

April 27, 1943.

K. L. WOODMAN

2,317,706

STEAM IRON

Filed April 11, 1941

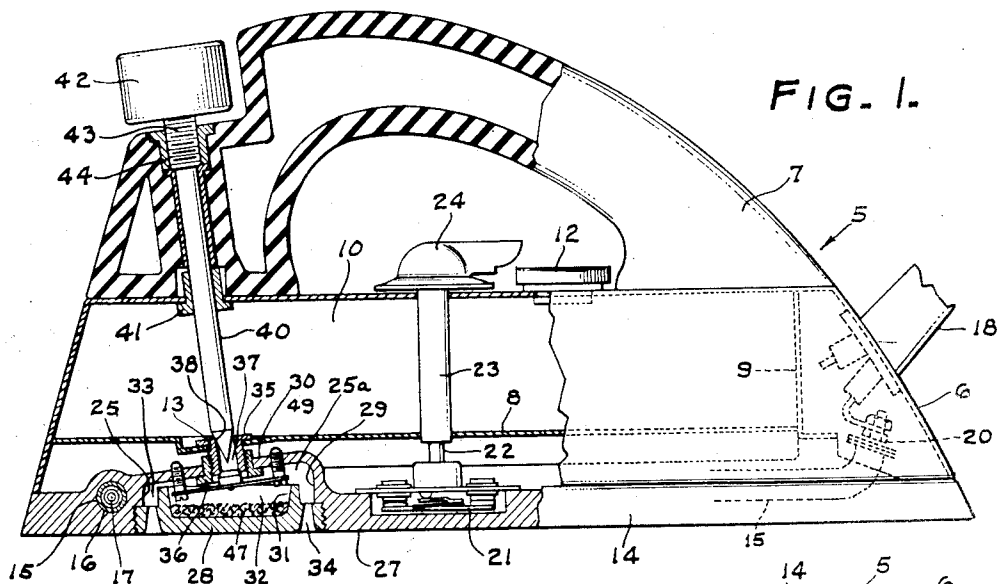


FIG. 2.

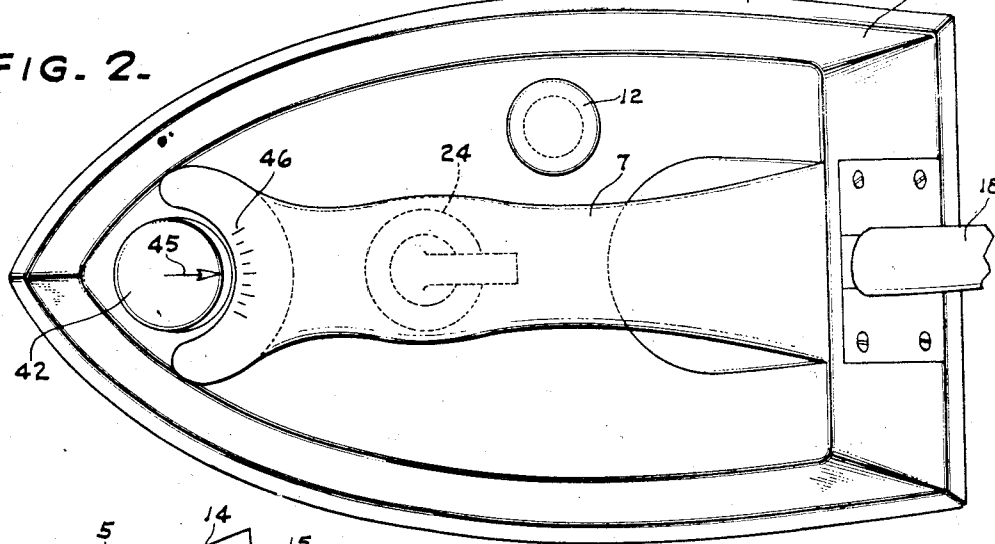
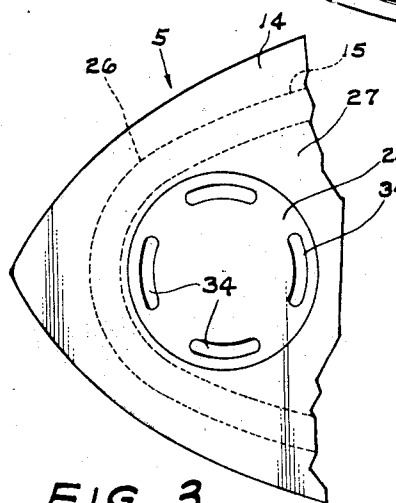


FIG. 3.

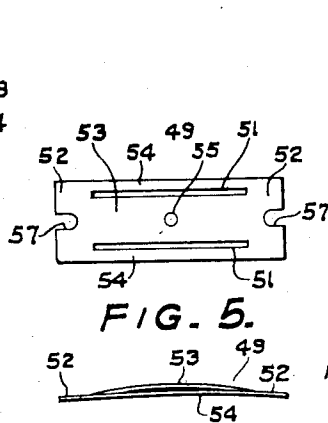


FIG. 5.

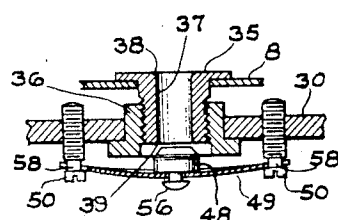


FIG. 4.

FIG. 6.

INVENTOR
KENNETH L. WOODMAN

BY *W. H. Steger*
ATTORNEY

UNITED STATES PATENT OFFICE

2,317,706

STEAM IRON

Kenneth L. Woodman, Mansfield, Ohio, assignor
to Westinghouse Electric & Manufacturing
Company, East Pittsburgh, Pa., a corporation
of Pennsylvania

Application April 11, 1941, Serial No. 388,062

2 Claims. (Cl. 38—77)

This invention relates to steam irons and particularly to that class of steam irons known as the flash-boiler type which include a steam generator and a valve controlled water supply and it has for an object to provide an improved steam iron of the character set forth.

In a steam iron of this class, water is fed to the steam generator at a rate which allows the water to be flashed almost instantly into steam. The generated steam is distributed to the material being ironed or steamed by means of ports or the like which communicate with the steam generator. If water is permitted to flow into the steam generator when the generator is not hot enough to convert the water into steam, the generator may be flooded with the result that water will run out through the steam ports. This condition may arise if the operator opens the water controlling valve too soon, that is, before the steam generator has reached a temperature in excess of 212° F. or if the operator forgets to close the water valve when the heating means for the iron has been turned off to allow the iron to cool.

Flooding of the steam generator is undesirable since all of the moisture in the steam generator should be evaporated before attempting to use the iron in order to prevent water particles from being discharged onto the material being pressed. Certain types of fabrics, such as silk and rayon, may stain or spot if water comes in contact with them. Further, if water is allowed to flow into the steam generator while the cool iron is resting on a support the water leaking out through the steam ports may ruin the supporting surface and also cause corrosion of the ironing surface of the soleplate.

The present invention has for an object to overcome the above-mentioned disadvantages.

These and other objects are effected by my invention as 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 side elevation, partly in section, of an electrically heated steam iron made in accordance with the present invention;

Fig. 2 is a top plan view of the steam iron illustrated in Fig. 1;

Fig. 3 is a fragmentary bottom plan view of the steam iron illustrated in Fig. 1;

Fig. 4 is an enlarged view of a portion of Fig. 1; and,

Figs. 5 and 6 are plan and edge views, respec-

tively, of an element forming a part of the present invention.

Referring to the drawing, there has been illustrated an electrically-heated steam iron indicated generally by the reference character 5. The iron 5 comprises a body including a cover or shell 6 having a handle 7 secured to the top thereof in any suitable manner. The interior of the cover is provided with partitions such as 8 and 9 which, together with the side and top walls of the cover, define a water-storage chamber or reservoir 10. This reservoir is filled with water through an opening in the top of the cover 6, which opening is normally closed by a removable plug 12. This plug preferably has a vent therethrough to allow air to enter the reservoir as water is removed through an outlet opening 13 provided in the bottom of the reservoir adjacent the front thereof.

A metallic soleplate or base 14 is detachably secured in any suitable manner to the bottom of the cover 6 in spaced relation to the partition 8. This soleplate may be of conventional outline, as illustrated in Fig. 2, and is provided with a U-shaped heating element 15 secured thereto or imbedded therein as illustrated particularly in Fig. 1. This heating element may be of well-known construction and comprises an outer metallic tube 16 having a coiled resistance element 17 supported in spaced concentric relation thereto by means of suitable heat-conducting, electrical insulating material.

Power for heating the iron is supplied to the element 15 by means of a cord 18 adapted to be connected to an electrical outlet (not shown). This cord comprises conductors connected to ends 20 (only one of which is shown in Fig. 1) of the resistance element 17 in series with a manually-adjustable thermostat 21.

The thermostat 21 may be of conventional design and is adjusted by means of a rotatable rod 22 extending through a sleeve 23 which is brazed, soldered or otherwise secured in fluid-tight relation in the upper and lower walls of the reservoir 10. A knob or handle 24 provided with a suitable scale to indicate the temperature of the soleplate 14 is fixed to the upper end of the rod 22 for turning the same.

The soleplate 14 is provided with a recess or hole 25 located within the loop or bight 26 of the heating element 15. This recess opens on the ironing surface 27 of the soleplate 14, and is normally closed at its lower end by means of a metallic plug 28 which is externally threaded to removably engage mating threads formed on the

lower side wall of the recess. It will be noted that the upper surface of this plug, together with the lateral wall 29 and the top wall 30 of the recess, defines a chamber 25a.

The chamber 25a is divided into two communicating compartments by an annular rib or baffle 31, preferably formed integral with the plug. The circular space or well within this baffle provides a steam-generating compartment 32 while the annular space between the baffle and the lateral wall 29 of the recess defines a steam-distributing compartment 33.

A plurality of steam ports 34 extending inwardly from the outer surface of the plug communicate with the steam-distributing compartment 33 and serve to discharge steam on the material being ironed. These ports also serve as tool-receiving openings whereby a suitable tool may be inserted therein for removing the plug from the iron for the purpose of cleaning the same.

The outlet 13 of the water reservoir 10 is preferably located directly above the steam-generating compartment 32 and receives a bushing 35 which may be brazed or soldered to the partition 8 to provide a fluid-tight joint therewith. The lower end of this bushing is externally threaded and receives an internally threaded bushing 36 inserted in an aperture provided in the upper wall 30 of the soleplate 14. The second bushing 36 is drawn snug against the wall 30 to provide a fluid-tight joint therewith. The bushing 35 is provided with a water passage 37 having a valve seat 38 formed at its upper end and a valve seat 39 formed at its lower end.

The upper valve seat 38 is engageable by the lower tapered end of a valve stem 40 for closing the passage 37. The valve stem extends through a bearing or bushing 41 secured in fluid-tight relation in the upper wall of the cover 6, and through the front support of the handle 7. The upper end of the valve stem carries a knob 42 fixed thereto and is preferably threaded as indicated at 43 to engage complementary threads formed in a sleeve or insert 44 provided in the handle 7. By turning the knob 42 in one direction or the other, the valve stem may be raised or lowered relative to the valve seat 38 to regulate the rate at which water is fed from the reservoir 10 into the steam-generating compartment 32. If desired, the knob 42 may be provided with an index arrow 45 (Fig. 2) which cooperates with the scale 46 on the handle 7 to indicate the size of the valve opening or the rate of water flow for any given setting of the knob.

In using the iron for the purpose of steaming clothes or supplying moisture in the form of steam to an article being pressed, the operator fills the reservoir 10 with water and adjusts the thermostat 21 by means of the knob 24 to maintain the temperature of the ironing surface at the proper value for the particular material being ironed. When the iron has reached the correct heat, the water valve controlling knob 42 is turned to raise the valve stem and allow water to be fed at a predetermined rate from the reservoir 10 through the passage 37 and into the steam generating compartment 32. The water drops on the surface of the plug 28 within the baffle 31 where it is flashed instantly into steam. The steam thus generated will pass over the baffle 31 and into the steam-distributing compartment 33 and then through the steam outlet ports 34 to the material being pressed. It will be understood that the plug 28, due to its metal-to-metal

contact with the soleplate which carries the heating element, will be heated sufficiently to convert the water into steam. Further, by locating the plug closely adjacent the loop or bight 26 of the heating element, proper heating of the plug is insured.

While the baffle 31 normally prevents the generated steam from carrying particles of water out through the ports 34, as an added precaution, a pad or loose mass of non-corrosive material 47 (Fig. 1), such as glass, asbestos, or aluminum wool, may be provided in the chamber 25a as disclosed in my copending application Serial No. 382,679, filed March 11, 1941, for Steam irons, and assigned to the assignee of the present application.

To prevent water from entering the steam generating chamber 32 when the steam generator is not hot enough to convert the water into steam, a second or auxiliary valve has been provided for closing the water passage 37. The actuating mechanism of the auxiliary valve is preferably located within the steam generating chamber 32 and automatically closes the valve when the temperature of this chamber or the soleplate is below a predetermined value and automatically opens the valve when the temperature of the chamber or the soleplate is above that value.

This auxiliary valve comprises a valve member 48 which is adapted to engage the valve seat 39 provided at the lower end of the water passage 37. In the embodiment of the invention illustrated in the drawing, the valve member is actuated by means of a snap-action bimetal element 49 supported between spaced adjusting screws 50 carried by the soleplate within the steam generator. These screws permit adjustment of the valve member 48 relative to the valve seat 39 and are received in threaded holes in the top wall 30 of the soleplate, at each side of the bushing, 36 so that the bimetal element 49 and valve member 48 are located below the water passage 37.

It will be understood that it is within the purview of this invention to locate the temperature-responsive bimetal element 49 in a position other than that specifically shown in the drawing.

The bimetal element 49 may be of any approved type. In the specific embodiment of the invention illustrated in the drawing, a bimetal thermostat like that shown and described in Valverde Patent No. 1,987,167 granted January 8, 1935 has been provided. This thermostat comprises a rectangular bimetal strip having elongated slots 51 (Fig. 5) therein dividing the same into three laterally-spaced sections connected by integral end portions 52. As disclosed in the above-mentioned patent, the three laterally-spaced sections are given an initial set or curve, the central section 53 having a curvature of smaller radius than the side sections 54 as shown in Fig. 6 of the present drawing. The center section 53 is provided with a hole 55 to loosely receive a headed pin 56 carried by the valve member 48. The hole 55 is preferably larger than the shank of the pin 56 so that the pin is freely movable in this hole. The ends 52 of the bimetal element are provided with inwardly-extending notches 57. These notches receive circumferentially grooved portions 58 formed adjacent the heads of the adjusting screws 50.

As disclosed in the Valverde patent mentioned above, a bimetal element of this character is curved or bowed in one direction when the tem-

perature of the element is below a predetermined value and will snap over and bow in the opposite direction when the temperature of the element rises above that value.

The bimetal element employed in the present iron is mounted on the screws 50 so that it tends to bow upwardly toward the valve seat 39 when the temperature of the strip is below its critical or operating temperature, which in the present case is preferably in excess of 212° F. The screws 50 may be adjusted to maintain the bimetal element in substantially flat condition as shown in Fig. 1 so that the valve member 48 will be resiliently pressed against the valve seat 39 when the temperature of the element is below 212° F. When the temperature of the steam generator or of the soleplate rises above the critical or operating temperature of the bimetal element, which may be 212° F or higher, the bimetal element will snap over into the position shown in Fig. 4 to open the passage 37 and allow water to be fed into the steam generating compartment 32.

From the above described construction, it will be seen that the valve member 48 is actuated by the bimetal element 49 to prevent water from entering the steam generator whenever the temperature of the steam generator is such that it cannot convert water into steam and will thereby prevent accidental flooding of the chamber 25a.

The auxiliary valve construction just described has the added function of permitting the operator to adjust the water controlling valve by means of the knob 42, to provide a predetermined rate of water flow, at the same time that the thermostat is adjusted, since no water will be fed into the steam generator as long as the temperature thereof is not high enough to convert the water into steam.

While I have shown my invention 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, and I desire,

therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What I claim is:

1. A steam iron comprising a body having a liquid storage chamber and an ironing base provided with an ironing surface, a steam generating chamber provided in said body at a level below said storage chamber, means for heating said base and steam generating chamber, a plug member, having an inner surface and an outer surface, removably secured in said base, the inner surface of said plug member defining a wall of said steam generating chamber, the outer surface of said plug member being substantially flush with said ironing surface of said base, passage means connecting said chambers whereby liquid in said storage chamber may flow into said steam generating chamber for conversion into steam, temperature-responsive means adjustably mounted within said steam generating chamber and accessible for adjustment upon removal of said plug member, and valve means actuated by said temperature-responsive means for controlling the flow of liquid through said passage means.

2. A steam iron comprising a body having an ironing base provided with an ironing surface, a steam generating chamber provided in said body, means for heating said ironing surface and said steam generating chamber, passage means communicating with the interior of said chamber for supplying liquid thereto for conversion into steam, valve means for closing said passage means, temperature-responsive means disposed within said steam generating chamber and responsive to the temperature thereof, said valve means being actuated by said temperature-responsive means, said base having an opening extending through said ironing surface to said chamber providing access to said temperature-responsive means, and a plug member removably secured in said base for closing said access opening.

KENNETH L. WOODMAN.