Sept. 16, 1947. J. H. ASHBAUGH 2,427,379

ELECTRIC IRON

Filed July 1, 1944 2 Sheets-Sheet 1

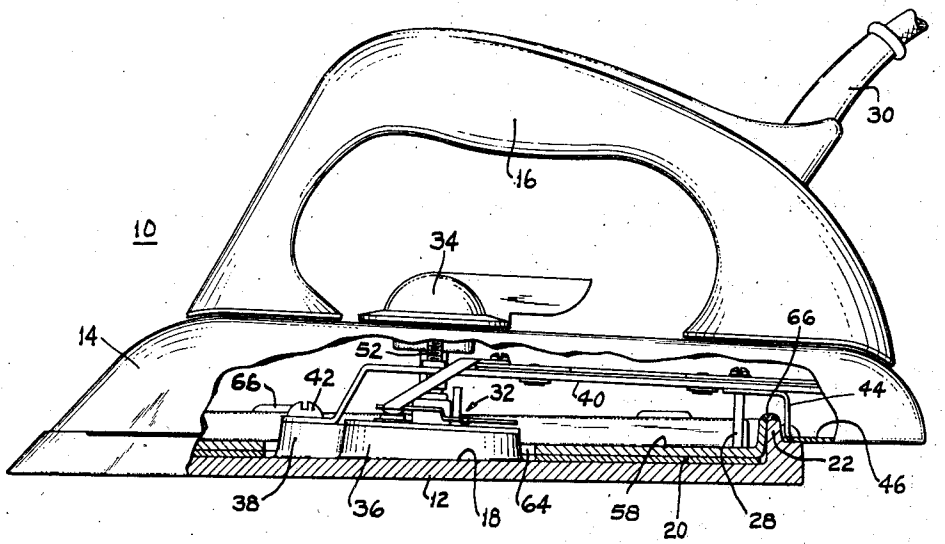

FIG. 1.

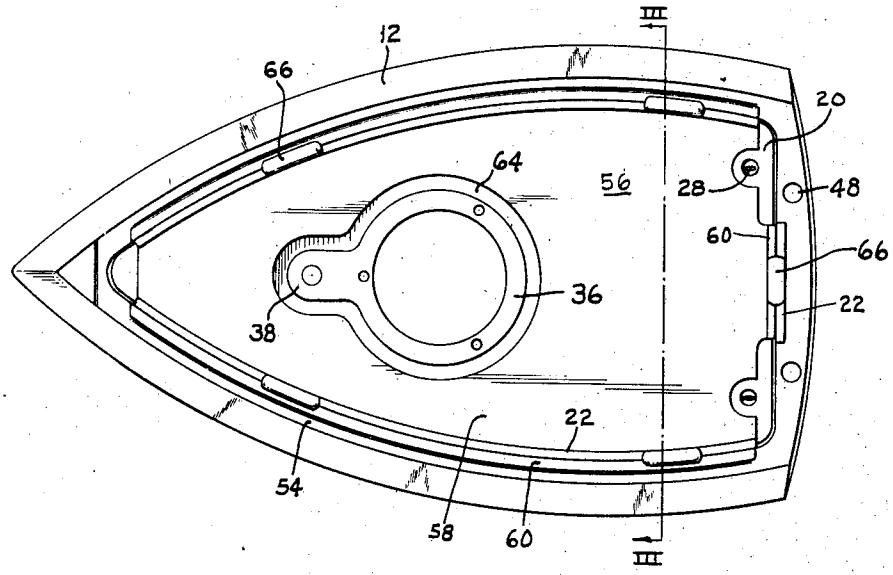

FIG. 2.

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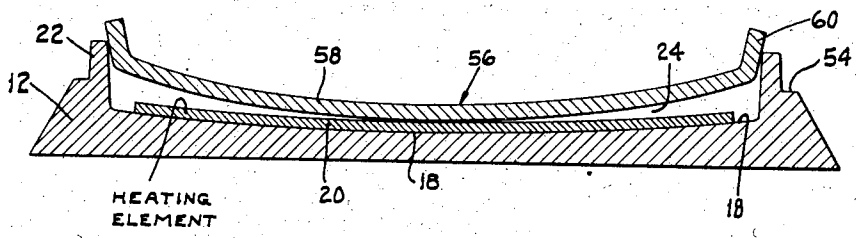

FIG. 3.

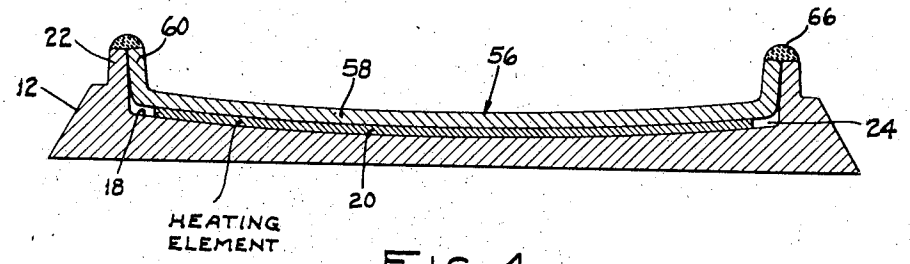

FIG. 4.

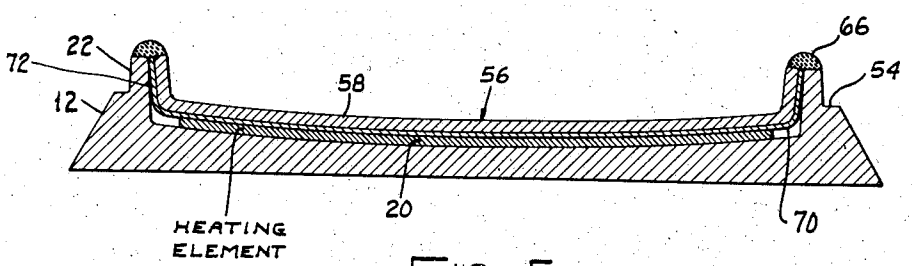

FIG. 5.

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UNITED STATES PATENT OFFICE

2,427,379

ELECTRIC IRON

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Application July 1, 1944, Serial No. 543,066

1 Claim. (Cl. 219—25)

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My invention relates to an electric flatiron of the type including a soleplate, a sandwich-type or flat heating element, and a pressure plate for clamping said heating element to said soleplate.

One object of the invention is to produce an improved iron of the type set forth.

In using an iron of this type in which the pressure plate is secured only along its edges, buckling of the pressure plate may be encountered. Such buckling is probably due to the fact that the pressure plate is usually thinner, and, therefore, heats up faster than the soleplate, and also to the fact that, in use, heat is drawn from the soleplate so that the pressure plate is hotter than the soleplate. Such buckling permits at least partial separation of the heating element from the soleplate and interferes with the flow of heat from the heating element and the pressure plate to said soleplate.

In order to remedy this condition, it has been proposed to secure the central portion of the pressure plate to the soleplate by one or more screws engaging said pressure plate and said soleplate.

It is, therefore, a further object of my invention to produce an improved construction in which the pressure plate will at all times effectively clamp the heating element to the soleplate of an iron without securing the central portion of the pressure plate to the soleplate by means of screws or other fastening devices.

A still further object of my invention is to produce an improved construction in which the pressure plate will exert substantially uniform pressure over the surface of the heating element, regardless of changes in the temperature of the iron.

A still further object of my invention is to produce a novel construction in which the tendency of the pressure plate to buckle is used to increase the pressure of said pressure plate against said heating element and said soleplate, thus insuring maximum heat transfer to, and uniform heat distribution over, the entire area of said soleplate.

A still further object of my invention is to devise an improved method of constructing and assembling the soleplate, heating element and pressure plate of an iron of the type set forth.

These and other objects are effected by my invention as will be apparent from the following description and claim taken in connection with the accompanying drawings, forming a part of this application, in which:

Fig. 1 is a view, partly in section and partly in side elevation, of an electric iron embodying my invention;

Fig. 2 is a top plan view of the soleplate, heating element and pressure plate of the iron shown in Fig. 1;

Fig. 3 is an enlarged section on line III—III

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of Fig. 2 showing the soleplate, heating element and pressure plate of the iron before they are assembled and secured together;

Fig. 4 is a view similar to Fig. 3 showing the parts of Fig. 3 after they are assembled and secured together; and

Fig. 5 is a view similar to Fig. 4 showing a modified form of construction.

Referring to Figs. 1 and 2 of the drawings, 10 designates a flatiron including a soleplate 12, a shell or cover 14 and a handle 16 suitably secured to the top wall of the cover 14. In prior art constructions, the pressure plate is secured to the soleplate by spot welding its edges or marginal portions to the soleplate and by means of screws passing through the central portion of the pressure plate and engaging the soleplate.

According to my invention, the soleplate 12 is provided with a concave upper surface 18 which extends over a major portion of the upper surface of the soleplate. The concave surface 18 is curved transversely of the soleplate, or from the longitudinal edges toward the center of the soleplate, as clearly seen in Figs. 3 to 5. The curvature of the surface 18 may be about a fixed radius so that the concave surface forms part of a circle, or the curvature may be in the nature of an arc or other rounded contour not related to a fixed radius. In any event, the concave surface 18 has a very small degree of curvature.

The concave surface 18 is adapted to receive a flexible, flat or sandwich type of heating element 20 which covers a major portion of the concave surface 18. The heating element 20 may be of any desired conventional type. For example, the heating element 20 may include a central sheet of mica, or similar material, around which is wrapped a resistance element of the flat or ribbon type, with upper and lower insulating sheets of mica, or similar material, enclosing said central sheet and said resistance element. The soleplate 12 may be provided with upstanding side and rear walls 22 surrounding the concave surface 18, and, with the concave surface, defining a recess 24.

The heating element 20 is connected by means of ribbon conductors 28 and suitable terminal connections, not shown, to an electric cord 30 for supplying electrical energy to the iron. The flow of electrical energy to the iron is controlled by a conventional thermostat, generally referred to by the numeral 32, which is adjusted by a control knob 34 disposed above the cover 14. The thermostat, the means for adjusting it and the circuit of the heating element may be of any well-known type, such, for example, as that shown in Clark Patent No. 2,180,399, and are, therefore, not shown or described in detail. The thermostat is preferably mounted in a well 36 which extends upwardly from or is carried by

the soleplate 12. The well structure 36 is preferably extended to form a boss 38 to which one end of a bracket 40 is secured by a screw or the like 42. The other end of the bracket 40 may be suitably secured to a rear supporting bracket 44 which forms part of or is carried by a rear plate 46, secured to the soleplate 12 by screws or the like engaging apertures 48 in the soleplate.

The bracket 40, in addition to supporting parts of the thermostat, wiring terminals, etc., also serves to support the cover 14 which, as will be seen from Fig. 1, is secured to the bracket 40 by one or more screws 52. The cover 14 rests on a shoulder 54, formed adjacent the walls 22 of the soleplate, and completely envelops the interior parts of the iron.

In order to clamp the heating element 20 against the concave surface 18 of the soleplate 12, I have devised a novel pressure plate 56 which is best shown in Figs. 3 to 5. The pressure plate 56 is preferably formed of a slightly resilient metal, such as hot rolled sheet steel, and includes a body portion 58 and upstanding marginal walls 60 which, in the assembled position, abut against the walls 22 of the soleplate, as shown in Fig. 4. The pressure plate 56 is of sufficient thickness to possess the desired strength and exert the required pressure. In actual practice, the pressure plate will be about $\frac{7}{32}$'' thick. While useful in carrying out the invention, the walls 22 and 60 are not altogether necessary and may be omitted if desired.

The pressure plate 56 is provided with an opening 64 through which the well structure 36 and the boss 38 project, as shown in Figs. 1 and 2. The body portion 58 of the pressure plate is given a permanent curve in the direction of curvature of the concave surface 18. This may be done in any well-known manner, as by rolling or with suitable dies. The curvature of the portion 58 of the pressure plate may be about a fixed radius so as to form an arc of a circle, or the portion 58 may be otherwise rounded or arched without any reference to a fixed radius. In any event, the curvature of the body portion 58 of the pressure plate 56 is preferably greater than the curvature of the concave surface 18. This will be clearly seen from Fig. 3.

Assembly

In assembling the soleplate, heating element and pressure plate according to my invention, the heating element 20 is placed on the concave surface 18 and the pressure plate 56 is placed over the heating element, as shown in Fig. 3. A total pressure of about 15 tons is then applied to force the pressure plate against the concave surface 18.

When the pressure plate is first placed on the heating element 20, it contacts the heating element only along a central, longitudinal portion thereof. When the pressure plate is pressed down against the heating element and the soleplate, the body portion 58 thereof is sprung or deflected so as to conform, or substantially conform, to the curvature of the concave surface 18. The parts now assume the position shown in Fig. 4, in which the pressure plate abuts the entire area of the heating element. While still under pressure, the upper edges of the marginal walls of the pressure plate and the soleplate are welded together, as at 66. If the vertical marginal walls of the pressure plate and the soleplate are omitted, the marginal portions of the pressure plate will be secured, as by welding, to the marginal portions of the soleplate.

In pressing the pressure plate 56 against the heating element 20 and the soleplate 12, the body portion 58 of the pressure plate 56 is not permanently deformed but is merely sprung or deflected from its initial shape, as shown in Fig. 3, to the less curved shape shown in Fig. 4. It, therefore, exerts a spring force tending to return it to its initial shape. Inasmuch as the marginal portions or edges of the pressure plate are rigidly secured to the soleplate, the spring force of the pressure plate is exerted against the heating element to press the heating element against the soleplate.

Operation

As the iron heats, the pressure plate 56, being thinner than the soleplate 12, becomes heated and expands more rapidly than the soleplate. Since the marginal portions of the pressure plate are rigidly secured to the soleplate, the tendency of the pressure plate to expand results in additional pressure being exerted downwardly against the heating element and the soleplate, and laterally against the side walls 22 of the soleplate, thus firmly clamping the heating element against the soleplate.

When the iron heats up, the expansion of the soleplate and pressure plate approaches equilibrium. This equilibrium is only momentary for, as the iron is used, heat is constantly withdrawn from the soleplate by the damp material being ironed, and by direct radiation to the atmosphere, so that, while the iron is being used, the pressure plate will, other things being equal, have a higher temperature and greater amount of expansion than the soleplate of the iron.

Aside from the tendency of the pressure plate to increase its pressure against the heating element and soleplate as a result of being heated, the curved or arched shape imparts to the pressure plate a capacity to resist buckling which is greater than the capacity of a flat plate of the same material and of the same thickness.

It will thus be seen that by placing the heating element between the concave surface 18 and the correspondingly curved pressure plate 56, the heating element will be tightly clamped against the soleplate, over its entire area regardless of the heating or cooling of the iron. It will also be seen that, by this construction, the central portion of the pressure plate does not need to be secured to the soleplate by screws or other fastening devices.

In Fig. 5, I show a modified form of construction in which a relatively thin and deformable sheet of metal 70, having good heat-conducting characteristics, is interposed between the heating element 22 and the underside of the pressure plate 56. The sheet 70 is preferably made of copper or steel, about .031'' thick, and is provided with upstanding marginal portions 72 which, in assembled position, are clamped between the edges or marginal walls of the pressure plate and the vertical walls of the soleplate, for conducting heat from the heating element 20 and pressure plate to the soleplate. Except for the addition of the sheet 70, the structure shown in Fig. 5 and manner of assembly is identical with that shown in the remaining figures.

While I have shown my invention in several forms, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other 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 claim.

What I claim is:

In an electric flatiron, a soleplate having upstanding side walls defining a recess in the upper surface of said soleplate, the bottom wall of said recess being concave, a heating element positioned on, and covering, a major portion of the area of said bottom wall, a resilient pressure plate thinner than said soleplate and curved in the direction of curvature of said bottom wall but having an initial curvature greater than the curvature of said bottom wall and having upstanding marginal portions, said pressure plate being adapted, under pressure, to approach the curvature of said bottom wall and to seat within said recess with the marginal portions thereof abutting against the side walls of said soleplate and thereby clamp said heating element against said bottom wall and apply a spring force against said heating element and said soleplate, and means for rigidly securing the marginal portions of said pressure plate to said side walls, so that when said heating element is energized said pressure plate expands against said side walls and increases the pressure applied to said heating element and said soleplate.

JOHN H. ASHBAUGH.

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