June 27, 1950 P. J. MORE 2,512,668

RESISTANCE ELEMENT FOR ELECTRIC IRONS

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Fig. 1.

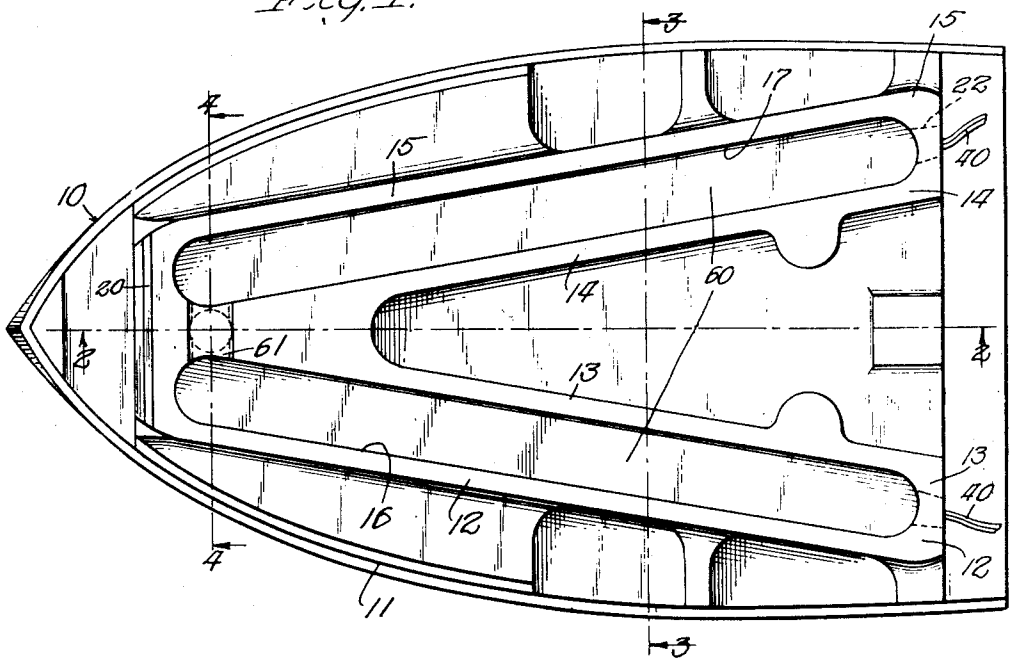


Fig. 2.

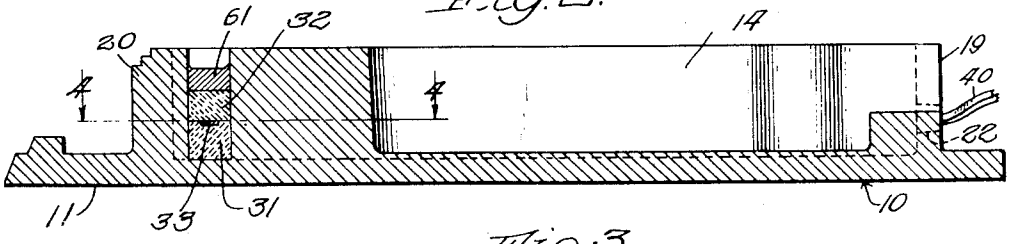


Fig. 3.

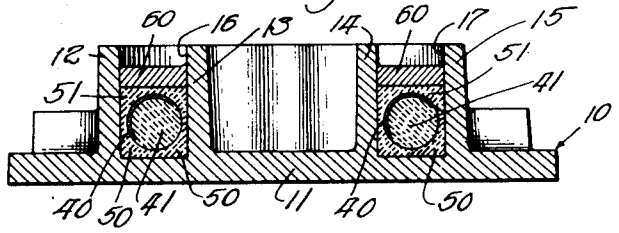
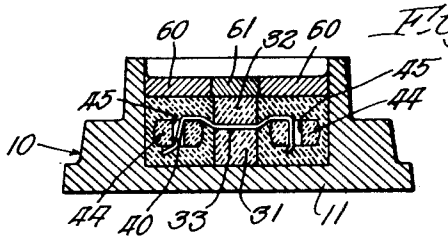


Fig. 4.



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RESISTANCE ELEMENT FOR ELECTRIC IRONS

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Fig. 5.

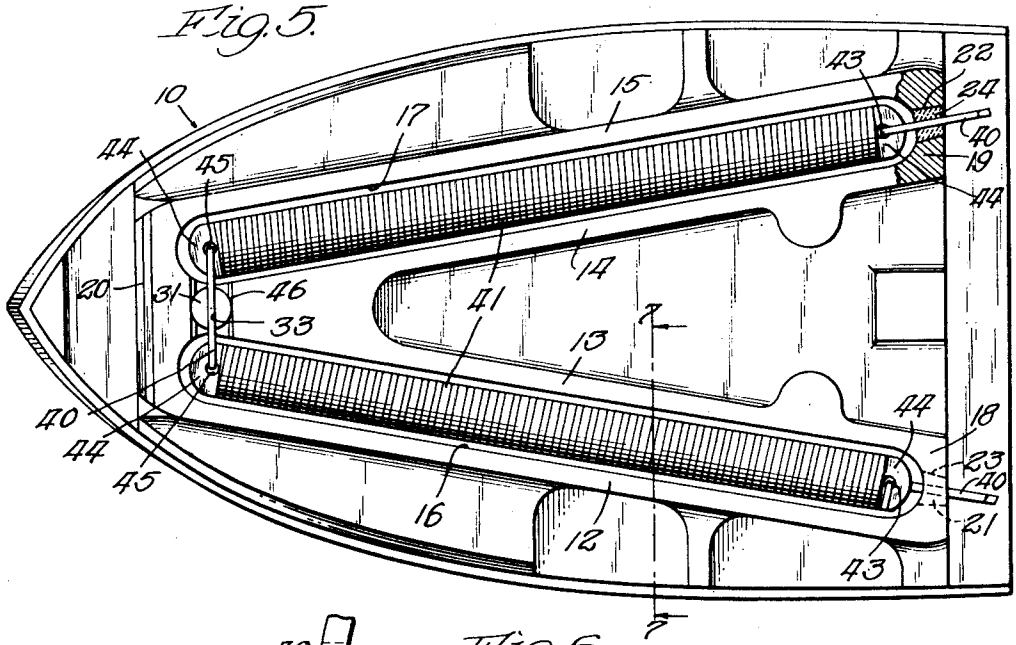


Fig. 6.

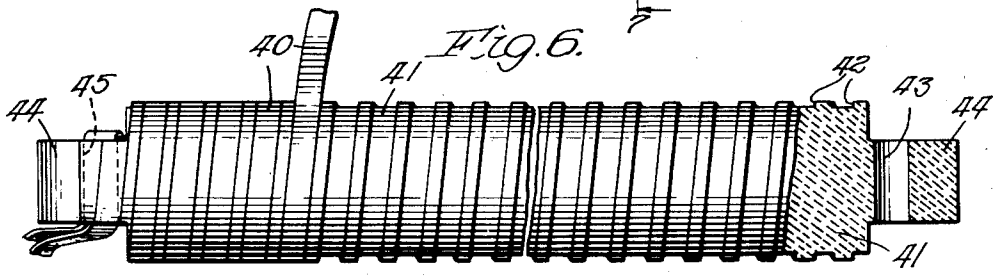


Fig. 7.

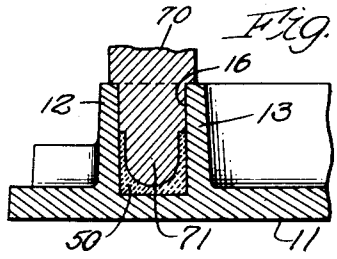


Fig. 8.

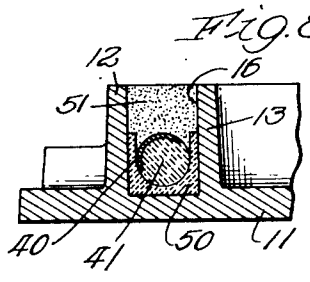
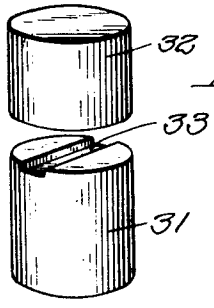


Fig. 9.



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UNITED STATES PATENT OFFICE

2,512,668

RESISTANCE ELEMENT FOR ELECTRIC IRONS

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Application April 18, 1945, Serial No. 588,969

1 Claim. (Cl. 201—64)

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This invention relates to a resistance element and more particularly to an electric iron containing such an electric resistance element. The invention is an improvement upon that described in Charles H. Sparklin application, Serial No. 524,850, filed March 3, 1944, now abandoned. The present improvement relates primarily to the embedding material for the electric resistance element.

Resistance elements for electric irons are subjected to severe strains. Not only is the temperature at which they operate high, but it is maintained for long periods and the irons are likely to be dropped or otherwise mishandled. The element must, therefore, be extremely strong and able to maintain itself over a wide range of temperature. For this reason resistance devices prior to the Sparklin invention were largely massive and relatively inefficient because it was impossible to maintain delicate arrangements under operating conditions. In the Sparklin device a coiled resistance wire is employed which is arranged in a helix, the convolutions of which are extremely close together. In order to maintain these convolutions without contact either with each other or with the surrounding walls, a suitable embedding material was essential. In the Sparklin application the preferred embedding material is magnesium oxide.

Magnesium oxide gave suitable insulation and was suitably refractory, but it has been found that an embedding material of zirconium silicate very greatly lengthens the average life of the element under operating conditions. It has been found that a mixture of granular zirconium silicate with milled zirconium silicate is most satisfactory. The granular material is very much more dense than the milled. A preferred granular material contains approximately 23% by weight caught upon a 100 mesh screen; 52% passing a 100 mesh screen and caught upon a 140 mesh screen; and 25% through a 140 mesh screen. The milled material was approximately 300 mesh or less.

The range of granular and milled material which may be employed may be widened by the use of a mild binding material in small proportion. A small proportion of sodium silicate, for example, may be employed.

The invention is illustrated in the drawings, in which Fig. 1 is a plan view of an iron incorporating the resistance element; Fig. 2 is a longitudinal section taken along the line 2—2 in Fig. 1; Fig. 3 is a section taken along the line 3—3 in Fig. 1; Fig. 4 is a section on line 4—4 in Fig. 1;

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Fig. 5 is a plan view of the iron with the element in place but uncovered; Fig. 6 is a detailed view of a portion of the resistance element; Fig. 7 is a sectional view taken along the line 7—7 in Fig. 5; Fig. 8 is a similar section at a later stage in the formation of the element; and Fig. 9 is a detailed view of the refractory plugs at the front of the element.

Since the method of forming the element is substantially the same as that set forth in said abandoned application Serial No. 524,850, it will be explained here in less detail.

The iron 10 comprises a sole plate 11 of any suitable metal, preferably aluminum or steel. Upon the upper surface of the sole plate are converging integral vertical flanges 12, 13, 14 and 15 which are arranged in pairs and define the slots 16 and 17. The flanges thus form a V pointing toward the front of the iron. The slots 16 and 17 are closed at the rear by walls 18 and 19, respectively, and at the front end by a single wall 20. Each of the rear walls is provided with a circular opening 21 and 22, respectively. These openings are closed by lava plugs 23 and 24, respectively, in which there is a central opening through which the resistance element extends.

The slots 16 and 17 are jointed at the front by a transverse slot 30, within which are mounted the plugs 31 and 32, which are superimposed. One of these plugs is provided with a groove 33 within which the resistance wire may lie.

The plugs 23 and 24 are made from fired lava. These plugs are slightly tapered from the inside to the out and are slipped into place from within the slot, and, once in place, cannot pass through the opening to the outside. They are held in position from the inside by the zirconium silicate powder. The pieces may also be made from high heat porcelain.

The front plugs are likewise made of fired lava or the equivalent.

The resistance wire is in the form of a tape 40 which is coiled upon a ceramic refractory rod 41 which contains a peripheral helical groove 42. As shown, a pair of these rods is employed but a continuous V-shaped rod may be used if desired, in which case a channel will be hollowed out of the sole plate at the front. In the form shown, the tape 40 is doubled over at each end and the free end of the wire carried back through the plug 23 or 24 and passed into an opening 43 in the neck 44 of the ceramic rod. This doubling of the ends of the wire serves to prevent burning out at the leads which otherwise frequently occurs. The wire or tape issues from the open-

ing 43 and passes directly into the helical groove 42. A suitable ribbon for a 1000-watt iron is a Nichrome tape 1/8 inch wide and 0.008 inch thick. The convolutions of the wire are separated by about 1/32 inch.

The rods 41 are alike at both ends, there being an opening 45 at the front end through which the tape passes, as shown in Figure 4, to the adjacent rod.

In assembling the element the grooves 16 and 17 are filled slightly more than half full with the zirconium silicate powder, and this is then pressed into a grooved receiving bed 50 as shown in Figure 7, a tool of appropriate shape being employed for this purpose. The tool here employed has a deeper head than that shown in said abandoned application 524,850. The rods 41 are then laid in position, with the wire already on them. The plugs 23 and 24 are on the ends of the wire and are placed in position in the openings 21 and 22. The plug 31 at the front has been dropped into position prior to the addition of the powder, with the groove 33 crosswise of the opening. It will be observed that the metal is slightly grooved at 46 to hold the plug 32 in position.

After the rods and wire have been placed in position, the plug 32 is placed in position and then additional powder is carefully distributed on top of them, as shown at 51 in Figure 8. In each case of course the amount of powder is carefully weighed out in advance and it is evenly distributed over the surface. A bar 60 of aluminum or other metal is then placed on top of the slots. This bar is tapered at the sides and the maximum dimension is slightly larger than the corresponding dimensions of the slots, so that the bar must be forced in by pressure, and, once in, is securely held within the flanges. These bars are placed in position in the two slots. At the same time a corresponding bar 61 is placed in the transverse slot 30, and then pressure is applied to all three to compact the refractory powder into the final form shown in Figures 2 and 3.

The usual electrical contacts, thermostats, and the like, have not been shown in this application because they are not part of the present invention. The electric resistance element may be adapted to various purposes.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom.

What I claim as new, and desire to secure by Letters Patent, is:

An electric resistance element comprising a dry bed of pressed zirconium silicate, a non-metallic refractory support in said bed, and a resistance wire helically wound around the refractory support, the convolutions of said wire being closely adjacent but non-contacting and the convolutions being held in position on the refractory support by dry powdered zirconium silicate between the convolutions, said zirconium silicate containing a substantial proportion of very fine zirconium silicate and a substantial proportion of relatively coarse zirconium silicate, with said fine and coarse zirconium silicates having a widely varying apparent specific gravity.

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