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Jeffress

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[54] **APPLIANCE CORD-CONNECTING STRUCTURE**

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[52] **U.S. Cl.** ..... **339/103 M,** 174/74 R, 219/245, 240/78 H, 339/213 R

[51] **Int. Cl.** **H01r 13/58**

[58] **Field of Search** ..... 339/101, 103 R, 103 B, 339/103 C, 103 M, 213 R, 213 S, 213 T, 112 R, 105; 240/78 H; 219/245, 256; 174/74 R

[56] **References Cited**

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3,665,374	5/1972	Denton	339/107 X

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[57] **ABSTRACT**

The invention is designed for use in an electric appliance having an electric cord secured to terminals therein by a portion having separated conductors extending outside the appliance and using a strain relief means clamping the conductors and adapted to mount in the appliance to reduce stress on the terminals. In this environment there is provided an improvement in the insulating structure of the cord that comprises at least a single insulator on one conductor extending primarily only from the clamping means away from the terminals and this insulator may be a glass tape. A second heavier glass sleeve type insulator is provided on the other conductor and its extends primarily only from the clamping means toward the terminals so that the clamping means, which may be a metal clip, is squeezed on the insulators which overlap within the clip so that only about half as much insulation is required as normal. The invention is especially adaptable to conductors covered with a molded chlorosulphonated polyethylene covering.

8 Claims, 2 Drawing Figures

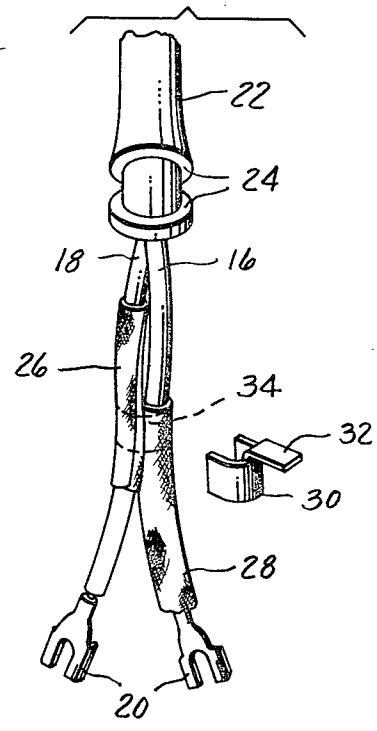


FIG. 1.

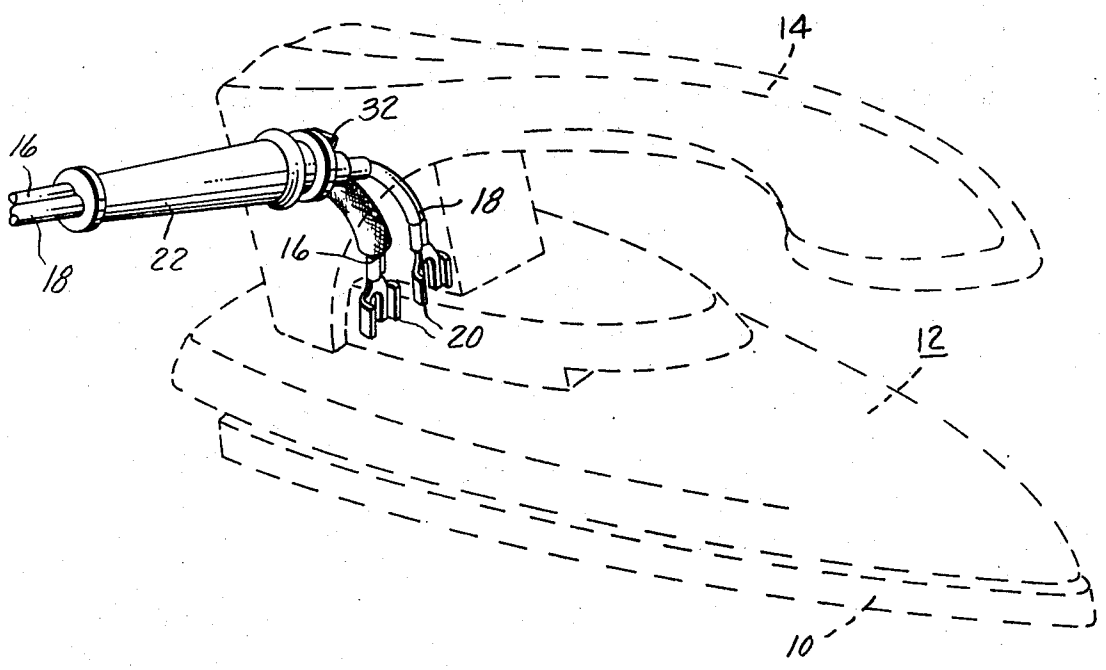
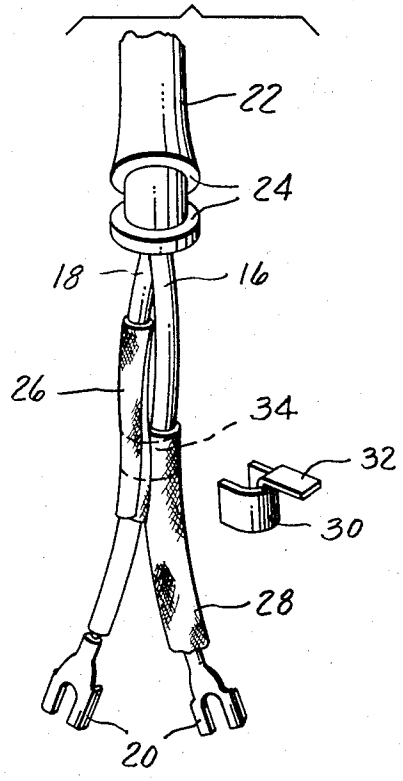


FIG. 2.



APPLIANCE CORD-CONNECTING STRUCTURE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention is directed to a specific cord insulating structure for use in an electric appliance, such as an iron, which uses the normal strain relief in combination with a different insulating structure so that the necessary insulation is reduced for a less expensive application.

2. Description of the Prior Art

Cord operated portable electrical appliances use various cord materials and, depending on the appliance, differing amounts of flexing of the cords occur in use. In time, the cord wears to expose the conductors or break them, resulting in potentially dangerous shorts. Also, some appliances such as irons can subject the cords to high temperatures and consequent burning or charring again setting up a potential danger. It is common to provide various forms of strain relief such as clamps or plates within the appliance to permit slack in the conductors between the appliance exit and the terminals to relieve stress on the terminals. Also, various parameters must be met to qualify for Underwriter Laboratory approval. A typical appliance that subjects the cord to stringent conditions is the electric flatiron and it is to this appliance the invention is directed although by no means limited. Normally cord for supplying current to an iron has been constructed in a manner known as heater parallel twisted conductors or better known as HPD heater cord. This uses cotton thread, uncured rubber, and then asbestos fiber topped by a braided cotton outer layer. It has been widely used and is generally successful but does have some disadvantages. If the hot soleplate contacts the outer braid it becomes scorched and weakens so that ultimately breaks exposing the asbestos and rubber eventually expose the conductors with consequent danger.

A later development is heater parallel neoprene or better known as HPN and this consists of two multistrand conductors coated with tin or covered with cotton thread or paper ribbon, coated with an insulating material such as neoprene rubber by extrusion of the rubber and conductors through a die so the extruded rubber holds the conductors apart and acts as an insulation between them and provides an outer covering. Flat extrusions include a connecting web like lamp cord so the conductors are easily rippable to separate them for connection to the terminals. This HPN heater cord has not been suitable for flatirons because it does not slide easily but tends to wrinkle the cloth and leaves marks as it is pulled across the cloth during ironing. A recent material that is an improvement on neoprene is chlorosulphonated polyethylene such as is available under the name "Hypalon." This slides easily over the cloth and does not mark it. More importantly, it has an extremely tough coating as well as being more resistant to high temperatures than neoprene. Hot irons on such a cord for several minutes do not damage it. If the conductors fail from constant flexing, because of the toughness of this polyethylene material, they simply open circuit with no arcing because they cannot penetrate the coating. Failures of such cords have generally resulted from flexing and U.S. Pat. No. 3,665,374 of common assignment is directed to an arrangement that relieves and reduces breakage because of flexing. Additionally, the use of this material has, to date, required a separate insulation in order to meet the Underwriter Laboratory requirements for use in an iron. The extra insulation normally requires only an additional sleeve over the polyethylene coating in order to meet temperature limitations required for iron application. An improvement to reduce the amount of insulation and still meet the requirements while lowering the cost of the product is needed.

SUMMARY OF THE INVENTION

Briefly described, the invention is for use in an electric appliance, such as a flatiron, having an electrical cord generally of the dual conductor type, secured to terminals in the appliance by a portion of the cord having separated conductors that extend outside the appliance and a strain relief means that clamps the conductors and is designed to mount in the appliance to reduce stress on the terminals. The invention consists in the improvement in the insulating structural arrangement of the cord which comprises at least a single insulator such as glass tape on one conductor extending primarily only from the clamping means away from the terminals. A second insulator such as a glass sleeve is provided on the other conductor to extend primarily only from the clamping means to or toward the terminals with the clamping means securing each insulator in an overlapping relation at opposite ends thereof to the conductors. The cord may be chlorosulphonated polyethylene molded over the conductors and the strain relief is a metal clip that is squeezed on the insulators to fix them in position and has an extending finger to abut the appliance for strain relief. The conductors may be turned to provide twisted alignment beyond the clamp in the separated portion to resist flexing. Thus, the main object is to provide an improved appliance cord-connecting structure for use in an electric appliance that has a different insulator arrangement to use half the insulation and which is especially adapted to the newer, tougher materials such as chlorosulphonated polyethylene.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** shows an electric iron in phantom with the cord-connecting structure applied thereto, and

FIG. **2** is a partial perspective of the cord insulating structure as used in FIG. **1** with the cord pulled out of its bushing.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention is applicable to any cord-connected appliance but is specifically applicable to an electric flatiron and will be described in connection therewith. An example of an iron using the cord herein is shown in U.S. Pat. No. 3,685,182 and the insulating arrangement disclosed herein is an improvement that may be added to the structure of U.S. Pat. No. 3,665,374 both of common assignment.

Referring to FIG. **1**, a flatiron of the light weight travel type is shown having a soleplate **10** heated by a suitable resistance unit embedded therein in a well known manner. Attached to the soleplate by suitable means is a cover **12**, the soleplate and cover together forming the body of the iron. Attached to the cover at the rear end of the iron is handle **14** which may be pivoted to be folded down against the top surface of the cover in a travel iron or may be unpivoted in a standard

iron. The newer and tough-coated cords may be extruded chlorosulphonated polyethylene comprising side by side web-connected conductors **16** and **18** for easy ripping. The cord may extend from the side of the iron as shown or from the top to be used by either a right- or left-handed operator. After entering the handle, to connect to the iron, the cord has a portion generally separated into plural conductors **16** and **18** that are secured to terminals **20** in the iron. To prevent strain on the cord being transmitted to the terminals **20**, it is customary to provide a clamping strain relief means of some form. Typically, such a relief may consist of a cover formed with a projecting toothed tongue to bite or compress and clamp the conductors against the iron and provide slack at the terminal region all as well-known as in the 3,665,374 patent. Some forms may use suitable separate metal clamps as shown at **39** in U.S. Pat. No. 2,727,322 of common assignment. It is common in irons to provide an elongated flexible sleeve bushing **22** that surrounds the cord and is anchored to the iron at one end by means, such as formed lips **24**, better seen in FIG. **2**, that engage under a matching flange in the handle. The bushing extends sufficiently far to prevent sharp cord bends at the iron and the strain relief means acting on the conductors is usually disposed between the anchor and terminals all as well-known in the art. Temperatures within the iron are higher, and even higher in the smaller travel-type irons than a regular iron because of the confined space so that the normal installation requires the use of additional insulation on the portion extending from lips **24** to the terminals **20** whether the cord is bare conductor or is covered with the molded tougher new materials because of UL requirements which states the chlorosulphonated polyethylene type cord must be insulated and it is treated as though the coating is not even there. The necessary requirements demand additional sleeve-like insulation all the way from the terminals to a specific distance outside of the appliance. Glass tape has served as an adequate insulation to meet certain temperature ranges but is inadequate inside the iron at the higher temperatures and a heavier glass sleeve is required there so this inner area becomes the determining one as far as extra insulation is concerned. Since the covering is recognized as no more than bare wire, it is possible to reduce the normal extra insulation approximately half by providing one form of insulation on the conductor outside of the iron and a second and more heat resistant insulation within the iron at the higher temperatures and use the strain relief to locate or fix these in position.

Consequently, it is possible to use at least a single insulator **26** on one conductor with the insulator extending mainly or primarily only from the strain relief back into the bushing **22** or on the outside of the iron. This may conveniently be a glass tape that is wound on conductor **18** as shown in FIG. **2**. Also, a second insulator **28** in the form of a heavier glass sleeve is provided on the other conductor and it also extends oppositely mainly or primarily only within the higher temperature portions within the iron. Thus, the insulators are of different grades of heat resistance or insulation and are conveniently a glass tape **26** in the cooler section and a heavier glass sleeve **28** in the hotter portion of the iron. In other words, separate pieces of insulation are used to extend from the clamping strain relief primarily in opposite directions to reduce the insulation required as seen in FIG. **2**.

Since the use of tape normally requires an adhesive, it is convenient to omit this by using the strain relief in the preferred form of metal clip **30** that is formed with an extending finger **32** to mount in and abut inside the appliance as shown in FIG. **1**. The clamping means or metal clip **30** is squeezed on the insulators to fix or secure each insulator at opposite ends by having the insulators overlap at the metal clamp as shown at **34** in the dotted portion and thus extend mainly oppositely from the strain relief as shown in FIG. **2**.

In order to protect against breakage during flexing it is highly desirable to use the tough chlorosulphonated polyethylene coating as previously stated and to turn the conductors to provide twisted conductors beyond the clamp in the rippably separated portion as taught by said U.S. Pat. No. 3,665,374 and shown in FIG. **2** herein. It should be appreciated that FIG. **2** shows the conductors pulled out of bushing **22** and, when installed, the twisted conductors are pulled back into the bushing up to clamp **30** which abuts against the inside of the appliance and against the formed lips **24** as shown in FIG. **1**. Thus, the single insulator **26** is disposed within the bushing and outside of the appliance in the lower temperature region whereas the insulator **28** is in the hotter region within the appliance. Since, as noted, the tougher polyethylene coating is not yet UL recognized it is treated as bare wire for insulating purposes. Thus, when the strain relief is a metal clip **30** it is necessary to insulated both conductors under the clip and to this end the overlapping arrangement lends itself well as held by the clip so that there is insulation between each individual conductor and the metal clip. Additionally, the clip fixes the different insulation **26** and **28** in position as well as serving the usual strain relief function. This securing arrangement obviates the need for any adhesive under the glass tape **26** and, while no adhesive is necessary in a sleeve, it also holds sleeve **28** in position.

Thus, the present invention effectively reduces the insulation normally used to approximately half and permits the use of different grades of insulation to reduce costs. It does this in the preferred mode while using the strain relief metal clip as an insulation securing means as well as retaining its strain relief function. The consequence is a less expensive insulation meeting all requirements and especially adaptable to a chlorosulphonated polyethylene molded coating although not limited thereto.

While there has been described a preferred form of the invention, obvious equivalent variations are possible in light of the above teachings. It is therefore to be understood that, within the scope of the appended claims, the invention may be practised otherwise than as specifically described, and the claims are intended to cover such equivalent variations.

I claim:

1. For use in an electric appliance having an electric cord secured to terminals therein by a cord portion having separated conductors extending outside said appliance and a strain relief means clamping said conductors and adapted to mount in said appliance to reduce stress on the terminals, the improvement in the insulating structure of said cord comprising,

at least a single insulator on one conductor extending primarily only from said relief clamping means away from said terminals, and

a second insulator on the other conductor extending primarily only from said relief clamping means toward said terminals,

said relief clamping means securing each insulator at opposite ends thereof to the conductors.

2. Apparatus as described in claim **1** wherein both said insulators overlap at said clamping means and are held thereby.

3. Apparatus as described in claim **2** wherein said insulators are of different grades of heat resistance.

4. Apparatus as described in claim **3** wherein said single insulator is a glass tape and said second insulator is a heavier glass sleeve.

5. Apparatus as described in claim **3** wherein the

cord covering said conductors is a chlorosulphonated polyethylene molded over said conductors and formed to rippably separate said conductors over a portion, and

said insulators are disposed over the covering.

6. Apparatus as described in claim **5** wherein said clamping means is a metal clip squeezed on said insulators and formed with an extending finger to abut inside the appliance.

7. Apparatus as described in claim **6** wherein said conductors are turned to provide twisted conductors beyond said clamp in the separated portion.

8. Apparatus as described in claim **7** wherein the single insulator is a glass tape and the second insulator is a heavier glass sleeve.

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