Oct. 25, 1949. C. H. SPARKLIN 2,485,672

HEATING ELEMENT

Filed Sept. 6, 1946

Fig. 1.

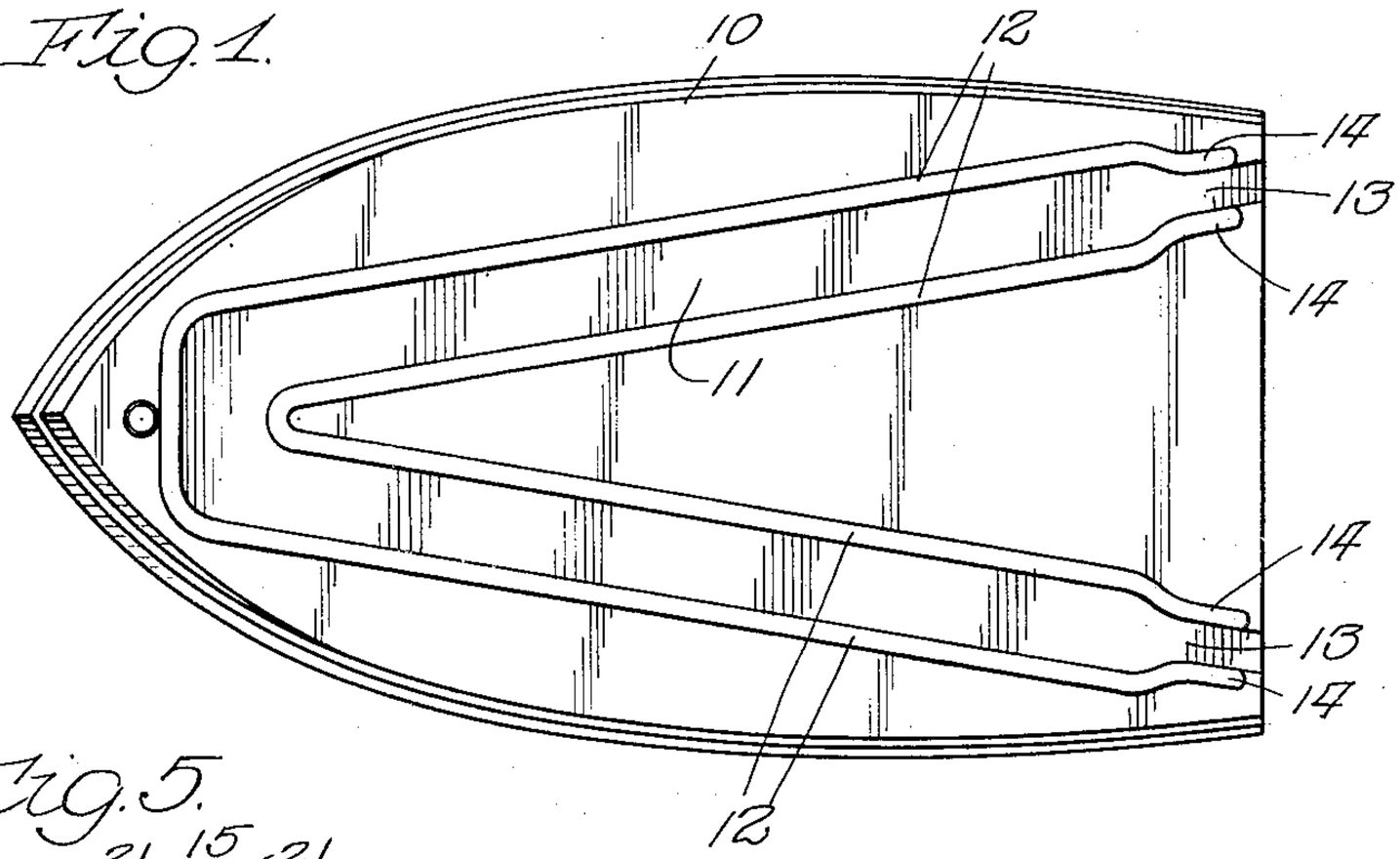


Fig. 5.

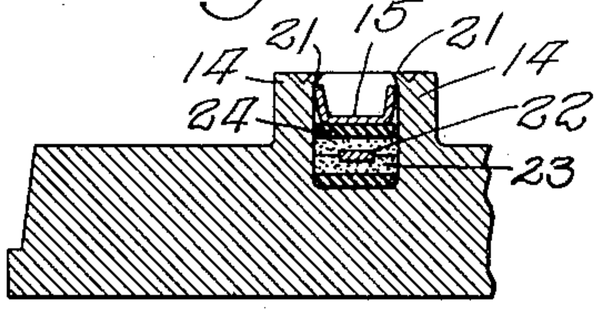


Fig. 2.

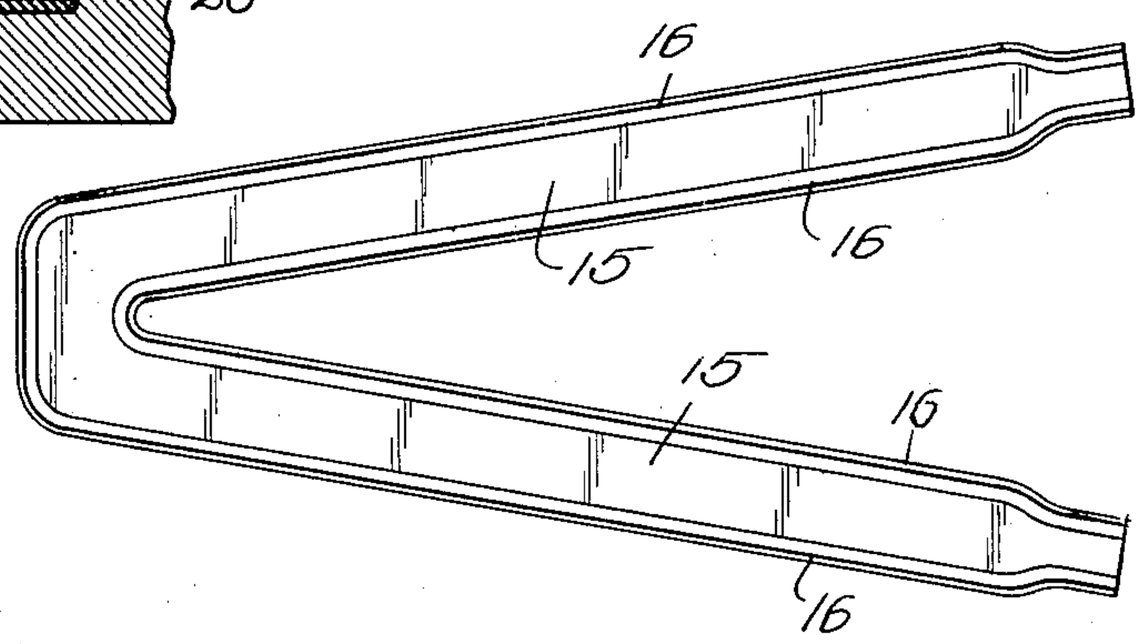


Fig. 3.

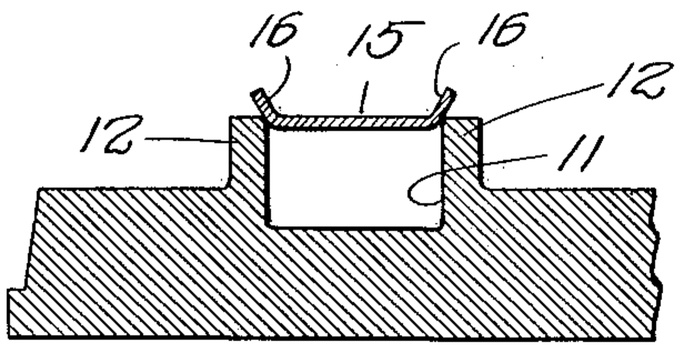
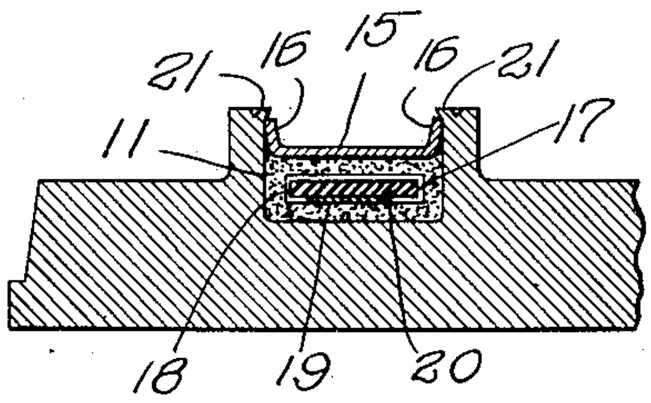


Fig. 4.



Inventor:
Charles H. Sparklin,
By Christie, Schroeder, Merriam & Hogan,
Attys.

Patented Oct. 25, 1949

2,485,672

UNITED STATES PATENT OFFICE

2,485,672

HEATING ELEMENT

Charles H. Sparklin, Chicago, Ill., assignor to Birtman Electric Company, a corporation of Illinois

Application September 6, 1946, Serial No. 695,203

7 Claims. (Cl. 219—25)

1

This invention relates to a heating element, and particularly to a resistance heating element of the type used to heat the sole plate of an electric iron.

Various methods of combining a resistance heating element with an electric iron sole plate have been employed in the past. These include imbedding the resistance element in mud on top of the sole plate of the iron, providing a resistance element in the form of a rod which was anchored on top of the sole plate, and pressing the resistance element or unit in grooves in the surface of the sole plate. Various difficulties were encountered with these prior methods, however, as in some the resistance element could not withstand the physical shock to which the electric iron was subjected, and in others uneven heating occurred.

In applicant's copending application Serial No. 637,581, filed December 28, 1945, there is shown a resistance element whose core is a flat strip of mica or the like having a generally flattened cross-section which may be rectangular or rounded at top, bottom, or sides, or any combination of these. This strip is wound with a tape of resistance material. The element is held in a groove in the sole plate formed by upstanding flanges and is surrounded by insulating material, preferably in powdered form. A cover plate is positioned on top of the insulating material in contact therewith and completely closes the groove. The sole plates are ordinarily formed of cast aluminum with the flanges forming a part of the sole plate. It was discovered in actual practice that the grooves were seldom uniform in width and that when the cover plate was placed in position over the insulating material it was in some places too narrow and in others did not extend completely across the groove. This permitted leakage of the granular insulating material. In order to overcome this I have invented a different type of cover plate that automatically seals the space between the flanges even though the flanges are not uniformly parallel to each other and may vary in width from one iron to another.

It was also discovered in earlier forms of heating elements that the ends of the resistance wire that extended out the ends of the groove were liable to become broken, thereby necessitating replacement of the entire resistance element. It has been found that a superior type of iron can be made if the flanges forming the sides of the groove at the end thereof are tapered toward each other. In this construction the end of the

2

wire within the tapered end of the groove is surrounded with insulating material that is held in place by an extended end of the cover plate. The end of the cover plate is tapered in a manner similar to the tapering of the groove.

The invention will be described as related to the embodiment shown in the accompanying drawings. Of the drawings Fig. 1 is a plan view of a sole plate having a V-shaped groove therein; Fig. 2 is a plan view of a cover plate for sealing the groove; Fig. 3 is a vertical section showing the cover plate in position to be pressed downwardly within the groove; Fig. 4 is a vertical section similar to Fig. 3 showing the cover plate in place and a resistance element within the groove; and Fig. 5 is a vertical section taken through a tapered end of the groove showing the cover plate in place.

The sole plate 10 of an electric iron is formed with a continuous V-shaped groove 11 therein bounded by upstanding flanges 12. The ends 13 of the V-shaped groove 11 are tapered with the ends 14 of the flanges 12 being closer together than are the flanges at the main body portion of of the groove. A similarly shaped cover plate 15 is provided with the edges 16 of the cover plate bent upwardly and outwardly.

The resistance element 17 comprises a flat resistance wire 18 wound on a flat mica core 19. This resistance element is held within the groove 11 and insulated therefrom by powdered insulating material 20. The construction of the insulating element and the arrangement and type of insulating material as well as the method of construction is described in greater detail in my aforementioned copending application 637,581.

When the resistance element and insulating material have been pressed within the groove 11 the cover plate 15 is arranged as shown in Fig. 3. In this cover plate the distance between the bottom of the bent edges 16 is slightly less than the width of the narrowest portion of the narrowest groove 11 which will be encountered in actual manufacture. The distance between the tops of the edges 16 is slightly greater than the width of the widest part of the widest groove 11 so encountered. The cover plate 15 is ordinarily made of a metal, such as aluminum, and is usually approximately $\frac{1}{16}$'' thick. The edges 16 are bent so that the radius of curvature at the bent line is approximately equal to the thickness of the plate. Each edge 16 extends upwardly above the top of the remainder of the plate a distance equal to at least twice the thickness thereof, as is shown in Figs. 3, 4 and 5.

A force is applied to the cover plate 15 and it is pushed down into the groove 11. This force causes the bent edges 16 to be bent further toward each other, as is shown in Fig. 4. Because the cover plate is made of very thin material it adapts itself to the groove 11 and closes the groove completely even though the inner sides of the flanges 12 are not exactly parallel. The cover plate is held in place by displacing small portions 21 of metal inwardly along the top edges of the flanges 12, as shown at 21 and as described in my aforementioned patent application. These displaced portions of metal are located above the tops of the bent edges 16, as shown in Figs. 4 and 5.

The end 22 of the resistance wire held within the tapered ends 13 of the groove is surrounded by three layers of fiber glass 23, having the ability to withstand a temperture of 1200° to 1400° F. The fiber glass is insulated from the bottom of the groove and the bottom of the cover plate 15 by thin sheets of mica 24. The fiber glass is compressed upon the wire by the pressure of the plate 15. This construction serves to anchor firmly the ends of the resistance wire, and prevents their accidental breaking.

Having described my invention as related to the embodiment shown in the accompanying drawings it is my intention that the invention be not limited by any of the details of description unless otherwise specified, but rather be construed broadly within its spirit and scope as set out in the accompanying claims.

I claim:

1. A heating element comprising a metal plate, an elongated groove therein bounded by upstanding flanges, said groove having a tapered end, a resistance element within the groove comprising a resistance wire around a solid core with the end of said reistance wire extending out the tapered end of the groove and the core extending only to the beginning of the tapered end, a thin layer of insulating material surrounding the resistance element, core and said end of the resistance element, and a metal cover plate contacting the insulating material and held by the flanges, said cover plate comprising a thin metal plate having bent upstanding edges contacting said flanges and distorted toward each other by pressure of the flanges against said edges.

2. The heating element of claim 1 wherein the insulating material around said core is a powdered material while the insulating material in said tapered end is a solid with the end of the wire held therein.

3. The heating element of claim 1 wherein the insulating material around said core is a powdered material while the insulating material in said tapered end comprises fiber glass, said fiber glass being around the wire and insulated from the bottom of the groove and the bottom of the cover plate by separate insulating material.

4. The heating element of claim 1 wherein the insulating material surrounding said core is a powdered material while the insulating material in said tapered end comprises fiber glass, said fiber glass being around the wire and insulated from the bottom of the groove and the bottom of the cover plate by thin sheets of mica.

5. In a heating element comprising a metal plate, an elongated groove therein bounded by upstanding flanges, a resistance element therein, and a thin layer of powdered insulating material surrounding the resistance element, a metal cover plate contacting the insulating material and pressed against the flanges at both sides at all peripheral points above the insulating material, said cover plate comprising a thin metal plate having a body portion and bent upstanding edges at the sides thereof with each edge extending upwardly above the top of the body portion a distance equal to at least twice the thickness of the body portion and said edges bearing against the inner surface of said flanges to form a tight seal therewith.

6. The heating element of claim 5 wherein the distance between the bottoms of the bent edges of the cover plate is slightly less at all points than the distance between said flanges at corresponding points, and the distance between the tops of said edges is normally slightly greater than the distance between said flanges at corresponding points.

7. The heating element of claim 5 wherein the tops of the bent edges of the cover plate are located below the tops of the flanges, and the cover plate is held in place by metal displaced inwardly from the flanges at points above the tops of said edges.

CHARLES H. SPARKLIN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,520,913	Simon	Dec. 30, 1924
1,979,631	Maurer	Nov. 6, 1934
2,053,933	Abbott	Sept. 8, 1936
2,222,192	Arnold et al.	Nov. 19, 1940
2,277,439	Jepson	Mar. 24, 1942