May 25, 1943. F. W. SCHARF 2,320,013

ELECTRIC IRON

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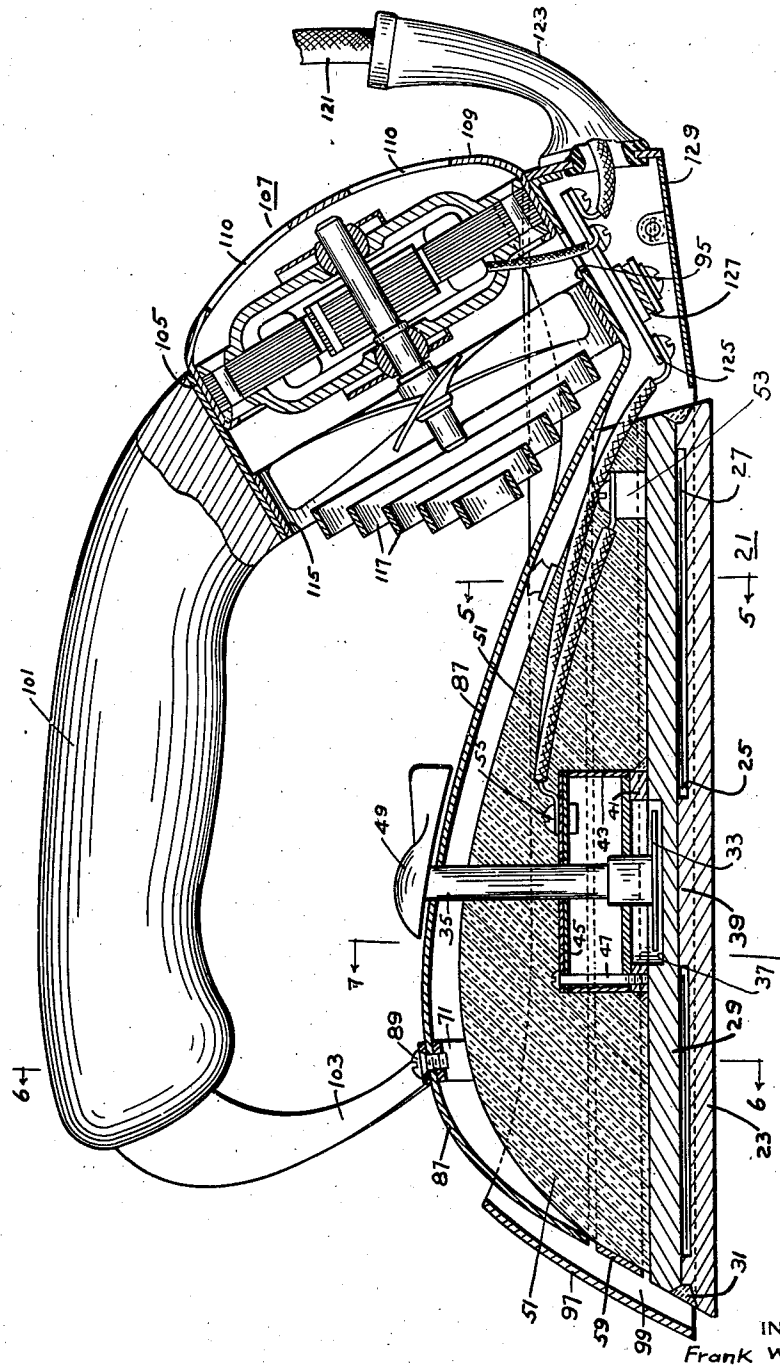



Fig. 1

INVENTOR
Frank W. Scharf

BY Roy M. Ellers
ATTORNEYS

May 25, 1943. F. W. SCHARF 2,320,013

ELECTRIC IRON

Filed July 7, 1939 5 Sheets-Sheet 2

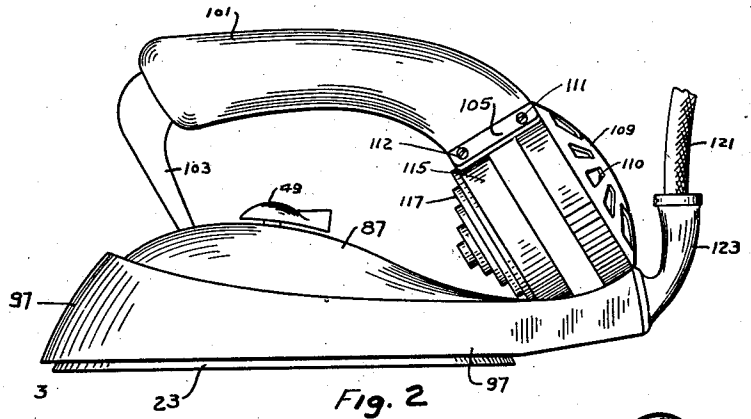



Fig. 2

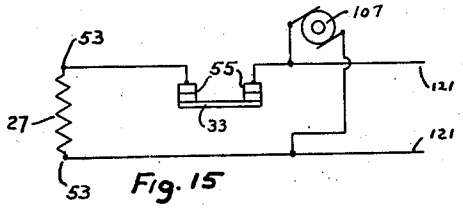



Fig. 15

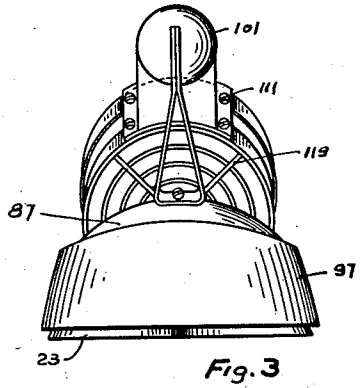



Fig. 3

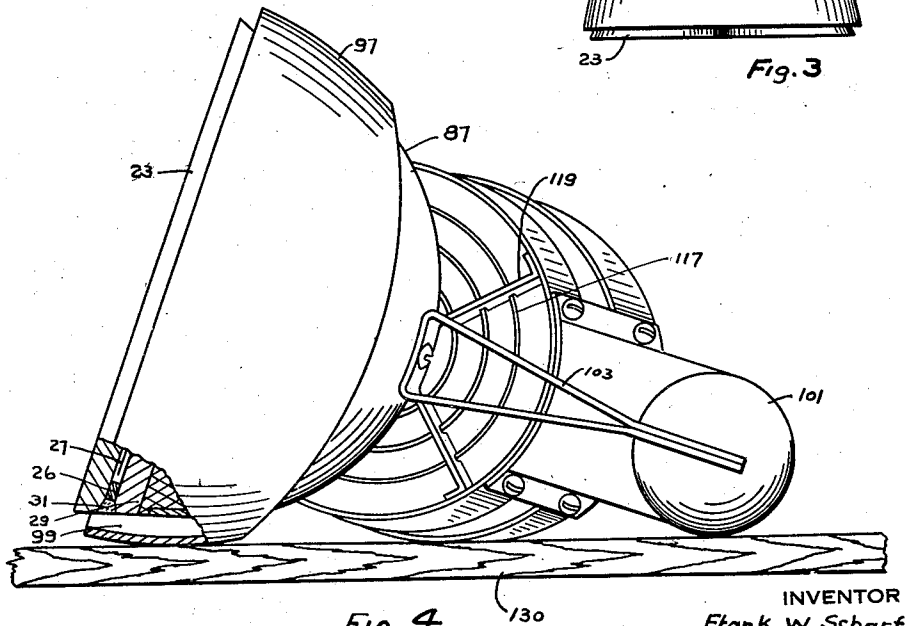



Fig. 4

INVENTOR
Frank W. Scharf

BY Roy M. Eilers
ATTORNEYS

May 25, 1943. F. W. SCHARF 2,320,013

ELECTRIC IRON

Filed July 7, 1939 5 Sheets-Sheet 3

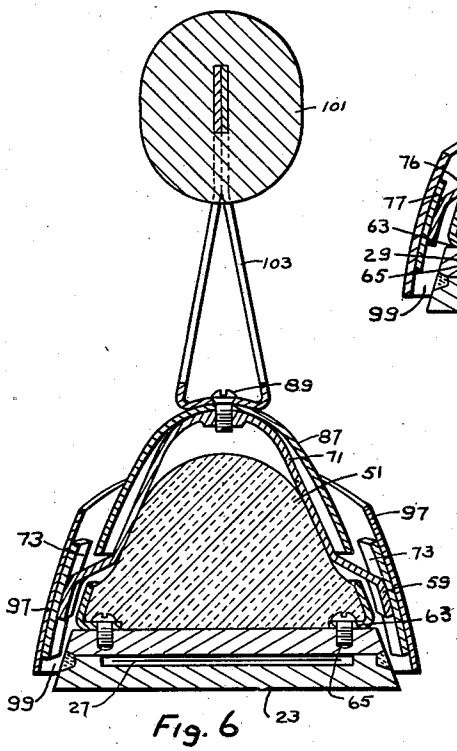



Fig. 6

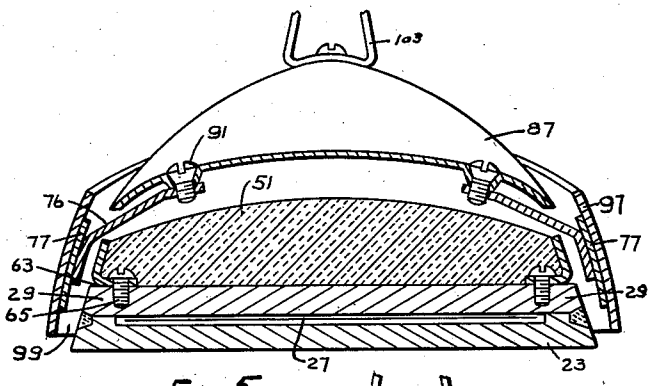



Fig. 5

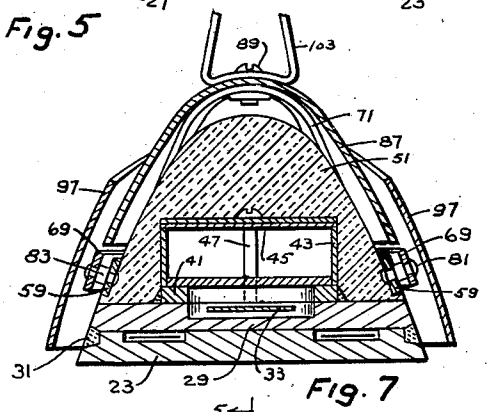



Fig. 7

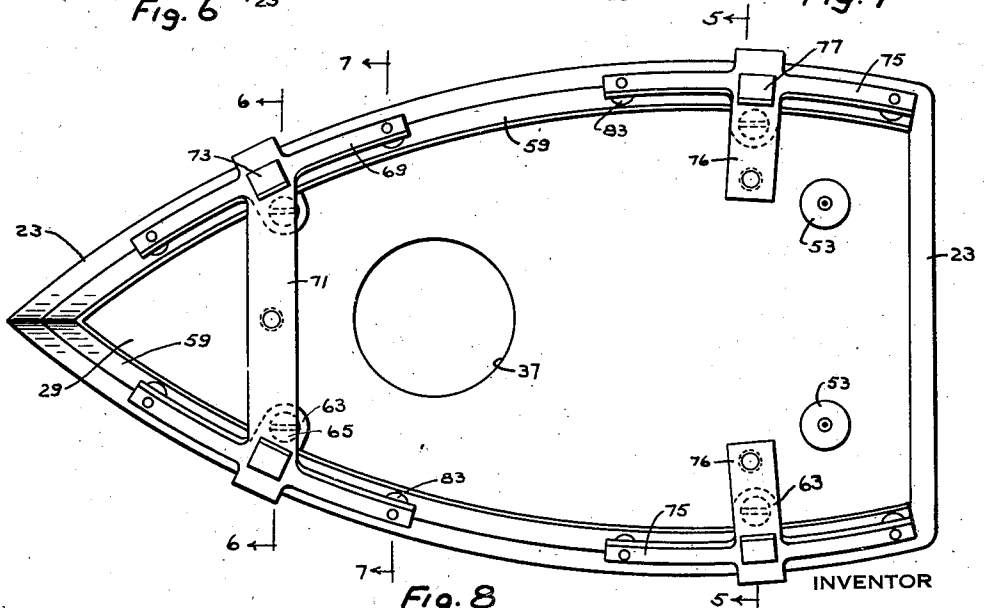



Fig. 8

INVENTOR
Frank W. Scharf
BY Roy M. Eilers
ATTORNEYS

May 25, 1943. F. W. SCHARF 2,320,013

ELECTRIC IRON

Filed July 7, 1939 5 Sheets-Sheet 4

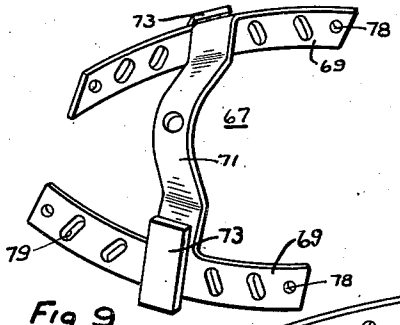



Fig 9

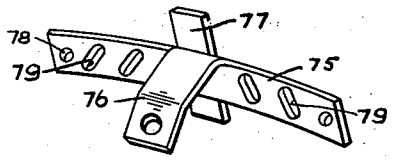



Fig. 10

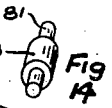



Fig 14

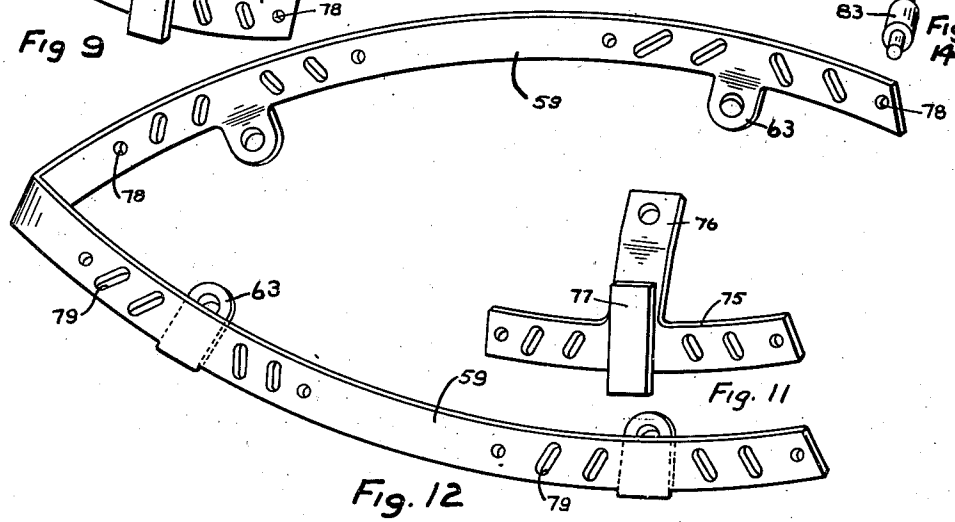






Fig. 11

Fig. 12

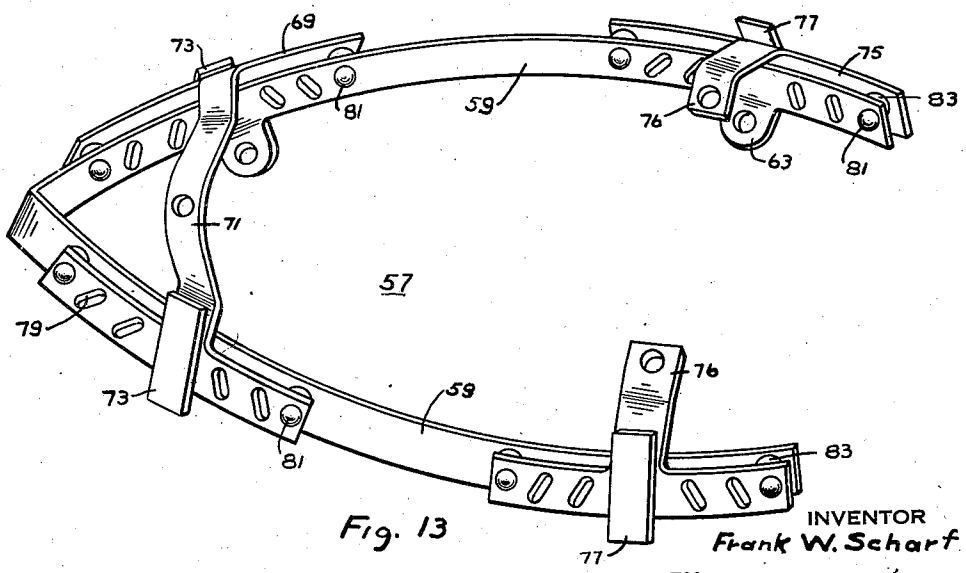



Fig. 13

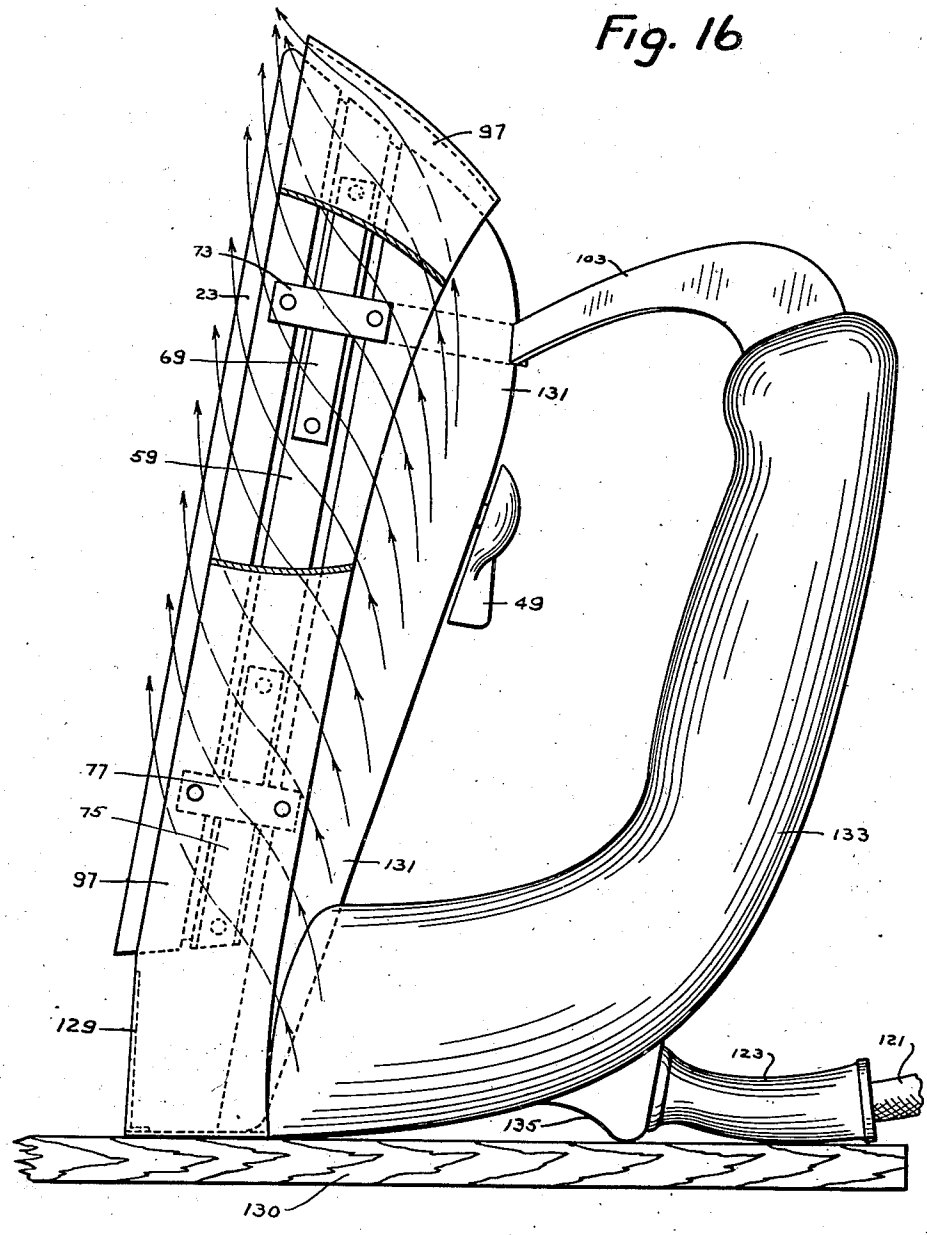
INVENTOR
Frank W. Scharf
BY
Ray M. Eilers
ATTORNEYS

May 25, 1943. F. W. SCHARF 2,320,013

ELECTRIC IRON

Filed July 7, 1939 5 Sheets-Sheet 5

Fig. 16




INVENTOR
Frank W. Scharf
BY Roy M. Eilers
ATTORNEYS

Patented May 25, 1943 2,320,013

# UNITED STATES PATENT OFFICE

2,320,013

## ELECTRIC IRON

Frank W. Scharf, Elgin, Ill., assignor to McGraw Electric Company, Elgin, Ill., a corporation of Delaware

Application July 7, 1939, Serial No. 283,134

16 Claims. (Cl. 38—89)

This invention relates to electric irons.

It is an object of this invention to provide an improved electric iron.

Reference is here made to my two co-pending patent applications, Serial No. 2,667, filed January 21, 1935, renewed May 3, 1939 and issued January 9, 1940, as United States Patent No. 2,186,930, and Serial No. 272,031, filed May 5, 1939, both relating to improvements in electric irons, and both showing certain features incorporated in the irons of this invention.

This invention provides a guard for an iron which is arranged and positioned to prevent accidental contact of an operator's fingers with the side edges of the hot sole plate of the iron while ironing and includes means for cooling this guard.

It provides a skeleton housing-supporting frame which supports the iron housing and the guard in such a manner as to keep at a minimum the heat flow from the heated body of the iron to these parts.

The iron shown is so designed and constructed as to maintain the proper operating temperature at the sole plate and yet maintain all surfaces which may be accidentally contacted by an operator while ironing at a temperature well below that which will cause a serious burn.

One embodiment of my invention is shown provided with an electric fan positioned to direct a stream of cooling air over the fingers of the hand of an operator grasping the iron handle.

A construction is also shown which permits the iron to be laid on its side during a rest period with only the guard and handle in contact with the supporting surface.

I also show a fanless construction designed to be stood on its heel during a rest period and incorporating features which make it possible to prevent accidental burning even though power driven air cooling means are not used.

Further objects and advantages will appear from the following description and the accompanying drawings in which I show for purposes of illustration only several of the many possible and useful embodiments of my invention.

In the drawings:

Fig. 1 is a vertical longitudinal section through an iron embodying my invention.

Fig. 2 is a side elevation thereof on a reduced scale.

Fig. 3 is a front elevation thereof on a reduced scale.

Fig. 4 is a view of the iron laid on its side with the guard and handle serving as a stand or rest.

Fig. 5 is a vertical cross-section taken on line 5—5 of Fig. 1.

Fig. 6 is a vertical cross-section taken along line 6—6 of Fig. 1.

Fig. 7 is a vertical cross-section taken on line 7—7 of Fig. 1.

Fig. 8 is a top plan view of a form of skeleton structure or frame secured to the top plate and used to support the housing and guard of the iron.

Figs. 9, 10, and 11 are perspective views of various parts of the skeleton frame shown in Fig. 8.

Fig. 12 is a perspective view of the main part of the skeleton frame shown in Fig. 8.

Fig. 13 is a perspective view of the assembled housing-supporting structure or skeleton frame shown in Fig. 8.

Fig. 14 is a perspective view of a type of spacer used in the skeleton frame.

Fig. 15 is a diagram of the electrical connections of one embodiment of my iron.

Fig. 16 is a side elevation of a fanless embodiment of my iron shown in a position of rest.

21 designates an iron generally having a heated body including a sole plate 23 which may be of the usual triangular shape although it is obvious that any desired type of sole plate may be used. One type of sole plate which I have used is shown in Fig. 1 and is provided with a recess 25 in which the electric heating element 27 may be positioned. The heating element shown is of the thin planar type well known in the art which has the heating resistance wound on a piece of mica and protected on both sides by sheets of mica. The heated body also includes a top or clamping plate 29 which is designed to cooperate with the sole plate and heating element to tightly press the heating element against the sole plate so that there will be efficient heat transfer between the heating element and sole plate. The top or clamping plate is also clamped tightly against the sole plate to allow efficient heat transfer between the top plate and sole plate. In the embodiment shown this is accomplished by welding the sole plate to the top plate by a welding seam 31. Other means to clamp the top plate to the sole plate may, of course, be used.

In Fig. 4 another form of sole plate and heating element construction is shown in which the sole plate 24 is not recessed but the heating element 27 is instead enclosed by a protecting band or strip 26 which may be of metal. The top plate is as before welded to the sole plate.

The iron may be provided with a thermal control means which may be of any suitable type,

In the form shown, a bimetal disc 33 is mounted on an adjustable stem 35. The disc may either carry contact members thereon or cooperate with fixed contact members to interrupt the circuit through the heating element when a predetermined temperature has been reached and to close the circuit when the temperature has dropped below a predetermined value. The details of this thermostat are not shown as it is of a type well known in the art and since any one of the many available types of thermostatic controls may be used.

The top plate 29 may be provided with a suitable recess 37 to allow the thermostat to be placed near a boss 39 on the sole plate so that the thermostat will more closely follow the sole plate temperature. A metal ring 41 may be provided on the top plate to support a casing 43 closed by a cover 45 secured by screw 47. This casing encloses and protects the thermostat. The stem 35 may be turned by a handle 49.

In order to reduce the flow of heat from the heated body to the housing, I may provide a heat-insulating means 51 which is a mass of rock wool in the embodiment shown in Fig. 1, and this I have found to serve satisfactory. I do not desire to be limited thereto, however, as any other insulating means effective for the same purpose may be used. Thus, bulk insulating materials, solid insulating materials, a plurality of heat-reflecting plates, thin metal foil or a vacuum chamber would all operate quite satisfactorily.

Terminal members 53 of the heating element are shown in Figs. 1 and 8 and indicated on Fig. 15. 55 indicates the terminal members for the thermostatic control switch.

One form of structure for supporting the housing or outer cover of the iron from the heated body is shown assembled in Fig. 13, where 57 is the assembled structure, 59 a strip or band substantially V-shaped in contour to conform to the shape of the heated body. Inwardly projecting lugs 63 are provided on the band so that the band may be secured to the top plate by screws 65 projecting through openings in the lugs. The band 59 aids in enclosing the mass of heat-insulating material and in keeping it in proper position.

67 (Fig. 9) is a front supporting member which may be formed substantially as shown with two horizontally extending portions 69 and a bowed cross-connecting portion 71. Secondary supports or blocks 73 may be welded on each side of the member 67 as shown and serve to support the outer cover or housing.

Rear supporting members 75 (Fig. 10) of T-shape may be provided at the rear of band 59. These rear supports may have upwardly and inwardly extending portions 76 and secondary supports or blocks 77 welded thereon to support the housing. Both the front and rear supporting members may be secured to the band 59 by the spacers or rivets shown in Fig. 14. The central portions 83 of the rivets serve as spacers to keep the various supporting frame members apart while the smaller portions 81 of the rivets project through openings 78 in the respective members and are headed over.

Various types of supporting frames may, of course, be used but I have found the one shown and described to function very satisfactorily. It may be constructed of a relatively thin sheet metal. Stainless steel for instance has been used, since it has a relatively inherent high thermal reluctance and retards the heat flow to some extent. In order to effectively increase the thermal reluctance still further, slots 79 may be provided in the band 59 and members 67 and 75. These slots increase the effective length of the heat flow path from the heated body to the cover as well as provide additional heat-radiating surfaces. In the embodiment shown, I prefer to design and construct the V-band so that it is put under an initial stress when it is bent to conform to the contour of the heated body to which it is secured. This makes it possible to construct the supporting frame of relatively thin sheet material and yet provide a relatively rigid supporting frame.

87 is the housing or outer cover and may be formed in the desired shape from any suitable material as for instance thin sheet metal. The housing is positioned over the heated body and insulating means but is not in direct heat-conducting relation with the heated body. The housing is supported at its front end by screw 89 extending into a suitable opening in cross bar 71 of the housing-supporting structure. The rear end of the housing is supported by the bars 75 of the housing-supporting structure and is secured thereto as by machine screws 91 (Fig. 5). It can be seen (Fig. 1) that the band 59 is spaced from and positioned above the upper surface of the top plate and the lower edge of the housing is spaced a distance above the upper edge of the V-band 59. Any heat traveling from the heated body to the sole plate must, therefore, travel through the skeleton-supporting frame which furnishes only a circuitous path since the respective members of the supporting structure are assembled in spaced relation as previously described. There is no direct thermal contact between the heated body and the housing.

The housing shown is higher at its front end than at the rear and may be provided at its rear end with an arcuate seat 95. An outer guard 97 is provided around the lower portion of the sides of the iron and may be shaped as shown, complementary to the V-band or housing. The guard extends down in front of and is spaced from the sides of the sole plate. It is, as shown, spaced from the sides of the housing and from the V-band. The space between the guard and the sole plate, the guard and the V-band, and the guard and the housing, forms a passage 99 extending along the sides of the iron.

The guard when positioned as shown will preclude accidental contact of an operator's fingers with the sole plate while the iron is in use and yet not hamper normal ironing usage since the guard does not interfere with the buttons or heavy seams of clothing.

A handle 101 which may be constructed of a material of low heat conductivity may be supported from the housing at its forward part by a strap 103 which may be secured to the handle in any desired manner and to the top of the housing by the screws 89. The rear end of the handle may be provided with an arcuate sheet metal seat 105 as shown.

In one of the embodiments of my invention (Fig. 1), an electric fan 107 is positioned at the rear of the iron. The fan may be of any suitable design and may utilize any of the many available types of motors and air-moving means. 109 is a fan housing which may be substantially circular

in shape and thus adapted to fit between the arcuate seat 95 in the housing and the arcuate seat 105 at the rear end of the handle. The housing 109 is shown relatively narrow in Figs. 1 and 2 of the drawings and is secured in position by machine screws 111 (Fig. 2). Openings 110 for the passage of air to the fan may be provided in the rear of the housing. It can be seen that these openings are positioned behind the heated parts of the iron and thus draw in cool air which has not been heated by the iron. This particular design of fan and housing makes it possible to easily remove the fan for servicing or replacement. A fan guard or louvres are provided by an annular housing 115 and a plurality of concentric strips 117 held by radial bars 119. The annular housing 115 may be secured between arcuate seat 95 in the housing and arcuate seat 105 in the handle by screws 112 (Fig. 2).

The louvres and fan are arranged to direct a stream of cooling air across the top of the housing, and thence to force a portion of this air through the passage 99 between the guard and the housing. The fan thus serves not only to cool the guard but to circulate a stream of air over the hand of an operator grasping the iron handle. This has been found to considerably increase the comfort of an operator.

121 is an electric cord which may be protected by a flexible rubber tubular member 123 at the point where it enters the rear of the iron. A terminal structure 125 may be supported at the rear of the iron within the housing and may include a cross bar 127 supported in any suitable or desired manner.

129 is a bottom closure plate which may be secured under the rear portion of the guard as shown in Fig. 1. The bottom plate 129 is shown provided with a rear portion in which the flexible cord protector may be suitably supported.

In Fig. 15, I show diagrammatically one system of electrical connections which I may use in my iron. According to this system the fan is in operation as long as the cord 121 is connected to a suitable electric outlet, while a thermostat controls the heating element 27. It is obvious that different methods of connecting the fan could be used if desired.

The heated body of this iron is so constructed as to conduct the major portion of the heat generated therein to the ironing surface. Thus in the particular form shown the manner of securing the top plate to the sole plate contributes to this result, while positioning of the heat-insulating means above the top plate reduces the flow of heat upward to the housing. The housing is positioned some distance from the insulation and is supported by the skeleton frame which is designed and constructed to prevent any appreciable heat conduction from the heated body to the housing. Portions of the supporting frame are positioned in the path of air going through the passage 99 and thus dissipate into the air stream a large portion of the heat which they might carry to the housing.

The guard is supported on the bars or blocks 73 and 77 on the housing-supporting frame and heat flow thereto from the heated body is retarded in the same manner as explained with regard to the heat flow to the housing. The stream of cooling air which flows along the top surface of the housing is sufficient to cool the housing and removes any heat which does reach it from the heated body.

The fan of the embodiment shown in Fig. 1 is arranged and positioned to cause a stream of cooling air to move longitudinally across the top of the iron housing and thence between the guard and the housing. The housing is shaped to distribute this air stream around the iron and guard. The upraised widened front of the housing contributes to this result. This air stream will cool the fingers of an operator as well as cool the housing and guard.

Heat conduction through the handle itself is reduced by the air flow through the fan housing which forms a support for the rear of the handle.

The stream of cooling air flowing between the guard and the housing will maintain it at a temperature well below that which will cause a burn and since this guard extends in front of the side edges of the sole plate, it is practically impossible for a person using the iron to burn their fingers even though they hold the garment being ironed with their fingers and even though the iron is brought up to the fingers.

In Fig. 4, I show how the iron may be laid on its side with the guard and handles serving as a stand, thus dispensing with the usual iron stand. The cool guard is in contact with the surface but is in fact much cooler than the usual iron stand, and as a result the iron may be laid down even on fabrics being ironed without danger of scorching them.

In Fig. 16, I have shown an embodiment of my iron in which I have dispensed with the fan shown in the other embodiments. The guard temperature of this iron will be cool enough to prevent a serious burn even though the usual 1000 watt heating element is used in the iron. This fanless iron is constructed to be stood on its end during the resting periods in a manner to take advantake of convection currents to cause air to flow between the guard and housing. The housing and guard are designed to facilitate such circulation which is indicated by the arrows in Fig. 16. The passage of air between the housing and guard will cool both guard and housing and in addition will cool portions of the housing-supporting frame positioned in the air stream, and will thus further reduce the heat conduction through the supporting frame to the housing and guard. In this embodiment the housing or outer cover is designated by numeral 131 instead of 87. This cover may be shaped slightly different from the cover or housing 87 since the fan housing seat 95 is not necessary and the rear end of the housing may be shortened somewhat. The handle 101 shown in the other embodiments may be replaced by modified handle 133 which may be secured directly to the housing as no fan is mounted between the housing and the handle. While the fanless type of iron shown is designed to be stood on its heel during a rest period, it is obvious that the housing and guard will be designed so that it could be rested on its side in a manner similar to that shown in Fig. 4.

135 is a bracket secured to the handle to form a rest for the iron when it is stood on its heel. The cord 121 and protector 123 may be secured to this bracket.

The outer surface of the housing and guard may be blackened or darkened in color. This may be done by using any one of the many available processes well known in the art. Black nickel plating will, for instance, provide a permanent black closely adherent coating which will withstand both the wear and heat to which it is subject. I have found that with the conven-

tional bright finish, the temperature of the housing and guard may be as much as 12% higher than with the blackened finish. Such a difference in temperatures is especially important with the fanless iron and makes it much more practical. In the irons provided with fans, the housing and guard temperatures are so slow that the blackening of the housing produces little noticeable effect and is, of course, not necessary. It may be noted that in both the fanless and fan type of iron, the rear end of the handle is supported from the housing at a point well behind the heated body and thus conducts less heat from the heated body than it would if secured at other points.

The housing and guard in both types are supported from the housing-supporting skeleton frame which materially reduces heat flow between the heated body and these parts. This supporting frame is similar to that described in my co-pending application, Serial No. 272,031.

The average 1000 watt conventional type iron was found to have a housing temperature of approximately 325° with a sole plate temperature of 525° after resting on its heel for several hours at room temperature of 75° while fanless irons of my design of the same wattage operate with a guard temperature of approximately 116°. The difference in these temperatures is appreciable especially from the standpoint of producing serious burns.

The fan type iron operates at even lower temperatures than the fanless type but the latter may sometimes be desirable from an economic standpoint. In a 1000 watt iron of my type provided with a fan and producing a sole plate temperature of 525–550° F., the housing and guard show a temperature rise of less than 25° F., while conventional irons show a housing temperature rise of approximately 250° above room temperature or an indicated temperature of 325°. This is a very appreciable difference in housing temperature especially when it is considered that the many advantages resulting therefrom are not attained by sacrificing efficiency.

I have thus provided an iron which maintains the sole plate of an iron at the desired operating temperature and at the same time appreciably reduces the temperature of all other parts where heat is not desired.

While I have shown only several particular embodiments of my invention, it will be understood, of course, that the scope of the invention is not to be limited thereby, but is defined by the appended claims.

I claim:

1. An electric iron comprising a heated body, a band of substantially V-shape thereabove, spaced therefrom and supported thereby at widely separated points, a housing above, spaced from and supported by said band and a guard spaced laterally from said body, band and housing and extending at least partially thereover.

2. In an electric iron comprising a heated body and a housing thereover spaced from the heated body, the improvement which comprises a guard spaced from the heated body and from the housing and extending along the iron at the front and sides thereof and overhanging the heated body and a supporting frame of substantially V-shape designed, constructed and connected for supporting the housing and guard at widely separated points from the heated body and for reducing heat flow therebetween.

3. An electric iron having a base plate, an electric heating element in heat-conducting relation therewith, an exterior housing for the iron above the heating element and base plate, a guard spaced from the outside of the housing and forming an air passage between the housing and the guard and a fan carried by the iron and arranged to move air along the outside of the housing and then down in said passage.

4. An electric iron having a base plate, an electric heating element in heat-conducting relation therewith, an exterior housing for the iron over the heating element and the base plate, a guard spaced from the outside of the housing and extending down in front of the edges of the base plate and spaced therefrom, said guard forming an air passage between the guard and the housing and the guard and the side edges of the base plate and means carried by the iron to move air along the surface of the housing and in said passage.

5. An electric iron having an electrically heated member, a supporting frame secured to the heated member, a hollow housing secured to the supporting frame and out of direct heat-conducting relation with the heated member, a band secured to the supporting frame and spaced from the outside of the housing, and a fan carried by the iron and arranged to move air along the upper side of the housing and over parts of the supporting frame and between the band and the housing.

6. An electric iron having a base plate, an electric heating element in heat-conducting relation therewith, a cover above the heating element and base plate, a guard spaced from the outside of the cover and extending along the side edges of the base plate and spaced therefrom to form an air passage between the guard and the cover, and a fan carried by the iron arranged to move air both along the upper side of the cover and through said air passage.

7. An electric iron having a base plate, an electric heating element in heat-conducting relation therewith, an outer cover for the iron over the heating element and base plate, a guard extending longitudinally along the sides of the iron spaced from the outside of the cover and arranged to provide an air passage therebetween and a fan carried by the iron arranged to move air along the outside of the cover and then through said air passage.

8. In an electric iron comprising a heated body and a hollow housing thereabove, the improvement which includes a motor-driven fan supported on the iron and effective to direct a stream of cooling air against the outer surface of the housing, and a guard of substantially V-shape in contour, around and spaced from the outside of said housing having a height relatively to said housing sufficient to entrap an appreciable amount of said cooling air and force it to flow downwardly between the guard and the housing.

9. An electric iron having an electrically heated member, a housing for the iron over said member sloping downwardly to the rear of the iron, a guard spaced from the outside of the housing to form an air passage therebetween, a fan carried by the iron positioned at the rear of the housing and arranged to move a stream of air forward and downward over the upper side of the housing and then through the air passage.

10. An electric iron having an electrically heated member, a housing for the iron over said

member, a guard spaced from the outside of the housing to form an air passage therebetween, a fan carried by the iron positioned to move a stream of air forward and downward over the outside of the housing and between the guard and the housing, a means for supporting the guard from the heated member, a portion of said means being in the air stream moving between the guard and the housing.

11. An electric iron having an electrically heated member, a supporting band secured to said member and presenting a larger radiating surface than its surface in contact with the heated member, an upper supporting band secured to the supporting band and presenting a larger radiating surface than its surface in contact with the supporting band, an exterior hollow housing for the iron secured to the upper supporting band, a protecting guard secured to the upper supporting band and spaced from the outside of the housing, and means carried by the iron to move air between the guard and the housing and over portions of the supporting bands.

12. An electric iron having an electrically heated member, thermal insulating means over the heated member, an outer cover for the iron over the insulating means and spaced therefrom, a guard spaced from the outer cover, a supporting frame enclosing the insulating means and securing the guard to the heated member and providing a heat path therebetween of high thermal reluctance, and a fan carried by the iron and positioned to direct a stream of air both along the upper side of the housing and under the guard, a portion of said supporting frame being in a stream of air from the fan.

13. An electric iron comprising a heated body, a housing for the iron supported above the heated body, a guard extending along and spaced laterally from the sides of the housing and heated body, means to support the housing and guard in said positions, said means being attached to the said housing at a number of points that are spaced laterally from points at which the means is attached to the heated body, said attaching arrangement providing a path of low thermal conductivity to reduce the heat transfer between the housing and the heated body.

14. An electric iron comprising a heated body, a housing for the iron over the heated body and spaced therefrom, a guard extending along and spaced laterally from the sides of the housing and the heated body, and a frame that is connected to the housing and guard at points widely separated from the points at which said frame is connected to said heated body to restrict the transfer of heat from said heated body to the housing and the guard, said heated body tending to create a flow of cooling air between said housing and said guard when the iron is supported in up ended position that will cool the outer surface of the housing, the guard, and parts of the said frame.

15. An electric iron comprising a heated body, a hollow housing for the iron having an upturned portion beyond the rear of the heated body, a guard band spaced laterally from the housing and heated body, a handle for the iron having a seat at its rear end, a seat in the upturned portion of the housing, an electric motor-driven fan positioned between said seats and effective to envelope the housing with a layer of moving air, the surface of said housing being so shaped as to distribute the air stream around the iron and under the guard.

16. An electric iron having a heated body, a supporting frame including a band of substantially V-shape that is connected at widely separated points to the heated body, a housing over and spaced from the heated body and said band that is supported by said frame, a guard of substantial height that is similar in plan to said housing and is outside of and spaced laterally from said body, band, and housing, and is supported by said frame, said heated body tending to create a flow of cooling air between said housing and said guard when the iron is in up ended position that will cool the guard, housing, and parts of the frame.

FRANK W. SCHARF.