

Description

Field of the Invention:

The present invention relates to a floating type electric connector comprising movable and stationary housing sections, and more particularly to an improvement relating to the joint between the movable and stationary housing sections.

Description of the Prior Art:

As is well known, floating type electric connectors have been widely used. Such a floating type electric connector comprises a stationary housing which is to be fixed to a printed circuit board, a separate movable housing which is capable of moving with respect to the stationary housing, and a plurality of female terminals. The terminals are attached to the housings laterally at regular intervals, and are to be mated with a plurality of male terminals of a mating electric connector, which is fixed to another printed circuit board. Even if one printed circuit board is somewhat deviated from its prescribed position relative to the other printed circuit board, the movable connector housing can be brought to such a position that the positional deviation may be absorbed, thus permitting the mating of the male and female terminals for stable connection.

To assure that the movable housing can move with respect to the stationary housing of the floating type electric connector, a movable joint is used to connect the movable housing to the stationary housing. A conventional floating type electric connector is made by forming a movable housing and a stationary housing separately, and by attaching a movable joint to these separate housings. Another conventional floating type electric connector is made by forming a movable housing and a stationary housing in an integrated form; separating these housings and finally attaching a movable joint to these separate housings. The disadvantage in these conventional connectors is that extra steps are required in forming movable and stationary housings separately or in separating movable and stationary housings and connecting the separated housings with movable joints.

Also in the hope of increasing the flexibility move of the movable housing relative to the stationary housing, the movable joint is reduced in thickness. This is liable to decrease the strength of the floating type electric connector against undesired external force, particularly against the vertically downward loading on the movable housing.

Summary of the Invention:

One object of the present invention is to provide a floating type electric connector structure which permits reduction of assembling steps and, accordingly improves the efficiency with which such floating type elec-

tric connectors can be manufactured.

Another object of the present invention is to provide a floating type electric connector structure which has an increased resistance to undesired external force, particularly to the vertically downward loading on the movable housing of the floating type electric connector.

To attain these objects a floating type electric connector adapted to be mounted on a circuit board, comprises a unitarily molded housing having a movable housing portion, a stationary housing portion mountable on the surface of the circuit board and surrounding the movable housing portion, and at least two resilient joints flexibly connecting the movable and stationary housing portions. The stationary housing portion surrounds the movable housing portion limiting the movement of the movable housing portion. A plurality of female terminals are provided each having a terminal mating section and a base section joined by an intermediate resilient section. The mating terminal section is mounted in the movable housing portion and the base terminal section is mounted in the stationary housing portion.

According to another preferred embodiment of the present invention, each resilient section of the terminal comprises two inverted U-shaped sections integrally connected at one end. The other end of one inverted U-shaped section being integrally connected to the solder tail section. The other end of the other inverted U-shaped section being integrally connected to the mating terminal section.

According to still another preferred embodiment of the present invention, the base section has arms extending laterally with projections on the base arms extending toward the mating terminal section and adapted to be mounted in the stationary housing portion so that the base section is mounted in the stationary housing portion. Also extending from the base section toward the movable housing portion is a support which contacts the movable housing portion when it moves a finite distance.

Other objects and advantages of the present invention will be understood from the preferred embodiment of the present invention, which is shown in accompanying drawings.

Brief Description of the Drawings

Figure 1 is an exploded perspective view of a floating type electric connector according to one preferred embodiment of the present invention, showing two printed circuit boards (phantom lines) to be electrically connected with the aid of the floating type electric connector;

Figure 2 shows a floating type electric connector according to another preferred embodiment of the present invention, showing two printed circuit boards connected together with the aid of the floating type electric connector;

Figure 3 is a plane view of a floating type electric connector according to the embodiment of Figure 2;

Figure 4 is a front view of the floating type electric connector;

Figure 5 is a right side view of the floating type electric connector;

Figure 6 is a sectional view of the floating type electric connector taken along the line 6-6 in Figure 4.

Figure 7 is a right side view of the movable and stationary housings of the floating type electric connector prior to insertion of female terminals;

Figure 8 is a section view of the movable and stationary housings of the floating type electric connector taken along the line 8-8 in Figure 4 prior to insertion of female terminals;

Figure 9 is a sectional view of the fragments of the movable and stationary housings of the floating type electric connector taken along the line 9-9 in Figure 3 prior to insertion of female terminals;

Figure 10 is a sectional view of the fragments of the movable and stationary housings of the floating type electric connector taken along the line 10-10 in Figure 3 prior to insertion of female terminals;

Figure 11 is a plane view of a female terminal integrally connected to a carrier strip;

Figure 12 is a right side view of the female terminal of Figure 11;

Figure 13 is a top view of the female terminal of Figure 11;

Figure 14 is a bottom view of the female terminal of Figure 11; and

Figure 15 is an enlarged view of the resilient joint conductor of the female terminal.

Description of the Preferred Embodiment

Figures 1 and 2 show two embodiments of floating type electric connectors of the present invention. In these drawings each electric connector 3 which is to be attached to one printed circuit board 1 includes a housing 4 having a plurality of female terminals 5 laterally arranged at regular intervals. A mating electric connector 7 which is to be attached to another printed circuit board 2 includes a housing 6 having a plurality of male terminals 8 laterally arranged at regular intervals. Referring to Figure 3 and subsequent drawings, the floating type

electric connector of Figure 2 is described in detail.

The housing 4 comprises an upper, inner movable housing portion 9 and a lower, outer stationary housing portion 10, which is to be attached to a printed circuit board. Different from a conventional floating type electric connector which includes separate movable and stationary housings, the movable housing portion 9 is so connected to the stationary housing portion 10 that the movable housing portion 9 may move relative to the stationary housing portion 10. As best seen from Figure 3, the four corners of the inner movable housing portion 9 are connected to the corresponding four corners of the outer stationary housing portion 10 by resilient joint pieces 11 as indicated by 12a, 12b, 12c and 12d.

Referring to Figures 7 and 10, these resilient joint pieces 11 are described in detail. For the sake of simplicity the movable and stationary housing portions 9 and 10 are shown prior to insertion of female terminals 5. As seen from these drawings, each resilient joint piece at each corner is a "U"-shaped piece 13. The opposite ends 14 and 16 of the resilient joint piece 11 are integrally connected to the movable housing portion 9 at 15 and the stationary housing portion 10 at 17 respectively. These U-shaped joint pieces permit the movable housing 9 to move horizontally with respect to the stationary housing 10 in opposite horizontal directions as indicated by a double-headed arrow Z in Figure 9 and, at the same time, move vertically with respect to the stationary housing 10 in opposite vertical directions as indicated by a double-headed arrow X in Figure 8.

Figure 11 shows a female terminal 5 joined to a carrier strip 18. As shown in the drawing, the female terminal 5 comprises a base section 19, an intermediate resilient section 20 extending from the center of the base section 19, and a contact piece which is composed of a lower contact section 22 integrally connected to the intermediate resilient section 20 and an upper contact section 21 consecutive to and integrally connected to the lower contact section 22.

The lower contact section 22 has sawtooth projections 23 on one side thereof, which will be held in the movable housing portion 9. The base section 19 has laterally extending arms 31, 32 upon which appear projections 24 which will skive into the stationary housing portion 10. Also, the arms 31, 32 each have a rest sections 26 located between the opposite projections 24. These rest portions 26 will support the movable housing portion 9 when the moveable housing portion descends. Finally, the base section 19 has two solder tails 28 integrally connected to its bottom edge.

A series of female terminals are removed from the carrier strip 18 by cutting and allowing one or the other solder tail 28 on the carrier strip to remain, so that when assembled the solder tails will be staggered. Figure 12 shows a female terminal 5 integrally connected to an elongated carrier 18 as seen from the left side of the female terminal 5. As shown in this drawings, the upper contact section 21 is bifurcated, defining the contact gap,

den Schlüsselkanal (8) eingeführten Schlüssel zur Drehungsfreigabe des Zylinderkerns (3) eingestellt werden können, wobei im Zylinderkern wenigstens zwei sich in Längsrichtung erstreckende gehärtete Stahlstifte (11) angeordnet sind, dadurch gekennzeichnet, dass die Stahlstifte (11) in den Zylinderkern (3) derart eingesetzt sind, dass sie eine zum Ausziehen des Zylinderkerns in diesen einzuschraubende Stahlschraube mit einem Durchmesser von wenigstens etwa 3 mm führt, derart, dass diese Stahlschraube am Umfang durch radial nach aussen auf Block gedrückte Stiftzuhaltungen (4,5,6) abgearbeitet wird.

2. Drehschliesszylinder nach Anspruch 1, dadurch gekennzeichnet, dass die Stahlstifte (11) zueinander einen Abstand (A) aufweisen, der nicht grösser als etwa 3 mm ist.
3. Drehschliesszylinder nach Anspruch 2, dadurch gekennzeichnet, dass die Stifte (11) links und rechts neben dem Schlüsselkanal (8) angeordnet sind und dass der Abstand (B) dieser Stifte (11) zu den nächstliegenden Kernstiften (5) so gewählt ist, dass eine zwischen den Stiften (11) in den Schlüsselkanal (8) eingedrehte Schraube von einem Durchmesser von etwa 4 mm die Stiftzuhaltungen (4,5,6) radial nach aussen auf Block schiebt.
4. Drehschliesszylinder nach Anspruch 2 oder 3, dadurch gekennzeichnet, dass der Abstand (B) zwischen den Stiften (11) und den nächstliegenden Kernstiften (5) nicht grösser als etwa 0,6 mm ist.
5. Drehschliesszylinder nach einem der Ansprüche 1 bis 4, wobei dieser ein Doppelzylinder mit einem die beiden Zylinderhälften verbindenden Steg (30) ist, dadurch gekennzeichnet, dass in Bohrungen (31) des Steges (30) gehärtete Stahlstifte (32) eingesetzt sind, die sich bis in das Zylindergehäuse (1) erstrecken.
6. Drehschliesszylinder nach Anspruch 5, dadurch gekennzeichnet, dass die Stahlstifte (32) senkrecht zur Längsrichtung des Drehschliesszylinder im Steg (30) verlaufen.
7. Drehschliesszylinder nach Anspruch 6, dadurch gekennzeichnet, dass beidseitig der Gewindebohrung (34) für die Stulpschraube wenigstens je ein Stahlstift (32) angeordnet ist.

Claims

1. A rotary lock cylinder for a safety lock in which

spring-loaded pin tumblers (4, 5, 6) are mounted in bores extending radially in relation to a cylinder core (3, 12) and the cylinder housing (1) and can be adjusted by a key introduced into the key channel (8) in order to release the cylinder core (3) for rotation, at least two hardened steel pins (11) extending in the longitudinal direction being disposed in the cylinder core, characterised in that the steel pins (11) are so introduced into the cylinder core (3) that they guide a steel screw with a diameter of at least about 3 mm and which has to be screwed into the cylinder core for its withdrawal, so that the steel screw is on its periphery abraded by pin tumblers (4, 5, 6) which press on the block radially from the outside.

2. A rotary lock cylinder according to Claim 1, characterised in that the steel pins (11) are spaced apart by a distance (A) which is no greater than about 3 mm.
3. A rotary lock cylinder according to Claim 2, characterised in that the pins (11) are disposed to the right and left of and are alongside the key channel (8) and in that the distance (B) between these pins (11) and the nearest core pins (5) is so chosen that a screw screwed into the key channel (8) between the pins (11) and having a diameter of about 4 mm pushes the pin tumblers (4, 5, 6) radially outwardly en bloc.
4. A rotary lock cylinder according to Claim 2 or 3, characterised in that the distance (B) between the pins (11) and the nearest core pins (5) is no greater than about 0.6 mm.
5. A rotary lock cylinder according to one of Claims 1 to 4, in which this is a double cylinder with a web (30) joining the two cylinder halves, characterised in that inserted into bores (31) in the web (30) are hardened steel pins (32) which extend into the cylinder housing (1).
6. A rotary lock cylinder according to Claim 5, characterised in that the steel pins (32) extend in the web (30) at right-angles to the longitudinal direction of the rotary lock cylinder.
7. A rotary lock cylinder according to Claim 6, characterised in that on both sides of the screw-threaded bore (34) for the screw there is at least one steel pin (32).

Revendications

1. Barillet de serrure pour serrure de sécurité



den Schlüsselkanal (8) eingeführten Schlüssel zur Drehungsfreigabe des Zylinderkerns (3) eingestellt werden können, wobei im Zylinderkern wenigstens zwei sich in Längsrichtung erstreckende gehärtete Stahlstifte (11) angeordnet sind, dadurch gekennzeichnet, dass die Stahlstifte (11) in den Zylinderkern (3) derart eingesetzt sind, dass sie eine zum Ausziehen des Zylinderkerns in diesen einzuschraubende Stahlschraube mit einem Durchmesser von wenigstens etwa 3 mm führt, derart, dass diese Stahlschraube am Umfang durch radial nach aussen auf Block gedrückte Stiftzuhaltungen (4,5,6) abgearbeitet wird.

2. Drehschliesszylinder nach Anspruch 1, dadurch gekennzeichnet, dass die Stahlstifte (11) zueinander einen Abstand (A) aufweisen, der nicht grösser als etwa 3 mm ist.
3. Drehschliesszylinder nach Anspruch 2, dadurch gekennzeichnet, dass die Stifte (11) links und rechts neben dem Schlüsselkanal (8) angeordnet sind und dass der Abstand (B) dieser Stifte (11) zu den nächstliegenden Kernstiften (5) so gewählt ist, dass eine zwischen den Stiften (11) in den Schlüsselkanal (8) eingedrehte Schraube von einem Durchmesser von etwa 4 mm die Stiftzuhaltungen (4,5,6) radial nach aussen auf Block schiebt.
4. Drehschliesszylinder nach Anspruch 2 oder 3, dadurch gekennzeichnet, dass der Abstand (B) zwischen den Stiften (11) und den nächstliegenden Kernstiften (5) nicht grösser als etwa 0,6 mm ist.
5. Drehschliesszylinder nach einem der Ansprüche 1 bis 4, wobei dieser ein Doppelzylinder mit einem die beiden Zylinderhälften verbindenden Steg (30) ist, dadurch gekennzeichnet, dass in Bohrungen (31) des Steges (30) gehärtete Stahlstifte (32) eingesetzt sind, die sich bis in das Zylindergehäuse (1) erstrecken.
6. Drehschliesszylinder nach Anspruch 5, dadurch gekennzeichnet, dass die Stahlstifte (32) senkrecht zur Längsrichtung des Drehschliesszylinder im Steg (30) verlaufen.
7. Drehschliesszylinder nach Anspruch 6, dadurch gekennzeichnet, dass beidseitig der Gewindebohrung (34) für die Stulpschraube wenigstens je ein Stahlstift (32) angeordnet ist.

Claims

1. A rotary lock cylinder for a safety lock in which

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spring-loaded pin tumblers (4, 5, 6) are mounted in bores extending radially in relation to a cylinder core (3, 12) and the cylinder housing (1) and can be adjusted by a key introduced into the key channel (8) in order to release the cylinder core (3) for rotation, at least two hardened steel pins (11) extending in the longitudinal direction being disposed in the cylinder core, characterised in that the steel pins (11) are so introduced into the cylinder core (3) that they guide a steel screw with a diameter of at least about 3 mm and which has to be screwed into the cylinder core for its withdrawal, so that the steel screw is on its periphery abraded by pin tumblers (4, 5, 6) which press on the block radially from the outside.

2. A rotary lock cylinder according to Claim 1, characterised in that the steel pins (11) are spaced apart by a distance (A) which is no greater than about 3 mm.
3. A rotary lock cylinder according to Claim 2, characterised in that the pins (11) are disposed to the right and left of and are alongside the key channel (8) and in that the distance (B) between these pins (11) and the nearest core pins (5) is so chosen that a screw screwed into the key channel (8) between the pins (11) and having a diameter of about 4 mm pushes the pin tumblers (4, 5, 6) radially outwardly on bloc.
4. A rotary lock cylinder according to Claim 2 or 3, characterised in that the distance (B) between the pins (11) and the nearest core pins (5) is no greater than about 0.6 mm.
5. A rotary lock cylinder according to one of Claims 1 to 4, in which this is a double cylinder with a web (30) joining the two cylinder halves, characterised in that inserted into bores (31) in the web (30) are hardened steel pins (32) which extend into the cylinder housing (1).
6. A rotary lock cylinder according to Claim 5, characterised in that the steel pins (32) extend in the web (30) at right-angles to the longitudinal direction of the rotary lock cylinder.
7. A rotary lock cylinder according to Claim 6, characterised in that on both sides of the screw-threaded bore (34) for the screw there is at least one steel pin (32).

Revendications

1. Barillet de serrure pour serrure de sécurité

a unitarily molded housing (4) having a movable housing portion (9) a stationary housing portion (10) mountable on the surface of the circuit board (1), and at least two resilient joints (11) flexibly connecting the movable and stationary housing portions, said stationary housing portion surrounding the movable housing portion limiting the movement of said movable housing portion; and

a plurality of female terminals (5) each having a terminal mating section (22) and a base section (19) jointed by an intermediate resilient section (20), said mating terminal section being mounted in said movable housing portion and said base terminal section being mounted in said stationary housing portion.

2. A floating type electrical connector according to claim 1 wherein said stationary and movable housing portions having ends and said resilient joints (11) attached to opposite ends (15, 17) of said movable (9) and stationary (10) housing portions.
3. A floating type electrical connector according to claim 2 wherein each of said resilient joints (11) is a U-shaped piece (13).
4. A floating type electrical connector according to claim 3 wherein the intermediate resilient section (20) of said terminal comprises two inverted U-shaped sections (37, 39) integrally connected at one end (38) of each inverted U-shaped section, the other end (36) of one inverted U-shaped section (37) being integrally connected to said base section (19) and the other end of the other inverted U-shaped section (39) being integrally connected to said terminal mating section.
5. A floating type electric connector according to claim 1 wherein said base section (19) has arms (31, 32) extending laterally with projections (24) on said base arms extending toward the mating terminal section and adapted to be mounted in the stationary housing portion so that the base section is mounted in the stationary housing portion.
6. A floating type electric connector according to claim 5 wherein said base section (19) has a rest section (26) extending toward the movable housing portion (9) adapted to support the moveable housing portion when said movable housing portion moves toward said rest sections a finite distance.
7. A floating type electric connector according to claim 6 wherein said rest section (26) is curved so that the rest section can exert a variable counter force against the movable housing portion (9) after it

moves a finite distance.



Patentansprüche

1. Schwimmender elektrischer Steckverbinder, der zur Befestigung an einer Schaltungsplatte angepaßt ist, mit folgenden Merkmalen:

ein einheitlich gegossenes Gehäuse (4) weist einen beweglichen Gehäuseteil (9), ein stationäres Gehäuseteil (10), das auf der Oberfläche der Schaltungsplatte (1) montierbar ist, und mindestens zwei nachgiebige Verbindungen (11) auf, welche die beweglichen und stationären Gehäuseteile flexibel miteinander verbinden; das stationäre Gehäuseteil umgibt das bewegliche Gehäuseteil und beschränkt dabei die Bewegung des beweglichen Gehäuseteils;

eine Mehrzahl von Buchsenanschlüssen (5), die jeweils einen Klemmenpassungsabschnitt (22) und einen Basisabschnitt (19) aufweisen, die über einen nachgiebigen Zwischenabschnitt (20) miteinander verbunden sind; der Klemmenpassungsabschnitt ist in dem beweglichen Gehäuseteil montiert und der Basisabschnitt der Klemme ist in dem stationären Gehäuseteil montiert.

2. Schwimmender elektrischer Steckverbinder nach Anspruch 1, dadurch gekennzeichnet, daß der stationäre und der bewegliche Gehäuseteil jeweils Enden aufweisen und daß die nachgiebigen Verbindungen (11) an entgegengesetzten Enden (15, 17) des beweglichen (9) bzw. des stationären (10) Gehäuseteils befestigt sind.
3. Schwimmender elektrischer Steckverbinder nach Anspruch 2, dadurch gekennzeichnet, daß die nachgiebigen Verbindungen (11) jeweils ein U-förmig gestaltetes Teil (13) darstellen.
4. Schwimmender elektrischer Steckverbinder nach Anspruch 3, dadurch gekennzeichnet, daß der nachgiebige Zwischenabschnitt (20) der Klemme zwei umgekehrte U-förmige Abschnitte (37, 39) umfaßt, die an einem Ende (38) des jeweiligen umgekehrten U-förmigen Abschnitts integral miteinander verbunden sind, und daß das andere Ende (36) des einen umgekehrten U-förmigen Abschnittes (37) mit dem Basisabschnitt (19) und das andere Ende des anderen umgekehrten U-förmigen Abschnittes (39) mit dem Klemmenpassungsabschnitt integral verbunden sind.
5. Schwimmender elektrischer Steckverbinder nach Anspruch 1, dadurch gekennzeichnet, daß der



Basisabschnitt (19) Arme (31, 32) aufweist, die mit Vorsprüngen (24) an den Basisarmen seitlich vorstehen und sich zum Klemmenpassungsabschnitt hin erstrecken sowie zur Befestigung in dem stationären Gehäuseabschnitt angepaßt sind, so daß der Basisabschnitt in dem stationären Gehäuseteil montiert ist.

6. Schwimmender elektrischer Steckverbinder nach Anspruch 5, dadurch gekennzeichnet, daß der Basisabschnitt (19) einen Auflageabschnitt (26) aufweist, der sich zu dem beweglichen Gehäuseteil (9) erstreckt, welcher zur Stützung des beweglichen Gehäuseteils ausgebildet ist, wenn dieses sich zu den Auflageabschnitten um eine endliche Entfernung bewegen.
7. Schwimmender elektrischer Steckverbinder nach Anspruch 6, dadurch gekennzeichnet, daß der Auflageabschnitt (26) gekrümmt ist, so daß er eine variable Gegenkraft gegen das bewegliche Gehäuseteil (9) ausüben kann, wenn er sich um einen endlichen Abstand bewegt hat.

Revendications

1. Connecteur électrique du type flottant conçu pour être monté sur une carte de circuit, comprenant :

un boîtier moulé d'un seul tenant (4) comportant une partie de boîtier mobile (9), une partie de boîtier fixe (10) pouvant être montée sur la face de la carte de circuit (1), et au moins deux liaisons élastiques (11) reliant de manière flexible les parties de boîtier mobile et fixe, ladite partie de boîtier fixe entourant la partie de boîtier mobile en limitant le déplacement de ladite partie de boîtier mobile ; et

plusieurs bornes femelles (5) chacune comportant une section d'accouplement de borne (22) et une section de base (19) reliée par une section élastique intermédiaire (20), ladite section de borne d'accouplement étant montée dans ladite partie de boîtier mobile et ladite section de borne de base étant montée dans ladite partie de boîtier fixe.

2. Connecteur électrique du type flottant selon la revendication 1, dans lequel lesdites parties de boîtier fixe et mobile ont des extrémités et lesdites liaisons élastiques (11) sont fixées à des extrémités qui se font face (15, 17) desdites parties de boîtier mobile (9) et fixe (10).
3. Connecteur électrique du type flottant selon la revendication 2, dans lequel chacune desdites

liaisons élastiques (11) est une pièce en forme de U (13).

4. Connecteur électrique du type flottant selon la revendication 3, dans lequel la section élastique intermédiaire (20) de ladite borne comporte deux sections en forme de U inversé (37, 39) d'un seul tenant l'une avec l'autre à une extrémité (38) de chaque section en forme de U inversé, l'autre extrémité (36) d'une section en forme de U inversé (37) étant d'un seul tenant avec ladite section de base (19) et l'autre extrémité de l'autre section en forme de U inversé (39) étant d'un seul tenant avec ladite section d'accouplement de borne.

5. Connecteur électrique du type flottant selon la revendication 1, dans lequel ladite section de base (19) comporte des bras (31, 32) s'étendant latéralement, avec des saillies (24) sur lesdits bras de base s'étendant en direction de la section de borne d'accouplement et conçues pour se monter dans la partie de boîtier fixe de façon à monter la section de base dans la partie de boîtier fixe.

6. Connecteur électrique du type flottant selon la revendication 5, dans lequel ladite section de base (19) comporte une section d'appui (26) s'étendant en direction de la partie de boîtier mobile (9) conçue pour supporter la partie de boîtier mobile lorsque ladite partie de boîtier mobile se déplace, d'une distance finie, en direction desdites sections d'appui.

7. Connecteur électrique du type flottant selon la revendication 6, dans lequel ladite section d'appui (26) est incurvée de façon telle que la section d'appui peut, après s'être déplacée d'une distance finie, exercer une force de réaction variable contre la partie de boîtier mobile (9).