(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 662 622 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
31.05.2006 Bulletin 2006/22

(51) Int Cl.:
H01R 13/648 *(2006.01)*

(21) Application number: **04257287.5**

(22) Date of filing: **24.11.2004**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LU MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL HR LT LV MK YU

(71) Applicant: **WEM Technology Inc.**
Taipei (TW)

(72) Inventor: **Hsiao, Wen-Hsiang**
Taipei (TW)

(74) Representative: **Prentice, Raymond Roy et al**
Prentice & Matthews,
Calvert's Buildings,
52B Borough High Street
London SE1 1XN (GB)

Remarks:
Amended claims in accordance with Rule 86 (2) EPC.

(54) Improved connector of a card reader

(57) An improved connector 14 of a card reader 10, the card reader 10 includes a circuit board 12 in a housing 11 as its principal unit; the circuit board 12 has a USB connecting port 13 to make circuit connection with a set of electric equipment, and is provided at least with one aforesaid connector 14 for insertion of a memory card. Wherein: the main body of the connector 14 is integrally made by injection molding purely of plastic, and a grounding electric circuit of the connector 14 is connected to a metallic housing 11 of a USB connecting port 13 to form circuit continuation of the metallic housing 11 of the USB connecting port 13 and the electric equipment, and to effectively prevent static-electricity damage. Because the main body of the connector 14 is made by injection molding purely of plastic, this can largely lower the cost of production of the connector 14.

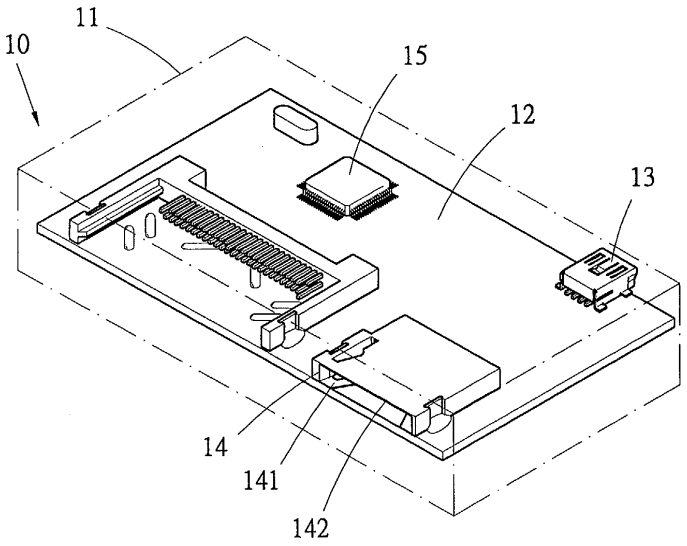

FIG. 2

EP 1 662 622 A1

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention is related to grounding of a connector of a card reader, and especially to an improved connector of which a main body is integrally made by injection molding purely of plastic, and of which a grounding electric circuit is connected to a USB connecting port to effectively avoid external static-electricity interference against the electric elements of the card reader.

2. Description of the Prior Art

[0002] As shown in Fig. 1 which is a perspective schematic view of the internal structure of a conventional card reader, it is shown that the whole card reader 10 includes a circuit board 12 in a housing 11 as a principal unit. The circuit board 12 is provided with a USB connecting port to be connected with a circuit of a set of electric equipment (not shown) to form circuit connecting of the card reader 10 with the electric equipment, and to supply power for operation of the card reader 10.

[0003] The circuit board 12 is provided at least with a connector 14 for insertion of a memory card, the entire card reader 10 also is provided on the circuit board 12 with electric elements such as an integrated circuit 15 to control operation of the card reader 10, and further to form circuit connection of the memory card with the electric equipment.

[0004] Andmore, an inserting portion of each connector 14 of a card reader 10 generally is allocated on the front side of the housing 11 in favor of inserting and drawing out for changing a memory card, and the front side of the housing 11 is provided with an opening for passing of the memory card therethrough, thereby the memory card can get in the card reader 10 to surely insert in and connect wi th the connector 14. However, the housing 11 wi th the opening for passing therethrough the memory card will also form an area losing shielding for the housing 11, and is subjected to direct incidence of external static electricity onto the circuit board 12 in the housing 11 through the opening, this will induce damage against the internal electric elements such as the integrated circuit 15, and even on the contrary make destruction against the memory card by electro-static discharging (ESD) of the internal electric elements such as the integrated circuit 15. Therefore, the connector applied on a portable device such as the card reader 10 especially needs increased ability of anti-ESD.

[0005] Conventional anti-ESD techniques used on such a card reader 10 mainly have the connector 14 covered thereover with a metallic shielding layer 20, and the metallic shielding layer 20 further is connected with passive elements such as electric induction and protecting diodes etc. against static discharging to improve the ability of anti-ESD. However, the main body of the connector 14 mainly is made by injection molding of plastic, while the metallic shielding layer 20 is made of metal by punching process, hence the entire connector 14 has to be completed by respectively finishing productions of semi-finished articles including the main body and the metallic shielding layer 20 by using different techniques and equipment, which semi-finished articles then are assembled to connect the metallic shielding layer 20 with the main body of the connector 14; in this way, not only the cost of production of the connector is increased, but the yield of production of such connectors still cannot be effectively increased.

[0006] Particularly, with a limited space of the card reader 10, for the sake of improving the function of anti-ESD, additional passive elements such as electric induction and protecting diodes etc against static discharging must be allocated on the extremely small circuit board 12, these elements not only occupy much space on the circuit board 12, but also lower the flexibility of designing of related circuits.

[0007] US-A-2004/0150971 discloses a connector (121) of a card reader. The card reader (10) includes a circuit board (12) in a housing (11) with a USB connecting port (121) and a plurality of card connectors (122). The circuit board further comprises an integrated circuit (123).

[0008] FR-A-2761177 discloses a card connector which comprises a main body (1) made integrally by injection molding of plastics material to form a structured member having an insertion member and a shielding plate.

[0009] Neither of these prior patent specifications solves the problem of grounding the connector of a card reader in which the connector is made of plastics material and in which grounding is achieved by connection to a USB port.

[0010] According to the present invention, there is provided an improved connector of a card reader, in which the card reader includes a circuit board in a housing as its principal unit, the circuit board is provided with a USB connecting port to make circuit connection with electrical equipment and said card reader is provided on said circuit board at least with one said connector for insertion of a memory card, characterized in that:

> a main body of said connector is integrally made by injection molding of plastics material to form a structural member having an inserting portion and a shielding plate; a grounding electric circuit of said connector is connected to a metallic housing of the USB connecting port; and in that said grounding electric circuit of said connector is connected to said metallic housing of said USB connecting port directly via a printed circuit of said circuit board.

[0011] The key point of the invention is that the main body of the connector is integrally made by injection

molding purely of plastic to form a structural member having an inserting portion and a shielding plate, the grounding electric circuit of the connector is connected to a metallic housing of a USB connecting port to form continuation of the electric circuit of the metallic housing of the USB connecting port and the electric equipment, and to effectively prevent static-electricity damage.

[0012] The main body of the connector can be made solely by injection molding of plastic in a set of shaping equipment, this can save the operation of assembling with a metallic shielding layer, and can largely lower the cost of production of the connector, and also effectively increases the yield of production of such connectors.

[0013] The present invention will be apparent in its structural combination and the entire mode of operation thereof after reading the detailed description of the preferred embodiment thereof in reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014]

Fig. 1 is a perspective schematic view showing the internal structure of a conventional card reader;

Fig. 2 is a perspective schematic view showing the internal structure of a card reader of the present invention;

Fig. 3 is an anatomic perspective schematic view showing a connector and a circuit board of the card reader of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0015] In the improved connector in a card reader 10 of the present invention, the structure of the card reader 10 is as shown in Figs. 2 and 3, and also has a circuit board 12 in a housing 11 as a principal unit; the circuit board 12 is provided with a USB connecting port 13 to make connection with a set of electric equipment using the card reader 10, thereby the card reader 10 can make circuit connection with the electric equipment to supply electric power for the card reader 10. In the same mode, the circuit board 12 is provided at least with one of the aforesaid connector 14 for insertion and drawing out of a memory card, and the circuit board 12 is provided thereon with electric elements such as an integrated circuit 15 to control operation of the card reader 10, and further to form circuit connection of the memory card with the electric equipment.

[0016] The front side of the housing 11 is provided, in mating with an inserting portion of the connector 14, with an opening for passing of a memory card therethrough. Thereby, the memory card can get in the card reader 10 to connect by insertion with the connector 14; in this mode, insertion and drawing out of the memory card is convenient.

[0017] The key point of the present invention is that: the main body of the connector 14 is designed to be integrally made by injection molding purely of plastic to form a structural member having an inserting portion 141 and a shielding plate 142, the grounding electric circuit of the connector 14 is connected to a metallic housing of a USB connecting port 13 (the connection can be made directly connect ing a printed circuit of the circuit board 12 with the metallic housing of the USB connecting port 13); thereby, by continuation of the metallic housing of the USB connecting port 13 and the grounding electric circuit of the electric equipment, the improved connector to effectively prevent static -electricity interference can be obtained, thus electro-static discharging (ESD) can be improved.

[0018] One thing is worth mentioning, the main body of the entire connector 14 can be integrally made solely by injection molding of plastic in a set of shaping equipment, this can save the operation of assembling with a metallic shielding layer, and can largely lower the cost of production of the connector, and also effectively increases the yield of production of such connectors. It is sure that when in practicing, the connector 14 can be provided on the periphery of the inserting portion 141 for insertion of a memory card with metallic pin-boards 143 connecting with the circuit board 12, the connector 14 can thus be connected with the circuit board 12, and this can help to increase the function of anti-ESD.

[0019] Accordingly, the present invention has provided an improved connector for improving grounding; while the description for practicing and drawings are only for illustrating a preferred embodiment of the present invention, and not for giving any limitation to the scope of the present invention. It will be apparent to those skilled in this art that various equivalent modifications or changes of this invention shall also fall within the scope of the appended claims of the present invention.

Claims

1. An improved connector of a card reader, said card reader includes a circuit board in a housing as its principal unit, said circuit board is provided with a USB connecting port to make circuit connection with a set of electric equipment, and said card reader is provided on said circuit board at least with one said connector for insertion of a memory card, each said connector is **characterized by** that:

   a main body of said connector is integrally made by injection molding purely of plastic to form a structural member having an inserting portion and a shielding plate; a grounding electric circuit of said connector is connected to a metallic housing of a USB connecting port.

2. The improved connector of a card reader as in claim

1, wherein said connector is provided on the periphery of said inserting portion with metallic pin-boards connecting with said circuit board.

3. The improved connector of a card reader as in claim 1, wherein said circuit board is provided further with at least an integrated circuit.

4. The improved connector of a card reader as in claim 1, wherein said grounding electric circuit of said connector is connected to said metallic housing of said USB connecting port directly via a printed circuit of said circuit board.

Amended claims in accordance with Rule 86(2) EPC.

1. An improved connector of a card reader, in which the card reader (10) includes a circuit board (12) in a housing (11) as its principal unit, the circuit board (12) is provided with a USB connecting port (13) to make circuit connection with electrical equipment and said card reader (10) is provided on said circuit board (12) at least with one said connector (14) for insertion of a memory card, **characterized in that**:

a main body of said connector (14) is integrally made by injection molding of plastics material to form a structural member having an inserting portion (141) and a shielding plate (142); a grounding electric circuit of said connector (14) is connected to a metallic housing of the USB connecting port (13); and **in that** said grounding electric circuit of said connector (14) is connected to said metallic housing of said USB connecting port directly via a printed circuit of said circuit board (12).

2. An improved connector of a card reader according to claim 1, **characterized in that** said connector (14) is provided on the periphery of said inserting portion (141) with metallic pin-boards (143) connecting with said circuit board (12).

3. An improved connector of a card reader according to claim 1 or claim 2, **characterized in that** said circuit board (12) is provided further with at least an integrated circuit (15).

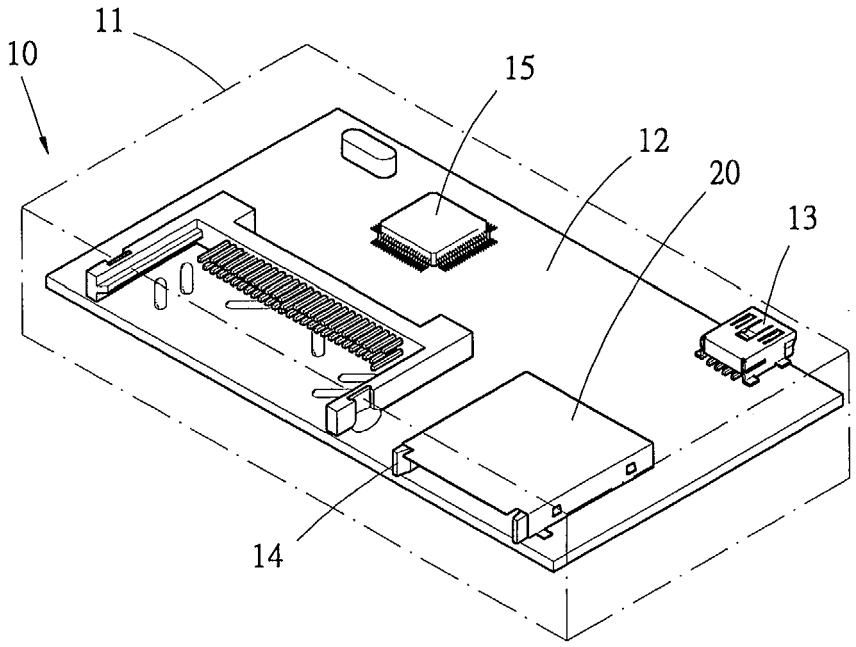

FIG. 1 (PRIOR ART)

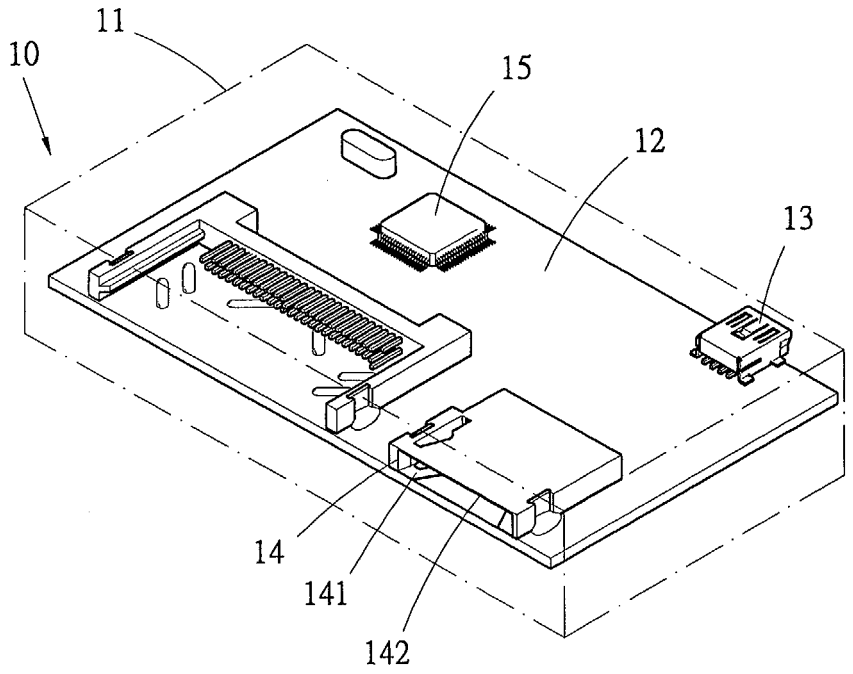

FIG. 2

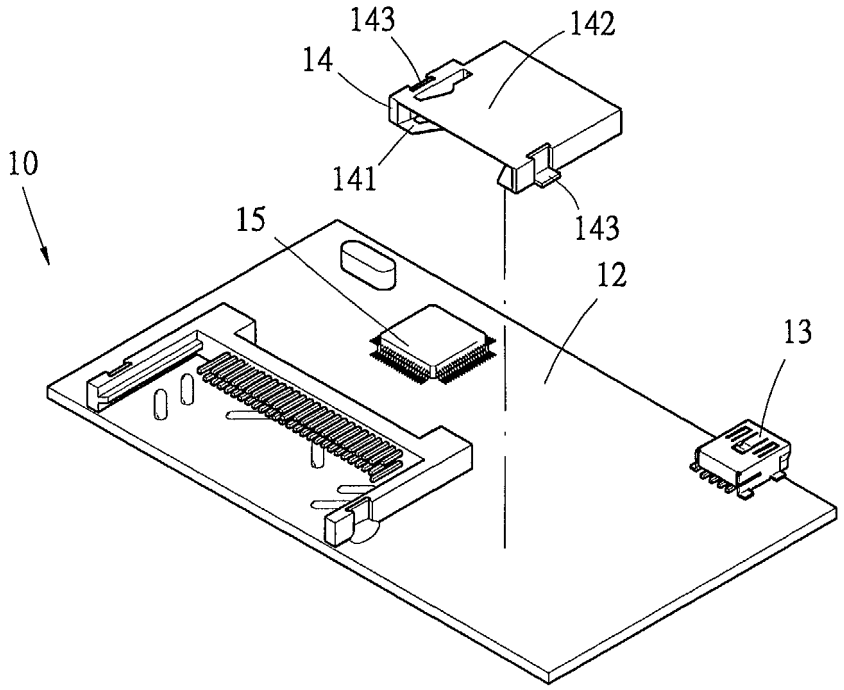

FIG. 3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 25 7287

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)
Y	US 2004/150971 A1 (HSIAO WEN-HSIANG) 5 August 2004 (2004-08-05) * paragraph [0014] - paragraph [0017]; figures 1-3 *	1-4	H01R13/648
Y	FR 2 761 177 A (FRAMATOME CONNECTORS PONTARLIER) 25 September 1998 (1998-09-25) * page 3, line 8 - line 35 * * page 4, line 24 - page 5, line 13; figures 1,2 *	1-4	
A	US 2004/214461 A1 (KAO TUNG-WEI [TW] ET AL) 28 October 2004 (2004-10-28) * paragraph [0017] - paragraph [0018]; figures 1,2 *	1-4	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

H01R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Berlin	19 April 2005	Stirn, J-P

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 04 25 7287

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

19-04-2005

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004150971 A1	05-08-2004	NONE	
FR 2761177 A	25-09-1998	FR 2761177 A1	25-09-1998
		DE 69809200 D1	12-12-2002
		DE 69809200 T2	28-05-2003
		EP 0968481 A1	05-01-2000
		WO 9843198 A1	01-10-1998
		TW 392378 B	01-06-2000
US 2004214461 A1	28-10-2004	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82