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(12) # EUROPEAN PATENT APPLICATION

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(54) **Electrical connector assembly with male and female connectors clamped together.**

(57) An electrical connector assembly (1) in which male and female connectors (10 and 12) of United States Patent Specification No. 3,760,335 are clamped back-to-back between metal half-shells (20,22) providing shielding openings (30, 54) for mating sides (10B) and 12B) of the connectors (10 and 12) and in clamping engagement with the cable shield (6). Cap screws (70, 80) are provided to clamp assemblies together in mating engagement thereby to provide shielded connection to two coaxial cables (2).

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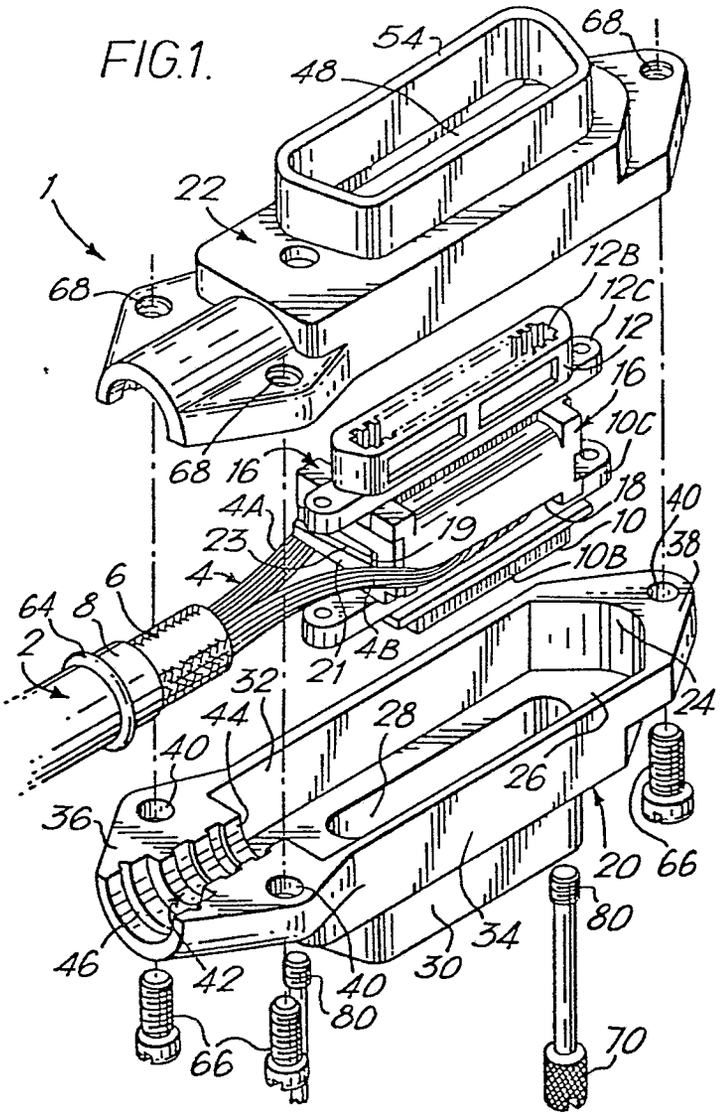
FIG.1.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The invention relates to electrical connector assemblies.

It is often desirable to make electrical taps to a plurality of wires in an electrical cable.

In one prior connector assembly disclosed in United States Patent Specification No. 4,032,211 a male and female connector each having a wire connecting side and a mating side, oppositely directed to the wire connecting side, are clamped together with their wire connecting sides adjacent and wire connecting portions of corresponding terminals in alignment, the mating sides being oppositely directed.

However, a disadvantage of such prior connector assembly is that no provision is made for shielding the wires which is often desirable and to avoid signal interference. In addition, there are no means for mechanically connecting the assembly to further assemblies as may often be desired, for example, in a telephone sub-station.

According to the invention, a connector assembly for effecting shielded connection to the wires of a coaxial cable includes first and second metal half-shells formed with rearwardly facing cavities receiving respective connectors and communicating with openings encircled by forwardly extending flanges, a cable lead-out opening being formed at one end of each half-shell, means being provided to clamp the half-shells together in back-to-back relation with the mating sides in the openings and half-shell

portions defining the cable lead-out opening in electrical contact with the coaxial cable shield and to adjacent half-shells of another, similar connector assembly with the male and female sides of the connector assemblies intermated thereby connecting two coaxial cables together.

Connector assemblies of the invention can provide shielded tapped connection to two or more coaxial cables and may be readily mechanically connected together on site.

Preferably, a pair of wire clasping members each having at one end a hasp and at the other end a latch are latched together about the wire connecting portion sides to provide strain relief for wires connected thereto.

In a particularly convenient assembly, the clamping means include cap screws having enlarged threaded shank portions adapted to engage the threaded heads of cap screws of adjacent half-shells.

Desirably, the half-shell flanges extend beyond the mating sides of the respective connectors and are adapted to mate with a flange of the half-shells of a mating connector assembly. This ensures complete shielding.

An example of the invention will now be described with reference to the accompanying drawings in which:-

Figure 1 is an exploded perspective view of a connector assembly according to the invention;

Figure 2 is a view of the connector assembly shown in Figure 1;

Figure 3 is an end view of the connector assembly of Figure 2;

Figure 4 is a cross-sectional view taken along line 4 - 4 of Figure 2; and

Figure 5 is a side elevation partly in cross-section of two connector assemblies clamped together in mating engagement (with strain relieving clasps omitted for clarity).

The connector assembly 1 is for effecting shielded connection to individual wires 4 of a coaxial cable 2 which wires are surrounded by a shield 6 of metal braid which is contained within an outer jacket 8 of plastics material. The wires 4 are connected to corresponding electrical terminals in each of two connectors described in United States Patent Specification No. 3,760,335, one connector being a male or plug connector 10, and the other being a female or receptacle connector 12, clamped together in back-to-back relationship. The wires 4 are connected to the terminals of the plug connector 10 and receptacle connector 12 using the technique disclosed in United States Patent Specification No. 4,032,211.

More specifically, the plug connector has a wire connecting side 10A abutting a wire connecting side 12A of the receptacle connector 12. Each side 10A and 12 is provided with two rows of mutually aligned wire receiving channels 14. Electrical terminals of the type disclosed in United States Patent Specification No. 3,760,335 have wire connecting portions located in the channels 14 of each connector and these wire connecting portions will penetrate the insulation of a wire when inserted into a channel, and establish electrical contact with the conductive core of the wire. As shown in Figures 1 and 5, the wires 4 are divided into two groups, 4A and 4B distributed along perspective parallel rows of the channels 14 and connected to respective rows of electrical terminals therein. The terminated wires 4A and 4B are then covered by a pair of clasps 16

each moulded in one piece from plastics material and of sufficient length to cover the opposed wire-connecting sides 10 and 12A. Undercut channels 18 are formed along each clasp 16 to provide a clearance for corresponding wires. The surface of each clasp is rounded to prevent pinching damage to any of the wires. One end of each clasp 16 is provided with a latching projection 19, engageable in an opening 23 in a hasp 21 on the other end of each clasp to secure the clasps together thereby to hold the wires more securely in the channels preventing inadvertent disconnection from the electrical terminals.

The connectors 10 and 12 further comprise a female or receptacle mating side 12B oppositely directed to a male or plug mating side 10B. A flange 12C and 10C on the receptacle and plug respectively separate the mating sides from the wire receiving sides 12A and 10A. In practice, the peripheries of the flanges 12C and 10C are reduced for compactness, and to fit within the confines of corresponding cast metal half-shells 20 and 22, described below.

The half-shells 20 and 22 are formed with rearwardly facing cavities 24 and 48 receiving the connectors 10 and 12, respectively. Bottom walls 26, 50 of respective cavities communicating with elongate openings 28 and 52 encircled by flanges 30 and 54 which extend beyond the mating sides of respective connections. Side walls 32 and 34 merge with thickened end walls 36, 58 and 38 provided with threaded bores 68. Hemi-cylindrical cable lead-out openings 42 and 56, respectively, of stepped diameter are provided in the ends 36 and 58 and are formed with mutually aligned spaced apart ribs 44 and 60, respectively, and semi-cylindrical grooves 46 and 62.

When the half-shells 20 and 22 are clamped together as shown in Figure 5, the grooves 46 and 62 are in mutual alignment to receive an O-ring 64 which tightly grips the jacket 8 of the cable 2, and is installed prior to connecting the wires 4 to the connectors 10 and 12. In addition, the ribs 44 and 60 are clamped against the shield 6 to establish a good mechanical and electrical connection therewith. The flanges 10C and 12C seat against the bottom walls 26 and 50 respectively, with the plug and receptacle mating sides 10B and 12B projecting into the openings 24 and 52 encircled by the flanges 30 and 54 respectively. Screws 66 passing through bores 40 engage threaded bores 68 connecting the shells 22 and 24 together. To complete the assembly, elongate cap screws 70 pass through aligned openings 72 in the shell 20, 74 in the flange 10C, 76 in the flange 12C and 78 in the shell 22. Each cap screw 70 includes an enlarged threaded shank end 80 which projects outwardly of the shell 22. The ends 80 may engage complementary screwheads of another set of cap screws 70 which are assembled to another connector, allowing a plurality of connectors 1 to be stacked and interlocked together, whereby the cables 2 may have their wires 4 electrically coupled together. As shown in Figure 5, the half-shell flange 54 fits into the half-shell flange 24 in mating relation. In addition, the receptacle mating side 12A intermates with a plug mating face 10B of the other connector.

Claims:

1. An electrical connector assembly in which a male and female connector each having a wire connecting side and a mating side, are clamped together with their wire connecting sides adjacent and wire connecting portions of corresponding terminals in alignment, the mating sides being oppositely directed, characterised in that for effecting shielded connection to the individual wires (4) of a coaxial cable (2), the connector assembly (1) includes first and second metal half-shells (20 and 22) formed with rearwardly facing cavities (24 and 48) receiving respective connectors (10 and 12) communicating with openings (28 and 52) encircled by forwardly extending flanges (30 and 54), a cable lead-out opening (42 or 56) being formed at one end of each half-shell (20 or 22), means (66, 68, 70, 80) being provided to clamp the half-shells (20 and 22) together in back-to-back relation with the mating sides (12B and 10B) in the openings (28 and 52) and half-shell portions defining the cable lead-out opening (42, 56) in electrical contact with the coaxial cable shield (6) and to adjacent half-shells (20, 22) of another, similar connector assembly (1) with the male and female sides (10B and 12B) of the connector assemblies (1) intermated thereby connecting two axial cables (2) together.

2. An electrical connector assembly according to CLaim 1, characterised in that a pair of wire clasping members (16) each having at one end a hasp (21) and at the other end a latch (19) are latched together about the wire connecting portion sides (10A and 12A) to provide strain relief for wires (4) connected thereto.

3. An electrical connector assembly according

to Claim 1 or Claim 2, characterised in that the clamping means (70, 80) include cap screws (70) having enlarged shank portions (80) adapted to engage the threaded heads of cap screws (70) of adjacent half-shells (20, 22).

4. An electrical connector assembly according to any one of CLaims 1 to 3, characterised in that the half-shell flanges (30, 54) extend beyond the mating sides (10B, 12B) of the respective connectors (10, 12) and are adapted to mate with a flange (54, 30) of half-shells (20, 22) of a mating connector assembly (6).

FIG.1.

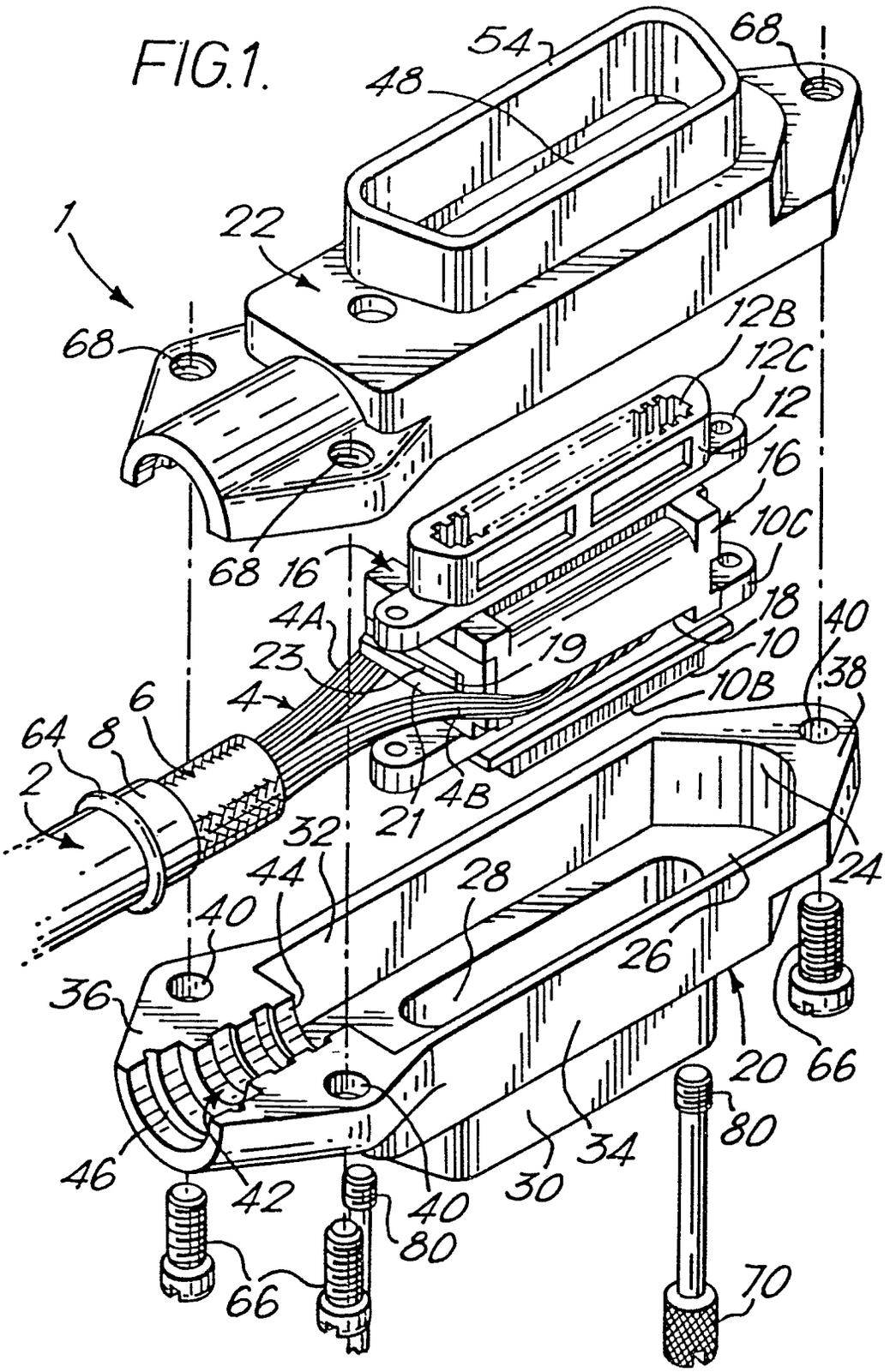
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FIG.2.

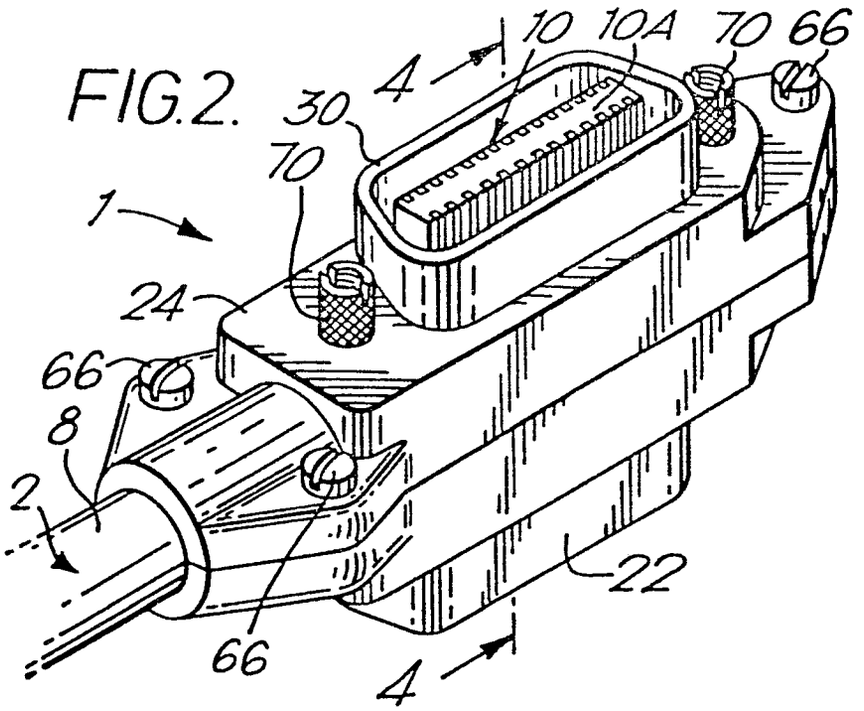


FIG.3.

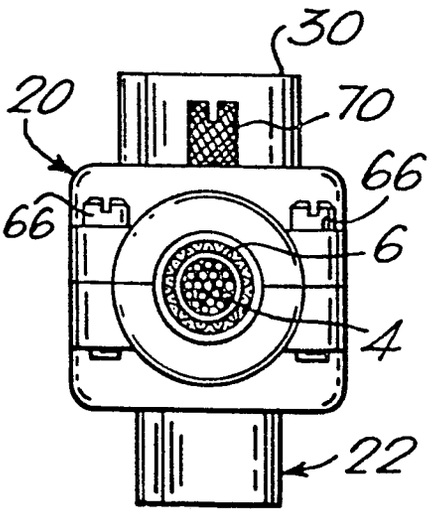


FIG.4.

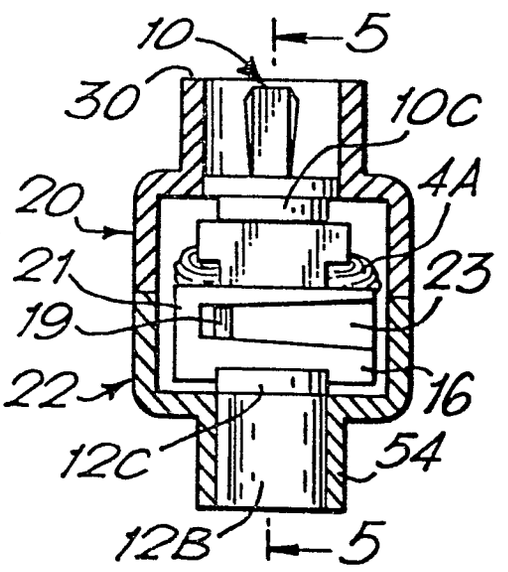
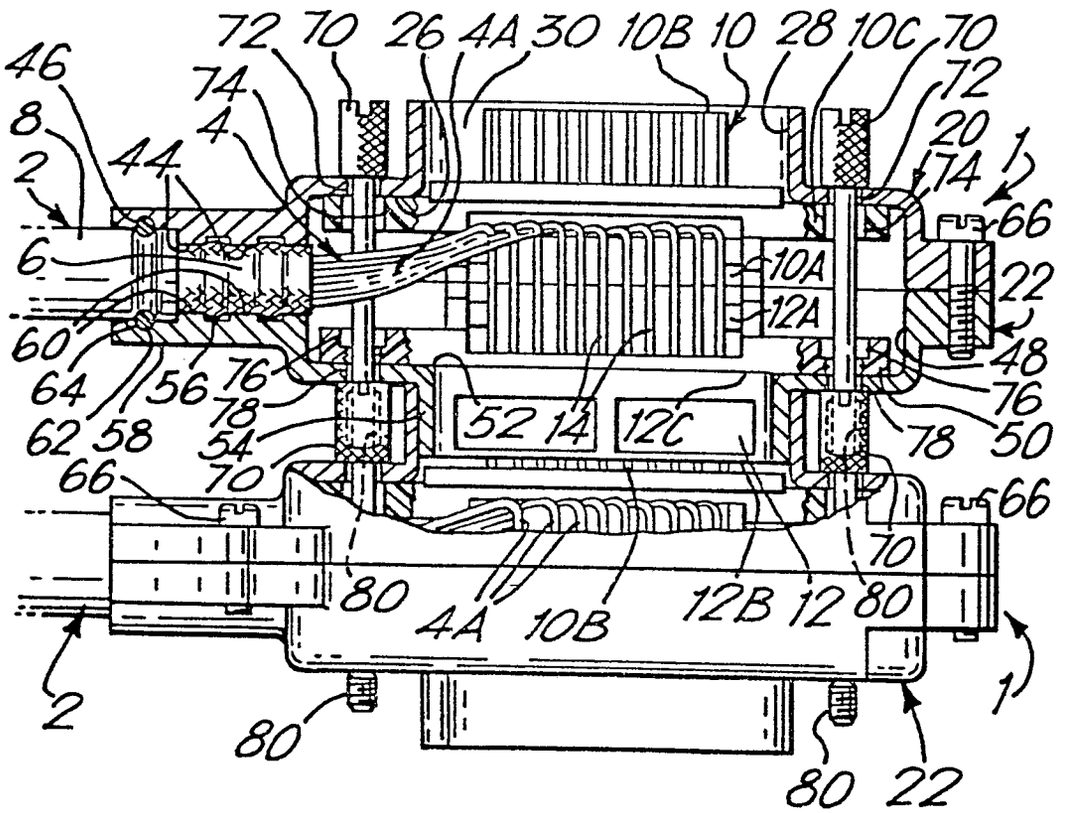


FIG.5.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10B
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10C
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10A
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12C
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European Patent Office

EUROPEAN SEARCH REPORT

Application number
EP 80 30 2051

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
D	US - A - 4 032 211 (AMP) * Column 2, lines 43-68; column 3; column 4, lines 1-32 *	1
	US - A - 3 692 966 (COOKE ENG.) * Column 3, lines 28-68; column 4; column 5, lines 1-60 *	1
	US - A - 3 056 942 (CARBAUGH) * Column 1, lines 71-72; columns 2,3 *	1,3
D	US - A - 3 760 335 (AMP) * Column 3, lines 41-68; columns 4-6; column 7, lines 1-35 *	1
	US - A - 3 876 276 (BUNKER-RAMO) * Column 2, lines 6-68; column 3; column 4, lines 1-9 *	1
P	GB - A - 2 020 494 (BUNKER-RAMO) * Page 2, lines 71-130; page 3; page 4, lines 1-108 *	1

CLASSIFICATION OF THE APPLICATION (Int. Cl.³)

H 01 R 13/658

TECHNICAL FIELDS SEARCHED (Int. Cl.³)

H 01 R 13/658
13/516
13/518
17/12
23/02
31/00

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	06-10-1980	LOMMEL