Sept. 10, 1963 S. R. BRICKER ETAL 3,103,079

STEAM IRON

Filed March 20, 1962

Fig. 1.

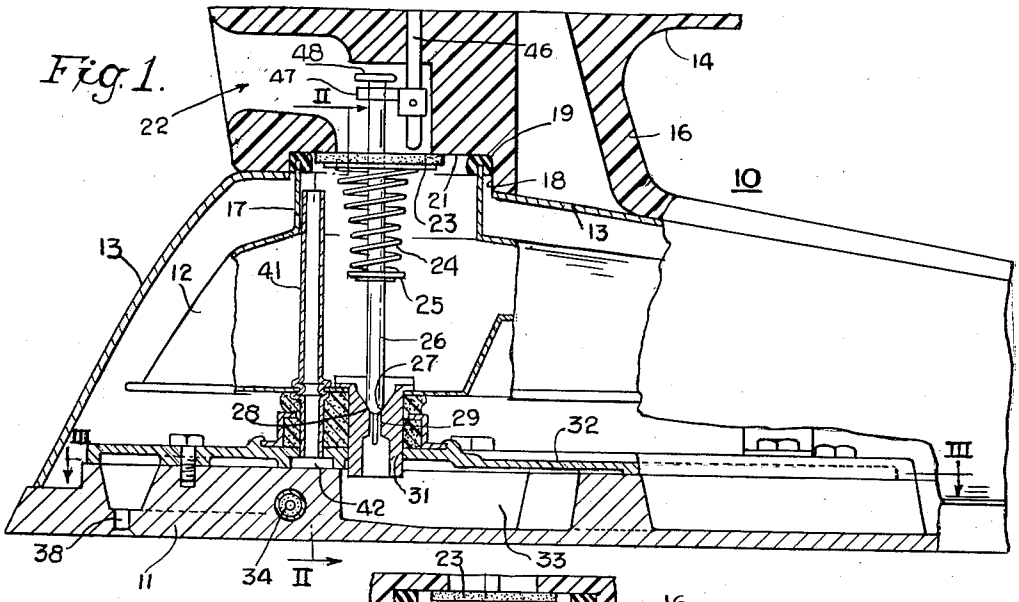


Fig. 2.

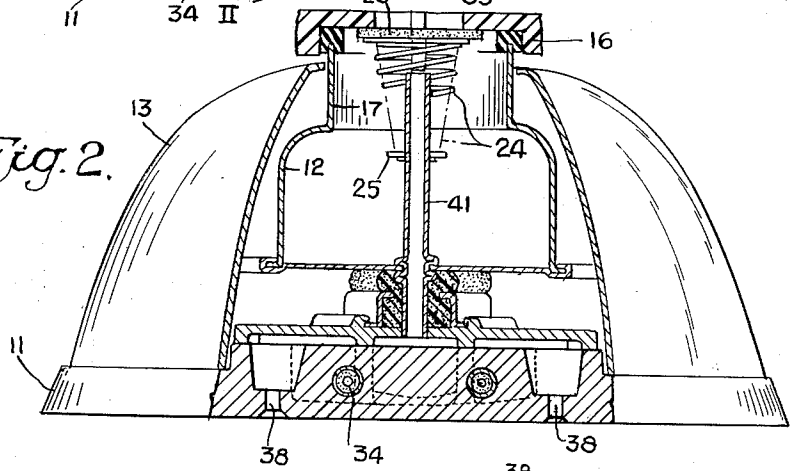
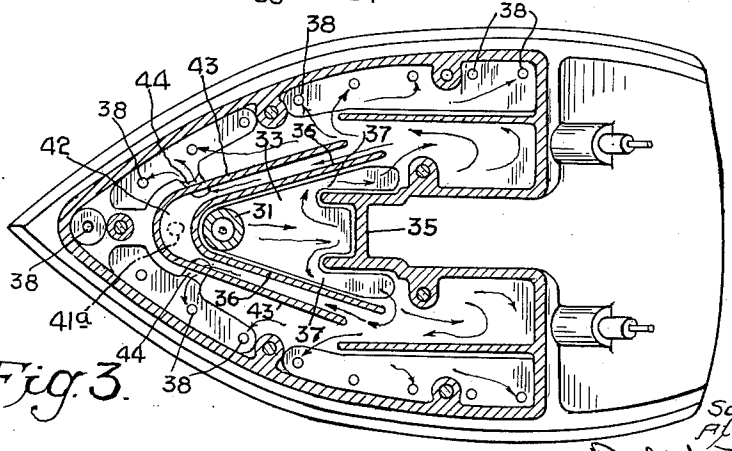


Fig. 3.



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3,103,079

STEAM IRON

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This invention relates to steam irons of the flash type, more particularly to such an iron in which the reservoir for water is not in free or unrestricted communication directly with the atmosphere.

The object of the invention is to provide as uniform as possible flow of water from the reservoir to the steam generating chamber, and consequent uniform rate of steam generation, under the varying conditions encountered by the steam iron, including the ironing position in which the discharge of steam from the ports is restricted by the material being ironed, and the raised position of the iron in which it steams freely, and also the various levels of water in the reservoir.

A further and more particular object is to provide such uniformity of water flow and steam generation using a valve orifice or opening of a practical size, such as .032 to .035 of an inch diameter, to control the flow of water from the reservoir to the steam generating chamber.

In many flash-type steam irons, an electrically heated steam generating chamber is provided in the soleplate of the iron and water is fed thereto by gravity from a reservoir above the steam generating chamber. A drip valve controls this flow of water to the steam generating chamber, and the flow passage is of sufficiently small diameter to limit the flow to separate and intermittent droplets, each droplet flashing to steam as it hits the hot bottom of the steam generating chamber.

To prevent water in the reservoir splashing out through the fill opening of the reservoir during ironing, it is common practice to provide a fill valve which completely closes the fill opening during ironing operations. This necessitates the provision of a vent tube to permit entry of air to the reservoir to replace the water as the latter is gradually fed to the steam generating chamber.

It is desirable that the valve flow passage or opening be of a large enough diameter that it can be machined accurately in a practical manner, and also that it does not clog readily. An opening of .032 to .035 of an inch diameter has been found satisfactory for these purposes. However, upon using an opening of this large diameter with a vent tube communicating at its upper end with the water reservoir and at its lower end directly with the steam generating chamber, it was found that the flow of water was excessive, presumably because of the high steam pressure communicated through the vent tube from the steam generating chamber to the water reservoir.

In accordance with the present invention, this vent tube, or pressure equalizing tube as it is sometimes referred to, provides communication between a region at the top of the reservoir above the water level therein, and a region of a steam flow passage connecting the steam generating chamber with a plurality of orifices in the bottom of the soleplate, which orifices discharge steam, generated in the chamber, to the material being ironed. This region of the steam flow passage with which the vent tube communicates is somewhat upstream of the discharge orifices, but closer to the latter than to the steam generating chamber. Particularly, this region is one where the maximum steam pressure is closer to that which occurs adjacent the inlets to the orifices than to that which occurs in the steam generating chamber.

With the above arrangement, both the maximum pressure and the average pressure in the reservoir above the body of water therein will be less than the corresponding pressures in the steam generating chamber. The pressure in the steam generating chamber is imposed on the under side of the drip valve, resisting gravitational flow of water therethrough, and since this pressure is greater than the pressure in the reservoir above the water, the water flow rate through the drip valve is less than it would be if gravitational forces only were involved. Thus, the desired flow is effected without undesirable restriction of the flow passage through the drip valve.

In the general arrangement of parts herein illustrated, which arrangement is popular today, the vent tube is relatively close to the steam generating chamber, due to the practice of locating the manually operable elements of all the controls in the front post of the iron handle. Consequently, the steam flow passage tends to be so short that little pressure drop occurs between the steam generating chamber and the entrance to the steam discharge orifices, unless a special restriction is provided in accordance with the present invention. As illustrated, one or more baffles or walls are interposed in the steam flow passage, increasing the effective length thereof and/or providing one or more restrictions, thus producing an additional pressure drop.

The invention and the advantages thereof will be apparent from the following description and claims taken in connection with the accompanying drawing, forming a part of this application, in which:

FIG. 1 is a fragmentary side elevational view, partially in section, of an iron constructed in accordance with the present invention;

FIG. 2 is a transverse sectional view, taken along the lines II—II of FIG. 1, looking in the direction indicated by the arrows; and

FIG. 3 is a horizontal sectional view, taken along the lines III—III of FIG. 1, looking in the direction indicated by the arrows.

In the drawings, the reference character **10** indicates a steam iron of the flash type previously described and including a soleplate **11**, a reservoir **12** for water positioned in spaced overlying relation to the soleplate, a shell **13** which, in cooperation with the soleplate, encloses and houses the reservoir **12**, and a handle member **14** including at least a front post **16**. If desired, the handle may also include the usual rear post, although the latter is not necessary in practicing the present invention.

The reservoir **12** has an upstanding neck portion **17** received in a downwardly facing recess **18** in the lower end of the front handle post **16**. The upper edge of the reservoir neck **17** is sealed, by any suitable compressible gasket **19**, with respect to the flat downwardly-facing surface **21** of the recess **18**. An opening or passage **22** is provided in the handle post **16**, this passage opening through the surface **21**, inwardly of the sealing gasket **19**, and also opening outwardly at the front of the post **16**. Consequently, when the iron is tilted to an upright position, with the front portion of the passage **22** in a vertical position, water may be poured through the passage **22** into the interior of the reservoir **12**. In order to prevent splashing of water from the reservoir out through the fill passage **22** during use of the iron, there is provided a closure disc **23** for closing the fill passage **22** under all conditions except actual filling of the reservoir. This disc **23** is freely movable longitudinally on and with respect to a valve rod **26** extending vertically through the reservoir **12**. However, the closure valve disc **23** is biased into closing position against its seat, which is a portion of the flat wall **21** of the recess **18**.

This biasing is effected by a compression spring **24** which surrounds the valve rod **26** below the disc and is maintained under compression by engagement with a washer **25** fixed on the rod **26**.

The lower end of the rod **26** constitutes a closure valve which cooperates with a valve seat **28** at the upper end of a flow passage **29** formed through an insert **31** which extends from above the bottom wall of the reservoir to and through a cover plate **32** which overlies and is cemented to, or otherwise held in tight engagement with, the top of the soleplate **11**. The passage **29** provides for limited flow of water from the reservoir **12** to a steam generating chamber **33** formed in the soleplate immediately below the passage **29**. When the valve **27** and its stem or rod **29** are in a raised position, water passes intermittently to the steam generating chamber **33** where it immediately flashes into steam.

An electric heating element **34**, preferably of the sheathed type, is disposed in the soleplate in close proximity to the steam generating chamber, so that the bottom wall thereof is maintained at a sufficiently high temperature to insure instantaneous flashing to steam of each drop of water as it falls thereonto from the reservoir. As previously explained, the drip passage **29** is of sufficiently small diameter that the water passes therethrough in separate and individual drops, even when the valve is fully open.

As best shown in FIGS. 1 and 3, the cover plate **32** is provided with a plurality of downwardly-facing ribs or wall elements which are sealed against the top surface of the soleplate and cooperate therewith to provide chambers and passages best shown in FIG. 3. From consideration of the latter figure, it will be apparent that the steam generating chamber **33** is defined by, in addition to the cover plate and the soleplate, an H-shaped wall structure **35** and a V-shaped wall structure **36**, the two being spaced slightly to provide exits **37** for steam generated in the chamber. It will be apparent that these exits **37** constitute restrictions in the path of flow of steam from the steam generating chamber **33** to a plurality of steam discharge orifices **38** provided in the soleplate **11** and through which steam is discharged through the bottom surface of the soleplate to whatever material is being ironed.

The flow path of steam from the generating chamber **33** to the orifices **38** is indicated by the arrows in FIG. 3, and it will be apparent that a fairly long flow path is provided, even though the steam generating chamber is relatively close to the exhaust or discharge orifices **38**. This elongated passage arrangement may be desirable for the reasons previously discussed, particularly in irons of the type herein illustrated, utilizing the presently popular arrangement where the manual controls for the various valves are disposed in or at the front post of the handle. In many earlier iron designs, the control for the drip valve was disposed in the space between the front and rear posts of the handle, and hence the drip valve, which was usually directly below the control valve, was disposed near or to the rear of the center of the iron, considered in a front-to-rear direction.

In order to prevent entry of water from the reservoir into the vent tube **41**, it is desirable to locate the upper end of this tube within the neck **17** of the reservoir, where it is least likely to be subject to the entry of water due to movement of the iron during ironing. This results in the vent tube and the drip valve being located in very close proximity to each other, with the result that, were it not for the utilization of the present invention, the lower end of the vent tube would receive steam at a pressure substantially the same as that existing in the steam generating chamber, with the result that the pressure in the upper portion of the reservoir would be substantially equalized with that in the steam generating chamber. However, as previously discussed, in order to have the drip passage **29** of maximum diameter, it is desirable to have the pressure above the water in the reservoir equalized with a pressure somewhat lower than that existing in the steam generating chamber, and this result is produced by the herein illustrated invention.

Referring again to FIG. 3, it will be noted that the lower end of the vent tube **41** (indicated by the dotted line **41***a* in FIG. 3) extends into a region **42** which is separated from the steam generating chamber **33** by the V-shaped wall structure **36**. To further isolate the region **42** in which the lower end of the vent tube is located from the steam flowing to the discharge orifices **38**, a second V-shaped wall structure **43** is disposed in somewhat spaced relation to the first-mentioned V-shaped wall structure **36**, with these two wall structures disposed at opposite sides of the region **42**.

A portion of the steam flowing to the exhaust orifices **38** passes between these wall structures **36** and **43**, and passes under the latter through grooves or recesses **44** formed in the upper surface of the soleplate near the region **42**.

It will be apparent that the lower end of the vent tube **41** is subjected to a steam pressure which, while somewhat above that existing at the inlets to the exhaust orifices **38**, is substantially below that existing in the steam generating chamber **33**. Consequently, the upper portion of the reservoir **12**, above the body of water therein, is likewise subjected to this same pressure which is intermediate that in the steam generating chamber and that at the discharge orifices.

The actual construction and relationship of the fill opening closure valve **23** and the drip valve **27** forms no part of the present invention, being disclosed and claimed in copending application Serial No. 179,357, filed March 13, 1962, and assigned to the assignee of the present application. However, it may be mentioned that there is provided, for vertical sliding movement in the front post **16** of the handle **14**, a valve adjusting rod **46** whose upper end would be operatively associated with a manual adjusting or positioning member (not shown). The lower portion of this adjusting rod **46** carries a laterally-extending lug or arm **47** which slidably receives the valve stem or rod **26** and, when raised from the position shown in FIG. 1, engages the under side of a head **48** formed on the valve stem **26** to raise the latter and its valve member **27** from the valve seat **28** to open the drip valve and permit flow of water from the reservoir to the steam generating chamber.

When the adjusting rod **46** is moved downwardly from the position shown in FIG. 1, its lower end will engage the disc closure valve **23** and tilt the latter to open the valve for filling or emptying of the reservoir.

For a more detailed description of the construction and operation of these two valves, reference should be had to the previously-identified copending application.

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

We claim:

1. A steam iron including
a soleplate having
a steam generating chamber,
means for heating the soleplate in the region of said chamber,
a closed reservoir for water above the soleplate,
means for supplying drops of water from said reservoir to said chamber for flashing to steam therein, said soleplate having
an orifice in the bottom surface thereof for discharge of steam, said iron having
a first passage for flow of steam from said chamber to said discharge orifice,
means providing a second passage between the upper portion of the interior of said reservoir and a region

of said first passage where the pressure of the steam flowing therethrough is less than maximum pressure in the chamber and greater than the maximum pressure at the orifice, and

baffle means in said first passage separating the downstream portion thereof into

a region communicating with the discharge orifice and

another region communicating with said second passage.

2. A steam iron including

a soleplate having

a steam generating chamber,

means for heating the soleplate in the region of said chamber,

a closed reservoir for water above the soleplate,

means for supplying water in droplet form from said reservoir to said chamber for flashing to steam therein, said soleplate having

an orifice in the bottom surface thereof for discharge of steam, said iron having

a passage for flow of steam from said chamber to said discharge orifice,

means defining a restriction in the flow path of steam through said passage, and

means providing a pressure-equalizing passage between the upper portion of the interior of the reservoir and a region of said steam flow passage downstream of the restriction therein.

3. A steam iron including

a soleplate having

a steam generating chamber,

means for heating said soleplate in the region of said chamber,

a reservoir for water above said soleplate,

a shell cooperating with said soleplate to house said reservoir,

a handle member including

a front post mounted on said shell,

a drip valve positioned beneath said handle front post and providing for gravity flow of water from said reservoir to said chamber for flashing into steam therein,

manually-operable means carried by said front post for controlling said drip valve, said soleplate having

a plurality of orifices opening through the bottom surface thereof for discharge of steam to material being ironed, said iron having

a passage providing communication between said steam generating chamber and said discharge orifices,

a tube beneath said front post and near said drip valve providing communication between the upper portion of the interior of said reservoir and a region of said passage intermediate said chamber and said discharge orifices, and

means restricting said passage between said region thereof and said chamber.

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