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(71) Applicant: **Sony Ericsson Mobile Communications AB**
221 88 Lund (SE)

(72) Inventor: **Ottocan, Robert**
211 37 Malmö (SE)

(74) Representative: **Andersen, Poul Hoeg et al**
Zacco Denmark A/S,
Hans Bekkevolds Allé 7
2900 Hellerup (DK)

(54) Electronic connection device for transferring energy and data

(57) An electronic connection device comprising a plug 10 and a connector 40, a plurality of corresponding electrical conductors 13 disposed on said plug 10 and connector 40 and at least one locking mechanism for creating a releasable connection between said plug 10 and said connector 40 wherein the locking mechanism is adapted to transfer a electrical current.

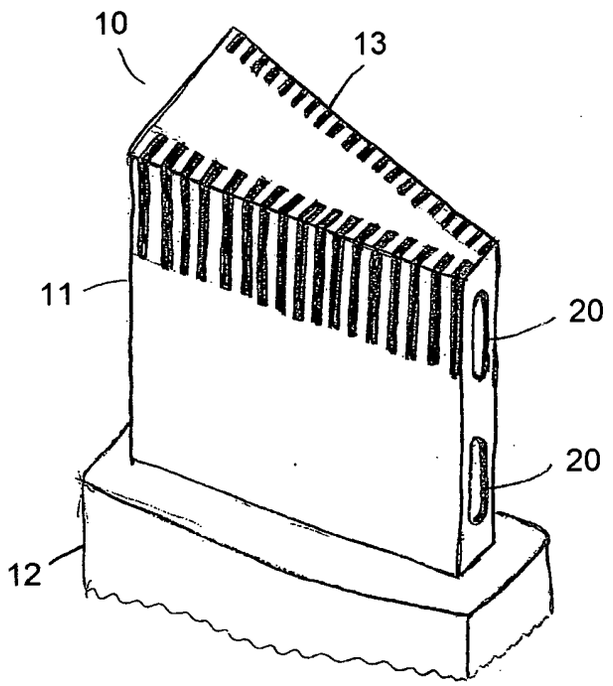

Fig. 1A

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Description

Technical field

[0001] The invention relates to an electronic connection device for transferring data or energy and data in an electronic form comprising a connector; a plug; a plurality of non-locking corresponding electrical contacts; and at least one additional locking mechanism.

Related prior art

[0002] Electronic data-transfer and the transfer of electrical energy between electronic equipment e.g. computers and portable radio communication equipment are usually carried out via some kind of cable connection. The cable is connected to the various types of electronic equipment using a connection device usually comprising plug (male part) and connector (female part). The plug is typically provided with a plurality of electrical contacts complementary with electrical contacts on the connector.

[0003] To keep the plug and connector in close contact, often the contacts on the connecter are adapted to pinch on the contacts of the plug. However, the contacts of such devices are susceptible to damage when the plug is inserted in the connector, especially when the connection device is small and/or the contacts are tiny as is often the case with connection devices for e.g. portable radio communication equipment.

[0004] In such cases a stable connection is needed. If the connections are cut off during the transfer of e.g. data, the important data can be lost. Therefore connection devices for such applications are sometimes equipped with some kind of additional locking mechanism for releasably locking the plug to the connector.

[0005] For example, connection devices are known in the art where the plug is provided with screws and the connector is provided with threaded recesses for receiving said screws. The assembly and disassembly of the plug and connector of such connection devices are cumbersome.

[0006] Also plugs equipped with leaf spring locking mechanisms are known in the art. These connection devices are easily connected, however the leaf spring often tends to be bent out of shape, thus rendering the connection device useless.

[0007] The data transfer rate of a connection device, e.g. a USB connection, generally depends on the number of electrical contacts between the plug and the connector. With the ever increasing demand for rapid transfer of information and ever smaller electronic equipment, such additional locking mechanisms take up a lot of space in the connection device, leaving less space for electrical connections/contacts.

Object of the invention

[0008] It is an object of the present invention to provide a connection device that provides a stable, durable and easily releasable locking mechanism that at the same time allows a large number of electrical contacts.

Summary of the invention

[0009] The object of the invention is achieved by an electronic connection device for transferring energy and/or data comprising a plug; a connector; a plurality of non-locking corresponding electrical contacts disposed on said plug and said connector; and at least one locking mechanism for creating a releasable connection between said plug and said connector, wherein each of said locking mechanisms is adapted to transfer an electrical current.

[0010] By using the locking mechanisms as electrical contacts space is saved on the connection device, and consequently a more efficient connection device is achieved with respect to a "size/data-transfer-rate ratio". A larger number of electrical contacts can be obtained without increasing the size of the connection device.

[0011] Preferably the locking mechanism comprises electrically conducting receiving parts in the form of indentations on the plug, said receiving parts cooperating with electrically conducting resilient means on the connector. Thus a locking mechanism is provided having a very compact volume and being reliable and robust, using simple, low cost parts.

[0012] Further, the conducting resilient means on the connector comprises a tap and an elastic member.

[0013] The passages/transitions of the indentations and the taps respectively are rounded/smooth. By forming the tap and indentations with smooth passages the plug is made to be releasably locked to the connector in a simple way.

[0014] All the parts of the above mentioned locking mechanism could be formed in a conductive material, such as a metal. Alternatively, all the parts of the locking mechanism are coated with an electrically conducting material such as a gold plating.

[0015] Preferably, the transferred electrical current is an electrical signal containing data. Alternatively, the transferred electrical current is used for transferring electrical energy. Thus the non-locking contacts of connection device can be reserved for data transfer allowing e.g. the simultaneous loading of a battery and the transfer of data.

[0016] In an embodiment, said electronic connection device comprises at least two conductive locking mechanisms and at least one locking mechanism is used for transferring electronic data and at least one locking mechanism is used for transferring electrical energy.

[0017] In a further embodiment, a cross-section of an insertion part of the plug and a corresponding receptive

part of the connector have complementary geometrical shapes allowing only one way of inserting the plug in the connector. By having only a single position of the plug in relation to the connector during the insertion it is assured that the contacts are correctly connected. This is of particular importance where both data and energy can be transferred by the same connecting device. If, e. g. the power supply contacts were connected to data transferring contacts, data could be lost and sensitive electrical components could be damaged.

[0018] The above mentioned cross-section could be a triangular shape. The triangular shape allows for easy visual inspection of the correct position of the plug in relation to the connector when inserting said plug in said connector.

[0019] Here the terms plug and connector are meant to cover the inserted ("male") and the receiving ("female") parts of an electrical connection.

[0020] It should be emphasized that the term "comprises/comprising" when used in this specification is taken to specify the presence of stated features, integers, steps or components but does not preclude the presence or addition of one or more other features, integers, steps, components or groups thereof.

[0021] The term "electronic equipment" includes portable radio communication equipment. The term "portable radio communication equipment", which herein after is referred to as a mobile radio terminal, includes. all equipment such as mobile telephones, pagers, communicators, i.e. electronic organizers, smartphones or the like.

Description of the drawings

[0022] The invention will be described in detail in the following with reference to the drawings in which

- fig. 1A is a perspective view of one embodiment of a part of a plug according to the invention;
- fig.1B is a perspective view of the plug in fig. 1A turned as to show the sides hidden in fig. 1A;
- fig. 2A is a planar view of a side surface of the plug in fig. 1;
- fig. 2B is a sectional view of a part of the plug in fig. 2B taken along the line BB;
- fig. 2C is a detailed sectional view through a connector complementary to the plug in fig. 2B;
- fig. 3 is a perspective view of a tap of a locking mechanism according to the invention; and
- fig. 4 is detailed sectional view of a pogo pin-like resilient means of a locking mechanism in a connector according to the invention;

[0023] It should be noted that the figures are not necessarily drawn to scale, and that they represent exemplary embodiments of the invention only.

Detailed description of embodiments of the invention

[0024] Figure 1 is a principle sketch showing a plug 10 for cooperation with a connector 40. The plug 10 may have a first part 11 for insertion into a corresponding receptive part of the connector 40, and a second part 12 constituting a handle part for handling the plug 10, e.g. when inserting or removing the plug 10.

[0025] In figure 1 the plug 10 is shown having a generally triangular cross-section. In this case the receptive part of the connector 40 correspondingly must have a generally triangular cross-section. The cross-section being triangular will provide the plug and connector with a keying function that is beneficial in relation to the correct insertion of the plug 10. As will appear the triangular cross-sectional shape is only exemplary. Any other distinct shape allowing only one way of inserting the plug 10 into the connector 20 can be applied. However, the plug can also have any traditional shape without the keying function.

[0026] The plug 10 is provided with a plurality of electrical contacts 13 adapted to cooperate with corresponding contacts (not shown) in the connector 40.

[0027] These contacts 13 are arranged on the first part 11, and are adapted to transfer electronic data. The capacity of the plug 10 to transfer data depends on the number of contacts 13.

[0028] On at least one of its side surfaces 15, the plug 10 is provided with one or more indentations 20 constituting a receiving part of a combined locking and data/energy transmitting mechanism.

[0029] In fig. 1B the plug has been rotated 180 degrees to show the reverse side of the plug 10 with respect to the view in fig. 1A.

[0030] Turning now to fig. 2A showing a face view of a side surface 15 of a plug 10, said indentations 20 can be elongated grooves. However the indentations 20 can have other shapes as well, e.g. circular.

[0031] As is apparent from fig. 2B the passages/transitions 21 from the bottom face 22 of the indentations 20 to the side surface 15 of the plug are smooth or rounded to allow the release of the tap parts 31 of the locking mechanism, which will be described below.

[0032] Also shown in figure 2B are electrical conductors 16 terminating at the bottom face 22 of the indentations. These electrical conductors 16 are adapted to transfer energy or data in an electrical form between the plug 10 to the connector 40.

[0033] The connector 40 has a receiving part (not shown) in the form of a recess having the same cross sectional form as the insertion part 11 of plug 10, and being adapted to receive part 11. At the bottom of this recess a plurality of electrical contacts (not shown) are provided, corresponding to the plurality of contacts 13

on the plug 10. When the plug 10 is inserted correctly in the connector 40 said contacts on the connector abut the contacts 13 on the plug, allowing the transfer of data and/or energy in electrical form. In figs. 2C, 4 and 5 only details of the connector 40 are shown, namely a cross-section of a wall defining the above mentioned recess for receiving the insertion part 11 of the plug 13.

[0034] As illustrated in fig. 2C the connector 40 has one or more recesses 41 adapted for holding pogo pin-like conductive, resilient means; the resilient means 30 constituting the connector parts of the locking mechanism corresponding to the indentations 20 in the plug 10. The resilient means 30 comprises a tap 31 and a helical spring 37 having a first end 38 and a second end 39. The first end 38 of the helical spring 37 is connected to the tap 31 and the second end 39 is connected to the bottom 42 of the recess 41. The helical spring may be replaced by other suitable resilient means.

[0035] The helical spring 37 is preferably made from or coated with an electrically conductive material.

[0036] Also shown in figure 2C are electrical conductors 46 terminating at the bottom face 42 of the recesses 41. These electrical conductors 46 are adapted to transfer energy or data in an electrical form between the plug 10 to the connector 40.

[0037] As illustrated in figure 3, the tap 31 has a front surface 33 and at least one side surface 34 and a flange 35 having a circumference greater than that of a cross section through the tap 31, i.e. the flange 35 extends beyond the side walls 34 of the tap 31. The passages/transitions 32 from the front surface 33 to the side surfaces 34 of the plug along the edges or at least the corners of surface 33 are smooth or rounded corresponding to the passages/transitions 22 of the plug 10.

[0038] In fig. 4 the recess 41 and the pogo pin 30 are shown in greater detail to illustrate the function of the flange 35. The flange 35 is adapted to cooperate with a groove 43 in the recess 41, the groove 43 providing a forward stopping surface 44 and a backward stopping surface 45 for the tap 31. The tap 31 is fitted inside and adapted to slide within the recess 41 in the connector 40 between extreme positions defined by the stopping surfaces 44 and 45 of the groove 43. The circumference of the flange 35 corresponds to the inner circumference of the groove 43.

[0039] In figure 4 the tap 31 is shown in its most advanced position; the flange 35 of the tap abutting the forward stopping surface 44 of the groove 43. The helical spring 37 is adapted to urge the tap 31 to remain in this advanced position. In the advanced position the front surface 33 of the tap 31 will extend beyond the plane of the wall 47 of the connector 40. In the fully retracted position of the tap 31, when the flange 35 abuts the backward stopping surface 45, the front surface 33 of the tap is aligned or retracted to a position behind the plane of the wall 47 of the connector.

[0040] When the insertion part 11 of the plug 10 is inserted into the connector 40 the side wall of the plug 10 will initially abut the taps 31. When the insertion part 11 is advanced further the rounded passages/transitions 32 of the taps 31 will allow the insertion part 11 to push the taps 31 towards their retracted position, against the force of the helical spring 37, and allow the insertion part to pass the taps 31. In the fully inserted position of the plug 10, the taps 31 will be aligned with the indentations 20 on the plug 10, the spring urging the taps 31 towards its forward position, locking the taps 31 into the indentations 20. Thus the plug 10 will be locked to the connector 40.

[0041] Due to the rounded passages/transitions 22, 32 of the indentations 20 and the taps 31, respectively, it will be possible to disconnect the plug 10 from the connector 40 with a firm pull. However, in the event of e.g. accidental pulls in the plug 10 or connecter 40 these two parts will remain firmly locked together.

[0042] The conductor 46, the helical spring 37, and the tap 31 of the locking mechanism are formed in a conductive material or they are coated with a conductive material and all the said parts 46, 37, 31 are electronically interconnected. Correspondingly, the conductor 16 and the at least part of the inside walls 23 of the indentation 20 are formed in a conductive material or they are coated with a conductive material, and all the said parts 16, 23 are electronically interconnected. Thus when the taps 31 are locked in the indentations 20 the locking mechanism will provide additional electrical connections between the plug 10 and the connector 40.

[0043] A gold plating could e.g. constitute the coating of all or some of the parts of the locking mechanisms. Alternatively, all or some of the parts of the locking mechanisms could be formed in a conductive material, such as a metal.

[0044] In the preferred embodiment shown in figures 1A and 1B the plug 10 is equipped with two indentations 20 on each of two opposite parallel side surfaces 15. Correspondingly, the connector will be equipped with two pairs of corresponding resilient means 30. Thus, the locking mechanism will provide the connection of the plug 10 and connector 40 with a stable grip on each other, as well as four additional contacts.

[0045] The plug 10 and connector 20, however, could be equipped with any desired number of pairs of resilient means 30 and indentations 20, depending on the size of the plug/connector and/or the size of the locking mechanisms.

[0046] The additional contacts provided by the locking mechanism can be used for transferring data, or they can be used for transferring electrical energy, e.g. for charging the battery of an electrical equipment. Alternatively, some of the additional contacts can be used to transfer energy and some for transferring data.

[0047] It is obvious that in an alternative embodiment the resilient means 30 could be placed on the plug 10 and the indentations 20 on the connector.

[0048] The plug 10 or the connector 40 could be an integrated part of an electronic equipment, e.g. a mobile/

cell phone. The corresponding part could be a separate part connected via a cord to another electronic equipment, e.g. a computer, or it could be an integrated part of another electronic equipment.

Claims

1. An electronic connection device for transferring energy and/or data comprising

   - a plug (10);
   - a connector (40);
   - a plurality of non-locking corresponding electrical contacts (13) disposed on said plug (10) and said connector (40); and
   - at least one locking mechanism for creating a releasable connection between said plug (10) and said connector (40), wherein each of said locking mechanisms are adapted to transfer an electrical current.

2. An electronic connection device according to claim 1, **characterized in that** said locking mechanism comprises electrically conducting receiving parts in the form of indentations (20) on the plug (10), said receiving parts cooperating with electrically conducting resilient means (30) on the connector (40).

3. An electronic connection device according to claims 1 or 2, **characterized in that** said conducting resilient means (30) on the connector (40) comprises a tap (31) and a helical spring (37).

4. An electronic connection device according to claim 3 , **characterized in that** passages/transitions (22, 32) of the indentations (20) and the taps (31) respectively are rounded/smooth.

5. An electronic connection device according to any one of claims 1-4, **characterized in that** all the parts of the locking mechanism is formed in a conductive material, such as a metal.

6. An electronic connection device according to any one of claims 1-4, **characterized in that** all the parts of the locking mechanism are coated with an electrically conducting material such as a gold plating.

7. An electronic connection device according to any one of the preceding claims, **characterized in that** the transferred electrical current is an electrical signal containing data.

8. An electronic connection device according to any one of claims 1-6, **characterized in that** the transferred electrical current is used for transferring electrical energy.

9. An electronic connection device according to any one of claims 1-6, **characterized in that** said electronic connection device comprises at least two conductive locking mechanisms and **in that** at least one locking mechanism is used for transferring electronic data and **in that** at least one locking mechanism is used for transferring electrical energy.

10. An electronic connection device according to any one of the preceding claims, **characterized in that** a cross-section of an insertion part (11) of the plug (10) and a corresponding receptive part of the connector (40) has a geometrical shape allowing only one way of inserting the plug into the connector.

11. An electronic connection device according to claim 10 **characterized in that** said cross-section is a generally triangular shape.

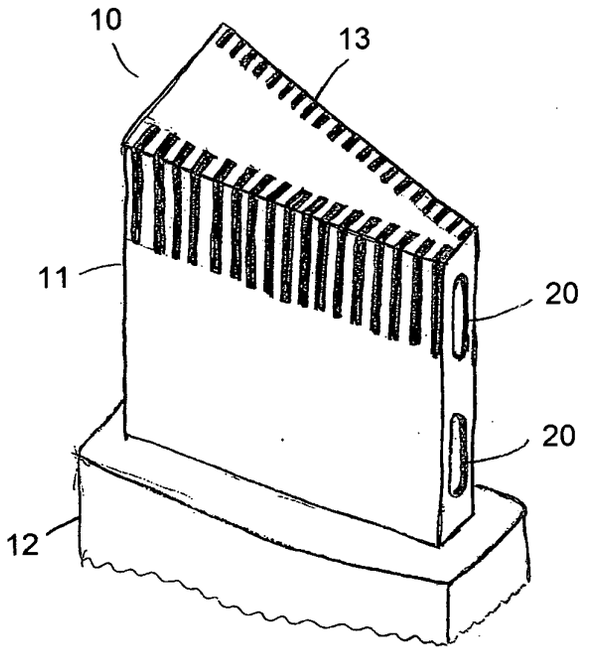

Fig. 1A

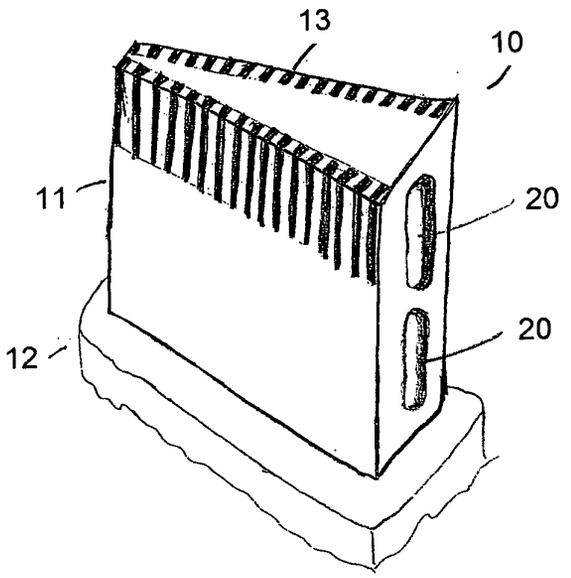

Fig. 1B

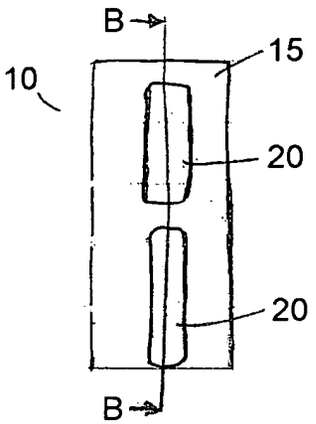

Fig. 2A

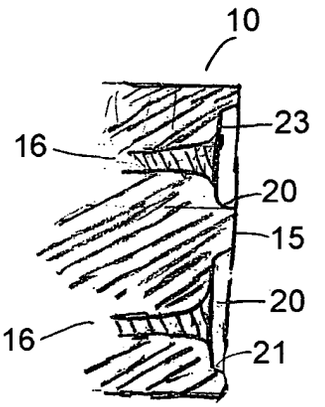

Fig. 2B

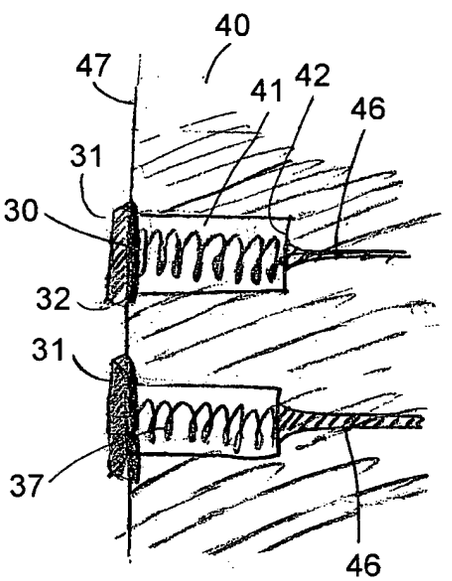

Fig. 2C

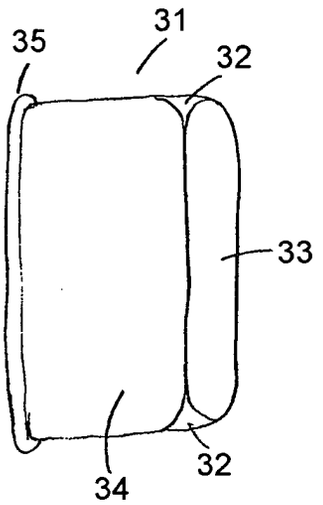

Fig. 3

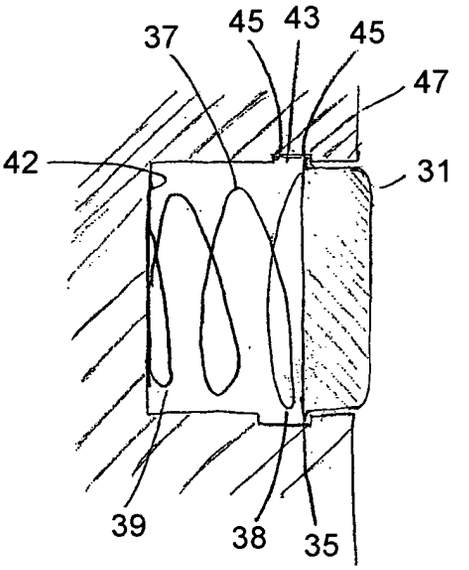

Fig. 4

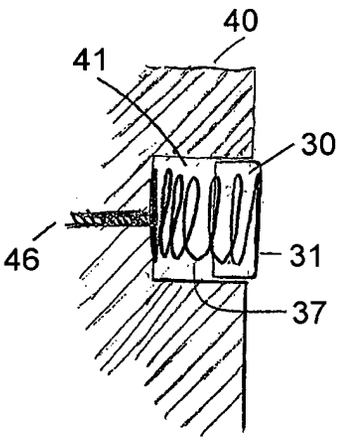

Fig. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 03 38 8072

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 Y	FR 2 402 317 A (VOEGTLIN JACQUES) 30 March 1979 (1979-03-30) * page 3, line 29 - page 4, line 13 * * page 4, line 31 - page 4, line 40; figures * ---	1-5,8 6,10,11	H01R13/627 H01R13/24
X	US 5 772 461 A (YU NOBBERT N H) 30 June 1998 (1998-06-30) * column 1, line 17 - column 1, line 27 * * column 2, line 21 - column 3, line 21; figures * ---	1-3,7,8	
Y	EP 1 329 991 A (SHINETSU POLYMER CO) 23 July 2003 (2003-07-23) * paragraph [0012] - paragraph [0014]; figures 1,2 * ---	6	
Y	US 2 306 206 A (WHITE DALGLEISH JAMES) 22 December 1942 (1942-12-22) * page 1, column 2, line 54 - page 2, column 1, line 57; figures 2,4 * ---	10,11	
A	DE 93 07 819 U (SIEMENS AG) 12 August 1993 (1993-08-12) * page 4, line 7 - page 5, line 2; figure 1 * ---	1-5,7,8	TECHNICAL FIELDS SEARCHED (Int.Cl.7) H01R
A	PATENT ABSTRACTS OF JAPAN vol. 016, no. 166 (E-1193), 22 April 1992 (1992-04-22) -& JP 04 014779 A (FUJIKURA LTD), 20 January 1992 (1992-01-20) * abstract; figures * -----	1,2,4,5, 7,8	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	23 April 2004	Ledoux, S

CATEGORY OF CITED DOCUMENTS

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23-04-2004

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 2402317 A	30-03-1979	FR 2402317 A1	30-03-1979
US 5772461 A	30-06-1998	NONE	
EP 1329991 A	23-07-2003	JP 2002134201 A	10-05-2002
		JP 2002141130 A	17-05-2002
		JP 2002158052 A	31-05-2002
		JP 2002158053 A	31-05-2002
		EP 1329991 A1	23-07-2003
		NO 20031895 A	08-05-2003
		CN 1471751 T	28-01-2004
		WO 0235656 A1	02-05-2002
		TW 526329 B	01-04-2003
		US 2003190825 A1	09-10-2003
US 2306206 A	22-12-1942	NONE	
DE 9307819 U	12-08-1993	DE 9307819 U1	12-08-1993
JP 04014779 A	20-01-1992	NONE	

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