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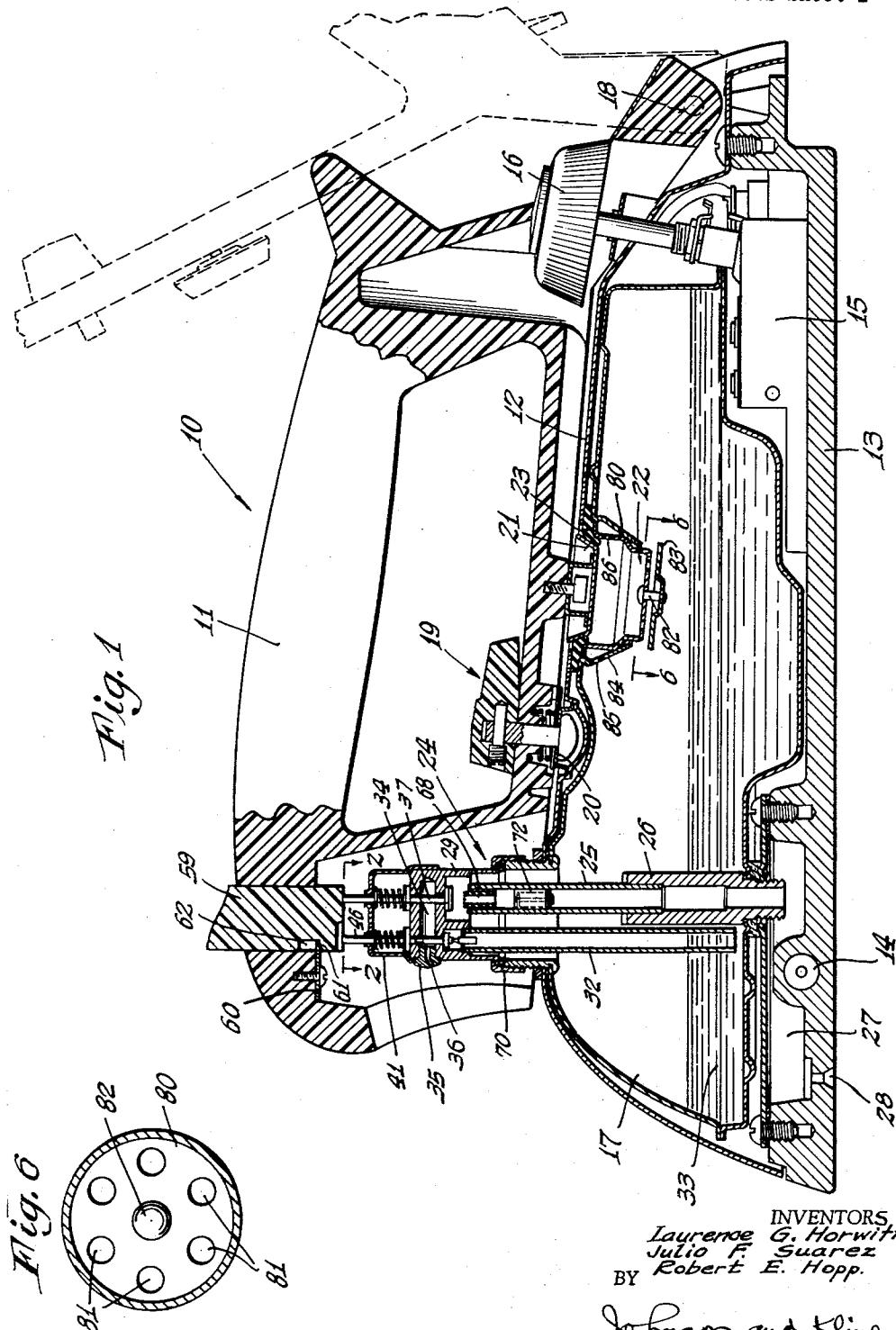
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3,003,266

## STEAMING AND DAMPENING IRON

Filed April 15, 1958

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 4

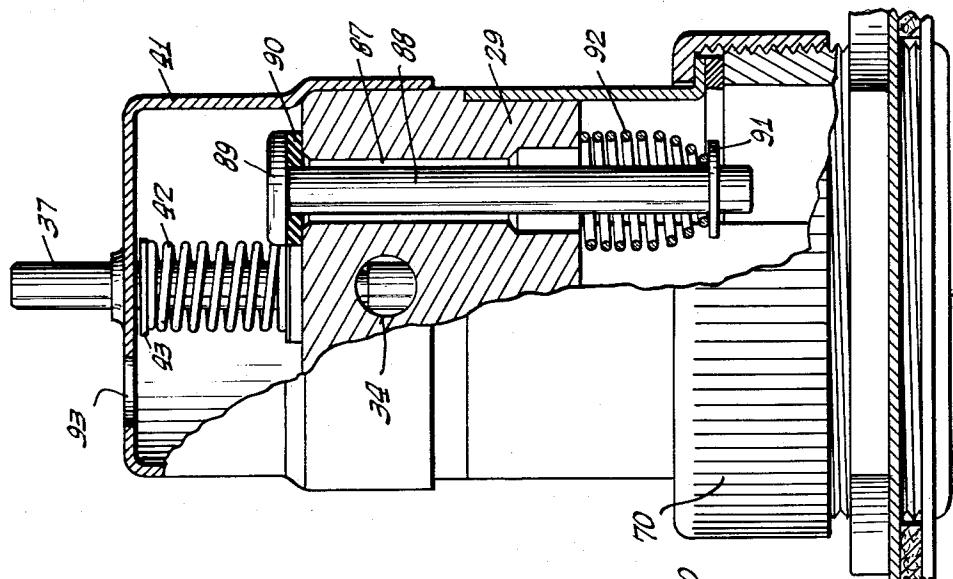
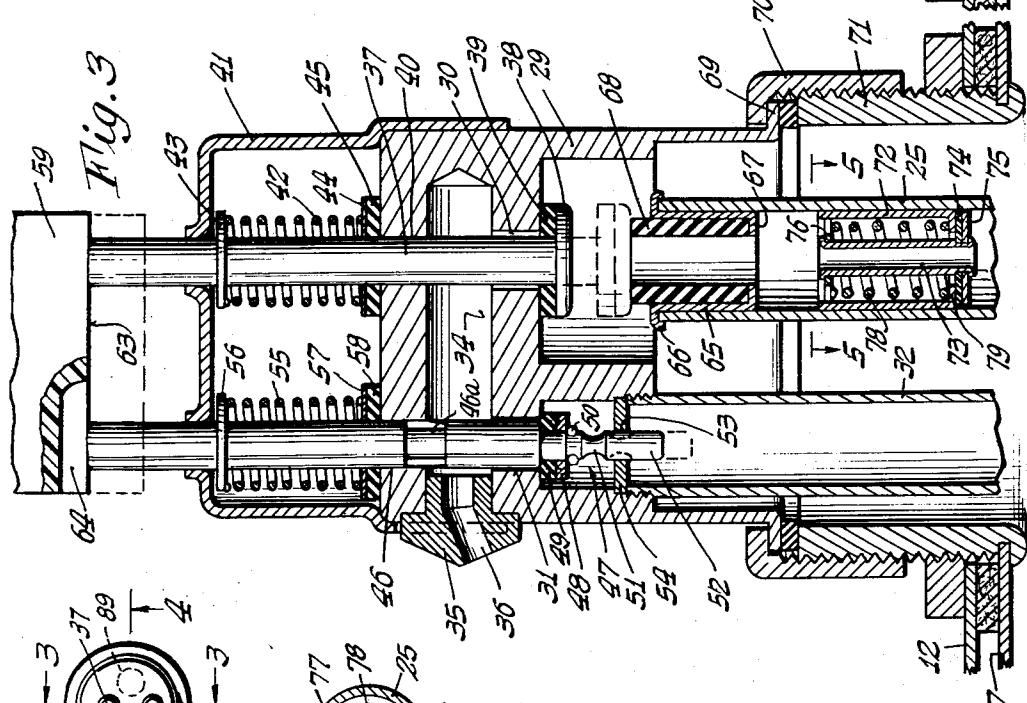


Fig. 3



## 1

3,003,266

STEAMING AND DAMPENING IRON  
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The present invention relates to an electric hand iron of the type which converts self-contained water to steam for steam ironing fabrics and more particularly to an iron which also enables spraying of the self-contained water in a nebulized stream onto fabrics for dampening them.

The steam and spray iron of the present invention has a boiler containing water to be heated to create steam, with the latter being conducted to the fabric through holes in the soleplate. The steam is driven from the boiler by the pressure created therein by the conversion and in the iron of the present invention this pressure is also utilized to drive the water out of a small orifice with sufficient velocity to form a dampening spray of fine droplets of warm water.

An object of the present invention is to provide a steam and spray iron in which self-contained water may be directed as steam through the soleplate to steam iron a fabric or in which the water may be directed in a stream containing only fine droplets of warm water forwardly and downwardly of the iron to dampen the fabric prior to and/or while ironing.

Another object of the present invention is to provide for the spraying of fabrics by a boiler type steam and spray iron in which the spraying means is economical to manufacture and may be incorporated into a conventional steam iron with relatively few changes in the conventional iron.

A further object of the present invention is to provide in a steam and spray iron of the boiler type for the maintaining of a minimum steam pressure in the boiler to enable immediate spraying at any time during steaming and in which the pressure is safely reduced upon opening of the boiler for filling it with water.

In carrying out the present invention, a boiler type steam iron such as disclosed in U.S. Patent No. 2,679,704, granted to Thibault, is provided with structure which enables the above recited objects to be attained. To this end, there is provided a pair of passageways in the boiler, one of which conducts steam and hence starts in the steam containing portion of the boiler, while the other conducts water and starts in the water containing portion of the boiler. The other ends of the passageways terminate in a duct which has a nozzle at one end having a small orifice and manually operable valve means are interposed between the passageways and the duct. Operation of the valves causes water to be forced into the duct and through the small orifice to be emitted as a stream of atomized water directed downwardly and forwardly of the iron. It will be appreciated that the commingling of the steam and water in the duct and orifice plus the pressure forcing the fluids through the orifice causes cooling of the fluid so that the stream consists substantially solely of fine droplets of water. Moreover, the stream, by being remote from the soleplate, does not affect the temperature of the soleplate nor does the soleplate add heat to the stream.

While a boiler type steam iron has very little pressure therein when it is being used for steaming, the present invention provides for maintaining a minimum pressure in the boiler during steaming to provide sufficient pressure in the boiler to cause the spray upon opening of the valves. This is accomplished by a restriction in the

## 2

passageway conducting steam from the boiler to the soleplate to limit the amount of steam flow and yet upon the steam pressure rising to a preselected value, the restriction permits more steam to flow to thus maintain a safe pressure within the boiler.

The steam pressure in the boiler, while needed for spraying, could constitute a hazard to the operator when the filling opening of the boiler is opened. In order to eliminate this possible hazard, the steam and spray iron of the present invention provides a pressure releasing means in the opening which enables the pressure to be safely eliminated quickly and entirely when it is desired to fill the boiler.

Other features and advantages will hereinafter appear.

15 In the drawing:

FIGURE 1 is a sectional view of the steam and spray iron of the present invention.

FIG. 2 is a view taken on the line 2—2 of FIG. 1.

20 FIG. 3 is a section taken on line 3—3 of FIG. 2, somewhat enlarged.

FIG. 4 is a section taken on the line 4—4 of FIG. 2, also enlarged, with only portions thereof shown in full.

FIG. 5 is a section taken on the line 5—5 of FIG. 3.

FIG. 6 is a section taken on the line 6—6 of FIG. 1.

25 Referring to FIGURE 1, the iron of the present invention is generally indicated by the reference numeral 10 and includes a handle 11, a shell 12 and a soleplate 13 having an electrical heating wire 14 embedded therein. A thermostatic unit 15 is mounted on the soleplate 30 within the shell 12 and has a projecting control knob 16 for enabling the setting of the temperature of the soleplate by regulating the electrical current passing through the heating wire 14 in a manner well known in the art. Mounted within the shell 12 is a boiler 17 which contains water that may be utilized either for spraying or for steaming the fabric (not shown) to be ironed.

35 The steam pressure in the boiler, while needed for the shell for movement between a closed spraying position shown in full lines and a boiler filling position shown in dotted lines in FIG. 1. The handle carries a locking mechanism 19 which cooperates with a catch 20 formed on the upper surface of the shell and a plug 21 for closing a filling aperture 22 of the boiler, the filling aperture being located below the top of the boiler, and the plug mates with a sealing ring 23 clamped between the shell and the boiler. The wire 14 heats the soleplate and the water in the boiler to create steam and the steam is conducted from a steam dome 24 through a steaming passageway consisting of tubular members 25 and 26, channel 27 and apertures 28 formed in the soleplate 13 onto the fabric being ironed. This steam iron construction is well known in the art as evidenced by the above recited patent to Thibault.

40 The present invention provides for making the above described steam iron into a steam and spray iron economically with only minor alterations in the steam iron structure. This is accomplished by forming the steam dome of an annular turret 29 having the cross-sectional shape shown and including a pair of passageways 30 and 31. One passageway 30 which constitutes a steam passageway terminates in the steam dome, while the other passageway 31 includes a tube 32 which terminates in the water containing portion 33 of the boiler. The other ends of the passageways terminate in a duct 34 which extends radially of the turret and has a nozzle 35 provided with a downwardly and forwardly directed orifice 36 of smaller diameter than the duct. It will thus be appreciated that steam may pass from the steam dome through the passageway 30, the duct 34 and out the orifice 36 and that water may be forced by steam pressure in the boiler up the tube 32, through the passageway 31 and the duct 34 and out the orifice 36. The steam and

water are thus mixed in the duct and ejected together; however the mixing and ejection of both plus the relative coolness of the turret condenses the steam so that the spray consists only of fine droplets of warm water.

In order to control the flow of steam and water there is mounted in the turret a steam valve means and a water valve means. The steam valve includes a stem 37 having a headed end 38 to which is attached a resilient washer 39 for engagement against the turret adjacent the passageway 30 to create the seal. The stem 37 extends through the passageway 30 (and has a diameter less than the passageway 30 to enable flow of steam therearound), the duct 34 and through an aperture 40 in the turret to project beyond a cap 41 mounted on and forming a part of the turret. Located within the cap 41 is a spring 42 which forces the stem 37 upwardly by engaging a washer 43 fastened on the stem and a washer 44 resting on the turret. A sealing washer 45 is mounted beneath the washer 44 to substantially prevent leakage into the cap through the aperture 40. The cross-sectional area of the duct 34 is larger than the cross-sectional area in which steam can flow in the steam passageway 30 with the stem therein to thereby provide less steam pressure in the duct than in the passageway.

The water valve means similarly includes a stem 46 which passes through the water passageway 31 (and which is of less diameter than the passageway to enable water to flow therearound) and has a reduced end portion 47 containing a rigid washer 48 and a resilient sealing washer 49 held in place as by crimping at 50. The lower extremity of the stem 46 is provided with a portion of reduced diameter 51 and an end portion 52. The end portion 52 is normally located in an aperture 53 formed in a washer 54, the latter being held in place by compression between the threaded end of the tube and an abutment in the turret. The stem 46 is mounted for axial movement between a closed position shown in full lines and an open position shown in dotted lines wherein the reduced diameter portion 51 is positioned within the aperture 53 in the washer 54. The stem 46 is biased to a valve closed position by a spring 55 circumscribing the portion of the stem enclosed by the cap 41, with the upper portion of the spring abutting a washer 56 secured on the stem, while the lower end of the spring abuts a washer 57 resting on the turret with a sealing washer 58 provided to prevent water flow into the cap. The stem has a decreased portion 46a which is positioned in the duct 34 when the valve is open to increase the flow area past the stem.

It will accordingly be appreciated by the above recited structure that movement of the two stems 37 and 46 downwardly opens the steam passageway and the water passageway respectively to permit flow of fluid therethrough. In addition, the use of the washer 54 and the reduced diameter 51 and the end portion 52 of the water stem 46 provides for controlling the amount of water which can pass through the water valve means and thus serve to meter the spray, and these parts may be economically manufactured within close tolerances. The end portion 52 by being only slightly smaller than the aperture 53 enables the metering valve to be self-cleaning.

To operate the valve and thus provide for the spray of fine droplets of water through the orifice, a control button 59 is mounted in the handle for axial movement and is contained in place by a plate 60 having a tongue 61 which operates in a channel 62 formed in the button. The bottom surface 63 of the button engages the top of the stems 37 and 46 so that movement of the button 59 downwardly by manipulation of the user opens the two valves to cause the spray. It will be appreciated that the button 59 is located in the forward portion of the handle 11 and projects thereabove in a position to be operated by the user's thumb of either hand.

According to the present invention it has been found desirable to have steam flow only through the orifice at

the beginning of the spraying cycle and at the end of the spraying cycle since this prevents large water droplets from being sprayed and it helps to maintain the orifice clear by preventing droplets of water from remaining in the orifice which, upon evaporation, would tend to clog the orifice by leaving deposits therein. To this end, the bottom surface 63 of the button is provided with a groove 64 aligned with the top of the water stem 46 with the bottom of the groove recessed below the bottom surface 63 of the button which engages the steam stem 37. Accordingly, pressing the button 59 to its normally open spraying position will first open the steam valve and then open the water valve while release of the button will first close the water valve and then close the steam valve.

The present invention provides for the prevention of steaming through the soleplate during spraying. This is accomplished in an economical and efficient manner by using the steam valve stem 37 to close the passageway for directing the steam to the soleplate. The upper end of the tubular member 25 is provided with a tubular collar 65 having its top edge 66 flanged over the end of the tubular member 25 and its lower edge flanged inwardly as at 67. A resilient tubular insert 68 is maintained in the tubular member 25 by the collar in the manner shown and projects thereabove to be in alignment with the stem 37 and engageable by the headed end 38 of the stem. It will be appreciated that when the stem 37 is moved to the dotted line position for normal spraying that the head of the stem engages the end of the resilient tubular insert 68 to close off the passageway conducting steam to the apertures in the soleplate.

In order to enable the turret 29 and associated parts to be easily and economically secured to the boiler of the conventional steam iron above referred to, the turret 29 has an outward-directed flange 69 on its lower end which engages an inwardly flanged nut 70 to clamp the flange 69 between a threaded nipple 71 secured to the boiler by means of threading engagement between the nut 70 and the nipple 71. It will thus be appreciated that if it is desired to remove the turret, including the valve means, all that is required is the unthreading of the nut 70. This construction is particularly advantageous in hard water areas wherein the water carries excessive amounts of minerals which after a period of time are apt to affect the operation of the spray.

In a boiler type steam iron there is very little steam pressure in the boiler when steaming and it has been found that the pressure is insufficient to permit substantially instantaneous spraying upon operation of the button 59 since a time lag is required in order to enable the steam pressure to increase. In order to enable the steam and spray iron of the present invention to have immediate spraying upon manipulation of the button 59, there is provided means for maintaining a minimum steam pressure within the boiler which does not interfere with the normal steaming of the iron. This means includes a short outer tube 72 secured inside the steaming tubular member 25 as by a pressed fit and an inner tube 73 mounted for axial movement relative to the tube 72. The tube 73 carries at its lower end a sealing washer 74 held in place by spinning over the lower end of the inner tube 73 against a metal washer 75 while the upper end of the tube 73 is spun over a rigid washer 76 having arcuate cutouts 77 (see FIG. 5) with the washer 76 fitting inside the outer tube 72. A spring 78 circumscribes the inner tube 73 and bears against at its upper end the washer 76 and at its lower end an inwardly directed flange 79 of the outer tube 72. The spring tensions the two tubes 72 and 73 axially and causes the sealing washer 74 to abut the flange 79 so that with the parts in the position shown steam passes only through the inner tube 73 since the washer 74 prevents steam from flowing through the cutouts 77 and between the flange 79 and the inner tube.

It will be appreciated that the above described structure restricts the amount of steam flow through the steam tube since the size of the inner tube is selected to maintain a minimum pressure within the boiler of approximately 1½ p.s.i. at low steaming temperatures. During higher steaming temperatures when a larger volume of steam is created in order to prevent a substantial increase in the steam pressure, the steam flow to the soleplate is increased. This is effected by the steam pressure acting on the portion of the sealing washer 74 between the flange 79 and the inner tube 73 to oppose and overcome the tension of the spring 78 to force the sealing washer 74 away from the flange 79 and permit steam to additionally flow through the cutouts 77, between the inner tube 73 and the outer tube 72, between the sealing washer 74 and the flange 79 and around the washers 74 and 75 and the tubular member 25. The spring is selected to permit increasing the steam flow at a relatively low safe steam pressure in the boiler in order to prevent excessive build-up of pressure within the boiler.

To fill the boiler of the iron of the present invention with water, it is necessary to release the latching mechanism 19 and pivot the handle 11 from the solid line position shown in FIG. 1 to the dotted line position. During steaming and particularly spraying, the steam pressure in the boiler would normally constitute a hazard if the filling aperture 22 were opened without releasing the pressure since it would tend to cause steam and boiling water droplets to rush out the aperture 22. In order to eliminate the hazard there is mounted in the filling opening 22 a cup 80 which closes off the opening when there is steam pressure within the boiler. The cup 80 has a bottom surface provided with a plurality of apertures 81 (see FIG. 6) and mounted on the bottom of the cup for movement theretowards by a pin 82 is a disk 83. The cup 80 is held against the funnel-like side 84 of the opening 22 by the pressure of the cover shell and the sealing ring 23.

Upon opening of the filling aperture 22 with steam pressure in the boiler, the pressure will cause the disk 83 to be forced against the bottom of the cup and close off the apertures 81. However, in order to relieve the pressure safely, there is provided a vent 85 in the funnel-like sides 84 of the opening 22 which communicates with another vent 86 formed opposite thereto in the side of the cup 80. Accordingly steam can flow through the vent 85 around the annular chamber formed between the cup and the sides 84 and out the vent 86. It will be appreciated that steam traveling this tortuous course decreases in pressure and that any water contained therein, such as droplets, will not be forced out of the hole to create a hazard. Any water which would collect in the chamber can return to the boiler by passing between the side 84 of the opening and the cup while the disk 83 is large enough to deflect water bubbling upward from the boiler from entering the chamber.

The steam and spray iron of the present invention is provided with a relief valve to prevent excessive steam pressure if such should occur during either spraying or steaming. As shown in FIG. 4, the turret 29 is provided with a vertical aperture 87 in which is positioned a pin 88 having a head 89 and a sealing washer 90 which bears against the turret. The lower end portion of the pin has a flange 91 against which abuts an end of a spring 92 with the other end of the spring engaging the turret. It will thus be appreciated that the steam pressure exerts a force on the sealing washer 90 and when this force becomes greater than the tension of the spring 92, the washer moves away from the turret to enable steam to escape through the aperture 87 into the cap 41 of the turret. A relief port 93 is provided in the cap to prevent build-up of pressure and water when there is a flow of fluid into the cap from the relief

valve and from leakage around the stems 37 and 47. The flowing of fluid out through the port 93 does not create a hazard since the flow is deflected by the handle.

It will accordingly be appreciated that there has been disclosed a steam and spray iron which may be economically manufactured by reason of the spraying mechanism being easily incorporated into a conventional steam iron. The iron is safe to use during spraying since the spray consists only of fine droplets of warm water and the boiler may be filled with water immediately after spraying without creating a hazard by the provision of means for safely releasing the steam pressure in the boiler. The iron of the present invention moreover provides for substantially instantaneous spraying upon operation of the control button by reason of the maintaining of a minimum steam pressure within the boiler during the steaming operation.

Variations and modifications may be made within the scope of the claims and portions of the improvements may be used without others.

We claim:

1. A spraying and steam iron comprising a soleplate, a heating element for the soleplate, a boiler adapted to contain water and be heated to convert the water to steam, a turret mounted on the boiler and forming a steam dome, a duct formed in the turret and communicating with an orifice formed therein, a first passageway communicating with the duct and the steam dome, a second passageway independent of the first communicating between the duct and the water containing portion of the boiler, and separate valve means located in its associated passageway for opening and closing each passageway individually whereby opening of both valve means enables the steam pressure in the boiler to force water through the second passageway into the duct and out the orifice in a stream of fine droplets of water.

2. A spraying and steam iron comprising a soleplate, a heating element for the soleplate, a boiler adapted to contain water and be heated to convert the water to steam, a turret mounted on the front portion of the boiler and forming a steam dome, a duct formed in the turret and extending lengthwise of the iron, a downwardly inclined orifice having a diameter less than that of the duct communicating with the duct, a first passageway communicating with the duct and the steam dome, a second passageway independent of the first communicating between the duct and the water containing portion of the boiler, and separate valve means located in its associated passageway for opening and closing each passageway individually whereby opening of both valve means enables the steam pressure in the boiler to force water through the second passageway into the duct and out the orifice in a stream of fine droplets of water downwardly and forwardly of the iron.

3. A spraying and steam iron comprising a soleplate, a heating element for the soleplate, a boiler adapted to contain water and be heated to convert the water to steam, an annular nipple secured to the boiler, a turret having a steam dome, means for removably securing the turret to the nipple, a duct formed in the turret and communicating with an orifice formed therein, a first passageway communicating with the duct and the steam dome, a second passageway independent of the first communicating between the duct and the water containing portion of the boiler, and separate valve means located in its associated passageway for opening and closing each passageway individually whereby opening of both valve means enables the steam pressure in the boiler to force water through the second passageway into the duct and out the orifice in a stream of fine droplets of water.

4. A spraying and steam iron comprising a soleplate, a heating element for the soleplate, a boiler adapted to contain water and be heated to convert the water to steam, a turret mounted on the boiler and forming a steam dome, a duct formed in the turret and commun-

cating with an orifice formed therein, a first passageway communicating with the duct and the steam dome, a second passageway independent of the first communicating between the duct and the water containing portion of the boiler, separate valve means located in its associated passageway for opening and closing each passageway with each of said valve means including a stem mounted for axial movement in the turret and including an end portion extending beyond the turret, a handle having a portion overlying the turret, and a button mounted in the handle for movement along the axis of the valve stems, said button when actuated having a surface which engages the ends of both stems to operate both valves whereby pressing of the button causes opening of both valve means to enable the steam pressure in the boiler to force water through the second passageway into the duct and out the orifice in a stream of fine droplets of water.

5. A spraying and steam iron comprising a soleplate, a heating element for the soleplate, a boiler adapted to contain water and be heated to convert the water to steam, a turret mounted on the boiler and forming a steam dome, a duct formed in the turret and communicating with an orifice formed therein, a first passageway communicating with the duct and the steam dome, a second passageway independent of the first communicating between the duct and the water containing portion of the boiler, separate valve means located in its associated passageway for opening and closing each passageway, and a single control means for operating both valve means including a lost motion connection between the second passageway valve means and the control means whereby operation of the control means opens the first passageway first and then the second to enable the steam pressure in the boiler to force water through the second passageway into the duct and out the orifice in a stream of fine droplets of water and upon release of the control means the first passageway is closed after the second passageway, in which each valve means includes a stem having an end projecting above the turret, the ends are substantially aligned, the control means is a button having a surface engaging the ends of the stem and the first passageway valve stem engaging portion of the button protrudes beyond the second passageway stem engaging portion of the button.

6. A spraying and steam iron comprising a soleplate, a heating element for the soleplate, a boiler adapted to contain water and be heated to convert the water to steam, a turret mounted on the boiler and forming a steam dome, said turret including an aperture communicating with the steam dome and a relief port communicating with a channel, pressure relief valve means in said channel whereby said relief valve means opens to allow escape of excess steam pressure in said boiler through said channel and port, a duct formed in the turret and communicating with an orifice formed therein independent of the channel, a first passageway communicating with the duct and the steam dome, a second passageway communicating between the duct and the water containing portion of the boiler, valve means for opening and closing each passageway whereby opening of the valve means enables the steam pressure in the boiler to force water through the second passageway into the duct and out the orifice in a stream of fine droplets of water.

7. The invention as defined in claim 6 in which the iron has a handle, in which the relief port is in the top portion of the turret and in which the handle includes a portion overlying the port to deflect escaping steam.

8. In a spray and steam electric iron having a soleplate, electric heating means for the soleplate, a boiler adapted to contain water and to be heated by the heating means to convert the water to steam, means for spraying water from the boiler forwardly of the iron and means for conducting steam from the boiler to the sole-

plate, the improvement comprising means for maintaining a minimum steam pressure in the boiler when steaming, said pressure being sufficient to force the water from the boiler out the spray means upon actuation of the spraying means and in which the means is mounted in the steam conducting means and includes an outer tube and an inner tube mounted inside the outer tube, a sealing surface on an end of the inner tube, a sealing seat formed on the adjacent end of the outer tube, spring means for maintaining sealing engagement between the sealing surface and seat whereby the inner tube restricts the amount of steam flowing through the conducting means to maintain a minimum pressure and steam flows between the outer and inner tube upon the steam pressure overcoming the force of the spring to end engagement between the sealing surface and sealing seat.

9. A spray and steam iron comprising a soleplate, heating means on the soleplate, a boiler adapted to contain water which is heated by the heating means into steam and being formed with a filling opening, a handle carrying a closing member for the filling opening mounted for pivotal movement with respect to the boiler between opening and closing positions for the opening, and pressure releasing means positioned in the wall of the opening for preventing sudden release of steam pressure upon opening of the opening.

10. A spray and steam iron comprising a soleplate, heating means on the soleplate, a boiler adapted to contain water which is heated by the heating means into steam and being formed with a filling opening, a handle carrying a closing member for the filling opening mounted for pivotal movement with respect to the boiler between opening and closing positions for the opening, and pressure releasing means positioned in the opening for preventing sudden release of steam pressure upon opening of the opening, said pressure releasing means including a cup positioned in the opening and having apertures formed in the bottom thereof, and a disk mounted on the cup and normally spaced from the bottom of the cup for movement against the bottom when the opening is opened whereby steam pressure in the boiler causes the disk to be moved against the bottom to close off the apertures.

11. A spray and steam iron comprising a soleplate, heating means on the soleplate, a boiler adapted to contain water which is heated by the heating means into steam and being formed with a filling opening, a handle carrying a closing member for the filling opening mounted for pivotal movement with respect to the boiler between opening and closing positions for the opening, and pressure releasing means positioned in the opening for preventing sudden release of steam pressure upon opening of the opening and including at least one vent in the side of the opening for enabling the steam to gradually flow therethrough to safely decrease the steam pressure.

12. A spray and steam iron comprising a soleplate, heating means on the soleplate, a boiler adapted to contain water which is heated by the heating means into steam and being formed with a filling opening, a handle carrying a closing member for the filling opening mounted for pivotal movement with respect to the boiler between opening and closing positions for the opening, and pressure releasing means positioned in the opening for preventing sudden release of steam pressure upon opening of the opening, said pressure releasing means including a cup positioned in the opening, the sides of the cup and the sides of the opening forming therebetween an annular chamber, a first vent in the side of the boiler leading to the chamber and a second vent in the side of the cup leading to the chamber whereby steam in the boiler passes through the first vent, the chamber and out the second vent to reduce the pressure gradually in the boiler.

13. A spray and steam iron comprising a soleplate, heating means on the soleplate, a boiler adapted to contain water which is heated by the heating means into steam and being formed with a filling opening, a handle

carrying a closing member for the filling opening mounted for pivotal movement with respect to the boiler between opening and closing positions for the opening, and pressure releasing means positioned in the opening for preventing sudden release of steam pressure upon opening of the opening, said pressure releasing means including a cup positioned in the opening and having apertures formed in the bottom thereof, a disk mounted on the cup and normally spaced from the bottom of the cup for movement against the bottom when the opening is opened whereby steam pressure in the boiler causes the disk to be moved against the bottom to close off the apertures, the sides of the cup and the sides of the opening forming therebetween an annular chamber, a first vent in the side of the boiler leading to the chamber and a second vent 15

in the side of the cup leading to the chamber whereby steam in the boiler passes through the first vent, the chamber and out the second vent to reduce the pressure gradually in the boiler.

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UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION

Patent No. 3,003,266

October 10, 1961

Laurence G. Horwitt et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 37, for "The steam pressure in the boiler, while needed for" read -- The handle 11 is pivoted on pivot 18 on the rear of --; column 5, line 26, for "during" read -- During --.

Signed and sealed this 3rd day of April 1962.

(SEAL)

Attest:

ERNEST W. SWIDER

Attesting Officer

DAVID L. LADD

Commissioner of Patents