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(54) **Receptacle connector having a soldering post improved in solderability to a through-hole on a circuit board**

Steckverbinder mit Lötstift zur besseren Lötbarkeit in Durchgangslöchern von Leiterplatten

Connecteur à douille ayant une broche de brasage pour améliorer la brasabilité aux trous de plaque de circuits

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(56) References cited:
EP-A- 0 496 082

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Description

This invention relates to a receptacle connector with a receptacle shell which is fixed to a circuit board known in the art.

In such a receptacle connector, a receptacle shell is used for magnetically shielding a connector body and is formed by press working to have a soldering post. When the receptacle connector is mounted on a circuit board, the soldering post is inserted into a through-hole which is formed in the circuit board. In this state, a soldering is carried out between the soldering post and the circuit board in the manner known in the art.

In the receptacle shell, the soldering post has a rectangular shape in a cross-sectional shape thereof, while the through-hole has a circular shape in a cross-sectional shape thereof. In EP-A-0 496 082 a right angle connector having semicylindrical soldering posts is described, which are inserted in round holes of a circuit board. With this structures, it is assumed that the soldering is poorly made between the soldering post and the circuit board.

It is therefore an object of the present invention to provide a receptacle connector in which a soldering post is improved in a solderability to a through-hole on a circuit board, to provide a receptacle connector of the type described, which can be fixed to the circuit board with strength increased and to provide a receptacle shell which is included in the receptacle connector.

This object is achieved by a receptacle connector and a receptacle shell according to claim 1 and claim 5, respectively.

Further developments of the invention are given in the subclaims.

According to this invention, there is provided a receptacle connector for being mounted on a circuit board having a hole defining surface defining a through-hole, the receptacle connector comprising a connector body and a receptacle shell formed from a plate member and coupled to the connector body, the receptacle shell comprising a shell body for covering the connector body, and a soldering post formed extending from the receptacle shell for being soldered to the circuit board with being inserted in the through-hole, the soldering post being curved along the hole defining surface, an outer peripheral surface of said soldering post having a deformed portion which faces said hole defining surface when said soldering post is inserted in said through hole.

According to this invention, there is also provided a receptacle shell for being coupled to a connector body of a receptacle connector which is mounted on a circuit board having a hole defining surface defining a through-hole, the receptacle shell comprising a shell body for covering the connector body, and a receptacle shell formed from a plate member and coupled to the connector body, the receptacle shell comprising a shell body for covering the connector body, and a soldering post formed extending from the receptacle shell for being sol-

dered to the circuit board with being inserted in the through-hole, the soldering post being curved along the hole defining surface, an outer peripheral surface of said soldering post having a deformed portion which faces said hole defining surface when said soldering post is inserted in said through hole.

Further aspects and advantages of the present invention will become clear from the description of embodiments of the invention referring to the figures, of which

Fig. 1 is a front view of a fixing portion of a conventional receptacle connector;

Fig. 2 is a side view of a fixing portion of a conventional receptacle connector;

Fig. 3 is a rear view of a fixing portion of a conventional receptacle connector;

Fig. 4 is a schematic partial side view of a fixing portion of a conventional receptacle shell on a circuit board;

Fig. 5 is a schematic sectional view taken along the line V-V in Fig. 4;

Fig. 6 is explanatory view when this invention is applied to a receptacle connector;

Fig. 7 is a front view when this invention is applied to a receptacle connector;

Fig. 8 is a side view when this invention is applied to a receptacle connector;

Fig. 9 is a rear view when this invention is applied to a receptacle connector;

Fig. 10 is a bottom view when this invention is applied to a receptacle connector;

Fig. 11 is a schematic perspective view of a receptacle shell of this invention;

Fig. 12 is a schematic enlarged view of B portion in Fig. 11;

Fig. 13 is a schematic side view of a structure of a fixing portion of a receptacle shell on a circuit board of this invention;

Fig. 14 and 14a are schematic sectional views taken along the line XIV-XIV in Fig. 13; and

Fig. 15 is a schematic sectional view similar to Fig. 14, in which the circuit board has a through-hole received with a soldering post of a receptacle connector according to another embodiment of this invention.

Referring to Figs. 1 to 5, description will be made at first as regards a conventional receptacle connector for a better understanding of this invention. The conventional receptacle connector comprises a connector body 23 and a conductive receptacle shell 25 which is provided to cover the outer surface of the connector body 23. The connector body 23 comprises a plurality of conductive contacts 27, such as pin contacts, and an insulator 28 fixedly holding the conductive contacts 27. The receptacle shell 25 is formed by press-working a conductive plate member and comprises a shell body 26 and a

soldering post 29 which is formed integral with the shell body 26. When the receptacle connector is mounted on a circuit board 33, the soldering post 29 is inserted into a through-hole 31 made in the circuit board 33.

The soldering post 29 is provided on a shell side plate 35 of the shell body 26. The shell side plate 35 is disposed on an outer side of a connector body 23. The soldering post 29 has a soldering portion inserted into the through-hole 31.

In addition, a positioning pin 41 is provided to extend parallel to the soldering post 29. When the receptacle connector is mounted on the circuit board 33, the positioning pin 40 is inserted into a positioning hole 43 formed in the circuit board 33.

The above-mentioned receptacle connector has a disadvantage as described in the preamble of the instant specification.

Referring to Figs. 6 to 14, the description will now be made as regards a receptacle connector according to an embodiment of this invention. The receptacle connector comprises a connector body 53 and a conductive receptacle shell 55 coupled to cover the outer surface of the connector body 53. The connector body 53 comprises a plurality of conductive contacts 56, such as pin contacts, and an insulator 60 fixedly holding the conductive contacts 56.

The receptacle shell 55 has a shell body 52 covering the connector body 53 and a pair of soldering posts 57 each extending from the shell body 52. Each soldering post 57 is formed integral with the shell body 52 and is inserted into a through-hole of a circuit board 63 when the receptacle connector is mounted on the circuit board 63.

Each soldering post 57 is provided on a shell side plate 54 of the receptacle shell 55. Although only one side of the receptacle shell 55 is shown in Fig. 12, the soldering post 57 is also provided on the other side.

Each soldering post 57 has a peripheral surface which is similar to a hole defining surface 65 in a shape thereof and faces the hole defining surface 65 with a particular gap left between the peripheral surface and the hole defining surface 65 when each soldering post 57 is inserted in the through-hole 61. In other words, each soldering post 57 is curved along the hole defining surface 65 to have a C-shape in a cross-section thereof.

More particularly, the hole defining surface 65 is circular in a cross-section. The peripheral surface 58 is semicircular in a cross-section. The hole defining surface 65 extends to have a predetermined curvature. The peripheral surface 58 extends to have a particular curvature greater than the predetermined curvature. The peripheral surface 58 has a deformed portion or a lateral hole 59 which faces the hole defining surface 65 when each soldering post 57 is inserted in the through-hole 61.

The shell body 52 and each soldering post 57 are press-formed by stamping out from a conductive metallic plate material. The shell body 52 is structured so as

to correspond to the outer configuration of the connector body 53. After being stamped out from the plate material, each soldering post 57 is press-formed to have substantially semi-cylindrical or semicircle shape. As a result, each soldering post 57 has an arcuate inner periphery and outer periphery. The wall thickness of each soldering post 51 is not specifically limited.

It is a matter of course that the radius of curvature of each soldering post 57 should be made smaller than the radius of the through-hole 61. With this structure, the positioning for mounting the receptacle connector is made by the soldering posts 57. Thus, taking this consideration, setting of a radius of curvature of each soldering post 57 should be decided. Namely, in the case of a radius of curvature of each soldering post 57 is too small, the distance within which the soldering post 57 moves inside the through-hole 61 becomes greater, and therefore, it is required that the dimension is decided not to lower the accuracy of the positioning. However, needless to say, this requirement is not demanded severely.

With the soldering posts 57 having such an arcuate shape and with the connector being provided with the soldering posts 57 at both sides, respectively, the accuracy of positioning is obtained without having play of soldering posts in the through-hole 61 on the circuit board 63.

Since the soldering posts 57 has the semicircle shape as shown on the left side of Fig. 14, the particular gap or a space between the outer periphery of the arc of the soldering post 57 and the inner periphery of the through-hole 61 is filled with a solder 71, and this allows the solder 71 to contact with wider areas, thereby to improve both solderability and strength (fig. 14a).

Inasmuch as the cross-section of each soldering post 57 is substantially semicircle, a contact area of the solder is made wider even with a small quantity of soldering, thereby to improve solderability, which in turn, improves the strength of securing the receptacle shell 55 and the connector.

Positioning on the circuit board 61 is carried out by using the soldering posts 57, therefore, there is no need for providing a positioning pin separately on the receptacle shell 55. Further, there is no need for providing the positioning hole in the circuit board 63 for receiving the positioning pin. Consequently, the manufacture of the receptacle shell 55 and the circuit board 63 is simplified, and in turn, lowering of the cost is made possible.

Turning to Fig. 15, the description will be directed to a receptacle connector according to another embodiment of this invention. Similar parts are designated by like reference numerals.

In the receptacle connector, the hole defining surface 65 is cylindrical. The outer peripheral surface 58 of each soldering post 57 is cylindrical and has an outer diameter which is smaller than that of the through-hole 61. It should be noted that a gap is left between the outer peripheral surface 58 and the hole defining surface 65 to form a ring shape.

While the present invention has thus far been described in connection with a few embodiments thereof, it will readily be possible for those skilled in the art to put this invention into practice in various other manners. For example, it is assumed that the through-hole is ellipsoidal or polygonal in a cross-section thereof. In this event, each soldering post is curved along an ellipsoidal shape or a polygonal shape.

Claims

1. A receptacle connector for being mounted on a circuit board (63) having a hole defining surface (65) defining a through-hole (61), said receptacle connector comprising:

a connector body (53); and

a receptacle shell (55) formed from a plate member (54) and coupled to said connector body (53); said receptacle shell (55) comprising:

a shell body (52) for covering said connector body (53); and

a soldering post (57) formed extending from said receptacle shell (55) for being soldered to said circuit board (63) with being inserted in said through-hole (61), said soldering post (57) being curved along said hole defining surface (65);

characterized in that

an outer peripheral surface (58) of said soldering post (57) has a deformed portion (59) which faces said hole defining surface (65) when said soldering post is inserted in said through-hole (61).

2. A receptacle connector as claimed in claim 1, wherein said hole defining surface (65) is cylindrical, said soldering post (57) being semi-cylindrical and more slender than said through-hole (61) or cylindrical and having an outer diameter which is smaller than that of said through-hole (61).

3. A receptacle connector as claimed in claim 1 or 2, wherein the outer peripheral surface (58) said soldering post (57) is similar to said hole defining surface (65) in a cross-sectional shape thereof and faces said hole defining surface with a particular gap left between said outer peripheral surface and said hole defining surface when said soldering post is inserted in said through-hole.

4. A receptacle connector as claimed in claim 3, wherein said soldering post (57) has a lateral hole (59) as said deformed portion.

5. A receptacle shell (55) for being coupled to a connector body (53) of a receptacle connector which is mounted on a circuit board (63) having a hole defining surface (65) defining a through-hole (61), said receptacle shell (55) comprising:

a shell body (52) for covering said connector body (53); and

a receptacle shell (55) formed from a plate member (54) and coupled to said connector body (53); and

a soldering post (57) formed extending from said receptacle shell (55) for being soldered to said circuit board (63) with being inserted in said through-hole (61), said soldering post (57) being curved along said hole defining surface (65);

characterized in that

an outer peripheral surface (58) of said soldering post (57) has a deformed portion (59) which faces said hole defining surface (65) when said soldering post is inserted in said through-hole (61).

6. A receptacle shell as claimed in claim 5, wherein said hole defining surface (65) is cylindrical, said soldering post (57) being semi-cylindrical and more slender than said through-hole (61) or cylindrical and having an outer diameter which is smaller than that of said through-hole (61).

7. A receptacle shell as claimed in claim 5 or 6, wherein the outer peripheral surface (58) of said soldering post (57) is similar to said hole defining surface (65) in a cross-sectional shape thereof and faces said hole defining surface with a particular gap left between said outer peripheral surface and said hole defining surface when said soldering post is inserted in said through-hole (61).

8. A receptacle shell as claimed in claim 7, wherein said soldering post (57) has a lateral hole (59) as said deformed portion.

Patentansprüche

1. Steckverbinder, der auf einer Leiterplatte (6) anzubringen ist, die eine ein Loch definierende Oberfläche (65) aufweist, die ein Durchgangsloch (61) definiert, wobei der Steckverbinder aufweist:

einen Verbinderkörper (53) und

eine Steckhülle (55), die aus einem Plattenteil (54) gebildet ist und mit dem Verbinderkörper (53) gekoppelt ist;

wobei die Steckhülle aufweist:

einen Hüllenkörper (52) zum Bedecken des Verbinderkörpers (53) und einen Lötstift (57), der so gebildet ist, daß er sich von der Steckhülle (55) so erstreckt, daß er an die Leiterplatte (63) angelötet wird, wenn er in das Durchgangsloch (61) eingeführt ist, wobei der Lötstift (57) entlang der das Loch definierenden Oberfläche (65) gekrümmt ist;

dadurch gekennzeichnet,

daß eine äußere Umfangsoberfläche (58) des Lötstiftes (57) einen deformierten Abschnitt (59) aufweist, der der das Loch definierenden Oberfläche (65) zugewandt ist, wenn der Lötstift in das Durchgangsloch (61) eingeführt ist.

2. Steckverbinder nach Anspruch 1, bei dem die das Loch definierende Oberfläche (65) zylindrisch ist, wobei der Lötstift (57) halbzyklindrisch und schlanker als das Durchgangsloch (61) oder zylindrisch und mit einem Außendurchmesser gebildet ist, der kleiner als der des Durchgangsloches 61 ist.

3. Steckverbinder nach Anspruch 1 oder 2, bei dem die äußere Umfangsoberfläche (58) des Lötstiftes (57) ähnlich zu der das Loch definierenden Oberfläche (65) in seiner Querschnittsform ist und der das Loch definierenden Oberfläche zugewandt ist, wobei eine spezielle Lücke zwischen der äußeren Umfangsoberfläche und der das Loch definierenden Oberfläche gelassen wird, wenn der Lötstift in das Durchgangsloch eingeführt ist.

4. Steckverbinder nach Anspruch 3, bei dem der Lötstift (57) ein seitliches Loch (59) als den deformierten Abschnitt aufweist.

5. Verbinderhülle (55), die mit einem Verbinderkörper (53) eines Steckverbinders zu verbinden ist, der auf einer Leiterplatte (63) angebracht ist, die eine ein Loch definierende Oberfläche (65) aufweist, die ein Durchgangsloch (61) definiert, wobei die Verbinderhülle (55) aufweist:

einen Hüllenkörper (52) zum Bedecken des Verbinderkörpers (53) und eine Verbinderhülle (55), die aus einem Plattenteil (54) gebildet ist und mit dem Verbinderkörper (53) gekoppelt ist; und einen Lötstift (57), der so gebildet ist, daß er sich von der Verbinderhülle (55) so erstreckt, daß er an die Leiterplatte (63) angelötet wird, wenn er in das Durchgangsloch (61) eingeführt ist, wobei der Lötstift (57) entlang der das Loch definierenden Oberfläche (65) gekrümmt ist;

dadurch gekennzeichnet,

daß eine äußere Umfangsoberfläche (58) des Lötstiftes (57) einen deformierten Abschnitt (59) aufweist, der der das Loch definierenden Oberfläche (65) zugewandt ist, wenn der Lötstift in das Durchgangsloch (61) eingeführt ist.

6. Verbinderhülle nach Anspruch 5, bei der die das Loch definierende Oberfläche (65) zylindrisch ist, der Lötstift (57) halbzyklindrisch und schlanker als das Durchgangsloch (61) oder zylindrisch ist und einen äußeren Durchmesser aufweist, der kleiner als der des Durchgangsloches (61).

7. Verbinderhülle nach Anspruch 5 oder 6, bei der die äußere Umfangsoberfläche (58) des Lötstiftes (57) ähnlich zu der das Loch definierenden Oberfläche (65) in einer Querschnittsform davon ist und der das Loch definierenden Oberfläche zugewandt ist, wobei eine spezielle Lücke zwischen der äußeren Umfangsoberfläche und der das Loch definierenden Oberfläche gelassen ist, wenn der Lötstift in das Durchgangsloch (61) eingeführt ist.

8. Verbinderhülle nach Anspruch 7, bei der der Lötstift (57) ein seitliches Loch (59) als den deformierten Abschnitt aufweist.

Revendications

1. Connecteur à douille destiné à être monté sur une carte de circuit (63) comportant une surface de définition de trou (65) pour définir un trou traversant (61), ce connecteur à douille comprenant :

un corps de connecteur (53) ; et une coquille de douille (55) réalisée à partir d'un élément de plaque (54) et couplée au corps de connecteur (53) ; cette coquille de douille (55) comprenant : un corps de coquille (52) pour recouvrir le corps de connecteur (53) ; et une broche de brasage (57) formée de manière à faire saillie sur la coquille de douille (55) pour être soudée à la carte de circuit (63) en étant introduite dans le trou traversant (61), cette broche de brasage (57) étant courbée le long de la surface de définition de trou (65) ;

caractérisé en ce qu'

une surface périphérique extérieure (58) de la broche de brasage (57) comporte une partie déformée (59) qui vient en face de la surface de définition de trou (65) lorsque la broche de brasage est introduite dans le trou traversant

- (61).
2. Connecteur à douille selon la revendication 1, dans lequel
- la surface de définition de trou (65) est cylindrique, la broche de brasage (57) étant semi-cylindrique et plus mince que le trou traversant (61), ou cylindrique et comportant un diamètre extérieur plus petit que celui du trou traversant (61).
3. Connecteur à douille selon la revendication 1 ou 2, dans lequel
- la surface périphérique extérieure (58) de la broche de brasage (57) est analogue à la forme de section transversale de la surface de définition de trou (65), et vient en face de la surface de définition de trou avec un intervalle particulier laissé entre la surface périphérique extérieure et la surface de définition de trou lorsque la broche de brasage est introduite dans le trou traversant.
4. Connecteur à douille selon la revendication 3, dans lequel
- la broche de brasage (57) comporte un trou latéral (59) à l'endroit de la partie déformée.
5. Coquille de douille (55) destinée à être associée à un corps de connecteur (53) d'un connecteur à douille monté sur une carte de circuit (63) munie d'une surface de définition de trou (65) définissant un trou traversant (61), la coquille de douille (55) comprenant :
- un corps de coquille (52) pour recouvrir le corps de connecteur (53) ; et une coquille de douille (55) formée à partir d'un élément de plaque (54) et associée au corps de connecteur (53) ; et une broche de brasage (57) formée de manière à faire saillie sur la coquille de douille (55) pour être soudée à la carte de circuit (63) en étant introduite dans le trou traversant (61), cette broche de brasage (57) étant courbée suivant la surface de définition de trou (65) ;
- caractérisée en ce qu'
- une surface périphérique extérieure (58) de la broche de brasage (57) comporte une partie déformée (59) qui vient en face de la surface de définition de trou (65) lorsque la broche de brasage est introduite dans le trou traversant (61).
6. Coquille de douille selon la revendication 5, dans laquelle
- la surface de définition de trou (65) est cylindrique, la broche de brasage (57) étant semi-cylindrique et plus mince que le trou traversant (61), ou cylindrique en ayant un diamètre extérieur plus petit que celui du trou traversant (61).
7. Coquille de douille selon la revendication 5 ou 6, dans laquelle
- la surface périphérique extérieure (58) de la broche de brasage (57) est analogue à la forme de section transversale de la surface de définition de trou (65), et vient en face de cette surface de définition de trou avec un intervalle particulier laissé entre la surface périphérique extérieure et la surface de définition de trou lorsque la broche de brasage est introduite dans le trou traversant (61).
8. Coquille de douille selon la revendication 7, dans laquelle
- la broche de brasage (57) comporte un trou latéral (59) à l'endroit de la partie déformée.

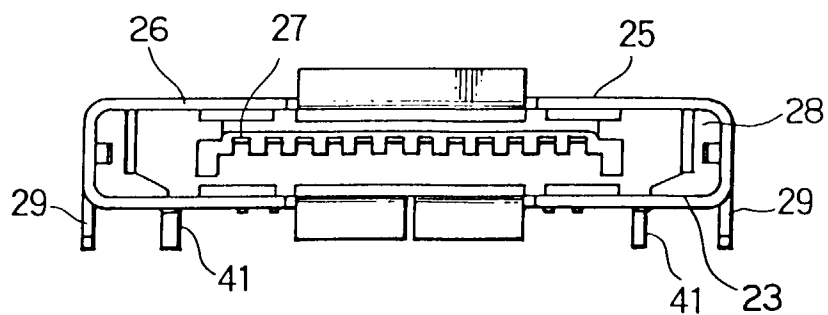


FIG. 1
PRIOR ART

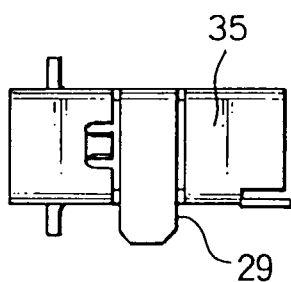


FIG. 2
PRIOR ART

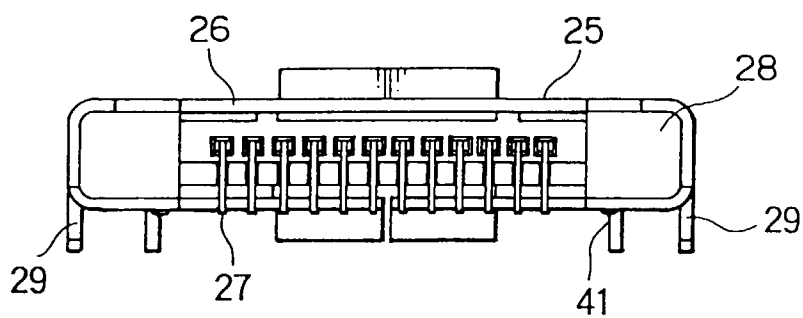


FIG. 3
PRIOR ART

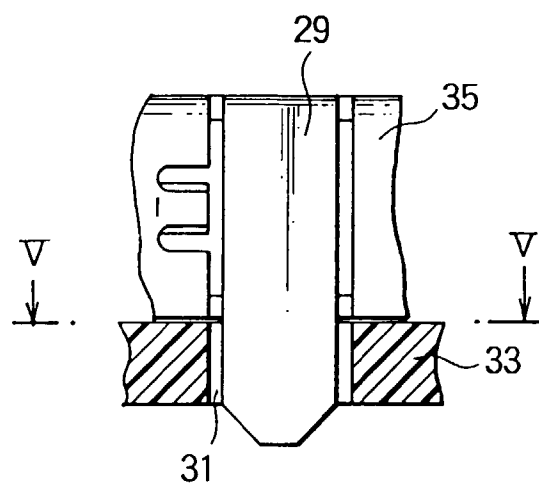


FIG. 4
PRIOR ART

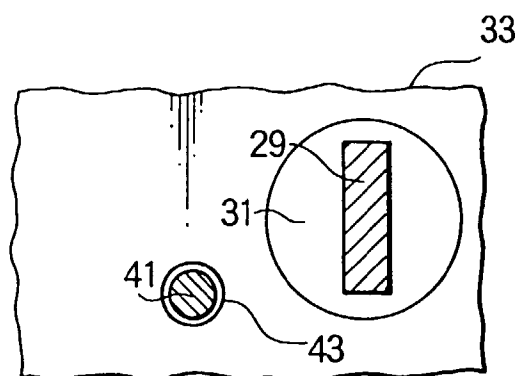


FIG. 5
PRIOR ART

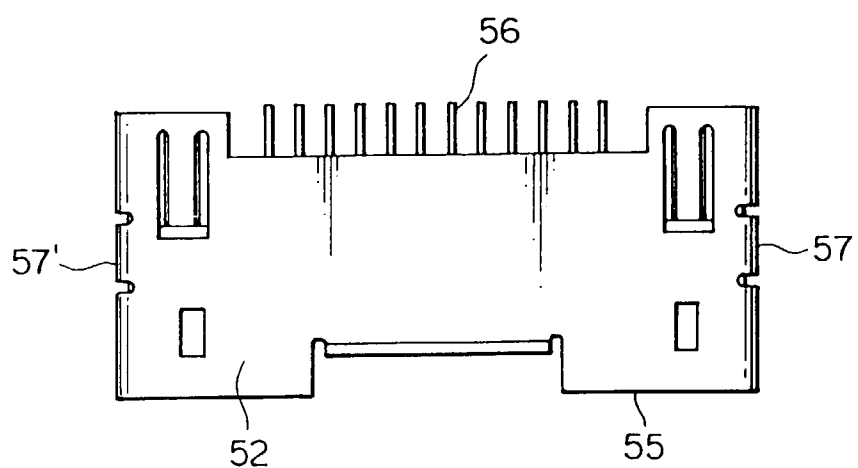


FIG. 6

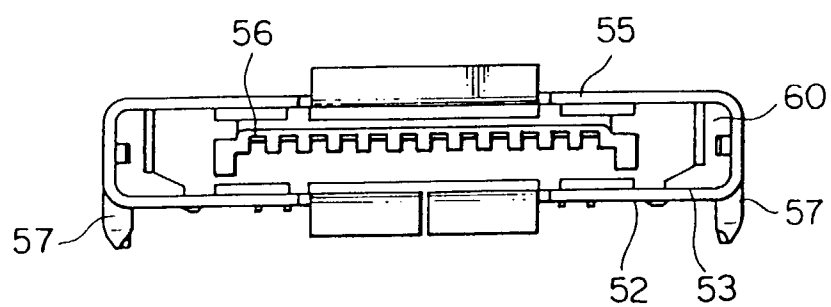


FIG. 7

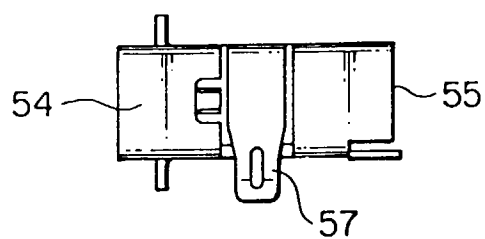


FIG. 8

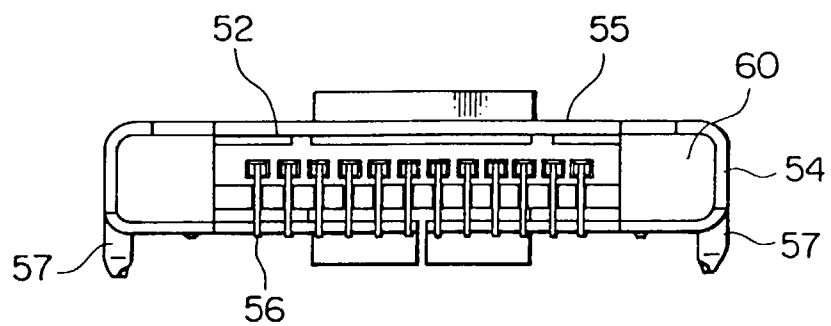


FIG. 9

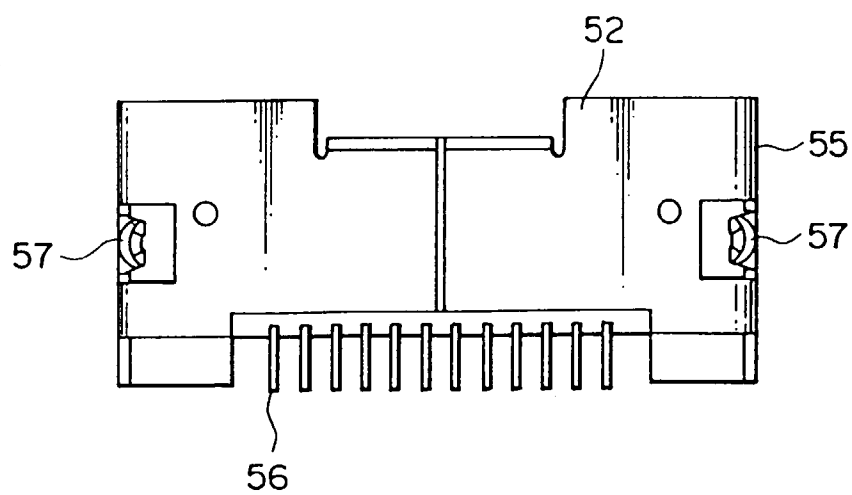


FIG. 10

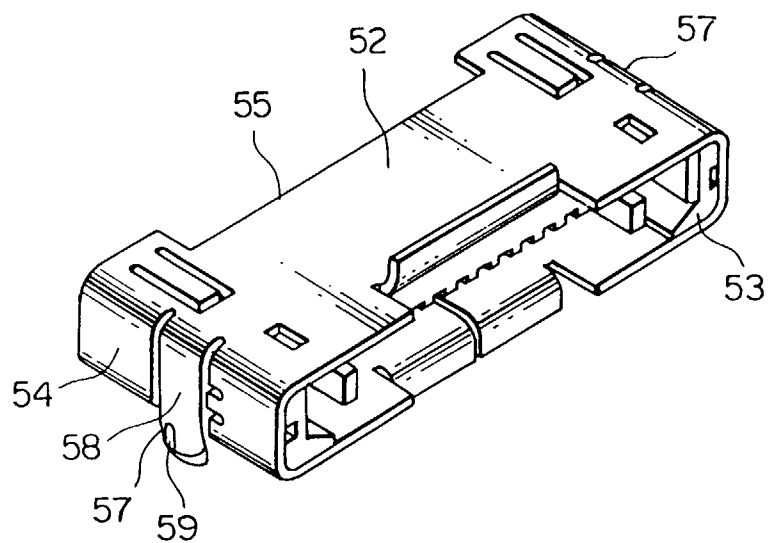


FIG. 11

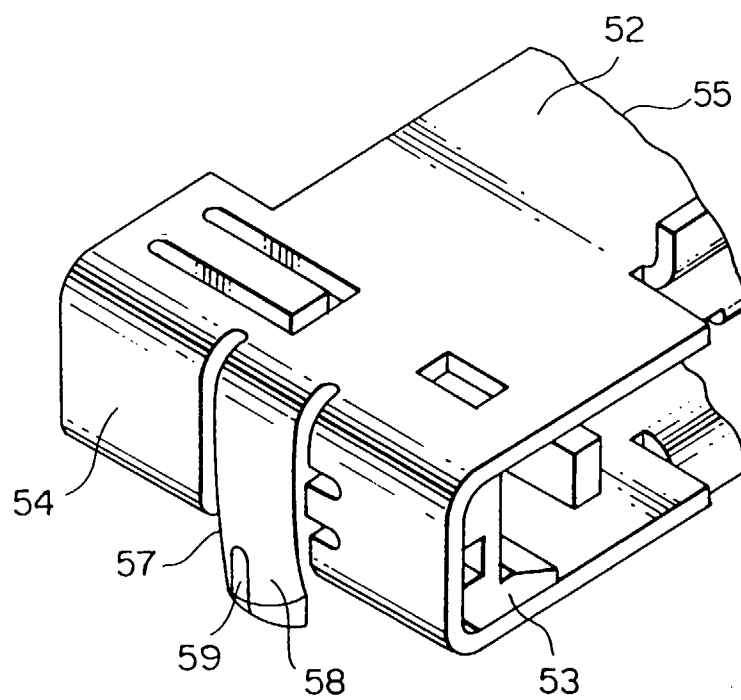


FIG. 12

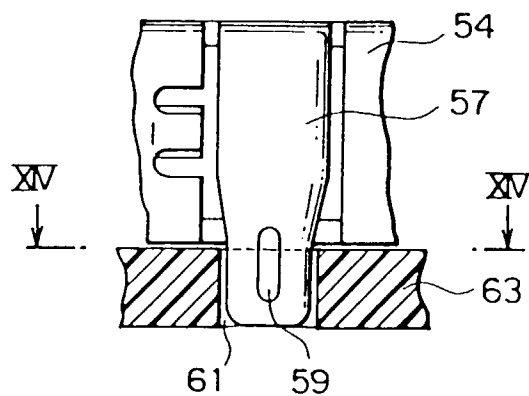


FIG. 13

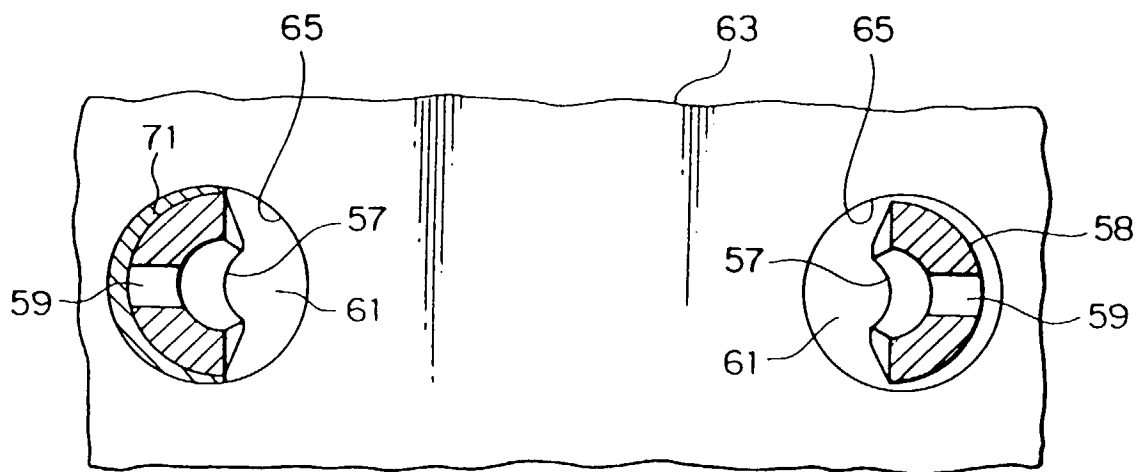


FIG. 14

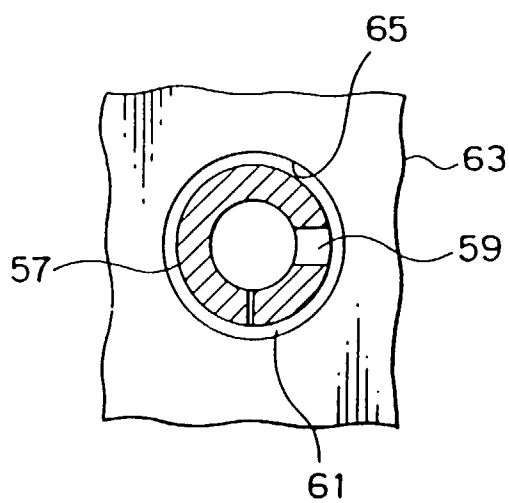


FIG. 15

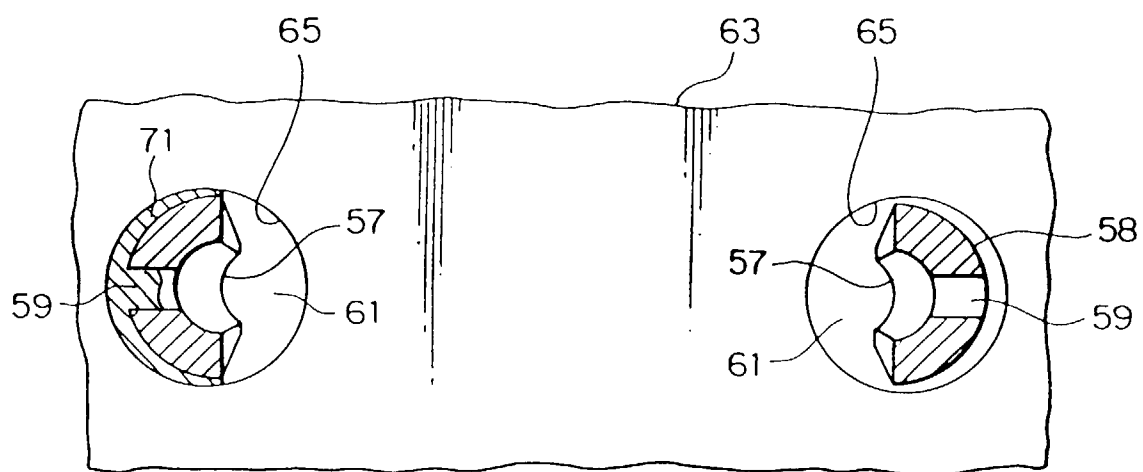


FIG. 14 a