

Jan. 17, 1967

W. L. PRESCOTT

3,299,394

EASY BREAK-AWAY ELECTRICAL STEP CONNECTOR

Filed June 23, 1964

2 Sheets-Sheet 1

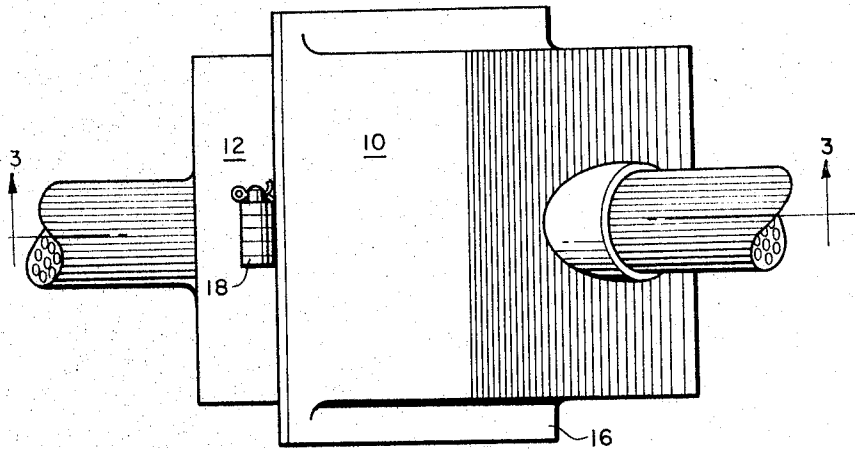


FIG. 1

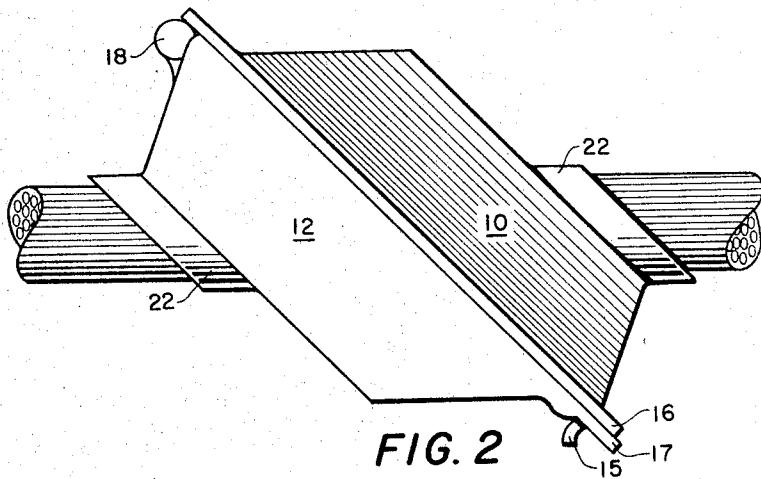


FIG. 2

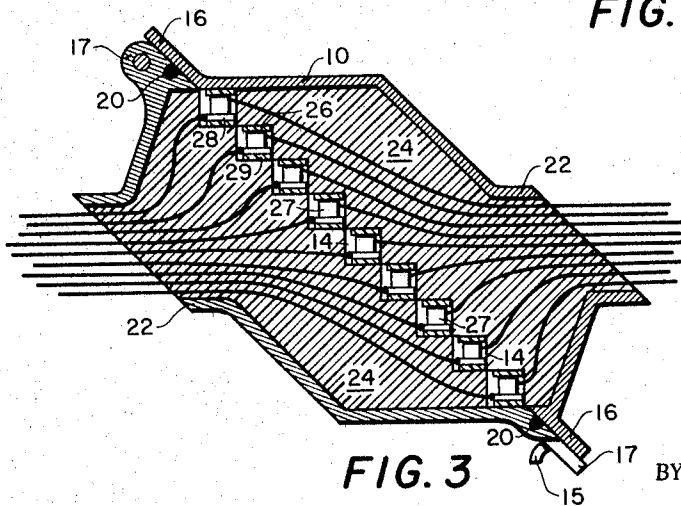


FIG. 3

WILMAR L. PRESCOTT
INVENTOR.

BY

J. M. St. Amant

ATTORNEY

Jan. 17, 1967

W. L. PRESCOTT

3,299,394

EASY BREAK-AWAY ELECTRICAL STEP CONNECTOR

Filed June 23, 1964

2 Sheets-Sheet 2

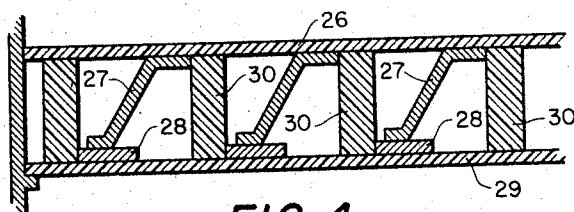


FIG. 4

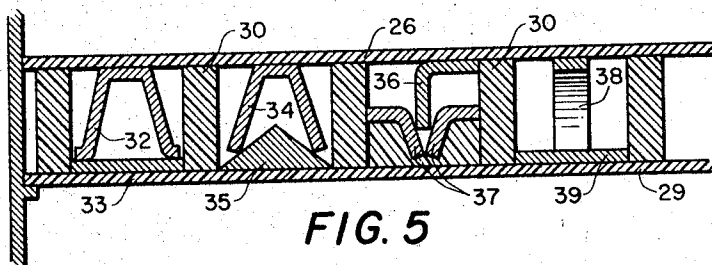


FIG. 5

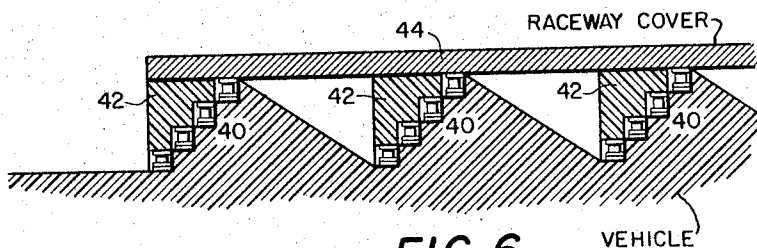


FIG. 6

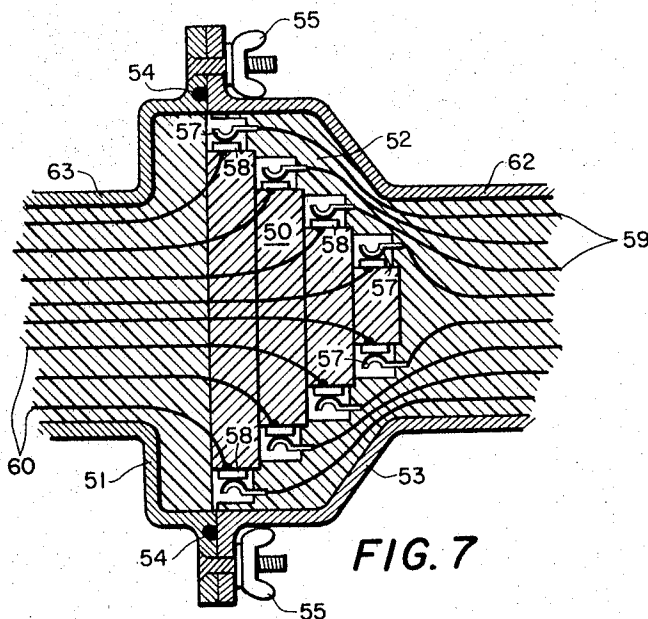


FIG. 7

WILMAR L. PRESCOTT
INVENTOR.

BY

J. M. St. Amant

ATTORNEY

1

3,299,394

EASY BREAK-AWAY ELECTRICAL STEP CONNECTOR

Wilmar L. Prescottt, 1231 N. Seward,
Hollywood, Calif. 90028
Filed June 23, 1964, Ser. No. 377,430
6 Claims. (Cl. 339-45)

The invention herein described may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

The present invention relates to electrical connectors and more particularly to a reliable multi-conductor electrical step connector which can be disconnected with ease.

Numerous multi-conductor electrical connectors have been developed in attempts to overcome problems of weak contact, contact failure, bent and broken pins, prevention of damage to contacts, alignment of contacts, ease in making repeated and secure contacts, and ease in the disconnecting or break-away of contacts. However, none of the prior art multi-conductor connectors has satisfied the needs of industry.

To overcome the disadvantages of prior multi-conductor systems, as well as meet the needs of industry, the present invention provides an easy break-away connector which eliminates electrical discontinuity problems encountered in previous systems and for immediate release of the connector when desired. The present invention uses a step design with interfitting wedge or insert contactors. The present system is superior to previous connectors, especially the common pin and socket connector because it eliminates contact damage occurring from high insertion and extraction forces (non-aligning) required in pin and socket design.

It is an object of the present invention to provide a simple, strong and dependable multi-conductor electrical connector.

Another object of the invention is to provide a reliable multi-conductor electrical connector for making secure contacts and easy break-away.

A further object of the invention is to provide a multi-conductor electrical connector having positive contact retention under all environmental conditions and ready release.

Other objects and many of the attendant advantages of this invention will become readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a top plan view of one embodiment of an electrical connector assembly of the present invention.

FIG. 2 is a front side view of the assembly shown in FIG. 1.

FIG. 3 is a cross-sectional view taken along line 1-1 of the assembly of FIG. 1.

FIG. 4 is a fragmentary cross-sectional view of a row of contacts taken along one step.

FIG. 5 is a cross-sectional view as in FIG. 4 illustrating only a few of the variety of contacts usable with the present invention.

FIG. 6 is a diagrammatic sketch of an embodiment showing how a series of stepped connectors of the present invention can be used in a raceway of electrical connections.

FIG. 7 is a cross-sectional view of another embodiment of the invention using a plurality of circular tiers of contactors.

Referring now to the drawings, like numerals refer to like parts in each of the figures.

Within a protective housing consisting of shells 10 and 12, is included a plurality of rows of electrical contactors

2

arranged in a series of steps 14. Housing shell 10 connects with housing shell 12 by a fastening means, such as guide pins 15 on flange 16 which interfit into holes in flange 17 forming a swing-apart hinge-type quick release on one side, together with a lock mechanism 18 on the opposite side of the housing as shown in FIGS. 1 and 2, by way of example. Other suitable means for securely retaining the two portions of the housing together and for providing quick release may be used as desired; for example, solenoid, squib or mechanical quick break-away locks may be used for mechanism 18. An O-ring 20 or the like can be used for sealing the two shells around respective flanges 16 and 17. Each of housing shells 10 and 12 is provided with a neck opening 22 diagonal to the incline of steps 14 and through which can pass a cable bundle of electrical conductors as shown in FIGS. 1-3.

Steps 14 are composed of dielectric material 24 and housed within shells 10 and 12. The ideal position of the steps is at a 45-degree incline diagonal to the cables which pass through neck openings 22, as shown in FIG. 3, but other angles of inclination may be used. Within the spaces formed between the steps of the respective halves of the connector are rows of electrical contactors as shown in FIGS. 3 and 4. On upper steps in shell 10, are mounted insulator strips 26 to which are bonded leaf type spring contacts 27 which make contact with a bus type contact 28 bonded to insulator strips 29 mounted on the lower steps in shell 12. Also, each pair of contactors 27-28 is separated by an insulator partition 30.

Various types of electrical contactors may be used other than the leaf spring 27 and bus 28 of FIG. 4. Other suitable types of contactors are shown in FIG. 5, for example; wedge 32 and bus 33, wedge 34 and wedge bar 35, bar insert 36 and groove 37, leaf 38 and bus 39. Other suitable type contactors providing good positive contact and easy release that are strong and not easily damaged may also be used as desired. The housing may take on any suitable configuration for the plurality of stepped rows of connectors.

The step release connector as shown in the embodiment of FIGS. 1-3 provides a reliable connector with positive contact retention, sealing means for a variety of environments, and ease in break-away upon release of mechanism 18. Using steps and strong contactors a connector which may be used again and again with dependability is provided.

In FIG. 6 is shown an embodiment where a series of step connectors, as in FIGS. 1-3, are used. A plurality of stepped rows 40 (like that in section 12 of FIG. 3) are provided on the surface of a vehicle, etc., and a plurality of stepped rows 42 (like that in section 10 of FIG. 3) are provided in a raceway cover 44, or the like, which provides support therefor. In this manner a larger number of multi-conductor electrical step-connectors can be provided. Retention and release mechanisms, such as mechanism 18 in FIGS. 1-3 can be used to retain raceway cover 44 in place and release same when desired allowing quick break-away. Rows of suitable contactors, like any of those shown in FIGS. 4 and 5, are provided between respective stepped rows 40 and 42 like those shown in FIG. 3.

The embodiment shown in FIG. 7 is a cross-section of cylindrical shaped stepped connector; the steps in each of the halves are cylindrical. Dielectric steps 50 are mounted in a base housing 51 and fit within cylindrical steps 52 mounted within housing 53. An O-ring 54 or the like is provided to seal the housing units 51 and 53 together. Wing-nut type connectors 55, or other connectors which would provide quick-release may be used. As shown in this figure, leaf contacts 57 on steps 52 make positive contact with bus type contacts 58 on steps 50;

these contactors are spaced around each of the cylindrical steps and are connected to electrical line wires 59 and 60 respectively which pass through housing necks 62 and 63. This embodiment also provides positive retention and good electrical contacts which are not easily damaged.

The present invention can also be used with printed circuit type contactors. The present device is adaptable for use as connectors for electronic tubes, transistorized components, microelectronics, wafered components as used in microcircuits, relays, capacitors, switches, printed circuits, solid state components, and the like. As previously indicated, the general configuration of the housing may be varied without departing from the spirit of the invention.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. An easy break-away multi-conductor electrical step connector comprising:

- (a) a pair of interfitting contactor sections,
- (b) each of said two sections having a plurality of steps rising at an angular incline along the contacting faces thereof in parallel rows,
- (c) a plurality of electrical contacts mounted in a row along each step of the first of said stepped sections,
- (d) a plurality of electrical contacts positioned in a row along each corresponding step of the second of said stepped sections for making good electrical connection with respective contacts on said first stepped section upon the mating together of both of said sections,
- (e) an electrical lead wire connected to each of said electrical contacts,
- (f) said sections each contained within respective protective housings which are releasably joined together

along a diagonal corresponding to the angular incline of said steps for ease in separation when desired and said electrical conductors being in respective cable bundles which extend out in opposite directions through apertures in said respective housings and also at a corresponding angle to the incline of said steps,

(g) means for holding said contactor sections and electrical contacts together in good electrical contact and means for providing quick break-away and easy release of the two sections and electrical contacts when desired.

2. A device as in claim 1 wherein said steps rise ideally at a 45° incline.

3. A device as in claim 1 wherein sealing means is provided to seal the housings at their juncture.

4. A device as in claim 1 wherein the steps on which said contacts are mounted are formed of dielectric material and in which are embedded the portion of said lead wires within their respective housings.

5. A device as in claim 1 comprising a plurality of interfitting stepped sections in series.

6. A device as in claim 5 wherein one half of said sections are mounted on a vehicle and the interfitting remaining half are mounted within a raceway cover.

References Cited by the Examiner

UNITED STATES PATENTS

2,048,129	7/1936	Loughridge	339—177
2,432,120	12/1947	Neill	339—10
2,437,358	3/1948	Mowery	339—89
3,086,188	4/1963	Ross	339—49
3,235,832	2/1966	Buchanan et al.	339—64

EDWARD C. ALLEN, *Primary Examiner*.

PATRICK A. CLIFFORD, *Examiner*.