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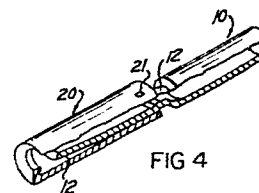
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54 **A method of making a two-piece electrical contact for use in an electrical connector.**

57 A method of making a two piece contact assembly (30) comprising the steps of cold drawing a tubular member (10), forming a plurality of axially extending fingers (12) at one end thereof and an annular groove (13) around the mid portion thereof, and attaching a sleeve (20) to the tubular member (10) to protect the fingers (12).



A METHOD OF MAKING A TWO PIECE ELECTRICAL CONTACT
FOR USE IN AN ELECTRICAL CONNECTOR

This invention relates to electrical connectors and more particularly to an electrical contact mounted within the connector.

Electrical connectors generally include a plug and
5 receptacle, each of which have a shell or housing, a plurality of contact each of which are connected to separate incoming wires, and a dielectric insert assembly for fixedly or removably mounting the electrical contacts in the connector shell. The electrical contacts may be
10 machined from a single piece of metal stock or stamped and formed from pieces of flat sheet metal and assembled into an electrical contact assembly. Examples of stamped and formed contacts may be found in U.S. Patents 4,120,556, issued October 17, 1978 and entitled
15 "Electrical Contact Assembly" and 4,262,987 issued April 21, 1981 entitled "Electrical Connector".

Because of the large number of contacts utilized by electrical connectors, stamped and formed electrical contacts are being used more and more as they are less
20 expensive than contacts machined from a single piece of metal. Although stamped and formed contacts are less expensive than machined contacts they are also weaker and more fragile because they are made from sheet metal. For instance, socket type contacts fabricated by stamping and
25 forming methods have spring fingers that are more easily deflectable than machined contacts. This provides less pressure when the spring fingers mate with a pin type contact resulting in an undesirable increase in electrical resistance between the mated contacts.
30 Further, because of the fragility of the stamped and formed inner sleeve, protective sleeves are necessary around the rear wire receiving portion of the sleeve and

the forward mating portion. This of course increases the cost of materials as well as increasing the time required to assemble the contact. These problems become even more significant in subminiature type electrical connectors because of the small size of the contacts, 1.25 centimeters long with a .15 centimeter diameter.

Disclosure of the Invention

10 This invention provides a two piece electrical contact for a subminiature electrical connector that is characterized by a cold drawn socket type contact member and a protective sleeve attached to and around the mating portion of the member.

15 Accordingly, it is the advantage of this invention to provide a contact that is less expensive than a machined contact and stronger than a stamped and formed contact.

Another advantage of this invention is that it 20 eliminates the need for a rear sleeve around the wire receiving portion of a contact assembly.

It is another advantage of this invention to increase the strength of the spring figures that make up the mating portion of a contact for a subminiature 25 connector and hence decrease the resistance drop across contact when mated.

It is another advantage of this invention to provide an electrical contact that meets the requirements of U.S. Military Specification MIL-C-39029.

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Detailed Description the Invention

Figures 1 and 2 illustrate the pieces making up the contact assembly.

Figure 3 and 4 illustrates a two piece contact assembly incorporating the principles of the invention.

Referring now to the drawing, Figure 1 illustrates a cold drawn tubular member 10 having a forward mating 5 portion that includes a plurality of spring fingers 12 forming a socket type contact. The tubular member 10 is comprised of a metal such as a copper alloy and includes an annular groove 13 adapted to cooperate with a contact retaining mechanism (not shown) within a connector 10 insert.

Figure 2 illustrates a sleeve 20 which is adapted to protect the forward mating end of the tubular member 10 shown in Figure 1.

Figure 3 illustrates the two piece contact assembly 15 30 with the sleeve 20 attached to the forward mating portion of the tubular member 10.

Figure 4 illustrates a cutaway view of the two piece contact assembly 30 shown in Figure 3.

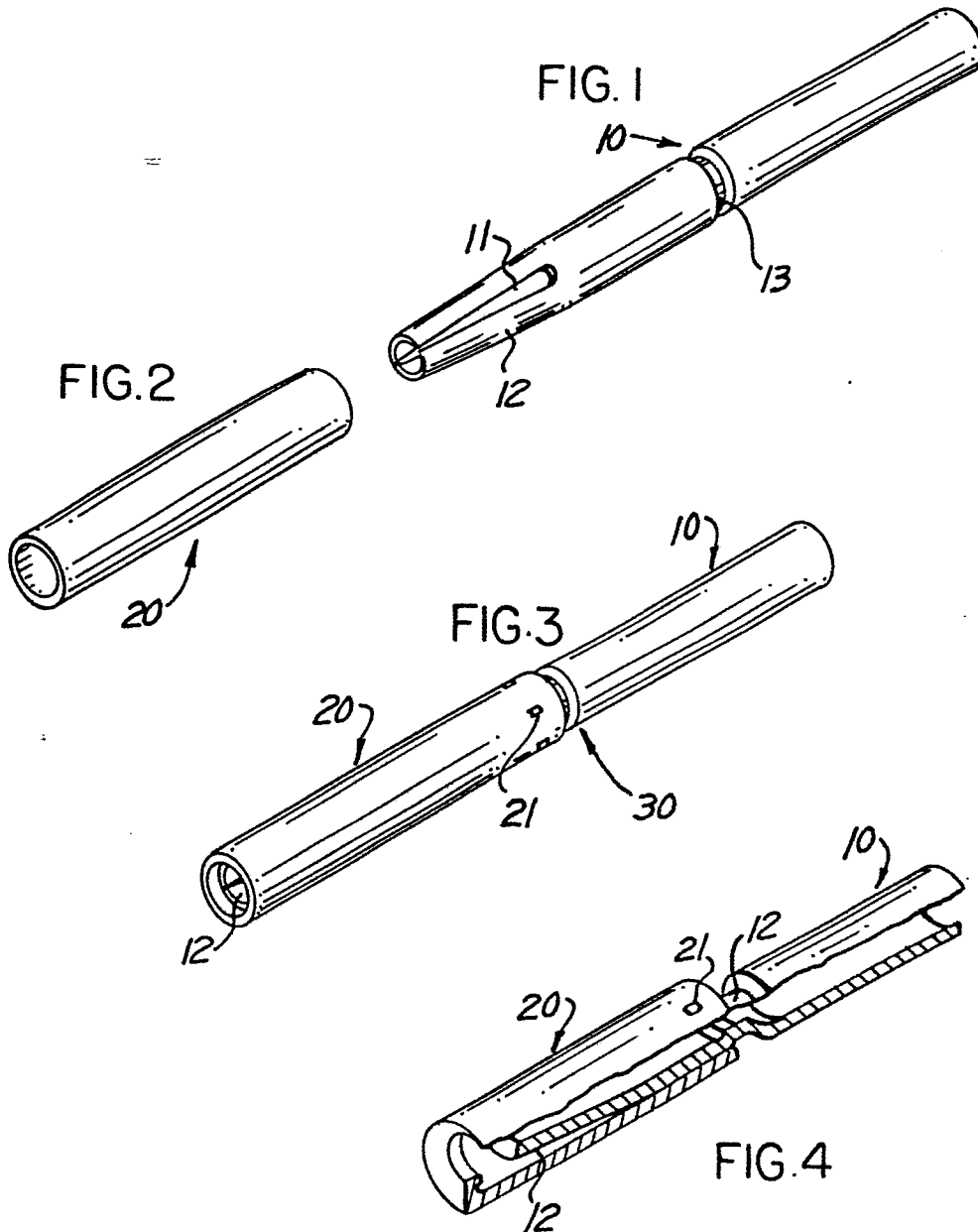
The contact assembly 30 is made by cold drawing the 20 tubular member 10, cutting or broaching two or more axial slots 11 in one end portion to form axially extending fingers 12, bending the end of the fingers radially inwardly to decrease the width of the slots 11 at the open end of the tubular member 12, thereby providing 25 resiliency to the fingers 12 when deflected by a pin type contact (not shown), placing a protective sleeve 20 around the forward end of the tubular member 10 and attaching the sleeve 20 to the tubular member 10 by punching a series of indentations 21 into the sleeve 20.

30 While a preferred embodiment of this invention has been disclosed, it will be apparent to those skilled in the art, that changes may be made to the invention as set forth in the appended claims and in some instances, certain features of the invention may be used to 35 advantage without corresponding use of other features.

Accordingly, it is intended that the illustrative and descriptive materials herein be used to illustrate the principles of the invention and not limit the scope thereof.

Claims:

1. A method of making a two piece electrical contact (30) for use in an electrical connector, said method
5 comprising the steps of:
cold drawing from a single piece of metal a tubular member (10) having a forward portion a middle portion and a rear portion;
cutting a plurality of slots (11) in the forward
10 portion of the tubular member (10) to form a plurality of axially extending fingers (12); and
attaching a protective sleeve (20) around the forward portion of said member (10).
- 15 2. The method as recited in Claim 1 including forming an annular groove (13) in the middle portion of said tubular member.
3. The method as recited in Claim 1 or 2 including the
20 step of bending the ends of the fingers radially inwardly to decrease the width of the slots (11) at the end of the tubular member (10).
4. The method as recited in Claim 1 or 2 wherein the
25 tubular member (10) is cold drawn to a diameter less than .15 centimeters.





DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
A	FR-A-2 057 512 (COMPAGNIE DEUTCH) *Figure 1; page 2, lines 2-21*	1,3	H 01 R 43/00
A	GB-A-1 322 906 (CANNON ELECTRIC) *Figure 2; page 1, lines 50-80*	1,2,3	
A	EP-A-0 005 602 (AMP) *Figure 2; page 2, line 21 - page 3, line 5*	1,2,3	
A	GB-A-2 074 904 (ITT) *Figure 1; page 2, lines 39-60*	1	
A	GB-A- 818 006 (BURNDY CORP) *Claim 7*	1	TECHNICAL FIELDS SEARCHED (Int. Cl. 3)
D,A	US-A-4 120 556 (BENDIX) *Figure 7; column 4, line 65 - column 5, line 17; column 5, lines 37-46*	1,3,4	H 01 R 13/00 H 01 R 43/00 H 01 R 4/00
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 22-06-1983	Examiner WAERN G.M.
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			