Jan. 15, 1952 F. E. FINLAYSON 2,582,773

SOLEPLATE STRUCTURE FOR ELECTRIC STEAM IRONS

Original Filed Sept. 11, 1946 2 SHEETS—SHEET 1

Fig. 1.

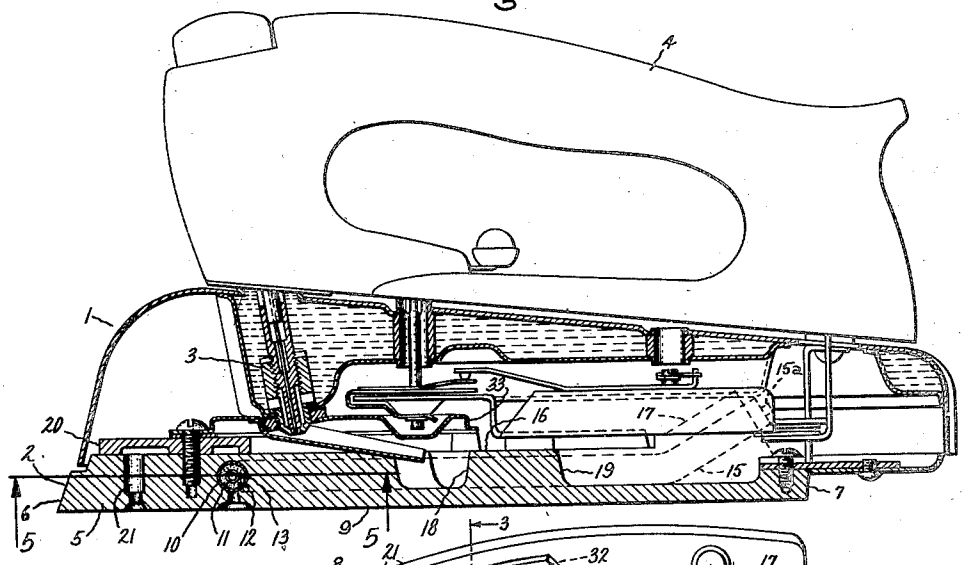


Fig. 2.

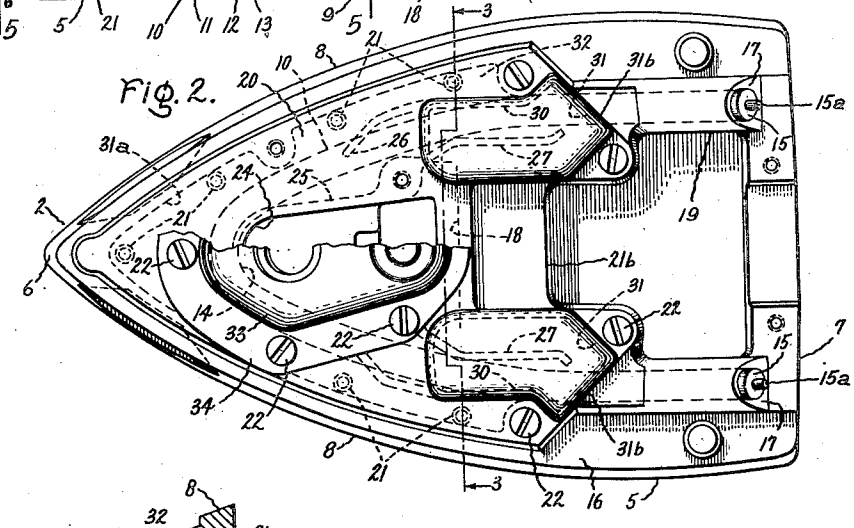
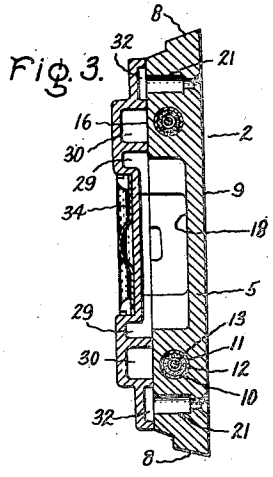


Fig. 3.



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Fig. 4.

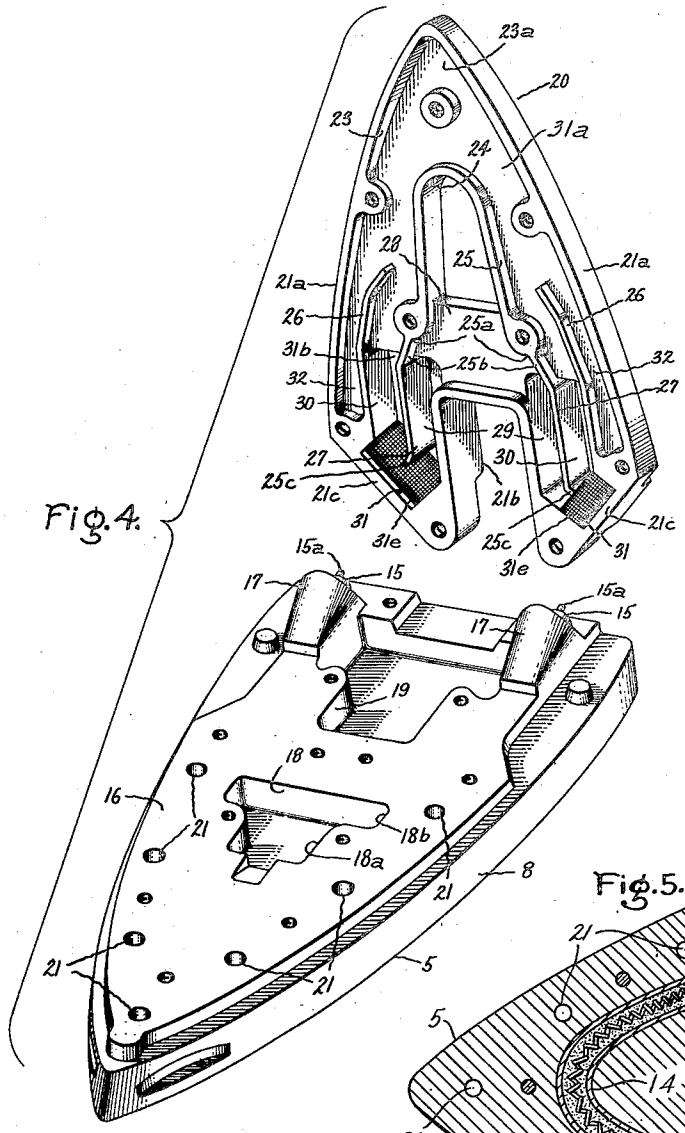
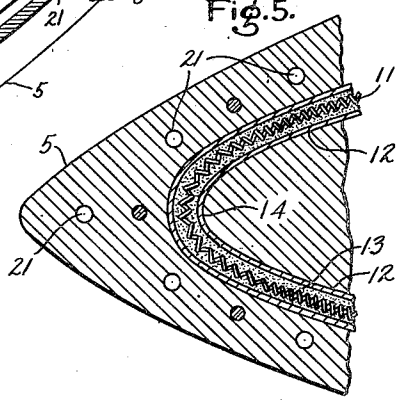


Fig. 5.



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SOLEPLATE STRUCTURE FOR ELECTRIC STEAM IRONS

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Original application September 11, 1946, Serial No. 696,298, now Patent No. 2,557,732, dated June 19, 1951. Divided and this application December 9, 1947, Serial No. 790,525

2 Claims. (Cl. 38—77)

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This invention relates to pressing irons having means for generating steam during the ironing or pressing operations, and it has for its object the provision in a device of this character of an improved soleplate structure for generating steam and for conveying it to the pressing surface of the iron, while presenting an evenly heated pressing surface.

This application is a division of my copending application, Serial No. 696,298, filed September 11, 1946, now Patent No. 2,557,732, patented June 19, 1951, and is assigned to the same assignee of that application.

For a more complete understanding of this invention, reference should be had to the accompanying drawings in which Fig. 1 is a vertical central sectional view taken through an electrically heated flatiron embodying this invention; Fig. 2 is a plan view of certain parts of the flatiron of Fig. 1; Fig. 3 is a sectional view taken through the line 3—3 of Fig. 2 and looking in the direction of the arrows; Fig. 4 is an expanded perspective view illustrating certain elements of the soleplate structure used in the iron of Figs. 1–3; and Fig. 5 is a partial cross-sectional view taken on the line 5—5 of Fig. 1.

Referring to the drawings, this invention has been shown in one form as applied to a pressing iron comprising an iron body 1 having a soleplate structure 2, a reservoir and valve structure 3, and a handle structure 4.

The soleplate structure 2 comprises a soleplate 5 having the usual shape, that is, it has a pointed front end 6, a slightly rounded heel end 7, and a pair of curved sides 8 joining the two ends. It also is provided with a smooth flat bottom 9, constituting the pressing surface. The plate will be made of any suitable heat conducting material, such as aluminum, and preferably, it will be cast from the material.

The soleplate 5 is heated by means of an electrical heating element 10 which preferably is of the sheathed type cast within the plate. Briefly, it comprises a helical resistance conductor 11 mounted in an outer tubular metallic sheath 12 and supported in spaced relation with reference to the sheath by an electrically insulating heat conducting mass 13, formed of compacted powdered magnesium oxide. This heating element is roughly in the shape of a hairpin, as shown most clearly in Fig. 2, the nexus or bight 14 being located at the pointed or point end of the soleplate and the two legs extending back to the rear thereof where their end sections 15 emerge from the rear. Terminals 15a project from these end

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sections. The two legs as they progress back follow in general the curved sides 8 of the soleplate, as clearly shown in Fig. 2.

The turns of the resistance conductor 11 located in the bight 14 are spaced further apart than are those in the two side legs so that a uniform temperature is produced over the entire soleplate when the iron is used as a "dry" iron, that is, with no steam generation. This arrangement is shown by Fig. 5.

The top surface 16 of the soleplate is flat and parallels the flat pressing surface 9, as shown. The surface 16 deviates from its flat plane character only at the rear where the two ends 15 of the heater legs are located and where the soleplate is provided with upraised bosses 17 to house these ends which incline upwardly, as shown in Fig. 1; at the center where a steam generating cavity 18 is depressed from the surface; and at the rear where a depressed cavity 19 is provided. Because of this, the soleplate lends itself to easy milling and finishing operations. Furthermore, the substantially uniform thickness of the soleplate aids in maintaining a more uniform temperature over the entire pressing surface.

The steam generating cavity 18 is located about midway between the two ends 6 and 7 of the soleplate; that is, in that section of the plate which has the area of greatest heat concentration. This location tends to avoid a chilled spot in the pressing surface under the cavity 18 when the relatively cold water is fed into it. If the cavity were at the nose of the iron, as in certain ones heretofore known, and where the heat concentration is relatively low, cold spots would develop in the pressing surface because there is not sufficient heat to keep up the temperature when the cold water is fed to the generator and moreover, a cold spot in the central area is not so detrimental as one at the nose.

The cavity 18, as shown, has roughly a T-shape, having a stem 18a to which the water is fed, and a cross bar section 18b extending crosswise of the plate, as shown.

Steam which is generated in the cavity 18 is directed therefrom by means of a cover plate 20 to a series of steam discharge ports 21 spaced along the sides of the soleplate in the spaces between the heating element 10 and the side edges of the soleplate, as shown in Fig. 3, and passing through the soleplate from top surface 16 to its pressing surface 9.

This cover plate 20 fits to the flat top surface 16, and has in general the shape of this surface in plan view, as shown. That is, it is provided

with curved side edges 21a joined at the front, and which correspond to the soleplate sides 8; with a U-shaped rear edge 21b which registers with the depression 19; and with a pair of end wall edges 21c inclining inwardly toward the rear to connect the side edges 21a with the U-shaped end edge 21b, and to cause the top plate to clear the bosses 17, as shown most clearly in Fig. 2. The top plate 20 is secured to the bottom plate by a series of screws 22 directed through it and threaded into tapped holes in the plate.

The cover plate 20 is provided with a depending marginal wall 23 which follows the edges 21a, 21b and 21c and which gives the plate a hollow interior chamber 23a which extends substantially throughout the area of the plate and therefore has its general shape. This chamber is closed except as to the ports 21, and as to an opening 24 in its upper wall through which water is delivered to the generating cavity 18. The chamber 23a is divided into a series of channels by means of a rib 25, and a pair of additional ribs 26. The rib 25, as shown, has a U-shaped section which follows the contour of opening 24, and the legs of which flare out at points 25a into sections 25b as they leave the opening, as shown; these flared-out sections terminate in straight substantially parallel sections 27 which are spaced from the corresponding legs of the U-shaped rear section of the marginal wall 23 which follow the edge 21b. The legs of ribs 25, therefore, follow in general the shapes of the point and side edges of the plate, as shown; and their rear ends 25c terminate somewhat short of the rear ends of chamber 23a, and flare outwardly at a rather sharp angle, as shown. The two ribs 26 are connected to the depending wall 23 substantially where its portions extending along side edges 21a join with those along rear edges 21c and which points are somewhat in advance of the rear ends 25c of the rib 25. Thence, the ribs 26 advance forwardly about midway between the side wall 23 and the corresponding adjacent legs of rib 25 and in general follow the contour of the side wall 23, as shown, but they terminate at points somewhat in advance of the points 25a where the legs of the rib 25 flare out.

The ribs 25 and 26 partition the chamber 23a into a series of channels as follows: A central cross channel 28 which overlies the steam generating cavity 18; a pair of identical channels 29 at the sides of the reentrant U-shaped back edge 21b, and which at their forward ends connect with channel 28 and also overlap the ends of cavity section 18b; a pair of channels 30, generally parallel with channels 29 and which are connected at their rear ends with the rear ends of these channels by channel sections 31; and at their forward ends emerge into a generally U-shaped channel 31a, Fig. 2, at the nose or point end of the plate; and finally a pair of identical outside channels 32 which coextend channels 30, and which also emerge into U-shaped channel 31a.

Preferably, and as shown, channel sections 29, 30 and 31 will be somewhat deeper than the remainder by providing them in deep blister-like sections 31b of the cover plate, as shown more clearly in Fig. 2. Inserted in these deeper sections is fine screening 31c which prevents drops of water from passing out of the generating cavity 18.

Steam generated in cavity 18 flows upwardly into central channel 28, thence is turned sharply back into channels 29; thence through connecting channels 31 and sharply forwardly into channels 30; and through the channels 30 into the large U-shaped channel 31a. From this channel it flows through ports 21 opening into it, and back through channels 32 and ports 21 opening into them.

It will be observed by reference to Fig. 2, that the various channels just described lie in a plane directly above and parallel with the highly heated soleplate. Channel 28 lies over a part of the soleplate between the heater legs and which has a high degree of heat concentration; channels 29 overlie areas of the soleplate just inside of the heater legs; channels 31 pass over into the areas above the legs; while channels 30 are directly over the legs, and so is the major part of U-shaped channel 31a; channels 32 overlie areas outside of the legs but close to them, all as shown in Fig. 2. The steam therefore emerging from the generating cavity 18 follows a tortuous path which lies in a plane above the heated plate and in close relation to it. It has been found that it is practically impossible for any water particles to reach the discharge ports 21. All the water fed to the cavity 18 is converted into steam, which is superheated before discharging through the soleplate.

As pointed out previously, water is fed to the generating chamber 18 through the opening 24 in the top plate 20, and it is fed from the reservoir section 3.

The opening 24 is covered by means of an inverted cup-shaped cover plate 33 formed of a suitable poor heat conducting metal, such as stainless steel. This cover plate 33 is provided with a flange 34 which is secured to the cover plate 20 and soleplate 5 by the screws 22.

The reservoir and valve structure 3, and handle structure 4 are described and claimed in my above-mentioned copending application.

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

1. A steam iron comprising a soleplate provided with a pointed front end and a heel end at the rear, with a flat pressing surface on its bottom and with a flat heating surface on its top substantially parallel and co-extensive with said pressing surface, and in addition provided with a series of ports spaced at intervals along its sides and interconnecting said pressing and heating surfaces, a U-shaped heating element embedded in said soleplate between said two surfaces to apply heat to said soleplate and to the surfaces and having its bight at the forward end of said soleplate and its two legs extending along the side portions thereof toward the rear, said heating element being formed to emanate less heat per unit length in said bight than in said legs, said soleplate having formed therein a steam generating cavity in said heating surface located substantially at the center of said soleplate relatively removed toward the rear from said bight and intermediate said two legs, and a cover plate substantially coextensive with and covering said heating surfaces provided with means defining a series of channels extending from said cavity first backwardly and thence forwardly along said heating surface into a generally U-shaped channel located along the forward parts of the sides of said surface and around its point, and a pair of side channels at the rear connected with the two legs of said U-shaped channel, and said latter pair of channels and said U-shaped channel connecting with said ports.

2. A steam iron comprising a soleplate pro-

vided with a pointed front end and a heel end at the rear and also a flat pressing surface on its bottom and with a flat heating surface on its top substantially parallel and co-extensive with said pressing surface, and in addition provided with series of ports spaced at intervals along its two sides and interconnecting said pressing and heating surfaces, a U-shaped heating element of helically wound resistance wire embedded in said soleplate between said two surfaces to apply heat to said soleplate and to the surfaces and having its bight at the forward end of said soleplate and its two legs extending along the side portions thereof inside of said ports, adjacent turns of said resistance wire forming said bight being spaced more than corresponding turns of said legs, said soleplate having formed therein a steam generating cavity in said heating surface located at a point relatively removed toward the rear from said bight and located between said two legs, and a cover plate substantially coextensive with and covering said heating surface provided with means defining a series of channels extending first across a portion of said cavity to receive steam therefrom, thence backwardly in a pair of substantially parallel legs and thence forwardly in a pair of legs substantially parallel with each other and with the legs of said first

pair respectively, said last pair at their forward ends emerging into a forward U-shaped channel extending along the forward parts and sides of said heating surface, and finally a pair of legs extending from the two legs of said U-shaped channel backwardly along the extreme outer side edges of said heating surface, said last pair of legs and said U-shaped channel communicating with said ports, and said three pairs of legs and said U-shaped channel overlying areas of said heating surface substantially above said legs of said heating element.

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REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,313,124	Seldin	Aug. 12, 1919
1,731,120	Abbott	Oct. 8, 1929
2,010,331	Starrick	Aug. 6, 1935
2,353,604	Waring et al.	July 11, 1944
2,384,839	Kistner	Sept. 18, 1945
2,387,281	Morton	Oct. 23, 1945
2,419,705	Busch et al.	Apr. 29, 1947