

[0003] Traditional steamers are well known in the art. Most steamers are used primarily for cleaning or for removing wrinkles from garments and other clothes. Steamers generally work by heating a heating element and passing water across the heating element such that the water is heated to the point of boiling and is therefore converted to steam. This steam is then directed towards a work area.

[0004] Unfortunately, traditional steamers require large amounts of energy to generate meaningful amounts of steam. This large amount of energy is delivered to traditional steamers by a power source that is external to the steamer itself—usually by a cord plugged into a wall socket, or high-energy demand docking station. This severely limits the usability and utility of current steamers. The cord limits the range of motion of the steamer, and it is otherwise cumbersome. In addition, there is no way to steam areas that lack an external power source.

[0005] This highlights a significant impediment of the prior art in its inability to deliver sufficient energy from an onboard battery pack to a heating element to create a meaningful amount of steam without the use of external power sources and/or docking stations. The industry has repeatedly attempted to create a cordless handheld steamer but has been unable to create such a device that is capable of being powered solely by an onboard battery pack.

[0006] For example, U.S. Patent No. 6,622,404 issued to Mohankumar Vallyambuth (“404 Patent”) discloses a semi-cordless steaming device; however, among other significant differences, the semi-cordless steaming device requires a stand that contains an electrically heated boiler which creates the steam and then transfers the steam to the steaming device when the steaming device is docked with the stand. See column 2, lines 19-40; column 3, lines 33-43.

[0007] An additional example is U.S. Patent Application 20070130718 invented by Choon Myun Chung, et. al. (“718 Patent Application”) which discloses a non-handheld semi-cordless steaming device with an on board battery; however, among other significant differences, the device requires that the water be pre-heated to steam using an external power source—“water preheating for a steam function of the cleaner in the early stage of operation of the cleaner is achieved by receiving an external power.” 718 Patent Application, Paragraph 11; See also paragraphs 5, 18, 19, 23, 54, and 56.

[0008] A final example is U.S. Patent Application 20070133962 invented by Leandro P. Rizzuto, et. al. (“962 Patent Application”) which discloses a non-handheld semi-cordless steaming device; however, among other significant differences, the device requires a “power base station [to supply] power to the heater assembly in order to use water to make steam.” ‘962 Patent Application, Paragraph 10. See also paragraphs 23 and 30-32.

[0009] As shown by the above cited examples, although the industry has attempted to create a truly cordless steamer solution, the industry has continually failed to produce a completely battery operated truly cordless steamer, much less a handheld cordless steamer.

BRIEF SUMMARY OF THE INVENTION

[0010] There is a need for a cordless handheld steamer small enough to be easily transported with sufficient energy to perform a meaningful steaming session without the need for an external power source or a charging/docking station.

[0011] A technical advantage of the disclosed subject matter is having a cordless steamer small enough to be handheld.

[0012] Another technical advantage of the disclosed subject matter is having interchangeable battery packs.

[0013] Yet another technical advantage of the disclosed subject matter is having rechargeable battery packs.

[0014] An additional technical advantage of the disclosed subject matter is being highly energy efficient.

[0015] Another technical advantage of the disclosed subject matter is efficiently and precisely heating and monitoring the temperature of the steam generation unit so as to waste energy.

[0016] Still another technical advantage of the disclosed subject matter is having heat radiated from the steam generation unit to pre-heat the water contained in the water reservoir.

[0017] An additional technical advantage of the disclosed subject matter is having an insulation material which may include heat reflective material surrounding the steam generation unit and water reservoir.

[0018] Yet another technical advantage of the disclosed subject matter is having a replaceable towlette to reduce steam loss, assist in the cleaning process, and/or for enhanced cleaning abilities by using additives to the towlette.

[0019] Another technical advantage of the disclosed subject matter is having a user controlled amount of water dispensed into/onto the flash boiler.

[0020] An additional technical advantage of the disclosed subject matter is having the cordless handheld steamer shaped in a generally half spherical shape so as to comfortably fit in a user’s palm.

[0021] These and other aspects of the disclosed subject matter, as well as additional novel features, will be apparent from the description provided herein. The intent of this summary is not to be a comprehensive description of the claimed subject matter, but rather to provide a short overview of some of the subject matter’s functionality. Other systems, methods, features and advantages here provided will become apparent to one with skill in the art upon examination of the following FIGURES and detailed description. It is intended that all such additional systems, methods, features and advantages that are included within this description be within the scope of the accompanying claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] The novel features believed characteristic of the invention are set forth in the claims. The invention itself,
however, as well as a preferred mode of use, further objectives, and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

**[0023]** FIG. 1 illustrates the outside of the cordless battery operated handheld steamer of the present embodiment.

**[0024]** 100 Water Pump
**[0025]** 102 Water fill tube cap
**[0026]** 104 Charging port
**[0027]** 106 On/Off switch
**[0028]** 108 Towelette

**[0029]** FIG. 2 illustrates a cross-sectional view of the cordless battery operated handheld steamer of the present embodiment.

**[0030]** 100 Water Pump
**[0031]** 102 Water fill tube cap
**[0032]** 104 Charging port
**[0033]** 106 On/Off switch
**[0034]** 108 Towelette
**[0035]** 200 Draw tube
**[0036]** 202 Water fill tube
**[0037]** 204 Water reservoir
**[0038]** 206 Battery pack
**[0039]** 208 Wiring Harness
**[0040]** 210 Wire to charging port
**[0041]** 212 Wire to heating element
**[0042]** 214 Plenum
**[0043]** 216 Temperature control unit
**[0044]** 218 Heating element
**[0045]** 220 Steam generation unit
**[0046]** 222 Towelette support
**[0047]** 224 Insulating material
**[0048]** 226 Internal chamber
**[0049]** 228 Water injection to boiler tube

**[0050]** FIG. 3 illustrates the hand positioning of the cordless battery operated handheld steamer of the present embodiment.

**[0051]** 100 Water Pump
**[0052]** 104 Charging port
**[0053]** 106 On/Off switch
**[0054]** 108 Towelette
**[0055]** 300 Hand

**DETAILED DESCRIPTION OF THE ILLUSTRATIVE EMBODIMENTS**

**[0056]** Although described with particular reference to wireless and/or battery operated handheld steamers, many of the teachings contained in this disclosure could also be implemented on more traditional steamers such as corded and/or charge station enabled steamers whether handheld or not.

**[0057]** Additionally, those with skill in the arts will recognize that the disclosed embodiments have relevance to a wide variety of areas in addition to those specific examples described below.

**[0058]** All references, including publications, patent applications, and patents, cited herein are hereby incorporated by reference to the same extent as if each reference were individually and specifically indicated to be incorporated by reference and were set forth in its entirety herein.

**[0059]** FIG. 4 illustrates the outside of the cordless battery operated handheld steamer of the present embodiment. The outside of the handheld steamer contains a water pump 100. In the preferred embodiment, this water pump is a mechanically actuated pump (e.g. actuated by the user’s thumb). The water fill tube cap 102 reduces the chances of foreign matter accidentally entering the water reservoir (not shown). The charging port 104 provides an electrical connection between a charging cord (not shown) and the onboard batteries (not shown) such that the onboard batteries can be recharged. The on/off switch 106 turns power to the device on or off. Finally, the towelette 108 is on the bottom of the device. The towelette 108 is removable and replaceable. In an alternative embodiment, the battery pack is accessible through an opening or hatch in the top of the device (not shown) such that a user could replace a spent battery pack (not shown) with a charged battery pack (not shown).

**[0060]** FIG. 2 illustrates a cross-sectional view of the cordless battery operated handheld steamer of the present embodiment. As briefly discussed previously, the charging port 104 provides an electrical connection between a charging cord (not shown) and the battery pack 206. This connection is completed by a wire to charging port 210 electrically connected between the charging port 104 and the wiring harness 208. The wiring harness 208 is then electrically connected to the battery pack 206. This permits the user to recharge a battery pack 206 without removing the battery pack 206.

**[0061]** Again, the water fill tube cap 102 acts as a cover to the water fill tube 202 to reduce the possibility of foreign matter accidentally falling into the water fill tube 202. The water fill tube 202 is used to fill the water reservoir 204. In an alternative embodiment there is a small window (not shown) showing the level of the water reservoir 204 to assist the user in not overfilling the device. In the preferred embodiment, the water reservoir 204 is relatively small providing sufficient water for about 5 to 10 minutes of use. The water pump 100 transports water from the water reservoir 204 into the draw tube 200. From the draw tube 200, the water travels via the water injection to boiler tube 228 into the steam generation unit 220. The water reservoir 204 and steam generation unit 220 are contained in the interior chamber 226. In the preferred embodiment, the steam generation unit 220 is a flash boiler; however, other steam generator methods could be employed and are considered to be within the scope of this disclosure. Furthermore, in certain places throughout the disclosure the benefits of using a flash boiler are described. One of the benefits of using a flash boiler over a traditional “simple pressure boiler” is the ability to add water to the device at any time (even when the boiler is hot).

**[0062]** In the preferred embodiment the water pump 100 is a mechanically actuated pump which allows the user to deliver only the amount of steam needed at that particular time. In an alternative embodiment, the water pump 100 is an electronic sprayer. By allowing the user to control the level of water converted to steam, the user can both extend the time between battery charges and only use the amount of steam necessary for the task at hand (by steamimg less water at a particular time the heating element 218 will be cycled on less often, thereby, using less energy).

**[0063]** When the device is switched on, via the on/off switch 106, a temperature control unit 216 monitors the temperature of the heating element 218. In the preferred embodiment the temperature control unit 216 is a thermostat; however, other items capable of measuring temperature could be used such as a pressure monitor (because there is a linear correlation between steam temperatures and pressure at the pressures contemplated herein). If the heating element is too cold to produce steam, the temperature control unit 216 per-
mits more energy to be transferred from the battery pack 206 to the heating element 218 via the wire to the heating element 212. When the temperature control unit 216 detects the heating element is nearing the optimum temperature, the temperature control unit 216 interrupts the energy from the battery pack 206. In the preferred embodiment, the temperature control unit 216 is sensitive—being able to detect temperature changes as small as 2 degrees Celsius. By using a sensitive temperature control unit 216, the heating element 212 is maintained at an optimum temperature. In the preferred embodiment, the optimum temperature is just over 120 degrees Celsius. This temperature allows the heating element 212 to flash boil the water and remain above the critical boiling temperature of 100 degrees Celsius. A lower temperature could be used, but if the user injected a large amount of water in the steam generation unit 220, there is the potential that the heating element’s 212 temperature could briefly dip below the critical boiling temperature. If a more traditional temperature control unit were used, the temperature of the heating element 218 would routinely exceed the optimum temperature, thereby wasting a significant amount of energy.

[0064] When a user actuated the water pump 100, water would be pumped into the steam generation unit 220 where the water would come in contact with the heating element 216, boiling immediately, and creating steam. As the steam expands, the steam fills the steam generation unit 220 and travels out the plenum 214 through the towlette 108 and onto the target. By keeping the steam generation unit 220 relatively small, the plenum 214 path relatively short, and the towlette sealed against the plenum 214, the steam is held at a relatively high pressure and temperature, so more heat energy is delivered to the target area and less heat is lost while the steam is traveling from the steam generation unit 220 to the target area than in conventional steam cleaners. In the preferred embodiment, the steam’s pressure is about 5 psi; however, other pressures can be utilized.

[0065] The towlette 108 is a thin disposable non-woven material which assists in the cleaning process. The towlette 108 could contain additives such as cleaning solutions, fragrances, heat-indicating dyes, and/or disinfecting solutions. The towlette 108 is affixed to the device via the towlette support 222. In the preferred embodiment, the towlette support 222 is a ring that slides around the plenum 214 to affix the wipe to the base of the device and create a seal around the plenum to assist in directing all of the steam towards the target area. In alternative embodiments, the towlette 108 could be affixed to the base of the device via adhesives, hook and loop fasteners (e.g. Velcro®, a registered trademark of Velcro Industries B.V.), or other methods. In yet another alternative embodiment, the towlette 108 could be made thinner to lower the heat absorbed by the towlette 108. The additives, in conjunction with the steam, provide additional utility, convenience, aesthetic appeal, and/or cleaning/disinfecting ability than with either alone. Additionally, the towlettes 108 provide added convenience because the towlettes 108 are removable and disposable.

[0066] Although described herein as having a towlette 108, the device could also be operated without the towlette 108.

[0067] The water reservoir 204 is positioned near and around the steam generation unit 220 such that the ambient heat from the heating element 218 and the steam generation unit 220 is readily transferred to the water in the water reservoir 204. The otherwise wasted ambient heat pre-heats the remaining water contained in the water reservoir 204 thereby reducing the energy required for future steam production. Also, to enhance the efficiency of the device, the steam generation unit 220 (again, in the preferred embodiment a flash boiler and in an alternative embodiment a pressure boiler chamber) is smaller than conventional steam cleaners which helps to reduce excess “heat sinking” during the initial heating of the heating element 218 and drastically reduces heat-up time. Additionally, the interior chamber 226, containing the steam generation unit 220 and water reservoir 204, are generally surrounded by an insulating material 224 that further reduces lost heat. In the preferred embodiment, this insulating material 224 includes heat reflecting material to additionally redirect otherwise escaping heat back into the water reservoir 204 and the steam generation unit 220. By reusing and redirecting otherwise lost heat, the energy and time necessary to pre-heat and operate the device is significantly reduced. The use of a full suite of insulating materials is in stark contrast to traditional steamers, which benefit from virtually unlimited access to power from external sources. An additional benefit of the insulating material 224 is keeping the outside of the device cooler to the touch both increasing comfort and lowering the chance of injury to the user.

[0068] FIG. 3 illustrates the hand positioning of the cordless battery operated handheld steamer of the present embodiment. The device is designed in a generally half spherical shape so that the device fits comfortably in the palm of a user’s hand 300. This design is superior from the traditional rod shaped handle of existing steamers because the handle 300 rests on the device, thereby not forcing the hand, wrist, and arm to contort to a rod shaped handle. Additionally, this design is superior to traditional steamers by not requiring the user to hold the steamer in the air and/or extended from the body. Additionally, in the preferred embodiment, the water pump 100 is positioned to be comfortably used with the thumb and the on/off switch 106 is positioned close enough to the thumb to be convenient and comfortable, but far enough away to protect against accidentally turning the device on or off. In addition to the above described embodiments, those skilled in the art will appreciate that this disclosure has application in a variety of arts and situations and this disclosure is intended to include the same.

What is claimed is:
1. A handheld cordless steamer comprising:
an outer casing;
an interior chamber containing a steam generation unit and a water reservoir, said water reservoir generally encompassing said steam generation unit, said steam generation unit containing a heating element;
an insulating material generally encompassing said interior chamber;
a water fill tube, wherein said water fill tube transports water to said water reservoir;
a battery pack, said battery pack providing the only electrical energy to said heating element;
a temperature control unit coupled to said heating element, wherein said temperature control unit controls the temperature of said heating element;
a water pump, said water pump capable of pumping a user controlled amount of said water from said water reservoir to said heating element; and
a plenum, wherein said plenum transports steam from said steam generation unit to a target area.
2. The handheld cordless steamer of claim 1, wherein said outer casing is in a generally half spherical shape.

3. The handheld cordless steamer of claim 1, wherein said steam generation unit is a flash boiler.

4. The handheld cordless steamer of claim 1, wherein said water pump is a mechanically actuated pump.

5. The handheld cordless steamer of claim 1, wherein said water pump is an electrically actuated pump.

6. The handheld cordless steamer of claim 1, wherein said temperature control unit is a thermostat or pressure monitor.

7. The handheld cordless steamer of claim 1, wherein said battery pack is removable.

8. The handheld cordless steamer of claim 7, wherein said battery pack is rechargeable.

9. The handheld cordless steamer of claim 1, including a disposable towelette.

10. The handheld cordless steamer of claim 9, wherein said disposable towelette is treated with an additive, said additive to enhance the aesthetic, utility, cleaning, and/or disinfecting properties of said towelette.

11. The handheld cordless steamer of claim 9, wherein said disposable towelette is coupled across said plenum as to create a seal against said plenum in order to further direct steam towards said target area and/or maintain a high temperature and pressure.

12. A method of operating a handheld cordless steamer, said method comprising the steps of:
   adding water to a water reservoir;
   heating a heating element;
   powering said heating element from only a battery pack;
   monitoring and controlling the temperature of said heating element with a temperature control unit;
   pumping a user controlled amount of said water from said water reservoir to a steam generation chamber, said steam generation chamber containing said heating element;
   using ambient heat from said steam generation chamber to pre-heat said water in said water reservoir;
   insulating said water reservoir and said steam generation chamber;
   converting said water in said steam generation chamber into steam by heating said water with said heating element; and
   allowing said steam to travel through a plenum to a target area.

13. The method of claim 12, wherein said step of allowing said steam to travel from said plenum includes the additional step of forcing said steam through a disposable towelette prior to impacting said target area.

14. The method of claim 13, with the additional step of enhancing the aesthetic, utility, cleaning, and/or disinfecting qualities of said towelette by adding additives to said towelette.

15. The method of claim 12, wherein said pumping step is accomplished by actuating a mechanical pump.

16. The method of claim 12, wherein said pumping step is accomplished by actuating an electrical pump.

17. The method of claim 12, with the additional step of charging said battery pack.

18. The method of claim 12, with the additional step of inserting said battery pack.

19. A handheld steamer comprising:
   an outer casing, said outer casing in a generally half spherical shape;
   an interior chamber containing a steam generation unit and a water reservoir, said water reservoir generally encompassing said steam generation unit, said steam generation unit containing a heating element.
   an insulating material generally encompassing said interior chamber;
   a water fill tube, wherein said water fill tube transports water from outside of said outer casing to said water reservoir;
   an electrical energy source, said electrical energy source providing electrical energy to said heating element, wherein said temperature control unit coupled to said heating element, wherein said temperature control unit controls the temperature of said heating element;
   a water pump, said water pump capable of pumping a user controlled amount of said water from said water reservoir to said heating element;

20. The method of claim 19, wherein said electrical energy source is external to said outer casing.

* * * * *