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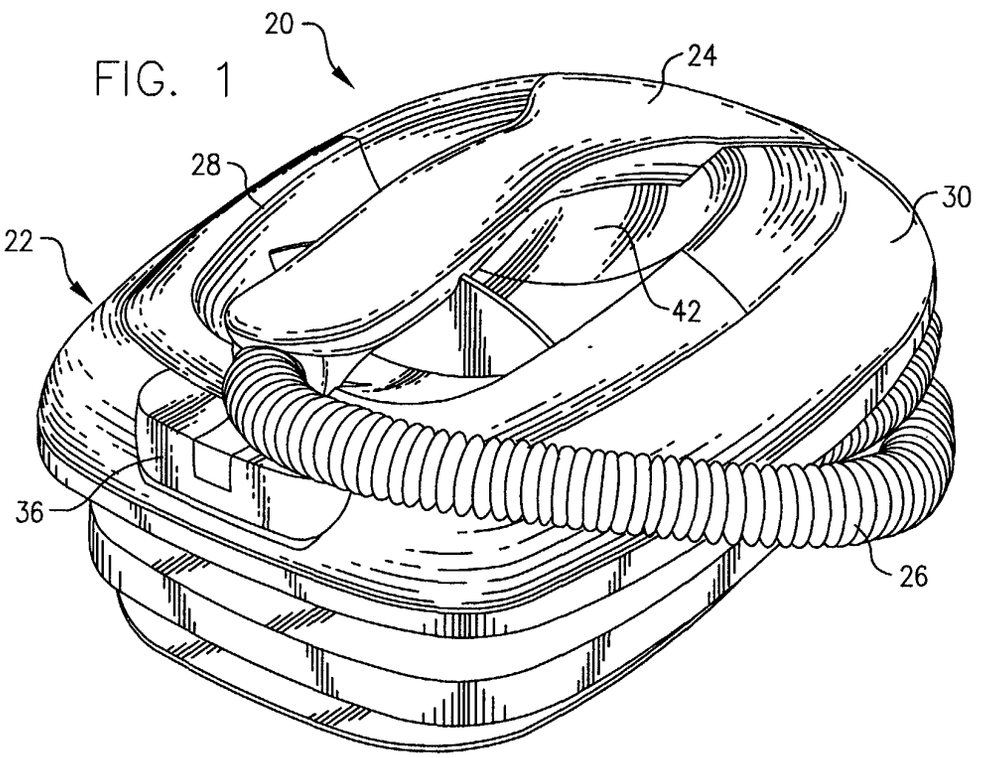
(54) Clothes steamer

(57) A steamer for generating steam. The steamer includes an enclosure having a steam generator therein, and a hose extending from the enclosure to a steam-applying wand. When a user desires steam, the user turns on the steamer, which preheats the steam generator to a steam-producing temperature. Once the steam generator is ready, the user actuates the production of steam, for example by pressing a button on the wand. A pump draws water out of a water tank and to the steam generator. The steam generator flashes the water to steam, thus producing an instant supply of steam. The steam runs out of the steam generator, through the hose to the wand. The steam may be applied, for example, to clothes so as to remove wrinkles in the clothes.

FIG. 1



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Description

FIELD OF THE INVENTION

[0001] The present invention relates generally to steamers, and more particularly to a clothes steamer.

BACKGROUND OF THE INVENTION

[0002] A contemporary business traveler embarking on a business trip may pack enough clothes for an entire week. To avoid baggage checks and dealing with a large amount of luggage, the business traveler may pack all of his or her clothes into a single carry-on bag. Although luggage manufacturers have designed bags to eliminate some wrinkling of clothes, jamming clothes for an entire week into such a small bag inevitably results in the business traveler arriving at his or her hotel room with an entire wardrobe that needs pressing or dry-cleaning.

[0003] One method business travelers have used to remove wrinkles from clothes is to place the wrinkled clothes in a steam-filled bathroom. Although this technique works to remove some or most of the wrinkles in the clothes, the amount of hot water used in steaming the bathroom is an expense that hotels would like to eliminate.

[0004] U.S. Patent No. 5,123,266, to Tabraham (hereinafter the "Tabraham Patent") discloses one effort at trying to alleviate the problem that business travelers experience with wrinkled clothes. The Tabraham Patent is directed to a wall-mounted steamer that is installed in a closet of a hotel room. A business traveler may apply steam generated from the steamer to remove wrinkles in the clothes. The steamer is secured to a wall and includes a housing that is filled with water. A heating element is provided in the lower part of the housing. The heating element heats all of the water in the container a sufficient amount to generate steam. The steam flows out of the housing, along a flexible hose, to a nozzle. The business traveler may apply the steam exiting the nozzle to wrinkled clothes in an effort to remove the wrinkles.

[0005] One problem with the steamer disclosed in the Tabraham Patent is that the entire container of water must be heated so as to generate steam. Heating the entire container may result in a waste of energy, especially if the user only plans to use a small amount of steam. In addition, heating all of the water in the container takes time. A user may be frustrated while waiting, and may decide to utilize other options, such as placing the clothes in a steamed-filled bathroom as described above.

[0006] A second problem with the steamer disclosed in the Tabraham Patent is that the container is attached to the wall, and includes a fill cap at its top for topping off the water in the container. Because all the water in the container is heated, to be safe, a user would have to wait until the container cools before removing the fill cap and adding water. In addition, a user must fill the container using a separate water vessel, such as a pitcher, which may not be readily available, and may result in spillage.

SUMMARY OF THE INVENTION

[0007] The present invention provides an improved steamer. The steamer is preferably hung in an upright fashion, such as on an interior wall of a closet, for example in a closet in a hotel room. Steam is generated in an enclosure using components that almost instantly flash water to steam. A hose is connected to the enclosure. A wand having steam nozzles is connected to the distal end of the hose. Steam generated within the enclosure travels along the hose to the wand, and is applied by a user to an item (e.g., wrinkled clothing).

[0008] When a user desires steam, the user turns on the steamer, which preheats a steam generator to a steam-producing temperature. The steam generator is preferably located inside the enclosure so as to prevent a user's contact with the steamer. An indicator light or the like signals that the steam generator is heated to the steam-producing temperature.

[0009] Once the steam generator is ready, the user actuates the production of steam, for example by pressing a button on the wand. A pump draws water out of a water tank and to the steam generator. The steam generator flashes the water to steam, thus producing an instant supply of steam. The steam runs out of the steam generator, through the hose to the wand. The steam may be applied, for example, to clothes so as to remove wrinkles in the clothes.

[0010] In accordance with one aspect of the present invention, the steamer includes a removable water tank that can be easily refilled by a user. The removable water tank fits in a bottom of the enclosure.

[0011] The present invention is advantageous in that steam may be produced as soon as the steam generator is preheated, which may be, for example, in a minute or less. In addition, water remains unheated until it is pumped into the steam generator. In this manner, water that is not steamed is not heated, so there is relatively little waste of energy. In addition, by not heating the water in the water tank, the water tank may be refilled even while the steam generator is hot.

[0012] Other advantages will become apparent from the following detailed description when taken in conjunction with the drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

FIGURE 1 is a bottom, right perspective view of a steamer made in accordance with the present invention, with a hose for the steam generator shown

wound around an enclosure for the steam generator, and a wand for the steam generator shown mounted on the front of the steam generator;

FIG. 2 is a front view of the steam generator of FIG. 1;

FIG. 3 is bottom, right perspective view of the steam generator of FIG. 1, similar the perspective view of FIG. 1, with the hose unwound from the enclosure and the wand removed from the enclosure, and showing a removable water tank in phantom;

FIG. 4 is an exploded perspective view of the steamer of FIG. 1;

FIG. 5 is rear perspective view of the water tank for the steamer of FIG. 1;

FIG. 6 is a cutaway view showing the connection of the water tank to the enclosure;

FIG. 7 is a partial cutaway view of the hose for the steamer;

FIG. 8 is a rear perspective view of a steam generator for use in the steamer of FIG. 1;

FIG. 9 is perspective view showing two halves of the steam generator of FIG. 8;

FIG. 10 is cutaway view of the steam generator of FIG. 8, taken along the section lines 10-10 of FIG. 8;

FIG. 11 is a partial cutaway, perspective view of a dual latch assembly that may be used in the steamer of FIG. 1; and

FIG. 12 is a representation of the steam generation process in accordance with the present invention.

DETAILED DESCRIPTION

[0014] Referring now to the drawing, in which like reference numerals represent like parts throughout the several views, FIG. 1 shows a clothes steamer 20 incorporating the present invention. The clothes steamer 20 is designed to be hung in an upright fashion (FIG. 2), and is preferably mounted in a convenient, but conspicuous location. The clothes steamer 20 may be mounted, for example, on an interior wall of a closet, such as in a closet in a hotel room. However, as is shown in FIG. 3, the steamer may also be mounted in a horizontal fashion, or may be placed on a floor. If desired, the steamer may also be made portable, such as by adding wheels. However, for ease of description, the clothes steamer 20 is described as being configured for mounting on a wall or other surface and in the position shown in FIG. 2. It can be understood that if the steamer is designed to be used in other configurations, the components may need to be arranged and configured accordingly so as to take into account factors such as gravity and heat dissipation.

[0015] Briefly described, the clothes steamer 20 includes an enclosure 22 that houses components for generating steam. A hose 26 is connected to the enclosure 22. A wand 24 having steam nozzles is attached to the distal end of the hose 26. In storage, the hose 26 is wrapped around the enclosure 22 and the wand 24 is seated against the front of the enclosure 22.

[0016] To use the clothes steamer 20, the wand 24 is removed from the front of the enclosure 22, and the hose 26 is unwrapped from the perimeter of the enclosure. The wand 24 may then be extended to an object to be steamed, such as is shown in FIG. 3. Steam is generated within the enclosure 22 and flows through the hose 26 to the wand 24, where it exits through the nozzles. The steam may be applied, for example, to clothes so as to remove wrinkles in the clothes. A refillable water tank 28 is provided at the bottom of the enclosure 22 so that a user may replenish the supply of water for the clothes steamer 20.

[0017] Turning now to a more detailed description of the clothes steamer 20, as can be seen in FIG. 4, the enclosure 22 includes a front housing 30, a rear housing 72, and a back attachment panel 80. The back attachment panel 80 is attached to a wall or other surface, and the rear housing 72 is mounted on the back attachment panel. The front housing 30 fits over the rear housing 72, and the components for generating steam are mounted in closed space formed between these two housings.

[0018] The front housing 30, the rear housing 72, and the back panel 80 are preferably formed of plastic, but may be formed of other materials as desired. In addition, the enclosure 22 may be provided in any number of different shapes, but in the embodiment shown in the drawings is a rounded, teardrop shape. Although the enclosure shown is sealed, the enclosure may include vents or may be partially enclosed. However, for safety, it is preferred that the components for generating steam not be exposed so that a user may not accidentally contact the components when they are hot.

[0019] Preferably, in accordance with one aspect of the present invention, the front housing 30 is designed so that the water tank 28 may fit into the bottom of the front housing 30. To this end, the front housing 30 includes a receptacle 32 at its lower half that receives the water tank 28. Also preferably, the wand 24 fits over the water tank 28 and part of the front housing 30, permitting the wand to be easily accessible from the front of the enclosure 22.

[0020] Just below the receptacle 32 for the water tank 28 is an indentation 34 that is configured to receive a dual latch mechanism 36. The dual latch mechanism 36 is configured to lock the water tank 28 into place and to lock the wand 24 over the water tank. Details of the dual latch mechanism 36 are shown in FIG. 11. The dual latch mechanism 36 includes outer buttons 37 that are fixed to rotate with a wand-retaining pin 38. The wand-retaining pin 38 fits into a notch (not shown) on the bottom of the wand 24. To store the wand 24, the upper edge of the wand is hooked under a notch 35 (FIG. 4) in the front housing, and the wand retaining pin 38 is locked into the notch on the bottom of the wand, thus maintaining the wand in place against the enclosure 22. Actuating (i.e., pressing down upon) the outer buttons 37 causes the

wand-retaining pin 38 to rotate out of the notch on the bottom of the wand 24, releasing the wand from the top of the enclosure. The outer buttons 37 are fixed for movement with one another, so either or both of the buttons may be actuated to release the wand 24.

[0021] The dual latch mechanism 36 also includes an inner button 39 that is fixed to rotate with a pair of water tank retaining pins 40. The water tank retaining pins 40 fit into a pair of notches 41 (FIG. 3) on the bottom of the water tank 28, and maintain the water tank in place in the receptacle until the inner button 39 is actuated. Actuating the inner button 39 causes the water tank retaining pins 40 to rotate out of the notches in the bottom of the water tank 28, thus releasing the water tank from the receptacle 32.

[0022] A concave opening 42 (best shown in FIG. 3) is provided on the front side of the front housing, above the receptacle 32. In storage, the wand 24 is seated in a position that is centered above the concave opening 42. The concave opening 42 is configured so that a user may grasp the wand 24 with minimal finger interference. As is further described below, the front of the water tank 28 also includes a concave front indentation 54 (FIG. 4) that permits easy access to the wand 24.

[0023] A switch panel 43 (FIG. 4) is located at the front, top portion of the front housing 30. The switch panel 43 includes a central hole 44 that receives an on/off button or switch 45. The on/off switch 45 is used to turn on and off heating components (described below) within the clothes steamer 20.

[0024] A number of indicators may be provided on the outside of the enclosure 22. For example, in the embodiment shown in the drawings, an indicator light 46 is provided on a ring around the on/off switch 45. The indicator light 46 is used to signal that the heating components are "on." A second indicator light 47 may also be provided on the ring, for indicating that the heating components are prepared to generate steam. A third indicator light 48, also located on the ring, may be provided to signal that water is low in the water tank 28. The indicators 46, 47, 48 may be arranged in different locations, such as on the enclosure 22 for the clothes steamer 20, or on a panel (not shown) that is separate from the clothes steamer. Indicators for other functions may also be provided as desired. In addition, indicators may be provided in forms other than an indicator light, such as, for example, via a whistle, a recording of a human voice, or a flashing light.

[0025] As shown in FIG. 4, the front side of the water tank 28 includes a handle 50 having at its outermost projection a wand rest 52. The handle 50 extends horizontally and is centered in the concave front indentation 54 of the water tank 28. The concave front indentation 54 and the handle 50 are preferably arranged and configured to allow a user to grasp the wand 24 when the wand 24 is seated on the wand rest 52. That is, the concave front indentation 54 permits room for the fingers to extend around the wand 24 when the wand is seated on the wand rest 52. The user's hand may grasp the wand 24 below or above the handle 50 for the water tank 28. If the user grasps the wand 24 above the handle 50, then the user's hand may also extend partly, or even fully, into the concave opening 42 on the front housing 30.

[0026] The water tank 28 also includes a latch indentation 56 at its lower, central front edge. The latch indentation 56 is configured to receive the upper portion of the dual latch mechanism 36, and to permit a user to access the dual latch mechanism with minimal interference.

[0027] A threaded opening 58 extends out the back, top left side of the water tank 28 (FIG. 5) . As further described below, the water tank may be filled through the threaded opening 58. A female-threaded cap 60 is provided for fitting onto the threaded opening 58. The threaded opening 58 is located in a cutout 61 on the back side of the water tank 28. The cutout 61 permits the water tank 28 to be placed within the receptacle 32 in the front housing 22, without the cap 60 engaging the rear wall of the receptacle.

[0028] An exit nipple 62 extends out of the back, top right side of the water tank 28. As is further described below, the exit nipple 62 is designed to seat within a fitting 64, which in turn is positioned within a hole 66 (FIG. 4) at the back, upper right corner of the receptacle 32 in the front housing 30. The fitting 64 includes a lip 68 (FIG. 5) at its front end, and tapers downward in cross-section to a distal portion 69 having a relatively constant diameter. The hole 66 is sized so that the fitting 64 extends into the hole and the front lip 68 is seated against the outer surface of the receptacle 32 (FIG. 6).

[0029] As shown in FIG. 6, a tube 70 begins at the end of the exit nipple, extends through the exit nipple 62 and into the water tank 28. The distal end of the tube 70 extends down to near the bottom of the water tank 28. The tube 70 permits the majority of water to be drained out of the water tank 28.

[0030] Referring again to FIG. 4, the rear housing 72 includes a horizontal back panel 74 and a flange 76 that extends out of the back panel. The flange 76 surrounds an area on the front side of approximately the top two-thirds of the rear housing 72. This area is closed by the back of the front housing 30, and receives the components for generating steam, which are described below. The hose 26 extends from the area inside the flange out of a hole 78 in the top portion of the flange 76. The flange 76 is cupped so as to form a groove around which the hose 26 is wrapped for storage.

[0031] The back attachment panel 80 includes a flange 72 onto which the rear housing 72 is seated. The flange 27 may include a lock-out (not shown) or similar device for preventing theft of the clothes steamer 20. The back attachment panel 80 includes a hole 84 at its center that fits over a nail or other more permanent, locking protrusion so that the enclosure 22 may be mounted and/or locked onto a wall or another surface.

[0032] Turning now to the components that are used

to generate steam, a pump 90 (FIG. 4) is positioned in the bottom of the area surrounded by the flange 76 of the rear housing 72. As can be seen in FIG. 6, a conduit 92 extends between the pump 90 and the fitting 62. The conduit 92 fits over the distal portion 69 of the fitting 64. The opposite end of the conduit 92 fits onto a fitting 93 at the inlet for the pump 90.

[0033] A tube 94 extends from an outlet of the pump 90 to an inlet of a steam generator 96. The outlet of the steam generator 96 is attached to the hose 26.

[0034] Generally described, the pump 90 draws water from the water tank 28 and pumps the water into the steam generator 96, where steam is generated. The steam flows from the steam generator 96 through the hose 26, and to the wand 24.

[0035] The pump 90 may be, for example, a DC or AC pump, such as a diaphragm pump. Alternatively, any device may be used that can supply water to the steam generator 96. For example, a gravity-fed system, in which a water supply is located above the steam generator 96, may be utilized. However, the arrangement of the components shown in the drawings are advantageous in that the pump 90 and water supply (i.e., the water tank 28) are located below the steam generator 96, and thus are not subject to heat that rises from the steam generator.

[0036] The pump 90 preferably supplies water to the steam generator 96 at a rate that is sufficient so that the steam generator may supply a sufficient amount of steam to the wand 24. To this end, the pump 90 preferably includes a flow regulator 97 (FIG. 12) for controlling the flow of water from the pump to the steam generator 96. The flow regulator 97 may be any type of flow control mechanism, for example, a flow control valve that incorporates the functions of a check valve, a flow sensing device, a minimum flow control and a pressure letdown. Alternatively, the functions of the pump 90 and the flow regulator 97 may be incorporated into one device, such as a metering pump. Applicants have found a sufficient rate of water supply to the steam generator 96 to be 20ml per minute, plus or minus 2ml.

[0037] If desired, the flow of water from the pump 90 to the steam generator may be variable, so that a user may set the amount of steam exiting the wand 24. In such a system, the flow regulator 97 may be adjustable so as to provide variable flow of water from the pump 90. A dial or other mechanism (not shown) may be provided, for example on the wand- 24 or on the enclosure 22, for setting the flow rate of water to the steam generator 96.

[0038] Insulation 98 extends between the pump and the steam generator 96 so that heat generated by the steam generator will not damage the pump 90. Preferably, insulation is also provided around the exterior surfaces of the steam generator 96 so that heat dissipated within the enclosure 22 is minimized, and to maximize thermal efficiency of the steam generator.

[0039] The steam generator 96 is preferably configured and maintained at a sufficient temperature during operation such that it may flash the water flowing from the pump 90 to steam at the rate the water is received. In this manner, only steam (and not fluid water) exits the steam generator 96 and enters the hose 26. Details of the structure of a steam generator 96 in accordance with one embodiment of the present invention are shown in FIGS. 8-10. Referring first to FIG. 8, the steam generator 96 includes an inlet 100 that is connected to the tube 94 leading from the pump 90, and an outlet 102 that is connected to the hose 26. In the embodiment shown in the figures, the steam generator 96 is formed from two halves: a front piece 104 and a back piece 106 (FIG. 9). Each of these pieces 104, 106 is shaped like a five-sided box. The open sides of the boxes formed by the front piece 104 and the back piece 106 are fitted together so as to form an enclosure, inside of which the steam is generated.

[0040] The front piece 104 includes a lower fin 108 that extends horizontally along the length of inside, bottom of the front piece, and an upper fin 110 that extends horizontally approximately along the length of the inside, middle of the front piece. The distal end of the lower fin 108 terminates adjacent to the outer edges of the walls of the front piece 104, but the distal end of the upper fin 110 preferably extends outside of the walls of the front piece. A U-shaped heating element 112 is cast into the front piece. The legs of the U-shaped heating element 112 extend along the length of, and within, the fins 108, 110. The front piece 104 includes a block 114 at one end that extends between the fins 108, 110 and that receives the rounded portion of the U-shaped heating element 112.

[0041] The fins 108, 110 are separated approximately midway along their length, and a wall 116 is positioned between the separated sections. The wall 116 extends between the upper and lower surfaces of the front piece 104, and preferably extends outward so as to align with the outer edges of these two walls.

[0042] The general configuration of the back piece 106 is essentially a mirror image of the front piece 104, in that the back piece includes two fins 120, 122 that extend horizontally along its length, and a heating element 124 that is received within the fins and a block 126. However, there are a few differences between the two pieces. First, the distal ends of both of the fins 120, 122 for the back piece 106 preferably extend outside of the walls for the back piece (whereas only the upper fin 110 for the front piece extends outside the walls). Second, as can be seen in FIG. 10, the fins 120, 122 of the back piece 106 are located such that, when the front piece 104 and the back piece 106 are joined, the fins 120, 122 are spaced on opposite sides of the upper fin 110 for the front piece 104. Finally, although the fins of the back piece are separated at approximately their center, and the back piece 106 includes a wall 128 extending from the top of the back piece, the wall for the back piece does not extend all the way to the bottom of the back

piece. Instead, the wall 128 extends down to approximately the bottom of the lower fin 122.

[0043] As can be seen in FIG. 10, when the front piece 104 and the back piece 106 are fitted together, the fins 108, 110, 120, 122 are slightly spaced from one another so that thin channels are formed between the fins. In addition, the walls 116, 128 abut against one another so as to divide the steam generator 96 into two separate sections, an "inlet section," located under the inlet 100, and an "outlet section," located under the outlet 102. Preferably, these walls 116, 128 are sealed, such as by welding, seaming, gluing, a gasket compound, or another suitable method, so that water cannot flow between the abutted edges of the two walls. The inside surfaces of the steam generator 96 are preferably coated with a wetting agent to aid in evaporation of water. Because the wall 128 does not extend to the bottom of the back piece 106, a flow passage 130 is formed in the bottom portion of the back piece 106. The flow passage 130 provides an opening between the inlet and outlet sections of the steam generator 96.

[0044] The fins 108, 110, 120, 122, and the walls 116, 128 define the flow of water and/or steam through the steam generator 96. In use, water is drawn out of the water tank 28 by the pump 90, and is pumped into the inlet 100. The water flows between the fins 108, 110, 120, 122 in the inlet section of the steam generator 96. The offset position of the fins 108, 110, 120, 122 relative to one another defines a serpentine path through which the water must travel, and causes the water to move in a cascading effect to the bottom of the back piece 106, where it is free to flow through the flow passage 130 to the outlet section. The water and/or steam may then move upward through the fins 108, 110, 120, 122 in the outlet section of the steam generator 96. The serpentine path increases the likelihood that water flowing through the steam generator 96 will come into contact with a heated surface and will be flashed into steam.

[0045] The heating elements 112, 124 may be formed of any material that generates heat, but preferably are formed of a conductive material having a resistance such that when electricity is passed through the heating elements, the heating elements generate heat. In one embodiment, the heating elements 112 are six hundred (600) Watt heating elements. The front piece 104 and the back piece 106 are preferably formed of a thermally conductive material, e.g., die cast aluminum or steel. Thus, when the heating elements 112, 124 are heated, the fins and the walls of the front piece 104 and the back piece 106 are also heated. As an alternative to the described embodiment, the front piece 104 and the back piece 106 may be formed out of heat producing materials (such as heating elements), or heat may be applied to the front and back pieces from an external source (e. g., through conduction or convection). In addition, the steam generator 96 may be provided in a variety of different shapes that provide the functions of the steam generator 96.

[0046] The narrow channels between the fins 108, 110, 120, 122 provide a large surface area, and a tight travel space, for water flowing through the steam generator 96. In addition, the cascading effect caused by the serpentine path defined by the fins 108, 110, 120, 122 causes turbulence in the water flow, maximizing the chance that most of the water comes into contact with the interior of the steam generator 96 and is quickly converted to steam. These combined structural features, plus a sufficient heating temperature of the steam generator 96, cause water entering the heated steam generator to flash almost instantaneously to steam.

[0047] In accordance with one embodiment of the present invention, the steam generator 96 generates sufficient heat and the flow of water is at a sufficient rate so that, by the time the water has hit the flow passage 130 or begins its travel up the outlet section of the steam generator, the majority or nearly all of the water has turned to steam. By doing so, the pump does not have to supply sufficient pressure to pump liquid water up the opposite side of the walls 116, 128, but instead can rely on the water having converted to steam so that it will freely flow out of the steam generator 96.

[0048] It can be understood that the probability of all water converting to steam by the time the water reaches the bottom of the steam generator 96 increases with an increased temperature of the walls and fins 108, 110, 120, 122 of the steam generator. However, if the temperature is too hot, the enclosure may be damaged and/or energy may be wasted. Applicants have found that by maintaining the heat of the steam generator 96 in the range of 300 to 425 degrees Fahrenheit, and by supplying water to the steam generator at a rate of 20ml per minute (plus or minus 2 ml), the goals of supplying adequate steam and converting a majority of water to steam before it reaches the outlet section are met. To this end, a thermostat 138 (FIG. 12) is provided that maintains the temperature at this range during operation. The thermostat may, for example, shut off the steam generator when it exceeds 350 degrees Fahrenheit, and turn it back on when it reaches 300 degrees. Although the temperature range described above is exemplary for the described embodiment, temperature and/or water flow variations may be needed based upon a number of factors, including, but not limited to, the thermal conductively of the materials used for construction of the steam generator 96, the amount of steam desired, the contour of the inside of the steam generator, the temperature of the water entering the steam generator, the pressure of the water entering the steam generator, the size of the steam generator, the spacing between the fins (if fins are used), and the size and offset of the fins. Other factors may vary the preferred operating temperature if, for example, a different configuration is used for the steam generator.

[0049] FIG. 7 shows a cutaway of the hose 26. The outer shell of the hose 26 preferably is a corrugated tubing 140 having flexibility and at least minimal insulating

properties. The corrugated tubing 140 may be made of plastic or nylon, for example. Inside the corrugated tubing 140 is an inner tubing 142 through which the steam flows, which may be for example, made of silicon rubber or another material that does not exhibit much thermal conductivity, and that is capable of withstanding the high temperatures that are associated with transferring the steam from the enclosure 22 to the wand 24.

[0050] Electrical hookup wires 144 extend the length of the hose 26 and are embedded in the corrugated tubing 140. The electrical hookup wires 144 extend into the wand 24. The function of the electrical hookup wires 144 is described below.

[0051] As can be seen in FIG. 3, the wand 24 includes a handle portion 150 and a nozzle portion 152. A button 154 is provided for initiating flow of water from the pump 90 to the steam generator 96, thus causing steam to be formed and permitting the steam to exit out of the nozzle portion 152, as indicated by the arrows 156 in FIG. 3. The button 154 is connected to the enclosure by the electrical hook-up wires 144 .

[0052] The operation of the clothes steamer 20 is now discussed with reference primarily to FIG. 12. A user that desires to use the clothes steamer 20 presses the on/off button 45 on the front of the enclosure 22, which starts heating of the steam generator 96. The indicator 46 lights to signal that the steam generator 96 is heating. Applicants have found that the steam generator 96 described herein heats to an adequate temperature to produce steam in less than a minute. It can be understood that if higher wattages are used for the heating elements 112, 124, a steam-producing temperature may be reached at a faster rate.

[0053] After the steam-producing temperature has been reached, the indicator 47 lights to signal that the clothes steamer 20 is ready to produce steam. The thermostat 138 may cut power to the heating elements 112, 124 when the steam generator 96 reaches a particular temperature, and may restore power when the steam generator falls below another temperature, as described above. The user presses the button 39 to release the wand 24, while the user's free hand grasps the wand. Pressing the button 39 causes the wand-retaining pin 38 to rotate and release the bottom end of the wand 24. The wand 24 may then be removed by the user and may be positioned adjacent to a target (e.g., wrinkled clothing).

[0054] The user presses the button 154 on the side of the wand. The button starts operation of the pump 90, which in turn pumps water through the flow regulator 97 and into the steam generator 96. The steam generator 96, which is at the temperature for generating steam, flashes the water to steam. The steam flows from the steam generator through the hose 26 and to the wand 24, and out of the nozzle portion 152 of the wand.

[0055] The user may at any time release the button 154 and the pump 90 stops the flow of water to the steam generator 96. Alternatively, the button 154 may lock to an "on" position upon the first actuation, and pressing the button a second time may shut off the pump 90. The steam generator 96 finishes flashing the water located therein, which is minimal, because the water entering the steam generator is flashed to steam almost immediately. In this manner, only the water that is converted to steam is heated by the steam generator 96. Thus, energy is not wasted in heating water that is not to be steamed or in creating steam that is not used.

[0056] If the user desires to replenish the water supply for the clothes steamer 20 (for example, because the indicator 48 signals that the water level is low), the user may depress the buttons 37 to release the water tank 28. Pressing the buttons 37 causes the water tank retaining pins 40 to rotate, releasing the water tank from the receptacle. The user grasps the water tank 28 by the handle 50 and removes the water tank from the enclosure 22. The user then unscrews the cap 60, fills the water tank 28 with water, and replaces the cap on the threaded connection 58. The water tank 28 may then be placed back within the receptacle 32 in the front housing 30.

[0057] The water tank 28 may be filled before each use of the clothes steamer 20. In addition, and importantly, because the water in the water tank 28 is not heated during steam production, the user may safely remove and refill the water tank 28 even while the steam generator is at the steam-producing temperature.

[0058] Other alternatives are within the spirit of the present invention. Thus, while the invention is susceptible to various modifications and alternative constructions, a certain illustrated embodiment thereof is shown in the drawings and has been described above in detail. It should be understood, however, that there is no intention to limit the invention to the specific form or forms disclosed, but on the contrary, the intention is to cover all modifications, alternative constructions, and equivalents falling within the spirit and scope of the invention, as defined in the appended claims. For example, although the invention is described with reference to be used as a clothes steamer 20, the features of the present invention may be incorporated into a device for use in steaming a number of items, for example, for steaming wallpaper for its removal. However, the described configuration is advantageous for use as a clothes steamer, because of, inter alia, its compact design, ability to instantly produce steam, storage of water away from the steam generating heat source, and inexpensive manufacture.

Claims

1. A steamer comprising:

a source of a flow of water;
a steam generator configured to receive the flow of water and convert it to steam; and

an applicator configured to receive the steam from the steam generator and to direct it toward an object.

2. The steamer of claim 1, wherein the source of the flow of water is a pump.

3. The steamer of claim 2, wherein the steam generator and the pump are mounted in an enclosure.

4. The steamer of claim 1, wherein the steam generator is mounted above the pump.

5. The steamer of claim 1, further comprising a removable water tank connected to the pump and configured so that the pump draws water from the water tank to create the flow of water.

6. The steamer of claim 5, wherein the steam generator is mounted above the water tank.

7. The steamer of claim 1, wherein the applicator includes a switch for starting the flow of water.

8. The steamer of claim 1, wherein the object is clothing.

9. The steamer of claim 1, further comprising a flow regulator for maintaining a substantially constant rate of the flow of water.

10. The steamer of claim 9, wherein the flow regulator is adjustable so that the substantially constant rate of flow of water is variable by a user.

11. The steamer of claim 9, wherein the substantially constant rate is between approximately 18 to 22 ml per minute.

12. The steamer of claim 1, wherein the steam generator comprises an inlet and an outlet, the flow of water from the pump entering the inlet and the outlet extending to the applicator, and wherein the steam generator operates at a temperature and comprises a configuration such that the flow of water is converted to steam prior to reaching the outlet.

13. The steamer of claim 12, wherein the steam generator comprises inner surfaces that are heated during operation, and wherein the heated surfaces define a serpentine flow path between the inlet and the outlet.

14. The steamer of claim 13, wherein the serpentine flow path travels downward from the inlet to a location, and upward from the location to the outlet.

15. The steamer of claim 13, wherein the inner surfaces are heated during operation of the steamer to an operating temperature between approximately 300 to 425 degrees Fahrenheit.

16. The steamer of claim 15, further comprising a thermostat to maintain the operating temperature.

17. A steamer comprising:

a steam generator configured to receive a flow of water and convert it to steam, the steam generator comprising:

an inlet for receiving the flow of water;
an outlet;
a temperature control mechanism for maintaining the steam generator at an operating temperature range;
an internal configuration such that, when the steam generator is within the operating temperature range, the flow of water is converted to steam prior to reaching the outlet.

18. The steamer of claim 17, wherein the flow of water is received at a substantially constant rate.

19. The steamer of claim 17, wherein the temperature range is between approximately 300 and 324 degrees Fahrenheit.

20. The steamer of claim 17, wherein the internal configuration of the steam generator comprises inner surfaces that define a serpentine flow path between the inlet and the outlet.

21. The steamer of claim 20, wherein the serpentine flow path travels downward from the inlet to a location, and upward from the location to the outlet.

22. The steamer of claim 17, wherein the steam generator comprises a thermally conductive material having at least one heating element cast therein.

23. The steamer of claim 22, wherein the steam generator comprises two pieces, each of the two pieces having a heating element cast therein, and the two pieces being joined to form the steam generator.

24. The steamer of claim 23, wherein the two pieces each comprise fins, the fins of one of the pieces being offset relative to the other, so that when the two pieces are joined, a serpentine path is formed between the fins.

25. The steamer of claim 24, further comprising a wall separating the steam generator into two sections and a passageway between the two sections,

and wherein the inlet is located above one section and the outlet is located above another section.

27. A steamer comprising:

a water reservoir;
a pump in fluid communication with the water reservoir and configured to pump water from the water reservoir out through a pump outlet; and
a steam generator in fluid communication with the pump outlet and configured to receive water pumped from the water reservoir by the pump and to convert the water to steam.

28. The steamer of claim 27, further comprising an attachment point for attaching the steamer to a wall.

29. The steamer of claim 27, wherein the water reservoir is removable and refillable.

30. The steamer of claim 27, further comprising a flow regulator between the steam generator and the pump and for maintaining the flow of water to the steam generator at a substantially constant rate.

31. The steamer of claim 27, wherein the steam generator is mounted above the pump.

32. The steamer of claim 27, wherein the steam generator is mounted above the water reservoir.

33. The steamer of claim 27, further comprising a temperature control mechanism for maintaining the steam generator at an operating temperature range.

34. The steamer of claim 27, wherein the temperature control mechanism is a thermostat.

35. The steamer of claim 27, further comprising a steam applicator connected to the steam generator by a conduit.

36. The steamer of claim 35, further comprising an actuator on the steam applicator for actuating the pump.

37. A clothes steamer comprising:

a structure for mounting on a vertical wall;
a water reservoir attached to the reservoir;
a pump mounted in fluid communication with the water reservoir and configured to draw a flow of water from the water reservoir;
a steam generator configured to receive the flow of water and convert it to steam; and
an applicator configured to receive the steam from the steam generator and to direct it toward clothing.

38. The clothes steamer of claim 37, wherein the water reservoir is removably attached to the structure, whereby a user may refill the water tank.

39. The clothes steamer of claim 37, wherein the steam generator comprises an inlet and an outlet, the flow of water from the pump entering the inlet and the outlet extending to the applicator, and wherein the steam generator operates at a temperature and comprises a configuration such that the flow of water is converted to steam prior to reaching the outlet.

FIG. 1

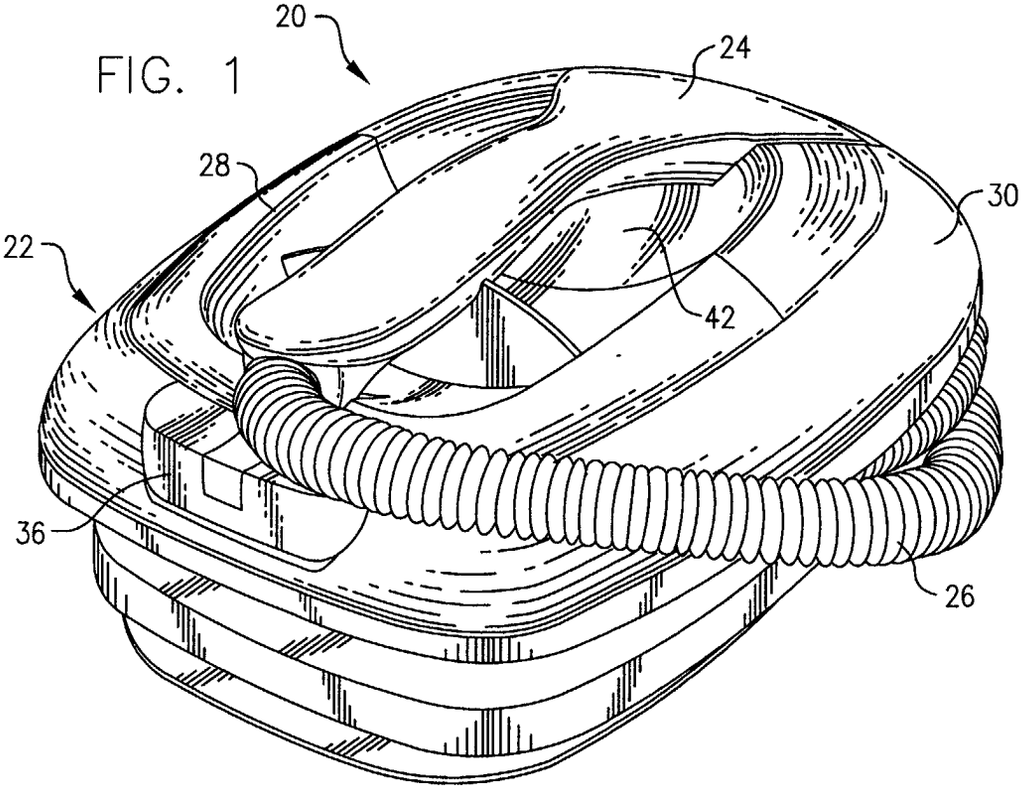


FIG. 5

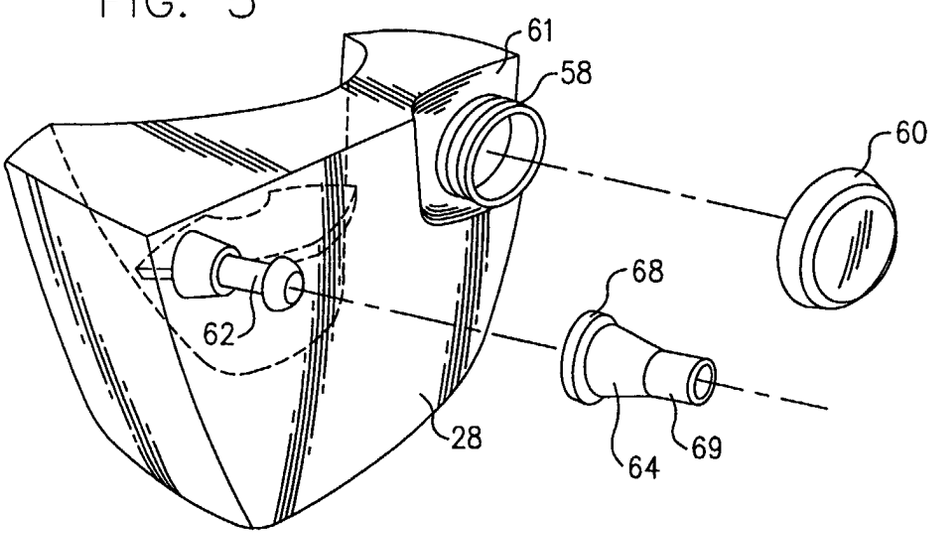


FIG. 2

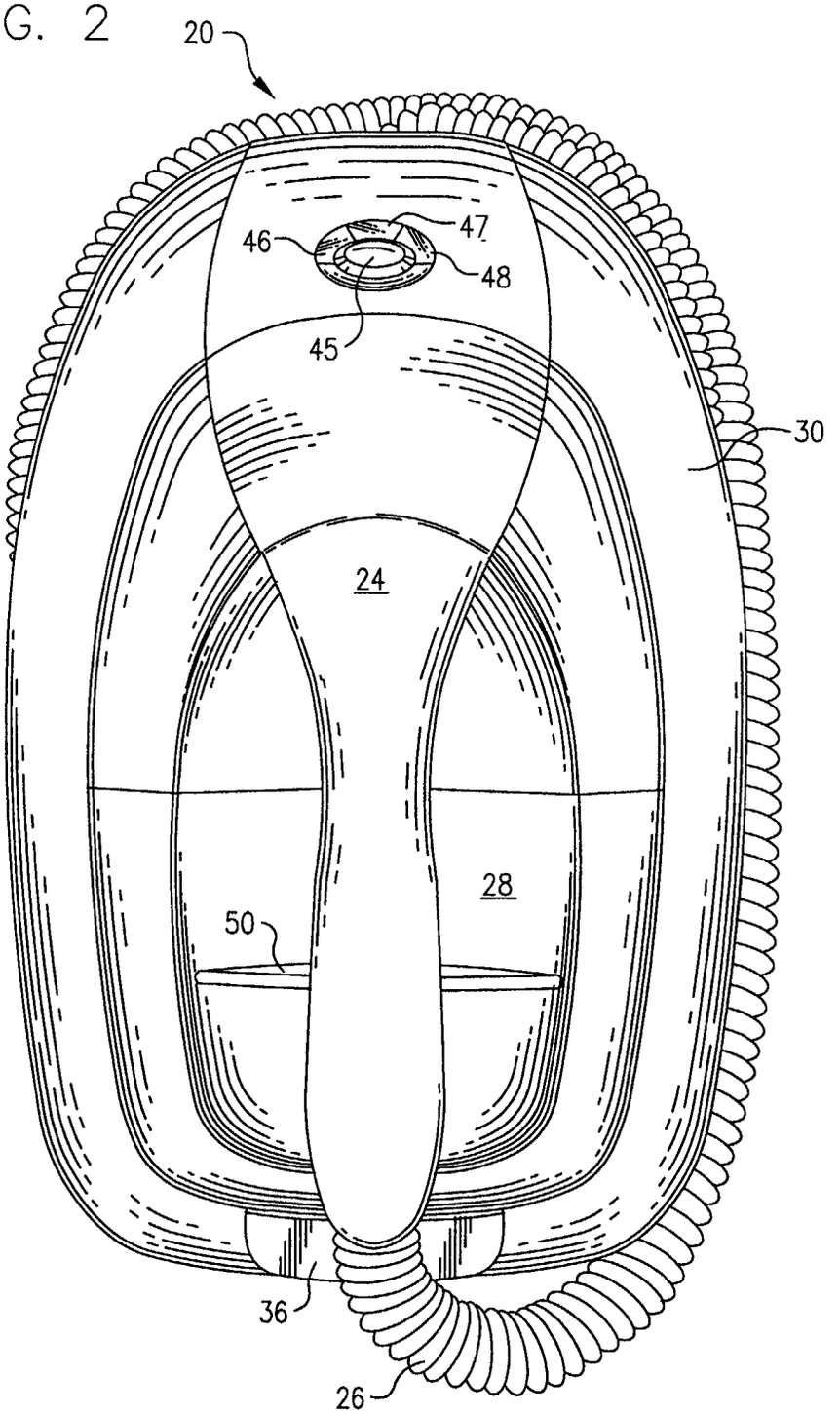
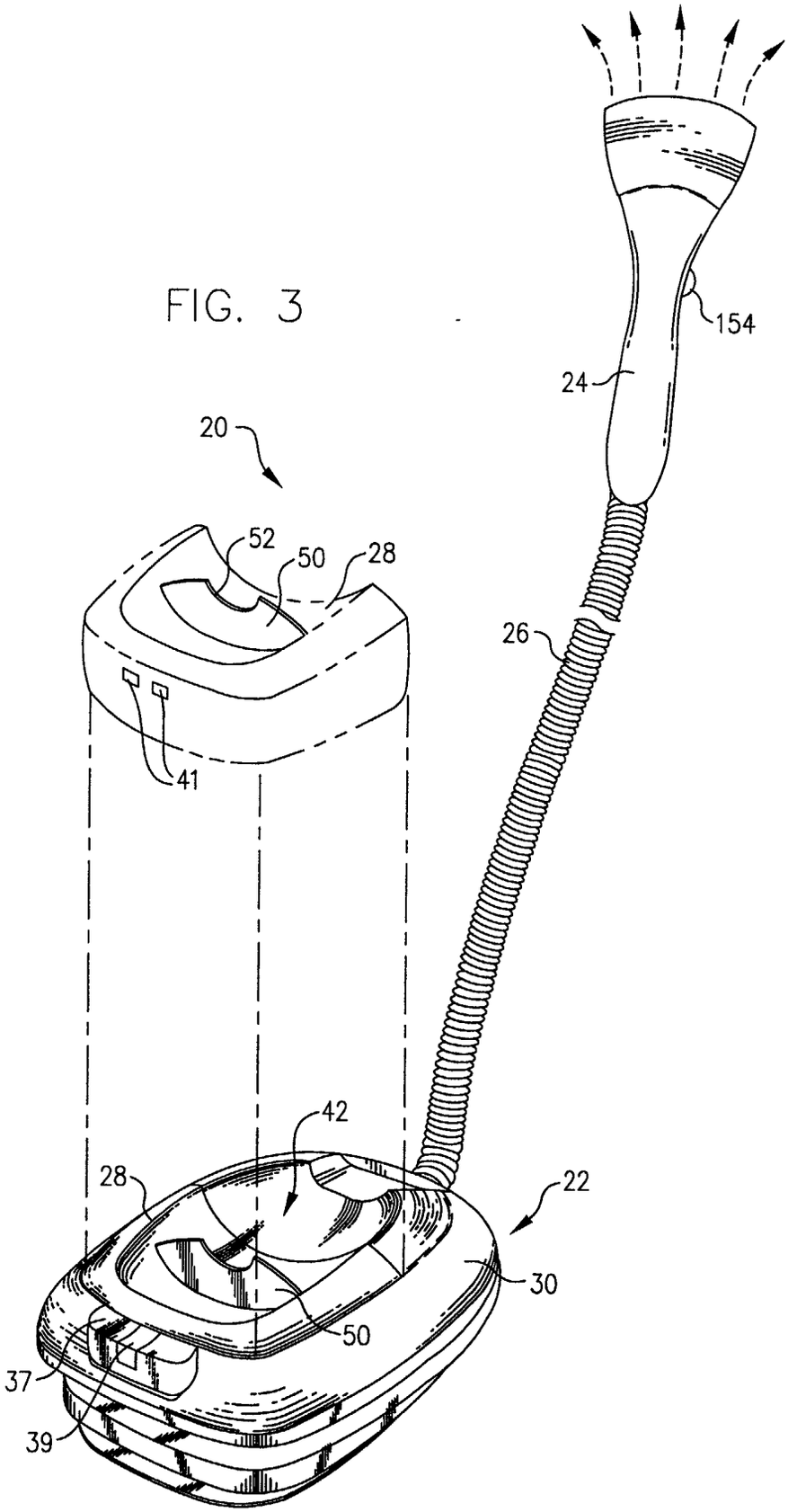


FIG. 3



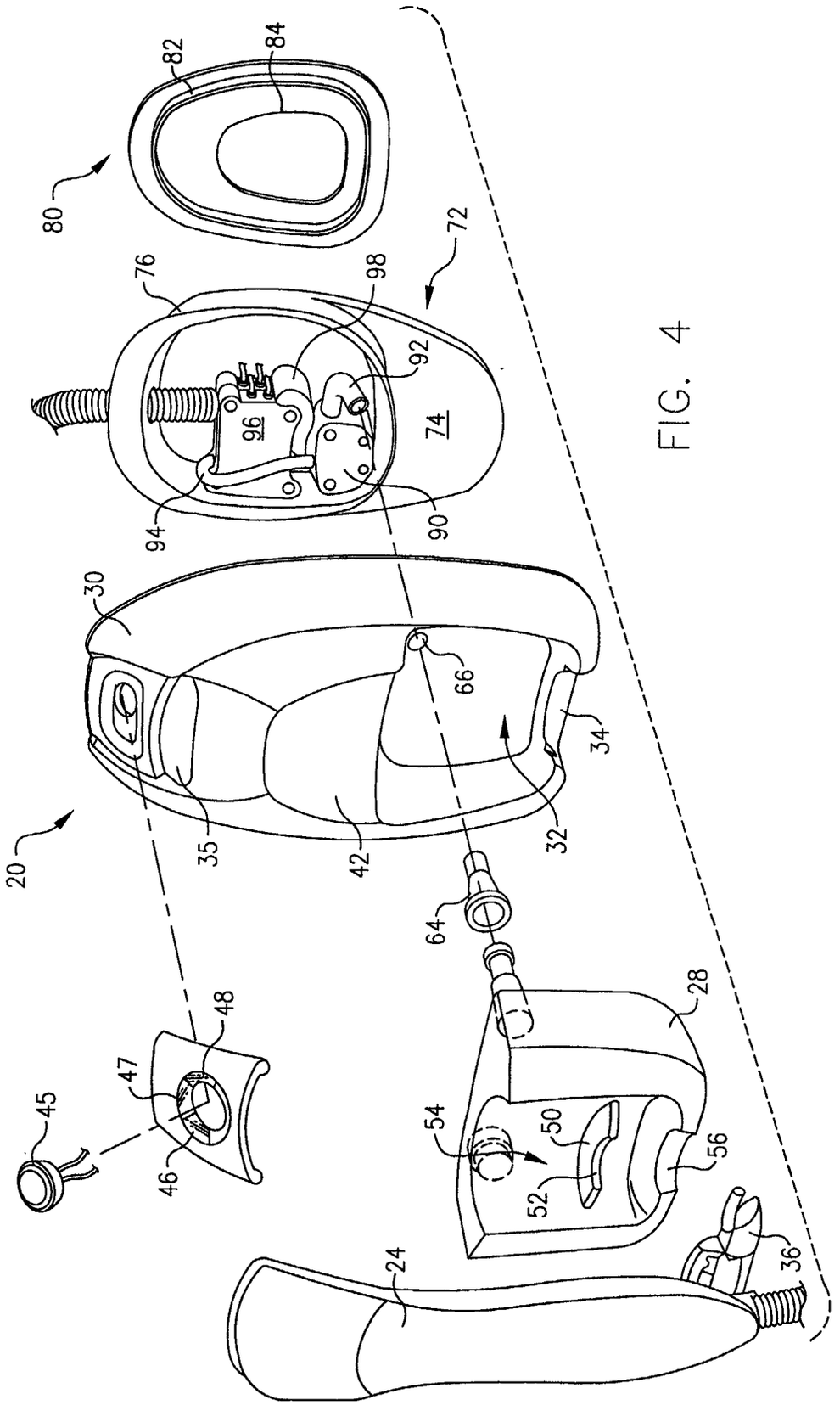

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FIG. 4

FIG. 6

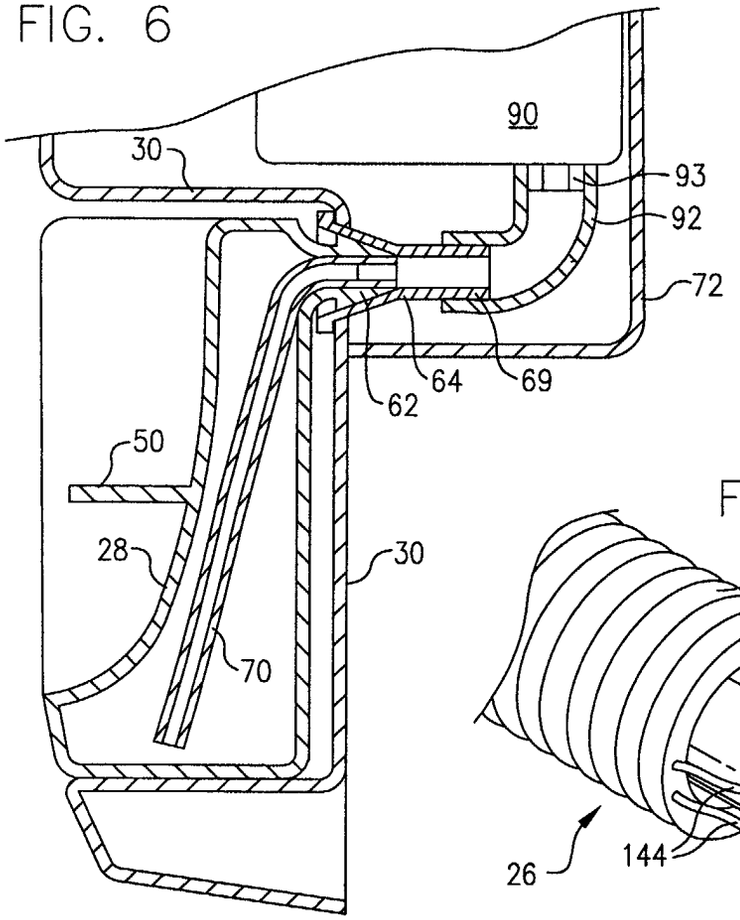


FIG. 7

FIG. 8

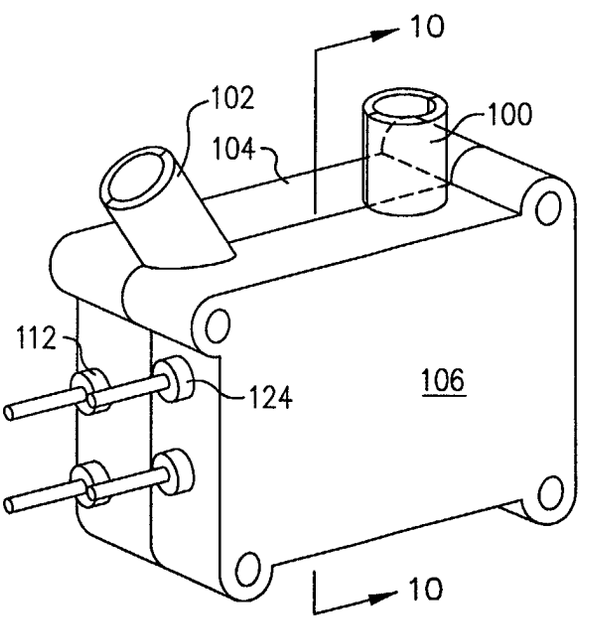
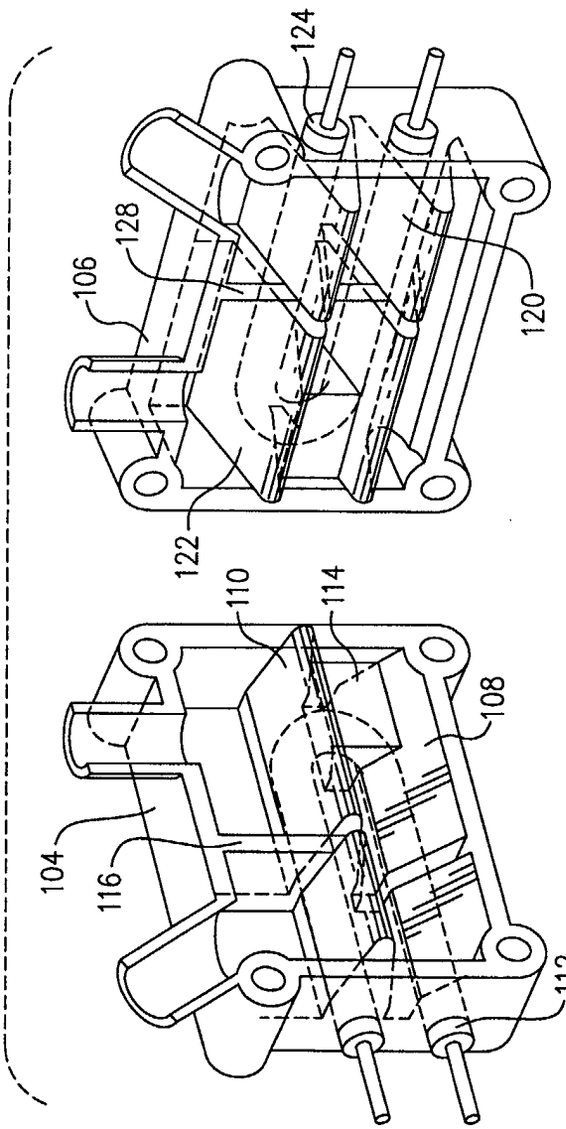


FIG. 9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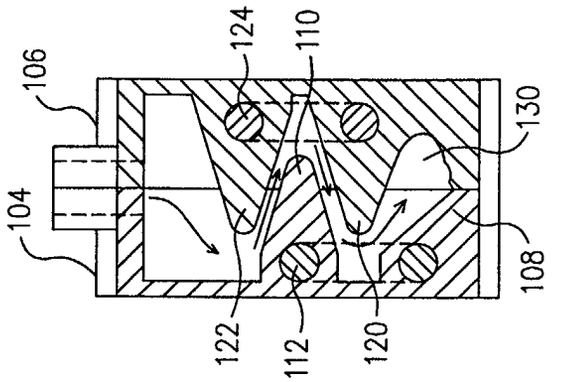
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FIG. 11

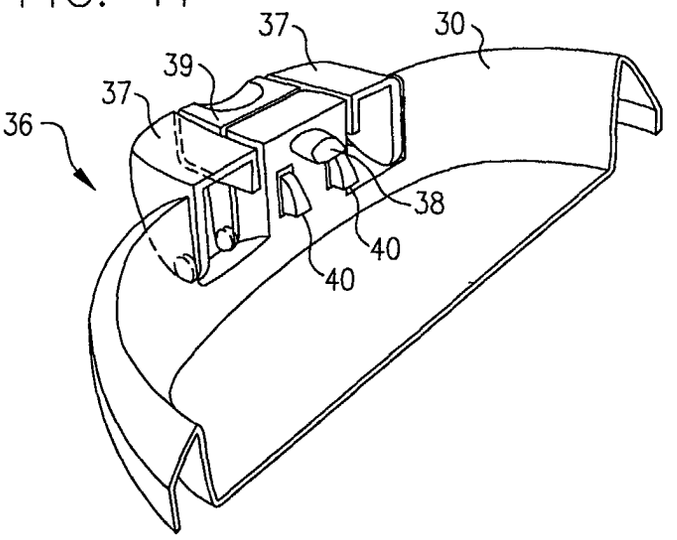
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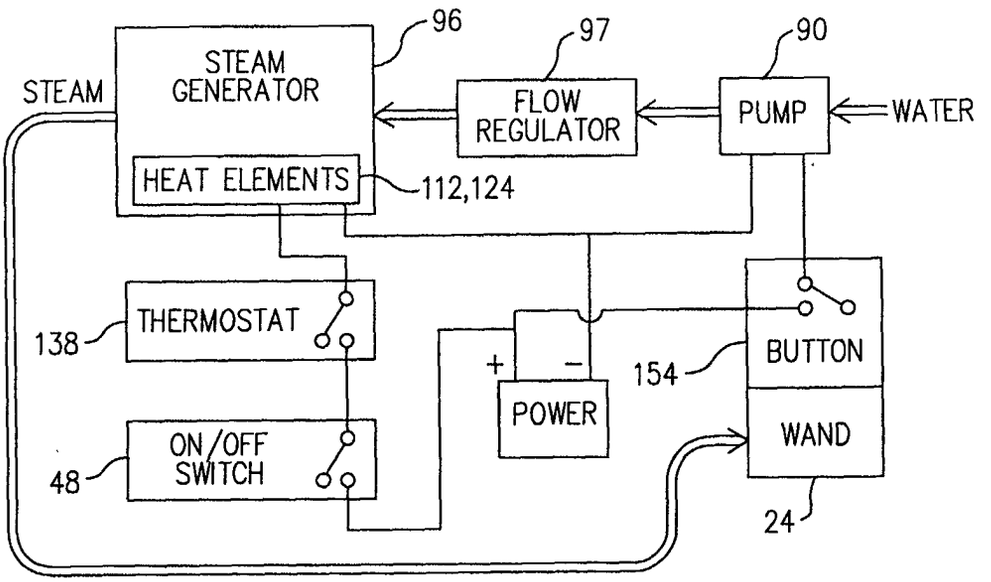
FIG. 12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STEAM
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PUMP
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THERMOSTAT
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+
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BUTTON
154
POWER
WAND
ON/OFF SWITCH
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