

Description

This invention relates to a receptacle comprising first and second rectangular frames each having a rectangular opening, so that a plug pin can be detachably inserted into the first frame through the rectangular opening;

a pair of leaf spring pieces connecting the first frame to the second frame and arranged opposite each other between respective pairs of opposite sides of the rectangular first and second frames;

and an external connection pin formed at one of the two opposite sides of the second frame such that it extends away from the first frame,

in which said pair of leaf spring pieces are inwardly curved toward each other so that they can elastically retain said plug pin when the latter is inserted into said receptacle through said first frame.

Such receptacle is known from US Patent 3,362,008 and it is an object of the present invention to provide such receptacle having contact sections which ensure an elastic, firm contact with an inserted plug pin, and, in particular to a very small receptacle for use in an IC card and the like.

A miniature receptacle 40 to be fitted on an IC card and the like, is constructed as shown, for example, in figure 1. Receptacle 40 comprises cylindrical contact 41, and connection pin 42 extending from one end of contact 41. Receptacle 40 as a whole is formed of a metal sheet which has excellent elasticity. Cylindrical contact 41 has a diameter t which is formed so as to be somewhat smaller than a diameter d of plug pin 50, as shown in figure 2. When plug pin 50 is inserted into cylindrical contact 41, contact 41 can firmly hold and maintain contact with plug pin 50.

Such receptacles 40 are individually fitted in corresponding holes 61, which are arranged in a grid-like array in receptacle housing 60. The receptacle housing can be incorporated into, for example, an IC card. The grid-like array is of such a high density type as to permit ten receptacles to be formed within a range of, for example, 1 cm across the end face of the housing. From this it will be understood that the individual receptacles are very small in configuration.

Since contact 41 is formed so as to have a cylindrical configuration, the holding ability of contact 41 is markedly reduced due to the repeated insertion and withdrawal of the plug pin into and from the receptacle. This is due to the fact that the cylindrical contact undergoes an outwardly expanding force due to the exertion of a twisting force of the plug pin upon the cylindrical contact during insertion and withdrawal of the plug pin.

The receptacle disclosed in above US Patent 3,362,008 comprises a rectangular contact having

flat leaf spring pieces which elastically retain a plug pin. These flat leaf spring pieces are not chamfered at their side edges, so that flash- or burr-like corners formed at the cut edges of these leaf spring pieces might easily damage a plug pin upon insertion between these leaf spring pieces. Flash- or burr-like corners cannot be allowed in a small connector for use in an IC card for plug pins having extremely small diameter.

This risk is avoided now in the connector of the present invention wherein the opposite surface of the pair of leaf springs are chamfered at their side edges.

(Follows original specification page 3, line 19 a.f.)

Brief Description of the Drawings

Fig. 1 is a view showing a conventional receptacle to be associated with a plug pin;

Fig. 2 is a cross-section as taken along line II-II in Fig. 1;

Fig. 3 is an outer appearance of a receptacle housing having a number of receptacles;

Fig. 4 is a perspective view showing a detail of a receptacle according to an embodiment of this invention;

Fig. 5 is a cross-sectional view as taken along line V-V in Fig. 4; and

Fig. 6 is a cross-sectional view as taken along line VI-VI in Fig. 4.

Detailed Description of the Preferred Embodiments

A receptacle according to the embodiment of this invention will now be explained below with reference to the accompanying drawings.

In Fig. 4, receptacle 10 is basically formed by bending a piece of metal sheet into a rectangular configuration. Receptacle 10 is comprised of first frame 12 having a rectangular opening at plug pin insertion inlet 11, and second frame 13 formed at a location remote from the plug pin insertion inlet such that it is positioned opposite the first frame. Bottom surface 14 of first frame 12 is connected to bottom surface 15 of second frame 13 by first leaf spring piece 16 which is bowed inwardly of receptacle 10. Top surface 17 of first frame 12 is similarly connected to top surface 18 of second frame 13 by second leaf spring piece 19. These leaf spring pieces 16 and 19 can be brought, at their respective middle curved portions 20 and 21, into elastic contact with plug pin 30. External connection pin 22 is formed at bottom surface 15 of second frame 13 so that it extends away from first leaf spring piece 16.

As shown in Fig. 5, inlet 11 of first frame 12 has an inner diameter L greater than a diameter d



of body 32 of plug pin 30, thus preventing first frame 12 from being externally expanded by plug pin 30 during the insertion of plug pin 30. Since inlet 11 of the receptacle is made wider as set forth above, even if plug pin 30 is displaced in the direction of an arrow c in Fig. 4 or tilted in the direction of insertion of plug pin 30, such a displacement or tilt can be absorbed to a certain extent, thus preventing unwanted deformation from occurring at first frame 12 and leaf spring pieces 16 and 19.

First frame 12 is formed by bending a portion of piece of metal sheet into a rectangular configuration. For this reason, first frame 12 is mechanically stronger due to the presence of corners 12a, 12b, 12c, and 12d, and is less prone to deformation than in a conventional cylindrical receptacle, even if an outwardly expanding external force is exerted on first frame 12.

As shown in Fig. 5, leaf spring pieces 16 and 19 are smoothly curved in an arcuate fashion to allow plug pin 30 to be inserted along their curved surface. That is, the forward end 31 of plug pin 30 is less likely to be worn, as there is a smaller friction contact angle between plug pin 30 and leaf spring pieces 16 and 19. Furthermore, since body 32 of plug pin 30 is in contact with leaf spring pieces 16 and 19, and not in contact with first frame 12, less wear occurs on the plug pin. Since the leaf spring pieces 16 and 19 are supported at both ends, and have no intermediate support member fixed in between, the plug pin is brought into stable, flexible contact with leaf spring pieces 16 and 19.

In Fig. 6, curved portions 20 and 21 of leaf spring pieces 16 and 19 are chamfered at their longitudinal side edges. Usually there is a risk that a plug pin will be damaged, or be in defective electrical contact with a receptacle, due to flash- or burr-like corners formed at the cut edge of a piece of metal sheet. Since according to this invention the side edges of the curved portions of leaf spring pieces 16 and 19 are chamfered, there is less risk that the plug pin will be damaged or be in defective electrical contact with the receptacle.

Claims

1. A receptacle (10) comprising:

first and second rectangular frames (12, 13) each having a rectangular opening, so that a plug pin (30) can be detachably inserted into the first frame (12) through the rectangular opening;

a pair of leaf spring pieces (16, 19) connecting the first frame (12) to the second frame (13) and arranged opposite each other between respective pairs of opposite sides (14,

17; 15, 18) of the rectangular first and second frames (12, 13); and

an external connection pin (22) formed at one of the two opposite sides (15, 18) of the second frame (13) such that it extends away from the first frame (12),

in which said pair of leaf spring pieces (16, 19) are inwardly curved toward each other so that they can elastically retain said plug pin (30) when the latter is inserted into said receptacle (10) through said first frame (12),

characterized in that the opposite surfaces of said pair of leaf spring pieces (16, 19) are chamfered at their side edges.

Patentansprüche

1. Steckdose (10), welche aufweist:

erste und zweite, rechteckförmige Rahmentteile (12, 13), welche jeweils eine rechteckförmige Öffnung haben, so daß ein Steckerstift lösbar in das erste Rahmenteil (12) über die rechteckförmige Öffnung eingesetzt werden kann;

ein Paar von Flachfederteilen (16, 19), welche das erste Rahmenteil (12) mit dem zweiten Rahmenteil (13) verbinden und einander gegenüberliegend zwischen zugeordneten Paaren von gegenüberliegenden Seiten (14, 17; 15, 18) der rechteckförmigen ersten und zweiten Rahmentteile (12, 13) angeordnet sind; und einen externen Anschlußstift (22), welcher an einer der beiden gegenüberliegenden Seiten (15, 18) des zweiten Rahmentteils (13) derart ausgebildet ist, daß er sich vom ersten Rahmenteil (12) wegerstreckt,

bei der das Paar von Flachfederteilen (16, 19) nach innen aufeinander zu derart gekrümmt ist, daß sie elastisch den Steckerstift (30) festhalten können, wenn der letztgenannte in die Steckdose (10) über das erste Rahmenteil (12) eingesetzt ist,

dadurch gekennzeichnet, daß die gegenüberliegenden Flächen des Paares von Flachfederteilen (16, 19) an ihren Seitenkanten abgechrägt sind.

Revendications

1. Une prise femelle (10) comprenant:

- des premier et second cadres rectangulaires (12, 13), chacun d'eux comportant une ouverture rectangulaire de manière à pouvoir enficher une broche (30) de façon amovible dans le premier cadre (12), à travers l'ouverture rectangulaire;
- une paire de lames de ressort (16, 19) reliant le premier cadre (12) au second

of body 32 of plug pin 30, thus preventing first frame 12 from being externally expanded by plug pin 30 during the insertion of plug pin 30. Since inlet 11 of the receptacle is made wider as set forth above, even if plug pin 30 is displaced in the direction of an arrow c in Fig. 4 or tilted in the direction of insertion of plug pin 30, such a displacement or tilt can be absorbed to a certain extent, thus preventing unwanted deformation from occurring at first frame 12 and leaf spring pieces 16 and 19.

First frame 12 is formed by bending a portion of piece of metal sheet into a rectangular configuration. For this reason, first frame 12 is mechanically stronger due to the presence of corners 12a, 12b, 12c, and 12d, and is less prone to deformation than in a conventional cylindrical receptacle, even if an outwardly expanding external force is exerted on first frame 12.

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In Fig. 6, curved portions 20 and 21 of leaf spring pieces 16 and 19 are chamfered at their longitudinal side edges. Usually there is a risk that a plug pin will be damaged, or be in defective electrical contact with a receptacle, due to flash- or burr-like corners formed at the cut edge of a piece of metal sheet. Since according to this invention the side edges of the curved portions of leaf spring pieces 16 and 19 are chamfered, there is less risk that the plug pin will be damaged or be in defective electrical contact with the receptacle.

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17; 15, 18) of the rectangular first and second frames (12, 13); and

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ein Paar von Flachfederteilen (16, 19), welche das erste Rahmenteil (12) mit dem zweiten Rahmenteil (13) verbinden und einander gegenüberliegend zwischen zugeordneten Paaren von gegenüberliegenden Seiten (14, 17; 15, 18) der rechteckförmigen ersten und zweiten Rahmentteile (12, 13) angeordnet sind; und einen externen Anschlußstift (22), welcher an einer der beiden gegenüberliegenden Seiten (15, 18) des zweiten Rahmentteils (13) derart ausgebildet ist, daß er sich vom ersten Rahmenteil (12) wegerstreckt,

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- une paire de lames de ressort (16, 19) reliant le premier cadre (12) au second



cadre (13) et disposées face à face entre les paires respectives des côtés opposés (14, 17; 15, 18) des premier et second cadres rectangulaires (12, 13); et

- une broche de connexion extérieure (22) 5
ménagée sur l'un des deux côtés opposés (15, 18) du second cadre (13), de manière à présenter un profil s'éloignant du premier cadre;

dans laquelle ladite paire de lames de ressort (16, 19) sont incurvées l'une vers l'autre en direction de l'intérieur, de manière à retenir élastiquement ladite broche (30) lorsque cette dernière est introduite dans ladite prise (10), à travers ledit premier cadre (12). 10 15

caractérisé en ce que les surfaces opposées de ladite paire de lames de ressort (16, 19) sont chanfreinées sur leurs bords latéraux.

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