

①



Europäisches Patentamt
European Patent Office
Office européen des brevets

⑪

Publication number:

0 137 920
A1

⑫

EUROPEAN PATENT APPLICATION

⑰

Application number: **84108462.7**

⑤①

Int. Cl.⁴: **H 01 R 13/621**

⑱

Date of filing: **18.07.84**

⑳

Priority: **29.08.83 US 527056**

㉑

Applicant: **THE BENDIX CORPORATION, Executive Offices Bendix Center, Southfield Michigan 48037 (US)**

㉓

Date of publication of application: **24.04.85**
 Bulletin 85/17

㉒

Inventor: **Schildkraut, Alan Leslie, Star Rt. Box 72, Sidney New York 13838 (US)**
 Inventor: **Luca, Vincent Anthony, Jr., 17 Bates Street, Sidney New York 13838 (US)**
 Inventor: **Shepler, Eric Francis, R.D. 3, Box 199, Bainbridge New York 13733 (US)**

㉔

Designated Contracting States: **DE FR GB IT**

㉒

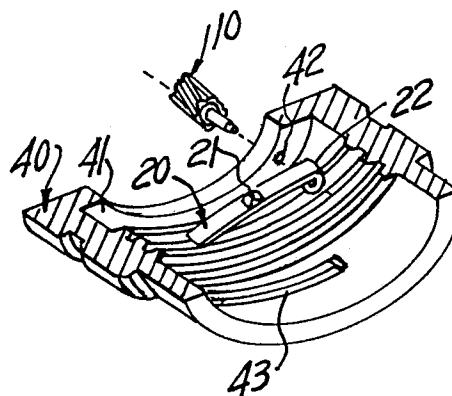
Representative: **Bruillé, Jean et al, Service Brevets Bendix 44, rue François 1er, F-75008 Paris (FR)**

㉕

An Electrical connector assembly.

㉖

This invention relates to the pin (10) that mounts the anti-decoupling spring (20) to the coupling nut (40) of an electrical connector assembly. The invention is characterized by a mounting pin (10) that has a helical thread (11) in the end portion of the pin (10) that is pressure fit into the circular aperture (42) in the annular flange (41) of the coupling nut (40).



EP 0 137 920 A1

-1-

AN ELECTRICAL CONNECTOR ASSEMBLY

This invention relates to an electrical connector and more particularly to an assembly for preventing unwanted uncoupling of a pair of coupled connectors.

5 An electrical connector assembly is comprised of a pair of electrical connectors each having a housing connectable by a coupling nut rotatably mounted to one of the housings. Each of the housings includes an insert of dielectric material provided with multiple openings within which electrical contacts are retained. The
10 coupling nut generally includes a thread adapted to engage a thread on the other housing so that when the threads are engaged and the coupling nut is rotated, the housings are drawn together mating the contacts within the housings. Because coupled connectors used in
15 aircraft are subjected to severe vibration they are provided with an anti-decoupling mechanism to retain the connector housings and respective contacts in mated relationship despite the vibrational forces. An example of such a mechanism may be found in U.S. Patent 4,109,990
20 entitled "Electrical Connector Assembly Having an Anti-Decoupling Mechanism" issued August 29, 1978. The anti-decoupling mechanism disclosed in this patent includes a plurality of radially outwardly extending teeth around the outside of one of the housings, a
25 coupling nut having a flange with a circular aperture and rotatably mounted to the other housing, a spring having a coiled portion defining an opening, and a radial projection that engages the teeth, and a pin pressure fit into the circular aperture in the coupling nut flange and in
30 the opening in the spring to mount the spring to inside of the coupling nut. The configuration of the portion of the pin located in the circular aperture in the coupling

-2-

nut is square to provide 4 edges that cut into the walls of the circular hole in the coupling nut to secure the pin to the coupling nut. The pin may be made by forming a cylindrically shaped pin on a screw machine and then
5 forming four flat surfaces and four edges on one end portion with a milling machine. The pin may also be made from square stock but such stock is more expensive than round stock and requires more handling of the stock to manufacture the pin.

10 Recently, a problem was recognized with the foregoing types of connectors when the coupling nut thread would not tighten completely to the thread on the other housing or the threads would bind. In some instances, the electrical connections between adjacent contacts were
15 shorted out. These problems were traced to pieces of metal between the threads and between the contacts. The piece of metal between the threads also caused unnecessary wear of the threads. As a result, care was taken to remove any metal particles or burrs off a thread after a
20 thread was machined into the coupling nut and housing. However, the problem persisted until it was recognized that when the pin, mounting the spring inside the coupling nut, was pressure fit into the circular aperture in also creating burrs. Failure to remove these burrs
25 caused the foregoing problems to continue as well as adversely affecting the anti-decoupling mechanism by interfering with the deflection of the spring, as the burr becomes lodged behind the spring.

30 Disclosure of the Invention

This invention eliminates the burrs previously produced by the pin that mounted the anti-decoupling spring to the coupling nut. The invention is
35 characterized by a mounting pin that has a helical

-3-

thread in the end portion of the pin that is pressure fit into the circular aperture in the coupling nut.

Accordingly, an advantage of this invention is to eliminate metal burrs that would occur when a pin is used to mount an anti-decoupling spring to a coupling nut.

Another advantage of this invention is that the mounting pin can be made more economically by a single manufacturing machine by eliminating the need for a second machine to mechanically mill flat sides on a portion of the mounting pin.

Another advantage of this invention is that the mounting pin can be made from round stock eliminating the need to use more expensive square stock.

Detailed Description of the Invention

FIGURE 1 is a diagrammatic view of a mounting pin incorporating the principles of the invention.

FIGURE 2 illustrates a cross-sectional view of a portion of an electrical connector assembly having an anti-decoupling mechanism.

FIGURE 3 is an exploded view of a portion of the coupling nut, a spring member and a pin for mounting the spring to the coupling nut.

Referring now to the drawings, FIGURE 1 illustrates a mounting pin 10 incorporating the principles of this invention. One end portion of the mounting pin 10 includes a plurality of helical threads 11 and the other end portion includes a reduced diameter cylindrical portion 12 terminating in a tapered end portion 13. The tapered end portion 13 is designed to facilitate the entry of the pin 10 into an aperture or passage. The end portion 14 of the threads 11 is tapered to facilitate the entry of the threads 11 into a passageway.

-4-

FIGURE 2 illustrates a cross-sectional view of an electrical connector assembly having an anti-decoupling mechanism which comprises a spring 20 having a radially inwardly extending projection 21 and a coiled end portion 22 defining an opening, a housing 30 having a plurality of radially outwardly extending teeth 31 thereon that engage the projection 21, a coupling nut 40 having a radially inwardly extending flange 41 that has a circular aperture 42 therein and a mounting pin 10 in pressure tight relationship with the opening in the coiled end portion 22 of the spring 20 and the circular aperture 42 in the coupling nut 40. Mounted within the housing 30 is a dielectric insert 32 and one or more electrical contacts 50 adapted to mate with respective contacts in another housing (not shown). The angle of the surfaces on the teeth 31 and on the projection 21 in the spring are designed to impede rotation of the coupling nut 40 in the direction that would uncouple the coupling nut 40 from the housing 30.

FIGURE 3 illustrates how the pin 10 mounts the spring 20 to the coupling nut 40. The spring 20 is a radially deflectable member that includes a radial projection 21 and a coiled portion 22 defining an opening adapted to receive the cylindrical portion 12 of the pin 10 in pressure tight relationship. The coupling nut 40 includes on the inside of one end thereof a plurality of threads 43 and at the other end a circular aperture 42 in the radially inwardly extending annular flange 41. Preferably, the diameter of the threaded portion of the pin 10 is .079 to .082 inches (.200 to .208 centimeters) and the diameter of the circular aperture 42 in the flange 41 is .069 to .073 inches (.175 to .185 centimeters) to provide a pressure tight fit of the pin 10 in the aperture 42.

-5-

The inventor believes that when an axial force is applied to the pin 10, to pressure fit the pin 10 into the circular aperture 42 of the coupling nut 40, burrs are eliminated because the threads in the pin displace
5 material of the walls into the area between the crests of the threads rather than cutting material loose and pushing the loose material through aperture 41 as did the previous pins. Since the threads 11 in the pin 10 rotate into the material, they do not cause metal burrs which
10 come loose from the coupling nut and adversely affect the threading of the coupling nut to the other housing. The pin 10 incorporating the principles of this invention can be made on one machine, i.e., a screw machine and eliminates the need to use a second machine to mill flat
15 surfaces in the pin 10 to form edges on the portion of the pin that will be located within the circular aperture 42 of the coupling nut 40. Hence, the cost of fabricating the mounting pin 10 has been reduced.

0137920

-6-

Claims:

1. An electrical connector assembly of the type having first and second (30) housings, an insert mounted in each
5 of said housings; a plurality of electrical contacts (50) mounted in each of said inserts, the contacts (50) in said first insert adapted to mate with the contacts in said second insert (32); a coupling nut (40) for connecting said first and second (30) housings together and
10 connecting said electrical contacts (50) in each of said inserts together, said coupling nut (40) mounted for rotational movement on said first housing, said coupling nut (40) having a thread (43) on the inside thereof adapted to engage a thread on the second housing (30) to
15 connect the first and second housings together upon engagement of the threads and rotation of the coupling nut (40), and a radially inwardly extending annular flange (41) having at least one circular aperture (42) therein; a plurality of radially outwardly extending
20 teeth (31) annularly arranged on the second housing (32); a resiliently and radially deflectable member (20) having a coiled portion (22) defining an opening and a radially inwardly extending projection (21) adapted to engage the teeth (31) when said threads are engaged and the coupling
25 nut (40) is rotated; and a pin (10) in pressure tight relationship with the circular aperture (42) in the annular flange (41) of said coupling nut (40) and with the opening defined by the coiled end portion (32) of said deflectable member (20), the pin (10) characterized
30 by:

a helical thread (11) located on the portion of the pin (10) that is in pressure tight relationship with the circular aperture (42) in the annular flange (41) of the coupling nut (40).

0137920

-7-

2. The connector assembly as described in Claim 1 wherein there are four circular apertures (42) in the coupling nut flange (41), four pins (10) each mounted in a respective apertures (42) and four deflectable members 5 (20) each mounted to a respective pin (10).

3. A cylindrical coupling nut (40) for use with an electrical connector assembly, said coupling nut (40) of the type having on the inside thereof threads (43) and a 10 radially inwardly extending annular flange (41), said flange (41) having a circular aperture (42) therein; a deflectable member (20) having a coiled portion (22) and a radially inwardly extending projection (21); and a mounting pin (10) extending through and in pressure tight 15 relationship with the circular aperture (42) in the coupling nut (40) and in pressure tight relationship with the opening defined by the coiled portion of said deflectable member (20), said pin (10) for mounting said deflectable member (20) to said coupling nut 20 characterized by:

a helical thread (11) on the portion of said pin (10) located in pressure tight relationship with the circular aperture (42) in the annular flange (41) of said coupling nut (40).

1/1

FIG. 2

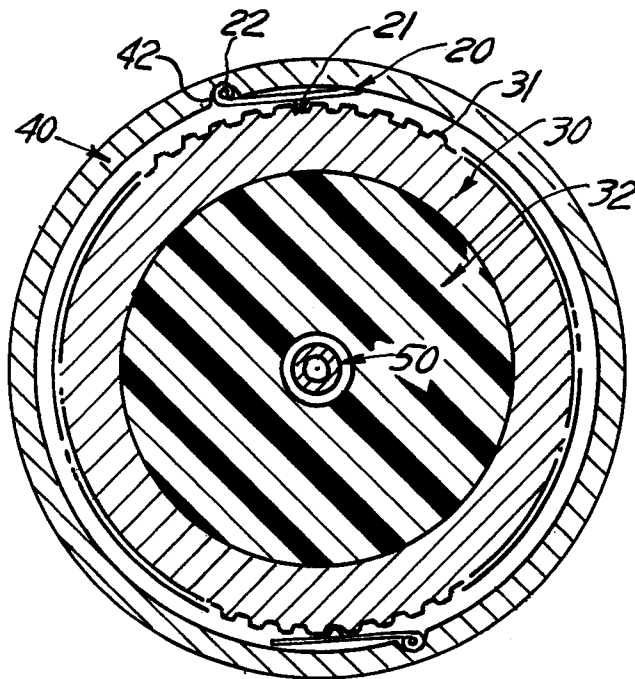


FIG. 1

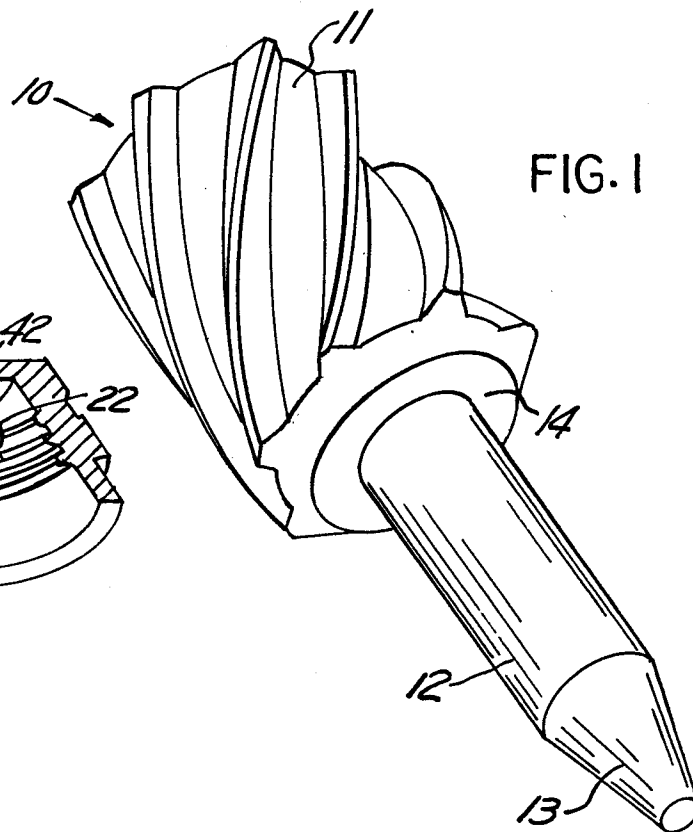
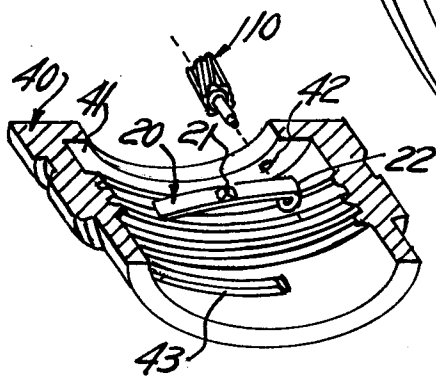


FIG. 3





European Patent
Office

EUROPEAN SEARCH REPORT

0137920
Application number

EP 84 10 8462

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.4)
Y,D	US-A-4 109 990 (CL.R. WALDRON) * Figures 3,4 *	1-3	H 01 R 13/621
Y	--- US-A-3 662 643 (H. SHEFFER) * Figure 2; column 1, lines 44-53 *	1-3	
A	--- GB-A-1 004 429 (GENERAL AMERICAN TRANSPORTATION CORP.) -----	1-3	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			H 01 R 13/00 B 23 P 11/00 F 16 B 29/00 F 16 B 37/00
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 26-11-1984	Examiner LEOUFFRE M.
CATEGORY OF CITED DOCUMENTS 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 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			