

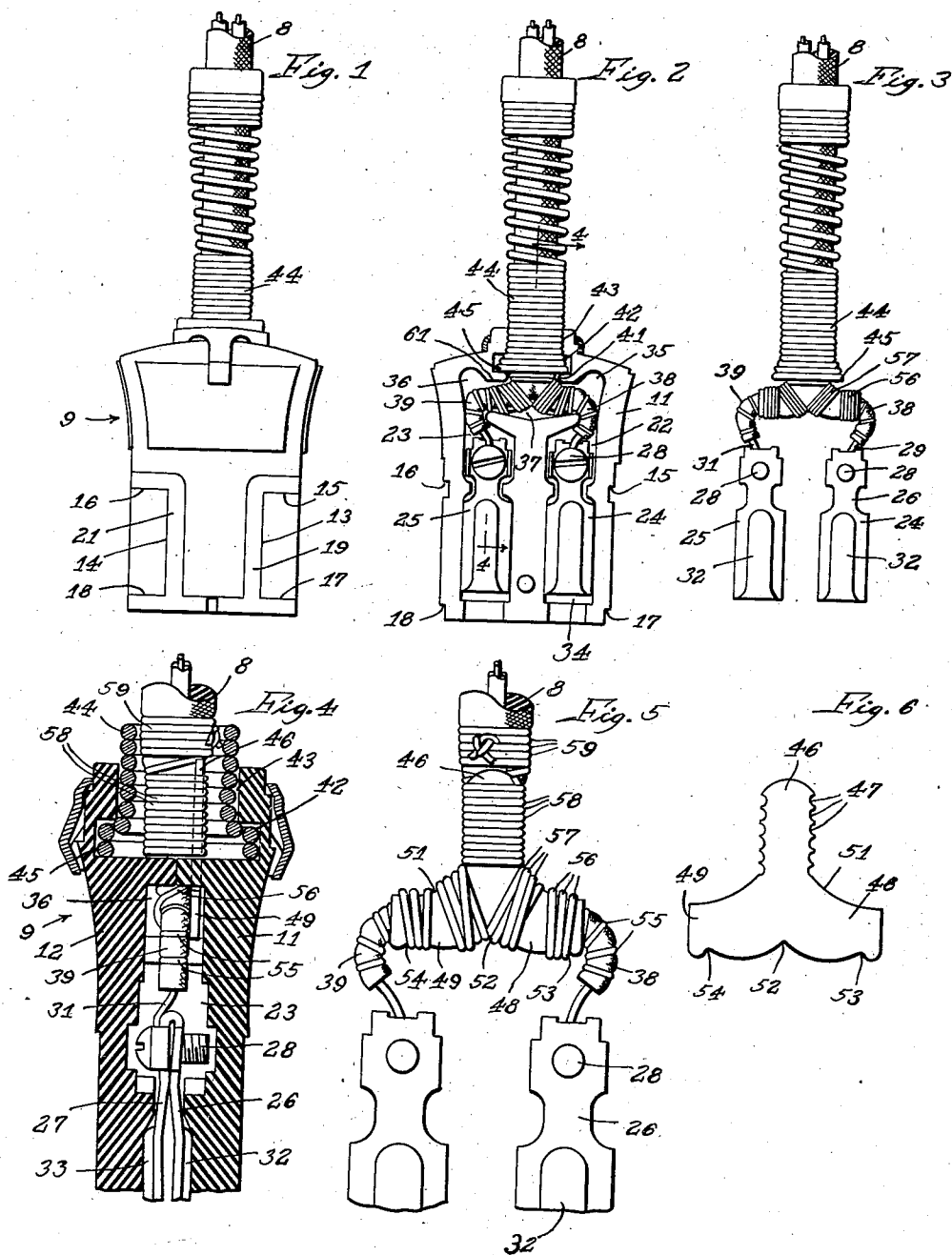
July 28, 1942.

J. DELMONTE

2,291,186

APPLIANCE PLUG AND CORD SET

Original Filed Aug. 1, 1938



Inventor:
Jack Delmonte

By

McLanna, Wintercorn & Marshall
Attys.

UNITED STATES PATENT OFFICE

2,291,186

APPLIANCE PLUG AND CORD SET

Jack Delmonte, Chicago, Ill., assignor to Chicago Flexible Shaft Company, Chicago, Ill., a corporation of Illinois

Continuation of application Serial No. 222,391, August 1, 1938. This application April 22, 1939, Serial No. 269,476

3 Claims. (Cl. 173-322)

This invention relates to appliance plugs and is directed more particularly to improvements in devices of this character designed to strengthen the same and to normally increase the life thereof.

This is a continuation of my copending application Serial No. 222,391, filed August 1, 1938.

One of the sources of serious difficulty in appliance plugs is the connection between the plug and the cord. Because of the nature of the devices with which the plugs are used and the fact that these devices are usually hot, the plug is commonly removed from the appliance by pulling on the cord. With a well made and efficient appliance plug the terminal posts of the appliance are gripped very tightly by the plug, and this, in addition to the growth of electrolytic corrosive products accompanying high temperatures and prolonged operation, makes the removal of the plug difficult and places a severe strain on the connection between the plug and the cord. As a result, the cord is frequently pulled loose from the plug and the device in this way seriously damaged. This is recognized by manufacturers as well as by the National Board of Fire Underwriters, the latter of which require that the connection shall withstand for a period of one minute a straight pull of fifty pounds applied between the cord and the appliance plug, and further that it should withstand for a period of one minute a torque of three inch pounds applied between the cord and the plug. These conditions are difficult to meet without very materially increasing the size of the plug and without making other changes in the shape and design of the plug, which in some instances will interfere with the operation thereof.

An important object of the invention is the provision of an appliance plug having improved means for retaining the cord therein and preventing the cord from pulling loose from the plug.

Another object of the invention is the provision of improved means for attaching or mounting the cord in an appliance plug.

I have also aimed to provide an appliance plug having an improved strain relief structure for transmitting the strain from the cord to the body of the appliance plug so that the force applied to the cord in withdrawing the plug from its terminals is not transmitted through the conductors.

Other objects and advantages will appear from the following description and the accompanying drawing, in which—

Figure 1 is a side elevation of an appliance plug embodying my invention;

Fig. 2 is a view similar to Figure 1 showing one section of the body removed;

Fig. 3 is an elevation of the cord, contacts and strain relief;

Fig. 4 is an enlarged section on the line 4-4 of Fig. 2;

Fig. 5 is an enlarged fragmentary view showing the manner in which the strain relief element is attached to the cord; and

Fig. 6 is a face view of the strain relief element.

In the present instance the preferred form of the invention is that shown in Figs. 1 to 6 and is embodied in an appliance plug having a cord 8 extending into a plug 9 consisting of two identical halves 11 and 12 of molded insulation material. The plug is of the general form disclosed in the U. S. Patent 1,595,348 to M. W. McArdle, and has longitudinally extending grooves 13 and 14 on each side of the plug and circumferentially extending grooves 15 and 16 connecting the upper ends of the grooves 13 and 14. The surface also has circumferentially extending grooves 17 and 18 at the lower end of the plug as appears from Figs. 1 and 2. Spring metal clips 19 and 21 are seated in the grooves, the clip 19 being seated in grooves 13, 15 and 17, and the clip 21 being inserted in the grooves 14, 16 and 18 spanning the junction between the halves at the edges of the plug so as to hold the two halves firmly together. Each of the halves is provided with spaced longitudinally extending recesses 22 and 23 on their inner faces for the reception of contact elements 24 and 25. The contact elements in this instance consist of a strip of electrically conductive spring metal bent upon itself substantially midway between its ends to provide opposed sides 26 and 27 which are drawn together by a screw 28, which also serves as a binding post for the attachment thereto of electrical conductors 29 and 31. The sides 26 and 27 are bent arcuately in a direction transversely of their length as shown at 32 and 33 for the reception of the conventional terminal posts of electrical appliances therebetween. The ends of the strips are flared outward slightly as shown at 34 to facilitate the entry of the terminals. The halves also have longitudinally disposed recesses 35 and 36 and a laterally disposed recess 37 for the reception of the insulated portions 38 and 39 of the individual wires comprising the cord 8. The halves also have a longitudinally disposed recess 41 joining the recess 37 and communicating with

semi-circular recesses 42 which, when the halves are placed together, form a circular recess of somewhat larger radius than the recess 41. Extending from the circular recess 42 are semi-cylindrical recesses 43 through which the cord enters the appliance plug. A sheath 44 of conventional form and made of coiled spring wire encloses the cord 8 and extends through the recess 43 into the circular recess 42, the lower turns of the sheath being larger than the intermediate turns as shown at 45 whereby the sheath is retained in the circular recess 42.

According to my invention, I employ a strain relief element such as shown in Fig. 6 which, in this instance, consists of a sheet of relatively thin insulation material such as that sold under the trade-mark "Micarta," and consists of cloth or other fibrous material impregnated with a synthetic resin. This element is in the general form of a T. The tail portion 46 of the T is provided with a plurality of serrations or arcuate cuts as shown at 47 extending along opposite edges thereof, and in this instance merges with the arms 48 and 49 of the element in a gradual curve as shown at 51. On the opposite edge of the arms a recess 52 is provided substantially midway between the ends of the arms, and recesses 53 and 54 are formed therein adjacent the ends of the arms.

In use, the strain relief element is seated against the cord at the point at which the individual conductors or strands are separated therefrom with the tail portion 46 resting against the protective exterior sheath of the cord and the arms 48 and 49 resting against the insulation of the individual conductors, as best shown in Fig. 5. The element is attached to the cord and the conductors by means of string filament, preferably of a strong variety such as a linen cord. The cord has a series of wrappings around the insulated portions 38 and 39 of the conductors as shown at 55. The cord has a further series of windings around the arms 48 and 49 of the element and around the insulated portions 38 and 39 of the conductors as shown at 56, the cord seating in the recesses 53 and 54. A further series of windings as shown at 57 binds the insulated portions 38 and 39 of the conductors to the arms 48 and 49 directly at the point at which the conductors are separated from the main body of the cord, the winding being seated in the recess 52. A further series of windings as shown at 58 bind the body of the cord 8 against the tail piece 46 of the strain relief element, the binding cord seating in the serrations 47. A further winding as shown at 59 is slightly beyond the end of the tail piece 46 and extends around the braid on the cord 8, and in this series of windings the ends of the winding cord are tied tightly together. All of these windings are comparatively tight and the windings 58 and 59 are such that the linen thread or cord becomes seated or embedded in the outer braid of the cord 8 during the winding.

It will be seen that this structure is of such size that the conductors and the arms 48 and 49 of the strain relief element will seat in the recess 37 of the plug body in such manner that the upper edges 51 of the element will bear against a shoulder 61 which forms the junction between the recess 41 and the recess 37. At the same time the tail piece 46 will extend upwardly through the circular recess 42 and the cylindrical recess 43 as best shown in Fig. 4. When strain is applied to the cord 8 for the purpose of withdraw-

ing the appliance plug from its appliance, the strain is transmitted from the silk outer covering of the cord 8 through the windings 58 and 59 to the strain relief element and thence through the arms 48 and 49 directly to the body without imposing any strain whatever upon the conductors or strands 29 and 31 and the screws 28. Likewise this strain is transmitted through the conductors to the strain relief element and thence to the body. The serrated edges 47 of the tail piece prevent any slippage of the cord along the tail piece when force is applied to the cord. Likewise, the recess 52 prevents any relative movement of the cord or the conductors with respect to the strain relief element, and prevents misplacement or sliding of the windings 57.

From the foregoing it will be observed that my invention provides a body of strain-resisting material applied to an electric attachment cord in such manner as to transmit from the cord to the terminal plug the tension and twisting forces incidental to usage of the cord set and that these forces are transmitted in such manner as to avoid any harmful effects to the insulated conductors and the connection of the terminal ends of these conductors to the contact elements in the plug. It will be particularly noted that the strain-resisting member is tightly bound or clamped to the body of the cord, that is, to the exterior protective sheath which in this instance is a woven fabric and serves to protect the insulated conductors from mechanical abrasion. According to my invention the tension and twisting forces on the cord are transmitted through this exterior protective sheath and thence through the strain-resisting material to the interior shoulders in the plug so that the harmful or destructive effect of these forces is not brought to bear on the branched insulated conductors. By means of my invention the electrical insulation so necessary to the conductors is effectively protected against wear and abrasion as a consequence of the tension and twisting forces on the cord. Also, the conductors are protected against loosening from their connections with the terminal contact elements in the plug. It will be observed that in all forms of my invention the harmful forces referred to are transmitted directly from the sheathed portion of the cord and through the strain-resisting material in such a way that the branched insulated conductors are free from the destructive effects of these forces. My invention is not limited to the particular form of means for binding, clamping or securing the strain-resisting material to the sheathed portion of the cord but contemplates broadly any suitable means for this purpose.

The present embodiments of the invention are shown by way of illustration, but I do not wish to be limited except as required by the prior art and the appended claims, in which I claim:

1. The combination in a cord set of a double conductor appliance cord having the separate conductors thereof branching therefrom at its ends, a terminal plug having an opening for the reception of the cord and laterally disposed recesses branching therefrom in opposite directions to provide shoulders at the junctions therebetween, and to receive the separate conductors, a strain relief element attached to said cord and said conductors at the junction therebetween and seated in said opening and said recesses to bear against said shoulders, said element comprising a sheet of strain resisting material having an approximate T shape, and a string for tying the

element to the cord and conductors, said string being wound around said conductors to prevent raveling of the insulation thereon, around said conductors and the ends of the arms of said element, around the conductors and the arms adjacent the tail portion of the element, around the cord and the tail portion of the element and around the cord beyond the end of the tail portion.

2. The combination with a cord and plug set of a strain relief element comprising a sheet of insulation material having a central tail portion and laterally disposed arms, said tail portion having a plurality of serrations along its edges, said arms having a central recess opposed to said tail portion, and recesses adjacent their ends, said recesses and serrations serving for attachment of the element to the cord.

3. The combination in a cord set of an appli-

5
10
15
ance cord having the separate conductor ends branching therefrom, a terminal plug having an opening for the reception of the cord and laterally disposed recesses branching therefrom in opposite directions to provide shoulders at the junctions therebetween, and to receive the separate strands, a strain relief element attached to said cord and said strands at the junction therebetween and seated in said opening and said recesses to bear against said shoulders, said element comprising a sheet of insulation material having an approximate T shape, and a string wound around the tail of said element and said cord and around the arms of said element and said strands to bind the element firmly to the cord whereby force applied to the cord is transmitted to the plug through said element.

JACK DELMONTE.