

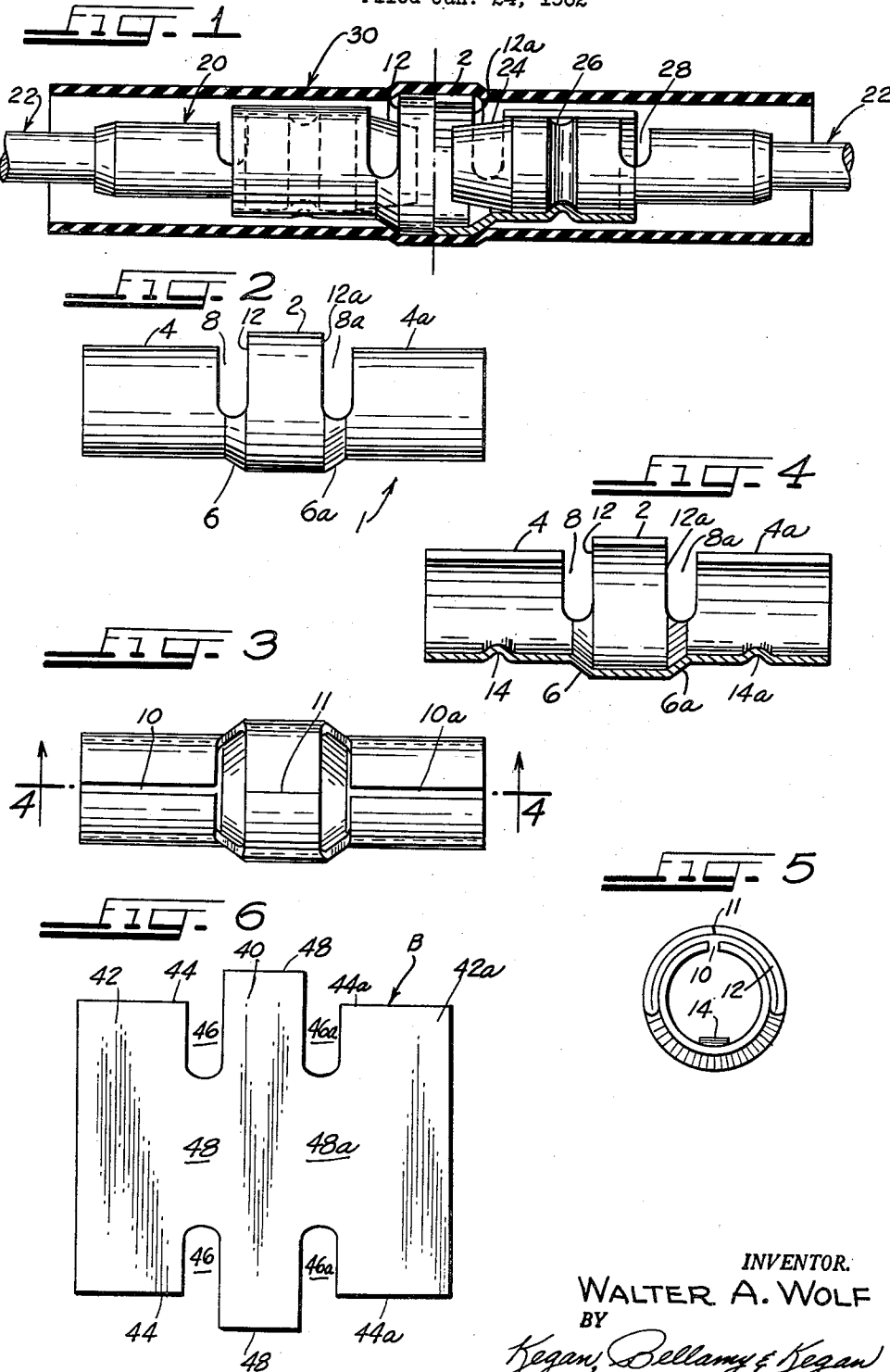
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ELECTRICAL TERMINAL CONNECTOR

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ELECTRICAL TERMINAL CONNECTOR

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This invention relates to an improved electrical terminal connector and more particularly to a female snap terminal connector adapted to receive on either end male snap terminals comprising electrical leads.

The improved electrical connector is preferably formed of inexpensive metal and is of a type having spring end portions adapted to receive bullet-type electrical leads. The electrical connector is in the form of a tubular cylinder having an enlarged central portion which serves to offset an enveloping electrical insulation from the spring portions of the connector such that the insulation does not interfere with the insertion and the removal of the male leads. The enlarged central portion is joined to a reduced-diameter spring portion on either side of the central portion by cam means preferably comprising a tapered joiner which serves to facilitate the insertion of the cylindrical connector into the enveloping insulating sleeve. Likewise, the enlarged connecting portion is provided with a stop means on either side thereof preferably comprising a sheared edge slot which serves to prevent the inadvertent withdrawal of the connector from within the enveloping insulation sleeve.

Therefore, it is an object of this invention to provide an electrical terminal connector having a clearance between the spring portions of the connector and the enveloping insulation sleeve by providing an enlarged central portion for the connector.

It is a further object of this invention to provide an electrical terminal connector having an enlarged central portion such that the insertion of the connector within the enveloping insulation sleeve may be facilitated and such that the inadvertent withdrawal of the connector from within the insulation sleeve may be obviated.

These and other objects, advantages, and features inherent in the invention will hereinafter appear; and, for purposes of illustration but not of limitation, an embodiment of the invention is shown in the accompanying drawing, wherein:

FIGURE 1 is a side elevational view partly in section showing the improved electrical terminal connector with bullet-type snap terminals inserted in each end thereof and with the entire assembly encased within an insulating sleeve;

FIGURE 2 is a side elevational view of the electrical terminal connector itself;

FIGURE 3 is a top plan view thereof;

FIGURE 4 is a sectional view taken along the line 4-4 of FIGURE 3;

FIGURE 5 is an end view taken from the left of FIGURE 2; and

FIGURE 6 is a plan view of a metal blank from which the improved electrical terminal connector may be formed.

With reference to the drawing, the improved electrical terminal connector 1 is seen to comprise an enlarged tubular cylindrical central portion 2 disposed between two reduced-diameter tubular cylindrical spring portions 4 and 4a. The spring portions 4 and 4a are joined to the enlarged central portion 2 by a frustum joiner comprising the tapered bevels 6 and 6a. Similarly, the spring portions 4 and 4a are separated from the enlarged central portion 2 by the arcuate slots 8 and 8a, the median lines of which are oppositely disposed from the median lines

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of the tapered bevels 6 and 6a respectively. In the preferred embodiment of the invention, the frustum joiner is a 180° segment of a right circular cone coaxially disposed with the axial line of the electrical terminal connector 1 such that the arcuate slots 8 and 8a are likewise oppositely disposed in 180° semicircular grooves. The spring portions 4 and 4a are each provided with longitudinal slots 10 and 10a respectively, which are correspondingly oppositely disposed from the median lines of the tapered bevels 6 and 6a. The slots 10 and 10a impart a leaf-spring characteristic to the spring portions 4 and 4a. Likewise, the enlarged central portion 2 is provided with a longitudinal slot 11, which is inherently formed by virtue of the manufacture of the electrical terminal connector 1 from a flat metal blank, in a manner to be subsequently described.

The provision of the arcuate slots 8 and 8a expose the sheared edges 12 and 12a adjacent the enlarged central portion 2. The spring portions 4 and 4a are provided with detent means such as the dimples 14 and 14a, as best seen in FIGURES 1 and 4.

The electrical terminal connector 1 is preferably formed from an inexpensive metal blank such as the blank B shown in FIGURE 6. The blank B comprises a central rectangle 40 joined to two end rectangle portions 42 and 42a on either side by the intermediate connecting portions 48 and 48a respectively, to define the slots 46 and 46a therebetween. As shown in FIGURE 6, the vertical length of the end rectangular portions 42 and 42a is greater than the corresponding length of the intermediate portions 48 and 48a but less than the corresponding length of the central portion 40. It should be apparent that by suitably depressing the central portion 40 relative to the end portions 42 and 42a the tapered bevel portions 6 and 6a will be defined by the planar offset between the portions 40 and 42-42a. Of course, this depressing operation can be simultaneously accompanied by a punch press operation to form the desired dimples 14 and 14a.

Once the blank is so deformed, it may be rolled into a cylindrical configuration so as to have the edges 44 of the left-hand end portion 42, the edges 48 of the central portion 40, and the edges 44a of the right-hand end portion 42a faced together to define correspondingly the slots 10, 11, and 10a in the assembled electrical terminal connector 1.

An electrical terminal connector so constructed is adapted for use with bullet-type male snap terminals such as the leads 20 and 20a shown in FIGURE 1. These leads may be crimped upon electrical wires 22 in any conventional and well known manner. A bullet lead 20 of the type described is conventional in form and comprises a tapered end portion 24 and a circumferential groove portion 26. Also, preferably, the bullet lead 20 is provided with a semicircular arcuate slot 28 for stress relief during the crimping of the bullet lead 20 onto the electrical wire 22.

In use, the bullet lead 20 is forcibly inserted into the spring portion of the electrical terminal connector, which receives the bullet lead 20 because of its leaf spring characteristic. The circumferential arcuate groove 26 cams into and locks upon the dimpled indentation 14 so as to prevent the inadvertent withdrawal of the bullet lead 20 from within the electrical terminal connector 1. When bullet leads 20 are inserted into either end of the electrical terminal connector 1, it is obvious that the connector serves as an electrical and mechanical joiner between the two inserted male leads 20.

In actual operation, such a joiner must be covered by an insulating body, such as the tubular insulating sleeve 30, shown in FIGURE 1. The sleeve 30 may be formed

of any conventional insulating material, such as flexible polyethylene tubing. It is, of course, desirable that the insulating sleeve 30 does not interfere either with the insertion of the removal of the bullet lead 20 which is inserted and retained in the spring portions 4 and 4a by virtue of the leaf spring characteristics thereof. It should be apparent that the offset provided by the enlarged central portion 2 obviates any such difficulty, since a clearance is provided between the insulating sleeve 30 and the leaf spring portions 4 and 4a.

Moreover, when the sleeve 30 is inserted over the electrical terminal connector 1, the tapered bevels 6 and 6a serve as cam means to facilitate the easy placement of the sleeve 30 over the connector 1. Conversely, the relatively abrupt shear edges 12 and 12a defined by virtue of the arcuate slots 8 and 8a respectively serve as stop means to prevent the inadvertent withdrawal of the sleeve 30 once it has been placed in position enveloping the connector 1.

A suitable sequence of assembly for the composite unit has been found to be as follows:

A bullet lead 20 is crimped upon a wire 22 and is then forced into a spring portion 4 of an electrical terminal connector produced in accordance with the subject invention. A sleeve 30 is then slipped over the connector 1 containing the one inserted bullet lead 20. Then another bullet lead 20 is crimped upon another wire 22 and the bullet lead 20 is inserted into the other end spring portion 4a of the connector 1, such that the overall composite assembly is achieved.

As an alternative sequence of assembly, the sleeve 30 may be slipped over the connector 1 to form a commercial unit which is sold as such. At the situs of use, the operator crimps two bullet leads 20 onto two respective wires 22 and inserts them into the opposite spring portions 4 and 4a, such that the overall composite assembly is achieved.

With either sequence of assembly, the preferred operation includes an immersion of the tubular insulating sleeve 30 in a conventional dilating fluid prior to insertion over the connector 1 such that the sleeve 30 is subsequently shrunk-fit into place in order to form a secure interconnection.

It should be understood that various changes and modifications may be made in the details of construction, arrangements, operation, mode of assembly, and materials for the various elements, without departing from the spirit and the scope of the subject invention, especially as defined in the appended claims.

What is claimed is:

1. An electrical terminal connector of the double female snap-type and adapted at either end for mechanical engagement with an electrical connection to a pair of bul-

let-type male snap terminals to join said male terminals, said connector comprising:

a first longitudinally-slitted tubular cylinder;

a second and third spring-tensioned tubular cylinder each being slit and each having a diameter smaller than that of said first cylinder, said second and third cylinders being coaxial with and disposed at opposite ends of said first cylinder and adapted to act as end clamps for receiving said bullet-type terminals therein;

first and second frustum joiners, said joiners comprising tapered bevels joining each of said second and said third cylinders to said first cylinder therebetween to provide an integral connector structure including said first cylinder as an enlarged central section whereby said tapered bevels constitute cam means to facilitate the positioning of an extensible plastic insulating sleeve over said first cylinder of said connector and whereby said enlarged central section of said connector structure is effective to distend said sleeve positioned thereover to clear adjacent ends of said end clamps to obviate interference of said sleeve with insertion of said bullet-type terminals into said end clamps;

said frustum joiners having arcuate slots therein at either side of said first cylinder at the junctures thereof with said second and said third cylinders, said slots being coaxial with said cylinders and constituting buffers against excessive mechanical distortion of other portions of said connector upon the insertion of a bullet-type terminal into one of said end clamps and providing arcuate edges effective to prevent inadvertent withdrawal of said insulating sleeve from its connector-enveloping position, said frustum joiners imparting structural strength to offset any weakening of said connector by said arcuate slots.

2. The connector of claim 1 wherein each of said end clamps includes detent means to prevent inadvertent withdrawal of said bullet-type terminals from said end clamps.

3. The connector of claim 1 wherein each said frustum is a 180° segment of a right circular cone coaxially disposed with the said cylinders.

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