

SPECIFICATION

Iron with Mode Valve

The invention herein pertains to an electric steam flatiron with plural surge and spray functions with a handle-mounted manual spray pump and a separate handle-mounted mode selector valve subassembly combination with the improvement being made in the details of the mode valve subassembly permitting an inexpensive, easily assembled, set of components to select either steam or extra surge on demand by separate actuation of the handle mounted pump.

With the advent of irons using water for either steam or spray or both, a water tank is provided in the iron above the soleplate and water valve structure is provided for metered drippage of water into a steam generator where it is evaporated and flashed into steam and directed out ports in the soleplate to steam the article. In order to provide extra steam capacity, irons also have means whereby an extra slug of water may be pumped into the steam generating area, usually into a separate chamber, whereupon the extra surge of steam may be fed into the distribution system to exit the soleplate ports as extra capacity steam. Different types of surge steam have been provided whereby the surge steam and main steam are both fed directly into a main distribution system as in U.S. patent 3,599,357 and where the extra steam may be passed first through the main generator and then into the distribution system to exit as surge steam as in U.S. patent 3,711,972. Still another system as in U.S. patent 3,707,043 allows generated steam to be shifted from one group of soleplate ports to another group so it exits vigorously through a few ports or softly through many ports depending on the needs of the fiber being ironed. It is also known to provide an iron wherein a single control handles both spray water and surge steam through a combined structure wherein a single pump both pumps the water and selects the exit or spray or surge by including a valve mechanism directly in the pump and such structure is shown in U.S. patent 3,691,660. The present invention is directed to such an electric flatiron with plural surge and spray functions wherein an easily assembled and inexpensive mode selector valve, separate from the pump structure, is supplied to direct water either to surge or spray in a simplified valve subassembly the separateness from the pump being desired for reasons that will become apparent.

In accordance with the present invention there is provided an electric flatiron comprising a mode selector valve mounted within a handle of the iron for selectively directing water to either steam surge or spray functions, the valve comprising a moulded cup-shaped support housing with an upright peripheral side wall surrounding a flat bottom wall; a cup-shaped disc seated in the housing, the disc being moulded with integral tubes extending through respective ones of a

plurality of outlets in the bottom wall, each outlet being aligned with a separate annular wall protruding into the cup of the disc; and a flat gating member having an external actuating arm and an internal projection nesting snugly within the cup of the disc, the gating member being clamped against the disc such that the projection seals against the protruding annular walls, and the gating member being rotatable between spaced stops on the said side wall such that a channel in the projection connects only two of the said outlets at any one time.

In a preferred embodiment of the invention, the disc is moulded with two integral tubes, one of which communicates with a water inlet and the other with either the steam surge or spray function. A third outlet in the flat bottom wall of the housing then includes a stepped moulded extension of the housing adapted to receive a removable flexible tubing from the other of the said functions. The channel in the projection of the gating member is preferably an arcuate channel which is always in communication with the water inlet so that water is directed from the inlet to either the steam surge or spray functions.

By way of example only, an embodiment of the invention will now be described with reference to the accompanying drawings in which:

Fig. 1 is a partial elevation of a typical spray and surge steam iron partly showing the invention;

Fig. 2 is a top view, partially broken, of the front portion of the iron handle showing the mode selector valve;

Fig. 3 is a cross-sectional view on line 3—3 of Fig. 2;

Fig. 4 is a view on line 4—4 in Fig. 3 with a slight modification and with the gate-actuating arm in "surge" in phantom;

Fig. 5 is a view, similar to Fig. 4, showing the structure in "spray" position; and

Fig. 6 is an exploded perspective of the mode selector valve subassembly.

Referring to Fig. 1, for convenience there is shown an electric steam iron generally of the self-cleaning variety of the type shown in U.S. patent 3,747,241. The iron includes a soleplate 10 with a plurality of steam ports 12 and an outer shell 14 suitably connected or forming part of handle 16 in known fashion. Soleplate 10 conveniently may be cast from aluminium with an electric heating element 18 cast in position and disposed so uniform heat distribution is provided when the iron is plugged in and activated. Any other suitable means of heating the soleplate may be employed and self-clean can be omitted.

The iron includes means for generating steam by providing water tank 20 that may be part of a single plastic housing positioned by bracket 22 and other suitable mechanism in conventional fashion. For steam, soleplate 10 has a steam generator 24 into which, under control of button 26 and guided valve stem 28 movable between an on/off position, water controllably drips from tank 20 onto hot soleplate 10 through metering

water valve 30 of a known type, the resulting steam being distributed through distributing passages 32 under coverplate 34 and out ports 12 onto the fabric being ironed. In the embodiment shown, an additional surge is provided by injecting water into a separate forward surge generator 36 by a separate manual bellows type pump control button 38 and a temperature control 40 thermostatically controls the soleplate heat. All the structure thus described is generally well-known.

One of the main features in the self-cleaning iron is provision for suddenly and completely dumping tank 20 onto the hot soleplate through a substantially large opening that preferably, although not necessarily, is spaced and separate from the usual water valve 30. Controlling this large opening, a dumper valve 42 is disposed in the bottom of the water tank, and operates to quickly empty the tank onto the soleplate where the combination of hot water and steam suddenly created forcefully steams out and purges or cleans the internal passages, tank, and soleplate ports of lint and internal deposits. The dumper valve is operated through a rod 44 under control of a separate handle-mounted dumper control knob 46 and this structure is generally known and shown in U.S. patent 3,747,241. The iron shown is also equipped with spray nozzle 48 of the general type such as shown in U.S. patent 3,664,045.

The iron structure described is generally conventional and is an iron of multi functions having spray, extra surge, and self-cleaning capabilities. In order to prevent inadvertent operation through a single control, it is desired to use separate controls for each of the functions and to this end dumper knob 46 is deliberately placed on the side of the handle so that it cannot be operated except by using both hands, one hand to hold the iron, and one hand to operate the dumper knob, a safety feature. Similarly, it is desired to operate the spray and extra surge functions separate from the pump control button 38 which supplies the hot steam by extra water so that the button 38 is used only as a separate pump thus again requiring use of both hands to switch from one function to another to prevent a surge of hot steam when spray is desired or vice versa. The arrangement is such that the operator's hands are required to select the desired function.

In accordance with the present invention, an improved separate handle-mounted mode selector valve subassembly 52 is supplied to select either surge or spray and such valve detailed parts is shown in Figs. 2—6 and would appear in Fig. 1 just forward of and with the operable arm on the far side of handle 16 as shown generally at 52. It is desired to have an inexpensive generally molded plastic flexible selector valve subassembly that uses a minimum number of parts and is easily put together on the assembly line while still providing necessary fluid tightness and reliable operation in either of the multi surge or spray functions disclosed. To this

end, reference is made to Fig. 6 where the general components of the mode valve subassembly are shown exploded. This subassembly comprises a molded plastic cup-shaped valve housing 54 that is conveniently made in a U-shape with depending legs 56 having barbs 58 on the end of each leg. The generally U-shaped plastic has an inherent spring resiliency so that the barbs are forced out and may be forced under suitable overhanging portions, not shown, within the handle to secure the housing within the iron handle. Alternately, a single leg 56 with an elongated upper part of stepped extension 94 (explained later) may be used as seen in Fig. 1. As shown, the housing is suitably molded to fit within the confines of the matching opening within the handle 16. An upright closed peripheral sidewall 60 is molded as part of the housing to form the cup shape and has spaced stops 62 along its upper rim for a purpose to be explained. Completing the cup shape, the sidewall 60 encloses a flat bottom wall 64 through which and extending below the housing 54 is a series of spaced outlets 66, two being shown to accommodate flexible elastomeric tubes 68 and 70 with tube 70 extending downwardly forming an inlet water tube. For proper orientation during assembly, the outlets 66 are adjacent and off center in the bottom wall 64 as shown in Fig. 6.

In order to form a tight sealing water chamber, a separate flexible and molded cup-shaped disc 72 is provided as an integral part of tubes 68 and 70 and is designed to nest snugly in side wall 60 of the housing as seen in Fig. 3. Thus, the disc 72, with its molded integral tubes 68 and 70 is accurately aligned to seat the disc in the cup housing formed by wall 60. In order to form a water chamber within disc 72, the upper portion of the tubes extending into a water chamber 74 are formed with separate annular walls 76 and 78 around each outlet in the disc with the walls protruding into the cup portion to form water chamber 74. In other words, the annular walls 76 and 78 limit any cover enclosure thus forming water chamber 74. In order to provide entrance of water at all times to chamber 74, the protruding annular wall 78 at the one end of water inlet tube 70 may be split to have side openings 80 that connect with chamber 74 thus insuring that water can enter chamber 74 at all times as seen in Fig. 4. As described below, this split and side opening's 80 may be omitted to simplify the construction as shown in Figs. 5 and 6. For completing the water chamber 74 to provide a selection for the functions of surge or spray, a flat plastic gate 82 is provided with an actuating arm 84 extending through the side of the iron handle for rotation to indicate a suitable surge or spray function as respectively shown in Figs. 4 and 5 as will become apparent. Closing the top of cup disc 72 is a molded offset matching projection 86 that rotatably nests snugly in the cup housing and, acting like half O-rings, seals flat against the protruding walls 76 and 78 to form the sealed water chamber 74. For an additional function and

further orientation of cup disc 72, a third outlet 88 is formed in the flat bottom wall 64 to accommodate a nipple 90 which is integrally formed with the cup disc 72 and also has comparable protruding walls 92 within water chamber 74 like the other two flexible tubes. Nipple 90 aligns itself in a corresponding stepped housing support extension 94 formed as part of housing 54 and extending below it as seen in Fig. 3. Extension 94 is formed to receive a removable flexible tubing 96 from one of the extra iron functions, such as the surge function, with the tube 96 being directed to surge generator 36 as seen in Fig. 1. As described above, a single leg 56 (Fig. 1) on valve housing 54 may be used in which case the upper part 95 of stepped support extension 94 is lengthened to better steady the valve housing 54 in the handle with the single leg 56.

For directing the incoming water in tube 70 into water chamber 74, the projection 86 on the gate 82 has an arcuate channel 98, a type of connecting arrangement generally known, on its underside with the channel extending sufficiently around to connect only two outlets at any one time, one outlet channeling water to tube 96 for the surge function of the iron as shown in Fig. 4 and the other rotated position of gate 82 channeling the water to tube 68 to provide a spray as shown in Fig. 5. The arrangement of Figs. 5 and 6 is preferred but the side openings 80 of Fig. 4 can be used to reduce restriction of water flow into chamber 74. In order to limit the two extreme movements of the external actuating arm 84, the gate is provided with symmetric peripheral stops 100 to abut the spaced stops 62 on peripheral side wall 60 of the cup on the housing.

For evenly clamping the parts together, a U-shaped spring 102 is formed with its upper leg 104 placed to abut the gate projection 86 centrally of disc 72 so that pressure is evenly distributed on the closure formed by projection 86 to compress and seal the projection tightly against the protruding annular walls 76, 80 and 92 in a half O-ring type seal to form a watertight chamber 74. Location of the spring is enhanced by a suitable matching detent 106 formed in the upper leg 104 and projection 86 as seen in Fig. 3. This ensures a positive central even pressure distribution on the parts. The bottom of the spring may be similarly formed of a pair of straddling legs 108 with similar detents, legs 108 straddling the various tubes and holding against the underside of valve housing 54.

The above rather detailed structure permits use of the mode selector valve subassembly of Fig. 6 of essentially four, preferably plastic, easily processed parts (three molded, one stamped) that fit together in only one manner for proper orientation of the parts. Thus, the off center position of outlets 66 ensures that the entire elastomer molded cup disc 72 and tubes can be

inserted in the cup formed by walls 60 in only one oriented manner. Similarly, the stops 62 and 100 permit only one orientation of operating actuating arm 84 for selection of one of the multiple functions of spray and/or surge. Finally, the arrangement permits the assembly operator to direct the water inlet tube 70 and spray tube 68 to be easily connected within the iron as shown in Fig. 1 while then using the other already-assembled tube 96 to the other function such as surge, to be easily connected to the bottom of the remaining outlet at nipple 90. The snap-in barbs 58 on the housing 54, whether single or double, permits anchoring the entire subassembly to the iron handle and holds the subassembly in place during assembly of the iron while providing a sturdy base for actuating arm 84.

Claims

1. An electric flatiron comprising a mode selector valve mounted within a handle of the iron for selectively directing water to either steam surge or spray functions, the valve comprising a moulded cup-shaped support housing with an upright peripheral side wall surrounding a flat bottom wall; a cup-shaped disc seated in the housing, the disc being moulded with integral tubes extending through respective ones of a plurality of outlets in the bottom wall, each outlet being aligned with a separate annular wall protruding into the cup of the disc; and a flat gating member having an external actuating arm and an internal projection nesting snugly within the cup of the disc, the gating member being clamped against the disc such that the projection seals against the protruding annular walls, and the gating member being rotatable between spaced stops on the said side wall such that a channel in the projection connects only two of the said outlets at any one time.

2. Apparatus according to claim 1, wherein the gating member is clamped by a U-shaped spring with one leg abutting the gate projection centrally of the disc.

3. Apparatus according to claim 2, wherein said channel is disposed to always connect one of the protruding annular walls with one of the two connected outlets.

4. Apparatus according to claim 3, wherein one of the said moulded integral tubes extends through a respective outlet to form a water inlet, and another of the tubes extends through an adjacent outlet to connect with one of the said functions.

5. Apparatus according to claim 4, wherein a third of the said outlets includes a stepped housing moulded extension to receive a removable flexible tubing from the other of the said functions.

6. Apparatus according to claim 1 and substantially as herein described with reference to the accompanying drawings.



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