United States Patent [19]

Plasko

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[45] **July 3, 1973**

[54] **PORTABLE ELECTRIC HAND-HELD CLOTHES STEAMER**

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[73] Assignee: **Micro Devices Corp.**, Dayton, Ohio

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[52] **U.S. Cl.** **38/69**, 68/222

[51] **Int. Cl.** **A47j 51/00**

[58] **Field of Search** 38/69, 75, 77.8; 68/222

[56] **References Cited**

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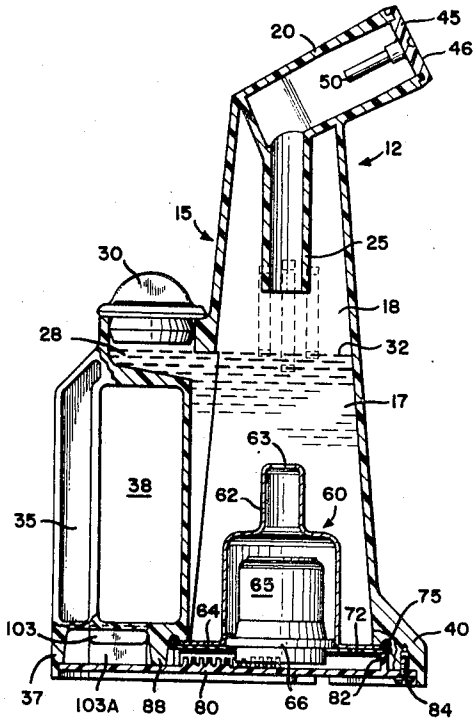
Primary Examiner—Patrick D. Lawson

Attorney—Marechal, Biebel, French & Brugg

[57] **ABSTRACT**

A portable hand-held electric clothes steamer has a one-piece body or housing with an integral fill opening intermediate a water chamber and a combined steam chamber and water trap, the position of the water inlet opening defining the maximum water level. Electric neon indicators are provided for showing when the unit is plugged in and also for showing when the unit has run dry. Provision is made for use of the steamer, in one embodiment, in either domestic or European current.

8 Claims, 11 Drawing Figures



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SHEET 1 OF 2

FIG-1

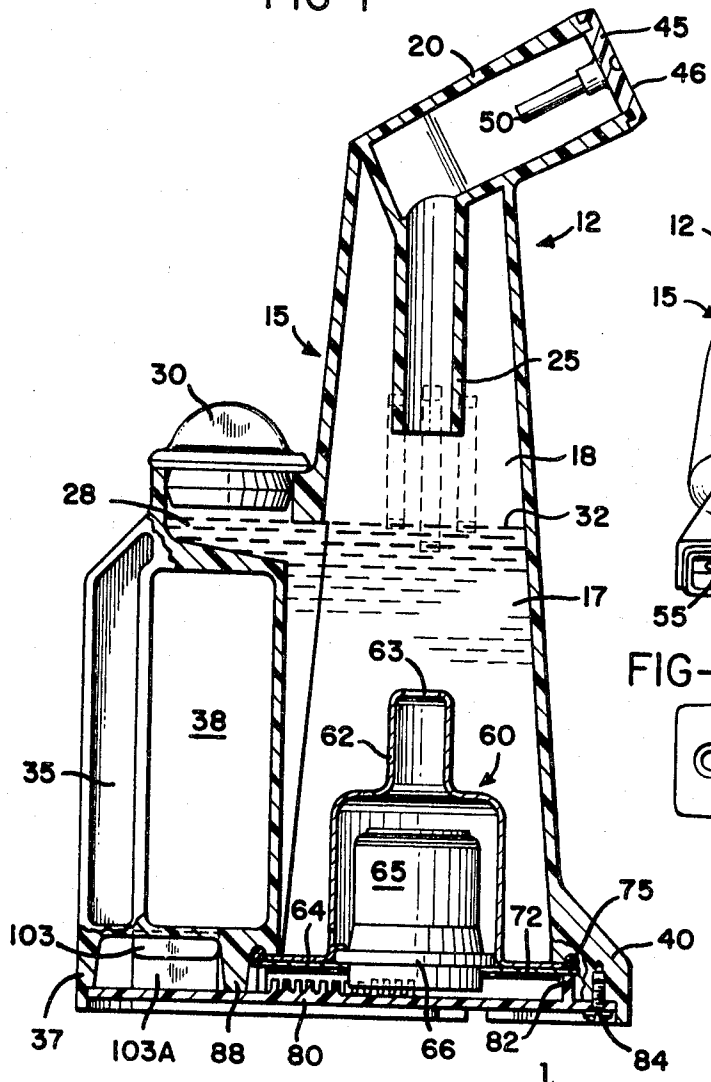


FIG-3

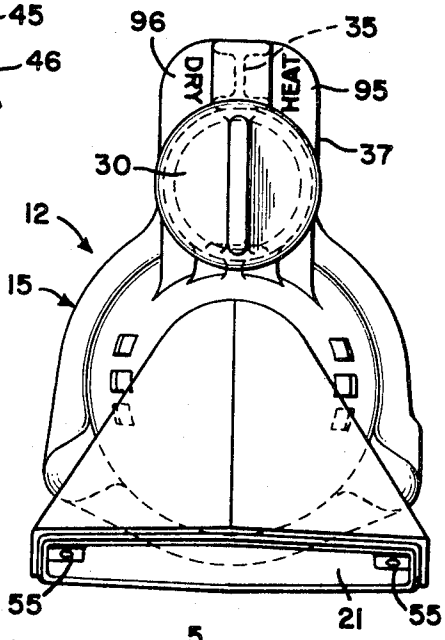


FIG-4

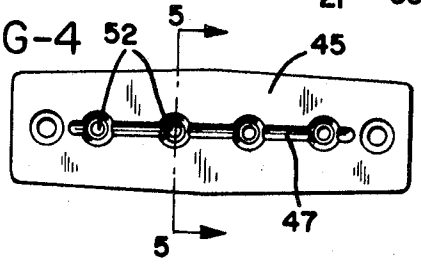


FIG-5

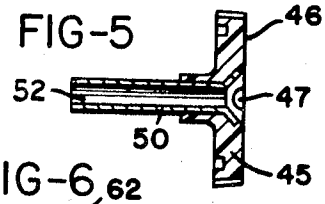


FIG-2

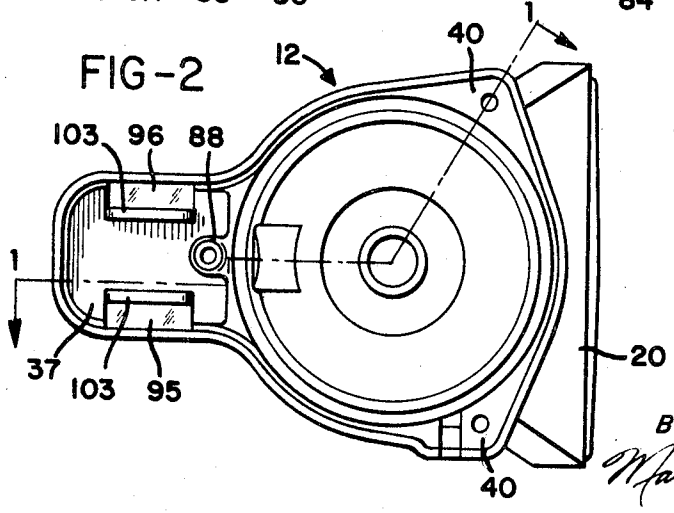
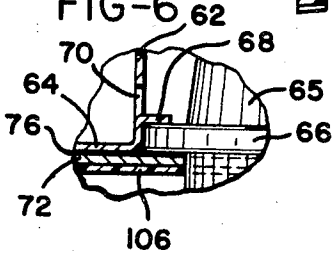


FIG-6



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FIG-7

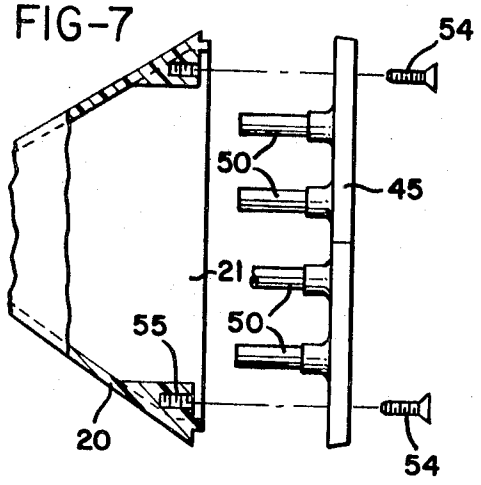


FIG-8

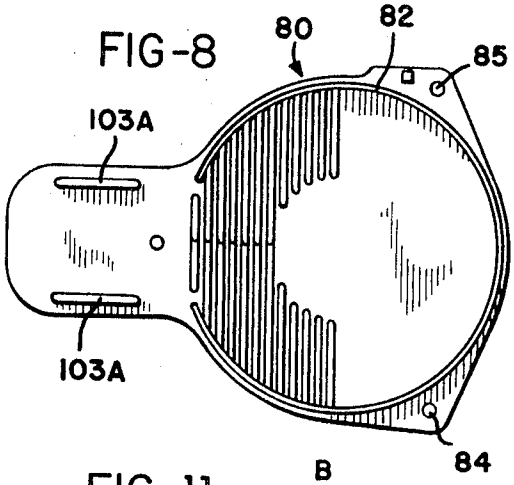


FIG-11

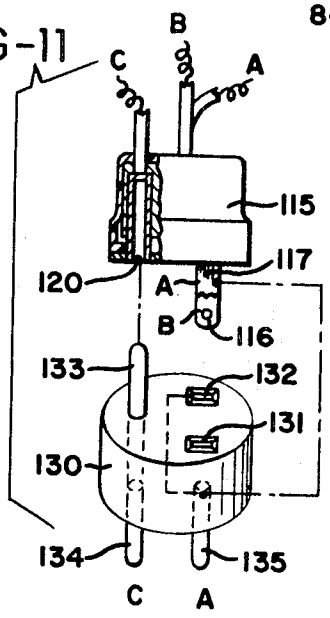


FIG-9

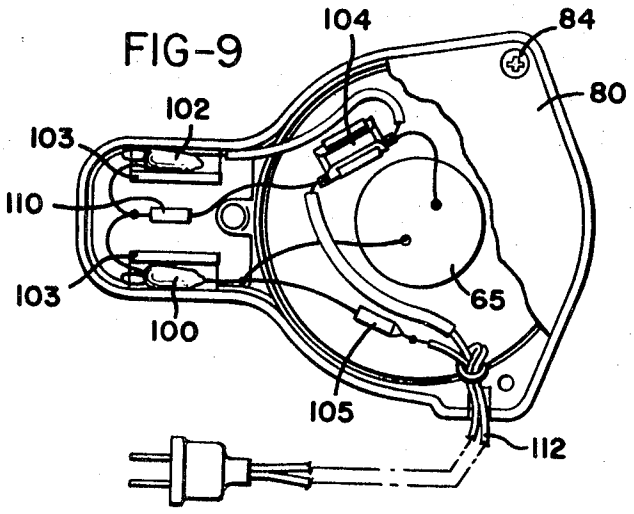
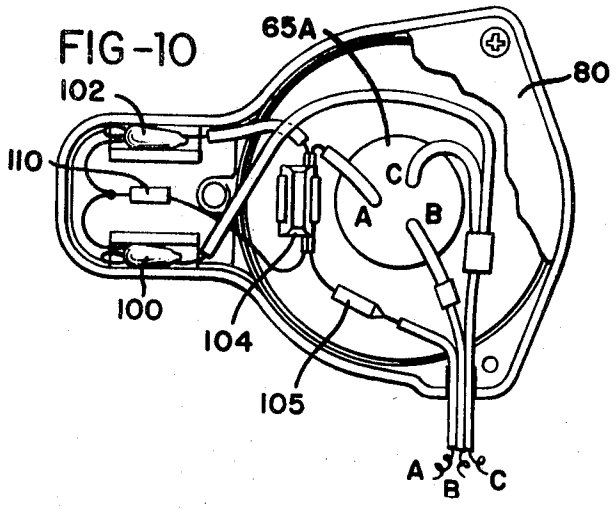


FIG-10



PORTABLE ELECTRIC HAND-HELD CLOTHES STEAMER

BACKGROUND OF THE INVENTION

Small portable electric hand-held clothes steamers are useful in eliminating wrinkles from clothes, particularly for travelers and for persons who do not have time to have their clothes professionally pressed. Examples of such units are shown in U.S. Pat. Nos. 3,395,469, 3,436,851, 3,470,719, 3,485,065 and 3,570,276. Such clothes steamers commonly have a reservoir for containing a quantity of water, an electric heating element for producing steam, a steam-emitting ironing head for applying the steam to the garment, and a water trap to prevent spilling of water if the unit is accidentally tipped onto its side.

Prior steamers as characterized above have suffered from one or more deficiencies which has decreased their usefulness and has contributed to a less than complete acceptance by the public. One such problem resides in the fact that in such prior units it is necessary to fill the water reservoir to a line and is thus necessary to estimate or guage the amount of water added. Overfilling of the reservoir not only results in the unit tending to spit water when used, but also results in water being spilled from the unit if it is accidentally tipped on its side as the amount of water in the reservoir will exceed the capacity of the trap to contain the water.

Further, while it has been customary to provide a thermal relay to disconnect the electric heating element upon the occurrence of an excess temperature rise, such as when the unit is plugged in without water or when it runs dry, it is necessary to observe the absence of steam or to shake the unit to determine an absence of water to determine when the unit is going dry.

A further problem with the prior units is the fact that their construction uses multiple dies and accordingly are relatively expensive to manufacture.

SUMMARY OF THE INVENTION

The present invention is directed to an electric handheld clothes steamer which has an improved one-piece housing which can be injection molded in plastic from a single mold at a relatively lower cost. The housing is provided with a water filling arrangement which is easy to use and which is designed so that it may be filled to the top without over-filling the reservoir. Specifically, a fill plug is associated with the housing at a water inlet level which permits the filling of the housing up to the level of the plug, thus eliminating the necessity for guessing or estimating the amount of water needed. A trap chamber is formed as an integral part of the housing.

In the preferred embodiment, electric indicators are provided to show when the unit is "ON" and also to show when the unit is "DRY." Further, in one embodiment, provision is made for operation of the unit on either European or domestic voltages.

It is accordingly an important object of this invention to provide a simplified and improved electric handheld clothes steamer.

A further object is to provide a hand-held steamer as outlined above in which a single housing forms an integral reservoir, water trap chamber and steam-emitting nozzle.

A further object of the invention is the provision of a hand-held steamer, as outlined above, including electric indicator means for providing a visual indication whenever the unit is plugged in to a source of electricity and further providing a second indication for informing the user whenever the unit's reservoir is dry.

These and other objects and advantages of the invention will be apparent from the following description, the accompanying drawings and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a vertical section through the steamer taken generally along the line 1—1 of FIG. 2;

FIG. 2 is a bottom plan view thereof;

FIG. 3 is a top plan view thereof;

FIG. 4 is an elevation of the nozzle face;

FIG. 5 is a section through the nozzle face taken along the line 5—5 of FIG. 4;

FIG. 6 is an enlarged fragmentary detail of a portion of FIG. 1 showing the mounting of the heater within the housing;

FIG. 7 is a partial section and a partial exploded view of the nozzle;

FIG. 8 is a plan view of the bottom plate;

FIG. 9 is a view of the bottom of the steamer with the bottom plate broken away to expose the wiring connections;

FIG. 10 is a view similar to FIG. 9 but showing the connections in modified form of the invention for use on either 230 volt or 115 volt power; and

FIG. 11 is an exploded view, partially in section of an adapter plug for the embodiment of FIG. 10.

DESCRIPTION OF PREFERRED EMBODIMENT

Referring to FIGS. 1–6, a portable hand-held steamer or steam presser is illustrated generally at 12 as including a one-piece injection molded housing 15. The housing is preferably made of a high-temperature and temperature-stable plastic material capable of being injection molded, examples including 15 percent glass-filled nylon or modified polyphenyleneoxide (PPO) sold under the trade name of "Noryl" by General Electric Company, Plastics Department, Selkirk NY 12158.

The housing 15 is formed with a generally conically-shaped bottom chamber section including a lower end defining a water chamber 17, and an upper end defining a combined steam chamber and water trap 18. The upper end of the chamber and trap 18 is joined with a somewhat flattened, diverging and angularly disposed nozzle section 20 which terminates at a nozzle opening 21 (FIG. 3). The steam chamber and trap 18 is formed with an integral, downwardly-depending trap tube 25 which extends substantially the height of the steam chamber, and which opens toward the chamber 17 and leads into the interior of the nozzle section 20.

Means for adding water to the water chamber portion 17 of the housing 15 includes a laterally-offset and upwardly-opening fill aperture 28 which is closed by a removable plug or cap 30. The aperture 28 is positioned on the housing 15 at a region which is intermediate the steam chamber 18 and water chamber 17, and defines the maximum water level in the housing as indicated at 32.

The housing 15 is formed with an integral laterally-offset handle 35 which is joined at its top in the region of the fill opening 28 so that the upper part of the handle 35 cooperates with the main portion of the housing 15 to define the fill opening. The bottom of the housing, as shown in FIG. 2 includes a transversely offset

bottom portion 37 which forms the bottom support for the handle and which defines an opening 38 (FIG. 1) between the handle 35 and the housing 15 to permit gripping of the handle 35. Further, the bottom portion of the housing 15 has outwardly flared support portions as indicated at 40 at locations which are symmetrical with respect to the transverse portion 37, the nozzle section 20, and to each other, at substantially 120° spacing, to provide a stable base surface for the steamer 12 and to provide attaching regions for the base plate.

The nozzle section 20 is terminated at a transversely elongated nozzle plate 45 (FIG. 4). Plate 45 may be formed of the same material as that of the housing 15, or alternatively, may be formed of die-cast metal in which the outer surface is coated with PTFE. Forming the nozzle plate 45 of die-cast metal has the additional benefit of providing an ironing surface which retains heat and which may be used, in combination with the steam, for pressing out wrinkles.

The plate 45 is formed with a planar applicator face 46 in which is formed a transverse groove 47. Opening into the groove are a series of orifices defined by short tubes 50 which extend a short distance inwardly of the nozzle section 20, and provide a secondary trap for preventing the spitting of water through the nozzle openings 52 defined by the tubes. As shown in FIG. 5, the individual tubes 50 may be formed of metal and may be molded directly to the plate 45. The transverse groove 47 communicates with each of the openings 52 to assist in a uniform distribution of the steam, and further prevents the occurrence of a pressure build-up within the steam chamber 18 in the event that a temporary blockage is formed at a portion of the face 46. The nozzle plate 45 is retained at the opening 21, as shown in FIG. 7 by means of a pair of screws 54 tapped into bosses 55 formed in the housing 15.

The water chamber 17 of the housing 15 is generally circular in cross-sectional configuration and is open at the bottom. The bottom opening is closed by a heater assembly indicated generally at 60 in FIG. 1. The heater assembly 60 includes a heater shroud 62, which may be a sheet metal stamping formed with an opening 63 at the top and with a radially outwardly extending flange 64 at the bottom. An electric heating element 65 is positioned in the shroud 62. The element 65 is formed with a peripheral support or mounting flange 66. A peripheral series of tabs 68 are formed out of the side wall of the shroud 62 and form flange-engaging ledges as shown in the enlarged detail in FIG. 6. Further, the cutout portions of the tabs 68 form small water inlet openings 70 leading into the interior of the shroud 62. Three of the tabs 68 are sufficient for supporting the element 65.

The bottom surface of the flange 66 is engaged by an annular bottom heater support plate 72 which is formed with a diameter slightly greater than the flared flange portion 64 of the shroud 62. The inside opening in the support plate 72 is adapted to receive the lower depending portion of the heating element 65 while the outside circumference is adapted to be received within a bottom annular recess formed at the lower end of the housing 15, in engagement with an O-ring seal 75. The heater support plate 72 may be assembled against the flange 64 and secured in place by a suitable sealant therebetween indicated at 76 in FIG. 6. A silicone elastomer may be used for this purpose to form a watertight seal and a bond between these members.

The assembly 60 is held in place, as shown in FIG. 1, by a bottom closure plate illustrated generally at 80 in FIG. 8. The bottom plate is formed with an outer shape which conforms generally to that of the bottom of the housing 15. It is formed, in the region surrounding the bottom opening of the water chamber 17, with a raised peripheral ledge 82. When the plate 80 is assembled in position, as shown in FIG. 1, the ledge 82 engages the heater support plate 72 on the side thereof immediately opposite the O-ring seal 75, and is retained in place by screws 84 through openings 85. Two of the screws extend into the housing off-set portions 40 while the third screw extends into a center boss 88 formed in the housing portion 37. The inside surface of the plate 80 is partially ribbed as indicated at 88 in FIG. 8 for the purpose of adding strength to the plate.

As previously indicated, the steamer of this invention preferably provides visual indicating means for informing the user whenever the power is applied to the heating element 65 and for further indicating whenever the water supply is omitted or has been depleted. For this purpose, the offset portion 37 of the housing is provided with integral plastic windows 95 and 96 as shown in FIGS. 2 and 3. These window sections are formed at regions which are transversely adjacent the handle 35 and comprise relatively thin sections of plastic material through which light may be transmitted. The plastic material, at the window sections, may be suitably formed with indicia as indicated by the lettering HEAT and DRY in FIG. 3.

The wiring components useful with this invention are illustrated in FIG. 9 which includes a "HEAT" neon pilot lamp 100 and a "DRY" neon lamp 102. The lamps 100 and 102 are positioned inwardly of the corresponding window sections 95 and 96 adjacent ledges 103. The ledges 103 also serve to form a light shield so that the light emitted from each lamp is isolated to its respective window. Projections 103A on the base 80 engage the lamps 100 and 102 and hold them in place.

The circuit further preferably includes a customary thermal cutout relay 104 and a high-temperature thermal safety fuse 105. The fuse 105 may be a "microtemp" device made in accordance with U.S. Pat. No. 3,180,958 by Micro Devices Corp., Dayton, Ohio 45439, the assignee of this invention. An insulating washer 106 is positioned on the plate 72 to isolate the electrical parts against possible short circuits with the plate 72.

The pilot light 100 in series with a protective resistor 110 is connected across the circuit defined by the inlet leads 112 so that the lamp 100 is on at all times power is applied to the heater 65. On the other hand, the lamp 102 is placed in series with the resistor 110 and parallel with the thermal relay 104 so that the lamp 102 is illuminated only upon the opening of this relay.

The operation of the embodiment of the invention described thus far is considered to be largely self-evident from the foregoing description. The filling of the reservoir 17 is simplified in that the plug 30 is removed and the steamer held under a water tap until water is brought up to the level of the aperture 28. Thus, in the up-right position, the unit cannot be overfilled and there is no necessity for visually guessing or gauging the amount of water to be added. The trap section 18 is specifically defined with a volume which will

accept the capacity of the reservoir **17** without spilling if the steamer should be accidentally tipped onto its side. Ribs **108** on the housing **15** provide a convenient region for grasping the housing whenever it is desired to empty the reservoir **17** of hot water by pouring through the fill aperture **28.**

When power is applied to the inlet leads **112,** it is also applied through the fuse **105** and the relay **104** to the heating element **65.** The water in the reservoir **17** freely enters the region between the shroud and the heater **65** in the opening **70** and the steam which is formed escapes through the top opening **63** in the shroud and collects within the chamber **18.** As soon as the chamber **18** is fully saturated with steam, steam begins to be emitted through the nozzle tubes **50** and the hand-held steamer may then be suitably manipulated to apply the steam to a garment for the purpose of removing wrinkles and the like.

As soon as the unit is plugged in, the neon lamp **100** is illuminated to indicate to the user that he is getting power to the heating element. This lamp will remain on at all times when the unit is powered. In the event that the water chamber should run dry, the build-up in heat results in the opening of the thermal relay **104** and the illumination of the lamp **102,** providing a positive visual indication that the steamer has gone dry or has been plugged in without water and accordingly should be disconnected. In the event of an internal short or a failure of the relay **104,** the device **105** will open.

Users often find that it is convenient to carry hand-held steamers when traveling, since it is at these times that it is more difficult to keep one's clothes in a neat and pressed condition. The steamer of this invention is particularly adapted for this purpose as it is a highly compact unit and may be readily carried with other personal items. For this purpose, a center tapped heater element **65***a*, commonly referred to as a three-wire heater, may be connected and used as shown in FIG. **10.** Two of the wires, namely *a* and *b*, are used with 230 volt current while a combination of wires *a* and *c* is selected for 115 volt operation.

An adapter plug assembly for this purpose is illustrated at **115** in FIG. **11.** The leads *a* and *c* are brought out at conventional male plugs **116** and **117** which are designed to be inserted within the common domestic house-hold receptacle. The lead *b* is brought out at a female recessed connector **120.** A European current adapter **130** includes a dead receptacle **131** for the plug element **117** connected to lead *c*, an electrically hot receptacle **132** for receiving plug element **116** connected to lead *a*, and a male connector **133** proportioned to be received in the receptacle **120.** Plug members **134** and **135,** at the other side of the adapter **130,** are proportioned to be received within the customary European outlet. In this manner, a steamer is provided by means of which either 230 or 115 volt operation may be selected simply by the insertion or the removal of the adapter **130.**

While the forms of apparatus herein described constitute preferred embodiments of the invention, it is to be understood that the invention is not limited to these precise forms of apparatus, and that changes may be made therein without departing from the scope of the invention.

What is claimed is:

1. An electric hand-held steamer comprising a one-piece housing having means defining a water chamber and a superimposed combined steam chamber and water trap, electric heater means in said water chamber for generating steam for flow into said steam chamber, a steam-applying head opening into said steam chamber, means on said housing defining an integral laterally-offset handle, and means in the upper part of said handle defining an upwardly-opening fill aperture intermediate said water and steam chambers and opening into said water chamber, the position of said aperture on said housing defining the maximum water level in said housing.

2. The steamer of claim **1** further comprising means in said housing defining a bottom opening, a heater assembly received in said bottom opening and extending into said water chamber, said assembly including said heater, a shroud received over said heater and defining opening means for admitting water to said heater, a bottom plate having a peripheral edge extending outwardly of said opening, O-ring means between said bottom plate and said housing, and means for retaining said bottom plate in sealing relation to said O-ring.

3. A hand-held steam presser comprising housing means defining a tank for containing a quantity of water, electric heater means in said tank for vaporizing said water into steam, a steam-applying head on said housing means for applying steam to a garment, first electric indicator means connected to operate whenever said heater is connected to a source of electricity, a thermal cutout relay for interrupting power to said heater upon the depletion of said water supply, and second indicator means connected to be actuated upon the opening of said relay to provide a visual indication of lack of water.

4. The presser of claim **3** in which said indicators are neon lamps.

5. The presser of claim **4** in which said housing is formed of plastic material having integral window means, said lamps being positioned in said housing adjacent said window means.

6. The presser of claim **3** in which said heater has a two-part heater element for operation on either 230 or 115 volts, plug means for connecting said heater for normal 115 volt operation, and a plug adapter for converting said heater to 230 volt operation.

7. In a hand-held steam presser housing a tank for containing a quantity of water, an electric heater in said tank is normally submerged in the water for vaporizing said water into steam, a steam applying head for applying steam to a garment, and a thermal cutout relay which opens and interrupts power to said heater upon the depletion of said water supply, the improvement comprising an electric lamp connected across said relay to be energized only upon the opening of said relay to provide a positive visual indication of lack of water.

8. An electric hand-held steamer comprising a one-piece molded housing having means defining a water chamber and a superimposed combined steam chamber and water trap, said housing defining an opening at the bottom thereof, said housing at said opening defining a generally radially, outwardly-directed heater-supporting ledge, a heater assembly for generating steam for flow into said steam chamber, said heater assembly including an electric heater received in said bottom opening and extending into said water chamber, shroud means over said heater and having therein means defining an opening for admitting water into said

heater, a bottom plate having a peripheral edge proportioned to be received in overlying relation to said ledge, an O-ring received between said bottom plate and said housing at said ledge, means for retaining said bottom plate in sealing relation to said O-ring, and means in said housing defining a fill aperture for admitting water into said water chamber.

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