May 7, 1957 F. E. FINLAYSON 2,791,045

STEAM FLATIRON

Filed Jan. 21, 1954 3 Sheets-Sheet 1

Fig. 1.

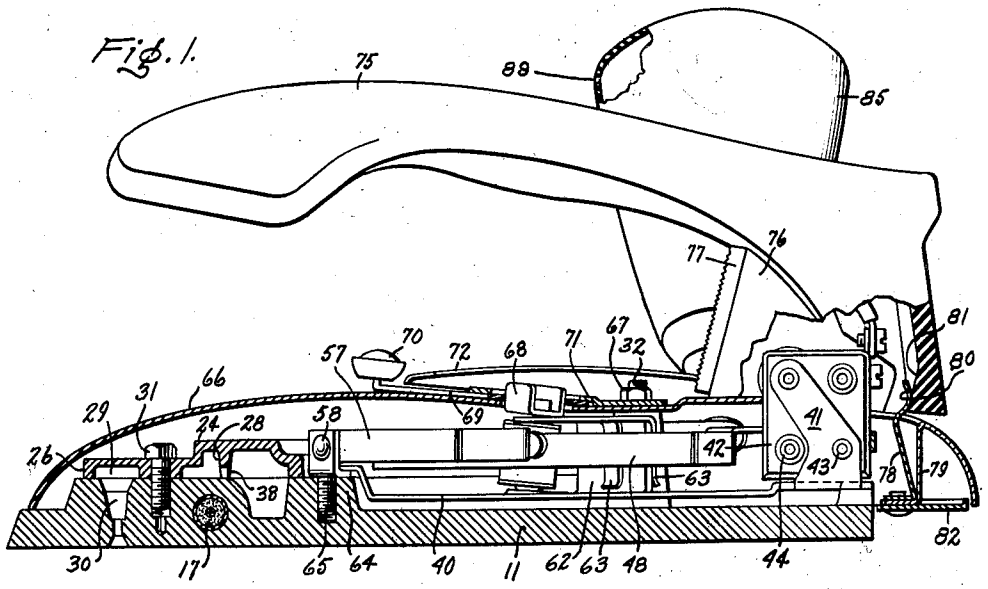


Fig. 5.

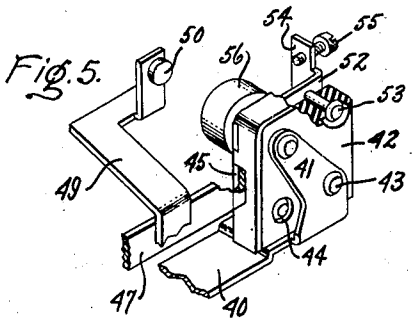


Fig. 4

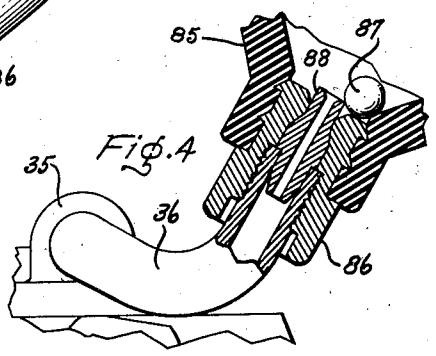
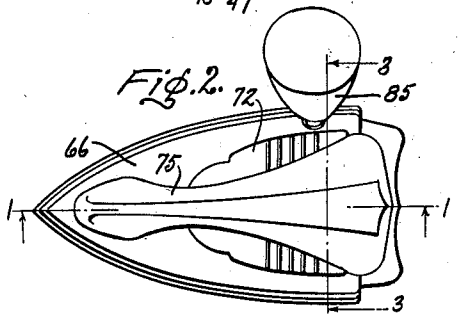


Fig. 2.



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May 7, 1957 F. E. FINLAYSON 2,791,045

STEAM FLATIRON

Filed Jan. 21, 1954 3 Sheets-Sheet 2

Fig. 6

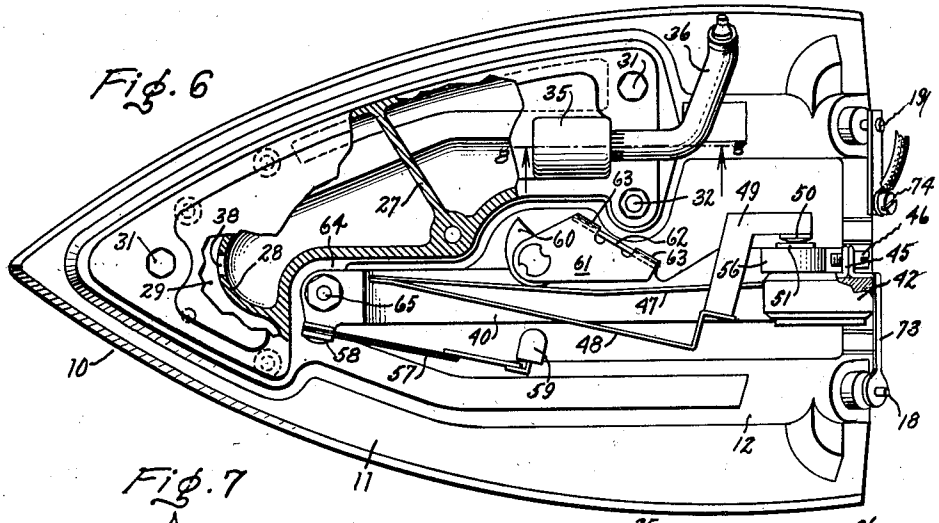


Fig. 7

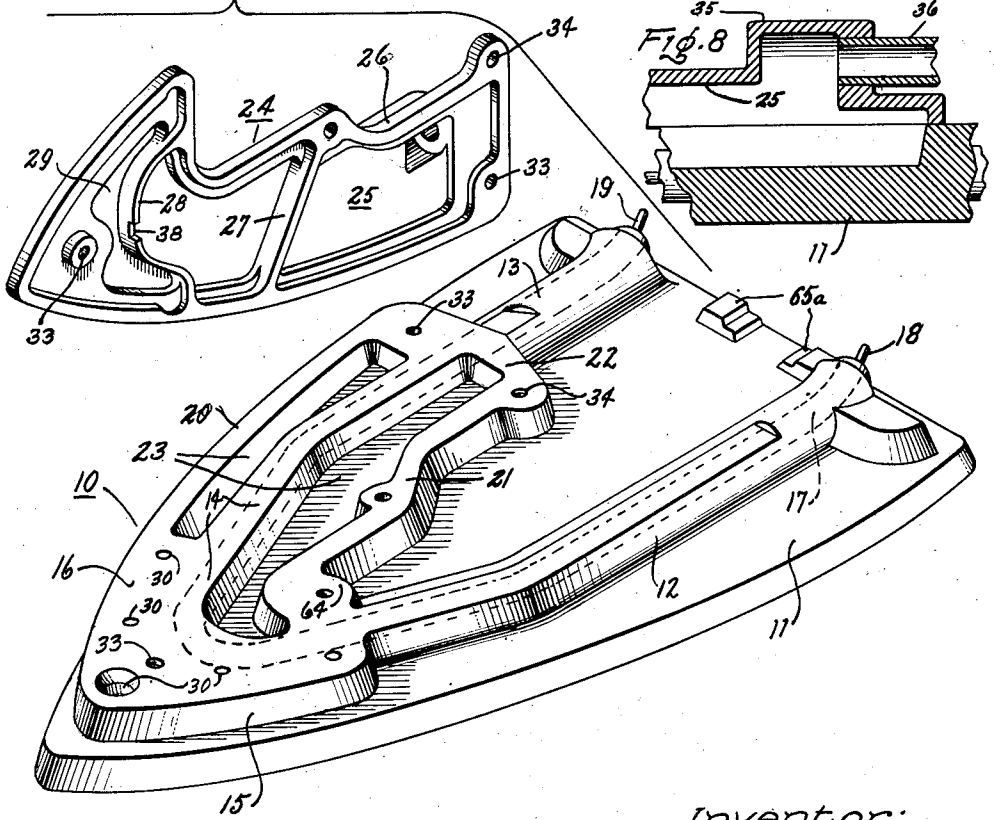


Fig. 8

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May 7, 1957 F. E. FINLAYSON 2,791,045

STEAM FLATIRON

Filed Jan. 21, 1954 3 Sheets-Sheet 3

Fig. 11.

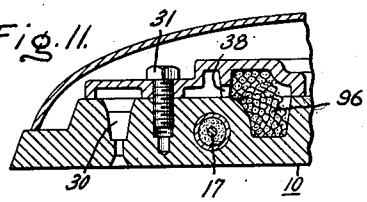


Fig. 10.

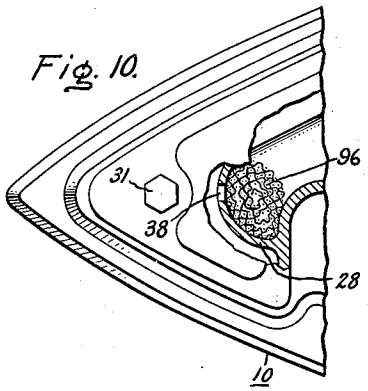
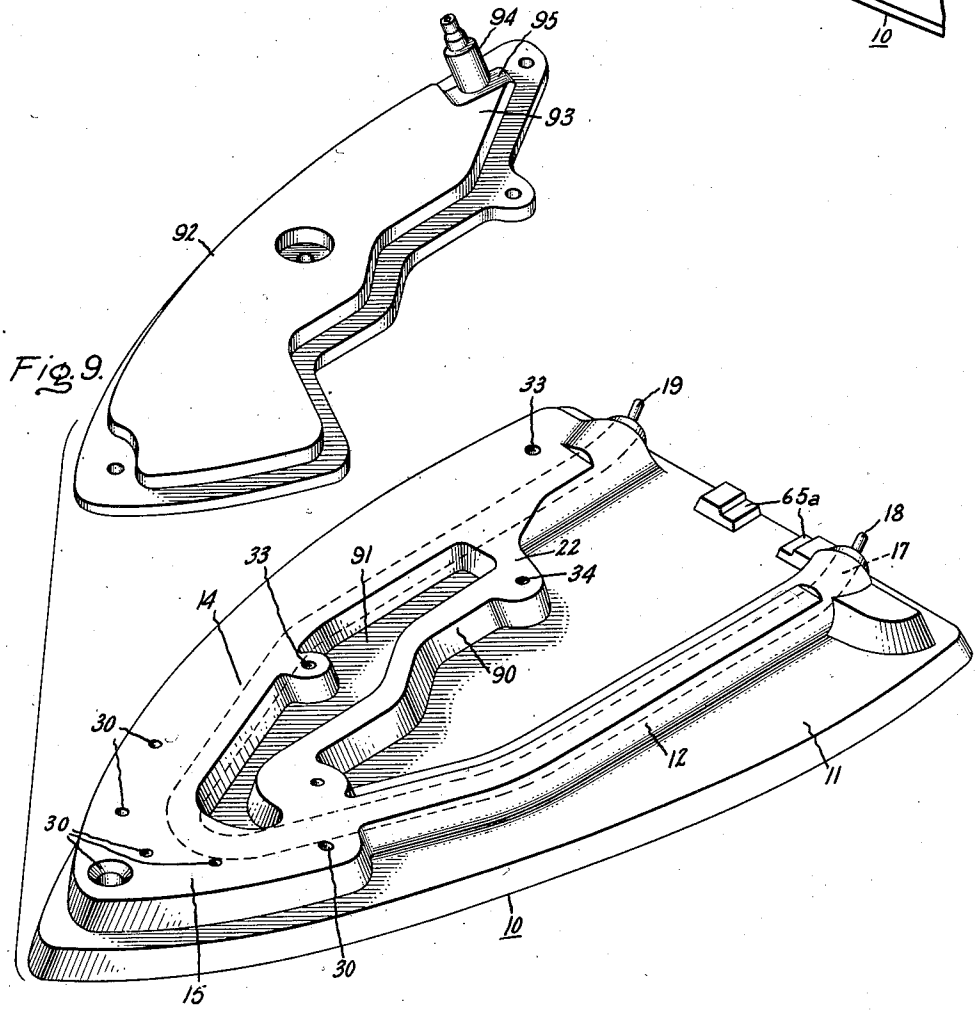


Fig. 9.



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United States Patent Office

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2,791,045

STEAM FLATIRON

Frank E. Finlayson, Ontario, Calif., assignor to General Electric Company, a corporation of New York

Application January 21, 1954, Serial No. 405,379

8 Claims. (Cl. 38—77)

The present invention relates to electric flatirons of the type which are so constructed that they may be used either as a dry flatiron or as a steam flatiron. It is especially well adapted for use in, and finds its primary utility in, small flatirons such as the so-termed "travel" flatirons although it is not limited necessarily to flatirons of this particular type.

It is desirable that travel flatirons be small and that the body be of small thickness so that when the handle is folded down onto the body (a usual arrangement) there is obtained for packing a compact structure which occupies a minimum of space. Also, it is desirable in travel flatirons to provide an adjustable thermostat usable on alternating or direct current for regulating automatically the soleplate temperature. There is thus presented in connection with such flatirons, when designed as a steam flatiron, the problem of providing in the relatively small space available in the flatiron body, both a steaming section which will in a satisfactory manner flash completely into steam the water supplied to it and distribute the steam to the surface being ironed, and a thermostat holding section large enough to accommodate a suitable thermostat structure.

The object of the present invention is to provide an improved construction and arrangement wherein both a steaming section and a thermostat section are embodied in the body of a small flatiron, and for a consideration of what I believe to be novel and my invention, attention is directed to the following specification and to the claims appended thereto.

In the drawing,

Fig. 1 is a longitudinal sectional view of a flatiron embodying my invention, the section being taken on line 1—1, Fig. 2.

Fig. 2 is a top plan view of the flatiron on a scale smaller than that of Fig. 1.

Fig. 3 is a transverse sectional view taken on line 3—3, Fig. 2.

Fig. 4 is a detail sectional view through a part of a water supplying means.

Fig. 5 is a detail perspective view of a part of the thermostat structure.

Fig. 6 is a top plan view of the flatiron body with the cover removed and walls partly broken away to better illustrate certain parts.

Fig. 7 is an exploded perspective view of the soleplate and steam chamber cover.

Fig. 8 is a detail sectional view taken on line 8—8, Fig. 6.

Fig. 9 is an exploded view of a portion of flatiron showing a modified form of my invention.

Fig. 10 is plan view, partly broken away, of a portion of this modified form.

Fig. 11 is a sectional elevation view, corresponding generally to Fig. 1, of a portion of this modified form.

Referring first to Figs. 6 to 8, 10 indicates the soleplate which comprises a flat base 11 having on its top surfaces

along one edge a longitudinally extending rib 12 and along the other edge a longitudinally extending rib comprising two sections 13 and 14. At the pointed end of the soleplate, rib 12 and rib section 14 merge into an enlarged portion 15 the top surface 16 of which forms the bottom wall of a steam distributing chamber. The flatiron heating unit 17, which may be the known sheathed wire type, is embedded in ribs 12 and 13—14, and in portion 15 as shown in dotted outline in Fig. 7. Its terminals are indicated at 18 and 19. It is shown in section in Figs. 1 and 3.

On opposite sides of rib section 14 are side walls 20 and 21 which in conjunction with an end wall 22 and the inner end surface of enlarged portion 15 form a vaporizing chamber 23 divided longitudinally by rib section 14. By this arrangement it will be seen that the portion of the flatiron heating unit in rib section 14 extends longitudinally of the central portion of the vaporizing chamber. The top surfaces of walls 20, 21 and 22 and of rib portion 14 are all flush with the flat surface 16 and fitted over them is a steam chamber cover 24 comprising a top wall 25, a peripheral side wall 26, and transverse partition walls 27 and 28. The forward end of cover 24 is triangular shaped to conform to the triangular shape of enlarged portion 15 and transverse partition wall 28 is in line with the inner edge of portion 16. There is thus formed at the pointed end of the soleplate a steam distributing chamber 29 which extends across such pointed end. Chambers 23 and 29 together form the steam chamber of the soleplate. Steam distributing chamber 29 is connected with the ironing surface of the flatiron by a series of spaced openings 30. Five such openings are shown in the present instance, but it will be apparent that a single opening at or near the pointed end, or a larger number than five may be employed, if desired. Cover 24 is fastened in place by a number of screws 31 and by a stud 32 which serves also to fasten in place the flatiron cover as explained hereinafter. In Fig. 7 the screw openings are indicated at 33 and the stud opening at 34. At the inner end of cover 24 are walls which form a dome 35 (Figs. 6 and 8) to which is connected a water supply pipe 36 through which water is supplied to the steam chamber for steam ironing. Partition wall 27 serves as a stiffener for the cover 24. Droplets of water clinging to lower surface of top wall 25 are blocked by partition 27 from flowing to the forward end of steam chamber without contacting the heated surface of the steam chamber. This insures a complete conversion of all the water into steam so fine particles of water will not be carried along to openings 30. The vaporizing chamber is connected to the steam distributing chamber through a relatively small passage 38 in wall 28 which serves to control the rate at which steam is supplied to openings 30, limiting it to the desired volume by producing a slight back pressure as described in my copending application, Serial No. 368,676, filed July 17, 1953, now abandoned, and assigned to the same assignee as the present application.

The region in the soleplate between side wall 21, and rib 12 and the region to the rear of end wall 22 defines an L-shaped space which forms the thermostat. The thermostat illustrated is similar to that shown in the application of Swenson and Finlayson, Serial No. 369,841, filed July 23, 1953, now Patent No. 2,723,336, and assigned to the assignee as the present application.

The thermostat structure comprises a metal base plate or frame member 40 provided at its rear end with an angularly extending ear 41 to which a block 42 of insulating material, which may be formed from ceramic, for example, is fastened by suitable means such as rivets 43. Fastened to block 42 by a rivet 44 is a terminal 45 (see

Fig. 6) having an angularly bent up end provided with a tapped opening to receive a terminal screw 46. Anchored on block 42 beneath terminal 45 and held by rivet 44 (see Figs. 5 and 6) is an end of a leaf spring 47. Leaf spring 47 extends along base plate 40 to a point adjacent to the forward end of the base plate. Attached to the free end of leaf spring 47 by suitable means, such as a weld, is a second leaf spring 48 which extends back in spaced generally parallel relation to leaf spring 47 to a point adjacent to insulating block 42. Here leaf spring 48 is provided with an angularly bent end portion 49 which projects over block 42 and carries a contact button 50. Leaf springs 47 and 48 form in substance a single leaf spring member which is reversely bent on itself with one end anchored to block 42 and the other end carrying a contact positioned in line with block 42. Leaf springs 47 and 48 may be of the same or different thicknesses, the thicknesses being such as to give the desired resiliency to the spring member. They are arranged edgewise with respect to the soleplate so that in operation they move in a plane parallel to the soleplate. Contact button 50 forms a movable contact which is adapted to make contact with a stationary contact button 51 fixed to a line terminal 52 which in turn is fastened to block 42 by a rivet 53 and has an ear 54 provided with a tapped opening for a terminal screw 55. Surrounding contact button 51 and held in place by it is a permanent magnet 56. Leaf springs 47 and 48 may be formed from nonmagnetic stainless steel. Accordingly, to provide a magnetic part for cooperating with permanent magnet 56, end portion 49 which carries contact button 50 is formed from a separate strip of suitable magnetic material attached to the other portion of leaf spring 48.

The spring member comprising leaf springs 47 and 48 is biased by its inherent resiliency to hold contact button 50 in engagement with contact button 51 and it is adapted to be moved to separate the contacts by a bimetal 57 fixed to an ear 58 at the forward end of base plate 40. Bimetal 47 may be of any suitable type. In the present instance, there has been illustrated a bimetal such as that disclosed in the patent to Winborne 2,128,869, issued August 30, 1938. Attached to the free end of bimetal 57 is an insulator 59 which when the bimetal flexes due to being heated engages leaf spring 48 to effect movement of contact 50 from engagement with contact 51.

Adapted to engage leaf spring 47 to effect adjustment of the spring member with respect to insulator 59 is a control cam 60 formed from insulating material. Control cam 60 is pivotally mounted between base plate 40 and an ear 61 carried by the base plate, the cam being provided with trunnions which engage in openings in the base plate and the ear. Ear 61 is shown as being a separate piece of material detachably connected to a tongue 62 on base plate 40 by spring fingers 63 which engage opposite sides of tongue 62. This arrangement forms a simple easy means whereby the cam may be assembled on the base plate.

The described thermostat arrangement forms a unitary structure which is attached at its forward end to an extension 64 of portion 15 by a bolt 65 as shown in Figs. 1 and 6. At its rear end it is positioned between lugs 65*a* on the rear end of base 11.

Positioned over the soleplate is a top shell 66 held in place by the outer end of stud 32 (see Fig. 1) which is made long enough to project out through shell 66 so as to receive a holding nut 67. The upper trunnion of cam 60 has attached to it a coupling 68 which projects through an opening in top shell 66 and has attached to it an adjusting lever 69, the outer end of which is provided with a button 70. By turning lever 69 the cam can be adjusted to effect lateral movement of leaf spring 47. Lever 69 is held in place by a friction spring 71 held on stud 32 by nut 67. Attached to top shell 66 over lever 69 is a suitable dial plate 72 on which are indicia to indicate the temperature setting of the thermostat.

Terminal 18 of the heating unit is connected by a jumper wire 73 to terminal 45 and thence through leaf springs 47, 48 and contact buttons 50 and 51 to line terminal 52. Terminal 19 of the heating unit is connected to a line terminal 74. Thus the circuit for the flatiron may be traced as follows: line terminal 74, heating unit terminal 19, heating unit 17, heating unit terminal 18, jumper wire 73, terminal 45, leaf springs 47, 48, contacts 50 and 51 (when in engagement) to line terminal 52.

In operation bimetal 57 flexes to move contact 50 out of and permit it to move into engagement with stationary contact 51 by engaging leaf spring 48, flexing of the bimetal being effected by temperature variations of the soleplate; and the temperature setting of the thermostat may be changed by turning cam 60 which adjusts the leaf springs 47, 48 with respect to insulator 59 on the bimetal. The function of magnet 56 is to hold the contacts in engagement until sufficient pressure has been built up in leaf spring 48 by the bimetal to insure a quick break of the contacts with a positive snap action and a blowing out of the arc due to separation of the contacts and the presence of the magnetic flux, thus adapting the flatiron for operation on either direct or alternating current.

As stated above, the thermostat structure shown is similar to that disclosed and claimed in the aforementioned Swenson and Finlayson application. It is not claimed herein except insofar as its specific construction cooperates with the structure which goes to make the steam flatiron.

The handle of the flatiron is shown at 75. Insofar as the present invention is concerned it may be either rigidly or pivotally mounted on the flatiron body. In the present instance it is indicated as being pivotally mounted after the manner disclosed and claimed in the application of Alfred G. Swenson, Serial No. 369,840, filed July 23, 1953,, now Patent No. 2,727,322, dated December 20, 1955, and assigned to the same assignee as is the instant application. To this end the handle is connected by suitable pivot means to a bracket 76 fixed to top shell 66, it being held by a spring pressed latch 77 the upper end of which engages under a shoulder on the underside of the handle so that by pushing on the latch it may be moved rearwardly from under the shoulder to permit of the handle being turned on its pivots down against the top surface of shell 66. For holding the handle in folded down position, a handle spring 78 is fastened at the rear end of top shell 66 to an ear 79 on the top shell, the handle spring having an elbow 80 which engages a surface 81 at the lower end of an inside wall of the handle.

The rear end of top shell 66 projects beyond the rear end of base 11 and handle 75, and forms with the upper rear end of the handle a heel rest upon which the flatiron may be up-ended. The space at the end of the base is closed by a plate 82 attached to ear 79.

Water for steam ironing may be fed to water supply pipe 36 by any suitable means. In the present instance a water supplying means is shown which is similar to that disclosed and claimed in the application of myself, Alfred G. Swenson, and Richard J. Zerveck, Serial No. 405,377, filed of even date herewith and assigned to the same assignee as the present application. Briefly it comprises a flexible self-supporting bulb 85 of rubber or other suitable material provided with a coupling 86 adapted to be screwed onto the outer end of pipe 36 as shown clearly in Fig. 4. At its inner end coupling 86 is shaped to provide a valve seat for a ball valve 87, the ball valve being displaced by a tubular post 88 at the outer end of pipe 36 when coupling 86 is screwed onto the pipe end. In bulb 85 is an air vent 89 (see Fig. 1). The opening through post 88 forms a metering orifice for regulating flow of water from the bulb to the vaporizing chamber.

When the flatiron is to be used for steam ironing, bulb 85 (detached from the flatiron body) is squeezed to collapse it, the neck of the bulb inserted in water, and

pressure on the bulb then released to permit it to expand to its normal shape. In expanding water will be drawn into the bulb. It may be filled in this manner to the desired extent. When filled, the ball valve prevents a flow of water out through the neck of the bulb when held approximately vertically. Coupling **86** is then screwed down over the end of pipe **36** to attach the bulb to the flatiron body as shown in Fig. 4. When attached, post **88** unseats ball valve **87** to permit flow of water from the bulb to the vaporizing chamber. Air vent **89** is so located that it faces forward toward the front of the flatiron when the bulb is in place so that when the flatiron is up-ended on its heel rest water will not leak out through the vent. The structure which includes the coupling, the arrangement for unseating the ball valve, and the location of the air vent is not part of the present invention but is described and claimed in the copending application of Richard J. Zerveck, Alfred G. Swenson and Frank E. Finlayson, Serial No. 405,377, filed January 21, 1954, now Patent No. 2,761,228, dated September 4, 1956, and assigned to the assignee of the present invention.

Water supplied through pipe **36** drops down onto the hot soleplate where it is flashed into steam. As generated initially, especially if the soleplate is at a lower temperature, there may be particles of unevaporated water carried along with the steam. Because of partition wall **27**, which forms a baffle plate, the steam is distributed throughout the vaporizing chamber, some of it being directed across the upper surface of rib section **14** and all of it being forced to flow under wall **27**. Thus the steam is brought into engagement with hot surfaces of substantial area which serves to effect complete vaporization. From the vaporizing chamber the steam flows through passage **38** to steam distributing chamber **29**; and from there through openings **30** to the surface being ironed.

By my invention wherein I provide a vaporizing chamber and a steam distributing chamber, the vaporizing chamber being arranged along opposite sides and across the top of a rib in which a section of the heating unit is located, and the distributing chamber being arranged across the pointed end of the soleplate and connected to the vaporizing chamber through a relatively small passage, I am enabled to obtain complete water vaporization (thus avoiding particles of water being carried along to the surface being ironed) while at the same time utilizing a steam chamber of minimum area and vertical depth, so as to leave sufficient room for a thermostat structure alongside the steam chamber. And by utilizing a thermostat wherein the leaf springs are arranged edgewise with respect to the base and move transversely I am enabled to provide a thermostat of vertical depth comparable to the vertical depth of the steam chamber. In other words the specific steam chamber structure and arrangement and the specific thermostat structure and arrangement cooperate to produce a flatiron of small depth.

In Figs. 9, 10 and 11 there is shown a modified form of my invention, this form of invention representing the presently preferred commercial embodiment. Corresponding numerals have been employed to identify corresponding parts in Figs. 9, 10 and 11 and in the previous figures. The form of invention shown in Figs. 9, 10 and 11 differs from that previously described in the specific shape of the lower portion of the steam chamber, in providing a somewhat longer steam chamber and cover, and in the arrangement of the water inlet.

Referring now to Figs. 9, 10 and 11, is shown a soleplate **10** including a longitudinally extending rib **12** along the top surface thereof. The heating element **17** is embedded in the rib. On one side of rib section **14** is formed a side wall **90**, corresponding to a side wall **21** in Fig. 7. The side wall **90** in conjunction with the end wall **22** and the inner end surface of the enlarged portion **15** forms a vaporizing chamber **91**.

The chamber is closed by a cover **92**, corresponding to the cover **24** in the form previously described. The cover **92** differs from the cover **24** in that it includes a rearwardly extending portion **93** which projects beyond a line corresponding to the rear edge of the cover **24** and extends substantially to the rear edge of the soleplate **10**. This provides a steam chamber of greater length than that in the form of invention previously described. The cover **92** is held in place by a plurality of screws, one of which is shown at **31** which are received in openings **33** in the soleplate and by a stud not shown corresponding to the stud **32** which is received in the stud opening **34**. The under side of the cover **92** is similar in construction to that shown in the form of invention previously described.

In the modified form of invention shown in Figs. 9–11, the water is supplied to the steam chamber from a bulb (not shown) which corresponds to the bulb **85** through a water supply conduit **94**. The conduit **94** is connected in any suitable manner to a corresponding opening in the cover **92**. As shown in Fig. 9 the conduit **94** is connected to the cover **92** at a beveled or inclined surface **95** and extends upwardly and outwardly from the soleplate so that the bulb is positioned generally in the same location as illustrated by the bulb **85** in Fig. 3. In the modified form of invention there is illustrated at **96** a mass of screen or similar material to further insure that all water particles have been broken up and converted to steam before passing to the openings **30**.

The form of invention illustrated in Figs. 9, 10 and 11 operates in the same manner as already described in detail in connection with the form of invention shown in Figs. 1 through 8, inclusive, and includes the same advantages there outlined.

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

1. In a steam flatiron, a soleplate having a pointed forward end and lateral sides diverging from said pointed end, walls including a part of the soleplate which define a steam chamber extending along one of said lateral sides of the soleplate, a thermostat space between said steam chamber and the other lateral side, at least one port in the region of the pointed end of the soleplate for supplying steam to a surface being ironed, said port being in communication with said steam chamber, means for supplying water to the steam chamber, a heating unit embedded in the soleplate, and a thermostat structure mounted on the soleplate alongside said steam chamber and in said thermostat space for regulating the temperature of the soleplate, said thermostat structure extending parallel to and substantially coextensive with said steam chamber.

2. In a steam flatiron, a soleplate having a pointed forward end and lateral sides diverging from said pointed end, walls including a part of the soleplate which define a steam chamber extending along one of said lateral sides of the soleplate and across the pointed end thereof, a thermostat space between said steam chamber and the other lateral side, at least one port in the region of the pointed end of the soleplate for supplying steam to a surface being ironed, said port being in communication with said steam chamber, means for supplying water to the steam chamber, a heating unit embedded in the soleplate, and a thermostat structure mounted in said thermostat space alongside said steam chamber for regulating the temperature of the soleplate, said thermostat structure extending parallel to and substantially coextensive with said steam chamber.

3. In a steam flatiron, a soleplate having lateral sides joining to define a pointed forward end, walls forming a part of the soleplate which define a steam chamber which extends along one of said lateral sides of the soleplate and across the pointed end, ports in the pointed end of the soleplate for supplying steam to a surface being ironed, said ports being in communication with said

steam chamber, means for supplying water to the steam chamber, a heating unit embedded in the soleplate, and a thermostat structure mounted on the soleplate between said steam chamber and the other of said lateral sides for regulating the temperature of the soleplate, said thermostat structure extending parallel to and substantially coextensive with said steam chamber, said thermostat structure comprising contact carrying leaf spring members positioned edgewise with respect to the base of the soleplate and movable crosswise with respect thereto.

4. In a steam flatiron, a soleplate having lateral sides converging to a pointed forward end, walls including a part of the soleplate and a cover which define a steam chamber extending along one of said lateral sides of the soleplate and across the pointed end thereof, at least one port in the region of the pointed end of the soleplate for supplying steam to a surface being ironed, means for supplying water to the steam chamber, one of said walls including a transversely extending partition near the forward end of said steam chamber, said partition including an opening for regulating flow of steam from said steam chamber to said port, a heating unit embedded in the soleplate, and a thermostat structure mounted in the soleplate between said steam chamber and the other of said lateral sides for regulating the temperature of said soleplate, said thermostat structure extending parallel to and substantially coextensive with said steam chamber.

5. In a steam flatiron, a soleplate having a pointed forward end, walls including a part of the soleplate which define a steam chamber extending along one side of the soleplate and across the pointed end thereof, at least one port in the region of the pointed end of the soleplate for supplying steam to a surface being ironed, means for supplying water to the steam chamber, a cover for said steam chamber, said cover including a transversely extending partition near the forward end thereof, said partition including an opening for regulating flow of steam from said steam chamber to said port, a heating unit embedded in the soleplate, and a thermostat structure mounted on the soleplate alongside said steam chamber for regulating the temperature of the soleplate, said thermostat structure extending parallel to and substantially coextensive with said steam chamber.

6. In a steam flatiron, a base, longitudinally extending ribs along opposite sides of the base, a heating unit embedded in said ribs, walls on the base which define a vaporizing chamber extending along and over the forward portion of one of said ribs and a steam distributing chamber which extends across the front end of the base, said forward portion of said one of said ribs extending through said vaporizing chamber intermediate the width thereof so that water entering said chamber may contact said forward portion of said rib along the top and both sides thereof, said chambers being separated by a wall extending transversely of the base which wall has an opening for regulating flow of steam from the vaporizing chamber to the steam distributing chamber, the base within the steam distributing chamber being provided with openings for flow of steam to the surface being ironed, means connected to the rear end of said vaporizing chamber for supplying water thereto, and a thermostat structure mounted on said base between said steam chamber and the other of said ribs for regulating the temperature of the soleplate, said thermostat structure extending parallel to and substantially coextensive with said steam chamber.

7. In a steam flatiron, a base, longitudinally extending ribs along opposite sides of the base, a heating unit embedded in said ribs, walls on the base which define a vaporizing chamber extending along and over the forward portion of one of said ribs and a steam distributing chamber which extends across the front end of the base, said forward portion of said one of said ribs extending through said vaporizing chamber intermediate the width thereof so that water entering such chamber may contact said forward portion of said rib along the top and both sides thereof, said chambers being separated by a wall extending transversely of the base which wall has an opening for regulating flow of steam from the vaporizing chamber to the steam distributing chamber, the base within the steam distributing chamber being provided with openings for flow of steam to the surface being ironed, means connected to the rear end of said vaporizing chamber for supplying water thereto, and a thermostat structure positioned on the base in the space between said vaporizing chamber and the other of said ribs for regulating the temperature of the base.

8. In a steam flatiron, a base, longitudinally extending ribs along opposite sides of the base, a heating unit embedded in said ribs, walls on the base on opposite sides of the forward portion of one of said ribs which define a vaporizing chamber, a cover for the vaporizing chamber the top wall of which is spaced from the top surface of said rib portion, said cover having a transversely extending partition wall which forms a baffle for directing vapor across the top of said rib portion, said cover comprising walls which define with the front end of the base a transversely extending steam distributing chamber, said last-named walls including a transversely extending partition wall which separates said two chambers and has an opening for regulating flow of steam from the vaporizing chamber to the steam distributing chamber, the base within the steam distributing chamber having openings for flow of steam to the surface being ironed, conduit means connected to the vaporizing chamber for supplying water thereto, and a thermostat structure positioned on the base alongside the vaporizing chamber for regulating the temperature of the base, said thermostat structure extending parallel to and substantially coextensive with said steam chamber.

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