April 29, 1947. F. BUSCH ET AL 2,419,705

STEAM ELECTRIC IRON

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Fig. 1.

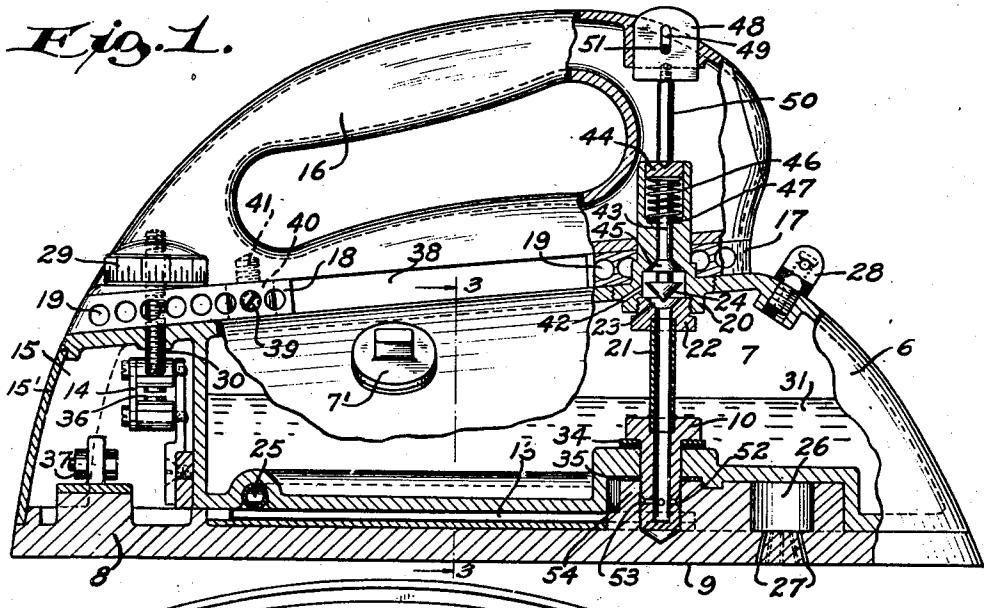


Fig. 2.

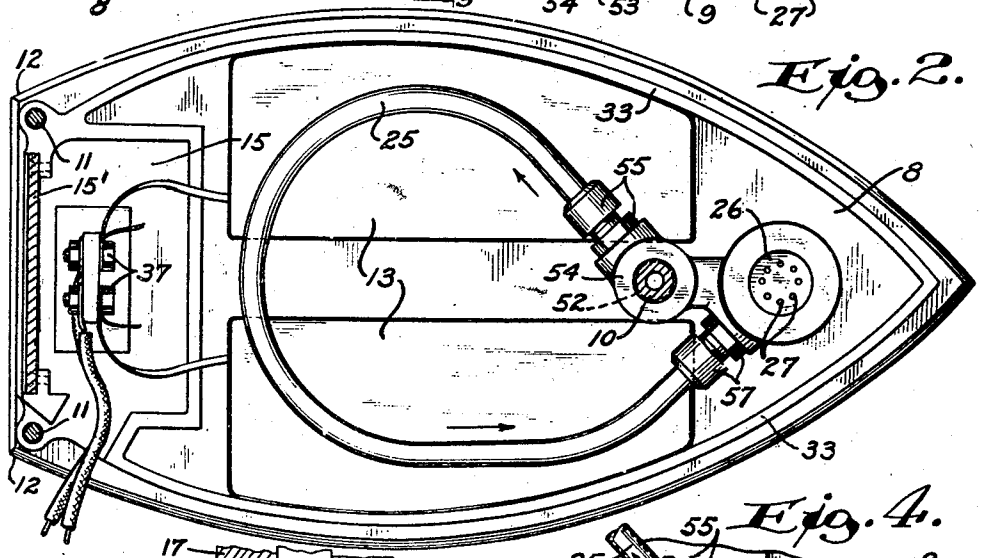
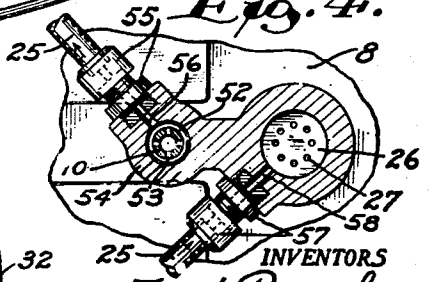


Fig. 4.



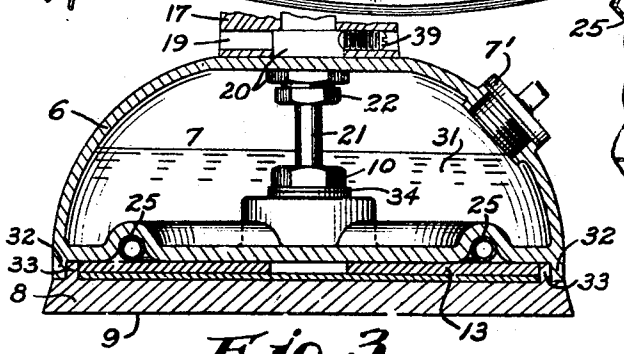


Fig. 3.

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STEAM ELECTRIC IRON

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3 Claims. (Cl. 38—77)

1

The present invention relates in general to improvements in the art of pressing or ironing fabrics, garments, and other materials or articles, and relates more specifically to various improvements in the construction and operation of electrically heated irons or the like.

The primary object of our invention is to provide a new and useful electrically heated iron which is simple in construction and efficient in use.

Many different types of so-called steam electric irons have heretofore been proposed and used with varying degrees of success, and in most of these prior flat iron assemblages the steam which is delivered to the surface of the article being ironed, is generated directly within the hollow body of the iron by the electric heater which also serves to heat the ironing plate or shoe. The steam thus generated is relatively moist and frequently results in delivery of drops of water upon the surface of the work; and in the case of many delicate fabrics, such deposition of liquid thereon is extremely objectionable and often results in ruination of the article. Then too, it is sometimes desirable when utilizing flat irons of this type, to be able to quickly and effectively shut off the steam delivery and to utilize the devices as ordinary irons, and so far as known, none of the prior steam electric flat irons are adapted to be thus converted in a rapid and effective manner. Another defect inherent in many of the prior electrically heated irons is that the thermostats are not conveniently accessible for initial setting, and the operator is not effectively safeguarded against excessive heating of the manipulating handle; and while it is desirable to utilize handles formed of plastic and other materials which cannot withstand high temperatures, the insulation heretofore afforded between the metal bodies and the handles was not sufficient to permit the use of such non-metallic handles without great danger. Still another objection to the prior electrically energized irons was the location of the normal heat controlling devices in relatively inaccessible places, and in positions which also complicated the construction and assembly of the mechanisms, thus making the prior flat irons of this particular type relatively objectionable and unsatisfactory for various specific reasons.

It is therefore a more specific object of our present invention to provide an improved steam electric flat iron which obviates all of the above-mentioned defects and objections in a most effective manner, and wherein the electric heaters are thoroughly protected against ingress of liquid.

Another specific object of the present invention is to provide a self-contained steam iron wherein the generated steam is super-heated before being delivered to the article being pressed, thereby preventing possible undesirable deposition of free liquid upon the article and insuring quick drying of the work.

2

A further specific object of this invention is to provide an improved unitary steam iron wherein the steam is generated directly within the unit, and in which the delivery of steam to the work may be quickly and effectively cut off at the will of the operator.

Still another specific object of the invention is to provide an improved electric iron in which the manipulating handle is most effectively heat insulated from the relatively hot body of the assemblage, thus safe-guarding the operator against injury while also protecting the handle.

An additional specific object of our invention is to provide an improved flat iron assemblage having a readily manipulable heat control device which is conveniently accessible, and which avoids undesirable complications in structure.

Another added object of the invention is to provide various improvements in the construction of electrically heated steam irons, whereby the manufacturing cost of such devices is reduced to a minimum, the efficiency is enhanced to a maximum, and the aesthetic appearance is greatly improved.

These and other objects and advantages of our invention will be apparent from the following detailed description.

A clear conception of the several features constituting our present improvement, and of the mode of constructing and of normally utilizing steam electric flat irons built according to the invention, may be had by referring to the drawing accompanying and forming a part of this specification wherein like reference characters designate the same or similar parts in the various views.

Fig. 1 is a part sectional side elevation of one of the improved electrically heated steam iron assemblages, part of the electrical connections having been omitted for the sake of clearness, and the section having been taken centrally through the device;

Fig. 2 is a top view of the lower shoe of the iron, showing the three elements for attaching the shoe to the body, in section;

Fig. 3 is a transverse section through the body and shoe, taken along the line 3—3 of Fig. 1; and

Fig. 4 is a fragmentary transverse horizontal section through the upper forward portion of the shoe showing the structure for super-heating the steam and for delivering the same to the pressing face.

While the invention has been shown and described herein as being specifically embodied in an electrically heated steam iron assembly of particular shape and design, it is not our desire or

intent to thereby unnecessarily restrict the scope or utility of the improved features.

Referring to the drawing, the improved steam electric iron shown therein, comprises in general a main hollow body 6 formed of suitable metal and providing a liquid confining chamber 7 having a removable liquid supply plug 7' at one side thereof; a lower plate or shoe 8 having a smooth bottom face 9 and being firmly but detachably secured to the lower portion of the body 6 by means of a front clamping element 10 and two rear clamping bolts 11 coacting with the heel of the shoe 8 near the opposite pointed corners 12 thereof; a pair of electric heating elements 13 confined between the bottom of the body 6 and the top of the shoe 8 and being controllable by means of a bi-metallic thermostat 14 disposed within a rear central recess 15 of the body; a manipulating handle 16 coacting with the top of the hollow body 6 through front and rear heat insulating pads 17, 18 respectively, and each having a series of transverse parallel air circulating holes 19 therethrough; a steam discharge fitting 20 secured to the upper front portion of the casing 6 and being connected to the clamping element 10 by means of a tubular member or riser pipe 21 and a special nut 22 having a valve seat 23 formed thereon; a double acting manually controllable steam shut-off valve 24 mounted within the fitting 20 and being cooperable with the seat 23; a steam super-heating coil 25 directly engaging the flat heating elements 13 and communicating at one end with the pipe 21 through the clamping element 10, and at its opposite end with a sealed dome or chamber 26 having a plurality of steam outlet ports 27 leading to the lower shoe face 9; an automatic safety valve 28 associated with the upper front portion of the casing 6 and chamber 7; and a manually adjustable heat control wheel 29 coacting with a threaded axially movable rod 30 which cooperates with the thermostat 14.

The main hollow body 6 is preferably formed of a light but durable metal such as aluminum, and the internal chamber 7 of the body 6 is normally supplied with a quantity of liquid 31 such as pure water, by removal of the supply plug 7'. The lower peripheral edge of the body 6 is provided with an integral flange or lip 32 which snugly engages an upstanding ridge 33 formed integral with the shoe 8 so as to effectively confine the heating elements 13 and the super-heating coil 25 between the body 6 and shoe 8, and to positively prevent liquid from reaching these parts when the chamber 7 is being filled. The lower plate or shoe 8 is constructed of relatively hard heat resistant material, and the points 12 formed on the heel of this shoe are provided for the purpose of facilitating certain ironing operations. As previously indicated, the shoe 8 is firmly but detachably attached to the body 6 by means of the rear bolts 11 and the front steam conducting element 10, thus providing a durable three point connection; and in order to prevent liquid 31 from escaping from the chamber 7 past the element 10 into the heater confining space, sealing washers 34, 35 are interposed between the clamping faces of the bushing 10 and body 6 and between the latter and the shoe 8, see Figs. 1 and 3.

The flat electric heating elements 13 which are confined between the lower part of the body 6 and the upper portion of the shoe 8, are of well known construction, and the bi-metallic thermostat 14 which is disposed within the rear

recess 15 of the body 6 may also be of any desired type. The thermostat 14 is ordinarily provided with make and break contacts 36 one of which is adjustable relative to the other with the aid of the axially movable screw rod 30 so as to vary the degree of heating of the shoe 8 by the heating elements 13; and the thermostat adjusting wheel 29 which is journalled for convenient rotation in the rear central portion of the handle 16, should be properly calibrated and marked so as to indicate the proper setting for different kinds of work to be performed. The iron should also be provided with suitable connector posts 37 for effecting ready attachment thereof to an electric current conductor cord within the recess 15 as shown in Figs. 1 and 2, and it is to be noted that the rear central recess 15 which is normally closed by a removable rear plate 15', provides a protective enclosure for the thermostat 14, and that the thermostat and connections are readily accessible for inspection upon removal of the plate 15'.

The manipulating handle 16 may be formed of wood or plastic, and is separated from the top of the body 6 by the heat insulating pads 17, 18 so as to provide an air space 38 between the handle and body, in addition to the air circulating holes 19 formed in the pads themselves. The handle 16 may be firmly but removably attached to the body 6, by means of several attaching screws 39 coacting with selected holes 19 of the front and rear pads 17, 18 and with rigid portions of the casing 6, and the pads 17, 18 should be rigidly connected to the bottom of the handle 16 in any suitable manner. The front attaching screw 39 shown in Fig. 3, coacts with the front fitting 20 which is firmly attached to the body 6, while the rear attaching screw 39, coacts with an upwardly extending boss or projection 40 formed integral with the casing body 6, and a pin 41 secured to the handle 16 may be fitted within a central hole in the boss 40, see Fig. 1.

The improved steam control and super-heating mechanism comprising the element 10, fitting 20, pipe 21, double acting valve 24, and heating coil 25, is adapted to deliver steam from the chamber 7 to the dome 26 at the front of the shoe 8 in super-heated condition, and is also constructed so as to permit the operator to entirely cut off the delivery of steam to the dome space 26 and ports 27 at will. The fitting 20 which is rigidly attached to the main body or casing 6, and to which the seating nut 22 is secured, is provided with several orifices 42 leading from the liquid confining and initial steam generating chamber 7 to the control valve 24, and this valve 24 is carried by a stem 43 having a head 44 at its upper end slidably confined within a bore in the upper portion of the fitting 20. The stem 43 also has an auxiliary valve 45 attached thereto above the main valve 24, and this valve 45 is normally seated against an auxiliary seat on the fitting 20 when the valve 24 is open, by means of a compression spring 46 coacting with the fitting and with the head 44 as shown in Fig. 1, thus providing a double acting valve assemblage. The spring 46 constantly urges the main valve 24 toward open position and the auxiliary valve 45 into closed position, and also coacts with a sealing washer 47 which snugly embraces the stem 43 at the point of exit thereof from the fitting 20. In order to permit manual closing of the main control valve 24 by depressing the spring 46, a push button or slide 48 having a

slot 39 therethrough, is slidably mounted in the forward portion of the grip of the handle 16, and this slide 48 is connected to the stem head 44 by a rod 50 and is pierced by a fixed stop pin 51 which passes through the slot 49. When the operator presses on the slide button 48 the valve 24 will be closed to shut off the steam flow past this valve, and while the auxiliary sealing valve 45 is simultaneously opened, the sealing washer 47 positively prevents escape of steam along the stem 43. When the operator releases the button or slide 48, the valve 24 is automatically opened by the spring 46 and the valve 45 is simultaneously closed to provide a dual seal for preventing undesirable escape of steam along the stem 43. The safety valve 28 is of conventional design, and is adapted to permit automatic release of excess steam pressure from within the chamber 7.

The riser pipe 21 which connects the seating nut 22 with the element 10, is rigidly attached to these elements to provide an effective seal, and the element 10 has a central inner bore connected to an external groove 52 by means of radial ports 53, as clearly shown in Figs. 1 and 4. The grooved lower portion of the clamping element 10 has screw thread coaction with a boss 54 formed integral with the plate or shoe 8, and the inlet end of the super-heating pipe or coil 25 is connected to the boss 54 by means of a detachable connector 55 and communicates through a passage 56 with the groove 52, ports 53, and pipe 21. The opposite outlet end of the pipe 25 is likewise attached to the steam distributing dome by means of a detachable connector 57, and communicates with the chamber 26 through a passage 58; and the super-heating pipe 25 with its connectors 55, 57 are all normally confined between the body 6 and shoe 8 in direct contact with the heating elements 13, see Figs. 1, 2 and 4.

When the improved steam electric iron has been properly constructed and assembled as above described, it may be used for diverse pressing and ironing purposes, and the thermostat 14 may be adjusted by manipulation of the control wheel 29 so as to secure any desired degree of heating, or to shut-off the energizing current entirely. During normal operation and use of the iron, the heat generated by the electric heating elements 13, not only properly heats the shoe 8, but simultaneously heats the liquid 31 confined within the chamber 7 and constantly generates vapor or steam in relatively moist condition. When the slide button 48 is released and the valve 24 is open, the steam thus generated in the chamber 7, flows through the orifice 42, pipe 21, element 10 and passage 56, into the super-heating pipe or coil 25, wherein the moist steam is converted into superheated steam devoid of free liquid. The superheated steam then flows from the coil 25 through the passage 57 into the dome chamber 26 from whence it is dispersed through the ports 27 to the article being pressed. If no steam delivery is desired, the operator need only to press the button 48, whereupon the valve 24 will be closed and the steam will be cut off; and in case the steam pressure within the chamber 7 becomes excessive, then the safety valve 28 will promptly function to relieve the excess pressure. If no steam is desired, liquid may be omitted from the chamber 7, and the iron can then be utilized as an ordinary electric iron.

From the foregoing detailed description it will be apparent that our present invention provides an improved electrically heated steam iron which is simple, compact and durable in construction, and which is also efficient in operation and flexible in its adaptations. The improved iron assemblage can be readily manufactured, assembled or dismantled, and all parts thereof are conveniently accessible for inspection and manipulation. The steam generating and superheating system will obviously produce an abundant supply of steam, and the steam supply may be shut off at will with utmost safety. The operator is moreover amply protected against excessive heat and escaping steam, and the degree of heating can be readily and accurately varied at will with the aid of conveniently located and non-obstructive adjusting mechanism. The improved flat iron also presents a pleasing appearance, and the simplicity of construction will permit streamlining in order to enhance the aesthetic appearance. The steam electric irons embodying our invention can be manufactured and sold at moderate cost, and the improved formation of the lower ironing plate or shoe with pointed corners at the heel also enhances the utility of the structure. The electric heating and control elements are all well protected against ingress of moisture, while still being readily accessible for inspection and setting.

It should be understood that it is not desired to limit this invention to the exact details of construction or to the precise mode of operation, herein shown and described, for various modifications within the scope of the appended claims, may occur to persons skilled in the art.

We claim:

1. A flat iron comprising, a work engaging shoe having a heater associated directly therewith and being provided with steam delivery passages leading to its work engaging face, a hollow liquid confining body resting upon said shoe and being exposed to heat generated by said heater, a manipulating handle coacting with the top of said body, a riser pipe having a hollow clamping element and a hollow fitting secured to its lower and upper ends respectively and cooperating therewith to form a conduit connecting the interior of the body with said passages, said element having an upper head clampingly engageable with said body and a lower screw threaded end coacting with said shoe to secure the body to the shoe, and said fitting having a lower screw threaded portion coacting with said body and an upper cylindrical portion snugly engaging a bore in said handle, means detachably connecting said handle to said upper fitting portion, and other means for detachably connecting said handle to said body remote from said fitting.

2. A flat iron comprising, a work engaging shoe having a heater associated directly therewith and being provided with steam delivery passages leading to its work engaging face, a hollow liquid confining body resting upon said shoe and being exposed to heat generated by said heater, a manipulating handle coacting with the top of said body, a riser pipe having a hollow clamping element and a hollow fitting secured to its lower and upper ends respectively and cooperating therewith to form a conduit connecting the interior of the body with said passages, said element having an upper head clampingly engageable with said body and a lower screw threaded end coacting with said shoe to secure the body to the shoe, and said fitting having a lower screw threaded portion coacting with said body and an

upper cylindrical portion snugly engaging a bore in said handle, a boss secured to said body and snugly engaging another bore in said handle located remote from said fitting, and screws coacting with said handle and with said fitting and boss respectively for detachably securing the handle to the body.

3. A flat iron comprising, a work engaging shoe having a heater associated directly therewith and being provided with steam delivery passages leading to its work engaging face, a hollow liquid confining body resting upon said shoe and being exposed to heat generated by said heater, a manipulating handle coacting with the top of said body, a riser pipe having a hollow clamping element and a hollow fitting secured to its lower and upper ends respectively and cooperating therewith to form a conduit connecting the interior of the body with said passages, said element having an upper head clampingly engageable with said body and a lower screw threaded end coacting with said shoe to secure the body to the shoe, and said fitting having a lower screw threaded portion coacting with said body and an upper cylindrical portion snugly engaging a bore in said handle, a vapor heating coil confined between said body and said shoe above said heater by said clamping element and having one end communicating with said conduit and its opposite end communicating with said passages, means detachably connecting said handle to said upper fitting portion, and other means for detachably connecting said handle to said body remote from said fitting.

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