June 4, 1968 D. G. WHEELER 3,387,254

STRESS-RELIEVING DEVICE FOR ELECTRICAL PLUGS

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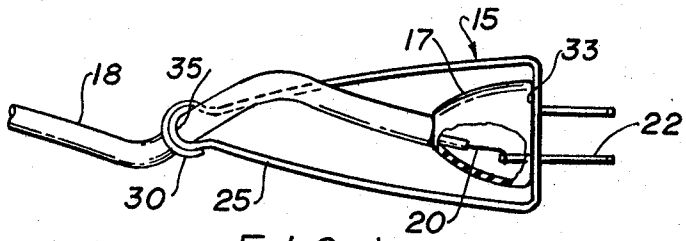


FIG. 1

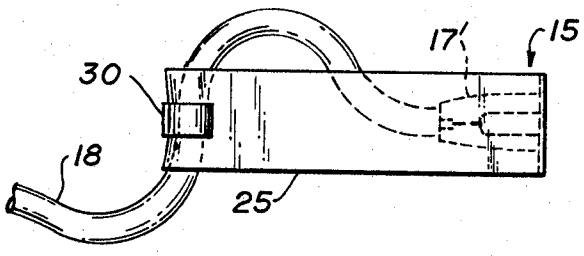


FIG. 2

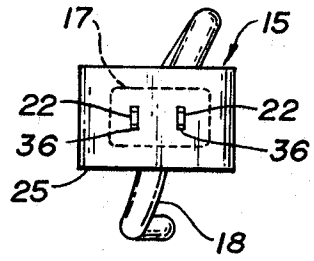


FIG. 3

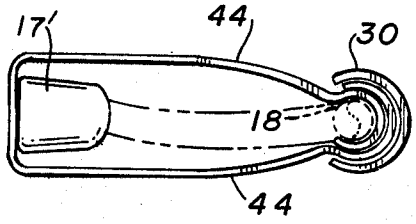


FIG. 5

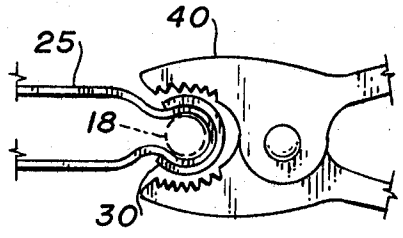


FIG. 4

INVENTOR.
DAVID G. WHEELER

BY

Townsend and Townsend

ATTORNEYS

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STRESS-RELIEVING DEVICE FOR ELECTRICAL PLUGS

David G. Wheeler, 1703 Orleans Court, Walnut Creek, Calif. 94598

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This invention relates to electrical plug connectors.

Electrical cords are conventionally attached to their plug connectors in such a manner that when the male and female plugs are relatively removed from each other, there is a psychological tendency of the operator to pull the cord rather than the plug structure itself. In such instances, the electrical conductors interior of the cord are frequently severed from contact with the connector thereby causing shorts and open circuits.

Previously, certain plug constructions have been formed which provide a sufficient grip on the plug so that the aforesaid problem is greatly minimized. However, there are still many connectors in which the weak link in the physical construction of the plug arrangement is the connection of the conductor interior of the cord to the plug assembly itself.

The subject invention is concerned with an apparatus which can be mounted on conventional electrical plugs in such a way as to mechanically grip the cord at a position spaced from the connector and transmit the plug removing force through the device to the body or housing of the plug, thus avoiding stressing of the cord conductor.

A feature and advantage of the device lies in the fact that pulling the cord leading to the plug stresses the cord at the connection to the adapter of this invention whereby the pulling force is then transmitted to the plug housing itself. There is provided a slack excess of the electrical cord between the point of contact with the adapter and with the plug housing which completely isolates the juncture of the electrical conductor from pulling stress at the housing.

A further object of this invention lies in the fact that it can be readily attached to existing connectors without in any way modifying the electrical conductor connection to the plug.

A further objective of this invention is to frictionally reinforce the attachment of a plug to its adjoined cord by providing a compressive cord gripping clamp which utilizes an interposing layer of dielectric material so as to uniformly grip the cord over a portion of its length and provide the insulation necessary for safe friction plug attachment.

Other objects, features and advantages of the present invention will be more apparent after referring to the following specification and drawings in which:

FIG. 1 is a plan view of a male plug connector with a stress relief attachment installed thereon;

FIG. 2 is a side view of a female plug connector with a stress relief attachment installed thereto;

FIG. 3 is an end view of a plug connector and stress relief attachment according to the present invention;

FIG. 4 is a plan view of that portion of the attachment which is installed to the cord of the plug connector; and

FIG. 5 is a plan view of a plug connector with an installed alternate embodiment of the stress relief attachment.

With reference to the drawings and in particular to FIGS. 1, 2 and 3 thereof, stress relief attachment **15** is shown attached to connector housing **17** and its appended cord **18**. As can be seen in the partial section of FIG. 1, cord **18** is attached to housing **17** through its internal conductor **20** at conductive member **22**. Without the

attachment of stress relief attachment **15**, any tensional or pulling force on cord **18** will be transferred to housing **17** through conductor **20**. As conductor **20** is chosen for its electrical properties and not for its tensile strength, this element represents the weakest link in the connector-cord union and tensional failures frequently occur along its length. While this defect is frequently remedied in the art by the attachment of an entirely different housing which securely grips the cord independent of conductor **20**, such a correction wastes the plug connector originally furnished with the appliance, requires the furnishing of a substitute housing, and makes the relatively laborious alteration of the internal electrical communications of the connector necessary. Accordingly, the present invention relates to a simple stress relief attachment which reinforces such a connector-cord union utilizing the original housing **17**.

Stress relief attachment **15** is composed essentially of two main components: flexible dielectric belt or loop **25** and compressible clamp **30**. Belt or loop **25** is typically a flat, endless strip of flexible dielectric material such as plastic, nylon and the like. Typically, loop **25** is curved normal to its flat surface and has a circumference which is larger in diameter than housing **17**. In width, loop **25** is slightly wider than that portion of housing **17** which it is designed to adjoin but has a small thickness normal to its flat surface which will not appreciably interfere with the penetration of the associated conductive member **22** when the connector is installed for electrical communication with a mating connector. Clamp **30** is comprised typically of a strip of soft metal, such as copper and the like, which may be pre-formed to fit over both cord **18** and a wrapped portion of loop **25**, as will hereinafter become apparent. In width, clamp **30** is equal to or less than the width of loop **25** so that the material of the clamp will not be in direct contact with the insulation of cord **18**.

In the installation of stress relief attachment **15**, loop **25** is adjoined along its interior flat surface to housing **17** at first portion or end **33**. End **33** is configured with apertures **36** therein which are medially located on the width of loop **25** and are of sufficient size to allow passage of conductive member **22**. If housing **17** is a male member (as illustrated in FIG. 1), apertures **36** are fitted over conductive members **22**, thereby centering loop **25** in its mating engagement with the housing. Alternatively, if housing **17'** is a female member (as illustrated in FIG. 2), first portion **33** is centered in its making engagement with housing **17'** so that members **22** of a male connector may pass through apertures **36**. As is readily apparent, both mating engagements may be adhesively reinforced with glue and the like to secure loop **25** to housing **17**.

Second portion **35** is wrapped about cord **18** so as to slack the cord between the point where it is wrapped and housing **17**. Clamp **30** is attached to loop **25** at second portion **35** receiving cord **18** in locked engagement with the dielectric of loop **25** therebetween. Typically, clamp **30** is attached by pliers **40** as illustrated in FIG. 4. In the compressed position, clamp **30** typically encompasses more than 180° of the periphery or circumference of cord **18**. This mode of frictional attachment utilizes the interposed dielectric material to uniformly grip cord **18** over a section of its length distributing the compressive load of the locked engagement and at the same time reinforcing the electrical insulation at the point of attachment.

When an operator extracts the connector by pulling on cord **18** from beyond attachment **15**, loop **25** is tensionally stressed due to its frictional attachment to the cord. Loop **25** compresses at first portion **33** against housing **17**, in effect pushing the housing out of engagement with the mating connector. Conductor **20** is not stressed as cord

18 is slack between its locked engagement with clamp 30 and housing 17.

An alternate embodiment of attachment 15 is shown in FIG. 5, utilizing dielectric band 44 in place of loop 25. Band 44 is identical in dimension to loop 25 with the exception that its ends are not joined to form an endless belt. The band 44, longer in length than housing 17, is attached to the housing in a manner similar to the attachment of loop 25 as hereinbefore described. The ends of band 44, illustrated in FIG. 5, are embracingly wrapped about cord 18 at a distance from housing 17 so that the cord is slack between the place where it is wrapped and the housing. Clamp 30 is attached to the ends of band 44 and receives cord 18 in locked engagement when compressively attached.

As is apparent, the present invention may be readily adapted to connector housings which have any number of conductive members associated therewith. Further, the apertures may be varied in size to include more than one conductive member. While two embodiments of the present invention have been shown and described, it will be apparent that other adaptations and modifications can be made without departing from the spirit and scope of the disclosed invention as limited by the appended claims.

What is claimed is:

1. A stress-relieving device for electrical plug connectors of the type having a housing with at least one conductive member associated therewith and a cord connected to said housing by a conductor interior of said cord, said device comprising: an endless flexible dielectric loop having a size greater than said housing; said loop having first and second portions on diametrically opposite ends thereof; means on said first portion to connect the face of said housing to said loop with said housing being located on the interior of said loop; clamp means mounted to the second portion of said loop to receive said cord in locked engagement therewith, said cord being looped between said clamp means and said housing sufficiently to relieve tensional forces applied to said cord at the juncture of the electrical connector and said cord.

2. A stress-relieving device for electrical plug connectors according to claim 1 wherein: said conductor member is formed of a protruding element and said means on said first portion comprises a medial aperture configured for receiving said protruding element whereby said loop is centered on said face by said member in the position of attachment.

3. A stress-relieving device for electrical plug connectors according to claim 1 wherein: said clamp means comprises a metallic clamp externally mounted about said cord with said loop therebetween.

4. A stress-relieving device for electrical plug connectors according to claim 3 wherein: said means of said metallic clamp encompasses more than 180 degrees of the periphery of said cord.

5. A stress-relieving device for electrical plug connectors of the type having a housing with at least one conductive member associated therewith and a cord connected to said housing by a conductor interior of said cord, said device comprising: a flexible dielectric band having a length greater than the length of said housing; means on said band for attachment of said band to said housing; clamp means mounted to portion of said band to receive said cord in clamped engagement therewith, said clamped engagement including at least one of said portions of said band wrapped in embracing relation about said cord, said cord being slack between said clamp means and said housing sufficiently to relieve tensional forces applied to said cord at the juncture of the electrical connector and said cord.

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RICHARD E. MOORE, *Primary Examiner.*