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(11)

EP 0 784 357 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

16.07.1997 Bulletin 1997/29

(51) Int Cl.⁶: **H01R 13/52, H01R 13/424**

(21) Application number: **96202379.2**

(22) Date of filing: **27.08.1996**

(84) Designated Contracting States:
DE FR GB

(30) Priority: **31.08.1995 US 521776**
23.07.1996 US 687082

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(54) Connector with wire sealing webs

(57) An improved MIL-C-26500 type connector having wire sealing webs (5), a hard dielectric face socket insert (14) to detect splayed or bent pins (27), and a controlled configuration of contact retention clips providing improved electrical performance, easy insertion and re-

moval of contacts and improved serviceability. Additionally, a receptacle connector has a set of ground wave springs (31) assembled on the receptacle connector flange (30) to assure a secure ground path on electrically bonded connectors.

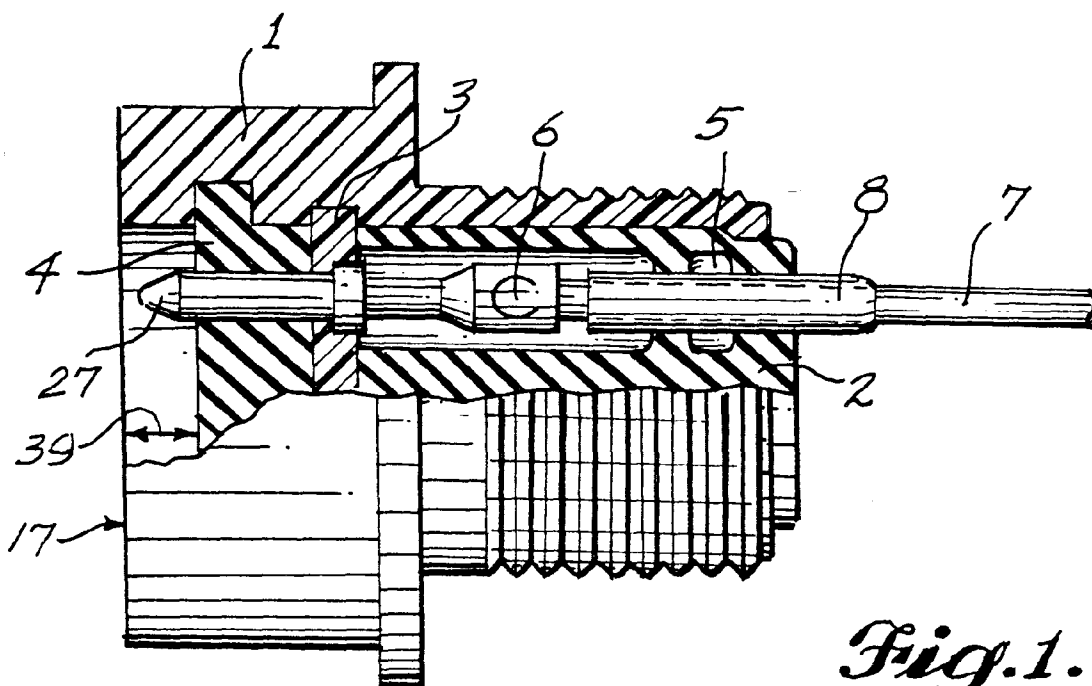


Fig. 1.

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Description

RELATED APPLICATIONS

This is a continuation -in-part of application Serial No. 08/521,776, filed August 31, 1995 which was a continuation-in-part of application Serial No. 08/435,122 filed May 5, 1995.

SUMMARY OF THE INVENTION

A preferred embodiment of the present invention utilizes a Mil-C-26500 type electrical connectors having an improved environment resisting rubber grommet, hard dielectric face socket insert and user friendly contact retention clips and ground wave springs on the receptacle connector.

It is an object of the present invention to eliminate waste associated with Mil-C-26500 type connector assembly and increase reliability and maintainability of the electrical connectors. As will be hereinafter appreciated, the present invention significantly lowers cost in the assembly of connectors and greatly improves the interconnection between the plug and receptacle connectors thereby avoiding discontinuities.

Another object of the invention is to maintain Mil-C-26500 connector environment resistivity.

A further object of the invention is to ensure proper mating or coupling on the electrical pin and socket contacts when splayed or bent contacts are affected.

Yet another object of the invention is to eliminate manufacturers variation on the construction of the contact retention clips and institute ease of assembly or disassembly of the electrical contacts.

A still further object of the invention is to provide a set of straight wave spring that becomes effective to assist the connector mounting screws in maintaining a secure ground path on the aircraft connectors that requires electrical bonding.

The present invention provides Mil-C-26500 type electrical connectors with improved wire sealing webs, provision of a hard dielectric face socket insert to detect splayed or bent electrical contacts, user friendly retention clips which enhances insertion and removal of contacts resulting to elimination of damaged or push back retention clips and ground wave springs to assure protection against lightning strike and continued system protection against high intensity radio frequency (HIRF). By reason of improved electrical characteristics, the mechanical construction is also improved.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a side elevational view of a Mil-C-26500 electrical receptacle connector, a portion thereof being broken away in order to show the connector's internal construction illustrating installed shrinkable build-up sleeve on wire;

Fig. 2 is a developed view of the present invention sealing web formed in the rubber grommet of the Mil-C-26500 electrical connector;

Fig. 3A-C is a graphical representation illustrating a Mil-C-26500 electrical plug connector having a hard dielectric face socket insert construction. A sectionalized view taken along lines 3B-3B, for the purpose of illustrating the connector insert consisting of two layers of material; in which the insert face is hard dielectric and functionally shaped and then bonded to an elastomeric type rubber;

Fig. 4 is a fragmentary view depicting the internal construction of the connector for the purpose of illustrating the shape, size and construction of parts which form the present user friendly attributes on the contact retention clips of Mil-C-26500 connectors; and

Fig. 5 is another fragmentary view corresponding generally to Fig. 4 but illustrating the criticality of assembling the rubber grommet to the other parts described in Fig. 4.

Fig. 6A-D is a graphical representation illustrating a Mil-C-26500 electrical receptacle connector having a ground wave springs assembled on the receptacle flange. A detailed view of the ground wave spring and sectionalized view 6C-6C are shown for the purpose of illustrating the shape, size and construction of parts as the attributes in the enhancement of maintaining a secure ground path on the receptacle connector to the aircraft panel and/or structure.

DETAILED DESCRIPTION OF THE INVENTION

An electrical, circular, environment resisting connector exemplifying the present invention is detailed in its entirety in Fig. 1 through Fig. 6. A connector of this type comprises a rigid shell 1 containing a rubber grommet 2 having formed inside a seal webbing 5, a rigid dielectric contact retainer 3 and a rubber insert 4. These members all being fixedly retained in the shell 1. Also, pictured is an electrical pin contact 6 crimped to a wire 7 with a shrinkable sleeve 8 used to build up diameter of wire 7. The several members 2-5 encompass and hold in place any preferred number of contacts 6, the precise number depending upon the number of wires 7 to be electrically connected.

Although the function thereof is not readily apparent at this stage of the description, it can be pointed out that the seal webbing 5 in the rubber grommet 2 ensures an environmentally resistant property of the connector. For this description but not limited thereto, the existing seal webbing 5 is constructed to accommodate size 20 contact 6, 15 on wire 7 with diameter range of 0.040 to 0.090

in. Fig. 2 is illustrative of the present invention environment resisting rubber grommet 2 having seal webbing 5 with a wire seal range of 0.035 to 0.090 in. At this time, attention is called to the shape and size of the seal webbing 5 construction in which the smaller diameter 9 of the seal webbing 5 is now 0.021 to 0.0215 in. but still within the molding elasticity of the rubber grommet 2. Equally important is the addition of a 0.025 to 0.030 in. flat radius 10 on each of the three seal webbings convolutions 11-13, thus securing a much more reliable wire seal.

Another feature of the invention is shown in Fig. 3. As described earlier, conventional connector of this type uses a rubber insert 4 on both the plug 16 and receptacle 17 connectors. It should be understood that a plug 16 connector having socket contact 15 coupled to a receptacle 17 connector having a pin contact 6 can result in improperly mated pin 6 and socket 15 contacts. This condition exists when splayed or bent contacts are mated whereby the pin contact 6 is laying outside or alongside the socket contact 15. Performing a very critical role in the practicing of the invention is a specially configured hard dielectric face insert 14. The hard dielectric face insert 14 is physically added to the existing rubber insert 4. In order to comply to the dimensional geometry 39, 40 of the Mil-C-26500 receptacle 17 and plug 16 connectors interfacial seal the layer of hard dielectric 14 is substituted to the removed portion of the rubber insert 4. As can be seen in Fig. 3, a layer of the hard dielectric 14 is bonded to the rubber insert 4 when the plug connector 16 or receptacle connector 17 has socket contacts 15. In this regard, it is to be observed that the socket contact hole opening 18 in the hard dielectric 14 has a diameter that chamfers down to another contact hole diameter 19 which is smaller in size than the combined diameter of the front ends 27 of the pin -16 and socket 15 contacts. Owing to these dimensional configurations, the inadvertent mating of splayed or bent contacts is eliminated.

The advantages to be derived from incorporating standardized, user friendly contact retention clips 20 on the Mil-C-26500 connector is graphically illustrated on Figs. 4 and 5. It shall be observed that the contact retention clips 20 hole opening 28 is at the receiving end of a series of predetermined diameters 21-23 designed to lead in pin 6 and socket 15 contacts without interference. Also, attention is called to the positioning 24 and hole opening 25 of the retention clip tines 27. It can be discerned that this construction permits contacts 6,15 extraction with ease. Otherwise stated, the advantages can be understood as (1) less critical assembly or bonding of the rubber grommet 2 towards alignment with the rigid dielectric contact retainer 3 whereby each component halves or parts 2,3 has plurality of contact holes 29, (2) insertion and removal of contacts 6,15 is vastly improved and (3) construction variations and damage to the contact retention clips 20 are eliminated. These advantageous features are all simultaneously realized

by virtue of the construction on the contact retention clips 20 within and outside the rigid dielectric contact retainer 3.

From Figs. 6A-D it will be further discerned that adjacent to each receptacle 17 connector mounting hole 32 is a wave spring 31. For this illustration but not limited to is a 0.005 in thick BeNi wave spring 31 which is held stationary in a configured dimensioned slot 33. Although, the way it is held stationary is relatively unimportant to a practicing of the invention, it is imperative that its properly adjusted positions, height 34 and length 36, be maintained accordingly to the slot 33 depth 35 and length 37. For this purpose, the wave spring 31 is designed to about 60 percent point of compression or deflection when the receptacle 17 connector is mounted to the aircraft panel and/or structure 38 using mounting screws. It can be understood that the wave springs 31 permits a maintainable, reliable and secure ground path to the mounted receptacle 17 connector.

Waste elimination associated with Mil-C-26500 type electrical connector assemblies, increased reliability and maintainability on these connectors with the addition of an improved environment resistant seal webbing 5, hard dielectric face socket insert 14, user friendly contact retention clips 20 and ground wave springs 31 are all realized in the preferred embodiment.

Claims

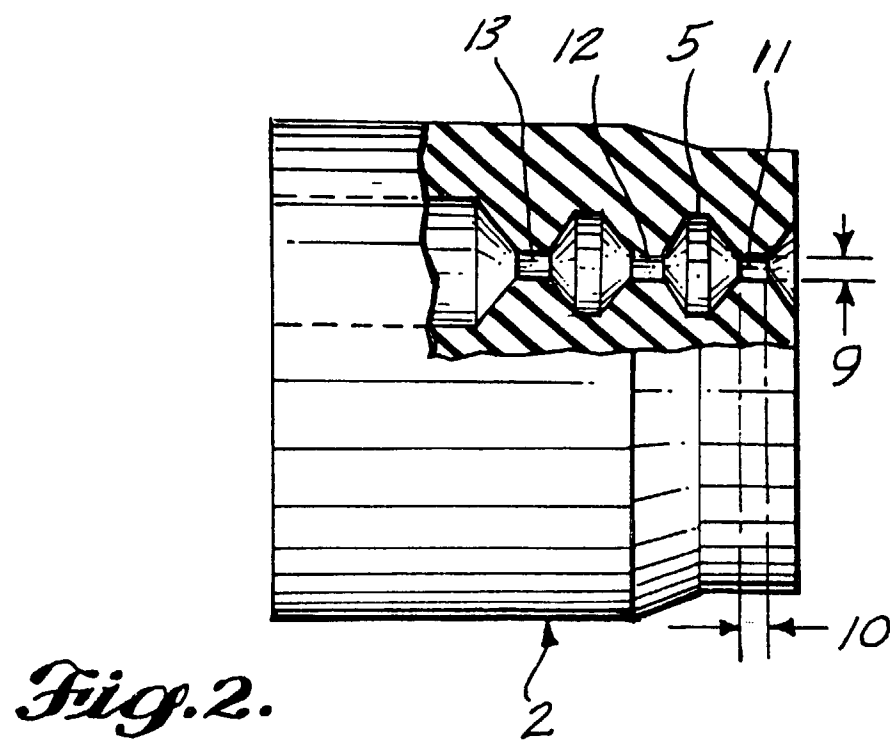
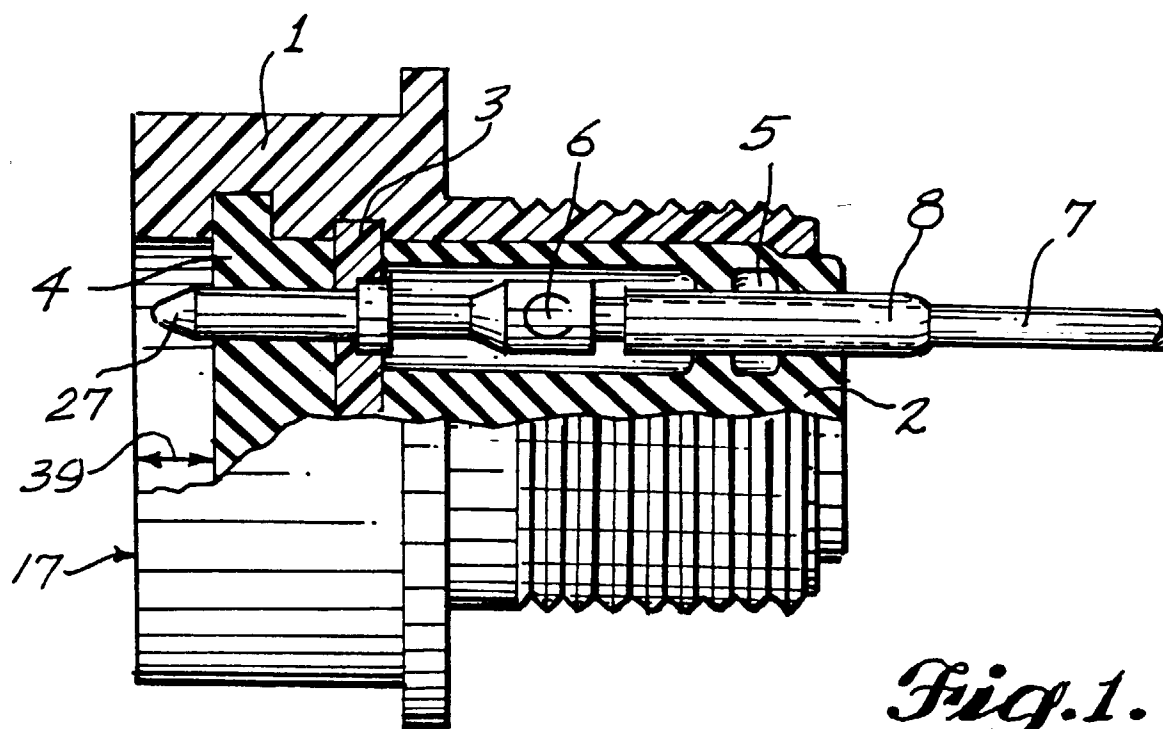
1. A Mil-C-26500 type electrical connector comprising an environment resisting rubber grommet having sealing webs with a smaller minimum wire seal on said Mil-C-26500 connectors; a rubber insert having specially configured hard dielectric on the face of the socket rubber insert and contact retention clips wherein the form, fit and function produce standard insertion and removal on electrical contact assembly.
2. A Mil-C-26500 type electrical connector according to claim 1 wherein said seal webbing ranges on wire diameter consisting of:
 - 0,035 to 0,090 in for size 20 contact
 - 0,065 to 0,130 in for size 16 contact
 - 0,075 to 0,140 in for size 12 contact
3. A Mil-C-26500 type electrical connector according to claim 1 or 2, in which said portion of said socket rubber insert is a layer of hard dielectric bonded rigidly to the face of said socket rubber insert, in which the interfacial seal property between the plug and the receptacle connector when coupled is maintained, and/or in which mating of splayed or bent electrical pin and socket contacts is unengageable.
4. An electrical connector comprising:

- a rubber grommet having sealing webs;
- a rubber insert having a hard dielectric on the face of said rubber insert; and
- contact retention clips.

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5. An electrical connector according to any of claims 1-4, in which electrical contacts are taperedly received in said contact retention clips.
6. An electrical connector according to claim 5 in which said contact retention clips are fixedly secured within a rigid dielectric contact retainer. 10
7. An electrical connector according to claim 6, having a flange portion and wherein a set of ground wave springs are assembled on the flange. 15
8. An electrical connector according to claim 7 in which said ground wave springs are coupled to connector mounting screws for providing a secure ground path to the connector. 20
9. An electrical connector according to claim 8, wherein said wave springs are fixedly secured within configured slots. 25
10. A Mil-C-26500 type electrical connector according to any of claims 5-9, in which the tapered opening on said rigid dielectric contact retainer precludes rigid interface between said contact retention clips and said contacts, and/or in which the positioning and hole opening of said contact retention clips provide access towards removal of said electrical contact. 30
11. A Mil-C-26500 type electrical connector according to any of claims 1-10, in which said connector comprises a highly environmentally resistant rubber grommet, a socket insert with a hard dielectric face, and contact retention clips providing user friendly insertion or removal on said electrical contacts. 35 40
12. A Mil-C-26500 type electrical connector according to claims 7 and/or any of claims 9-11, in which said ground wave springs are positioned adjacent to each said receptacle connector mounting hole. 45
13. A Mil-C-26500 type electrical connector according to any of claims 7-12, in which said inwardly projecting wave spring is in its properly adjusted point of compression or deflection. 50

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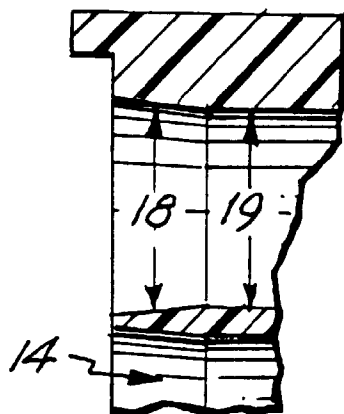


Fig. 3C.

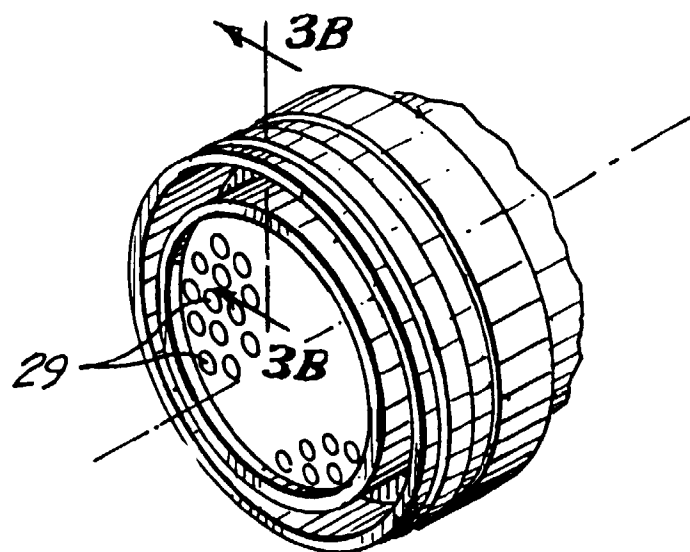


Fig. 3A.

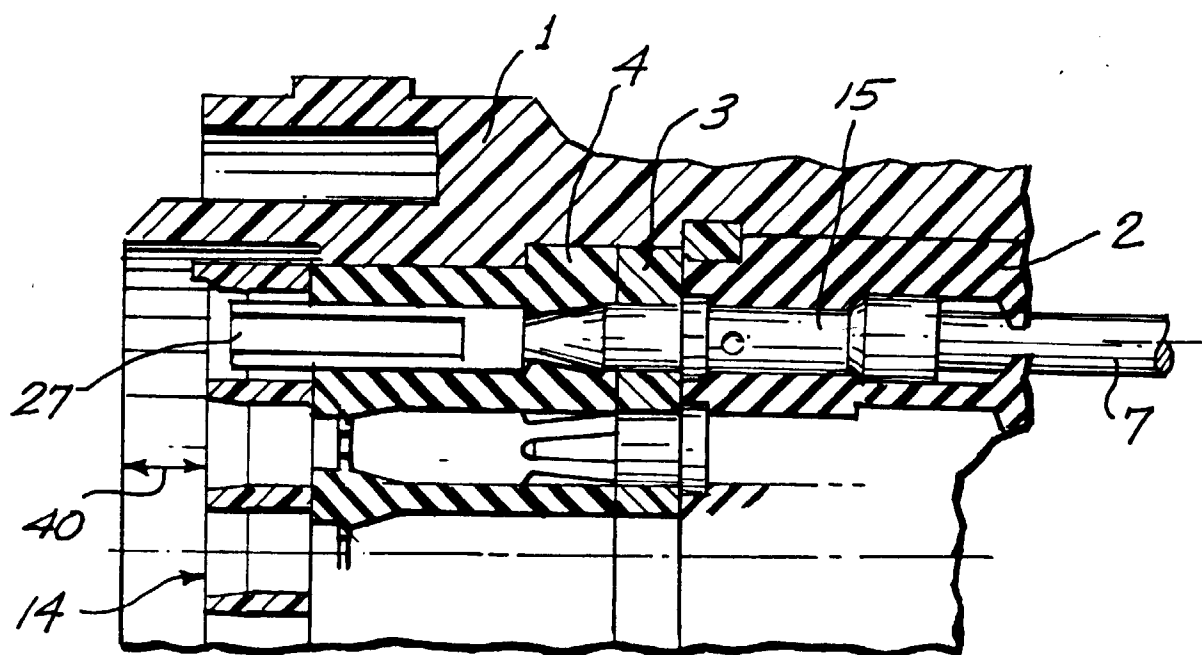


Fig. 3B.

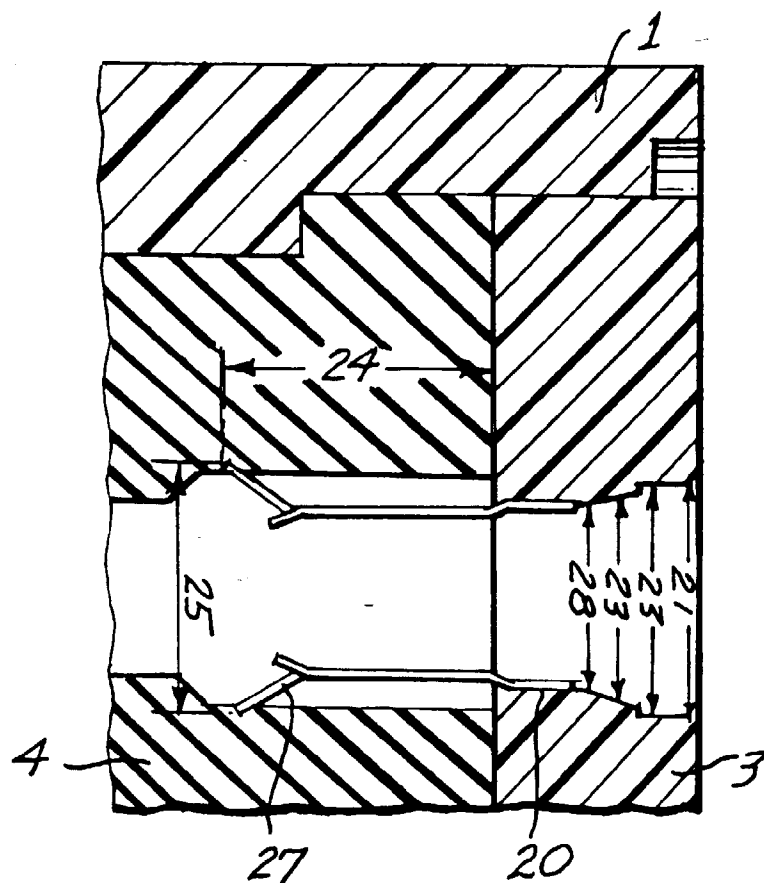


Fig. 4.

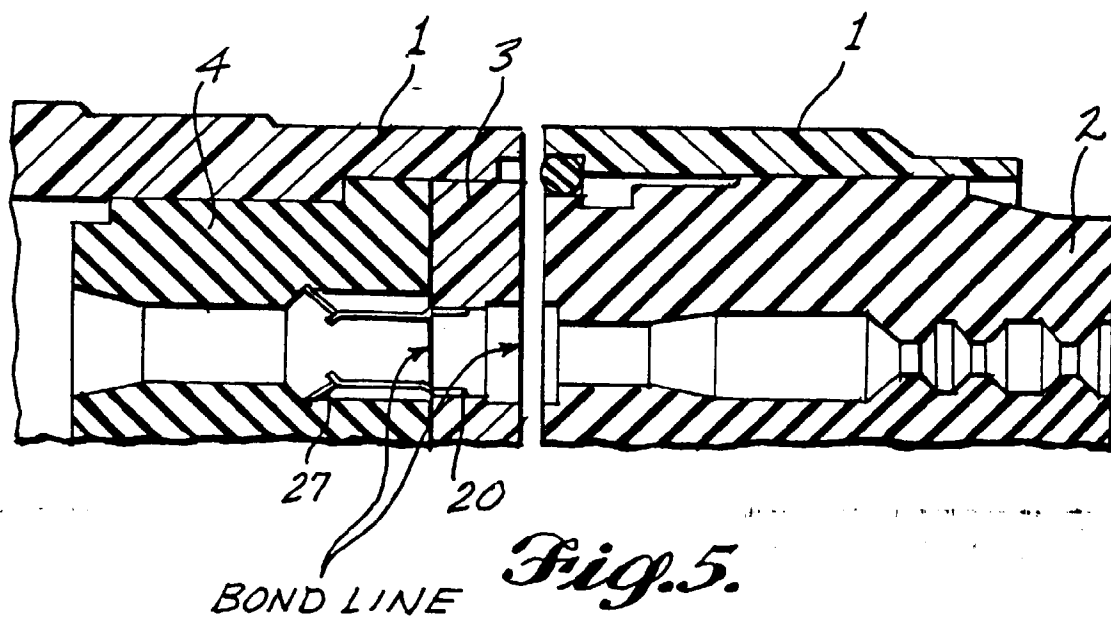
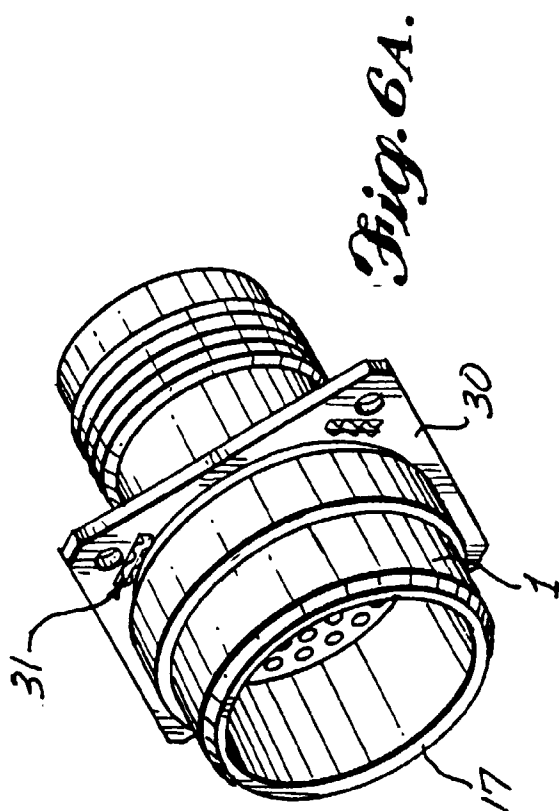
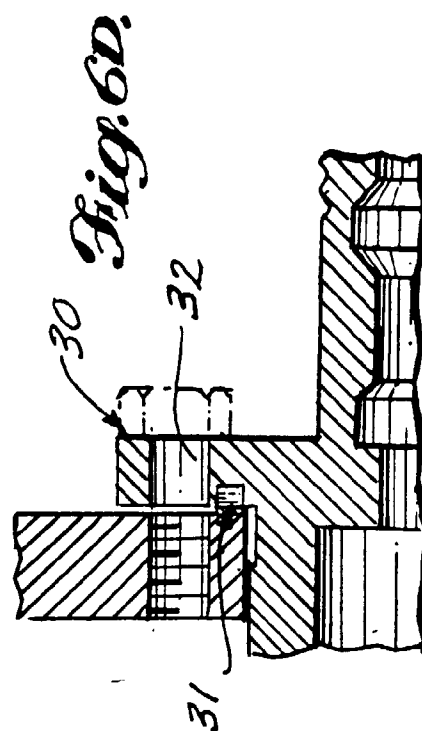
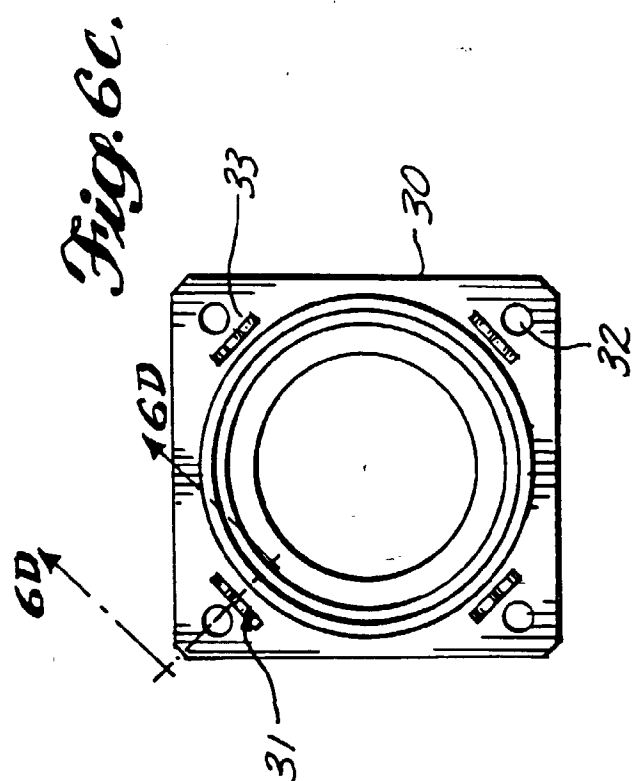


Fig. 5.





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EUROPEAN SEARCH REPORT

Application Number
EP 96 20 2379

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.6)
X	US 4 084 875 A (YAMAMOTO STEPHEN K) 18 April 1978 * column 2, line 20 - line 34 * * column 2, line 42 - line 45 * * column 3, line 13 - line 21 * * column 3, line 21 - line 24 *	1,4-6	H01R13/52 H01R13/424
A	---	7-9	
A	GB 2 117 575 A (AUTOMATION IND INC) 12 October 1983 * page 2, line 65 - line 74 * * page 2, line 129 - page 3, line 18 *	1,4,10, 11	
A	EP 0 643 445 A (LABINAL COMPONENTS & SYSTEMS) 15 March 1995 * column 6, line 34 - line 40 * * column 6, line 47 - line 53 * * figures 1,2,4 *	1,4-11	
A	US 4 981 446 A (LAZARO JR LUIS J ET AL) 1 January 1991 * column 2, line 24 - line 51 * * figure 1 *	1,4	TECHNICAL FIELDS SEARCHED (Int.Cl.6)
A	GB 2 127 626 A (ALLIED CORP) 11 April 1984 * page 2, line 50 - line 60 *	7	H01R
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 16 April 1997	Examiner Berg, S
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			

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