

The invention relates to an electrical connector system comprising a first connector frame mountable on a circuit board, and a number of connector pins arranged in a predetermined pattern in openings in the circuit board and in openings in said first connector frame such, that the parts of said pins protruding from one side of said circuit board form together with said first connector frame a first connector and the parts of said pins protruding from the other side of said circuit board can be used for attaching connecting leads.

Such connector systems are in wide use in the electrotechnical and electronics industry. Especially connecting pins with rectangular form are used for making connections in the so-called "wire wrap" technique. The ends of the connecting leads stripped of insulation are thereby in a number of turns wrapped around the connecting pins whereby because of the mechanical deformation a good contact results.

It is often necessary to establish connections between a number of said connecting pins and further connectors. In that case a second combination of connecting pins could be positioned in suitable openings in the circuit board and openings in a second connector frame such that at one side of the circuit board a second connector is formed, whereby the parts of said connecting pins protruding from the other side of the circuit board can be used for establishing the connections with the chosen pins from the first group of connecting pins belonging to said first connector. This method is rather circumstantial and requires furthermore a lot of space and material.

It is an object of the invention to realize in a connector system of the abovementioned type the possibility to make connections between a second connector and said first connector with relatively little material and within a relatively little space. In accordance with the abovementioned object the electrical connector from the abovementioned type has been developed further in a form described in EP—A—4422 in which the upper sections of said parts of the pins connecting from said other side of the circuit board are kept free during the attaching of said connecting leads and a second connector frame is positioned on said free sections such that said second connector frame together with said free upper sections of said pins forms a second connector, which second connector frame is mounted by means of spacer elements at a certain distance from the circuit board and is connected to the first connector frame by means of mounting pegs extending from both ends of said first connector frame and passing through suitable openings in said circuit board, through said spacer elements and then into openings in the second connector frame, which mounting pegs each have a hooked head, which

hooked heads snap behind the edges of the respective openings in the second connector frame.

In this construction both end sections of the connecting pins are used together with connector frames to form connectors.

We have developed a further improvement for a connector of this type which, according to the invention is characterized in that the mounting pegs are attached to said first connector frame, the spacer elements are separate elements and at the edge of said openings in the second connector frame at the side facing said circuit board two diametrically opposed, projecting, cam ridges are formed and that the end faces of the spacer elements directed towards said second connector frame each contain two approximately semi-circular, helical, projecting sections, connected by edge sections parallel to the axes of the pegs, the projecting sections co-operating with the cam ridges on the second connecting frame. In this development it is possible by turning the spacer elements to adjust the distance between the first and second connector frames.

Said adjusting possibility is preferred especially when circuit boards of varying or different thickness are used. Because in principle always connecting pins of the same length are used irrespective of the thickness of the circuit board the distance which should be bridged by the spacer elements will relate to the thickness of said circuit board and to possible further tolerances. By means of the spacer elements, embodied in the abovementioned way with on one end face thereof helical extending edge segments it is possible to adjust the distance between both connector frames.

Preferably said distance is determined by the length of the mounting pegs. If both connector frames are coupled by means of the mounting pegs and the spacer elements are adjusted such, that the hooked heads of the pegs tightly snap over the edges of openings in the second connector frame, then the length of said mounting pegs defines the mutual distance between the two connector frames.

The invention will furthermore be explained in detail referring to the embodiments illustrating in the figures.

Figure 1 shows a partly sectional view of an electrical connector system according to the invention.

Figure 2 shows in a number of intermediate situations how the electrical connector system according to the invention is assembled.

Figure 3 shows an upperside view of the spacer element which is used in the electrical connector system according to the invention.

Figure 4 shows two situations of the spacer element during the assembling process of the connector system.

Figure 1 shows an electrical connector system according to the invention. The circuit board 1 comprises a number of throughgoing bores arranged in a predetermined pattern and in said bores the pins 2 are pressed. Preferably all the pins 2 have the same length and all said pins are positioned into the related bore in the circuit board such that all the parts of the pins protruding from one side of the circuit boards have the same length. Then the connector frame 3 is positioned over the pins at the underside of the circuit boards such that the connector frame 3 together with the parts of the pins 2 protruding from the underside of the circuit board forms a male connector. The connector 3 comprises in principle an elongated boxshaped constructional element consisting of a bottom part and four side walls, whereby in the elongated bottom part bores are arranged according to the already mentioned predetermined pattern, through which bores the pins 2 are positioned. The general construction of such a connector is considered as known to the expert and therefore will not be explained in detail. A more detailed description is only necessary for both longitudinal end parts of said connector which parts are resting against the circuit board 1. Reference is made to Figure 2. The bottom part 4 of said connector is at both ends protruding of some distance outside the main boxshaped connector construction. In the longitudinal direction of said bottom part 4 and protruding in the direction of the circuit board 1 the blocks 5 are integrally formed onto the connector body. Between said blocks 5 and the bottom part 4 an opening 6 is positioned of which the dimensions are corresponding to the diameter of the mounting peg 7 which will be described afterwards. Between each of said blocks 5 and the nearest edge of the opening 6 approximately trapezoid shaped protruding parts 8 with preferably a cam shaped supporting face are positioned which parts 8 however are not protruding as far from the bottom part 4 as both marginal blocks 5. At the other side of said extending section of the bottom part 4 further to that side of the bottom part 4 protruding parts 9 can be positioned functioning as supporting elements for the block 10 formed at the upper end of the peg 7, which will be explained in detail afterwards.

As is illustrated in Figure 1 a second connector frame 13, shaped in a similar way as the first connector frame 3, is positioned at the other side of the circuit plate 1 at a short distance thereof such that the parts of the pins 2 protruding at this side of the circuit board 1 are guided into bores in the bottom part 14 of said connector 13 which bores are arranged into the abovementioned predetermined pattern. In this way the parts of the pins 2 protruding from this side of the circuit board 1 are forming together with the connector frame 13 also a complete male connector.

As is furthermore shown in Figure 1 the con-

connector frame 13 is kept at a distance of the circuit board 1 by means of the spacer elements 20, of which an embodiment will be described in more detail. The mounting of the frame parts 3 and 13 to the circuit board 1 is realized at both ends by means of a peg 7. Peg 7, seen from the underside in Figure 1 contains a block, which after assembly is supported by the therefor intended supporting faces of the protruding parts 9, whereby the other end of the peg 7 carrying the hooked head 11 snaps behind the edge of the opening 6 in the bottom part 4 of the connector frame 13.

As is shown clearly in Figure 1 the length of the pegs 7 is determining the distance between the connector frames 3 and 13. It will furthermore be clear that problems can arise when circuit boards 1 with different thickness are used. When the thickness of the circuit 1 is different, then also the length of the spacer elements 20 must be adapted to reach a stable construction after assembling. With connectors of this type furthermore the distances A and B, pointed out in Figure 1, are important to get a good connection in combination with a suitable female connector. Tolerances for said distances are specified in the so-called DIN-standards.

It will be clear that during positioning of the pins 2 in the circuit board 1 the length of the pin parts protruding from the underside of said circuit board can be chosen such that after positioning of the connector frame 3 onto the circuit board 1 the distance B corresponds to the specified value in said DIN-standards. To maintain the distance A within the specified tolerance limits it is necessary to be able to adjust the distance between the connector frames 3 and 13 accurately irrespective for instance of thickness variations in the circuit board 1 or other tolerances which can be present in the construction as a whole. For that reason the invention now provides a spacer element of special construction.

As is illustrated in Figure 2 and 3 said spacer element comprises an in generally cylinder shaped body 23. The cylinder has a flat underface but the upper face of said cylinder comprises along the edge nearly over half the circumference of the cylinder helically extending edge segments 31, joint by means of axially directed edge segments 32. The outer diameter of the cylindrical spacer element is smaller than the distance between both block parts 5 protruding from the underside of the connector frames so that the spacer elements fit in between said block segments 5 and the helically extended edge segments can cooperate with the furthermore at the underside of each connector frame protruding parts 8. Without explicitly describing further details of said spacer element it will be clear that by turning said spacer elements 20 the distance between the connector frame 13 and the circuit board 1 can be varied because of the cooperation between the protruding cam parts 8 at the

underside of the connector frame 13 and the helically extending edge segments at the upper face of the spacer elements 20. Said adjusting possibility can be used to adjust the distance between the connector frame 13 and the circuit board 1 after assembling the various parts such that the hooked heads 11 and the upper ends of the pegs 7 tightly snap over the related edges of the openings 6 in the connector frame 13. Because the length of said mounting pegs 7 determines the mutual distance between the connector frame 13 and the connector frame 3 the result of said turning of the spacer elements is that possible tolerances for instance in the thickness of the circuit board 1 are eliminated and that the distance between the both connector frames is indeed determined by the length of the pegs 7.

In such a construction a further problem may arise. By turning the spacer elements 20 for adjusting the distance between the connector frame 13 and the circuit board 1, in the given case the distance between the connector frame 13 and the connector frame 3 tensions will develop especially in the hooked heads 11 and the joint parts of the pegs 7. If, for instance the spacer element 20 is turned too tightly, or if the connector 13 is loaded too heavily, said tension may become too high. In this circumstance the upper parts of the pegs 7, especially the hooked head 11 will move inwardly (by deformation) under the influence of said tension to such an extent that the connections formed by said hooked heads 11 and the edges of the related openings 6 in the connector frame 13 will be broken so that the connector frame 13 may come loose.

A further development of the spacer element according to the invention gives a solution for this problem. Special reference is made to Figure 2 and 3, which last mentioned figure shows an upper side view of the spacer element 20. As is shown in the figures the spacer element 20 has a central circular opening 21 extending from the underside. Said centrally positioned circular opening 21 passes into an excentrically positioned opening 22 extending from the upperside of the spacer element until a short distance from the underside thereof. As is shown in Figure 3, the openings 21 and 22 have a common wall part 28, which in the illustrated embodiment is extending over nearly half the outline of the opening 21. The remaining not aligned wall parts defines a sickle shaped transitional edge 27 near the underside of the spacer element.

The ledge pin 24 positioned into the circular opening at the inside of the spacer element is operating with a key way 25, extending in axial direction in the peg 7. As is shown in Figure 2a the spacer element 20 can only be shifted over the peg 7 in one position because of said ledge pin 24. The axial key way 25 cooperating with the ledge pin 24 during the shifting movement of the spacer element ends in a radial ledge

groove extending over half the circumference of the peg 7. As soon as the ledge pin 24 has reached said radial ledge groove 26 and the spacer element 20 is turned over a short distance then said ledge pin 24 will be moved in said ledge groove 26 such that the spacer element 20 cannot be pulled from the peg 7.

During the assembling of the connector system according to the invention first of all the pegs 7 are guided through the openings 6 in the connector frame 3 and are thereafter guided through the related openings in the circuit board 1. Then, as is shown for one end of a connector frame in Figure 2, the spacer elements 20 are shifted onto the pegs 7 at the other side of the circuit plate such that the ledge pin 24 through the key way 25 is positioned at the beginning of the ledge groove 26. Then the situation as is illustrated in Figure 2b is reached. Thereafter the spacer element 20 will be rotated or turned over about 180° (counter clockwise seen in Figure 2), such that the ledge pin 24 is guided through the ledge groove 26 until it reaches the other end of said groove which is in the figures not visible. The connector frame 3 is now secured against loosening. It will be clear that also the other end of the connector frame 3 which is not illustrated in Figure 2 will be secured similarly.

The Figures 4a and 4b are showing two partial sectional views according to the same plane as the sectional view in Figure 1, which views are especially relating to the left peg 7, with corresponding spacer element 20 in Figure 1. As soon as the spacer element is shifted over the peg 7 so that the situation from Figure 2b is reached, then the peg 7 and the spacer element 20 are mutually positioned as is illustrated in Figure 4b, however without the part of the connector frame 13, which is also shown in Figure 4b. The sickle shaped edge is situated at the left side in Figure 4b and the right side of peg 7 is completely resting against the aligned wall part 28 of the bores 21 and 22. Now the spacer element is turned over about 180°, so that the situation illustrated in Figure 2c is reached, corresponding with the partial sectional view in Figure 4a. Now the left part of peg 7 is completely resting against the aligned wall part (28) over the bores 22 and 21. In this situation it is possible to bend (deform) the hooked head of the peg 7 over a little distance to the right so that it is possible to place the connector frame 13 onto the pegs 7 whereby under little pressure the hooked heads 11 are bending rearwardly so that they are guided through the openings 6 in the connector frame 13 after which the hooked heads 11 return elastically and snap over the edges of the openings 6 to realize the snap connection which is illustrated in Figure 1.

After the connector frame 13 is positioned in this way the spacer elements are again turned but now in the clockwise direction as seen in Figure 2 so that, as already mentioned, possible

tolerances are eliminated and the connector frames 3 and 13 are fixed with the right intermediate distance. Because of the excentricity of the bores 21 and 22 in the spacer element and because of the special shape of the bore 22, which is in detail illustrated in Figure 3, after a short turning of the spacer element a situation is reached in which the right side of pegs 7 in Figure 4b is completely resting against the aligned wall part of the openings 21 and 22. In this situation the hooked head 11 of the peg 7 cannot be moved to the right or at least not be moved far away to the right to loosen the hooked head 11 from the edge of the opening 6, so that also in the case that greater tensions are developed in the construction the connection is unbreakable maintained.

As is illustrated in the figures the spacer element 20 contains a protruding milled edge grip element 29 to facilitate the turning of the spacer element. It will be clear that also other edges can be used for facilitating said turning movement. It is for instance possible to use a hexagonal protruding edge functioning as gripping edge for a tool.

In a further embodiment of the invention, which is not illustrated in detail in the figures, also the connector frame 3 is positioned at a certain distance of the circuit board 1. Between the connector frame 3 and the circuit board 1 conventional cylindrical spacer elements are used having a predetermined length. When the pins 2 are positioned in the circuit board 1 attention has to be paid that the parts of the pins protruding from the side directed to the connector frame 3 have a predetermined length irrespective of the thickness of the circuit board 1. The other connector frame 13 is thereafter positioned by means of the correspondingly longer pins and adjusted by means of the above-described spacer elements 20.

Although the abovementioned description is based on a construction in which first of all the connection pins 2 are pressed through openings into the circuit plate 1 after which the connector 3 is positioned it is of course possible to start with a complete connector having connecting pins, which connecting pins are guided through the bores in the circuit board 1.

Although furthermore the abovementioned description is based on connection pins protruding all over the same distance from one side of the circuit plate it is possible to let a predetermined number of pins protrude over a longer distance. In that case a male connector is realized whereby when a female connector is positioned onto said male connector the first contact is made by further protruding pins. This is for instance preferable when the connectors are used for connecting MOS-circuits. The further protruding and therefor first contacting connection pins could be connected to earth potential so that the MOS-circuits which are to be connected first of all are earthed before

through the other pins further voltages are supplied to said MOS-circuit.

It is furthermore remarked that the first and second connector frame can be shaped identically.

The invention provides an electrical connector system with two connector frames mutually mounted at a predetermined distance irrespective of possible tolerances in the circuit board positioned in between, whereby the mounting means not only functioning for the distance adjustment but also for realizing a connection which can withstand possible developing high tensions.

Although the invention is described referring to a preferred embodiment thereof it will be clear that several amendments are possible in the scope of the invention. It is for instance possible to eliminate the protruding parts 9, defining the supporting faces for the block 10 at the end of peg 7. Also for instance block 10 may have a completely different shape and the pegs may be formed integrally with the first mounting frame.

Claims

1. An electrical connector system comprising a first connector frame (3) mountable on a circuit board (1), and a number of connector pins (2), which are arranged in a predetermined pattern and positioned in openings in the circuit board and in openings in said first connector frame such that the parts of said pins protruding from one side of said circuit board form, together with said first connector frame, a first connector; and the parts of said pins protruding from the other side of said circuit board can be used for attaching connecting leads; the upper or end sections of said parts of the pins protruding from said other side of the circuit board are kept free during the attaching of said connecting leads and a second connector frame (13) is positioned on said free sections such that said second connector frame together with said free upper sections of said pins forms a second connector; which second connector frame (13) is mounted by means of spacer elements (20) at a certain distance from the circuit board (1) and is connected to the first connector frame (13) by means of mounting pegs extending from both ends of one of the connector frames (3) and passing through suitable openings in said circuit board, through said spacer elements (20) and then into openings in the second connector frame, which mounting pegs each have a hooked head (11) which hooked heads snap behind the edges of respective openings in the second connector frame, characterized in that the mounting pegs (7) are attached to said first connector frame (3), the spacer elements (20) are separate elements, and at the edge of said openings in the second connector frame at the side facing said circuit board two diametrically opposed, projecting, cam ridges (8) are formed,

tolerances are eliminated and the connector frames 3 and 13 are fixed with the right intermediate distance. Because of the excentricity of the bores 21 and 22 in the spacer element and because of the special shape of the bore 22, which is in detail illustrated in Figure 3, after a short turning of the spacer element a situation is reached in which the right side of pegs 7 in Figure 4b is completely resting against the aligned wall part of the openings 21 and 22. In this situation the hooked head 11 of the peg 7 cannot be moved to the right or at least not be moved far away to the right to loosen the hooked head 11 from the edge of the opening 6, so that also in the case that greater tensions are developed in the construction the connection is unbreakable maintained.

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In a further embodiment of the invention, which is not illustrated in detail in the figures, also the connector frame 3 is positioned at a certain distance of the circuit board 1. Between the connector frame 3 and the circuit board 1 conventional cylindrical spacer elements are used having a predetermined length. When the pins 2 are positioned in the circuit board 1 attention has to be paid that the parts of the pins protruding from the side directed to the connector frame 3 have a predetermined length irrespective of the thickness of the circuit board 1. The other connector frame 13 is thereafter positioned by means of the correspondingly longer pins and adjusted by means of the above-described spacer elements 20.

Although the abovementioned description is based on a construction in which first of all the connection pins 2 are pressed through openings into the circuit plate 1 after which the connector 3 is positioned it is of course possible to start with a complete connector having connecting pins, which connecting pins are guided through the bores in the circuit board 1.

Although furthermore the abovementioned description is based on connection pins protruding all over the same distance from one side of the circuit plate it is possible to let a predetermined number of pins protrude over a longer distance. In that case a male connector is realized whereby when a female connector is positioned onto said male connector the first contact is made by further protruding pins. This is for instance preferable when the connectors are used for connecting MOS-circuits. The further protruding and therefor first contacting connection pins could be connected to earth potential so that the MOS-circuits which are to be connected first of all are earthed before

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and that the end faces of the spacer elements directed towards said second connector frame (13) each contain two approximately semi-circular, helical, projecting sections (31), connected by edge sections (32) parallel to the axes of the pegs, the projecting sections co-operating with the cam ridges (8) on the second connecting frame (13).

2. An electrical connector system according to claim 1 characterized in that the length of said mounting pegs and therewith the distance between said connector frames depends onto the length of the connecting pins.

3. An electrical connector system according to one of the foregoing claims, characterized in that each mounting pegs along its side opposite the side on which the hooked head is projecting are bevelled according to a plane directed at an angle to the axis of the mounting pegs such that the mounting pegs can be guided through the openings in said circuit board and said connector frame of which the diameter corresponds to the main diameter of said mounting pegs.

4. An electrical connector system according to one of the foregoing claims, characterized in that the spacer elements (20) comprise a central bore from the end face directed towards the circuit board, the diameter of which bore corresponds to the diameter of the mounting pegs and furthermore an excentric bore from the end face directed towards the connector frame, the diameter of which is greater, and which excentric bore extends to within a short distance of the end face directed to the circuit board and passes into said central bore such that the walls of said bores are at least partly aligned (28) without transition.

5. An electrical connector system according to claim 4, characterized in that the shape of the excentric bore with bigger dimensions is such that the wall of the central bore at least over half the outline thereof is aligned (28) to the wall of the excentric bore without transition.

6. An electrical connector system according to one of the foregoing claims, characterized in that the mounting pin (7) has a key way (25) extending axially from the upper end and ending into a radial ledge groove (26) extending over half the circumference of the mounting peg, and in that the spacer element has a ledge pin (24) positioned in the central bore and cooperating with the key way and with the ledge groove.

7. An electrical connector system according to one of the foregoing claims, characterized in that the mounting pegs (7) are integrally formed with the first connector frame.

8. An electrical connector system according to one of the claims 1—6, characterized in that the mounting pegs (7) are also guided through openings in the first connector frame (3) whereby the ends of said mounting pegs positioned near said first connector frame comprise a section (10) extending outside the main diameter of the mounting peg and supported by

the edge zone of the related openings into the first connector frame.

Patentansprüche

1. Ein elektrisches Verbindungssystem mit einem ersten Verbinderrahmen (3), der auf einer Schaltplatte (1) angeordnet werden kann, und einer Anzahl von Verbinderstiften (2), die nach einem bestimmten Muster angeordnet und in Öffnungen in der Leiterplatte sowie in Öffnungen in dem ersten Verbinderrahmen eingesetzt sind derart, daß die Teile der Stifte, die von der einen Seite der Leiterplatte abstehen, zusammen mit dem ersten Verbinderrahmen einen ersten Verbinder bilden; und die Teile der erwähnten Stifte, die von der anderen Seite der Leiterplatte abstehen, können zum Anbringen von Verbindungsleitungen verwendet werden; die oberen oder Endabschnitte der Teile der Stifte, die von der erwähnten anderen Seite der Leiterplatte abstehen, werden während des Anbringens der Verbindungsleitungen freigehalten und ein zweiter Verbinderrahmen (13) wird auf die erwähnten freien Abschnitte so aufgebracht, daß der zweite Verbinderrahmen zusammen mit den erwähnten freien oberen Abschnitten der erwähnten Stifte einen zweiten Verbinder bilden; welcher zweite Verbinderrahmen (13) mit Hilfe von Abstandsstücken (20) in einem bestimmten Abstand von der Leiterplatte (1) angeordnet und mit dem ersten Verbinderrahmen (13) mittels Befestigungsbolzen verbunden ist, die sich von beiden Enden eines der Verbinderrahmen (3) aus erstrecken und durch geeignete Öffnungen in der Leiterplatte, durch die erwähnten Abstandsstücke (20) und dann in Öffnungen im zweiten Verbinderrahmen geführt sind, welche Befestigungsbolzen je einen hakenförmigen Kopf (11) haben, welche hakenförmigen Köpfe hinter der Kanten von jeweiligen Öffnungen im zweiten Verbinderrahmen rasten, dadurch gekennzeichnet, daß die Befestigungsbolzen (7) am ersten Verbinderrahmen (3) angebracht sind, die Abstandsstücke (20) gesonderte Elemente sind und an der Kante der erwähnten Öffnungen in den zweiten Verbinderrahmen auf der Seite, die der Schaltplatte zugekehrt ist, zwei diametral gegenüberliegende abstehende Nockenrippen (8) ausgebildet sind, und daß die Endflächen der Abstandsstücke, die zu dem zweiten Verbinderrahmen (13) gerichtet sind, je zwei annähernd halbkreisförmige, schraubenlinienförmige, abstehende Abschnitte (31) enthalten, die durch Kantenabschnitte (32) parallel zu den Achsen der Bolzen verbunden sind, wobei die abstehenden Abschnitte mit den Nockenrippen (8) am zweiten Verbinderrahmen (13) zusammenwirken.

2. Ein elektrisches Verbindungssystem nach Anspruch 1, dadurch gekennzeichnet, daß die Länge der erwähnten Befestigungsbolzen und damit der Abstand zwischen den Verbinderrahmen



men von der Länge der Verbindungsbolzen abhängt.

3. Ein elektrisches Verbindungssystem nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß jeder Befestigungsbolzen längs seiner Seite, entgegengesetzt der Seite, an welcher der hakenförmige Kopf absteht, nach einer Ebene abgeschrägt ist, die mit einem Winkel zur Achse der Befestigungsbolzen gerichtet ist, so daß die Befestigungsbolzen durch die Öffnungen in der Leiterplatte und in dem erwähnten Verbinderrahmen geführt werden können, deren Durchmesser dem Hauptdurchmesser der Befestigungsbolzen entspricht.

4. Ein elektrisches Verbindungssystem nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß die Abstandsstücke (20) eine mittige Bohrung von der Endfläche, die der Leiterplatte zugekehrt ist, aufweisen, deren Durchmesser dem Durchmesser der Befestigungsbolzen entspricht, und ferner eine exzentrische Bohrung von der Endfläche, die zum Verbinderrahmen gerichtet ist, deren Durchmesser größer ist, und welche exzentrische Bohrung sich erstreckt bis innerhalb einer kurzen Entfernung von der zur Leiterplatte gerichteten Endfläche und in die erwähnte mittige Bohrung hinein derart, daß die Wände der erwähnten Bohrungen zumindest teilweise ausgefluchtet (28) ohne Übergang sind.

5. Ein elektrisches Verbindungssystem nach Anspruch 4, dadurch gekennzeichnet, daß die Form der exzentrischen Bohrung mit größeren Abmessungen derart ist, daß die Wand der mittleren Bohrung zumindest über die Hälfte des Umrisses derselben ausgefluchtet (28) zur Wand der exzentrischen Bohrung ohne Übergang ist.

6. Elektrisches Verbindungssystem nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß der Befestigungsbolzen (7) eine Keilnut (25) hat, die sich axial vom oberen Ende aus erstreckt und in eine radiale Leistenut (26) endet, die sich über den halben Umfang des Befestigungsbolzens erstreckt, und daß das Abstandsstück einen Leistenstift (24) hat, der in der mittleren Bohrung angeordnet ist und mit der Keilnut sowie mit der Leistenut zusammenwirkt.

7. Elektrisches Verbindungssystem nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß die Befestigungsbolzen (7) aus einem Stück mit dem ersten Verbinderrahmen geformt sind.

8. Ein elektrisches Verbindungssystem nach einem der Ansprüche 1 bis 6, dadurch gekennzeichnet, daß die Befestigungsbolzen (7) ferner durch Öffnungen in dem ersten Verbinderrahmen (3) geführt sind, so daß die Enden der Befestigungsbolzen, die in der Nähe des ersten Verbinderrahmens angeordnet sind, einen Abschnitt (10) aufweisen, der sich außenseitig des Hauptdurchmessers des Befestigungsbolzens erstreckt und durch die Randzone der jewei-

ligen Öffnungen in den ersten Verbinderrahmen getragen werden.

Revendications

1. Système de connecteur électrique comprenant une première armature de connecteur (3) pouvant être montée sur une plaque à circuit (1) et un certain nombre de broches de connecteur (2) qui sont disposées suivant un arrangement prédéterminé et positionnées dans des ouvertures de la plaque à circuit et dans des ouvertures ménagées dans ladite première armature de connecteur, de façon que les parties desdites broches faisant saillie d'un côté de ladite plaque à circuit forment, conjointement avec ladite première armature de connecteur, un premier connecteur; et les parties desdites broches faisant saillie de l'autre côté de ladite plaque à circuit peuvent être utilisées pour attacher des conducteurs de connexion; les portions supérieures ou d'extrémité desdites parties des broches faisant saillie dudit autre côté de la plaque à circuit sont maintenues libres pendant l'attache desdits conducteurs de connexion et une deuxième armature de connecteur (13) est positionnée sur lesdites portions libres de façon que ladite deuxième armature de connecteur, conjointement avec lesdites portions supérieures libres desdites broches, forme un deuxième connecteur; cette deuxième armature de connecteur (13) étant montée au moyen d'éléments d'écartement (20) à une certaine distance de la plaque à circuit (1) et étant reliée à la première armature de connecteur (3) au moyen de chevilles de montage partant des deux extrémités d'une des armatures de connecteur (3) et passant par des ouvertures convenables dans ladite plaque à circuit, au travers desdits éléments d'écartement (20), puis dans des ouvertures ménagées dans la deuxième armature de connecteur, ces chevilles de montage ayant chacune une tête (11) en forme de crochet, lesquels les têtes passent avec déclic derrière les bords d'ouvertures respectives ménagées dans la deuxième armature de connecteur, caractérisé en ce que les chevilles de montage (7) sont attachées à ladite première armature de connecteur (3), les éléments d'écartement (20) sont des éléments séparés et au bord desdites ouvertures dans la deuxième armature de connecteur du côté tourné vers ladite plaque à circuit deux arêtes de came en saillie (8), diamétralement opposées, sont formées et que les faces d'extrémité des éléments d'écartement, dirigées vers ladite deuxième armature de connecteur (13), contiennent chacune deux portions saillantes (31) hélicoïdales, sensiblement semicirculaires reliées par des portions de bord (32), parallèles aux axes des chevilles, les portions saillantes coopérant avec les arêtes de came (8) formées sur la deuxième armature de connexion (13).

2. Système de connecteur électrique selon la revendication 1, caractérisé en ce que la lon-



gueur desdites chevilles de montage et en même temps la distance entre lesdites armatures de connecteur dépendent de la longueur des broches de connexion.

3. Système de connecteur électrique selon l'une des revendications précédentes, caractérisé en ce que chaque cheville de montage est biseautée, le long de son côté opposé à celui sur lequel la tête en forme de crochet fait saillie et selon un plan dirigé sous un certain angle par rapport à l'axe des chevilles de montage, de façon que les chevilles de montage puissent être guidées au travers des ouvertures ménagées dans ladite plaque à circuit et dans ladite armature de connecteur, dont le diamètre correspond au diamètre principal desdites chevilles de montage.

4. Système de connecteur électrique selon l'une des revendications précédentes, caractérisé en ce que les éléments d'écartement (20) comprennent un perçage central à partir de la face d'extrémité dirigée vers la plaque à circuit, le diamètre de ce perçage correspondant au diamètre des chevilles de montage, et en outre un perçage excentré à partir de la face d'extrémité dirigée vers l'armature de connecteur, dont le diamètre est plus grand, et ce perçage excentré s'étend sur une courte distance à partir de la face d'extrémité dirigée vers la plaque à circuit et se transforme dans ledit perçage central de façon que les parois desdits perçages soient alignées (28) au moins partiellement sans transition.

5. Système de connecteur électrique selon la revendication 4, caractérisé en ce que la forme

du perçage excentré de plus grande dimension est telle que la paroi du perçage central soit alignée (28), au moins sur la moitié de son contour, sur la paroi du perçage excentré sans transition.

6. Système de connecteur électrique selon l'une des revendications précédentes, caractérisé en ce que la broche de montage (7) comporte une rainure de clavette (25) partant axialement de l'extrémité supérieure et finissant par une rainure de rebord radial (26) s'étendant sur la moitié de la circonférence de la cheville de montage et en ce que l'élément d'écartement comporte une broche de rebord (24) positionnée dans le perçage central et coopérant avec la rainure de clavette et avec la rainure de rebord.

7. Système de connecteur électrique selon l'une des revendications précédentes, caractérisé en ce que les chevilles de montage (7) sont formées solidairement de la première armature de connecteur.

8. Système de connecteur électrique selon l'une des revendications 1 à 6, caractérisé en ce que les chevilles de montage (7) sont également guidées au travers des ouvertures ménagées dans la première armature de connecteur (3), ce qui fait que les extrémités des chevilles de montage positionnées au voisinage de ladite première armature de connecteur comprennent une partie (10) s'étendant à l'extérieur du diamètre principal de la cheville de montage et supportée par la zone de bord des ouvertures relatives dans la première armature de connecteur.



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