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(54) **USB CONNECTOR FOR SENSING INSERTION**

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(57) **ABSTRACT**

Provided is a USB connector capable of sensing the insertion of USB devices such as a mobile phone, PDA, MP3 player and the like into the USB connector. The USB connector includes: a fixing body which is shaped as a quadrangle and made of metal material; an insulating member which is inserted and fixed within the fixing body, and one side of which has a power terminal and a data terminal connected to respective lead pins; and a switching pin which is elastically coupled to one side of the insulating member such that the switching pin is insulated from the fixing body, and which senses the insertion of a USB device by being brought into contact with the USB device inserted into the fixing body.

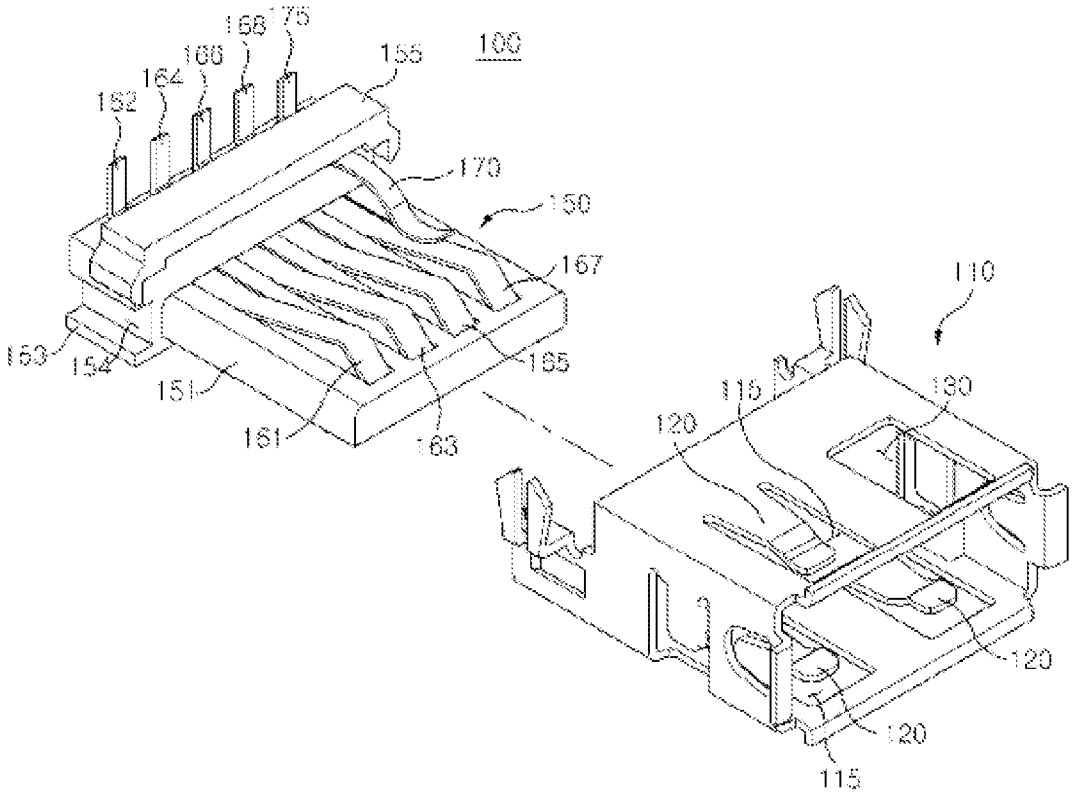
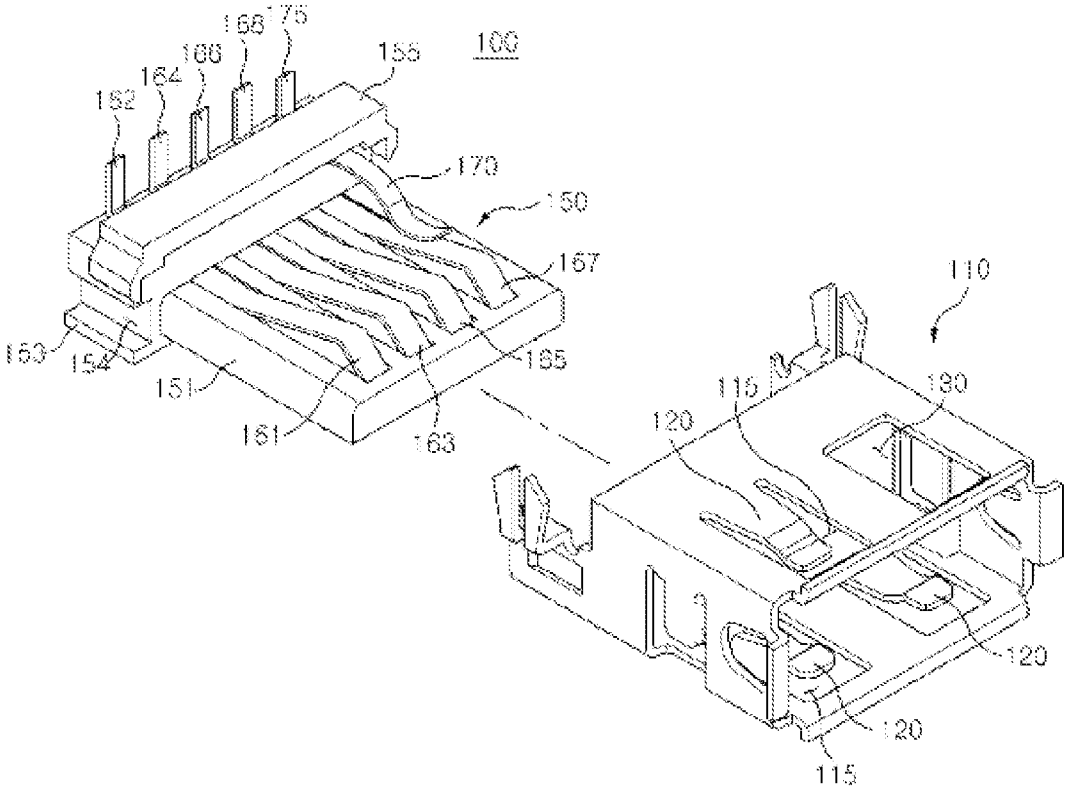


FIG. 1


168
175
166
164
162
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100
170
150
167
110
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161
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185
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130
120
120
120
115

FIG. 2

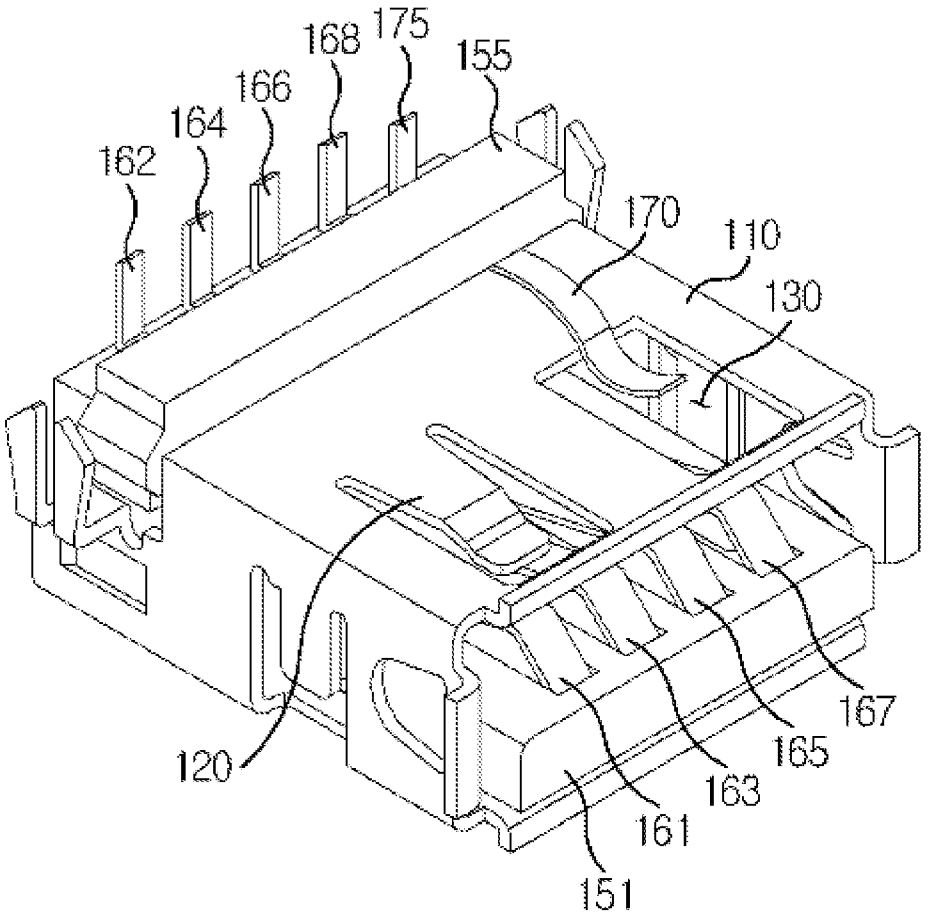


FIG. 3

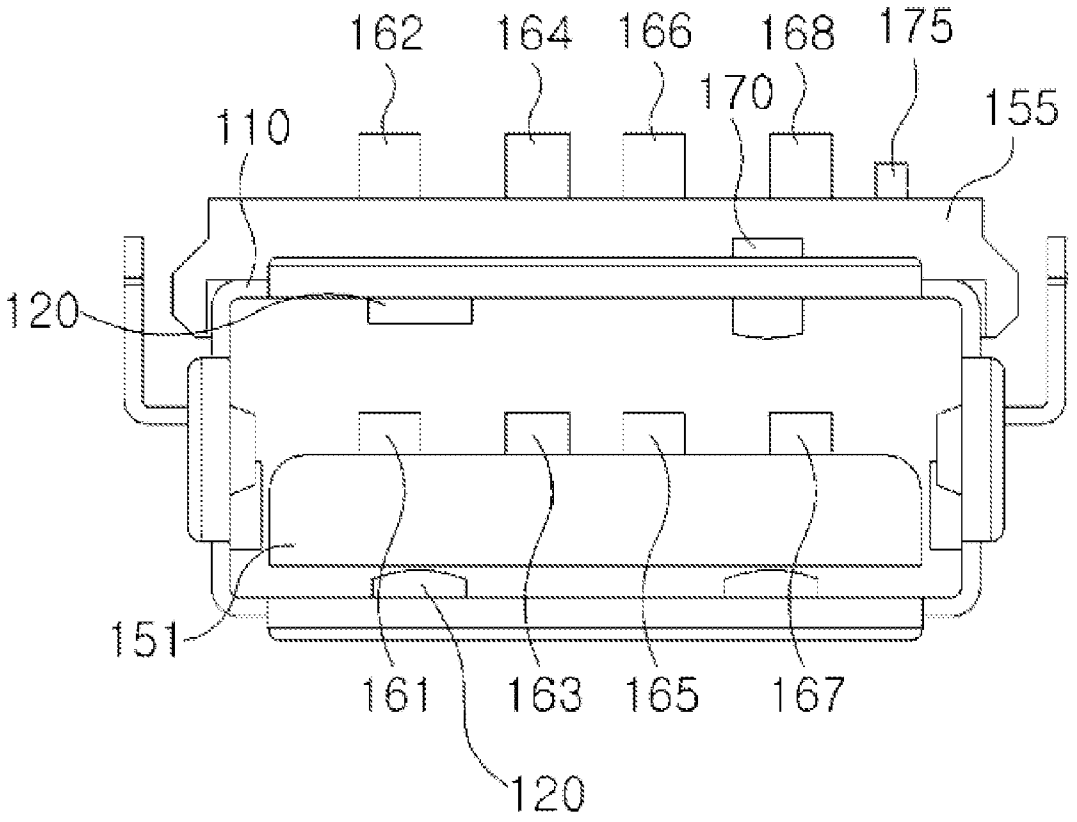
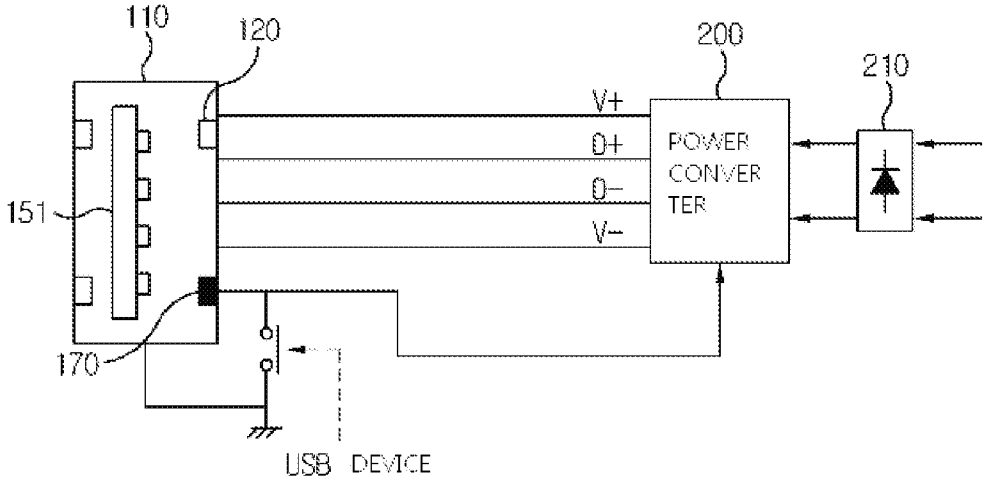

162
164
166
168
175
170
155
110
120
151
161
163
165
167
120

FIG. 4


110
120
200
210
V+
D+
D-
V-
POWER CONVERTER
151
170
USB DEVICE

USB CONNECTOR FOR SENSING INSERTION

TECHNICAL FIELD

[0001] The present invention relates to a universal serial bus (USB) connector, and more particularly, to a USB connector for sensing insertion capable of sensing the insertion of USB devices into the USB connector, such as a mobile phone, PDA, MP3 player which are powered through the USB connector.

BACKGROUND ART

[0002] The Universal Serial Bus (USB) interface is the most popular connection fashion recently. The USB connector refers to a terminal, a plug or a connector that is installed in a personal computer, a laptop computer or an adaptor and inserts therein a USB device such as a mobile phone, a personal digital assistant (PDA), a MP3 player, a memory stick for operating power supply or data communication.

[0003] As various application programs have been developed, more USB devices such as a printer, a speaker, a mouse, a scanner, an adapt, a mobile phone and an MP3 player need to be connected, than is conventionally required. Nowadays, more convenient and capable USB interfaces are used for connecting the USB devices to a main body. The USB interfaces benefit in that it may easily connect the USB devices and is equipped with a hot plugging capability and an excellent plug and play capability so that a computer need not be re-booted when USB devices are changed.

[0004] Typically, the USB connectors are installed at least one of the front, side or rear of the main body of a computer or a communication terminal. However, even when a USB device is not inserted into the USB connector, current is applied to the USB connector due to the operation of a power converter in a power-on or standby state, thereby resulting in unnecessary power consumption of the power converter.

DISCLOSURE

Technical Problem

[0005] An object of the present invention is to provide a USB connector for sensing insertion capable of sensing the insertion of USB devices into the USB connector, such as a mobile phone, PDA, MP3 player and the like which are powered through the USB connector, based on physical contact.

[0006] Objects of the present invention are not limited to the above-mentioned object. Other objects that are not mentioned may be obviously understood by those skilled in the art to which the present invention pertains from the following description.

Technical Solution

[0007] In one general aspect, a USB connector for sensing insertion includes: a fixing body being shaped as a quadrangle and made of metal material; an insulating member which is inserted and fixed within the fixing body, wherein one side of which has a power terminal and a data terminal connected to respective lead pins; and a switching pin which is elastically coupled to one side of the insulating member, wherein the switching pin is insulated from the fixing body and senses the insertion of a USB device by being brought into contact with the USB device inserted into the fixing body.

[0008] The switching pin may be extended from the one side of the insulating member toward the inside of the fixing body through a slot of the fixing body, and the switching pin may be bent in the slot of the fixing body.

[0009] The switching pin may allow current applied from the outside to flow into the fixing body upon being brought into contact with the USB device, a lead pin corresponding to the switching pin may be connected and fastened through the insulating member, and standby power supplied to the power terminal may be interrupted upon sensing that the USB device is detached through the switching pin.

[0010] The USB connector may further include a fixing pin formed on and integrated with at least one of the surfaces of the fixing body, and elastically fixing the USB device inserted therein.

Advantageous Effects

[0011] As set forth above, according to the present invention, the insertion of USB devices such as a mobile phone, a PDA, a MP3 player can be sensed based on physical contact. Further, if a USB device is not inserted into a USB connector, a power converter is not operated even in a power-on or standby state, such that unnecessary power consumption can be prevented.

DESCRIPTION OF DRAWINGS

[0012] The above and other objects, features and advantages of the present invention will become apparent from the following description of preferred embodiments given in conjunction with the accompanying drawings, in which:

[0013] FIG. **1** is an exploded perspective view of a USB connector according to an embodiment of the present invention.

[0014] FIG. **2** is a perspective view of the USB connector assembly of FIG. **1**.

[0015] FIG. **3** is a front view of the USB connector of FIG. **2**.

[0016] FIG. **4** is a diagram conceptually illustrating an application example of a USB connector according to an embodiment of the present invention.

[0017]

[Detailed Description of Main Elements]

100: USB connector	110: fixing body
120: fixing pin	115, 130: slot
140: protrusion	150: insulating member
151: base	153: rear part
155: pin coupling part	
161~167: power and data terminals	
162~168: lead pins	170: switching pin

BEST MODE

[0018] Hereinafter, exemplary embodiments of the present invention will be described in detail with reference to the accompanying drawings. Throughout the drawings, like reference numbers are used to designate like elements. Moreover, detailed descriptions related to well-known functions or configurations will be omitted in order not to unnecessarily obscure the gist of the present invention.

[0019] FIG. **1** is an exploded perspective view of a USB connector according to an embodiment of the present inven-

tion, and FIG. **2** is a perspective view illustrating the bottom of the USB connector assembly of FIG. **1**.

[0020] The USB connector **100** includes a fixing body **110**, fixing pins **120**, an insulating member **150**, and a switching pin **170**.

[0021] The fixing body **110** is shaped generally as a quadrangle and made of conductive material such as metal.

[0022] The fixing pins **120** are integrated with at least one of the surfaces of the fixing body **110** so as to elastically fix a USB device (not shown) inserted into the fixing body **110**. As shown, the fixing pins **120** are integrated with the fixing body **110** at top and bottom surfaces of the fixing body **110**, and are bent inwardly in slots **115** so as to elastically fixing the inserted USB device. In the embodiment, plural spaced-apart fixing pins **120** are formed in the slots **115** at the top surface of the fixing body, and one fixing pin **120** is formed in the slot **115** at the bottom surface of the fixing body **110**. At the bottom surface of the fixing body **110**, only a slot **130** is formed on the other side.

[0023] The insulating member **150** is inserted into and fixed in the fixing body **110**, and has power terminals **161** and **167** and data terminals **163** and **165** formed spaced apart on its one side. Each of the terminals **161~167** is connected to the respective one of the lead pins **162~168** formed on the other side of the insulating member **150**. As shown, the insulating member **150** includes: a base **151**, on one surface of which the power terminals **161** and **167** and the data terminals **163** and **165** are disposed spaced apart; a rear part **153** in which lead pins **162~168** connected to the power terminals **161** and **167** and the data terminals **163** and **165** extending from the base **151** and being bent, and in which a concaved groove **154** are formed at the side thereof to couple with a protrusion **140** of the fixing body **110**; and a pin coupling part **155** which extends downwardly at the interface between the base **151** and the rear part **153** and has a switching pin **170** disposed at one side. Typically, in arranging the plurality of terminals **161~167**, the power terminals **161** and **167** (V+, V−) are disposed on the outer side and the data terminals **163** and **165** (D−, D+) are disposed on the inner side.

[0024] Here, the switching pin **170** disposed at the pin coupling part **155** is connected to a corresponding lead pin **175** disposed at the rear part **153**. That is, the insulating member **150** may be divided into the base **151** inserted into the fixing body **110**, a rear part **153** extended from the base **151** and positioned on outer side of the fixing body **110**, and a pin coupling part **155** having the switching pin **170**. The power terminals **161** and **167** and the data terminals **163** and **165** are disposed on one surface of the base **151** inserted into the fixing body **110**, the lead pins **162~168** are disposed on one side of the rear part **153** positioned on outer side of the fixing body **110** and electrically connected to the respective terminals **161~167**, and the switching pin **170** is disposed at the pin coupling part **155** and electrically connected to the corresponding lead pin **175** disposed at the rear part **153**.

[0025] The switching pin **170** is extended from one side of the insulating member **150** toward the inside of the fixing body **110** through the slot **130**, and, as shown, is bent in the slot **130** like the fixing pin **120**. The switching pin **170** faces and is spaced apart from the power terminals **161** and **167** or the data terminals **163** and **165** formed on one surface of the insulating member **150**.

[0026] The insulating member **150** thus configured is inserted into and fastened in the fixing body **110** such that the protrusion **140** of the fixing body **110** is fitted into the concaved groove **154** of the insulating member **150** so as to tightly couple the fixing body **110** with the insulating member **150**. Here, one end of the switching pin **170** is inserted toward the inside of the fixing body **110** through the slot **130** so as to be bought into contact with a surface of a USB device inserted from the outside. Accordingly, the switching pin **170**, which is insulated from and elastically coupled with the fixing body **110** at one side of the insulating member **150**, may electrically sense the insertion of the USB device by being brought into contact with the USB device inserted into the fixing body **110** based on physical contact to change an electrical signal.

[0027] FIG. **3** is a front view of the USB connector of FIG. **2** in which the base **151** of the insulating member **150** is spaced apart from the inner surfaces of the fixing body **110**. The distance between the surface of the base **151** on which the terminals **161~167** are disposed and the inner surface of the fixing body **110** is set to be greater than the distance between the other surface of the base **151** and the inner surfaces of the fixing body **110**.

[0028] Accordingly, when a USB device is inserted into the fixing body **110** to be brought into contact with the switching pin **170**, the current applied from the outside through the switching pin **170** flows into the fixing body **110**. Needless to say, when the USB device is detached from the fixing body **110**, the switching pin **170** is electrically open, and no current flows.

[0029] It is also possible to configure the switching pin **170** to be brought contact with the fixing body **110** when the USB device is inserted. In this configuration, when the USB device is inserted, current directly flows into the fixing body **110** through the switching pin **170**, without passing through the USB device. This configuration may be useful when a USB device inserted into a fixing body **110** has no metal frame and only terminals **161~167** are formed on a plastic base **151**.

[0030] FIG. **4** is a diagram conceptually illustrating an application example of a USB connector according to an embodiment of the present invention, in which a USB connector **100** and a power converter **200** are shown.

[0031] The USB connector **100** may be installed in a such product as a personal computer, a laptop computer and a communication terminal. When powered on or in a standby power mode, the power converter **200** output standby power regardless of whether or not a USB device is connected to power terminals (V+, V−) of a USB connector **100**.

[0032] The switching pin **170** is electrically connected to an input terminal EN of the power converter **200** so that the power converter **200** may determine if a USB device is attached by sensing change in voltage at the input terminal EN.

[0033] If a USB device is detached from the USB connector **100**, the switching pin **170** would be in an open (off) state, and thus the input terminal EN of the power converter **200** would maintain a "high" signal. If a USB device is inserted into the USB connector **100**, the switching pin **170** would be in a closed (on) state, and thus current applied to the switching pin **170** would flow to ground through the fixing body **110** so that the input terminal of the power converter **200** is pulled down to ground potential GND and changed to a "low" signal.

[0034] Accordingly, upon sensing that a USB device is detached with the input terminal EN, the power converter **200** interrupts the power output to the power terminals (V+, V−) of the USB connector **100**, such that unnecessary power consumption may be prevented.

[0035] The power converter **200** serves to step down a direct current power input through a rectifying circuit unit **210** to a necessary voltage and then supply it to the USB connector **100**. The power converter of FIG. **4** is merely an example, and the USB connector according to the present invention may be applied to any device requiring sensing of whether a USB device is detached.

[0036] Although the preferred embodiment of the present invention has been disclosed for illustrative purposes, those skilled in the art may conceive other embodiments within the essential scope of the invention. The essential scope of the present invention is defined by the accompanying claims, and technical ideas equivalent thereto are within the scope of the present invention.

1. A USB connector for sensing insertion, the USB connector comprising:

a fixing body being shaped as a quadrangle and made of metal material;

an insulating member which is inserted and fixed within the fixing body, wherein one side of which has a power terminal and a data terminal connected to respective lead pins; and

a switching pin which is elastically coupled to one side of the insulating member, wherein the switching pin is insulated from the fixing body and senses the insertion of a USB device by being brought into contact with the USB device inserted into the fixing body.

2. The USB connector of claim **1**, wherein the switching pin is extended from the one side of the insulating member toward the inside of the fixing body through a slot of the fixing body.

3. The USB connector of claim **1**, wherein the switching pin is bent in the slot of the fixing body.

4. The USB connector of claim **1**, wherein the switching pin allows current applied from the outside to flow into the fixing body upon being brought into contact with the USB device.

5. The USB connector of claim **1**, wherein a lead pin corresponding to the switching pin is connected and fastened through the insulating member.

6. The USB connector of claim **1**, wherein standby power supplied to the power terminal is interrupted upon sensing that the USB device is detached through the switching pin.

7. The USB connector of claim **1**, further comprising a fixing pin formed on and integrated with at least one of surfaces of the fixing body, and elastically fixing the USB device inserted therein.

8. The USB connector of claim **1**, wherein the switching pin faces and is spaced apart from the power terminal or the data terminal of the insulating member.

9. The USB connector of claim **1**, wherein the switching pin allows current to flow into the fixing body through the USB device if the USB device is inserted.

10. The USB connector of claim **1**, wherein the switching pin is configured so that it is brought into contact with the fixing body if the USB device is inserted.

* * * * *