July 3, 1962 H. S. FOSTER 3,041,756

STEAM AND LIQUID SPRAY IRON

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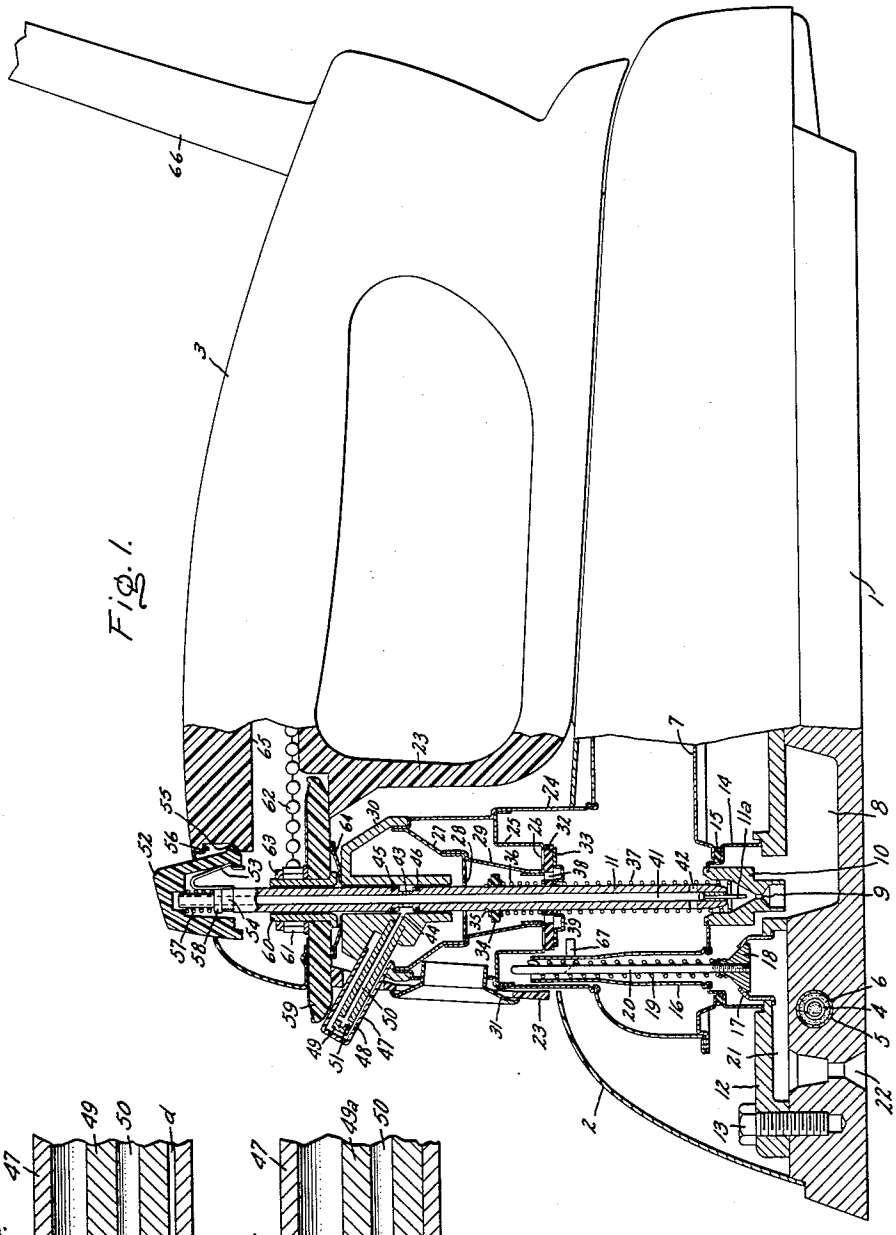


Fig. 1.

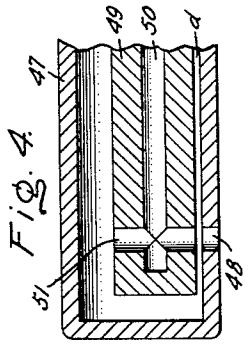


Fig. 4.

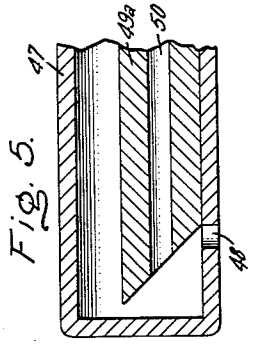


Fig. 5.

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Fig. 3.

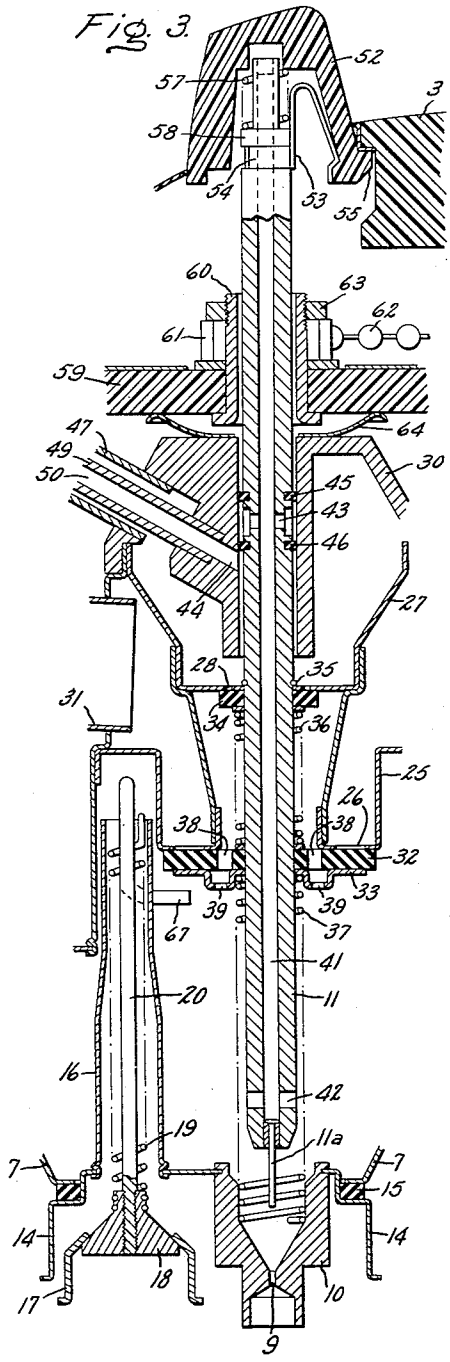
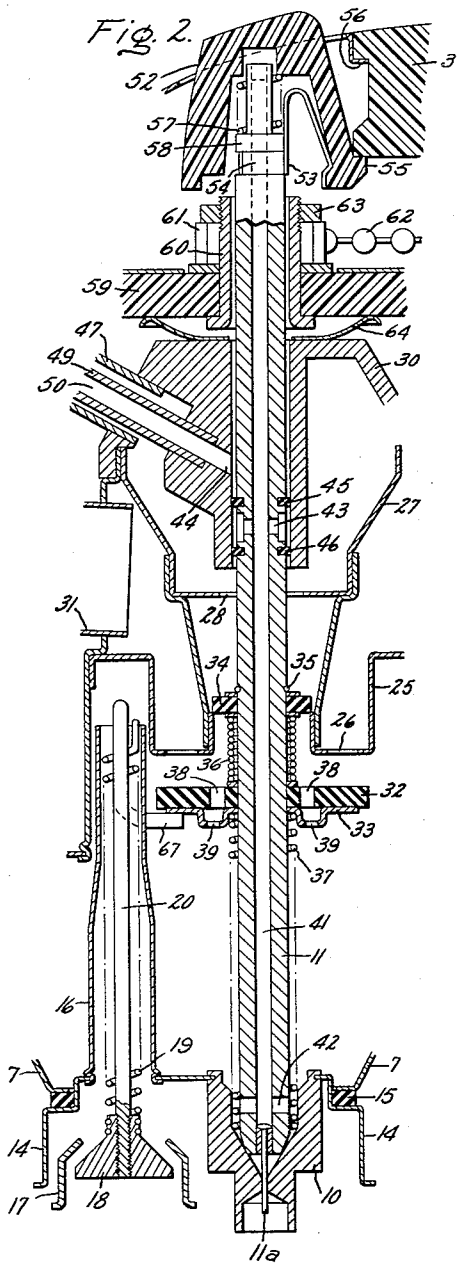


Fig. 2.



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STEAM AND LIQUID SPRAY IRON

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17 Claims. (Cl. 38—77)

This invention relates to electric flatirons, and more particularly to a flatiron operable to provide steam for the fabric being ironed and to spray liquid onto the fabric being ironed.

It is a well known fact that ironing of most fabrics requires not only heat and pressure, but also moisture. For ease of operation, the tendency is to reduce the pressure or weight requirement, relying upon heat and moisture, as suitable to the particular fabric, in order to remove wrinkles, folds, and the like.

Typically, moisture has been applied to fabrics preparatory to smoothing with a flatiron by manual sprinkling, followed by a soaking period during which time the moisture becomes evenly distributed throughout the fabric. While satisfactory results may be achieved, the additional operation of sprinkling, followed by a waiting or soaking period becomes burdensome and time consuming. Therefore, flatirons which provide for steam generation and discharge through the soleplate have been popular, for the reason that the iron not only provides the desired heat, but also attempts to provide necessary moisture. It is believed that the beneficial effect of steam in the ironing process results, at least in part, by condensation of steam in the fabric and subsequent evaporation by the heat from the iron. However, if the iron is operated at a high temperature, as necessary for linens and heavy cottons, for example, there is very little, if any, condensation of steam in the fabric, and hence the results have not been altogether satisfactory for such fabrics. Furthermore, great care must be taken with some fabrics to prevent application of discreet drops or particles of water, since water stains may result.

An object of the present invention is to provide a flatiron operable as an improved steam iron, and also capable of substantially instantaneous operation as desired to discharge a finely atomized liquid spray onto the fabric.

A further object of this invention is to provide an iron operable as a dry iron, a steam iron, or as a liquid sprayer, with selection of the mode of operation conveniently under the control of the operator.

Still another object of this invention is to provide a steam iron capable of operation as a liquid spray iron at any time, and which further provides a high quality and finely divided liquid spray. A still further object of this invention is to provide a flatiron including liquid spray means capable of operation under relatively low steam pressures.

In carrying out my invention in one form, a steam iron of the balanced pressure type is constructed, including a steam generator and a water reservoir communicating with this generator, and with pressure equalization means between the steam generator and the reservoir. Thus, the same pressure exists within the reservoir as in the steam generating chamber. In the steam discharge passage from the generator to appropriately positioned apertures in the soleplate, I have provided a pressure regulating valve, so that during operation as a steam iron,

a normal operating pressure always exists in the steam generating chamber and in the reservoir.

In accordance with a further aspect of this invention, a spray nozzle is provided at the upper forward portion of the iron, having a steam tube in communication with the steam generator, and which steam tube encompasses a liquid tube in communication with liquid in the reservoir. A discharge aperture is provided through the steam tube, forming the spray nozzle; while a discharge opening provided through the water tube adjacent the spray nozzle over which steam may pass, provides the desired liquid spray, while utilizing only relatively low steam pressures.

In accordance with the illustrated embodiment of my invention, this iron may be operated as a dry iron, as a steam iron, or with application of liquid spray, as desired by the operator, and under the control of a single control member or push button. When this control member is depressed to its lowermost position, for example, supply of liquid from the reservoir to the steam generator is blocked, whereby the iron is operated as a dry flatiron. Under this condition of operation, the liquid reservoir is open so that it may be filled with liquid as desired by the operator. With the control member in an upper position, liquid is allowed to flow drop by drop from the reservoir into the steam generator, and at the same time the opening into the reservoir is sealed by a movable valve member, whereby the iron operates as a steam iron. Due to the presence of the pressure regulating valve, steam pressure is built up within the iron during operation as a steam iron, which pressure is available for operation of the liquid sprayer whenever the control member is depressed to a spray position.

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter which I claim as my invention, this invention may be better understood from the following description taken in connection with the accompanying drawings in which:

FIG. 1 is a side elevation of a flatiron embodying this invention, partially in section to illustrate details;

FIG. 2 is a partial cross-sectional elevation, enlarged to show details and components in one operating position;

FIG. 3 is a cross-sectional elevation similar to FIG. 2, but with the component parts in a different operative position;

FIG. 4 is a partial cross-sectional view, enlarged to illustrate more clearly the spray nozzle assembly; and

FIG. 5 is a partial cross-sectional view of a modified spray nozzle assembly.

Referring to the drawings, in FIG. 1 I have shown a flatiron including a soleplate 1 over which is positioned a cover 2 and provided with an operating handle 3. As shown, the soleplate may be heated by a sheathed-type electrical heating element having an electrical resistor 4 within an outer tubular sheath 5 with the electrical resistor separated from the sheath by a mass 6 of an electrical insulating compound capable of withstanding heat. For example, mass 6 may be highly compressed granulated magnesium oxide.

Preferably, the iron includes its own internal water supply reservoir, here shown as a tank 7 positioned under cover 2 and overlying the soleplate. Formed in the soleplate is a steam generating cavity 8 into which liquid may flow from reservoir 7 through an orifice 9 in a valve

seat member 10. Cooperating with valve seat 10 is a valve operating stem 11. When valve stem 11 is seated against the valve member 10, flow of liquid into the steam generator cavity is shut off; while with the valve stem in the position shown in FIG. 1, liquid may flow from the reservoir into the steam generating cavity drop by drop.

Steam generated within cavity 8 is confined by means of a coverplate assembly 12 secured to the upper surface of the soleplate in a suitable manner, for example, by fastening devices 13. Secured to coverplate 12 in any suitable manner is a steam dome 14, preferably formed from relatively thin stainless steel or the like to retard the flow of heat from the soleplate and coverplate 12 to reservoir 7. In this embodiment, I have shown valve seat member 10 secured to the top wall of steam dome 14, although obviously other arrangements could be employed. Also, in accordance with this embodiment, steam dome 14 is provided with a shoulder upon which rests a gasket 15 to receive the marginal flange defining an enlarged aperture in the bottom wall of the liquid reservoir. It is to be understood that the reservoir is biased downwardly by any suitable means (not shown) against gasket 15, thus providing a liquid-tight seal.

In accordance with this invention, a pressure equalization tube is provided between the steam generator and the reservoir, so that the pressure within the reservoir corresponds with the pressure within the steam generator. This pressure equalization tube 16 is secured to steam dome 14, and extends upwardly to a point above the normal water level in the reservoir. Therefore, any steam generated within cavity 8 may flow upwardly through the pressure balancing or equalizing tube 16 into the upper portion of the reservoir. By this construction, water will continue to flow through orifice 9, regardless of the pressure existing within the steam generator.

It is desirable for many reasons to regulate the steam pressure existing within a flatiron of this type. Practically, relatively low pressures, in the order of 1 to 2 pounds per square inch are desirable. While a fixed orifice has been used previously in flatirons, such an arrangement does not provide a satisfactory means for maintaining uniform operating pressure within the iron. With an orifice only, initial pressure build up is relatively slow, and steam pressure variations during operation become excessive. To provide such pressure regulation, a pressure regulating valve is provided comprising a valve seat 17 and valve member 18. As shown, valve seat 17 is carried by coverplate 12 and is provided with a conical shape for cooperation with valve member 18. Valve member 18 is biased in an upwardly direction by a tension spring 19 secured at its lower end to valve 18, and hooked over the upper end of the pressure balancing tube 16. A valve stem 20 is secured to valve member 18 to maintain it in properly aligned position. With this arrangement, valve member 18 is subjected to the pressure existing within the steam generating chamber, which pressure tends to force valve 18 downwardly toward an open position. This movement of valve member 18 is resisted by tension spring 19. By proper selection of the tension spring, compared to the exposed area of valve member 18, the desired pressure may be maintained in the steam generating chamber. At such time as the steam forces valve 18 downwardly, steam escapes through the discharge passageway 21 in the cover plate, and downwardly through one or more discharge passages 22 through the soleplate to discharge steam into the fabric being ironed. This pressure regulating valve may be manually opened in a manner to be described. For this purpose, valve stem 20 is provided with an actuating arm 67.

To accommodate the operating mechanism of this iron, front handle support 23 is hollow as shown. Extending upwardly within the front handle support and forming a part of reservoir 7 is a riser 24. Secured within riser 24 is a fill valve seat member 25 having a series of fill apertures 26. Secured to the upper portion of riser

24 is a second valve seat member 27 with an enlarged aperture 28 through which valve stem 11 passes. A vapor-tight passageway surrounds valve stem 11 as defined by a generally tubular connecting member 29 brazed or otherwise secured to valve seat members 27 and 25. The upper end of riser 24 is closed and sealed by a housing member 30 for the spray nozzle presently to be described. A fill funnel 31 for the reservoir extends through the front wall of the front handle support and into riser 24.

When it is desired to fill the liquid reservoir, or for operation as a dry iron, the components are in the position shown by FIG. 2; whereas operation of the iron as a steam iron or liquid spray device is shown by FIGS. 1 and 3. The liquid fill passageway from funnel 31 into the reservoir includes valve seat member 25 with the series of fill apertures 26. A valve member cooperable to close off apertures 26 is in the form of a flexible disk 32 slidably mounted on valve stem 11 and backed with a metallic reinforcing member 33, also slidably mounted on valve stem 11. Valve stem 11 furthermore carries an upper or steam valve disk 34 for a purpose presently to be described, and this disk is limited in its upward movement along valve stem 11 by any suitable means such as a snap ring 35. A compression spring 36 encircling the valve stem is interposed betwen steam valve disk 34 and inlet valve disk 32. A lower compression spring 37 on valve stem 11 extends between the backing member for the inlet valve disk and body 10 of the steam control valve. Springs 36 and 37 are selected with the spring force of spring 36 less than the force for spring 37, so that on downward movement of the valve stem, spring 36 is compressed to a substantial degree prior to opening motion of valve disk 32. With valve disk 32 sealed against valve seat member 25, as shown by FIG. 3, the liquid reservoir is sealed. On the other hand, when the valve stem 11 is depressed a sufficient distance, valve disk 32 is moved away from valve seat member 25, thereby to open the fill passageway and allow liquid to be poured into fill funnel 32 to fill the reservoir. At the same time, the downward movement of member 33 of the fill valve engages arm 67 of the pressure regulator, opening valve 18 as shown in FIG. 2.

For operation of the liquid sprayer, it is necessary that a steam passageway be provided through fill valve 32. As clearly shown by FIGS. 2 and 3, fill valve disk 32 includes a plurality of apertures 38 spaced radially inwardly from the sealing portion of this valve disk. Aligned with apertures 38 are similar apertures 39 in the metallic backing disk. Thus, when valve disk 32 is sealed against the fill openings as shown in FIG. 3, a steam passageway through apertures 38 and 39 remains open.

Control of steam flow to the liquid spray nozzle assembly is accomplished by means of steam valve disk 34 in cooperation with valve seat member 27. As shown clearly in FIGS. 2 and 3, the valve seat member 27 includes an enlarged aperture 28 surrounding valve stem 11, and this aperture may be sealed off by steam valve disk 34 when this disk is in its upper position as shown by FIG. 3. Downward movement of the valve stem will, of course, move valve disk 34 to its open position, allowing steam to pass upwardly through aperture 28.

The liquid spray device in accordance with this invention requires both steam and liquid. Steam is supplied in the manner previously indicated upwardly through apertures 38 and 39 in the fill valve assembly and through aperture 28 in the steam valve assembly. As clearly shown in the drawings, valve stem 11 includes an internal passageway 41. The lower end of passageway 41 is in communication with liquid in the reservoir through hole 42. A second cross hole 43 is provided in the valve stem, which cross hole is arranged to be aligned with a liquid passageway 44 in housing 30 of the liquid sprayer. Housing 30 of the liquid sprayer is, of course, fixed in position with respect to the movable valve stem 11. Cross

hole 43 in the valve stem is provided with upper and lower sealing rings 45 and 46, so that normally liquid does not flow through this cross hole or upwardly through internal passageway 41 unless the cross hole is aligned with liquid passage 44 in the liquid sprayer housing 30.

For a steam iron application such as this, the liquid spray nozzle assembly operated by steam generated within the iron should be adapted especially for operation at low pressure. The use of low pressures permits lightweight construction, offers less risk of explosion, and is far easier to control. Therefore, I prefer to provide an iron of this type, utilizing steam pressures in the order of 1 to 2 pounds per square inch, although I do not wish to be limited to this specific range.

Referring in particular to FIGS. 1 and 4, I have shown a liquid spray nozzle assembly especially constructed for this invention. A steam conduit or tube 47 is secured in fluid-tight fashion to housing 30 of the liquid sprayer assembly. As clearly shown by FIG. 1, steam conduit 47 is in communication with the upper steam space in the reservoir through passage 28, apertures 38 and 39 in the fill valve, and into the reservoir. Thus, steam generated within cavity 8 may flow upwardly through the pressure balancing tube, into the reservoir, and then upwardly through the steam passages to the steam discharge conduit 47. The steam discharge conduit includes a spray aperture 48 adjacent the outer end thereof and directed generally downwardly toward the fabric to be ironed. Positioned within steam conduit 47 is a liquid conduit 49 having an internal passageway 50 therein. Liquid conduit 49 likewise is secured to body 30 of the sprayer assembly with the internal passageway 50 in communication with liquid passageway 44 of the body. The outer end of passageway 50 is sealed in any appropriate manner, and adjacent the outer end of the liquid conduit, and in alignment with steam discharge aperture 48, is a cross hole or aperture 51. Aperture 51 extends diametrically across conduit 49, so that steam flowing upwardly into the upper portion of the steam conduit 47 may pass through aperture 51, across liquid conduit 50, and outwardly through aperture 48. This action of the steam, by aspiration, draws liquid through conduit 50 for atomization. It should be noted at this point that the cross-sectional areas of the liquid passage 50, and the steam passage 51 and aperture 48 are of the same general order of size. For example, in an application found to be particularly successful, and utilizing a steam pressure in the order of 1½ pounds per square inch, I have found that aperture 48, steam passage 51, and liquid passage 50, all having a diameter of approximately 0.040 inch, produced satisfactory results; providing, however, that the spacing *d* between the liquid conduit and the inside wall of the steam conduit, measured at the discharge apertures, was approximately 0.010 inch. Particular attention is also invited to this fact that conduit 49 is spaced slightly from the internal surface of the steam conduit. As noted above, a spacing in the order of 0.010 inch resulted in exceptionally good operation of the liquid sprayer at low steam pressures. With a construction of this type, the steam flow through cross passage 51, aspirates liquid supplied through passageway 50. Th additional steam supplied directly to the exhaust port 48 through the space *d* serves to further break up liquid particles so that the resulting spray is of high quality finely divided liquid particles carried in the steam flow. It may be also noted that with this construction, liquid is not forced out through the liquid passageways by steam pressure within the reservoir. The only pressure differential causing water flow upwardly through liquid passageway 41 and to the spray nozzle is caused by high velocity flow of steam through the outlet orifice 48.

In FIG. 5, a modified spray nozzle is illustrated. In this instance, steam tube 47 is provided with the same type of spray opening 48 as above described. However, a liquid tube 49*a* is secured contiguously within steam tube 47, without an intervening space adjacent spray opening 48. Preferably, the open end of liquid tube 49*a* is cut on an angle as shown to improve the aspiration and atomization of liquid discharging into the steam flow path. Otherwise, this nozzle of FIG. 5 operates in substantially the same manner as the previously described embodiment of FIG. 4.

For convenient operator control, valve stem 11 is provided at its upper end with an operating button 52. As clearly shown in the drawings, button 52 is recessed to receive the upper end of the valve stem and to receive a locking spring 53 which also has a collar portion 54 secured to the valve stem. Button 52 is also provided with an outwardly extending shoulder portion 55 adapted to be engaged under an interior surface of handle 3 as shown in FIG. 2; or under an intermediate step 56, button 52 being shown in this position in FIG. 3. To allow for manufacturing tolerances and to facilitate operation, I prefer to include a lost motion connection between valve stem 11 and the push button. This connection includes a compression spring 57 operating between an interior shoulder on the button, and a collar portion 58 on the upper end of valve stem 11. Thus, when it is desired to move button 52 from the position shown in FIG. 3 to the FIG. 2 position, spring 57 may be compressed slightly in order to effect necessary engagement of locking shoulder 55 as shown.

It is contemplated that suitable temperature control mechanism will be included within the iron. However, since such mechanism does not form a part of the present invention, I have not shown the temperature controlling thermostat. To provide for operator selection of temperature, I have shown an adjustable disk or wheel 59 having a portion thereof projecting outwardly in front of the handle. Wheel 59 may be rotatably mounted on a bushing 60. Secured to disk or wheel 59 is a sprocket 61 operatively engaged with a bead chain 62. While I have shown the use of a bead chain, obviously other types of flexible connections could be employed. Sprocket 61 and wheel 59 are rotatably secured on bushing 60 by means of a threaded fastening device 63 as shown. A friction spring 64 may be provided additionally to retain wheel 59 in an adjusted position and to provide limited frictional engagement to prevent accidental displacement. It is contemplated that the flexible interconnection to sprocket 61 will extend through a hollow passageway 65 in the handle and downwardly through the rear handle support into the body of the iron. Obviously, rotation of wheel 59 and sprocket 61 will cause relative longitudinal movement of the bead chain 62, thus providing the necessary longitudinal movement for proper adjustment of a temperature control switch assembly within the iron.

Electrical power can, of course, be supplied to the iron by any suitable means, such as by a conventional electric cord connected to the iron through a cord lift device 66 as shown in FIG. 1.

In operation of the iron in accordance with this invention, the electrical cord is, of course, connected to a suitable source of power. The temperature adjustment wheel 59 is rotated to the desired position to select operating temperature. While the iron is heating up, push button 52 may be depressed to the fill or dry iron position as shown by FIG. 2, with the projection 55 of the push button engaged under the interior surface of the handle. With push button 52 in this position, valve stem 11 is forced downwardly to seal off the liquid flow passage from the reservoir through orifice 9 into the steam generator. As clearly shown by FIG. 2, clean-out pin 11*a* projects through the orifice, thus to remove any scale or deposit that may have accumulated. Movement of the valve stem to this position also opens fill valve disk 32 so that there is now an unobstructed passage from fill funnel 31, through the filling apertures 26 into the interior of the liquid reservoir. With the flatiron on its heel rest, fill funnel 31 faces upwardly, so that liquid may now be

poured into the iron for filling the reservoir. Any air trapped in the reservoir during filling may escape through the open pressure regulating valve.

If it is desired to utilize the iron as a dry iron, push button **52** remains in the position shown by FIG. 2. Since no liquid can flow through orifice **9** into the steam generator, no steam is generated within the iron. Furthermore, movement of fill valve backing disk **33** to the open position, engages the outwardly projecting arm **67** of valve stem **20**, thus forcing the pressure regulating valve **18** downwardly to its open position. This also allows the reservoir to be filled with less difficulty, since air can escape through the pressure balancing tube, and out through the pressure regulating valve and the apertures in the soleplate. It may be noted also that the pressure balancing tube extends well upwardly into the riser for the reservoir, and with the construction shown, there is relatively little risk of liquid splashing into the upper end of the pressure balance tube.

If at any time during the ironing process, the operator should desire discharge of steam through the soleplate, push button **52** is disengaged from the inside shoulder of the handle and is allowed to rise by action of compression springs **36** and **37** until shoulder **55** engages the intermediate handle shoulder **56**. This is the position shown by FIG. 3, wherein it may be noted that valve stem **11** has been raised clear of valve body **10**, thereby allowing liquid to flow from the reservoir through orifice **9** into the steam generating cavity **8**. It may be noted also that the upward movement of valve stem **11** has permitted pressure regulating valve **18** to move into its closed position under the influence of tension spring **19**. Furthermore, expansion of springs **36** and **37** have also resulted in closure of valve disk **32** to seal off apertures **26** in the reservoir fill passageway. Additionally, valve disk **34** is also in its upper sealed position with respect to steam passageway **28**. Therefore, the liquid reservoir is completely sealed with provision, however, for pressure control by means of the pressure regulating valve **18**. As liquid flows drop by drop through orifice **9** into the steam generator, steam is generated by vaporization of this liquid. This steam may rise upwardly through pressure balancing tube **16** into the upper portion of the reservoir, whereby the reservoir is maintained under the same pressure as exists within the steam generator. At such time as sufficient steam is created to increase the pressure corresponding to that selected for the pressure regulating valve, this valve opens to allow steam to escape through passage **21** and the apertures **22** in the soleplate. Thus, steam may be applied to the fabric being ironed. If at any time sufficient steam has been obtained, further steam supply may be cut off merely by depressing button **52** and engaging shoulder **55** as shown by FIG. 2.

During operation as a steam iron, it may be desirable to add additional moisture to the fabric being ironed. For example, when ironing cottons and linens, steam alone is frequently insufficient to remove wrinkles. As previously explained, during operation as a steam iron, steam pressure exists within the liquid reservoir. This pressure is, therefore, available to power the liquid sprayer. With push button **52** in the position shown by FIG. 3, resulting in operation as a steam iron, the liquid sprayer may be operated merely by depressing button **52** to the position shown by FIG. 1. This motion of button **52** and the corresponding motion of valve stem **11** opens steam passageway **28**, whereupon the steam flows upwardly into steam conduit **47** and outwardly through sprayer discharge aperture **48**. The further downward motion of the valve stem, after passageway **28** is opened, aligns cross hole **43** with liquid conduit **44**. Liquid from the reservoir may now flow through cross hole **42**, upwardly through passageway **41** in the valve stem, through cross hole **43** and into liquid conduit **49** in the spray nozzle. High velocity flow of steam through cross hole **51** (FIG. 4) in the liquid conduit of the spray nozzle results in liquid being drawn up and aspirated into the discharge orifice **48**. Flow of steam directly to the discharge orifice **48** further breaks up the liquid into finely divided particles with the spray being directed generally downwardly toward the fabric being ironed. Push button **52** may be released at any time, of course, and upon release it is forced upwardly by spring **36** to terminate liquid spray. However, the iron may continue to be used as a steam iron, since steam will be generated until such time as push button **52** is depressed to its lowermost position with shoulder **55** engaged on the handle as shown by FIG. 2.

Throughout operation as a steam iron, the pressure regulating valve functions not only to maintain adequate pressure within the reservoir for liquid spray purposes, but also functions to prevent any overpressure condition. Should it be desired at any time during operation to refill the liquid reservoir, push button **52** is depressed to its lowermost position, thereby shutting off liquid supply to the steam generator, and opening the valve into the liquid reservoir.

Heretofore it has been suggested that steam irons should be operated only within a limited temperature range. This range was selected to provide steam of the desired quality for ironing purposes. If a higher temperature were selected by the operator, the iron might appear to function properly; however, the higher iron temperature would result in discharge of dry superheated steam. Such steam is not effective to moisten the fabric being ironed, and hence such steam is wasted. With an iron in accordance with the present invention, on the other hand, the liquid sprayer may be operated at any ironing temperature above the liquid boiling temperature. For example, if the iron is set at its maximum temperature setting, as for ironing linens, the liquid sprayer can be operated as desired by generating steam within the iron, and then depressing push button **52**, whereupon atomized liquid is discharged onto the fabric being ironed.

While I have shown and described a particular embodiment of this invention, it will be obvious to those skilled in the art that various changes and modifications may be made without departing from the invention in its broader aspects. Therefore, I aim in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of my invention.

What I claim is new and desire to secure by Letters Patent of the United States is:

1. In a steam and liquid spray iron, an electrically heated soleplate including a flash steam generator, a liquid reservoir above said soleplate, means including a control valve providing communication from said reservoir to said steam generator, a steam outlet passage including a pressure regulating valve therein discharging through said soleplate, a steam pressure equalizing means between said steam generator and said reservoir, a fill passage for said reservoir including a valve seat therein and fill valve member cooperable therewith, a liquid spray nozzle discharging from an elevated position with respect to said soleplate and including steam and liquid supply conduits therefor, valve means in each of said conduits for control of said spray nozzle, and a three-position valve stem and valve stem operating member interconnected with said control valve, said pressure regulating valve, said fill valve, and said spray nozzle valves.

2. In a steam and liquid spray iron, a source of steam under pressure, a liquid reservoir, a liquid supply tube from said reservoir provided with a transverse passageway across the tube at the liquid discharge point, and a steam tube extending from said steam source encompassing said liquid tube and having a discharge nozzle to the atmosphere in alignment with the transverse passageway in said liquid tube.

3. In a steam and liquid spray iron, a source of steam under pressure, a liquid reservoir, a liquid supply tube

from said reservoir provided with a transverse passageway across the tube at the liquid discharge point, a steam tube in communication with said steam source encompassing said liquid tube and having a discharge nozzle to the atmosphere in alignment with said transverse passageway, and valve means controlling flow of steam through said steam tube.

4. In a steam and liquid spray iron including a source of steam under pressure, a closed liquid reservoir including pressure equalization means with said source of steam pressure, a discharge nozzle including a steam supply tube in communication with said source of steam pressure, a liquid supply tube from said reservoir extending through said steam tube and provided with a transverse passageway across the tube in alignment with said discharge nozzle, said liquid tube being spaced interiorly of said steam tube at both ends of said transverse passageway.

5. The combination of claim 4 wherein the interior spacing between said liquid tube and steam tube is relatively closer adjacent said discharge nozzle than the spacing at the opposite end of said transverse passageway.

6. In a steam and liquid spray iron, an electrically heated soleplate including a flash steam generator, a liquid reservoir above said generator, means including a control valve for regulating liquid flow from said reservoir to said steam generator, steam pressure equalizing means between said steam generator and said reservoir, a steam discharge passage communicating from said steam generator including a pressure regulating valve therein for maintaining a normal operating pressure within said steam generator and reservoir, liquid spray means including a steam conduit in communication with said steam generator and a water tube in communication with liquid in said reservoir discharging at a common atomizing nozzle, and valve means controlling steam and liquid flow to said nozzle.

7. A liquid sprayer comprising a liquid reservoir, a flash steam generator to receive liquid from said reservoir, a spray nozzle, means conducting steam from said generator to said spray nozzle, a valve member controlling liquid flow from said reservoir to said generator, a liquid conduit terminating in a discharge port at said spray nozzle, and a hollow passageway through said valve member for conducting liquid from said reservoir to said liquid conduit.

8. In a steam and spray iron, a flash steam generator, a reservoir positioned to supply liquid to said generator, a steam control valve and passage between said reservoir and generator, a liquid sprayer including a water conduit and a steam conduit communicating respectively with said reservoir and with said steam generator, a valve in each of said conduits, and valve operating means having a first position in which said steam control valve is closed, a second position in which said steam control valve is open and said valves in the water and steam conduits are closed, and a third position in which said steam control valve is open and the valves in each of said conduits are open.

9. The combination of claim 8 wherein the valve in said steam conduit opens before the valve in said liquid conduit.

10. In a steam and liquid spray iron, a steam generator, a liquid reservoir above the level of said generator including a fill valve for closing said reservoir, a steam control valve and liquid passage between said reservoir and said generator, a liquid sprayer including a liquid conduit and a steam conduit in communication respectively with said reservoir and said steam generator, a valve in each of said conduits, and valve operating means having a first position in which said steam control valve is closed and said fill valve is open, a second position in which said steam control valve is open while said fill valve and liquid and steam conduit valves are closed, and a third position in which all of said valves are open except said fill valve.

11. In a steam iron, a liquid reservoir, a steam generator positioned to receive liquid from said reservoir, means providing liquid and steam communication between said reservoir and said steam generator, means defining a fill opening for said reservoir including a pressure sealing closure member therefor, a steam discharge passageway from said steam generator to the ironing surface including a pressure regulator therein, and interconnected means for opening said pressure regulator and the closure member in said fill opening means.

12. In a steam and liquid spray iron, a liquid reservoir, a steam generator positioned to receive liquid from said reservoir, means providing liquid communication from said reservoir to said generator, a riser projecting upwardly from said reservoir and including a reservoir fill valve therein, means defining a fill opening into said riser, a spray nozzle, a steam tube having communication with said steam generator and extending upwardly through said riser and reservoir fill valve to said spray nozzle, a water tube extending from said reservoir through said steam tube to said spray nozzle, and steam and liquid valves respectively in said steam and liquid tubes.

13. In a steam and liquid spray iron, a liquid reservoir, a flash steam generator positioned to receive liquid from said reservoir, a valve body providing liquid communication from said reservoir to said steam generator, a riser projecting upwardly from said reservoir including a fill opening into said riser, a steam tube in communication with the steam space in said reservoir extending upwardly through said riser and terminating in a spray nozzle, a hollow valve and valve stem member for cooperation with said valve body controlling liquid flow from said reservoir to said steam generator and providing a liquid passageway from said reservoir to said spray nozzle.

14. In a steam iron including a soleplate, a flash steam generator, means defining a liquid reservoir positioned to supply liquid to said generator, means closing said reservoir to the atmosphere, liquid valve means controlling discharge from said reservoir into said generator, means equalizing pressure between said generator and reservoir, a steam discharge passage from said generator opening through the soleplate of the iron for supplying steam to fabrics during steam ironing, pressure regulating means between said steam generator and the soleplate opening in said discharge passage to maintain normal operating pressure within said steam generator and reservoir, and a steam powered liquid sprayer including means in steam and liquid communication respectively with said steam generator and reservoir and terminating in a spray nozzle at which steam and liquid are mixed.

15. In a steam iron, a flash steam generator, a closed liquid reservoir above the level of said generator, means providing liquid communication from said reservoir to said steam generator, means providing pressure communication from said steam generator to the upper portion of said reservoir, a steam discharge passage providing the sole outlet for steam from said steam generation means during normal operation, a pressure regulating valve in said discharge passage for maintaining a substantially uniform operating pressure within said steam generator and reservoir, and steam distributing means connected to said discharge passage down stream of the steam flow through said pressure regulating valve.

16. In a steam and liquid spray iron, a liquid reservoir, a source of steam under pressure within the iron, a spray nozzle at an elevated position with respect to said reservoir and aimed in a downwardly direction toward a fabric being ironed, a liquid passage from said reservoir extending generally upwardly to a point of discharge into said spray nozzle, a steam conduit extending upwardly from said steam source to said nozzle with the steam discharge flow path at said nozzle being transverse to the liquid flow discharging from said liquid passage into said nozzle, thereby to atomize the liquid issuing from said nozzle, a liquid valve in said liquid passage, a steam valve in said steam conduit, and common means to actuate said valves.

17. The combination of claim 16 in which said common valve actuation means is connected to said liquid and steam valves to move said steam valve toward open position prior to opening of said liquid valve.

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