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[54] **OVERTEMPERATURE PROTECTION ASSEMBLY FOR AN APPLIANCE**

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[51] **Int. Cl.**[6] **H01H 37/00**; H01H 37/76

[52] **U.S. Cl.** **337/403**; 337/1; 337/407; 219/253

[58] **Field of Search** 337/299, 400–409, 337/13, 1; 219/253, 331

[56] **References Cited**

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3,629,765	12/1971	Gould, Jr.	337/239
3,827,015	7/1974	Ball	337/414
3,952,274	4/1976	Plasko	337/407
3,956,725	5/1976	Merrill et al.	337/407
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4,451,814	5/1984	Barry et al.	337/407
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4,536,641	8/1985	Chan	219/253
4,652,964	3/1987	Ziegenbein	361/54
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4,802,860	2/1989	Kikuta	439/79
4,899,124	2/1990	Hollweck	337/299
4,929,922	5/1990	Hollweck	337/407
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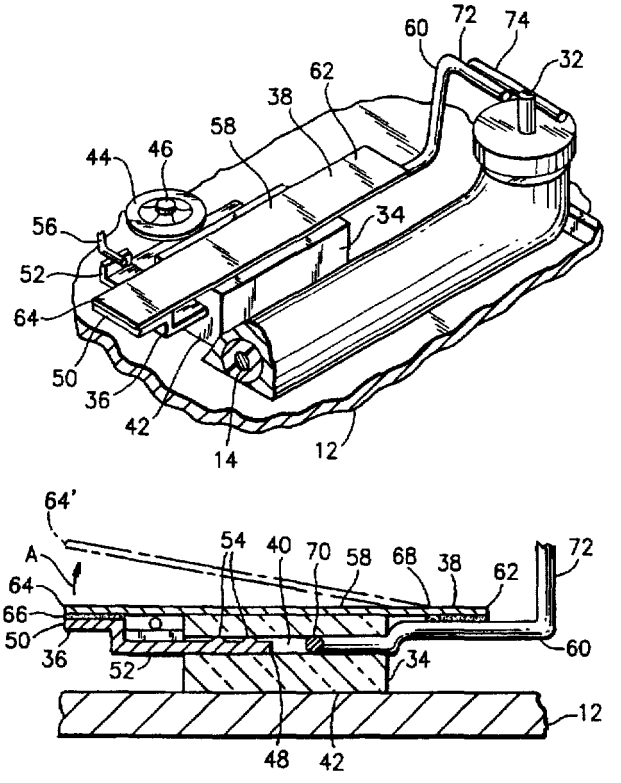
[57] **ABSTRACT**

An overtemperature protection assembly with a mount, a solder terminal and a bridging connector. The mount is a block of ceramic material with a slot extending therethrough. The solder terminal has an end that is located in the slot and forms a frictional connection therein. The bridging connector has a busing terminal and a spring contact. The busing terminal has an end that is located in the slot. The spring contact has a first end connected to the busing terminal and a second end that is deflected towards the solder terminal and soldered thereto. If the solder connecting the second end of the spring contact to the solder terminal melts from excessive heat, the spring contact deflects away from the solder terminal thereby breaking electrical connection between the solder terminal and the busing terminal.

20 Claims, 3 Drawing Sheets



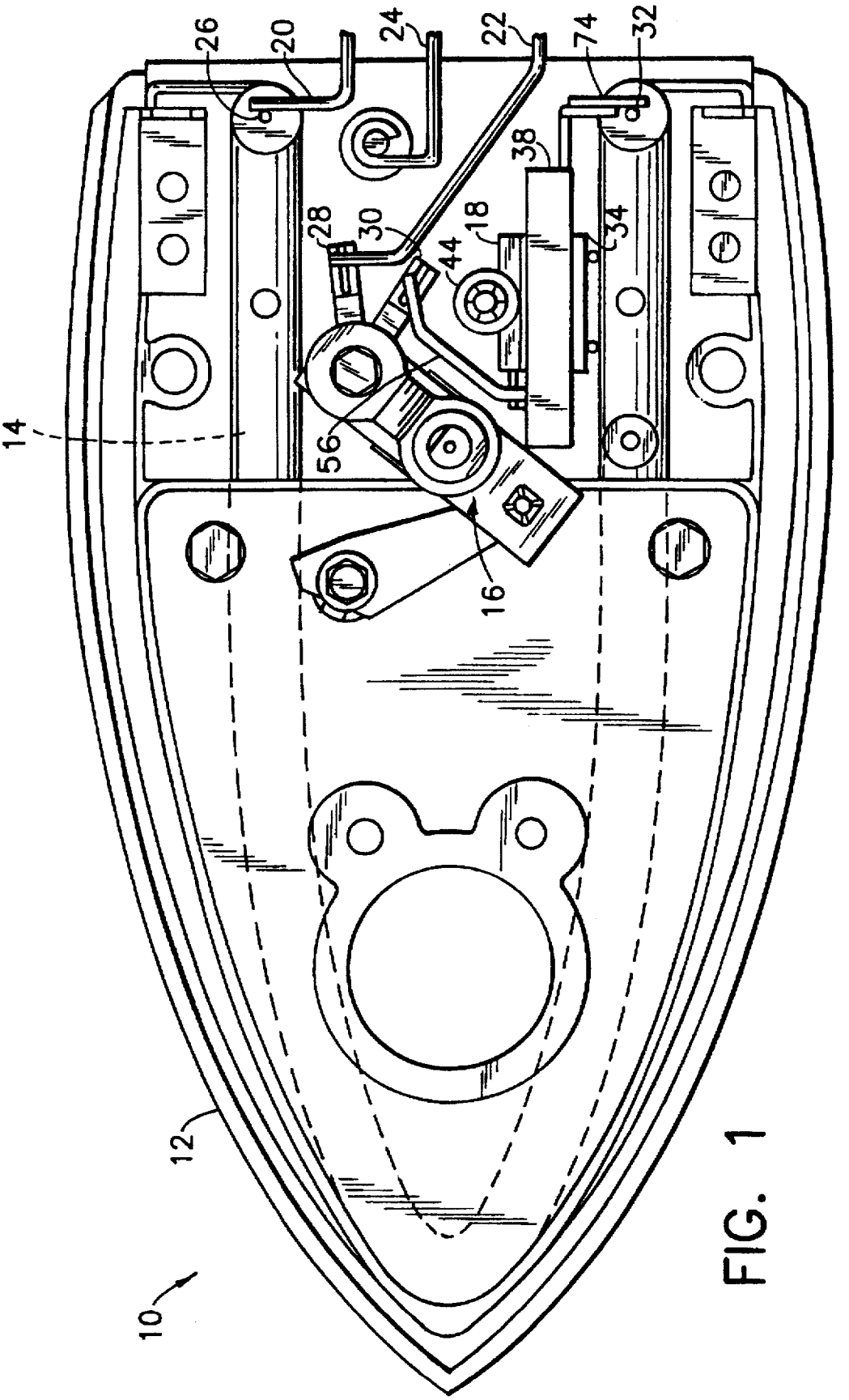


FIG. 1

FIG. 2

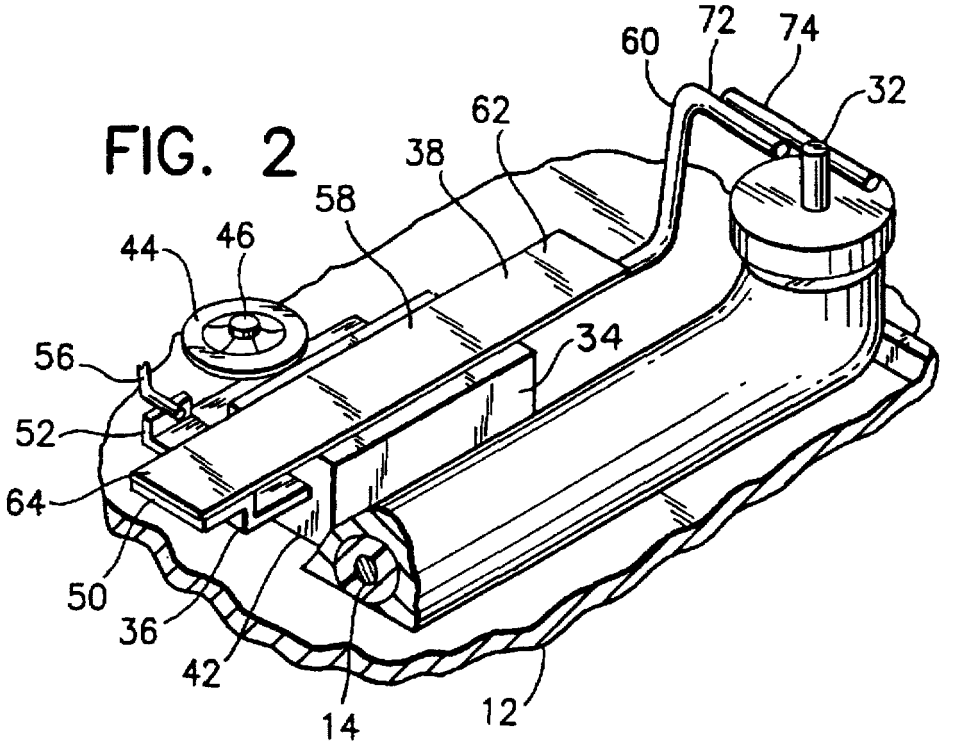
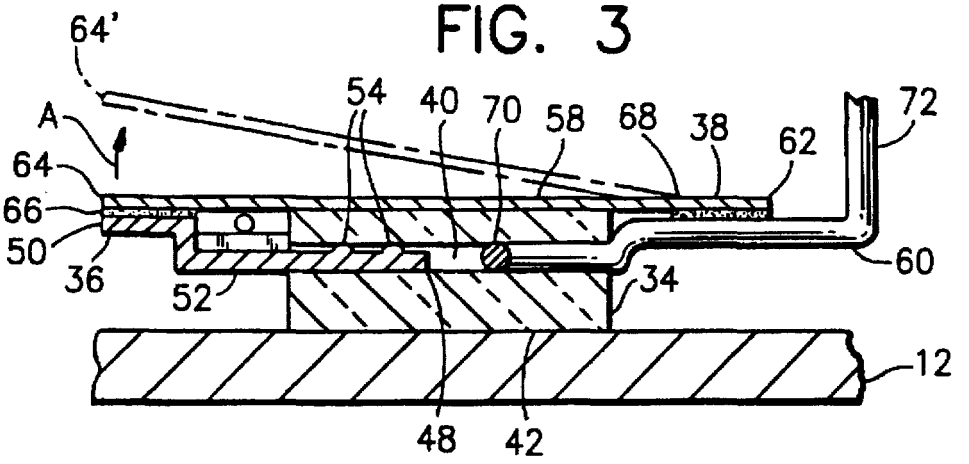


FIG. 3



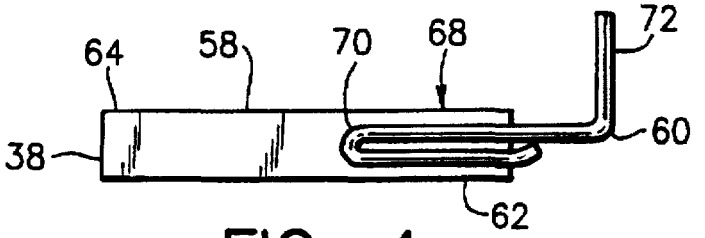
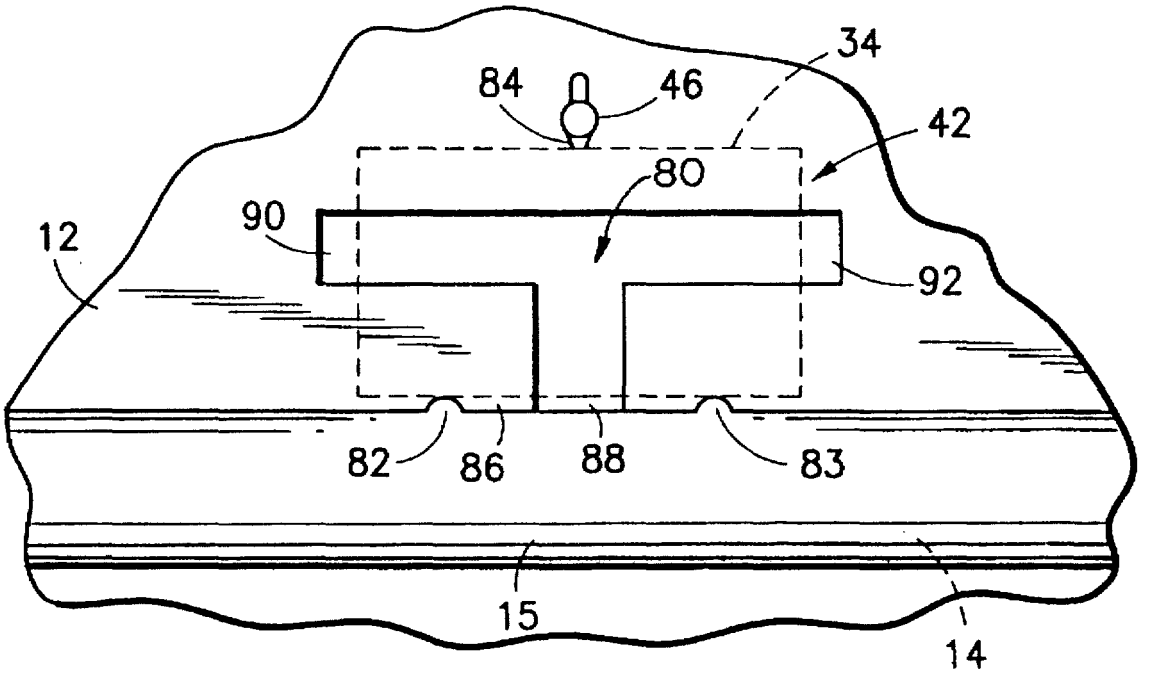


FIG. 4

FIG. 5



OVERTEMPERATURE PROTECTION ASSEMBLY FOR AN APPLIANCE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to electrical appliances and, more particularly, to an overtemperature protection assembly.

2. Prior Art

U.S. Pat. Nos. 4,536,641; 4,433,231; 4,415,796; and 3,444,355 disclose electric appliances with overtemperature protection devices. U.S. Pat. No. 4,536,641 specifically discloses an overtemperature limiter for an electric iron that has a ceramic insulating block and rivets that connect a spring contact and circuit members to the ceramic block. The spring contact is deflected and than soldered to one of the circuit members. Other thermal switches or fuses are disclosed in the following U.S. Pat. Nos.:

3,198,914	3,436,712
3,602,864	3,629,766
3,827,015	3,952,274
3,956,725	4,297,669
4,366,462	4,451,814
4,472,705	4,527,144
4,533,897	4,652,964
4,789,800	4,899,124
4,929,922	5,138,297
5,221,914	

SUMMARY OF THE INVENTION

In accordance with one embodiment of the present invention, an electric iron is provided having a soleplate, a heater connected to the soleplate, a thermostat operably connected to the heater, and an overtemperature protection assembly electrically connecting the thermostat to the heater. The overtemperature protection assembly comprises a mount, a solder terminal, and a bridging connector. The mount is comprised of electrically insulating material and has a slot therein. The solder terminal is connected to the mount. The bridging connector has a mounting portion and a spring contact portion. The mounting portion connects the bridging connector to the mount in the slot. The spring contact portion extends from the mounting portion to the solder terminal. The contact portion is deflected towards the mount and soldered to the solder tail. The spring contact portion springs away from the solder terminal when a solder connection of the spring contact portion and the solder terminal is melted to thereby break electrical connection between the solder terminal and the bridging connector.

In accordance with another embodiment of the present invention, an overtemperature protection assembly is provided for an electrically powered household appliance. The assembly comprises a mount, a solder terminal, and a bridging connector. The mount is made of ceramic material and has at least one slot therein. The solder terminal is connected to the mount with a first end in the slot and a second end extending out of a first end of the mount. The bridging connector has a first portion with a first end in the slot, spaced from the solder terminal, and a second end extending out of a second end of the mount. A second portion extends from the first portion to the solder terminal. The second portion is deflected towards the solder terminal and fixedly connected to the solder terminal by solder.

In accordance with one method of the present invention, a method of assembling an overtemperature control assembly for an electrical appliance is provided comprising steps of providing a mount made of dielectric material with at least one slot therein; mounting a spring connector to the mount by inserting an end of the spring connector into an end of the slot; deflecting a portion of the spring connector towards a solder terminal connected to the mount; and soldering the portion of the spring connector the solder terminal.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing aspects and other features of the invention are explained in the following description, taken in connection with the accompanying drawings, wherein:

FIG. **1** is a top plan view of a soleplate of an electric iron with a heater, a thermostat, and an overtemperature protection assembly incorporating features of the present invention;

FIG. **2** is a partial perspective view of the overtemperature protection assembly shown in FIG. **1** with portions of the soleplate and heater;

FIG. **3** is a partial cross-sectional view of the soleplate and overtemperature protection assembly shown in FIG. **2**;

FIG. **4** is a bottom plan view of the bridging connector used in the overtemperature protection assembly shown in FIG. **3**; and

FIG. **5** is a partial schematic top view of the soleplate at the receiving area of the overtemperature protection assembly.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. **1**, there is shown a plan top view of a portion of an electric iron **10** incorporating features of the present invention. Although the present invention will be described with reference to the single embodiment shown in the drawings, the present invention may be embodied in many alternative forms of embodiments. In addition, the overtemperature protection assembly of the present invention may be incorporated into any suitable type of electric appliance. Any suitable size, shape or type of elements or materials could also be used.

The electric iron **10** is similar to the iron shown in U.S. Pat. No. 4,536,641 which is hereby incorporated by reference in its entirety. The iron **10** has a soleplate **12**, a heater **14**, a thermostat **16**, and an overtemperature protection assembly **18**. The heater **14** is an electric heating element that is cast in position in the soleplate **12**. The soleplate **12** is preferably comprised of cast aluminum. The iron preferably also has means for steam generation (not shown). The iron is connected to an electrical outlet by a suitable electric cord (not shown). The electric cord is connected to an IN conductor **20**, an OUT conductor **22**, and a ground conductor **24**. The IN conductor **20** is connected to an IN terminal pin **26** of the heater **14**. The OUT conductor **22** is connected to an OUT terminal **28** of the thermostat **16**. The ground conductor **24** is connected to the soleplate **12**.

The overtemperature protection assembly **18** is electrically connected between an IN terminal **30** of the thermostat **16** and an OUT terminal pin **32** of the heater **14**. Referring also to FIGS. **2–4**, the overtemperature protection assembly **18** generally comprises a mount **34**, a solder terminal **36**, and a bridging connector **38**. The mount **34** is preferably comprised of a ceramic material to withstand the heat from the heater **14** and soleplate **12**, transfer heat from the soleplate to the rest of the assembly **18**, and to function as an electrical

insulator or dielectric. The mount **34**, in the embodiment shown, has a block-like shape with a single slot **40** extending therethrough. The slot **40** is enclosed except at two opposite ends of the slot **40**. In alternate embodiments, other shapes of mounts could be provided and more than one slot could be provided. The soleplate **12** has a receiving area **42** that receives the mount **34**.

Referring also to FIG. **5**, there is shown a partial schematic top view of the soleplate **12** at the receiving area **42**. The mount **34** is shown in dashed lines. The soleplate **12** includes a "T" shaped pocket **80** on its top surface that extends from the raised portion **15** of the soleplate **12** that houses the heater **14**. Extending laterally from the raised portion **15** are two spacer ribs **82**, **83**. Extending laterally from the post **46** is a spacer rib **84**. When the mount **34** is located in the receiving area **42** it is sandwiched between the ribs **82**, **83** and **84**. A gap **86** is established by the ribs **82**, **83** between the mount **34** and the raised portion **15** to allow air to pass through the gap **86**. This allows air to enter and/or exit the bottom **88** of the "T" shaped pocket **80**. The top of the "T" shaped pocket **80** is longer than the length of the mount **34**. Therefore, two open ends **90**, **92** are established at the opposite ends of the mount **34**. The bottom end **88** and the opposite open top ends **90**, **92** provide for convective air flow underneath the mount **34**. The geometry of the pocket can be selected to get the correct amount of heat transfer for the overtemperature limiter being used. The pocket **80** forms an insulation barrier for preventing too much heat transfer from the soleplate **12** to the mount **34** that could otherwise result in premature opening of the assembly **18** during normal operation. The open ends **90**, **92** also provide for additional air cooling of the mount. In alternate embodiments, alternative or additional insulating means could be provided as well as alternative or additional cooling means.

Referring back to FIGS. **1** and **2**, a fastener **44** is connected to the soleplate **12** on a post **46**. A portion of the mount **34** is stationarily sandwiched between the fastener **44** and the soleplate **12** in the receiving area **42**. This stationarily connects the mount **34** to the soleplate **12**. In alternate embodiments, other types of means to connect the mount to the soleplate could be provided.

The solder terminal **36** is a one-piece metal member and includes a first end **48**, a second end **50** and a side extension **52**. The first end **48** is suitably sized and shaped to be inserted into the slot **40**. The first end **48** includes interference projections **54** on its top. When the first end **48** is inserted into the slot **40**, the projections **54** cause the bottom surface of the first end **48** to engage the bottom surface of the slot **40**. This causes an interference frictional connection between the solder terminal **36** and the mount **34**. In alternate embodiments, alternative or additional means to connect the solder terminal to the mount could be provided. The side extension **52** has a conductor **56** connected thereto. The conductor **56** electrically connects the solder terminal **36** to the IN terminal **30** of the thermostat **16**. The second end **50** is located outside of the slot **40** on one end of the mount **34**. The second end **50** is elevated to a higher plane than the first end **48** that is slightly below the top of the mount **34**.

The bridging connector **38**, in the embodiment shown, is comprised of a spring contact **58** and a busing terminal **60**. The spring contact **58** is a one-piece metal member with a first end **62** and a second end **64**. The first end **62** is fixedly connected to the busing terminal **60**, such as by welding. The second end **64** is fixedly connected to the second end **50** of the solder terminal **36** by solder **66**. The solder **66** both mechanically and electrically connects the solder terminal **36** to the bridging connector **38**. The spring contact **58**, in a home position (i.e., when not connected to the solder plate **36** by the solder **66**) has a bend at area **68** and a shape as shown by dotted lines in FIG. **3**. However, with the spring contact **58** connected to the solder terminal **36**, the spring contact has a substantially flat shape. The busing terminal **60** is a one piece metal member with a first end **70** and a second end **72**. The first end **70** has a general U-shape. The first end **70** is suitably sized and shaped to be inserted in the slot **40** of the mount **34**. The second end **72** extends towards the OUT terminal pin **32** of the heater **14**. A conductor **74** electrically connects the second end **72** to the OUT terminal pin **32**. Thus, an electrical path is established from the OUT terminal pin **32**, through the conductor **74**, through the busing terminal **60**, through the spring contact **58**, through the solder **66**, through the solder plate **36**, and through the conductor **56** to the IN terminal **30** of the thermostat **16**.

The operation of the overtemperature protection assembly **18** is relatively simple. During normal use of the iron **10**, the assembly merely functions as a conductor in an electrical circuit between the heater **14** and the thermostat **16**. However, if the iron gets too hot the solder **66** will melt. When the solder **66** melts, the mechanical connection holding the second end **64** of the spring contact **58** to the second end **50** of the solder terminal **36** is broken. The stored potential energy in the spring contact **58**, from being deflected into a flat shape, is then able to be released. The second end **64** springs upward as indicated by arrow A in FIG. **3** to the position **64'**. The position **64'** is spaced from the solder terminal **36**. Thus, the electrical connection between the solder terminal **36** and the spring contact **58** is broken. This breaks the circuit path between the heater **14** and the thermostat **16** thereby shutting the iron off until repaired by a qualified service center.

The assembly of the present invention is reliably constructed, is compact in size and, is inexpensive to manufacture. A solder overtemperature protection apparatus is one of the most simple and dependable forms of overtemperature protection. With the present invention, the overtemperature protection assembly **18** consists of the solder **66** and only four parts: the mount **34**, the solder terminal **36**, the spring contact **58** and the busing terminal **60**. The use of only four parts reduces manufacturing costs. The need for only four parts also reduces assembly time and costs.

To assemble the overtemperature protection assembly **18**, the solder terminal **36** is mounted to the mount **34** by merely inserting the first end **48** into the slot **40**. Frictional engagement between the mount **34** and the first end **48** keeps the solder terminal connected to the mount **34**. The spring contact **58** is connected to the busing terminal **60**. The first end **70** of the busing terminal **60** is inserted in the opposite end of the slot **40**. The second end **64** of the spring contact **58** is then deflected towards the second end **50** of the solder terminal **36**. The spring contact **58** deforms at area **68** into a substantially flat shape. The solder **66** is melted between the two second ends **64** and **50** and then allowed to cool. Assembly of the assembly **18** is then complete. Because of the location of the end **70** in the slot and connection of end **64** to solder terminal **36**, no fasteners are needed to connect the bridging connector **38** to the mount **34**. Likewise, because of the engagement of the first end **48** of the solder terminal **36** in the slot **40**, no fasteners are needed to connect the solder terminal **36** to the mount **34**. This obviously saves time and money during manufacture. In an alternate embodiment, the bridging connector might be provided as a one-piece member. In another alternate embodiment, the

conductors **74** and **56** could be replaced by the assembly being directly connected between the heater and the thermostat. The present invention could also be combined with a thermostat as a single assembly.

It should be understood that the foregoing description is only illustrative of the invention. Various alternatives and modifications can be devised by those skilled in the art without departing from the spirit of the invention. Accordingly, the present invention is intended to embrace all such alternatives, modifications and variances which fall within the scope of the appended claims.

What is claimed is:

1. An electric iron having a soleplate, a heater connected to the soleplate, a thermostat, and an overtemperature protection assembly electrically connecting the thermostat to the heater, the overtemperature protection assembly comprising:

a mount comprised of electrical insulating material, the mount having a slot therein, said slot extending entirely through said mount;

a solder terminal connected to the mount; and

a bridging connector having a mounting portion and a spring contact portion, the mounting portion connecting the bridging connector to the mount in the slot, the spring contact portion extending from the mounting portion to the solder terminal, the spring contact portion being deflected towards and soldered to the solder terminal, wherein the spring contact portion springs away from the solder terminal when a solder connection of the spring contact portion and the solder terminal is melted to thereby break electrical connection between the solder terminal and the bridging connector.

2. An electric iron as in claim **1** wherein the mount is comprised of ceramic material.

3. An electric iron as in claim **1** wherein the slot is enclosed except for openings at opposite ends of the mount.

4. An electric iron as in claim **1** wherein the mount has a block shape and the soleplate has a receiving area for receiving the mount.

5. An electric iron as in claim **4** further comprising a fastener connected to the soleplate that stationarily sandwiches a portion of the mount between the fastener and a portion of the soleplate.

6. An electric iron as in claim **1** wherein the solder terminal has an end that is located in the slot that connects the solder terminal to the mount.

7. An electric iron as in claim **6** wherein the end of the solder terminal makes frictional mounting engagement with the mount in the slot.

8. An electric iron as in' claim **1** wherein the mounting portion of the bridging connector makes a frictional mounting engagement with the mount in the slot.

9. An electric iron as in claim **1** wherein the bridging connector comprises a solder blade fixedly connected to a bus terminal, the solder blade forming the spring contact portion and the bus terminal forming the mounting portion.

10. An electric iron as in claim **1** wherein the spring contact portion has a substantially straight shape when connected to the solder terminal.

11. An electric iron as in claim **1** wherein the soleplate has a receiving area with a pocket along a surface.

12. An electric iron as in claim **11** further comprising means for air cooling the mount which includes the pocket.

13. An electric iron as in claim **11** further comprising means for thermally insulating a portion of the mount from the soleplate.

14. An electric iron as in claim **11** wherein the pocket has a general "T" shape.

15. An overtemperature protection assembly for an electrically powered household appliance, the assembly comprising:

a mount comprised of ceramic material, the mount having at least one slot therein; said slot extending entirely through said mount;

a solder terminal connected to the mount with a first end in the slot and a second end located outside of the mount at a first end of the mount; and

a bridging connector having a first portion with first end in the slot spaced from the solder terminal and a second end located outside of the mount at a second end of the mount, and a second portion extending from the first portion to the solder terminal, the second portion being deflected towards the solder terminal and fixedly connected to the solder terminal by solder.

16. An assembly as in claim **15** wherein the slot is enclosed except for openings at the first and second ends of the mount.

17. An assembly as in claim **15** wherein the first end of the solder terminal makes frictional mounting engagement with the mount in the slot.

18. An assembly as in claim **15** wherein the first portion of the bridging connector is fictionally mounted to the mount in the slot.

19. An assembly as in claim **15** wherein the bridging connector comprises a solder blade fixedly connected to a bus terminal, the solder blade forming the second portion and the bus terminal forming the first portion.

20. An assembly as in claim **15** wherein the second portion has a substantially straight shape when connected to the solder terminal.

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