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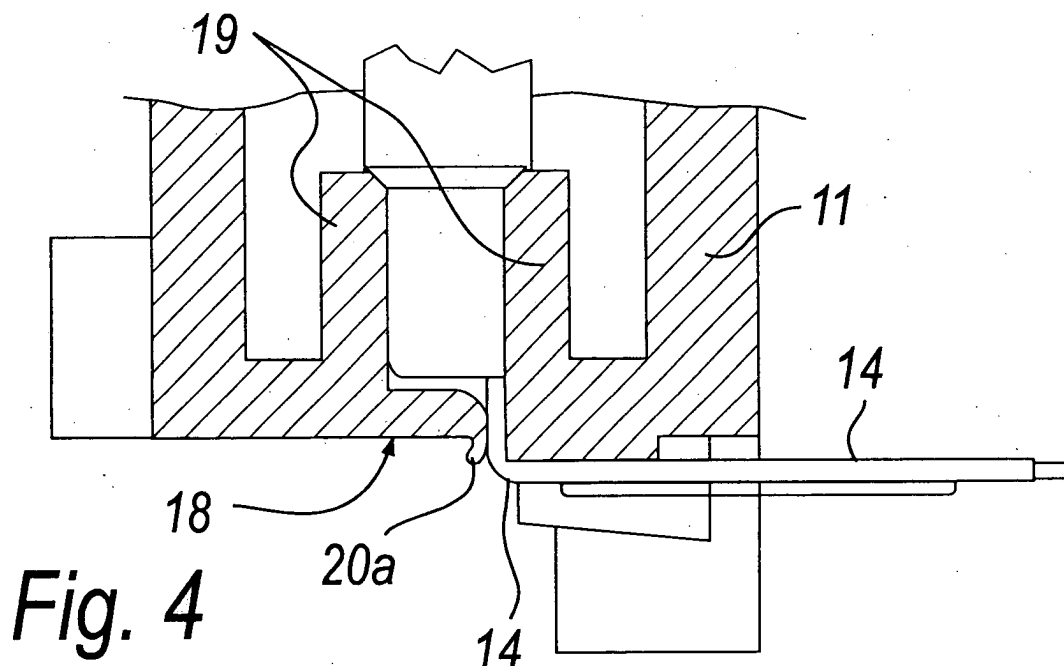
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(54) **Connector, particularly but not exclusively for application to printed circuits**

(57) A connector, useful particularly but not exclusively in application to printed circuits to be coated with a protective coating. The connector (10) comprises a box-like shell (11), which forms internally at least one receptacle (12) for a corresponding electrical terminal (13) that can be inserted in the box-like shell (11) so that an electrical contact tip (14) protrudes from the bottom wall (18) of the shell (11). The at least one receptacle (12) is closed at the bottom wall (18) and has, on the bottom wall (18), a thinner portion (20) that is suitable

to be pierced by the electrical contact tip (14) during the assembly of the terminal (13) with the box-like shell (11). The electrical contact tip (14), during insertion in the connector (10), tears the thinner portion (20) with dimensions that are substantially equal to its own dimensions, forming in practice an opening that is shaped complementary to its own shape, without forming in practice any gap between the inside and the outside of the shell (11); accordingly, the protective coating finds no access to the inside of the connector (10).



Description

[0001] The present invention relates to a connector that is useful particularly but not exclusively in application to printed circuits.

[0002] Plastic connectors are known in which electrical terminals for contact with the printed circuit formed on a supporting board are inserted; complementary connectors for the connection of various electrical and electronic components are coupled to these connectors.

[0003] These connectors are fixed with respect to the board, and the respective electrical terminals are accommodated in corresponding seats, in which openings are formed at the bottom wall of said connector; the electrical contact tips of said terminals protrude from said openings and interact with the printed circuit.

[0004] In most cases, the electric terminals are assembled with said connectors by means of automatic machines, especially when said terminals are difficult to handle.

[0005] The assembly of the connectors with the corresponding terminals on the board that supports the printed circuit, when deemed convenient, can also occur automatically.

[0006] In certain particular applications, after the connector with the corresponding terminals has been fitted on the board, said board is immersed in a protective coating (typically colored red), for example to protect it against humidity.

[0007] During immersion in the protective coating, said coating may penetrate inside the connector through said openings formed in the bottom wall.

[0008] The coating that has entered the connector, once it has solidified, can prevent correct coupling of said connector to its complementary component.

[0009] The aim of the present invention is to provide a connector particularly but not exclusively useful for application to printed circuits that solves the drawback noted in known types.

[0010] Within this aim, an object of the present invention is to provide a connector, useful particularly but not exclusively in application to printed circuits, that does not allow protective coating to penetrate inside it.

[0011] Another object of the present invention is to provide a connector, useful particularly but not exclusively in application to printed circuits, that allows easy and convenient assembly with the respective electrical terminals.

[0012] Another object of the present invention is to provide a connector, useful particularly but not exclusively in application to printed circuits, that can be manufactured with known systems and technologies.

[0013] This aim and these and other objects that will become better apparent hereinafter are achieved by a connector, particularly but not exclusively for application to printed circuits, which comprises a box-like shell, which forms internally at least one receptacle for a corresponding electrical terminal that can be inserted in

said box-like shell so that an electrical contact tip protrudes from the bottom wall of said shell, said connector being characterized in that said at least one receptacle is closed at said bottom wall and has, on said bottom wall, a thinner portion that is suitable to be pierced by said electrical contact tip during the assembly of said terminal with said box-like shell.

[0014] Further characteristics and advantages of the present invention will become better apparent from the following detailed description of a preferred but not exclusive embodiment thereof, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a sectional side view of a connector according to the invention;

Figure 2 is a sectional side view of a connector according to the invention, illustrating an electrical terminal inside it;

Figure 3 is a bottom plan view of a connector according to the invention, illustrating the electrical contact tips of the electrical terminals inserted in said connector;

Figure 4 is an enlarged-scale partial view of Figure 2;

Figure 5 is a sectional plan view of a portion of a connector according to the invention.

[0015] With reference to the figures, a connector according to the invention is generally designated by the reference numeral 10.

[0016] The connector 10 comprises a box-like shell 11, which forms or has formed internally receptacles 12 for corresponding electrical terminals 13 that can be inserted in the box-like shell 11.

[0017] Each one of the electrical terminals 13 is composed of an electrical contact tip 14, to be inserted in corresponding female terminals formed for example on a board on which there is an electrical circuit (both not shown in the figures), and of an additional electrical contact tip 17, to be coupled to complementary female terminals of a complementary connector (also not shown in the figures) to be coupled to the connector 10.

[0018] The electrical contact tips 14, once inserted in the connector 10, protrude from the shell 11 through the bottom wall 18 of said shell.

[0019] In this illustrated embodiment, the electric contact tips 14 are of the type folded at 90°, and have a flat shape formed by a blade 15 that is delimited laterally by two edges 16; it is evident that other embodiments of the invention may include other types of terminal.

[0020] Each receptacle 12 is delimited laterally by side walls 19 for containing and supporting the respective terminal 13 and is closed in a lower region by the bottom wall 18.

[0021] The side walls 19 are externally cylindrical.

[0022] Advantageously, on the bottom wall 18, each receptacle 12 has a thinner portion 20, which is suitable

to be pierced by the electrical contact tip 14 during the or upon assembly of the terminal 13 with the box-like shell 11.

[0023] The region that surrounds the thinner portion 20, generally designated by the reference numeral 21, defines the contour of an insertion guide for the electrical contact tip 14.

[0024] In particular, the region 21 forms a sliding bottom 22 for the blade 15 of the electrical contact tips 14 and lateral abutments 22a (as shown in Figure 5) for the edges 16 of the blade 15.

[0025] In practice, the thinner portion 20 has dimensions that are substantially comparable or corresponding to the dimensions of the electrical contact tip 14 of the terminal 13.

[0026] Advantageously, the region 21 that surrounds the thinner portion 20 has a contour 23, formed by a curved bevel, that assists such as by guiding the insertion of the electrical contact tip 14.

[0027] Once the terminal 13 has penetrated the thinner portion 20, said portion can undergo deformation, separate, bend et cetera in a highly variable manner depending on the type of terminal used and on the corresponding insertion method used: Figure 4 illustrates, merely by way of example, the deformation of the thinner portion, here designated by the reference numeral 20a.

[0028] In practice it has been found that the invention thus described solves the problems noted in known types of connector; in particular, the present invention provides a connector that can be used in application to printed circuit boards that must be immersed in a protective coating without the risk of said coating penetrating the connector, preventing its correct mating with a complementary connector.

[0029] The electrical contact tip 14, during insertion in the connector 10, in fact tears the thinner portion 20 within dimensions that are substantially equal to those of the blade 15, forming in practice an opening that is shaped complementarily to the blade 15, without in practice leaving a gap between the inside and the outside of the shell 11; the protective coating therefore finds no access to the inside of the connector.

[0030] Moreover, the present invention provides a connector, useful particularly but not exclusively in application to printed circuits, that allows easy and comfortable insertion of the respective electrical terminals.

[0031] The region 21 that surrounds the thinner portion 20 in fact assists the correct centering of the electrical terminals and guides them correctly.

[0032] In practice, the materials employed, so long as they are compatible with the specific use, as well as the dimensions, may be any according to requirements and to the state of the art.

[0033] The disclosures in Italian Utility Model Application No. PD2003U000075 from which this application claims priority are incorporated herein by reference.

[0034] Where technical features mentioned in any

claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A connector, particularly but not exclusively for application to printed circuits, comprising a box-like shell (11), which forms internally at least one receptacle (12) for a corresponding electrical terminal (13) that can be inserted in said box-like shell (11) so that an electrical contact tip (14) protrudes from the bottom wall (18) of said shell (11), said connector (10) being **characterized in that** said at least one receptacle (12) is closed at said bottom wall (18) and has, on said bottom wall (18), a thinner portion (20) that is suitable to be pierced by said electrical contact tip (14) during the assembly of said terminal (13) with said box-like shell (11).
2. The connector according to claim 1, **characterized in that** the region (21) that surrounds said thinner portion (20) forms an insertion guide for said electrical contact tip (14).
3. The connector according to one or more of the preceding claims, **characterized in that** said region (21) that surrounds said thinner portion (20) has a contour (23) for guiding the insertion of said electrical contact tip (14).
4. The connector according to one or more of the preceding claims, **characterized in that** said thinner portion (20) has dimensions that are substantially comparable to the dimensions of said electrical contact tip (14) of said terminal (13).

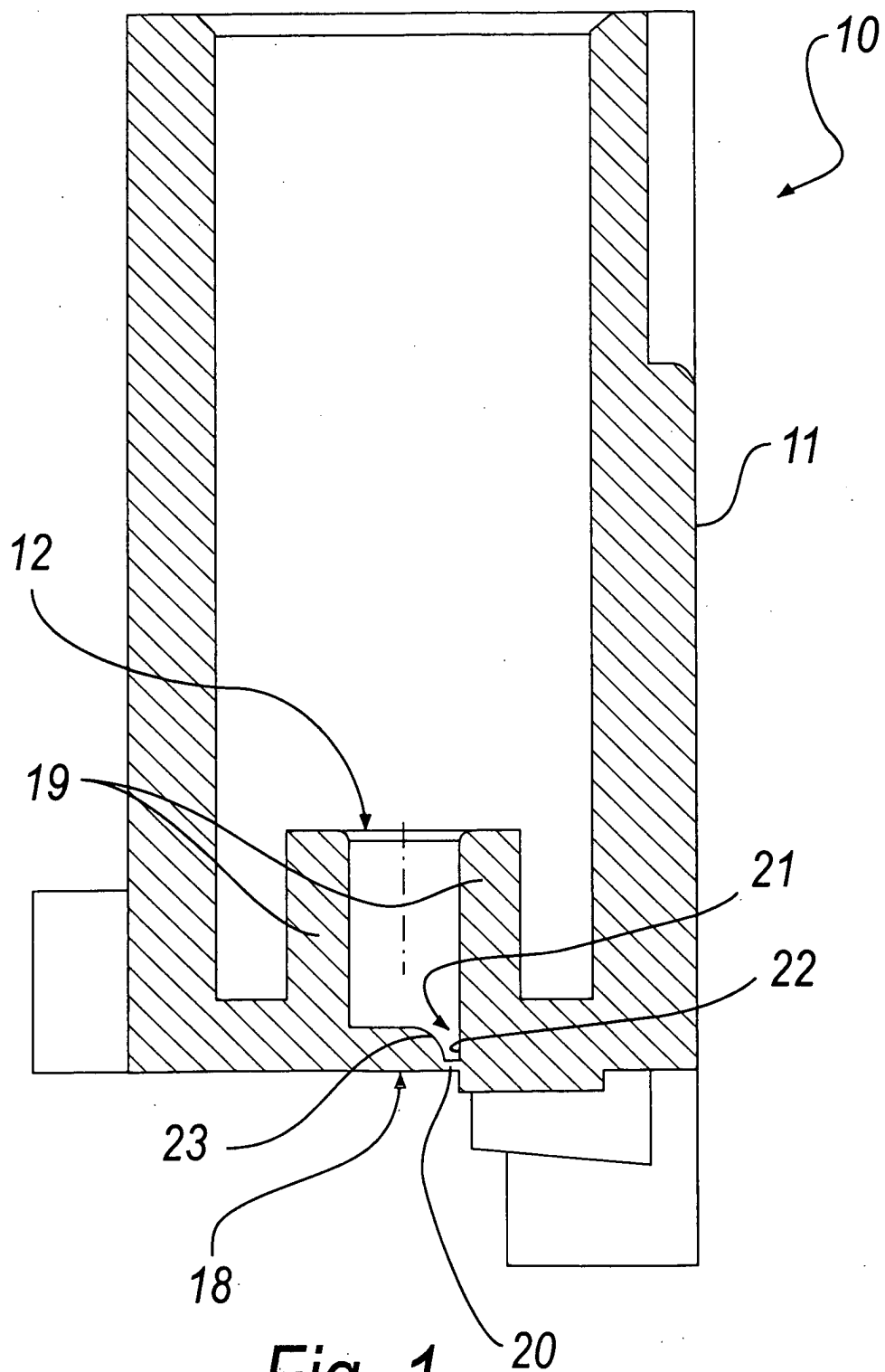


Fig. 1

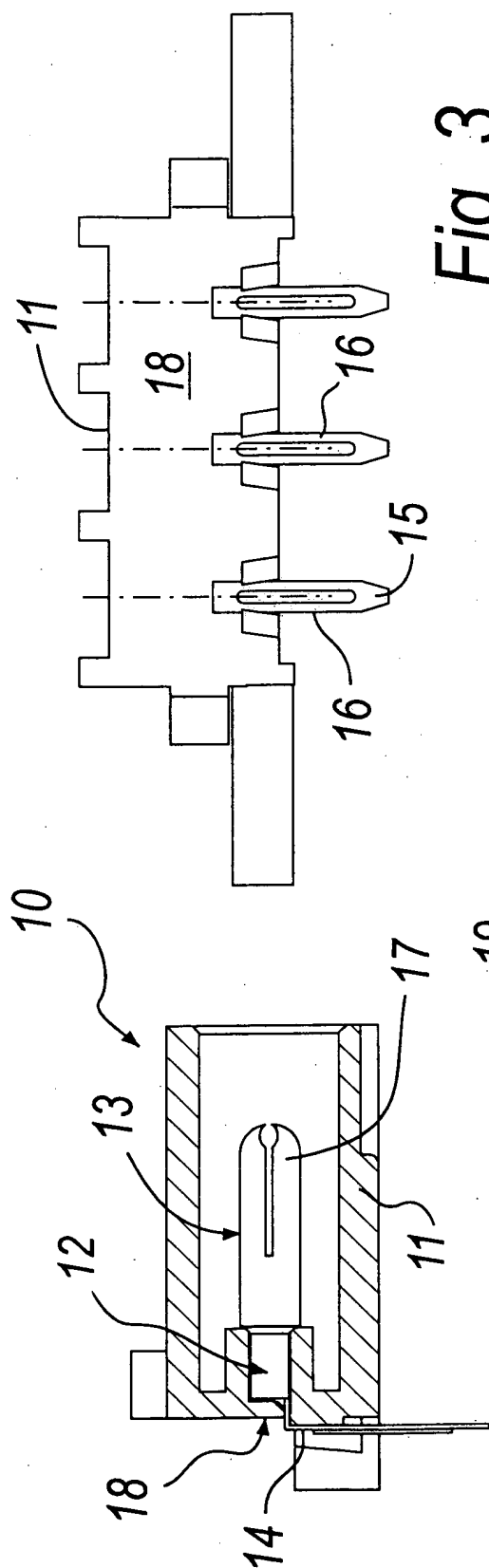


Fig. 3

Fig. 2

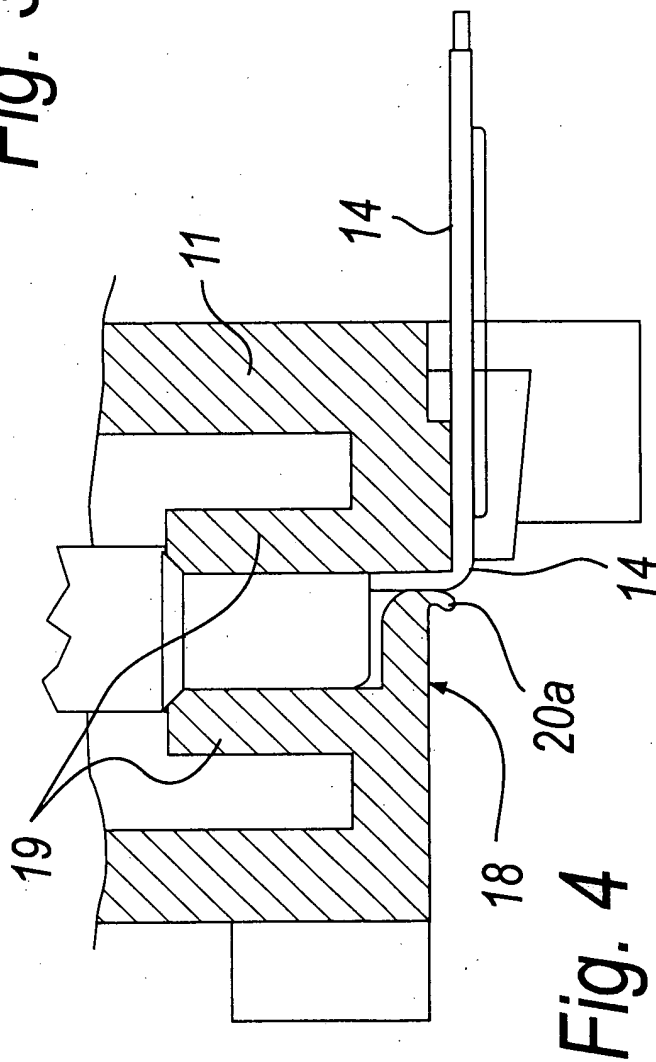


Fig. 4

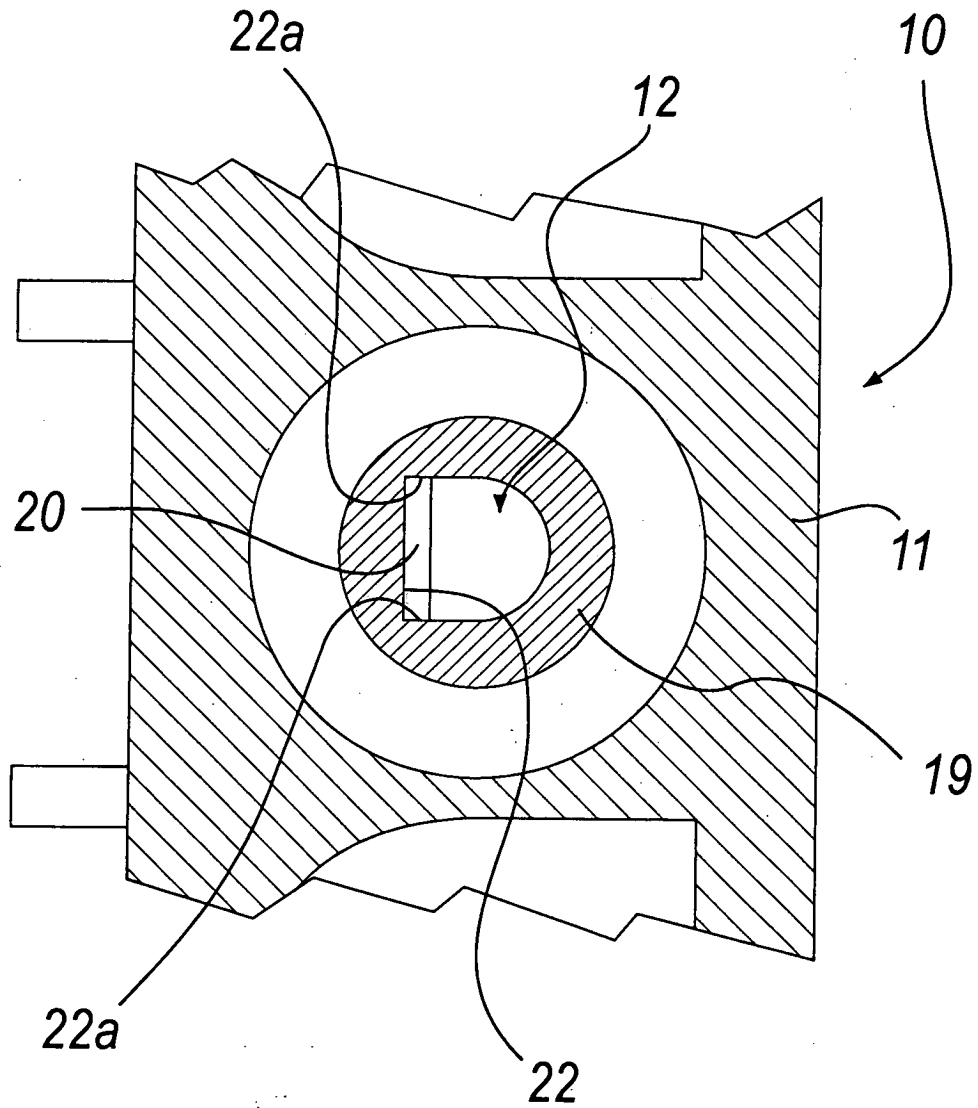


Fig. 5



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 01 9994

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.7)
X	EP 0 749 142 A (EMERSON ELECTRIC CO) 18 December 1996 (1996-12-18) * figure 6 *	1-4	H01R12/00 H01R23/70
X	US 4 629 269 A (KAILUS WILLIAM A) 16 December 1986 (1986-12-16) * column 3, line 19 - line 44; figures 1-3 *	1	
A	EP 0 866 521 A (AIR LB INTERNATIONAL) 23 September 1998 (1998-09-23) * abstract *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			H01R
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 12 January 2005	Examiner Tappeiner, R
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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 04 01 9994

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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12-01-2005

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
EP 0749142	A	18-12-1996	DE	749142 T1	09-10-1997
			EP	0749142 A2	18-12-1996
			ES	2100835 T1	01-07-1997

US 4629269	A	16-12-1986	DE	2844787 A1	03-05-1979
			FR	2407579 A1	25-05-1979
			GB	2007040 A ,B	10-05-1979
			IN	150372 A1	18-09-1982
			IT	1099711 B	28-09-1985
			JP	1350479 C	28-11-1986
			JP	54066486 A	29-05-1979
			JP	61012621 B	09-04-1986
			SE	7810694 A	26-04-1979

EP 0866521	A	23-09-1998	FR	2745122 A1	22-08-1997
			EP	0866521 A1	23-09-1998
			DE	69702436 D1	10-08-2000
			DE	69702436 T2	25-01-2001
