Feb. 19, 1963 K. EHRMANN ETAL 3,077,900

VALVE FOR STEAM IRON

Filed July 20, 1960

FIG. 1.

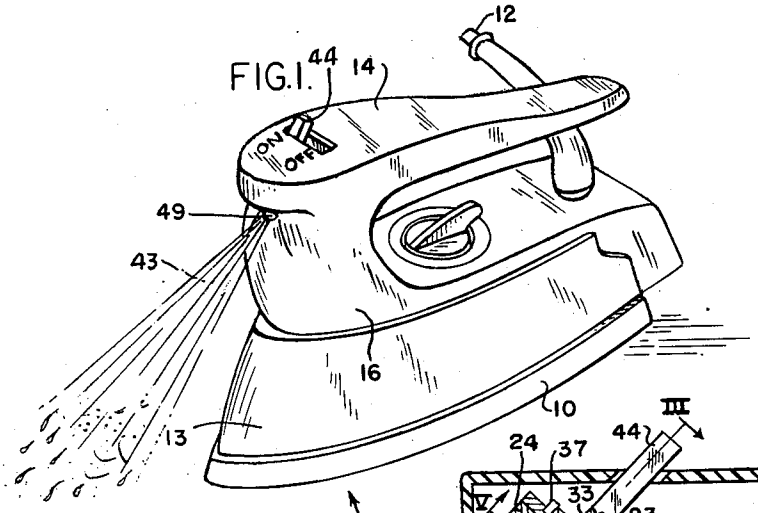


FIG. 2.

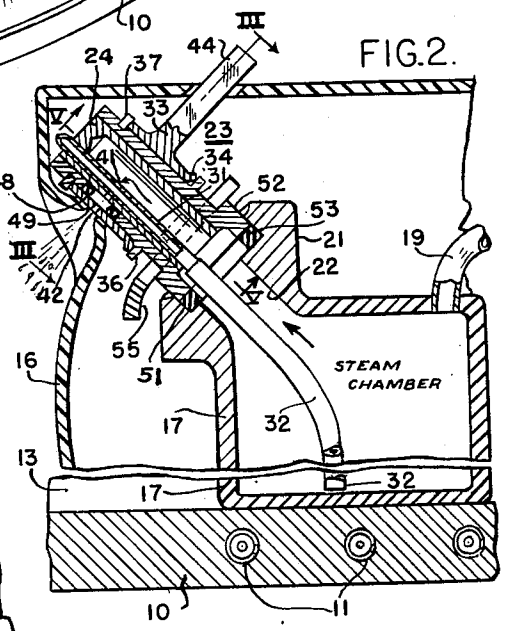


FIG. 3.

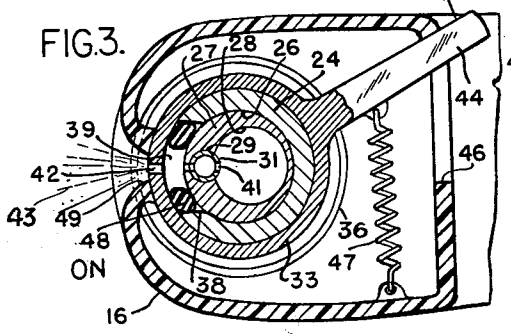


FIG. 4.

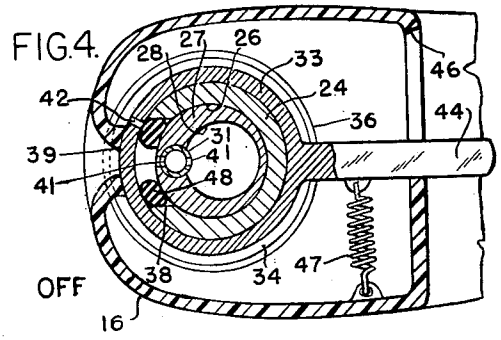


FIG. 7.

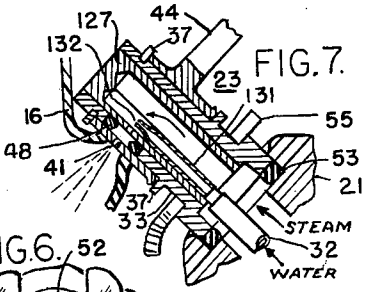


FIG. 5.

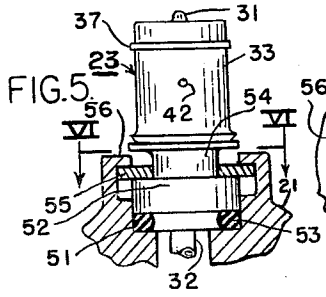
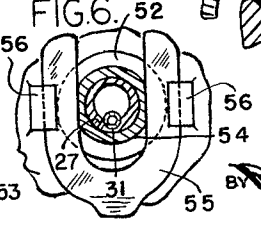


FIG. 6.



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VALVE FOR STEAM IRON

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1 Claim. (Cl. 137—604)

This invention relates to steam electric irons having means for directing a spray of atomized water onto the material being ironed, ahead of the iron.

More particularly, the invention relates to atomizing spray valves for steam irons wherein the atomization is effected by steam under low pressure, as distinguished from that type of atomizing spray nozzle wherein the spray is effected by manual pumping of water through an atomizing nozzle.

For obvious safety reasons, it is desirable to utilize relatively low pressures in small, manually utilized appliances, including electric hand irons. In steam irons it is desirable to limit the pressure to a range of one to four pounds per square inch.

Atomizing nozzles are manufactured commercially in a great variety of designs. However, applicants have been unsuccessful in locating any such nozzle that would produce a satisfactory spray with less than ten pounds per square inch of pressure.

Designing a low pressure atomizing nozzle for use in a domestic steam iron involves the solution of a number of problems in addition to that of effecting a satisfactory spray at low pressures. Some of these are reliability, cost of manufacture, ease of repair and prevention of leaks or dripping.

An object of the present invention is to produce a spray of atomized water, utilizing a source of water and a source of low pressure steam, i.e., steam at a pressure of four pounds per square inch, or lower.

Another object of the invention is to facilitate manual intermittent operation of an atomizing spray nozzle of a steam iron.

Briefly, the invention, in one form, utilizes a cylindrical valve body having a hollow interior in communication with a source of low pressure steam. A recess is provided in the outer cylindrical surface and a cylindrical valve sleeve closely surrounds the cylindrical valve body in closing relation to the recess. A radial passage through the valve body wall provides for flow of steam from the body interior to the recess and a similar passage through the valve sleeve provides an orifice for discharge of steam and water from the recess in the form of a spray. A tube communicating with a source of water in the iron has a portion disposed in the hollow interior of the valve body, and this tube is provided with a discharge opening adjacent the passage to the recess, with the result that flow of steam past this discharge opening entrains water from the tube and carries it to the recess for discharge through the spray orifice in the valve sleeve. The valve sleeve is rotatable of the valve body between a "spray" position where the orifice communicates with the recess and an "off" position where the recess is covered by an unapertured portion of the sleeve. Preferably, sealing means of the O ring type is disposed in the recess and is compressed between the bottom of the recess and inner surface of the valve sleeve.

The above and other objects are effected by the invention as will be apparent from the following description and claim taken in connection with the accompanying drawing, forming a part of this application, in which:

FIG. 1 is a perspective view of a steam hand iron constructed in accordance with the present invention;

FIG. 2 is an enlarged fragmentary longitudinal sectional view showing details of the invention as utilized in the iron of FIG. 1;

FIG. 3 is an enlarged transverse sectional view taken along the line III—III of FIG. 2, looking in the direction indicated by the arrows;

FIG. 4 is a view similar to FIG. 3, but showing the nozzle valve in a different position;

FIG. 5 is a longitudinal sectional view taken along the line V—V of FIG. 2, looking in the direction indicated by the arrows;

FIG. 6 is a transverse sectional view taken along the line VI—VI of FIG. 5, looking in the direction indicated by the arrows; and

FIG. 7 is a vertical sectional view showing a modified construction.

Referring particularly to FIGS. 1 and 2, there is shown an electric steam iron including the usual soleplate 10 having electrical heating means 11 provided therein. The heating means 11 receives electrical energy from any suitable source via the cord 12. The iron includes the usual shell 13 and a handle 14 which may be of plastic, or other moldable material, the handle including a hollow post 16 which, together with the shell 13, houses a tank 17 providing a reservoir for a supply of water. The upper portion of the tank constitutes a steam chamber for steam generated by heat applied to the water in the tank 17 by the heating means 11. The tank 17 may be provided with a fill tube 19 whose outer end (not shown) is located at a readily accessible place and provided with a suitable closure to prevent spillage of water from the reservoir when the iron is tilted back on its heel. The tank 17 is provided with a boss 21 through which is formed a passage 22 for a purpose to be hereinafter described.

Mounted on the boss 21 is the valved atomizing nozzle 23 constituting the principal contribution of this invention. As best shown in FIGS. 2 and 3, this nozzle comprises a valve body 24 which is circular in cross section and is provided with an internal bore 26 in which is secured, preferably by a press fit, a cylindrical insert 27 having a main bore 28 and a supplemental bore 29. The main bore is arranged eccentrically with respect to the longitudinal axis of the insert 27 in order to provide sufficient thickness of wall structure in the insert to contain the major portion of the supplemental bore 29. However, these two bores may, and preferably do, overlap slightly as shown in FIGS. 3 and 4, in order that a tube 31 which is press fitted into the supplemental bore may project slightly into the main bore 28 of the insert 27.

The tube 31 may extend through the otherwise closed end of the insert 27 and has the end thereof which projects beyond the closed end of the insert closed tightly, as by pinching or other means. The other end of the tube 31 has tightly secured thereon a tube 32 which may be of Teflon or other suitable material, and which effects extension of the tube through the passage 22 to a point near the bottom of the water reservoir provided by the tank 17, so that water may be drawn from the reservoir up into the atomizing nozzle in a manner to be described later.

A cylindrical valve sleeve 33 surrounds the valve body 24 in close engagement therewith but sufficiently loose thereon to permit its rotation relative to the valve body. The lower edge of the valve sleeve 33 is flared outward slightly, as at 34, to facilitate its assembly on the valve body by axial sliding motion. The valve sleeve is retained in its selected position by a radial outwardly extending flange 36 formed integral with the valve body and a snap ring 37 retained in a mating groove formed in the outer surface of the valve body.

The valve body 24 has a circular opening 38 formed therethrough before the insert 27 and the valve sleeve 33 are assembled with respect thereto. When assembly is

completed, the circular hole 38 provides a recess 39 between the insert 27 and the valve sleeve 33, and this recess is placed in communication with the main bore of the valve insert 27 by a passage 41 which extends radially through both walls of the tube 41 and the adjacent wall structure of the insert 27. This passage 41 provides for entry of steam under pressure from the steam chamber 18 via the passage 22 and the main bore 28 of the insert to the recess 39. During flow of steam through the passage 41, water will be aspirated through the tubes 32 and 31, and the passage 41 to the recess 39.

The valve sleeve 33 is provided with an opening or aperture 42 providing a nozzle orifice for discharge of mixed steam and water from the recess 39 in the form of a spray of atomized moisture, as at 43.

The valve sleeve 33 is, as previously indicated, rotatable with respect to the valve body 24, and this rotation is effective between a first position, as shown in FIG. 3, where the aperture 42 is aligned with the passage 41, which may be termed a "spray" position, and an "off" position, as best shown in FIG. 4, where the aperture 42 no longer communicates with the recess 39. In order that the valve sleeve 33 may be manually adjusted between its "spray" and its "off" positions, the sleeve is provided with a radially extending handle or finger piece 44 which projects through a slot 46 provided in the handle 14, the slot 46 being of such length that its end walls serve as stops to position the valve sleeve in one or the other of its two pertinent positions. To facilitate the manual use of the finger piece 44, the latter is provided with means such as the tension coil spring 47 for biasing the valve sleeve to "off" position, so that the user need only push the finger piece counterclockwise, as viewed in FIGS. 3 and 4, to effect a spray action and merely release the finger piece 44 to provide for cutting off the spray due to the tension in the spring 47 automatically returning the valve sleeve to its "off" position.

Since it is desirable to have the valve sleeve 33 loose enough on the valve body 24 to permit the valve sleeve to be readily adjusted, it is desirable to seal the recess 39 against leakage of steam and/or water therefrom into the space between the valve sleeve and the valve body. It has been found that an excellent seal is effected by use of an O-ring 48 of circular form and of circular cross section, the material of this ring being resilient and compressible and its cross sectional diameter being greater than the depth of the recess 39, so that when the ring is positioned between the valve insert 27 and the valve sleeve 33, the O-ring is compressed into sealing engagement with the opposed surfaces of the insert and valve sleeve, thereby effectively preventing leakage of water and/or steam from the recess 39. The flared lower end of the valve sleeve 33 provides for assembly of the sleeve over the O-ring without damage to the latter.

It will be apparent that the post 16 of the handle 14 should be provided with a suitable opening, as at 49, for uninterrupted discharge of the spray 43 from the aperture 42.

The valved atomizing nozzle 23 is provided with means by which it may be easily secured to or detached from the boss 21 surrounding the passage 22 from the steam chamber 18. To this end, the boss 21 is provided with a recess 51 (FIG. 5) for reception of a collar 52 formed integral with the base or inner end of the valved atomizing nozzle 23. To prevent leakage of steam through the normal clearance between the walls of the recess 51 and the surface of the collar or base 52, a gasket 53 is preferably positioned in the bottom of the recess 51, to be compressed by the nozzle 23 when assembled. The nozzle 23 is provided with a neck portion 54 of reduced diameter, between the collar 52 and the flange 36 on the valve body (FIGS. 5 and 7). During assembly, the atomizing nozzle 23 is pressed into the recess against the resilient force of the compressed gasket 53 and is retained therein by a bifurcated wedge 55 which straddles the neck 54 and bears against the upper surface of the collar 52, the wedge 55 also engaging under and being retained by inwardly directed lugs 56 disposed at opposite sides thereof and formed integral with the boss 21, all as clearly illustrated in FIGS. 5 and 6.

In operation, when the housewife desires to obtain a spray to dampen a portion of the material being ironed, she merely moves the finger piece 44 counterclockwise as viewed in FIG. 3, which results in rotation of the valve sleeve 33 to the position where the aperture 42 provides a spray orifice for discharge of steam and water from the recess 39. Steam under pressure from the steam chamber 18 passes through the passage 22 and the main bore 28 of the valve insert 27, and then through the passage 41 to the recess 39. Flow of steam through the passage 41 produces aspiration of water through the tubes 32 and 31 for mixed flow with the steam to the recess 39 and for discharge therefrom in the form of an atomized spray, as at 43. Release of the finger piece 44 by the user results in tension applied by the coil spring 47 returning the valve sleeve 33 to its "off" position.

In FIG. 7 there is shown a modified arrangement which differs from the structure described above only in that the tube 131 does not extend through the closed end of the valve insert at 27, but terminates substantially in line with the passage 41 through the insert side wall. This terminal portion of the tube 131 is provided with a small opening through which water is aspirated during passage of steam therepast as it flows to and through the passage 41, the recess 39 and the aperture 42.

It has been found that valved atomizing nozzles constructed as herein disclosed provide highly satisfactory atomization where the steam is available at pressures of four pounds per square inch or less, as distinguished from other known atomizing nozzles which usually require pressures in excess of ten pounds per square inch, pressures in this range being undesirable for appliances utilized in the home and particularly utilized by hand.

While the invention has been shown in but two forms, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications without departing from the spirit thereof.

What is claimed is:

For use with a steam iron having a water reservoir and a space for steam: a valved atomizing nozzle comprising a cylindrical valve body having a cylindrical central bore opening through one end thereof, a cylindrical insert closely received in the valve body bore and having a hollow interior closed at one end and open at the other end for flow of steam thereinto, a water-conducting tube mounted in the hollow interior of the insert at one side thereof and adapted to be placed in communication with a body of water, a cylindrical valve sleeve closely surrounding the valve body and rotatable with respect thereto between valve opening and valve closing positions, said valve body having a circular opening through a side wall thereof providing a recess closed at its outer side by the valve sleeve and at its inner side by the cylindrical insert, an O-ring of resilient compressible material in the recess adjacent the circular periphery thereof and compressed into sealing engagement with the valve sleeve and the insert, said insert having a passage therethrough providing an inlet to the recess from the hollow interior of the insert, the water-conducting tube having a discharge opening adjacent said inlet passage and the valve sleeve having an orifice therethrough providing an outlet from the recess when said valve sleeve is in its valve-opening position, and means normally biasing said valve sleeve to its valve-closing position.

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