United States Patent

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[72] Inventor **Edmund M. Waller, Sr.**
3228 Sleepy Hollow Road, Falls Church, Va. 22046

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[54] **INTERLOCKING ELECTRICAL CONNECTOR**
4 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **339/192,** 339/103, 339/196, 339/91
[51] **Int. Cl.** **H01r 13/06,** H01r 13/54
[50] **Field of Search** ..... 339/103, 196, 191, 91 F, 20, 21, 198, 176, 258, 252

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Primary Examiner—Richard E. Moore
Attorneys—Clarence A. O'Brien and Harvey B. Jacobson

ABSTRACT: Male and female electrical connectors, each having contacts bent medially to provide one portion overlying another portion. The female connector includes an offset stepped socket which permits contact engagement within the socket thereby preventing separation of the connectors under the influence of outwardly pulling forces.

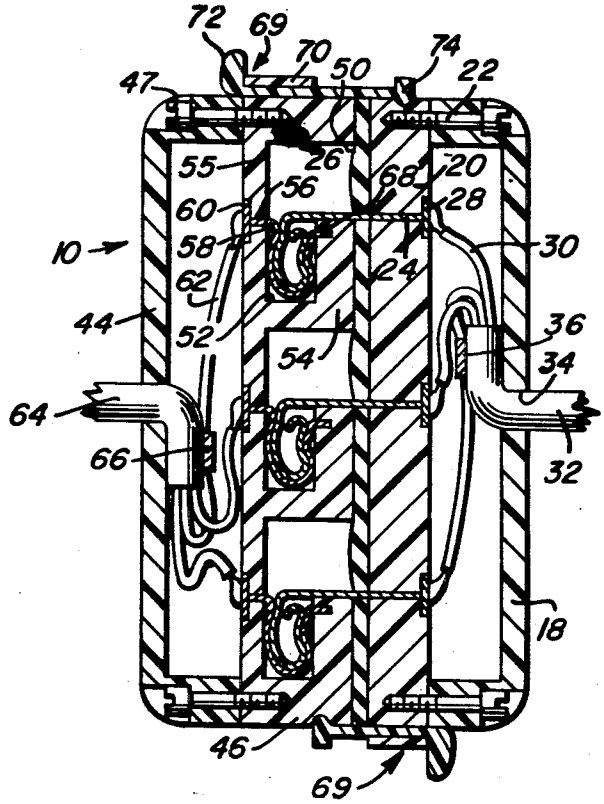


Fig. 1

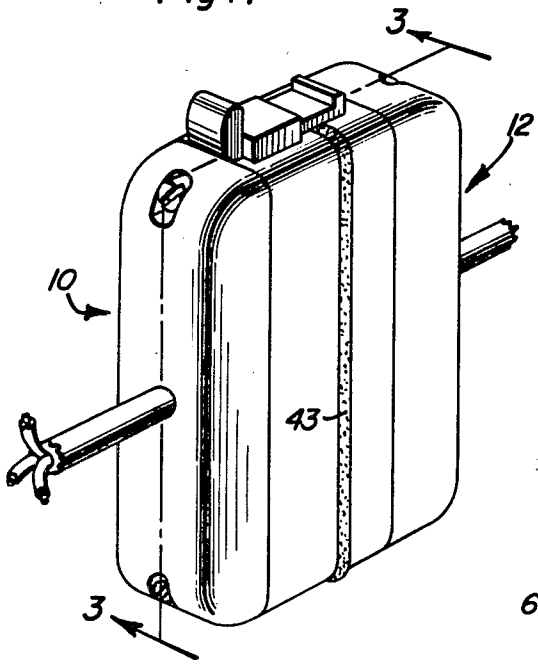


Fig. 3

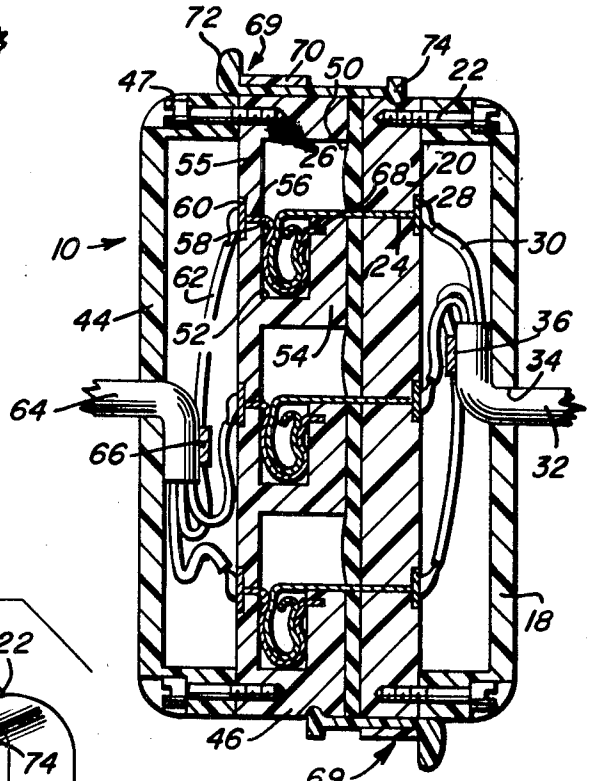
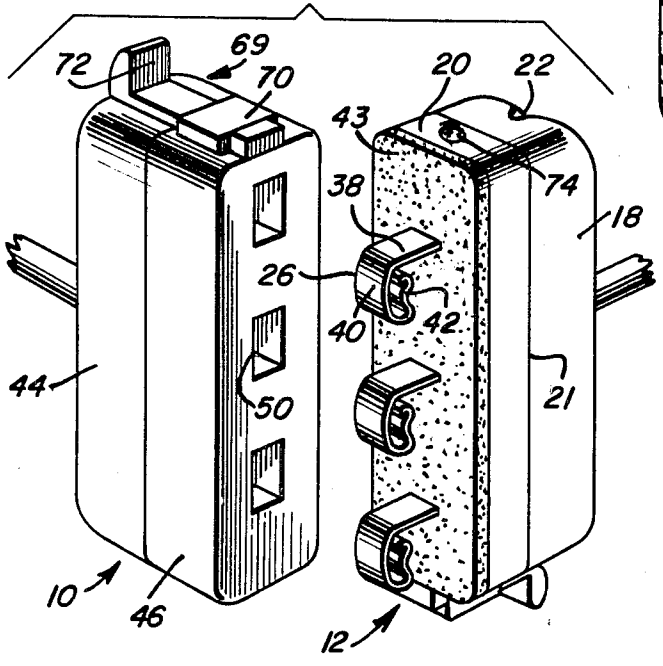


Fig. 2



Edmund M. Waller, Sr.
INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

INTERLOCKING ELECTRICAL CONNECTOR

The present invention relates to electrical connectors.

A primary disadvantage of conventional electrical connectors is their inability to withstand unintentional separating pulling forces. In many applications, when it is desired to secure two connectors together, tape or clamps must be employed. As will be appreciated, these rather crude techniques for securing the connectors together are time-consuming.

The present invention is directed to mating connectors which can withstand separating forces having a tendency to separate the connectors. The contacts employed in the male and female connectors are sinuous in design thereby permitting extended overlying engagement between the two contacts. The female connector includes an offset stepped passageway which seats the female contact and upon insertion and engagement of the male contact therein, the male contact is precluded from outward displacement due to its disposition in the offset passageway. Accordingly, in applications where pulling or tensile forces are exerted upon one or both connectors, electrical continuity is insured.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIG. 1 is a perspective view of the male and female connectors in an engaged position.

FIG. 2 is a perspective view illustrating the male and female connectors in a separated position.

FIG. 3 is a transverse sectional view taken along a plane passing through section line 3—3 of FIG. 1.

Referring to the drawings and more particularly FIG. 1, the present invention is seen to include an electrical connection comprising a female connector **10** and a male connector **12**.

Referring to FIGS. 2 and 3 there will be shown the structure of the male connector **12** which includes a hollowed elongated shell **18** which is removably secured to a base plate or member **20** having a generally rectangular cross section. The shell **18** and base member **20** have flush peripheral sides. The members are secured together by means of suitable fasteners **22** which pass through the shell **18** and are received in the base member **20**.

As will be seen by referring to FIG. 3, three longitudinally aligned and spaced apertures **24** are formed in the baseplate **20** to permit insertion of the elongated portion of contacts **26**. Considering the structure of each identical contact, the inward end of the contact extends into the shell **18** and provides means for attaching a terminal wire portion thereto as indicated by **28**. Each contact has an associated wire **30** connected thereto, the wire forming a portion of a cable **32** which passes through an aperture **34** in the connector housing **18**. A generally U-shaped clamp **36** is suitably fastened to the interior of the shell **18** and serves to clamp the inwardly disposed portion of cable **32** to the shell thereby inhibiting wrenching of the cable from the connector.

The particular configuration of the contact will be seen by viewing FIG. 2 wherein there is shown the outwardly extending portion of contact **26** including an exposed elongated portion **38** integrally appending to an arcuate portion **40** which curves inwardly toward the base member **20**, and is finally deformed to include two spaced peaks and an intermediate recess thereby generally resembling the numeral "3," as indicated by **42**. Otherwise stated, the contact is bent medially to provide one portion overlying another portion. An insulating strip **43** is retained in overlying contacting relation with the outward surface of the base member and also serves as a sealing interface with the mating female connector **10**.

With continuing reference to FIGS. 2 and 3, the female connector **10** is seen to include a shell **44** similar to the shell **18** of the male connector. A base member **46** is removably secured to the shell **44** by means of suitable fasteners **47** which pass through the shell and the base member. As will be noted by viewing FIG. 2, the outward surface of the base member **46** forms an interface with the outward surface of gasket **43** of the male connector **12**. The base member **46** includes three longitudinally aligned rectangular sockets or entrance ways **50**. As will be appreciated by viewing FIG. 3, the entrance **50** appends downwardly to an offset recess or passageway **52** formed within the intermediate body **54** of the base member **46**. The inner wall **55** of the base member **46**, which confronts the shell **44** of the female connector, includes apertures **56** formed therein for purposes of receiving a connecting portion of a sinuously deformed female contact **58** being bent medially to provide one portion overlying another portion resulting in the formation of a pocket to embrace the male contact **26**. Each contact specifically includes an arcuate portion adapted to overlyingly contact the arcuate portion **40** of an engaged male contact **26**, and an end portion deformed to include two spaced peaks and an intermediate recess to effect detent action with the mating contact. The end portion of contact **58** is adapted to overlie the associated portion of male contact **26**. Contacts **26** and **58** must necessarily be made resilient to allow their mutual engagement.

As will be noted in FIG. 3, the connecting portion of female contact **58** is connected with a terminal wire portion as indicated by **60**. The connected wire **62** forms a part of a cable **64** having a plurality of wires connected to respective female contacts. A generally U-shaped clamp member **66** suitably attached to shell **44** is identical to the previously mentioned clamp **36** in the male connector and serves the same function.

FIG. 3 clearly illustrates the disposition of the outward end **68** of the female contact. In particular, this end is frictionally retained within a recess formed in the body **54** of the base member **46**.

Referring to FIG. 2, in operation of the connectors, the contacts of the male connector are inserted within respective entrances **50** in the female connector. After engagement of the connector interfacing surfaces, the male connector is displaced downwardly so that the male contacts engage the female contacts in the offset passageway **52**, formed in the female connector. Inasmuch as the male contact is now engaged within the passageway **52**, forces exerted upon the connectors tending to pull them apart are ineffective due to the retention of the engaged male contact within the passageway **52** which is offset from the entrance **50**.

In order to further secure retention of the male and female connectors together, slidable detent means indicated by **69** are mounted to both transverse ends of the male and female connectors. Particularly, each detent means includes a stationarily attached guide member **70** which guides the motion of an elongated slidable detent locking means **72**. Detent recess **74** are formed in the adjacent complementing surfaces of the connectors so that when engagement between the connectors is effected, the slide **72** on each connector can be displaced until the detent projection on each slide **72** engages a respective detent recess **74** on the adjacent connector. By sliding both detent means on both transverse ends of the connector, longitudinal motion between the transverse ends of the connectors is inhibited.

When separation of the connectors is desired, the detent means are withdrawn from engagement thereby permitting the male contact to be moved upwardly until the male and female contacts are disengaged. Then upon straight outward displacement, the male contacts are withdrawn from the respective entrances **50** thereby completing separation of the connectors. Although the present description has been stated in terms of connectors which are manually fastened together, it will be appreciated that each connector and associated cable may be fabricated in the form of a single molded unity by utilizing conventional molding techniques.

Although the present invention has been described in terms of two mating connectors to form a connection, with suitable modification of the design but using the basic principle of the invention, the female connector may well be used as a socket

connector recessed within a wall or have a screw base which would permit utilization of the connector in an ordinary light socket.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

What is claimed as new is as follows:

1. A female connector comprising a housing adapted for enclosing the terminal portion of a wire, a base element connected to the housing and having a surface adapted to form an interface with the mating connector, at least one passageway formed in said base element having a first longitudinal portion extending from and perpendicular to the surface and a second longitudinal portion substantially parallel to the surface, each of said first and at least one contact inserted within the base element having a body bent medially to provide one portion overlying another to form a resilient pocket in the second portion of said passageway for embracing a mating contact, said contact having outward ends rigidly attached to said base element.

2. A male connector comprising a housing adapted for enclosing the terminal portion of wire, a male base element connected to the housing and having a surface adapted to form an interface with a mating connector, at least one male contact having a cantilever portion extending from said substantially perpendicular to the surface of the male base element, said male contact having a body spaced from said surface and bent medially to provide one portion overlying a free flexing resilient end portion with a hollow therebetween, both portions being laterally offset to one side of the cantilever portion thus effecting a resilient contact structure to be embraced by a mating female contact said portions being shaped to affect resilient detent with the mating female contact.

3. The structure set forth in claim 2 together with a female connector comprising a second housing adapted for enclosing the terminal portion of a wire, a female base element connected to the second housing and having a surface adapted to from an interface with the surface of the base element of the male connector, a plurality of passageways formed in said female element each having a first longitudinal portion extending from the surface and a second longitudinal portion substantially parallel to the surface, each of said first and each of said second portions being substantially parallel to one another respectively, at least one female contact inserted within the female base element having a body located in the second portion of a passageway, and bent medially to provide one portion overlying another to form a resilient pocket for embracing the male contact.

4. The structure of claim 3 wherein the both said housings include hollow shell portions, and together with removable fastening means for securing said first and second housings to the male and female base elements respectively.