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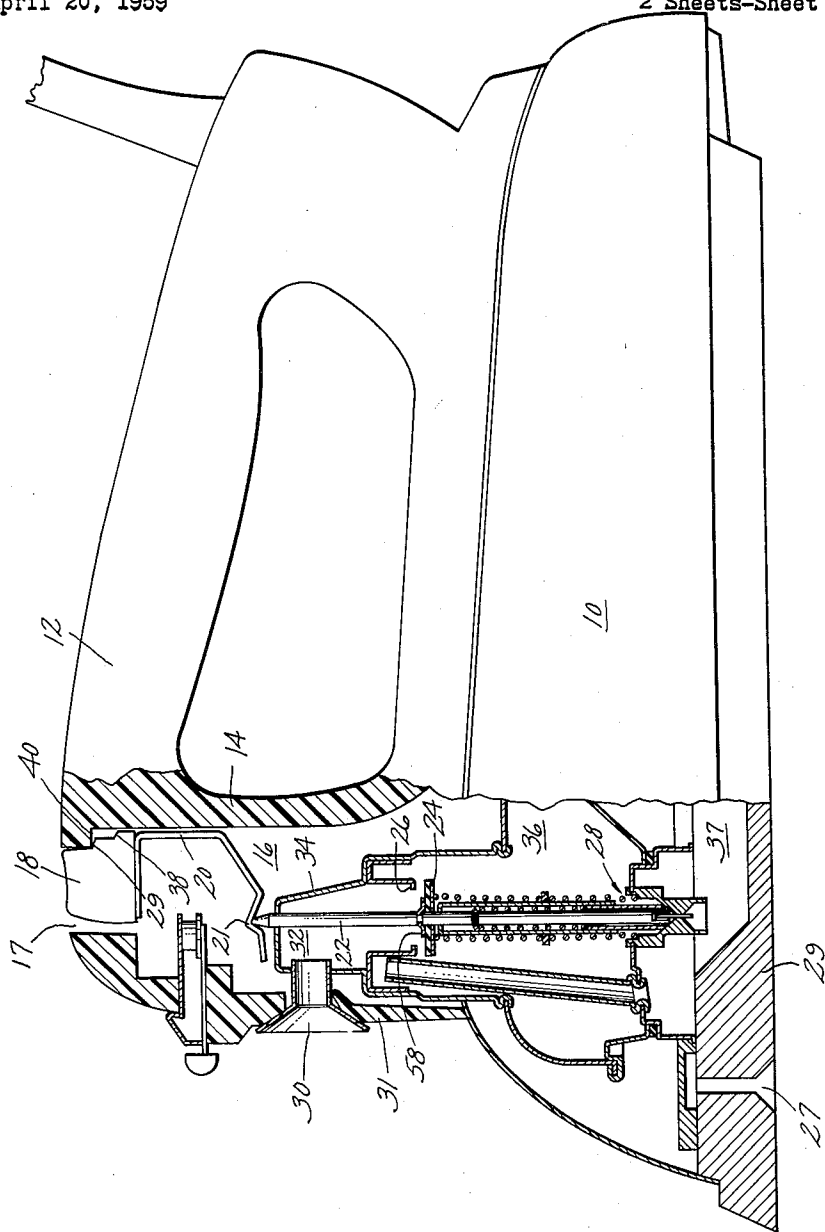
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FILL AND STEAM CONTROL VALVE ASSEMBLY FOR STEAM IRONS

Filed April 20, 1959

2 Sheets-Sheet 1



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FIG. 2.

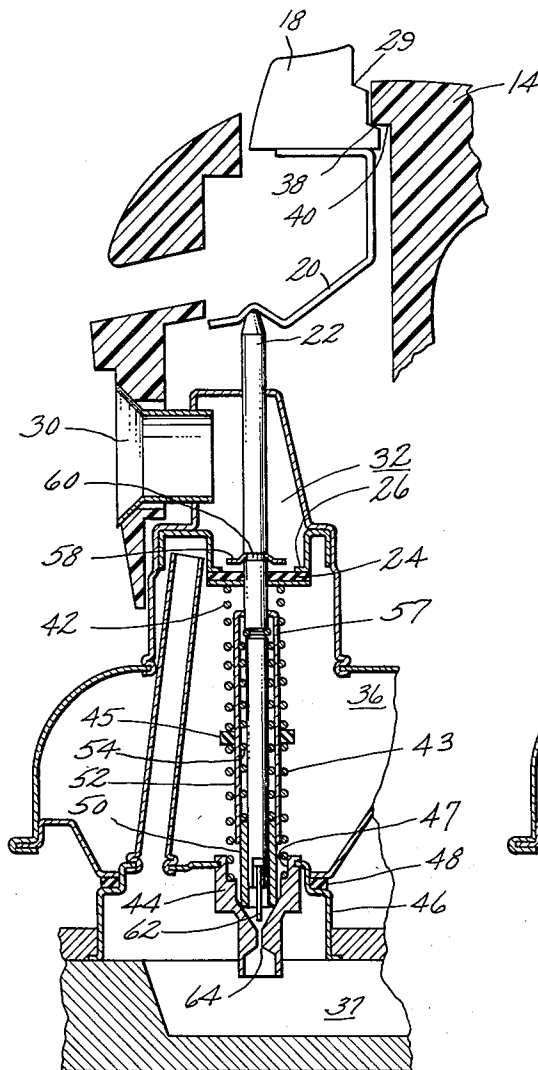
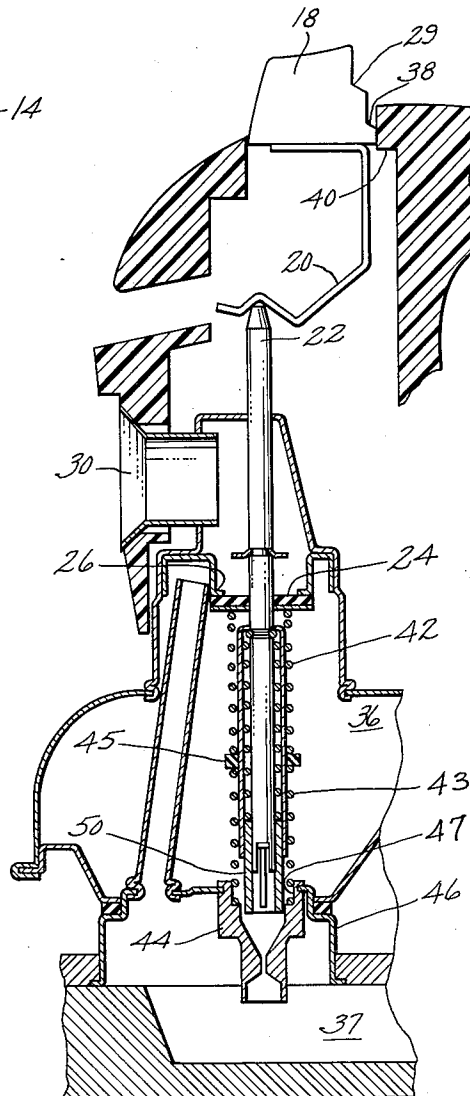


FIG. 3.



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FILL AND STEAM CONTROL VALVE ASSEMBLY FOR STEAM IRONS

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10 Claims. (Cl. 38—77)

This invention relates to electric flatirons of the type which contain a liquid reservoir with valve control means whereby they may be used either as a steam iron, or a spray iron, or as a dry flatiron. More particularly, the invention is directed to an improved valve mechanism affording greater ease and safety of operation when the reservoir is filled with water.

A difficulty heretofore encountered in such irons of the prior art has occurred with the presence of scalding water in the reservoir at times when the iron is used for a substantial period as a dry iron. During such operation, the water in the reservoir gradually becomes heated to a temperature near boiling, and if for any reason the operator should tip the toe of the iron downwardly, a quantity of this scalding water may be expelled through the fill opening, by reason of steam pressure which builds up in the reservoir near the heel.

One of the objects of the present invention is to overcome this prior difficulty by a construction of liquid reservoir type irons having a positive safeguard against inadvertent expulsion of scalding water.

Another object of the invention is to provide such a positive safeguard by a single valve mechanism which normally maintains a pressure seal between the fill opening and the liquid reservoir of the iron, but which can be intentionally opened by the operator for filling when the iron is safely positioned on its heel rest.

An additional object is to provide such a fill safety valve construction which is suitable for incorporation in electric irons adapted for either spraying or steam ironing operations.

A further object is to provide a steam iron in which a fill safety valve and a steam release valve are both operated by a single push button control, the fill valve only being opened upon full depression of the control button to its maximum depressed position.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

FIG. 1 is a horizontal view, partially cut away, of a steam iron embodying the invention, and illustrating in particular the fill safety valve of the invention in its open position;

FIG. 2 is an enlarged sectional view, partially cut away, showing the fill and steam valves both closed, in the normal position for dry ironing operation, and

FIG. 3 is another enlarged sectional view, similar to FIG. 2, partially cut away, showing the valve mechanism of the invention in its steaming position, with the fill port valve closed.

In general the invention, as disclosed in one embodiment, comprises a safety fill valve structure in a steam iron, the fill valve being effectively closed at all times except when the iron is on its heel rest and the control button is fully depressed for the filling operation.

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Referring now in greater detail to FIG. 1 of the drawings, the steam iron, indicated generally at 10, may be seen to comprise a handle portion 12 having a substantially vertical front post portion 14 which may be formed of moulded plastic having a hollow cavity 16 and containing in its upper portion 17 a manually operable control button 18 mounted on a spring yoke member 20, the lower end of which yoke includes a detent portion 21 bearing upon the upper end of a spring loaded valve stem 22, whereby the steam and fill valves may be operated through depression of control button 18. As shown in FIG. 1, the control button 18 is in its fully depressed position, the fill valve 24 is open, being disengaged from valve seat 26, while a steam valve indicated generally at 28 is closed. The control button 18 is held in this position by shoulder 29 of button 18 in engagement with shoulder 40 of handle post 14. Valve 28 is adapted when open (as shown in FIG. 3) to permit controlled amounts of water to pass from reservoir 36 into flash boiler 37, from whence the generated steam escapes through a steam exhaust port 27 in sole plate 29, as is well known in the art. A flared fill opening 30, which passes through the front portion 31 of vertical handle post 14 connects with a fill chamber 32 formed by enclosure wall 34 within the cavity 16. As also shown in FIG. 1, with the fill valve 24 open, a passageway is completed from fill opening 30 into the liquid reservoir chamber indicated generally at 36, and when the iron 10 is standing on its heel rest the fill opening 30 is then in a substantially horizontal position and water may readily be introduced into the reservoir chamber 36 simply by pouring a quantity into the flared funnel opening 30. The manner in which the spring loaded steam and fill valve members cooperate may be better understood by reference to the enlarged drawings of FIGS. 2 and 3.

Reference is now made in detail to FIG. 2 of the drawings, wherein the fill and steam valves are both closed in the condition for dry ironing. The control button 18 is now in its midposition, being held there by shoulder 38 of button 18 in engagement with shoulder 40 of handle post 14. In this position the fill valve 24 is closed in pressure-sealed engagement with valve seat 26 of fill chamber 32, being held in this position by the upward thrust of coil springs 42 and 43. The lower end of compression spring 42 engages annular shoulder 45 on tubular sleeve 52, while spring 43 is compressed between shoulder 45 and an annular recess 47 in the upper portion of a valve body 44. In turn valve body 44 is affixed to a steam dome 46 by a pressure seal 48. Valve stem 22 is slidably mounted in a tubular valve member 50 which is press fitted into a tubular shell member 52. An inner spring 54 is disposed within the shell 52 in compression between the upper end of force-fitted tubular member 50 and in engagement with a spring retainer 57 which may be a groove in valve stem 22. A stop washer 58 is engaged in a second groove 60 on valve stem 22 at a position above fill valve 24—26 as shown in FIG. 2. The opposite end of valve stem 22 carries a valve cleaning rod 62 which is adapted to penetrate a small orifice 64 of valve body 44 when valve stem 22 is fully depressed (as shown in FIG. 1). Cleaning rod 62 is thus adapted to remove any mineral deposits or sediment which may accumulate in orifice 64 of valve body 44, and such cleaning operation is automatically performed on those occasions when control button 18 is fully depressed (as shown in FIG. 1) for the purpose of filling the liquid reservoir. In this fully depressed position stop washer 58 engages the upper surface of fill valve washer 24, thereby depressing this valve member against the compression of spring 42 until the fill valve is opened, as shown in FIG. 1. In the central op-

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erating position of control button 18 and valve stem 22, as shown in FIG. 2, the tubular valve member 50 is firmly seated in valve body 44, holding this valve member closed under the force of compressed inner spring 54. Further depression of control button 18 from the position shown in FIG. 2 to the position of maximum depression shown in FIG. 1 further compresses inner spring 54 as valve stem 22 slides coaxially downward through tubular valve member 50, and cleaning rod 62 penetrates valve orifice 64.

Referring now in detail to FIG. 3 of the drawings, the relative positions of the several valve parts may be seen in the condition for operation as a steam iron. This condition is achieved by releasing control button 18 from the engagement shown between the shoulders 38 and 40 in FIG. 2, whereupon valve stem 22 is urged upward through the force exerted by inner compression spring 54 and outer concentric compression spring 43 to raise the tubular valve member 50 a predetermined distance above its valve seat in valve body 44, at the same time raising control button 18 to its uppermost position as shown in FIG. 3. The compression of spring 43 should exert a slightly greater force upward than spring 42 in order to hold tubular shell 52 in the position shown in FIG. 3. This desired differential in spring forces may readily be achieved with identical springs 42 and 43 by the simple expedient of compressing the lower spring 43 to a shorter axial length between shoulder 45 and annular recesses 47. A retaining shoulder (not shown) may be provided in the upper portion of the handle cavity to engage yoke 20 when the control button 18 is extended to its uppermost position for steam ironing as shown in FIG. 3.

Summarizing the operation of the invention, when the control button 18 is in the position shown in FIG. 3, the upper and lower springs 42 and 43 are both under compression, and their forces are so balanced as to retain the tubular steam valve member 50 at a predetermined height above its seat in the steam valve body 44, while the filler valve washer 24 is held against its inlet seat 26 to maintain the fill valve closed. Water from the liquid reservoir 36 then passes through the open valve 44 and drips through restricted orifice 64 into the vapor-pressure generating chamber 37 from whence the generated live steam passes to steam exhaust ports (such as 27 in FIG. 1) in a well-known manner as heretofore disclosed in the art. When the control valve 18 is depressed to its first locking position as shown in FIG. 2, the valve stem 22 is forced downwardly until the tubular valve member 50 seats within the valve body 44 to interrupt the passage of water from reservoir 36 to boiler 37 and thereby stops the generation of steam. In this position, the movable fill valve member 24 remains held in its closed position through the force exerted by upper spring 42, and any pressure which may build up in reservoir 36 cannot cause expulsion of water through the chamber 32 and from the fill opening 30. When the control button 18 is depressed further, to its extreme downward second locking position as shown in FIG. 1, the stop washer 58 mounted on valve stem 22 engages the movable fill valve member 24, forcing it downwardly against the compression of spring 42 and thereby opening the fill valve 24—26, and at the same time the valve cleaning rod 60 passes through the orifice 64 of valve body 44.

In this manner, it will be seen that the fill valve of the invention remains closed in both of the normal operating positions, for both steam ironing and dry ironing operations, thereby preventing any splashing of hot water from the reservoir out through the filler opening. Among the further advantages of this structure are greater ease of operation in that the change from steam ironing to dry ironing conditions requires less motion and less pressure on the control button, by reason of the fact that the valve cleaning rod is not required to be operated during the change between these two conditions,

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but this cleaning member functions only when the control button is fully depressed to the fill position. Less pressure on the control button in changing from steaming to dry ironing also results from this structural arrangement wherein the fill valve remains unmoved during this changeover and is opened only by full depression of the control button to its extreme position.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained, and since certain changes may be made in the above construction without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is to be understood that the invention is applicable to all types of electrically heated irons having a liquid-containing reservoir, and that it may be employed, for example, in spray type irons whether or not they be also adapted for steaming operation.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention which, as a matter of language, might be said to fall therebetween.

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

1. In an electrically heated flatiron of the type including a liquid reservoir and a vapor pressure generating chamber in liquid flow communication with said reservoir, that improvement in liquid fill and flow control means comprising: a liquid flow control valve in the liquid flow path between said reservoir and pressure generating chamber, means defining a fill opening and passageway into said reservoir through which liquid may be introduced, a fill valve within said fill passageway in axial alignment with said liquid flow control valve, a valve stem and operating means therefor in axial alignment with and slidable with respect to said liquid flow control valve and said fill valve, spring means interconnecting said valve stem with said valves, said spring means normally biasing said fill valve to a closed position and said liquid flow control valve to an open position, and means for opening said fill valve upon an increment of axial motion beyond the axial motion required to compress said spring means to force said liquid flow control valve closed.

2. The combination of claim 1 including a first releasable locking means associated with said valve stem operating means for retaining said valve stem in a partially depressed position, against the tension of said spring means, whereby both said fill valve and said liquid control valve may be maintained in their closed conditions.

3. The combination of claim 1 including a second releasable locking means associated with said valve stem operating means for retaining said valve stem in a fully depressed position, against the tension of said spring means, whereby said fill valve may be maintained in its open condition and said liquid control valve in its closed condition.

4. In an electrically heated iron including a liquid containing reservoir having a fill opening and a liquid escape opening to a vapor pressure generating chamber, the combination comprising, a manually operable push button selectively depressable to a plurality of operative positions, an axially slidable valve stem, means connecting said push button to one end of said axially slidable valve stem, a first valve member coaxially movable with respect to said valve stem and engageable with a first valve seat to effectively close said fill opening, a second valve member resiliently movable with respect to said valve stem and engageable with a second valve seat to effectively close said liquid escape opening, a first spring means normally holding said first valve member in closed relation to said first valve seat and said second valve member in open relation to said second valve seat, a second spring means associated with said valve stem and said second

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valve member, whereby said second valve member may be moved to closed engagement with said second valve seat when said push button and valve stem are depressed to a predetermined position, and means on said valve stem engageable with said first valve member, whereby said first valve may be opened by further depression of said push button and said valve stem.

5. The combination of claim 4 in which the force exerted by said first spring means is sufficiently great to effectively maintain closure between said first valve member and said first valve seat when said push button control is depressed to a position at which said second valve member is in closed engagement with said second valve seat.

6. The combination of claim 4 in which the combined forces of said first and second spring means are sufficient to disengage said second valve member from said second valve seat when said push button control is released.

7. The combination of claim 4 in which said first spring means comprises a pair of coaxial helical springs in compression, the first spring of said pair positioned between said fill valve member and a collar in fixed axial relation to said second valve member, and the second spring of said pair positioned between said collar and the valve seat of said second valve.

8. The combination of claim 7 including a third helical spring comprising said second spring means, coaxial with both springs of said first spring means, and positioned in compression between said second valve member and a spring retaining means on said valve stem.

9. In an electrically heated steam iron including a vapor pressure generating chamber and a liquid containing reservoir with means defining a liquid fill opening into said reservoir and a liquid escape opening communicating from said reservoir to said vapor pressure generating chamber, the combination comprising a fill valve and a separate liquid escape valve, an axially movable valve stem having a valve cleaning rod affixed to one end there-

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of, a fill closure valve member substantially concentric with said valve stem and axially movable with respect thereto, a first valve seat engageable with said fill closure valve member, collar means on said valve stem and engageable with said fill closure valve member to effectively open said fill valve when said valve stem is moved axially in one direction to a limit position whereat said cleaning rod penetrates said liquid escape valve, a substantially cylindrical tubular member slidably encompassing a portion of said valve stem, a helical spring substantially coaxial with said valve stem and enclosed within said tubular member, a substantially cylindrical liquid control valve member rigidly affixed to said tubular member at one end thereof and slidably enclosing the end of said valve stem containing said cleaning rod, means on said valve stem for holding said enclosed helical spring in compression between said stem and said liquid control valve member, a pair of coaxial helical springs surrounding said tubular member and said valve stem, and spring retaining means affixed to said tubular member externally thereof and in engagement with adjacent ends of both springs of said pair, whereby one spring of said pair is maintained in compression between said fill valve member and said retaining means, while the other of said springs is maintained in compression between said retaining means and a fixed seat portion of said liquid control valve.

10. The combination of claim 9 in which one spring of said pair of springs exerts a greater force in compression than the force exerted by the other spring of said pair, whereby said valve stem is normally biased to maintain said liquid control valve at a predetermined open position while normally maintaining said fill valve in a closed position.

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