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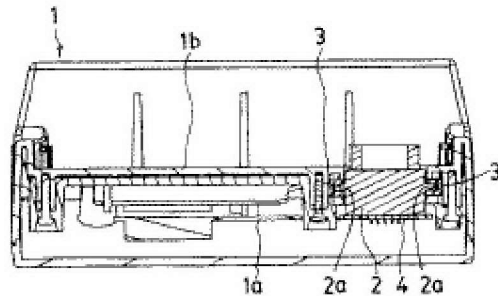
**(54) [Title of Invention]    CONNECTOR FLOAT MECHANISM**

(57) [Abstract]

[Problem] To prevent damage to the connector while ensuring a reliable electrical connection.

[Solution] A float mechanism of a connector 2 in a cradle 1 on which is mounted an electronic device such as a digital camera and which electrically connects the electronic device via the connector 2, wherein a flange portion 2a is formed on the outer periphery of the connector 2, the flange portion 2a is covered with a cushioning member 3, and the cushioning member 3 is fixed to the cradle body 1a to prevent damage to the connector 2 while ensuring a reliable electrical connection.

[Selected Figure] Figure 2



[SCOPE OF THE PATENT CLAIMS]

[Claim 1]

A connector float mechanism in a cradle on which an electronic device such as a digital camera is mounted and which is provided with a connector which electrically connects the electronic device via the connector, wherein

a flange portion is formed on the outer periphery of the connector, the flange portion is covered with a cushioning member, and the cushioning member is fixed to the cradle body.

[Claim 2]

The connector float mechanism according to claim 1, wherein at least either a rubber-based material or a urethane-based material is used as the cushioning member.

[Claim 3]

The connector float mechanism according to claim 1 or 2, wherein the cushioning member has a groove on an inner peripheral portion into which the flange portion is fitted and is pre-formed as an annular member surrounding the flange portion.

[Claim 4]

The connector float mechanism according to claim 1, 2, or 3, wherein only the peripheral portion of the cushioning member is fixed to the cradle body by a molded material.

[Claim 5]

The connector float mechanism according to claim 1, 2, 3, or 4, wherein the connector is a printed board connector in which contact connection terminals of the connector are connected to lands on a printed wiring board of the requisite size, and the printed wiring board is attached to the connector via the lands and is in a floating state with respect to the cradle body.

[DETAILED DESCRIPTION OF THE INVENTION]

[Technical Field]

[0001]

The present invention relates to a connector float mechanism, and particularly to a connector float mechanism that can prevent damage to the connector in a cradle while ensuring a reliable electrical connection.

[Background Art]

[0002]

Conventionally, cradles are known on which are mounted electronic devices such as a digital camera, which serve as stands for the electronic devices, and which are provided with a connector to establish an electrical connection with the electronic device mounted thereon, enabling charging of the electronic device and data exchange with a computer, etc.

[0003]

Regarding the connectors in such cradles, the following prior art is known, for example. A socket portion (connection portion) provided with terminals for charging and data exchange is provided on the bottom surface of the digital camera serving as the electronic device. At the same time, the cradle that supports this digital camera is provided with a connector that fits into the socket portion of the digital camera and a cable that connects wires connected to the connector to other devices. The connector is

fixed to the cradle body and does not move when the digital camera is mounted (see for example Patent Document 1).

[Patent Document 1] JP 2003-68394 A (pages 2-3, Figure 1).

[Disclosure of the Invention]

[Problems to be Solved by the Invention]

[0004]

Electronic devices such as digital cameras are generally configured to be mounted in a cradle, while being positioned by the outer shape thereof, so that the connector on the cradle side fits into the socket portion. However, even when the electronic device is mounted in the cradle while being positioned, misalignment may occur between the socket portion on the electronic device side and the connector on the cradle side during typical handling. However, in the conventional technology described in Patent Document 1, since the connector is fixed to the cradle body, the connector is subjected to stress due to this misalignment, and if this stress is large, there is a possibility that damage may occur to the contact portion of the connector. When damage occurs to the connector, it becomes difficult to establish a normal electrical connection with the socket portion.

[0005]

Therefore, a technical problem to be solved arises in order to prevent damage to the connector while ensuring a reliable electrical connection, and an object of the present invention is to solve this problem.

[Means for Solving the Problem]

[0006]

The present invention has been proposed to achieve the above object, and the invention according to claim 1 is a connector float mechanism in a cradle on which an electronic device such as a digital camera is mounted and which is provided with a connector which electrically connects the electronic device via the connector, wherein a flange portion is formed on the outer periphery of the connector, the flange portion is covered with a cushioning member, and the cushioning member is fixed to the cradle body.

[0007]

According to this configuration, when the electronic device is mounted in the cradle, while being positioned by the outer shape thereof, and an electrical connection is established via the connector, any misalignment that occurs between the connection portion of the electronic device and the connector is absorbed by the cushioning member, regardless of the direction of the misalignment. Therefore, a smooth fitting between the connection portion of the electronic device and the connector becomes possible, and a reliable electrical connection is achieved.

[0008]

The invention according to claim 2 provides the float mechanism of the connector according to claim 1, wherein at least either a rubber-based material or a urethane-based material is used as the cushioning member.

[0009]

According to this configuration, by using a rubber-based material or a urethane-based material with excellent elasticity as the cushioning member, when establishing an electrical connection between the electronic device and the connector in the cradle, the stress applied to the connector due to misalignment

between the connection portion of the electronic device and the connector is adequately absorbed by the cushioning member.

[0010]

The invention according to claim 3 provides the float mechanism of the connector according to claim 1 or 2, wherein the cushioning member has a groove on an inner peripheral portion into which the flange portion is fitted and is pre-formed as an annular member surrounding the flange portion.

[0011]

According to this configuration, the cushioning member is pre-formed as an easily assembled annular member, and by fitting the flange portion into the groove of the annular member, the entire flange portion is reliably covered with the cushioning member of the required thickness.

[0012]

The invention according to claim 4 provides the float mechanism of the connector according to claim 1, 2, or 3, wherein only the peripheral portion of the cushioning member is fixed to the cradle body by a molded material.

[0013]

According to this configuration, when establishing an electrical connection between the electronic device and the connector in the cradle, the stress applied to the connector due to misalignment between the connection portion of the electronic device and the connector is absorbed even more effectively by the cushioning member.

[0014]

The invention according to claim 5 provides the float mechanism of the connector according to claim 1, 2, 3, or 4, wherein the connector is a printed board connector in which contact connection terminals in the connector are connected to lands on a printed wiring board of the requisite size, and the printed wiring board is attached to the connector via the lands and is in a floating state with respect to the cradle body.

[0015]

According to this configuration, when applying a printed board connector as the connector, the printed wiring board is floated with respect to the cradle body, so even if misalignment occurs between the connection portion of the electronic device and the connector when establishing an electrical connection via the connector in the cradle, no stress due to the misalignment occurs in the printed wiring board.

[Effects of the Invention]

[0016]

The invention according to claim 1 forms a flange portion on the outer periphery of the connector and covers the flange portion with a cushioning member, fixing the cushioning member to the cradle body; therefore, when fitting together the connection portion of the electronic device and the connector in the cradle to establish an electrical connection, any misalignment that occurs between the connection portion and the connector is absorbed by the cushioning member, thus preventing damage to the connector while ensuring a reliable electrical connection.

[0017]

The invention according to claim 2 uses either a rubber-based material or a urethane-based material as the cushioning member, thereby providing, in addition to the effects of the invention according to claim 1, the advantage of using a rubber-based material or a urethane-based material with excellent elasticity as the cushioning member so that when establishing an electrical connection between the connection portion of the electronic device and the connector in the cradle, the stress applied to the connector due to misalignment between the connection portion and the connector is adequately absorbed by the cushioning member, ensuring that damage to the connector is reliably prevented.

[0018]

The invention according to claim 3 provides the connector float mechanism according to claim 1 or 2, wherein the cushioning member has a groove on an inner peripheral portion into which the flange portion is fitted and is pre-formed as an annular member surrounding the flange portion; thus, in addition to the effects of the inventions according to claim 1 or 2, the advantage is provided that by pre-forming the cushioning member as an easily assembled annular member, the entire flange portion can be reliably covered with the cushioning member by simply fitting the flange portion into the groove of the annular member. Furthermore, since the cushioning member can be easily made to have the required thickness, there is increased freedom in the position of the connector in the cradle, thus allowing for absorption of assembly error.

[0019]

The invention according to claim 4 provides the connector float mechanism according to claim 1, 2, or 3, wherein only the peripheral portion of the cushioning member is fixed to the cradle body by a molded material; therefore, in addition to the effects of the inventions according to claim 1, 2, or 3, the advantage is provided that when establishing an electrical connection between the connection portion of the electronic device and the connector in the cradle, the stress applied to the connector due to misalignment between the connection portion and the connector is absorbed even more effectively by the cushioning member, further ensuring that damage to the connector is reliably prevented.

[0020]

The invention according to claim 5 provides a printed board connector in which contact connection terminals in the connector are connected to lands on a printed wiring board of the requisite size, and the printed wiring board is attached to the connector via the lands and is in a floating state with respect to the cradle body; therefore, in addition to the effects of the inventions according to claim 1, 2, 3, or 4, the advantage is provided that when establishing an electrical connection between the connection portion of the electronic device and the connector in the cradle, even if misalignment occurs between the connection portion and the connector, no stress due to the misalignment is applied to the printed wiring board. Thus, no damage such as land peeling occurs in the printed wiring board.

[Best Mode for Carrying Out the Invention]

[0021]

The object of preventing damage to the connector in the cradle while ensuring a reliable electrical connection is achieved by forming a flange portion on the outer periphery of the connector and covering the flange portion with a cushioning member made of a rubber-based material or a urethane-based

material with excellent elasticity, and fixing only the peripheral portion of the cushioning member to the cradle body.

[Embodiment 1]

[0022]

Hereinafter, embodiment 1 of the present invention will be described in detail with reference to the drawings. Figure 1 is a plan view of the float mechanism of the connector, Figure 2 is a cross-sectional view along line A-A in Figure 1, and Figure 3 is a cross-sectional view along line B-B in Figure 1. First, the configuration of the connector float mechanism according to this embodiment will be explained. As shown in Figures 1 to 3, the cradle 1 is provided with a mounting platform 1b for mounting an electronic device such as a digital camera (not shown), and the connector 2 is attached at a predetermined position on the mounting platform 1b in the following manner. Specifically, a flange portion 2a is formed on the outer periphery of the connector 2, and the entire flange portion 2a is covered with a cushioning member 3, with only the peripheral portion of the cushioning member 3 fixed to the cradle body 1a by a resin mold 1c (see Figure 3). The connector 2 has the function of a plug, and the electronic device mounted on the mounting platform 1b is provided with a socket portion (connection portion) into which the connector 2 fits.

[0023]

The configurations of the connector 2 and the cushioning member 3, as well as the manner of attachment of the connector 2 to the cradle body 1a, will be further explained with reference to Figures 4 to 9. Figure 4 is a plan view of the connector, Figure 5 is a front view of the connector, Figure 6 is a side view of the connector, Figure 7 is a plan view of the cushioning member, Figure 8 is a cross-sectional view along line C-C in Figure 7, and Figure 9 is a cross-sectional view along line D-D in Figure 7. As shown in Figures 4 to 6, the connector 2 has a flange portion 2a formed on the outer periphery thereof, and a fitting portion 2b formed on the upper surface, with multiple contact connection terminals 2c, 2c ... protruding from the lower surface.

[0024]

At the same time, as shown in Figures 7 to 9, the cushioning member 3 is made of a rubber-based material or a urethane-based material, and has a groove 3a formed on the inner peripheral portion into which the flange portion 2a of the connector 2 is fitted, and is pre-formed as an annular member shaped to surround the flange portion 2a. A cut 3b is formed at an appropriate location on the square annular body. The square annular cushioning member 3 is attached to the flange portion 2a by fitting the flange portion 2a into the groove 3a while in an open state from the cut 3b, wrapping around the entire circumference of the flange portion 2a.

[0025]

Moreover, the connector 2 in this embodiment has the form of a printed board connector and, as shown in Figures 2 and 3, multiple contact connection terminals 2c, 2c ... in the connector 2 are connected to corresponding lands (not shown) on a printed wiring board 4 by soldering. The multiple contact connection terminals 2c, 2c ... in the connector 2 are configured to connect to external devices via printed conductors on the printed wiring board 4 and a cable (not shown) attached to the cradle 1. The printed wiring board 4 is attached to the connector 2 side via the lands and the multiple contact connection terminals 2c, 2c ..., and is configured to be in a floating state with respect to the cradle body 1a.

[0026]

Next, the operation of the float mechanism of the connector configured as described above will be explained. The cushioning member 3 is pre-formed as an easily assembled square annular member made of a rubber-based material or a urethane-based material, and by fitting the flange portion 2a of the connector 2 into the groove 3a while in an open state from the cut 3b and wrapping around the entire circumference of the flange portion 2a, the entire flange portion 2a is easily and reliably covered with the cushioning member 3 of the required thickness. In this manner, after covering the flange portion 2a with the cushioning member 3, only the peripheral portion of the cushioning member 3 is fixed to the cradle body 1a by the resin mold 1c, and the connector 2 is attached to a predetermined position in the cradle 1.

[0027]

When an electronic device such as a digital camera is mounted in the cradle 1 while being positioned by the outer shape thereof, and an electrical connection is established via the connector 2, the stress applied to the connector 2 due to any misalignment that occurs between the socket portion of the electronic device and the connector 2, regardless of the direction of the misalignment, is effectively absorbed by the cushioning member 3. Therefore, a smooth fitting between the socket portion of the electronic device and the connector 2 becomes possible, and damage to the connector 2 is prevented, thus ensuring a reliable electrical connection.

[0028]

Furthermore, when using a printed board connector as the connector 2, the printed wiring board 4 is floated with respect to the cradle body 1a so that when establishing an electrical connection by fitting together the socket portion of the electronic device and the connector 2 in the cradle 1, even if misalignment occurs between the socket portion of the electronic device and the connector 2, no stress due to the misalignment occurs in the printed wiring board 4. Therefore, damage such as land peeling in the printed wiring board 4 is prevented.

[0029]

As described above, in the float mechanism of the connector according to this embodiment, when establishing an electrical connection by fitting together the socket portion of the electronic device and the connector 2 in the cradle 1, any misalignment that occurs between the socket portion and the connector 2 is effectively absorbed by the cushioning member 3, thereby preventing damage to the connector 2 while ensuring a reliable electrical connection.

[0030]

Additionally, the requisite thickness can easily be achieved by pre-forming the cushioning member 3 as an easily assembled square annular member. This allows for increased freedom in the position of the connector 2 in the cradle 1, thus enabling absorption of assembly error.

[0031]

The float mechanism of the connector according to the present invention can be applied not only to cradles but also to various direct-plug connector products.

[0032]

Moreover, the present invention can be variously modified without departing from the spirit of the invention, and can naturally be applied to any modified versions of the present invention.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[0033]

Figure 1 is a plan view of the float mechanism of the connector according to Example 1 of the present invention.

Figure 2 is a cross-sectional view along line A-A in Figure 1.

Figure 3 is a cross-sectional view along line B-B in Figure 1.

Figure 4 is a plan view of the connector in Example 1 of the present invention.

Figure 5 is a front view of the connector in Figure 4.

Figure 6 is a side view of the connector in Figure 4.

Figure 7 is a plan view of the cushioning member in Example 1 of the present invention.

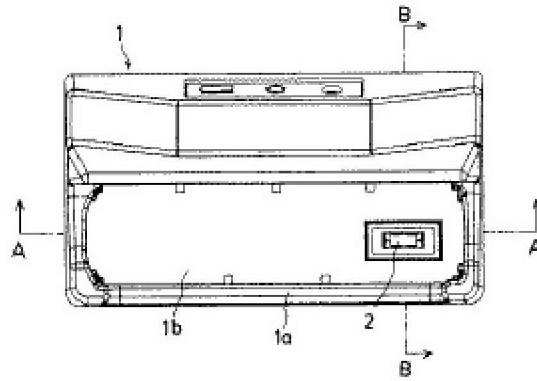
Figure 8 is a cross-sectional view along line C-C in Figure 7.

Figure 9 is a cross-sectional view along line D-D in Figure 7.

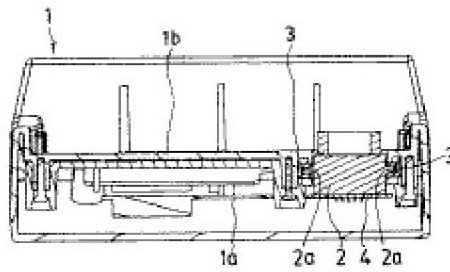
[Explanation of Reference Numerals]

[0034]

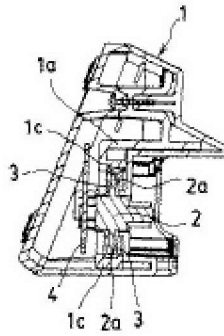
- 1 Cradle
- 1a Cradle body
- 1b Mounting platform
- 1c Resin mold
- 2 Connector
- 2a Flange portion
- 2c Contact connection terminal
- 3 Cushioning member
- 3a Groove
- 4 Printed wiring board



[FIGURE 1]



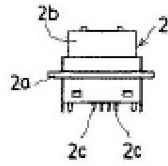
[FIGURE 2]



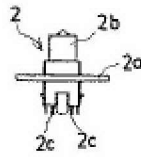
[FIGURE 3]



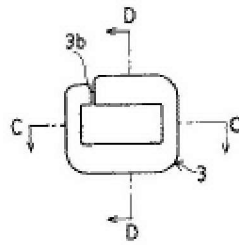
[FIGURE 4]



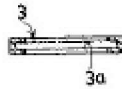
[FIGURE 5]



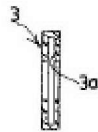
[FIGURE 6]



[FIGURE 7]



[FIGURE 8]



[FIGURE 9]



September 5, 2025

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Re: JP\_2005085593\_A\_final

To Whom It May Concern:

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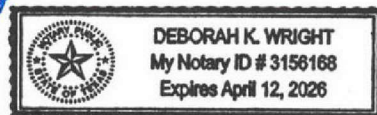
The English translation conforms essentially to the original Japanese except for those words or phrases for which there are no equivalents. Such words or phrases are noted in the translation along with the best English meaning.

All statements made in this declaration of our own knowledge are true, and all statements made on information and belief are believed to be true. We certify these statements under the understanding that willful false statements and the like are punishable by fine or imprisonment, or both (18 U.S.C. 1001). To the best of our knowledge, the aforementioned documents are a true, full, and accurate translation into English of the specified document.

*Tonja Shepard*  
TONJA SHEPARD

Subscribed and sworn to before me on September 5, 2025.

*Deborah K. Wright*  
Deborah K. Wright  
Notary Public, State of Texas



My commission expires on April 12, 2026