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EXPLOSION CONNECTOR WITH IMPROVED INSULATING MEANS

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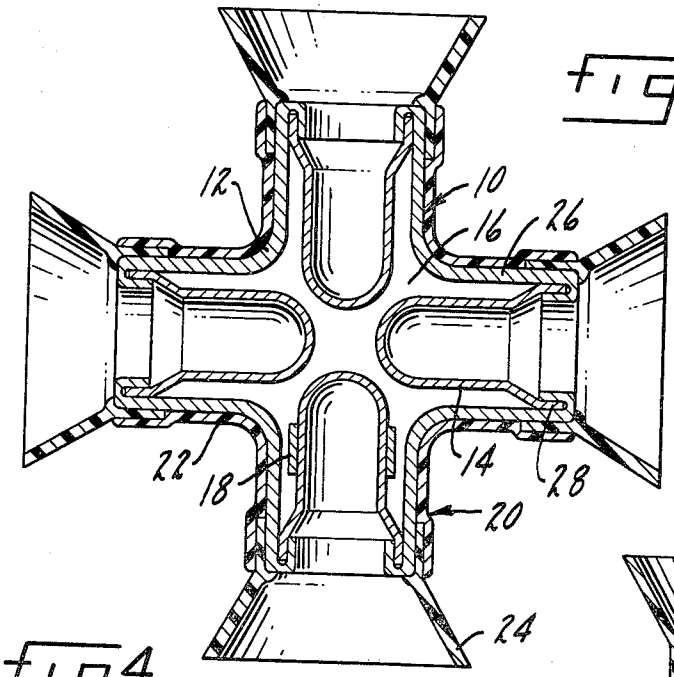

Fig. 1.

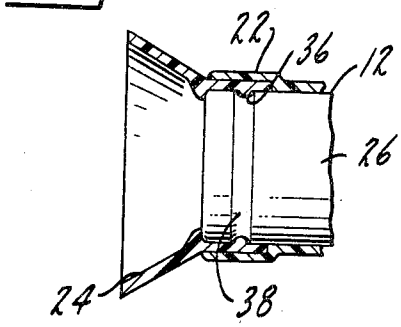

Fig. 4.

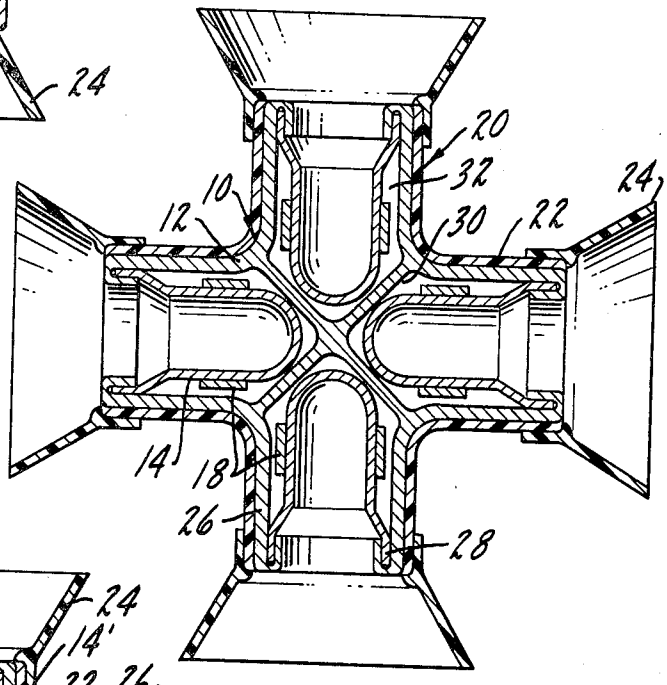

Fig. 2.

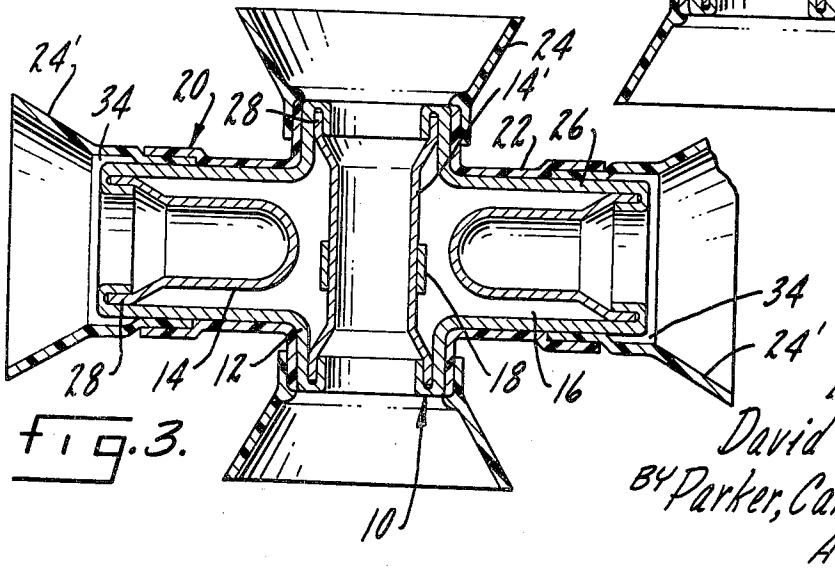

Fig. 3.

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EXPLOSION CONNECTOR WITH IMPROVED INSULATING MEANS

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U.S. Cl. 174—72 8 Claims

ABSTRACT OF THE DISCLOSURE

An explosion connector for mechanically or electrically joining the ends of wires, cables or the like including a substantially non-deformable outer jacket, at least one deformable inner shell, explosion means located between the outer jacket and the inner shell to cause the shell to deform into crimping contact with the wires, cables or the like, and insulating means to prevent electrical shock.

SUMMARY OF THE INVENTION

This invention relates to an apparatus for connecting wires, cables or the like, and more specifically, to an explosive actuated connector for joining the ends of wires, cables or the like having an improved insulating means.

A primary object of this invention is an improved insulating means for a branch or multi-ported connector including a substantially non-deformable outer jacket, an explosion means and a deformable inner shell.

A further object is an apparatus for connecting a plurality of wires, cables or the like by crimping them together through the use of an inner shell deformed by a charge of an explosive.

Another object is a compact explosion connector that is economical to make and may be safely operated to energize all the connecting elements simultaneously.

Another object is a connector of the multi-ported type which may utilize explosive charges to join together wires, cables or the like at various time sequences.

Another object is an explosion connector having a plurality of ports for receiving wires, cables or the like at various angles.

Other objects and advantages will be apparent from the following specification, claims and drawings for this invention.

BRIEF DESCRIPTION OF THE DRAWINGS

This invention is illustrated by the accompanying drawings wherein:

FIG. 1 is a cross-sectional view through a four-ported explosion connector showing the improved insulating means;

FIG. 2 is a similar cross-sectional view through another embodiment of this invention;

FIG. 3 is a cross-sectional view through still another embodiment of this invention; and

FIG. 4 is a partial sectional view showing an insulating cuff in more detail.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The explosion connector **10** has been shown in the figures as a branch or multi-ported connector including an outer jacket **12** and at least one inner shell **14** sealed together to form a chamber **16** with at least one explosion means **18** located in the chamber. The inner shells **14** are deformable members and open at least one end to receive the wires, cables or the like. An improved insulating means **20** including an insulating envelope **22** and insulating cuffs **24** provides protection against electrical shock.

FIG. 1 shows a branch connector **10** having four ports with the central axis of all four ports in one plane. The outer jacket **12** is made from a material that is substantially non-deformable. The inner shells **14** when mounted for electrical applications, are made from a conductive material that is deformable. Each shell may be mounted in a sleeve **26** of the outer jacket **12**. In this embodiment the deformable shells **14** are closed at one end and open at the other end for receiving electrical wires or similar objects.

The explosion means **18** in this embodiment consists of a single explosive charge located at any convenient place in the chamber **16** between the outer jacket **12** and the inner shells **14**. The chamber **16** may be sealed by folding an overlapping portion of each sleeve **26** over a respective skirt portion **28** of each inner shell.

The insulating means **20** consists of an insulating envelope **22** and an insulating cuff **24** at the end of each sleeve **26**. The insulating envelope **22** is formed by coating the outer jacket **12** with an electrical insulating material through such processes as dipping or spraying. The insulating cuffs **24**, as shown in FIG. 1, are cemented to the outer jacket **12** prior to the coating process. An important feature of the embodiment shown in FIG. 1 is that it allows energizing of all the connecting elements simultaneously.

FIG. 2 shows another embodiment for a four-ported connector **10** wherein the outer jacket includes an interior arrangement of ligatures **30** that form four separate isolated compartments or chambers **32**. The inner shells **14** are similar to those shown in FIG. 1, however, the explosion means **18** consists of an explosive charge located in each of the four compartments **32**. In addition, the insulating cuffs **24** differ from those shown in FIG. 1 in that they are cemented to the insulating envelope **22** after the envelope has been formed by a coating process. An important feature of this embodiment is that it allows for ignition of the explosive charges in any selected order thereby permitting sequential operation of the connector **10** at the discretion of the operator.

FIG. 3 shows still another embodiment for this invention. A vertically aligned inner shell **14'** is cylindrical in shape with mutually aligned openings at each end for receiving the wires, cables or the like. As in FIG. 1 an explosion means **18** consisting of a single explosive charge activates the connecting elements simultaneously.

In addition, since the coating process which forms the insulating envelope **22** may be applied at a sufficiently high temperature to have deleterious effects on the explosion means **18** it may be necessary to complete the mechanical assembly of the connector **10** after the coating process. As shown in FIG. 3 the horizontally aligned insulating cuffs **24'** may be cemented to the sleeves **26** of the outer jacket **12** in a manner similar to that shown in FIG. 1. However, a clearance space **34** is provided between the cuffs **24'** and the sleeves **26** of the outer jacket to admit assembly tooling.

FIG. 4 shows another method for attaching an insulating cuff **24** to the connector **10**. In this embodiment the cuff **24** is mechanically attached to the connector by an annular ridge **36** engaging an annular groove **38** in the outer jacket **12**. The mechanical attachment of the cuff **24** to the connector may be applied before or after the coating process with the envelope **22** overlapping the cuff **24**, as shown, or the cuff overlapping the envelope to provide sufficient overlap to create a length of potential gap necessary for safety.

The use, operation and function of this invention are as follows:

The explosion connector **10** is adapted to join together the ends of wires or cables through use of an explosion means **18** which inwardly deforms an inner member **14** into crimping contact with the wires or cables.

The invention is shown as a branch or multi-ported connector **10** having sleeves **26** at various angles. It is important to note that the sleeves **26** need not radiate from the same plane.

The connector **10** may be adapted for either electrical or mechanical applications. When used for electrical applications both the inner shells **14** and certain sleeves **26** of the outer jacket **12** may be made from a conductive material. This may be desirable for the embodiment shown in FIG. 2 when conduction is required from one port to another.

The chamber **16** or compartments **32** formed between the outer jacket **12** and the deformable inner shells **14** contain the explosion means **18**. The explosion means **18** is set off or ignited by an ignition means which has not been shown. The ignition means may be electrical, mechanical, application of heat, shock or other means suitable for the chosen explosive and application.

This invention permits either simultaneous or sequential operation of the explosion connector **10**. As shown in FIGS. 1 and 3 a single explosive may deform the inner shells **14** into crimping contact with the wires or cables simultaneously. On the contrary the embodiment in FIG. 2 allows for sequential operation as each port of the connector is isolated by an arrangement of ligatures **30**. The isolated compartments **32** permit variation in sequence of operation by allowing the explosion means **18** in each compartment to be activated when desired.

The insulating means **20** is preferably electrical insulation which may be made from a heat shrinkable preformed material. The insulating means **20** renders the connector safe to use without electrical post-insulation and includes an insulating envelope **22** and insulating cuffs **24** which protect the connector **10** against electrical shock.

The insulating envelope **22** may be formed by dipping, spraying or otherwise coating the exterior of the outer jacket **12**. The insulating cuffs **24** may be mechanically placed or cemented in place either before or after the coating process forming the insulating envelope **22**. If the cuffs **24** are made from a heat shrinkable material they may be heated and shrunk to provide a seal around the elements being connected.

I claim:

1. A connector for joining wires, cables and the like including:

a generally nondeformable outer member having a central chamber with at least two openings leading into said chamber,

a deformable, generally tubular member having an open end and a closed end extending through each of said openings into said chamber with the closed end of each member located in the chamber and the open end of each member facing outwardly, at least a portion of each deformable member in said chamber being spaced from said generally nondeformable member,

each deformable member having a bore adapted to receive at least one wire, cable and the like, and

an explosive located in said chamber and of sufficient quantity, when exploded, to deform said deformable members into contact with the wire, cable and the like located in their respective bores.

2. The structure of claim **1** further characterized in that at least one partition is located in said chamber and separates said deformable members from each other, and

a separate quantity of explosive is provided to deform each deformable member into engagement with its respective wire, cable and the like.

3. The structure of claim **1** further characterized in that said nondeformable member is in the shape of a cross having four openings therein, and

a deformable, elongated tubular member open at both ends is positioned in said chamber and extends between an aligned pair of said openings of said nondeformable member.

4. The structure of claim **1** further characterized in that said generally nondeformable outer member is formed of an electrically conductive material.

5. The structure of claim **4** further characterized in that said generally nondeformable outer member is covered by an insulating coating.

6. The structure of claim **5** further characterized in that an insulating funnel-shaped cuff is provided for each opening into said chamber.

7. The structure of claim **6** further characterized in that said insulating cuffs are formed separately and are attached to said nondeformable member.

8. The structure of claim **1** further characterized in that said deformable, generally tubular members lie in a common plane.

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U.S. Cl. X.R.

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