June 3, 1969 N. SZEREMY ET AL 3,448,429

COMBINED CORD CONNECTOR AND STRAIN RELIEF WITH RECEPTACLE

Filed Dec. 5, 1967

FIG. 1.

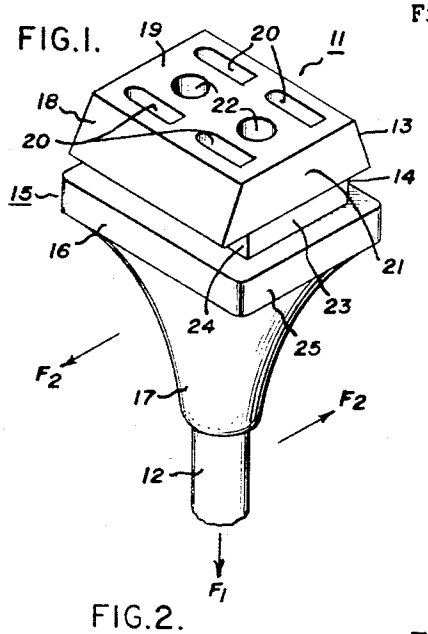


FIG. 5.

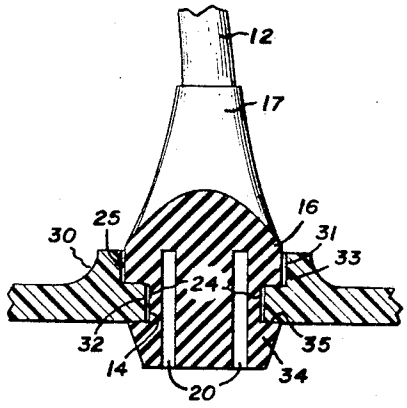


FIG. 2.

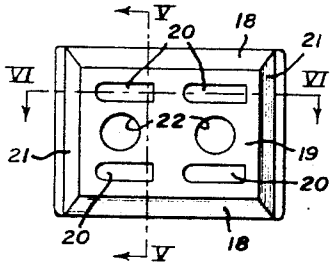


FIG. 3.

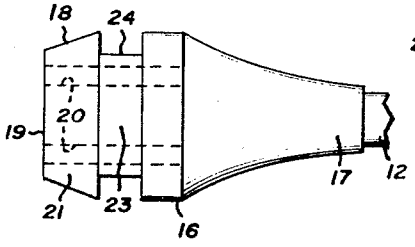


FIG. 4.

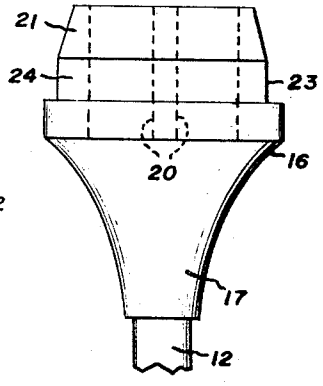


FIG. 6.

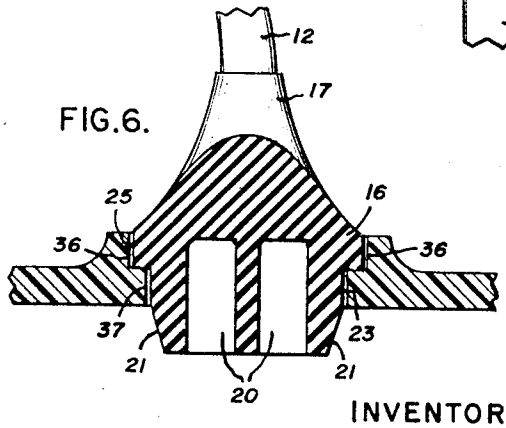
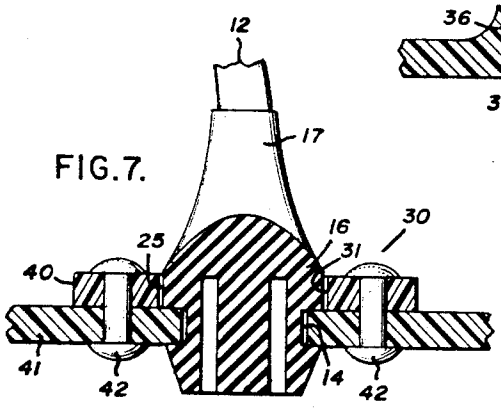


FIG. 7.



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COMBINED CORD CONNECTOR AND STRAIN RELIEF WITH RECEPTACLE

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Int. Cl. H01r 11/04, 13/58
U.S. Cl. 339—61 5 Claims

ABSTRACT OF THE DISCLOSURE

A combined cord connector and strain relief including a tapered portion, a neck portion, and a shoulder portion is inserted into an opening in a receptacle including a well portion and a retention portion. The combined cord connector and strain relief is of a rectangular cross-sectional configuration across its longitudinal axis and the opening in the receptacle is of a mating configuration. The tapered portion of the cord connector and strain relief includes two opposing inclined deflecting surfaces which flare outwardly in contrast to a neck portion of reduced cross-sectional area retained by inwardly projecting catch members in the retention portion of the receptacle. The shoulder portion of the cord connector and strain relief extends into mating relationship with the well portion so as to resist a disconnecting force normal to the axis of the connection.

Background of the invention

The present invention relates to electrical connectors, and more particularly, to combined electrical cord connectors and strain reliefs which mate with a receptacle in electrical equipment and appliances.

This invention is particularly useful in power supply cords for television receivers although it is appreciated that it is not limited to such a use and is readily adaptable to all types of electrical apparatus.

At the present time, snap-in connectors do exist in the art. The snap-in connectors disclosed therein, which are readily adaptable to a television receiver, include a tapered portion which is inserted in a receptacle and retained at a neck portion which is engaged by a retention means. Although these snap-in connectors have eliminated the need for riveting a connector in place, only those connectors which taper from the cord to a contact surface may be used wtihout a slot extending from the receptacle and providing means for slipping the snap-in connector in place.

Although the slot and snap-in connector technique will withstand a 35 lb. pull along the axis of the connector or in a direction normal thereto, the snap-in variety which tapers from the cord to a minimal cross-sectional area at the contact surface has been unable to meet the 35 lb. test pull requirement. In order to allow insertion of the tapered portion into the receptacle of a limited opening, it has been necessary to provide relief areas within the tapered portion to allow deflection of the outer surfaces. When these relief areas are provided, the resistance to a pull normal to the axis of the connector is greatly reduced and the connector is unable to meet the 35 lb. test pull in that direction. It has been the necessity for providing these relief areas in order to avoid a slot and facilitate a snap-in action which has imposed limitations on these connectors in the prior art.

Summary of the invention

It is therefore the object of this invention to provide a snap-in cord connector and strain relief which will snap-in with relative ease and withstand a disconnecting pull along the axis of the connector.

And it is a further object of this invention to provide a receptacle for receiving the combined cord connector and strain relief which will provide resistance to a disconnecting pull normal to the axis of the connector.

Briefly stated, and in accordance with one embodiment of the invention, there is provided a combined cord connector and strain relief including a tapered portion, a neck portion, and a shoulder portion which is inserted into a receptacle including a well portion receiving the shoulder portion in mating relationship therewith and a retention portion including catch members projecting into the neck portion. The tapered portion also includes relief areas behind inclined deflecting surfaces of the tapered portion so as to facilitate the snap-in action while the well portion receiving the shoulder portion provides resistance to a disconnecting force normal to the axis of the connection.

Brief description of the drawing

The specification concludes with claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention. The invention may also be understood from the following description taken in connection with the accompanying drawings in which:

FIGURE 1 is a perspective view of a combined cord connector and strain relief;

FIGURE 2 is a frontal view disclosing the contact surface of the combined cord connector and strain relief of FIGURE 1;

FIGURE 3 is a side view of the connector of FIGURE 2;

FIGURE 4 is a top view of the connector of FIGURE 2;

FIGURE 5 is a cross-sectional view of the connector along section lines V—V of FIGURE 2 in combination with a molded receptacle;

FIGURE 6 is a cross-sectional view along section lines VI—VI of the connector of FIGURE 2 in combination with the molded receptacle; and

FIGURE 7 is a cross-sectional view of the connector of FIGURE 2 taken along section lines V—V in combination with an alternative receptacle.

FIGURE 1 discloses a cord connector and strain relief **11** which may be easily snapped into a receptacle to be described at length later in this specification, which receptacle, cord connector and strain relief are extremely resistant to disconnective forces directed along the longitudinal axis of the connector combination as well as normal to that axis. These disconnective forces are shown as force F_1 which is directed along the longitudinal axis and forces F_2 which are directed normally to that axis. The connector **11** which extends from a cord **12** may be essentially subdivided into three portions: a tapered portion **13**, a neck portion **14**, and a shoulder portion **15**. The shoulder portion **15** may in turn be subdivided into an upper shoulder portion **16** and a lower shoulder portion **17**. In order to achieve the snap-in feature, all portions are integrally molded from a body of resilient material which may comprise a variety of plastics or elastomerics although vinyl has been found to be quite successful in providing the appropriate resilience while not sacrificing the necessary resistance to the disconnective forces F_1 and F_2.

Referring now to FIGURES 2–4 along with FIGURE 1, there is disclosed a tapered portion **13** in some detail. This portion is of substantially rectangular cross-section, although various configurations are available in the alternative, defining two opposing deflecting surfaces **18** which are inclined to the axis of the connector. These are inclined to provide a taper resulting in a reduced cross-sectional area at a contact surface **19** and an enlarged cross-sectional area adjacent the neck portion **14**.

In order to allow these inclined surfaces **18** to be deflected when inserted into the receptacle, relief areas **20** are provided which extend substantially longitudinally from the contact surface **19** toward the cord **12.** Thus insertion of the connector **11** into the receptacle will result in a force parallel to the force F_2 to be applied to the surfaces **18** by the restrictive opening of the receptacle.

End surfaces **21** are also inclined slightly although they remain undeflected since, as shown in FIG. 4, they taper inwardly from the neck portion **14** rather than cantilevering over the neck portion **14** as do the surfaces **18.** Consequently, additional relief areas are not required for the embodiment shown.

The actual electrical connection of the connector **11** with the mating receptacle may take various forms although the embodiment disclosed herein includes female connective means embedded in the connector **11** and ending at the contact surface **19** at apertures **22.** It is, of course, readily appreciated that male connective means might be utilized at the contact surface **19** while female connective means could be utilized in the receptacle.

The neck portion **14** is disclosed as also being rectangular in cross-section to define opposing end surfaces **23** and opposing side surfaces **24.** As mentioned above, the surfaces **18** are cantilevered over the side surfaces **24** so as to achieve a neck configuration providing the snap-in feature. In contrast, the end surfaces **23** extend axially from the edges of the surfaces **21,** although it is again appreciated that provision for relief areas could allow these end surfaces **21** to be cantilevered. Both the end surfaces **23** and the side surfaces **24** extend toward the cord **12** in a substantially parallel direction to the axis of the connector. The parallelism has been found to adequately resist the forces F_2, although actual parallelism would not be essential, if a receptacle were provided of a complementary shape.

The shoulder portion **15** extends outwardly from the surfaces **23** and **24** in a direction parallel to force F_2 (normal to the longitudinal axis of the connector) to complete the neck portion and achieve the snap-in feature. In the upper shoulder portion **16,** the axially extending surfaces **25** formed by the rectangular cross-section extend a distance substantially equal to the longitudinal length of the neck portion **14** so as to provide sufficient resistance to the forces F_2 when in the receptacle. It is, of course, possible to allow these longitudinal surfaces **25** to extend a substantially greater length to achieve even greater resistance to the force F_2. In fact, it would be possible to eliminate the taper in the lower shoulder portion **17** assuming a rather deep receptacle, although increased costs for materials and esthetic considerations may dictate otherwise.

A receptacle **30** referred to previously is disclosed in FIGURES 5 and 6 with the snap-in connector **11** inserted. As may be seen, the receptacle may be integrally molded as part of the back of a television receiver, if that should be the application of the invention, so as to minimize cost. The receptacle **30** is subdivided into essentially two portions, a well portion **31** which receives and mates with the upper shoulder portion **16** and a retention portion **32** which receives and mates with the neck portion **14.**

Referring first to FIGURE 5, the cross-sectional view provided therein reveals the parallel relationship of internal well surfaces **33** and the axially extending surfaces **25.** Similarly, there is revealed the mating relationship of catch means **34** with surfaces **35** substantially parallel with, and in close proximity to, the surfaces **24.** An appreciation for the ease with which the snap-in action occurs may also be obtained from FIGURE 5 wherein the relief areas **20** are more fully disclosed. It is the combination of the well portion and these relief areas **20** which have allowed this embodiment of the invention to meet the requirement of the Underwriter's Labaratory.

FIGURE 6 discloses well surfaces **36** of the well portion which are maintained at right angles with well surfaces **33** in order to achieve complete resistance to the normal forces F_2. The parallel relationship between the well surfaces **36** and the axially extending surfaces **25** and the similar relationship between surfaces **38** and the opposing surfaces **23** may be observed. It may be seen that the relief areas **20** which allow the snap-in action are substantially coextensive with the inclined deflecting surfaces **18** so as to enhance the ease of insertion.

FIGURE 7 is included so as to indicate flexibility of manufacturing techniques for the receptacle **30.** As shown, the well portion **31** is effected by securing the substantially doughnut-shaped member **40** to a base member **41.** This particular embodiment would be of considerable applicability in television receivers wherein the back member comprises a laminate; i.e., Masonite. The doughnut-shaped well portion **40** may, of course, be secured to the base member **41** by a variety of means including rivets **42.**

As mentioned previously, it is fully appreciated that the cross-sectional configuration of the receptacle **30** and the connector **11** may vary considerably within the scope of the invention providing the coextensive and complementary nature of the well portion and shoulder portion are maintainend and sufficient relief areas are provided for the inclined surfaces to be deflected. It is also appreciated that other embodiments of this invention are available, and it is not desired that the invention be limited to the particular form shown and described.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. An electrical connector comprising:

a combined cord connector and strain relief including a body of resilient material, said body including a tapered portion, a neck portion, and a shoulder portion, said tapered portion including a contact surface and deflecting surfaces cantilevered over said neck portion and inclined to form an enlarged cross-sectional area at said neck portion and a reduced cross-sectional area at said contact surface, said tapered portion including a plurality of relief areas extending substantially axially from said contact surface toward said neck portion; and

a receptacle receiving said body, said receptacle including a well portion with an opening receiving said shoulder portion in complementary relationship therewith and a retention portion including catch members projecting inwardly from said well portion to said neck portion.

2. The electrical connector as recited in claim **1** wherein the cross-sectional configuration of said tapered portion includes two opposing deflecting surfaces with the relief areas adjacent thereto, and further includes an opening in said retention portion which is substantially rectangular.

3. The electrical connector as recited in claim **2** wherein the cross-sectional configuration of said shoulder portion and the opening of said well portion are rectangular, said shoulder portion and said well portion including substantially mutually parallel surfaces.

4. The electrical connector as recited in claim **3** including female connective means embedded in said body, said female connective means having apertures in said contact surface adapted to receive male connective means positioned within the opening of the receptacle.

5. The electrical connector as recited in claim **1** wherein said receptacle is an integrally molded unit.

References Cited

UNITED STATES PATENTS

3,116,960	1/1964	Olsson et al.	339—128
3,387,253	6/1968	Salners et al.	339—102

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339—102, 128