United States Patent

Gronwick et al.

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[54] **ELECTRIC PRESSING IRON**

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[52] **U.S. Cl.** **38/77.83**

[51] **Int. Cl.** **D06f 75/06**

[58] **Field of Search** 38/77.83, 77.5, 77.1, 77.9

[56] **References Cited**

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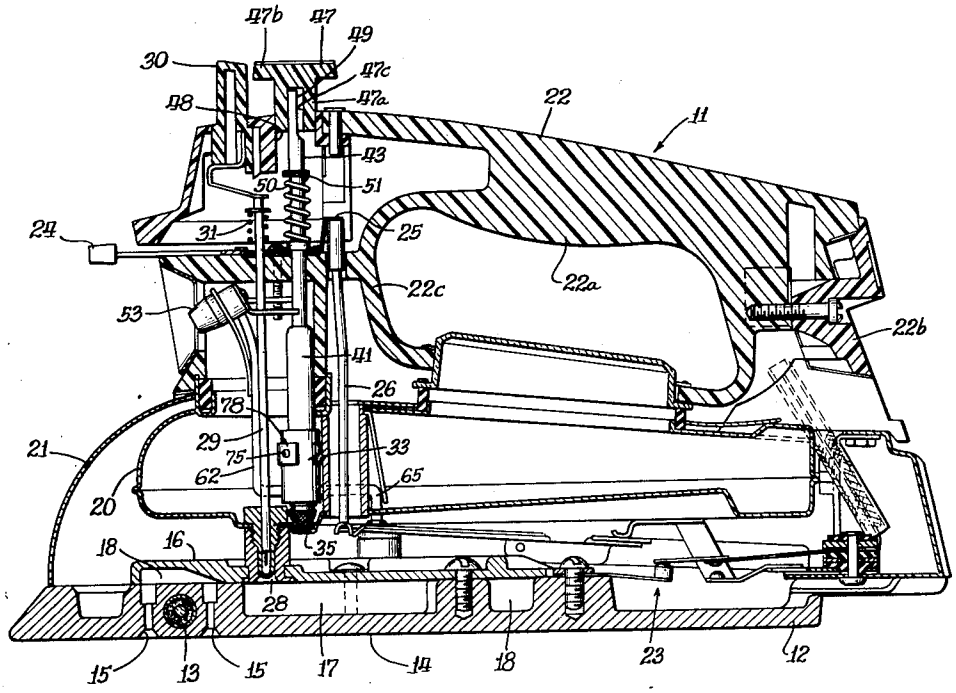
[57] **ABSTRACT**

A pressing iron having means for producing a water spray or a pressurized discharge of steam from the soleplate. The means for operating the spray and steam including a single manually actuable control which is rotatable to predetermined positions to select the spray or the steam discharge and is movable axially to produce tHe selected spray or steam discharge.

12 Claims, 9 Drawing Figures



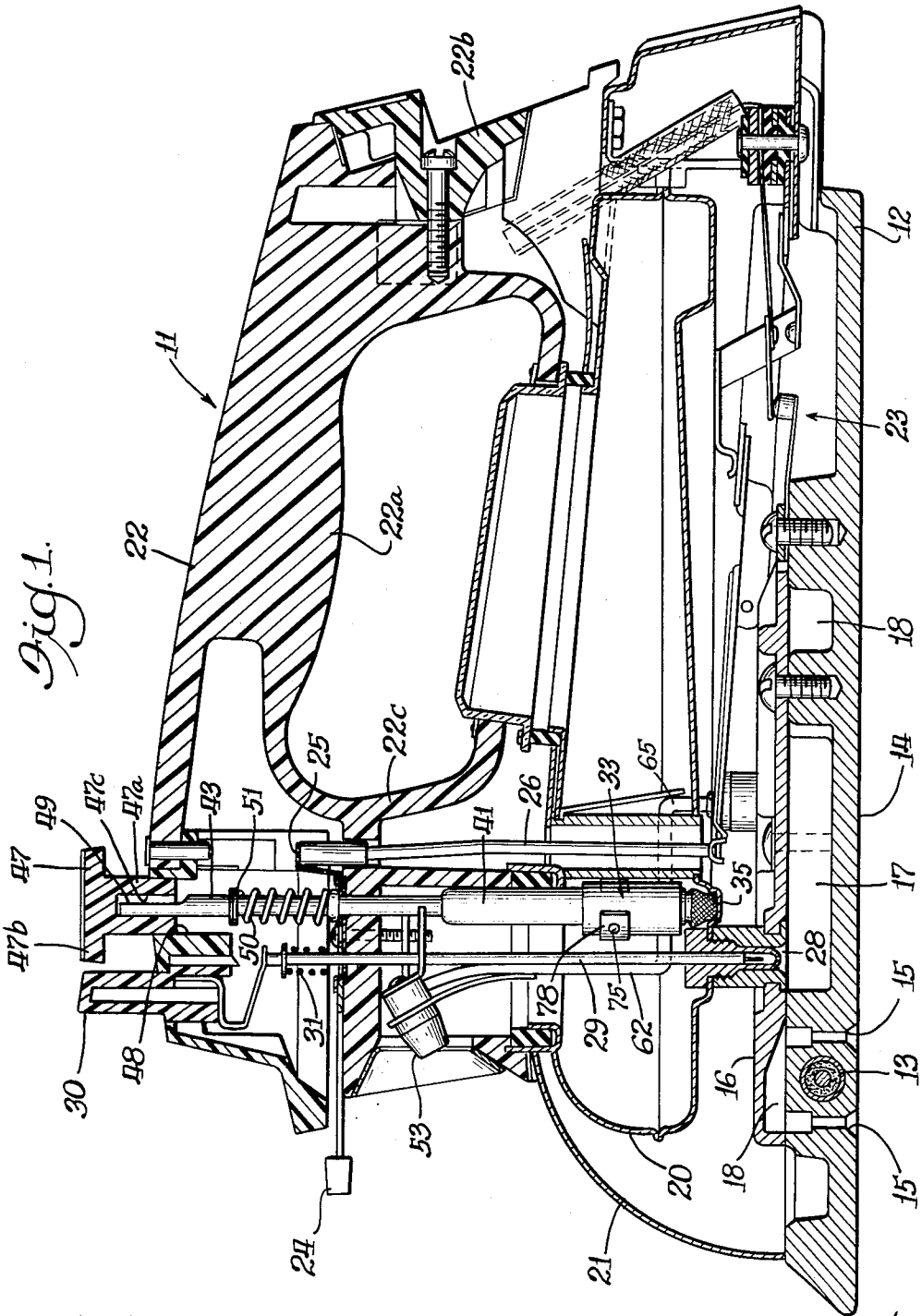


Fig. 1.

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Fig. 3.

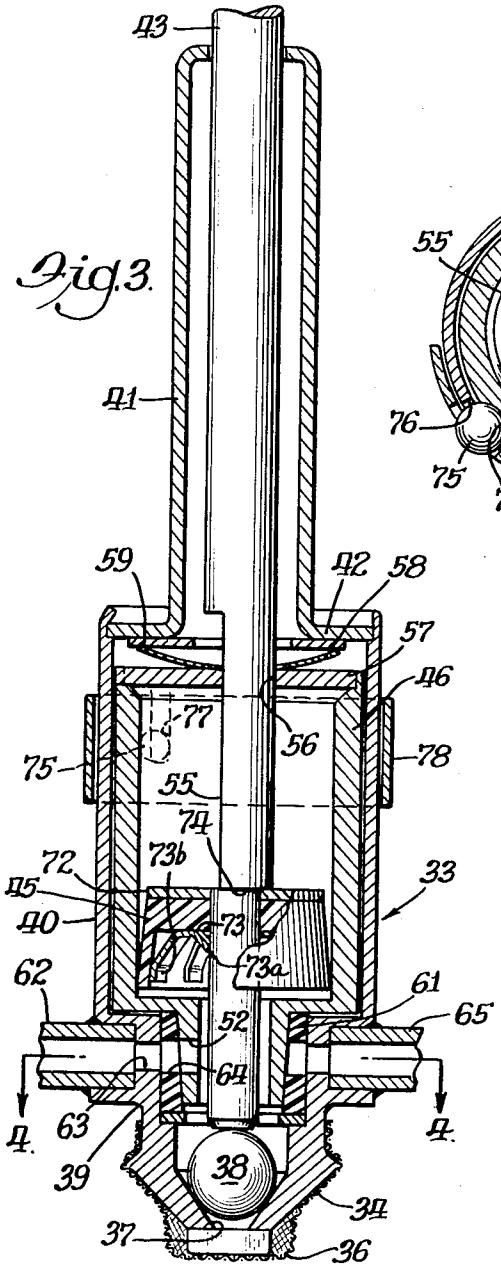

Fig. 6.

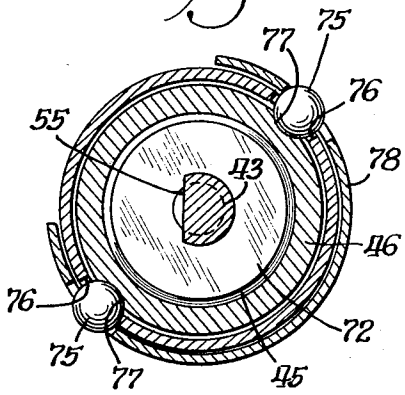

Fig. 2.

Fig. 4.

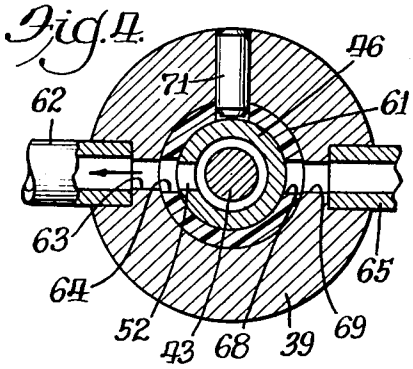

Fig. 5.

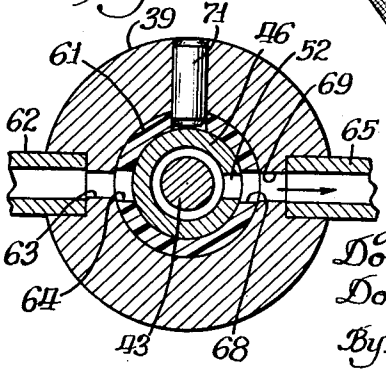

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Fig. 8.

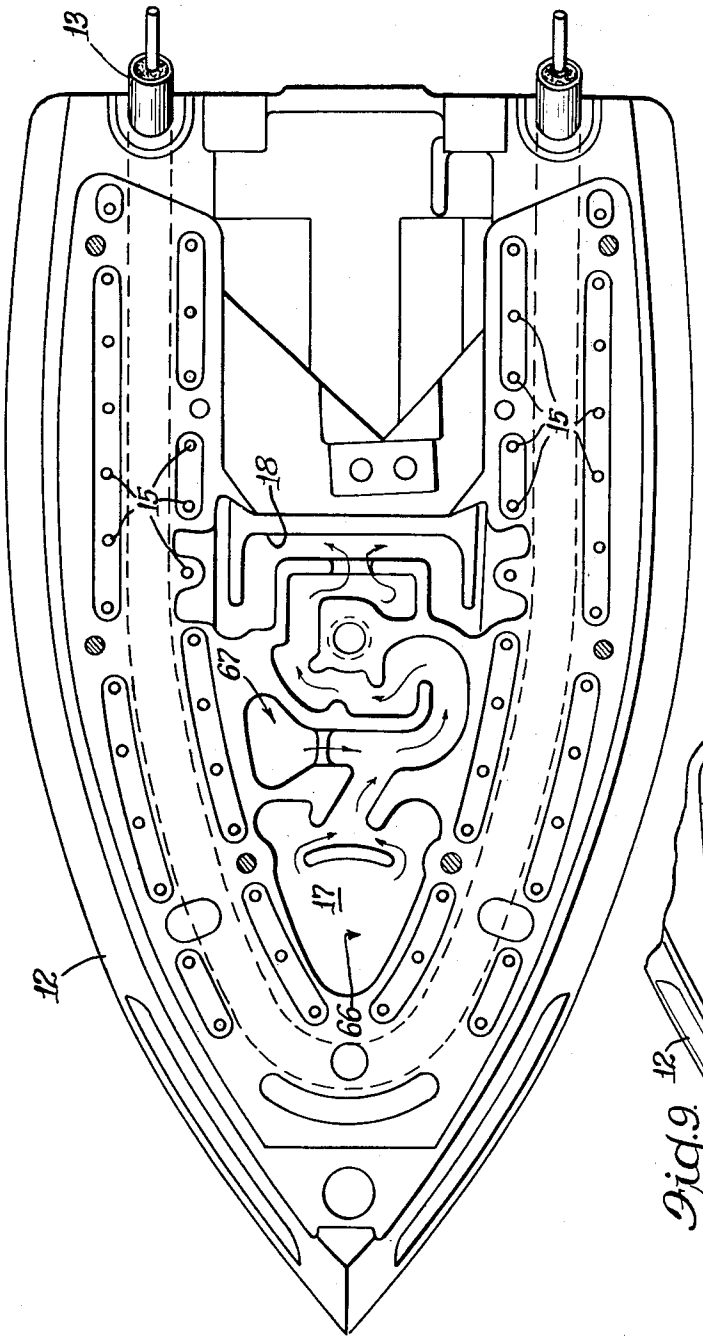


Fig. 7.

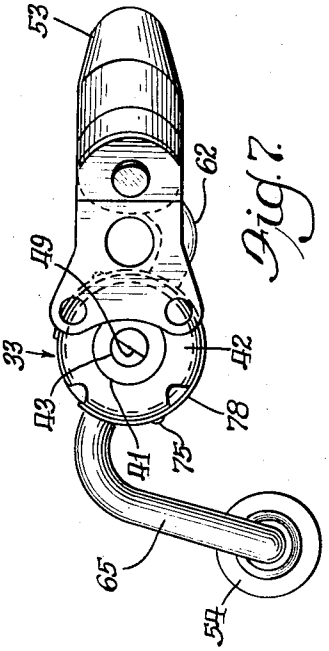
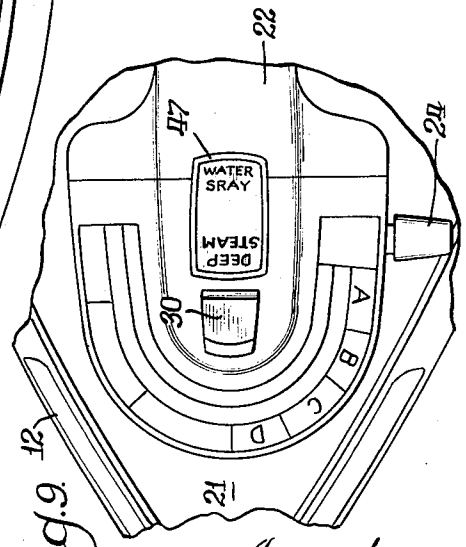


Fig. 9.



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ELECTRIC PRESSING IRON

BACKGROUND OF THE INVENTION

The portable electric pressing iron has reached a high state of development in recent years with these irons being capable of performing many functions which were heretofore unknown. It is well recognized that the heated soleplate of an electric pressing iron has certain limitations as far as removing wrinkles in various types of fabrics is concerned. With the addition of the means for producing steam which is distributed through openings in the soleplate, the versatility and usefulness of the electric pressing iron was increased considerably. At a later point in time, it was recognized that the soleplate steam is not always completely satisfactory as far as dampening fabrics for wrinkle removal is concerned. Accordingly, irons were provided with means to distribute steam from the soleplate and means to discharge a fine water mist from the front of the iron on to the fabric to be pressed.

In order to further increase the speed and effectiveness of the pressing iron, an improvement was created which involved forcing water under pressure into the steam generating chamber in order to produce larger quantities of steam which would penetrate the fabric better. A pressing iron embodying this development is disclosed and claimed in application Ser. No. 858,723 filed Sept. 17, 1969, now U.S. Patent No. 3,559,357, on Electric Pressing Iron in the name of Jerry P. Gronwick and Donald J. Westphal, which application is assigned to the same assignee as the instant invention. While the above cited application is directed principally to the means for producing the pressurized or extra penetrating steam, there is also disclosed in FIG. 8 of that application a steam iron which includes, (1) means for producing conventional soleplate steam, (2) means for producing a fine water spray from the front of the iron, and (3) means for producing a pressurized steam discharge from the soleplate of the iron. In order to accomplish these various functions the iron disclosed in FIG. 8 of the above cited application includes a plurality of control means. Because of the limited space on the handle of a portable pressing iron and because of the desirability of having the controls in close proximity to the fingers of the operator for easy manipulation, it is important that the controls of an electric pressing iron be made as simple as possible. In addition, the intense competition in the marketing of portable pressing irons requires that the structures be made as simple as possible to minimize the manufacturing costs.

SUMMARY OF THE INVENTION

Briefly the improved electric pressing iron of the present invention provides a simplified control for selecting either the spray or the deep penetrating steam function which are selectively available in the iron. The iron is provided with a pump which displaces water for discharge either into the steam chamber for the deep penetrating steam or from the spray nozzle for producing a mist to dampen the clothes prior to ironing. The pump itself provides means for permitting the operator to select either the spray or the steam discharge functions rotatively by positioning the pump actuator to either of two predetermined positions. The pump actuator is then depressed or moved axially to force the water from the reservoir to either the water spray nozzle or into the steam chamber.

Accordingly, it is an object of the present invention to provide a new and improved electric pressing iron having simplified control means for selectively actuating the water spray or the steam discharge mechanism.

It is a further object of the present invention to provide an improved electric pressing iron having a pump which includes a valve mechanism to direct the discharge from the pump to either the water spray mechanism or the pressurized steam chamber.

It is another object of the present invention to provide an improved electric steam pressing iron having a displaceable pump control which may be rotated to predetermine positions to operate selected functions of the iron.

Further objects and advantages of the present invention will become apparent as the following description proceeds and the features of novelty which characterize the invention will be pointed out with more particularity in the claims annexed to and forming a part of this specification.

BRIEF DESCRIPTION OF THE DRAWINGS

For better understanding of the present invention reference may be had to the accompanying drawings in which:

FIG. **1** is a vertical sectional view of an electric pressing iron embodying the present invention;

FIG. **2** is an enlarged side elevational view of the pump mechanism and nozzle embodying the present invention and shown separate from the remainder of the iron structure included in FIG. **1**;

FIG. **3** is an enlarged sectional view of the pump mechanism of FIG. **2**;

FIG. **4** is a horizontal view taken on line **4—4** of FIG. **3** assuming FIG. **3** to show the complete pump mechanism;

FIG. **5** is a sectional view similar to FIG. **4** but showing the pump valve in an alternative position;

FIG. **6** is an enlarged sectional view of pump taken on line **6—6** of FIG. **2**;

FIG. **7** is a top plan view of the pump and nozzle mechanism shown in FIG. **2**;

FIG. **8** is a top plan view of the soleplate embodied in the iron of FIG. **1**; and

FIG. **9** is a fragmentary top plan view of the forward portion of the iron shown in FIG. **1**.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings wherein like characters designate corresponding parts throughout the several views, there is shown an electric pressing iron designated generally by reference numeral **11**. As was indicated above, the pressing iron **11** represents an improvement over the iron disclosed and claimed in application, Ser. No. 858,723 filed Sept. 17, 1969, now Patent No. 3,559,357, on Electric Pressing Iron. The electric pressing iron **11** includes a soleplate **12** which is preferably a cast aluminum part having a sheathed heating element **13** integrally cast therewith. The soleplate **12** has a smooth, highly polished bottom pressing surface **14** and includes a plurality of steam discharge orifices **15** which extend through the soleplate.

Mounted on the upper surface of the soleplate 12 is a steam chest cover 16 which cooperates with cavities formed in the soleplate 12 to form a steam generating chamber 17 and steam distribution passageways 18. The steam distribution passageways 18 are in communication with the discharge openings 15 as is evident from the showing in FIG. 1.

Positioned above and carried by the soleplate 12 is a water reservoir 20 and a decorative cover or shell 21 which overlies and encloses the entire top of the soleplate 12. Immediately above the cover or shell 21 is a plastic handle 22. The handle 22 includes a central gripping portion 22*a*, a rear column 22*b* through which the cord connection is made and a front column 22*c* which encloses most of the control mechanism as will be described in greater detail below.

The iron 11 has conventional means for regulating the temperature of the soleplate 12. This means comprises a thermostatic switch 23 which controls the flow of electricity to the heating element 13. To establish the temperature at which the thermostatic switch regulates the soleplate 12, there is provided a temperature control 24 which, as is shown in FIGS. 1 and 9, extends from the forward portion of the handle 22. The temperature control 24 is rotatable about a vertical axis and controls a cam 25 which, through a cam follower 26, adjusts the thermostatic switch to the desired temperature.

The iron 11 is of a type whereby steam may be produced and then causes to issue from the discharge openings 15 in several different ways. The more conventional type of steam generation involves the use of a simple valve 28 which permits gravity flow of water from the reservoir 20 into the steam generating chamber 17. The valve 28 is opened and closed by means of a rod 29 and an actuator 30 which permits use of the iron as either a steam iron or a dry iron. In operation as a steam iron the valve rod 29 is biased to an open position by means of a spring 31. When the actuator 30 is latched downwardly in a depressed position, the valve rod 29 is urged into a seated position in which the valve 28 is closed and prevents water from flowing into the steam generating chamber 17.

The alternative means for producing steam involves pumping water under pressure into the steam chamber 17 so that greater quantities of steam may be discharged from the openings 15 at a greater velocity than is possible with the gravity feed of the water through the valve 28. This pressurized injection of water into the chamber 17 is accomplished by means of a pump 33 which is mounted within the reservoir 20 as is shown in FIG. 1. The pump 33 is provided with a valved inlet 34 at its lower end. The inlet 34 is received within a depression 35 in the bottom of the reservoir 20 in order to insure that the last remaining amounts of water within the reservoir 20 may be drawn into the inlet 34. As is best illustrated in FIG. 3 the inlet 34 includes a filter screen 36 which surrounds an inlet opening 37. The inlet opening 37 is of a conical shape to provide a seat for a check valve ball 38. The pump 33 includes a valve portion 39 positioned immediately above the inlet and a body portion 40 which is disposed above the valve portion 39. The body portion is generally cylindrical having an upwardly facing open top which is closed by a guide member 41. The guide member 41 has a lower flange 42 the outer edge of which is staked or otherwise secured to the upper shouldered edge of the body portion 40 as is shown in FIG. 3.

The guide member 41 surrounds and supports for axial movement the vertically extending pump shaft 43, which supports at its lower end a plastic or nylon pump piston 45. The piston 45 is dimensioned to be snugly received within a rotatable pump cylinder 46 which is itself received within the body portion 40 of the pump 33.

The pump shaft 43 extends upwardly through the front column 22c of the handle 22 and at its upper end receives a pump control 47 which extends well above the gripping portion 22a of the handle 22. The pump control 47 is essentially T-shaped having an elongated cylinder portion 47*a* which is received within a cylindrical opening 48 formed in the handle 22. At its upper end the pump control 47 has an elongated flat member 47*b* which is of suitable size and suitably positioned so that the user of the iron 11 may apply downwardly thumb pressure against the control 47 to actuate the pump 33. The upper end of the shaft 43 is provided with a flatted portion 49 which is snugly received within a vertically extending passageway 47*c* in the pump control 47 to permit the shaft 43 to be rotated through rotation of the pump control 47. The passageway 47*c* is non-circular so that there will be no relative rotation between the control 47 and the shaft 43.

The pump shaft 43 is biased to its uppermost position by means of a spring 50 which, as shown in FIG. 1, engages at its lower end a hub support for the cam 25 and at its upper end engages a washer 51 secured to the shaft 43. In the upwardly displaced position of the shaft 43, its associated piston 45 is disposed at the top of the pump cylinder 46. Thus when the shaft 43 is depressed by applying pressure on the control 47, the water which has been drawn into the pump cylinder 46 through the opening 37 is then discharged through an outlet opening 52 which is best shown in FIG. 3. It is important to note that the entire pump cylinder 46 including the outlet 52 is mounted for rotation within the body portion 40 of the pump 33 in order to selectively deliver the output of the pump 33 either to a water spray nozzle 53 or through a check valve 54 to the interior of the steam generating chamber 17.

In order to accomplish this rotation of the pump cylinder 46, the lower end of the pump shaft 43 is formed with a flatted portion 55 which extends through a semi-circular hole 56 formed in a top wall 57 of the pump cylinder 46 as best shown in FIG. 3. Immediately above the wall 57 is a spring washer 58 and a flat washer 59. The spring washer 58 applies a downwardly force against the pump cylinder 46 and urges it into seated engagement with a sealing gasket or member 61 shown in FIGS. 3 to 5.

In order to connect the pump 33 with the nozzle 53, there is provided a somewhat L-shaped tubular conduit 62 which extends from the valve portion 39 of the pump 33 up into the connection with the nozzle 53. The valve portion 39 of the pump 33 is formed with an opening 63 which registers with the interior of the conduit 62 and which is also in registry with another opening 64 formed in the sealing member 61. When the pump cylinder 46 is positioned to deliver water to the

nozzle 53 the outlet 52 in the pump cylinder is positioned as shown in FIG. 4 such that the openings 52, 64 and 63 are in registry with the conduit 62 thus permitting water forced out of the pump cylinder 46 by the piston 45 to be discharged through the conduit 62 to the nozzle 53.

For the purpose of providing the alternative connection from the pump 33 to the steam chamber 17, a second conduit 65 is employed which extends from the valve portion 39 of the pump 33 at a point diametrically opposite from the point where the nozzle conduit 62 is connected. The conduit 65 extends into engagement with the check valve 54 which is carried by the steam chest cover 16 and permits discharge of water from the pump 33 into a particular area of the steam generating chamber 17. In this regard it should be noted that the soleplate 12 disclosed in the instant application and shown in FIG. 8 is of the same configuration and functions in the same manner as the soleplate disclosed in connection with the above cited Gronwick and Westphal application. To be more specific, however, the water discharged through the gravity valve 28 falls in the forward position of the steam chamber at a point generally indicated by an arrow and reference numeral 66. On the other hand, the water discharged through the check valve 54 is deposited in a spaced area of the soleplate designated by reference numeral 67 and an arrow. The steam generated at points 66 and 67 flows through the tortuous passageways and is discharged from the same discharge openings 15 in the manner described in the aforementioned Gronwick and Westphal application.

Referring now to FIG. 5 of the drawings, the pump cylinder 46 is shown in the position wherein the outlet 52 is positioned to discharge water through an opening 68 in the sealing gasket 61 and an opening 69 in the valve portion 39 of the pump 33. Thus when the pump outlet 52 is rotated 180° from the position shown in FIG. 4 to the position shown in FIG. 5, the pump circulates water from the reservoir 20 to the steam chamber 17.

It should be noted that the sealing gasket or member 61 is formed preferably of a Teflon material so as to prevent leakage between the rotatable pump cylinder 46 and the valve portion 39 of the pump 33. There is a 5° taper provided on the inner diameter of the sealing member 61 so that the downward force applied by the spring washer 58 maintains the parts in sealed engagement. In order to prevent displacement of the gasket 61 or misalignment of the openings 64 and 68 formed therein with respect to the openings 63 and 69 in the valve portion 39 of the pump 33, a retaining pin 71 is employed which extends through aligned openings in the valve portion 39 and the sealing member 61 as is best shown in FIGS. 4 and 5.

The piston 45 of the pump 33 is a cup shaped Teflon member which is secured to the shaft 43 by means of a washer 72 and a formed spring retainer 73. The retainer 73 has formed interior legs 73*a* which engage the shaft 43 and prevent its removal therefrom. The spring retainer 73, therefore, clamps the piston 45 and the washer 72 against a shoulder 74 formed at the transition of the smaller diameter end portion of the shaft 43 with the larger diameter upper portion thereof. The spring retainer 73 is also formed with a plurality of outwardly extending fingers 73*b* which engage the interior of the cup shaped Teflon piston 45 and retain it in good sealing engagement with the interior of the pump cylinder 46. The spring fingers 73*b* thus assure a good pumping action even under adverse conditions as the water within the reservoir 20 becomes heated and the Teflon might otherwise have a tendency to deform and deflect out of engagement with the interior of the pump cylinder 46.

For the purpose of protecting the piston 45 from bottoming against the end of the pump cylinder 46 the lower end of the shaft 43 is extended downwardly to provide a stop as is best shown in FIG. 3. Thus the lower end of the shaft 43 engages the ball 38 arresting the downward movement of the piston 45 while it is still spaced from the end of the cylinder 46.

As is best shown in FIG. 9 the pump control 47 is formed with suitable legends such as "WATER SPRAY" and "DEEP STEAM" inscribed thereon at opposite ends. This provides the operator with a means of selecting the position of the pump cylinder 46 to obtain the desired function or alternative output of the pump 33. In the position shown in FIG. 9 with the inscription "DEEP STEAM" reading upright to the operator as the iron is used, the pump cylinder would be positioned to deliver water through the conduit 65 to the check valve 54 to the steam chamber 17 as shown in FIG. 5. Alternatively, if the pump control 47 is rotated 180° so that the inscription "WATER SPRAY" is upright to the user of the iron, the pump cylinder 46 would be positioned as shown in FIG. 4 so that water would be delivered through the conduit 62 to the nozzle 53. This provides the operator with a very simple means of controlling the type of operation obtainable as the control 47 is depressed.

As is best shown in FIG. 6, the control 47 is provided with detent means including balls 75 carried by the body portion 40 of the pump 33 for locating the pump cylinder 46 in either of the alternative positions shown in FIGS. 4 and 5. The balls 75 are received within the openings 76 formed in the walls of the body portion 40. The adjacent portion of the pump cylinder 46 is formed in its outer wall with slots 77 into which the balls 75 are urged by a C-shaped retaining spring 78. Thus the balls 75 and the spring 78 provide a detent mechanism which permits the pump cylinder 46 to be selectively and accurately positioned in either of the two alternative positions shown in FIGS. 4 and 5 whereby liquid is delivered to either the nozzle or the steam chamber as desired.

In the light of the description presented above it may be readily appreciated that the combined pump and valve mechanism 33 provides a simple and compact means of delivering water under pressure selectively to either the nozzle 53 or the steam chamber 17. Considering the forward portion of the iron 11, as shown in FIG. 9 it is noted that there is supported on the handle 22 the temperature control 24, the normal gravity water valve control 30 and spray and pressurized steam control 47. By virtue of the instant invention it is possible to position all of these controls within a very limited area wherein they may be readily operated by the thumb or fingers of the operator. The arrangement thus provides a significant advantage in convenience for the operator as well as in the area of structurally simplifying the overall design of the iron.

While there have been shown and described several embodiments of the present invention, it will be apparent to those skilled in the art that numerous changes and modifications may occur, and it is intended in the appended claims to cover all such changes and modifications which fall within the true spirit and scope of the present invention.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. An electric pressing iron comprising a soleplate including a steam generating chamber and steam discharge passageways communicating with said chamber and extending through said soleplate, a water reservoir supported on said soleplate, a handle mounted above said soleplate to manipulate said iron, a water spray nozzle supported to discharge a fine water spray from the front of the iron, a pump having an inlet communicating with said reservoir to deliver water from said reservoir to said pump, pump discharge valve means connecting said pump to said nozzle and to said steam chamber to selectively deliver water alternatively to either said nozzle or said steam chamber, said pump discharge means including valve means in said pump, said pump having a manually operable control extending above said handle, said control being displaceable to operate said pump to move water under pressure from said reservoir to either said nozzle or to said steam generating chamber, said valve means being controlled by rotating said control about an axis along which it is displaceable.

2. The electric pressing iron of claim 1 wherein said pump includes a pump cylinder which is received within a pump body, a pump piston mounted in said cylinder for movement to displace water therefrom, said manually operable control being connected to said pump piston by a rod extending axially of said cylinder, said pump cylinder being rotatable about its axis to operate said valve means.

3. The electric pressing iron of claim 2 wherein said valve means comprises means on said pump body defining two passageways, one connecting to said nozzle and one to said steam chamber, said pump cylinder being formed with an outlet opening which is movable into registry with either one of said passageways by rotating said pump cylinder.

4. The electric pressing iron of claim 2 wherein said pump cylinder is formed with a top closure wall having an opening through which said rod extends, said rod having a non-circular cross section and said opening in said closure wall having a shape congruent to said non-circular cross section whereby said rod is reciprocable but not rotatable with respect to said pump cylinder.

5. An electric pressing iron comprising a soleplate including a steam generating chamber, a reservoir superimposed above said soleplate and a handle positioned above said reservoir, said handle having an elongated gripping portion with upright supporting columns at either end thereof, a thermostat for regulating the temperature of said soleplate, manual control means for said thermostat positioned at one end of said gripping portion adjacent the top of one of said columns, a gravity flow valve controlling the flow of water to said steam chamber, a manually operated gravity valve control mounted on said cue end of said gripping portion adjacent said manual control means for said thermostat, a water spray nozzle mounted on the front of said iron, a pump connected to pump water selectively from said reservoir to either said nozzle or said steam chamber, valve means for selecting whether said pump is connected to supply said nozzle or said steam chamber and a manual pump control supported on said handle at said one end adjacent said gravity valve control, said manual pump control serving to operate said pump and said valve means.

6. The electric pressing iron of claim 5 wherein said manual pump control comprises a push button which is depressible to operate said pump and rotatable to operate said valve means.

7. The electric pressing iron of claim 5 wherein said pump is mounted within said iron reservoir and includes a body portion and a valve portion, said valve portion having a pair of discharge passageways with a conduit interconnecting one of said passageways with said nozzle and one with said steam chamber, a pump cylinder rotatably mounted within said body portion, said pump cylinder having an apertured boss extending into said valve portion, the aperture in said boss registering with a selected one of said passageways to direct the flow from said pump to either said nozzle or said steam chamber.

8. The electric pressing iron of claim 7 wherein said pump includes a piston reciprocably mounted within said pump cylinder, a rod interconnecting said manual pump control to said piston whereby displacement of said manual pump control displaces said piston, means interconnecting said rod and said pump cylinder whereby said rod is reciprocable but not rotatable with respect to said cylinder.

9. An electric pressing iron comprising a soleplate including a steam generating chamber, a reservoir superimposed above said soleplate and a handle positioned above said reservoir, said handle having an elongated gripping portion, a thermostat for regulating the temperature of said soleplate, manual control means for said thermostat positioned on said handle, a water spray nozzle mounted on the front of said iron, a pump connected to pump water selectively from said reservoir to either said nozzle or said steam chamber, valve means for selecting whether said pump is connected to supply said nozzle or said steam chamber and a manual pump control supported on said handle, said manual pump control serving to operate said pump and said valve means.

10. The electric pressing iron of claim 9 wherein said pump comprises a positive displacement pump and said manual pump control comprises a push button which is moveable vertically to operate said pump and rotatable about a vertical axis to operate said valve means.

11. The electric pressing iron of claim 9 wherein said pump is mounted within said iron reservoir and includes a body portion and a valve portion, said valve portion having a pair of discharge passageways with a conduit interconnecting one of said passageways with said nozzle and one with said steam chamber, a pump cylinder rotatably mounted within said body portion and having means registering with a selected one of said passageways to direct the flow from said pump to either said nozzle or said steam chamber, said pump cylinder being rotatable by said manual pump control.

12. The electric pressing iron of claim 11 wherein said pump includes a piston reciprocably mounted

within said pump cylinder, a rod interconnecting said manual pump control to said piston whereby displacement of said manual pump control displaces said piston, means interconnecting said rod and said pump cylinder whereby said rod is reciprocable but not rotatable with respect to said cylinder.

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