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3 Sheets-Sheet 1

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STEAM IRON

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3 Sheets-Sheet 2

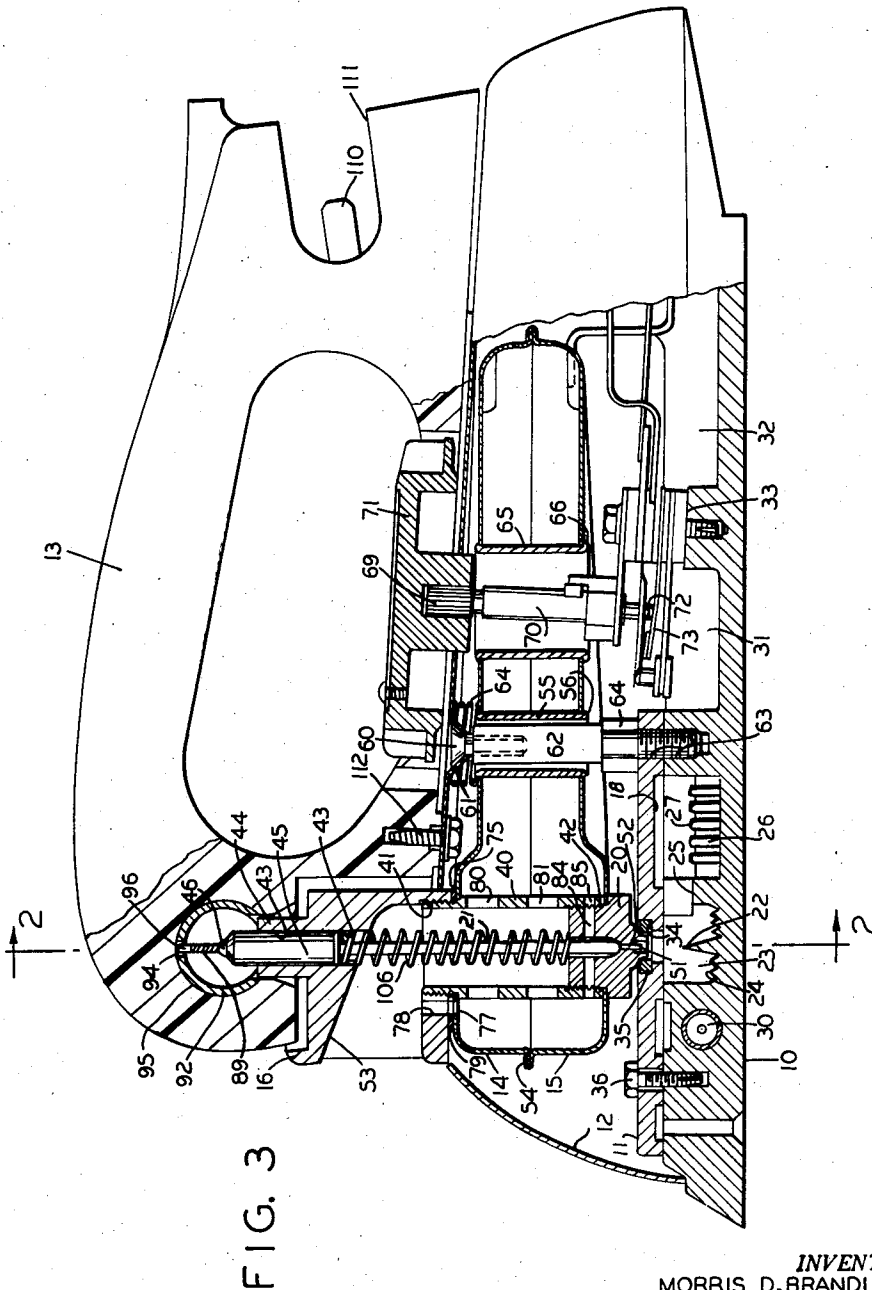


FIG. 3

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3 Sheets-Sheet 3

FIG. 4

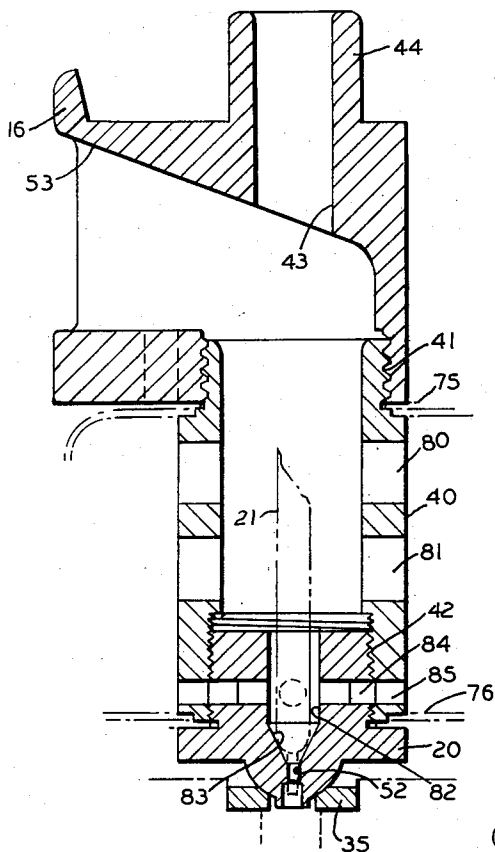


FIG. 5

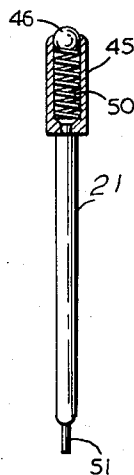


FIG. 8

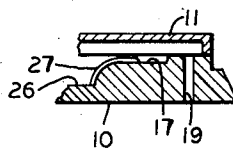


FIG. 6

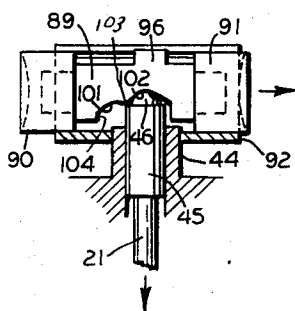
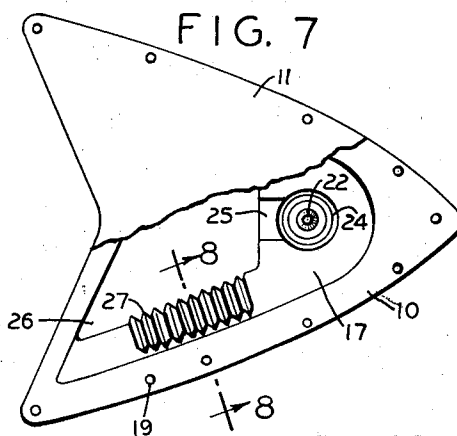


FIG. 7



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1

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STEAM IRON

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4 Claims. (Cl. 38—77)

This invention relates to electric flatirons of the type which are adapted for use in conventional fashion as a dry iron or as a steam flatiron.

An important object of the present invention is the provision of a steam iron having improved means for the generation of steam.

A further object of the invention is the provision of an improved sole plate structure for electric irons to provide for rapid and efficient steam generation.

Another object of the invention is to provide simple means for the efficient and rapid evaporation of water into steam by an improved arrangement of heat radiating fins or ribs located close to the sheathed heating element embedded within the sole plate. The invention in this connection takes advantages of the fact that in metals or other substances heat tends to flow towards sharp edges or points.

In accordance with the present invention two steam generating chambers are provided, the primary one having a central conical projection on the top of which drops of water fall from an adjustable metering orifice connected with a water reservoir. A portion of the water is immediately transformed into steam and flows out into the passages leading to openings in the sole plate. The portion not so evaporated contacts a plurality of raised annular ribs of lesser height than the conical projection, converting more of the water into steam.

A dam separates the primary steam chamber from a secondary chamber, the latter having a flat floor defined on opposite sides by upwardly and outwardly curved fins located directly over the two branches of the embedded heating element.

Water passing over this dam enters the steaming surface afforded by this flat floor. After the initial wetting of the upwardly curved fins, caused by the motion of the iron, a capillary action takes place, causing the faces of the grooves between the fins to be constantly supplied with a rising film of water, thereby accelerating the formation of steam. The result is that by the time the water leaves the secondary chamber it is all converted into steam, thus avoiding the possibility of unvaporized water particles contacting and causing damage to the fabrics being ironed.

Another object of the invention is to provide an improved water inlet arrangement for introducing water from the filling opening at the front handle section to the tank or reservoir.

Yet another object of the invention is to provide a novel reciprocating push button arrangement in the handle within the reach of the thumb and forefinger of the operator for controlling the valve at the metering orifice.

In the drawings:

Fig. 1 is a side elevation of a steam iron embodying the present invention.

Fig. 2 is a transverse vertical section taken on line 2—2 of Fig. 3.

2

Fig. 3 is a central vertical longitudinal section taken through the steam iron.

Fig. 4 is an enlarged vertical section taken through the funnel.

Fig. 5 is a side elevation, partly in section, of the valve member.

Fig. 6 is a broken section of the push button assembly.

Fig. 7 is a broken plan view of the sole plate and the cover therefor, a portion of the latter being broken away to show the details of the steam chambers.

Fig. 8 is a broken section taken on line 8—8 of Fig. 7.

The iron of the present invention includes a sole plate 10, a sole plate cover 11, a casing or shell 12, a handle structure 13, a water tank formed in upper and lower sections 14 and 15 and a funnel 16. The upper face of the sole plate and the lower face of the cover therefor have recesses 17 and 18 through which steam from the steam generating chambers pass into openings 19 in the sole plate and onto the fabric being ironed. Water from the tank is arranged to pass through an orifice in a nozzle 20 when a metering valve member 21 is open, onto the upper end of a conical projection 22 which extends upwardly from a well or steam chamber 23 in the sole plate.

A plurality of concentric ribs 24 surround the base of the conical projection and as the water passes into the steam chamber drop by drop it first encounters the pointed top of projection 22 and thence passes downwardly its sides and encounters the tops of ribs 24 and a substantial portion of the water is converted into steam while it is in primary chamber 23. The front wall of the primary chamber (unnumbered) extends to the upper surface of the sole plate and its rear wall terminates in a ledge 25 which forms a dam over which the water which has not been converted into steam may pass into a secondary steam chamber 26.

This secondary chamber 26 has a flat floor and along two opposed edges thereof there are formed a plurality of curved upwardly and outwardly extending ribs or fins 27 which terminate at the upper or outer ends in flat recesses or platforms 17 in the sole plate. Water overflowing dam 25 covers the floor of chamber 26 which forms a steaming surface. Movement of the iron back and forth over the surface being ironed causes the water on this floor to contact the fins which causes the water to travel upwardly over the surfaces. This constantly rising film of water, which is distinctly observable when the sole plate cover is removed and water is supplied to the primary chamber while heat from the heating element is applied thereto clearly appears to be due to capillary action.

The iron is heated by a sheathed tubular heating element 30 embedded in the sole plate. The sole further has two additional wells or recesses 31 and 32 to the rear of steam chamber 26 which are separated by a ledge 33.

The sole plate cover 11 has a number of openings including an opening having an enlarged upper end section 34 forming an annular support for a nozzle seat 35. Screws 36 secure the cover in place. A tubular water inlet 40 has external screw threads 41 at its upper end for the purpose of mounting the water funnel 16, and internal screw threads 42 at its lower end to mount the nozzle 20. The upper wall of the funnel 16 has a vertical bore 43 which passes upwardly through a boss 44 and forms a bearing supporting a tubular extension or spring retainer 45 at the upper end of valve stem 21. A ball 46 is mounted at the upper end of the bore in this tubular extension and the upper terminal is rolled over to confine the ball. The ball is urged upwardly by

a compression spring 50 and the ball must be free to move against the spring and rotate. At its lower end the valve has a pin 51 for removing dirt particles and other obstructions which might accumulate in a central feed opening 52 in nozzle 20.

The funnel has an inwardly tapered water-charging opening 53 leading inwardly from its front wall. The tank is formed in upper and lower sections 14 and 15 as aforesaid, which are joined together by complementary flanges 54. The tank has intermediate vertically aligned openings and a bushing 55 connects the openings and the ends of the bushing are flanged at 56 to retain the tank in water-tight condition. The casing or shell 12 is secured in place by a screw 60 whose head is positioned within a dimpled opening 61 in the shell, said screw being received in a threaded opening at the upper end of a stud 62 whose lower threaded terminal is received in aligned apertures 63 in the sole plate and cover. This stud has a wrench receiving portion 64. The stud, which passes through bushing 55 is first secured in apertures 63, after which the tank is positioned in place and then the casing is mounted and screw 60 inserted. A spring 64 between the casing and the tank retains the latter in place.

The tank has similar but larger vertically aligned openings to the rear of bushing 55 and they receive a bushing 65 flared at 66, through which passes a thermostat control rod 70 having a knurled upper end 69. A control dial 71 is force fitted on this knurled end. A contact 72 at the lower end of the control rod engages switch elements 73 positioned above well 31.

Before the two sections of the tank are secured together the upper end of tubular water inlet 40 is passed through an opening therefor in the forward end of upper tank section 14. A gasket 75 is now placed on the upper face of the tank and the funnel structure screwed in place. The lower tank section 15 is now fitted to the upper section and joining flange 54 is formed. The lower end of the water inlet rests upon the upper face of lower tank section 15 and the nozzle 20 is screwed into the lower end of the inlet with a gasket 76 on the upper threaded section of the nozzle.

The upper tank section 14 has two openings 77 adjacent its front edge. One of these openings is aligned with an opening 78 in the funnel 16 to allow air from the tank to escape while the tank is being filled with water. A gasket 79 seals the passage between the tank and opening 78. The other opening receives a downwardly extending lug on the lower face of the funnel for alignment purposes.

The tubular water inlet has upper and lower water outlet openings 80 and 81 through which the water may pass into the tank. The nozzle has a central bore 82 having an inwardly tapered lower end 83 forming a seat for the lower tapered end of valve 21 and when the valve is fully seated therein the water outlet for the tank is closed. The lower end of the nozzle has a spherical surface which contacts nozzle seat 35.

The nozzle further has a transverse opening 84 aligned with openings 85 in the water inlet 40.

It will be seen from the foregoing that water may enter the funnel from a water tap when the sole plate is held in a vertical position with the mouth of the funnel under the tap. This water passes into the tank through openings 80—81 in the water inlet 40 and remains there so long as valve member 21 is closed. When, however, this valve is opened the water passes through openings 85—86, downwardly through opening 82 in the nozzle in steam chamber 23. The water thus drops onto the central conical projection where it is initially heated, thence over the concentric ribs 24 and finally over ledge 25 and into the second chamber. Passing over the floor of the latter it contacts the spaced ribs or fins 27 and is converted to steam as it moves up the surfaces thereof. Any water unconverted to steam

which reaches the upper recess or platform 17 encounters this final heating surface and is converted to steam.

Closing and opening of the valve is controlled by a reciprocating push button assembly shown in Fig. 2 and comprising a flat cam plate 89 having push button members 90 mounted in a sleeve 92 having a central opening 93 in its lower wall to receive the upper end of boss 44 formed at the upper end of the funnel. The sleeve further has a slot 94 extending the full length of the upper wall. The sleeve is mounted in a transverse opening 95 at the forward end of handle 13. The cam plate has a projection 96 on its upper edge which rides in slot 94 and prevents rotation of the push button assembly. The lower edge of the cam plate is cut out to form an irregular camming surface which is engaged by ball 46 at the upper end of the valve member when the assembly is moved back and forth. This edge includes a high point 102 and a lower point 101 and a central cam portion 103. The terminal portions 104 of the cut out form stops limiting travel of the push button assembly when one or the other of these stops contact extension 45 of the valve.

The outer face of push button 90 may have the words "Steam Off" printed thereon and button 91 the words "Steam On." By referring to Fig. 6 it will be noted that some portion of buttons 90—91 always reside in sleeve 92. In Fig. 6 the "Steam Off" button has been depressed and the ball contacts the high point 102 of the cam plate and the valve is open, the valve being urged to open position by a spring 106 carried concentrically of the valve stem.

When the other button 90 is depressed, camming surface 102 depresses the ball and the valve is closed when the ball enters lower recess 101.

The handle structure, which positions plug contacts 110 in a recess 111, is secured to casing 12 by screws 112 and the casing is secured to the sole plate by screw 60 earlier referred to.

While there have been described herein what are at present considered preferred embodiments of the invention, it will be obvious to those skilled in the art that many modifications and changes may be made therein without departing from the essence of the invention. It is therefore to be understood that the exemplary embodiments are illustrative and not restrictive of the invention, the scope of which is defined in the appended claims, and that all modifications that come within the meaning and range of equivalency of the claims are intended to be included therein.

What we claim is:

1. In a steam iron, the combination of a sole plate having primary and secondary interconnecting steam generating chambers, a cover for the sole plate, a heating element in the latter, a handle, a water tank having a metered orifice and a valve above the first chamber, a cross slide having a cam edge for closing the valve and a spring for opening the valve, water inlet means including a funnel having a front opening for filling the tank when the sole plate is in a vertical position, the first chamber being provided with a central upstanding conical projection positioned directly under the orifice, and a plurality of concentric annular ribs around the conical projection and being of lesser height than said projection, the second chamber having on opposed sides thereof upwardly and outwardly curved ribs up the surfaces of which water may travel due to capillary action, the sole plate having steam ports leading to the lower face of the iron.

2. A sole plate for a steam iron having steam discharge ports and a first steam generating chamber adapted to receive water from a reservoir, a second steam generating chamber and a wall of lesser height than the depth of the chambers separating the same, a conical projection extending upwardly from the lower wall of the first

5

chamber and a plurality of circular, concentric ribs surrounding the projection and being of lesser height than the projection, the second chamber having a floor and a pair of side walls, said side walls having a plurality of vertically extending spaced ribs along the surfaces of which water may travel due to capillary action, and a cover enclosing both chambers, the cover and the sole plate having mating recesses forming channels connecting the second chamber with the discharge ports, and a heating element embedded in the sole plate and extending below said vertically extending ribs.

3. In a steam iron, the combination of a sole plate having a first and a second steam generating chamber with an overflow wall separating the two, the first chamber having an upstanding central conical projection and concentric annular ribs of lesser height surrounding the projection, the second chamber being provided with a floor and a pair of side walls, said side walls having a plurality of upwardly extending spaced ribs up the surfaces of which water may travel due to capillary action, the sole plate having steam passages extending from the second chamber to the lower face of the sole plate, a water tank above the sole plate, a water inlet extending through the tank and having a water outlet opening, a valve seat provided with a metered orifice at the lower end of the outlet and located in vertical alignment with the conical projection in the first chamber.

6

4. In a steam iron, the combination of a sole plate having a closed steam generating chamber provided with a floor and a pair of side walls, said side walls having a plurality of upwardly and outwardly extending curved spaced ribs up the surface of which water may travel due to capillary action, and platforms at the upper ends of the ribs for receiving water which is unconverted to steam, a heating element embedded in the sole plate extending below said ribs and platforms, the sole plate having steam passages extending from said chamber to the lower face of said sole plate, a water tank above the sole plate, a water inlet extending through the tank and having a water outlet opening, a valve seat provided with a metered orifice at the lower end of the outlet for delivering water into said chamber.

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