

Description

Field of the Invention

This invention relates to electrical connectors, and particularly to an electrical jumper for electrically connecting two or more adjacent pins which extend from electronic devices.

Background of the Invention

Printed circuit boards are typically provided with a row or array of pins (a "pin field") to facilitate making connections between the electronic components on the board and external devices including other printed circuit boards. Electronic equipment, including digital computers, may also be provided with such pin fields for connecting the equipment to peripheral devices or data communication lines.

If a printed circuit board is capable of several uses, the devices which can be connected to its pin field may vary. This is almost certainly the case with a pin field of a general purpose device such as a digital computer. For some applications, it may be necessary to "jump", or electrically interconnect, two or more pins in the pin field. The jumped pins may or may not have further connections made to them.

It is therefore known to provide jumpers which can interconnect two or more pins in a pin field. The jumpers are generally rectangular and of such dimensions that there is sufficient space to connect additional jumpers on adjacent pins. The jumpers have an entry end with apertures for the entry of the pins, and are generally shorter than the pins so that the pins protrude from the opposite, exit end of the jumper to allow additional connections to be made to them. Because of their small dimensions, these jumpers are sometimes called "low profile" jumpers.

Such jumpers have a housing made of a non-conductive, dielectric material, having electrically interconnected terminals for receiving the pins to be jumped. An electrical connector housing for securing an electrical terminal in a passageway thereof is disclosed in US-A-4 013 331. It is also known from EP-A-0 099 246 to provide electrically interconnected terminals by forming the entire terminal member from one piece of conductive material, by stamping or otherwise. A conductive material commonly used is a metal, such as hard phosphor bronze, plated with nickel, then over-plated with gold or a tin/lead alloy.

In one particular known type of jumper for interconnecting two pins, the terminal member has four arms, two for engaging each pin. Each pair of arms engages its respective pin from two sides.

Each arm is provided with a dimple for better contact with its respective pin. The arms extend from a central spine, which is received in a slot in the housing, across to the sides of the housing. The free ends of the arms are supported in slots in the sides of the housing.

This known type of jumper functions well, but is not easily assembled automatically at high speeds. The free ends of the arms of the terminal member are sometimes bent out of place before the terminal member is inserted into the housing, so that they do not align properly with the slots intended to receive them. Alternatively, the arms may bend in the slots if accumulated tolerances are such that a maximum width arm is mated to a minimum width slot. As a result, the arms bend instead of seating properly in the slots. Such a jumper must then be discarded. Therefore, this type of jumper is assembled by hand.

In addition, when forming the dimples in the arms of the known jumper, if the metal which is used for the terminal member has been plated before the dimples are formed ("pre-plated"), there is a tendency for the base metal to break through the plating when the dimple is formed. Therefore, the terminal members of the known jumper are plated after they are formed. Such post-plating is a more difficult and expensive step than pre-plating.

Jumpers of the types generally described above can be provided in multiple units which allow discrete pairs of pins to be electrically connected by a number of electrically isolated terminal members in a common housing. In addition, jumpers can be provided which interconnect a multiplicity of pins in a bus bar configuration.

A jumper for electrically connecting terminal pins having the features of the preamble of claim 1 is disclosed in US-A-4 482 198.

Summary of the Invention

A general object of the present invention is to provide an improved form of electrical connector or jumper.

In accordance with this invention, a jumper for electrically connecting terminal pins is provided including a housing of dielectric material having a solid rectangular shape, an entry end having at least one pair of apertures for receiving said pins, an open exit end opposite said entry end, first and second long side walls parallel to each other and perpendicular to said entry and exit ends, first and second short side walls parallel to each other and perpendicular to said entry and exit ends and to said long side walls and rail members extending along said long side walls from said entry end to said exit end on either side of each said pair of apertures, each of said rail members projecting a

first preselected distance from said second long side wall; a terminal member associated with said pair of apertures comprising a pair of terminals of resilient, electrically conductive material for alignment with said apertures, each of said terminals having an entry end and an exit end, the entry and exit ends of each said terminals being connected to the entry and exit ends, respectively, of the other of said terminals by a respective electrically conductive cross-piece, said terminal member further having four tabs extending laterally outwardly from the corners thereof, the tabs being formed by extensions of the cross-pieces; with the terminal member being supported in the housing on the rail members, spaced from the second long side wall, by the tabs, and a latch associated with each said pair of apertures is characterized in that, the terminals are twin-beam terminals providing a rectangular opening formed by each pair of twin-beams and said cross-pieces, to provide positive frictional and electrical contact between each terminal and each terminal pin inserted therein, the latch has a ramp having a latch width and extending from said first long side wall toward said entry end and toward said second long side wall between the two apertures of said pair of apertures and further having a lip adjacent said entry end and said second long side wall, said lip of said latch engaging the cross-piece of said terminal member which connects the entry ends of said terminals, said latch extending into said rectangular opening, thereby retaining said terminal member in said housing, said lip having a lip height and being a second preselected distance from said second long side wall and a third preselected distance from said entry end, the sum of said lip height and said second preselected distance defining a fourth preselected distance, the cross-piece having a thickness greater than the difference between said first preselected distance and said second preselected distance, no greater than the difference between said first preselected distance and said fourth preselected distance, and no greater than said second preselected distance, and a width approximately equal to and no greater than said third preselected distance.

Jumpers constructed in accordance with the invention can be assembled automatically at high speed can have a low profile and can utilise a terminal member of pre-plated metal which is relatively simple to manufacture.

The invention may be understood more readily and other features and advantages of the invention may become apparent upon consideration of the following description.

Brief Description of the Drawings

Embodiments of the invention will now be de-

scribed, by way of examples only with reference to the accompanying drawings in which like reference characters refer to like parts throughout, and in which:

FIG. 1 is a perspective view of a terminal member of an electrical connector according to the invention;

FIG. 1A is a plan view of the terminal member of FIG. 1, the view being taken from line 1A-1A of FIG. 1;

FIG. 1B is a side elevational view of the terminal member of FIG. 1, the view being taken from line 1B-1B of FIG. 1A;

FIG. 1C is an end view of the terminal member of FIG. 1, the view being taken from line 1C-1C of FIG. 1A;

FIG. 2 is a plan view of a number of terminal members attached to a carrier strip;

FIG. 3 is a perspective view of a housing of an electrical connector according to the invention;

FIG. 3A is an entry and elevational view of the housing FIG. 3 the view being taken from line 3A-3A of FIG. 3;

FIG. 3B is a cross-sectional view of the housing of FIG. 3, the view being taken from line 3B-3B of FIG. 3;

FIG. 3C is a cross-sectional view of the housing of FIG. 3, the view being taken from line 3C-3C of FIG. 3;

FIGS. 4, 5 and 6 are cross-sectional views corresponding to FIG. 3C showing successive steps in the insertion of the terminal member of FIG. 1 into the housing of FIG. 3;

FIGS. 4A, 5A and 6A are cross-sectional views of FIGS. 4, 5 and 6, respectively the views being taken from lines 4A-4A, 5A-5A and 6A-6A, respectively;

FIG. 7 is an entry end elevational view of another housing of an electrical connector according to the invention;

FIG. 8A is a cross-sectional view of one form of interior arrangement of the housing of FIG. 7, the view being taken along line 8-8 of FIG. 7;

FIG. 8B is a cross-sectional view of another form of interior arrangement of the housing of FIG. 7 the view being taken along line 8-8 of FIG. 7;

FIG. 9 is a plan view of a strip of terminal members for use with the housing of FIG. 8B; and

FIG. 10 is an entry end elevational view of a further embodiment of a housing for an electrical connector according to the invention.

Description of Preferred Embodiments of the Invention

The jumper of this invention can be made as a single jumper, as multiple, physically connected

electrically separate jumpers, or as multiple, physically and electrically connected jumpers.

The preferred embodiment of a single jumper according to this invention is shown in FIGS. 1-6A. The jumper includes the terminal member shown in FIGS. 1-2 and the housing shown in FIGS. 3-6A.

The terminal member 10 includes two terminals 11, 12 of the twin-beam type. Each terminal 11, 12 includes two strips, or "beams", 13, 14 and 15, 16 respectively, connected at their proximal ends 17 to the terminal and held in fixed, spaced-apart relationship. The beams 13, 14 and 15, 16 converge as they extend along their respective terminals 11, 12 reaching a point of closest proximity adjacent their distal ends 18 and then flaring slightly at ends 18.

Ends 18 are the entry ends of terminals 11, 12, through which contact pins (not shown) are inserted to the terminals. Ends 17 are the exit ends of terminals 11, 12 through which the contact pins protrude if they are longer than terminals 11, 12. The convergence of the beams 13, 14 and 15, 16 and the resiliency of the metal from which they are made give rise to positive frictional and electrical contact between each terminal 11, 12 and the pin inserted therein.

Terminals 11, 12 of terminal member 10 are interconnected by entry end cross-piece 19 and exit end cross-piece 101. Terminals 11, 12 and cross-pieces 19, 101 together form rectangular opening 102 in terminal member 10. Entry end cross-piece 19 is extended beyond terminals 11, 12 to form tabs 103, 104. Exit end cross-piece 101 is similarly extended to form tabs 105, 106.

FIG. 2 shows a strip 20 of terminal members 10. Terminal members 10 are manufactured as a unit, attached to carrier 21, by stamping from a single piece of electrically conductive metal. Strip 20 is fed into the machine which assembles terminal members 10 into the housings to be described below. The individual terminal members 10 are broken off strip 20 as they are assembled by severing score lines 22, 23, 24. Holes 25 in carrier 21 are provided for proper indexing of strip 20 during assembly.

Terminal members 10 are preferably plated for improved conductivity. A preferred composition for terminal members 10 is a substrate of hard phosphor bronze with a plating of nickel and an overplating of substantially pure gold or an overplating of a 93/7 tin/lead alloy.

Single jumper housing 30 is made of a dielectric material, preferably a plastic. A particularly preferred plastic is glass-filled polyester. Housing 30 has first and second long side walls 31, 32, first and second short side walls 33, 34, an entry end 35, and an open exit end 36. Entry end 35 has two apertures 37 for receiving contact pins. Apertures

37 are aligned with terminals 11, 12. A commonly used pin spacing in the type of electronic devices for use with which this invention is intended is 0.100 inch (2.54 mm), and therefore the preferred separation distance for apertures 37 (and for terminals 11, 12) is 0.100 inch (2.54 mm). However, other spacings can be provided and, in fact, the jumper of the invention can be used for applications that do not involve printed circuit boards.

Projecting into housing 30 from first long side wall 31, and centered between the two apertures 37, is a latch 38 for retaining terminal member 10 in housing 30. Latch 38 includes a ramp 39 extending from first long side wall 31 toward second long side wall 32 and toward entry end 35. At the end of ramp 39 is a lip 300. Latch 38 cooperates with rail members 301, which extend along second long side wall 32 from entry end 35 to exit end 36 of housing 30 on either side of the pair of apertures 37, as explained below.

FIGS. 4-6A show the sequence of events in inserting terminal member 10 into housing 30. In FIGS. 4 and 4A, terminal member 10 has been inserted into exit end 36 of housing 30, with tabs 103, 104 riding on rails 301. Entry end cross-piece 19 has not yet reached ramp 39. In FIGS. 5 and 5A, cross-piece 19 has reached ramp 39 and has begun to bow (exaggerated in FIG. 5A) into the space between ramp 39 and second long side wall 32. Cross-piece 19 is free to bow because it is held away from second long side wall 32 by tabs 103, 104 riding on rails 301. In FIGS. 6 and 6A, cross-piece 19 has cleared lip 300 of ramp 39 and has snapped back to its normal configuration. Tabs 105 and 106 are now also riding on rails 301. As best seen in FIG. 6A, lip 300 engages cross-piece 19 to prevent the withdrawal of terminal member 10 from housing 30.

Instead of providing tabs 103, 104, 105, 106 to ride on rails 301, the body of terminal member 10 could be made to extend laterally far enough to ride rails 301. However, that would increase both the frictional contact between terminal member 10 and rails 301, and the amount of material needed to fabricate terminal member 10.

The dimensions of ramp 39, lip 300 and rails 301 must be within certain limits in order for latch 38 to function as intended. First, ramp 39 can be no wider than opening 102 in terminal member 10 so that it can fit between terminals 11, 12. Second, lip 300 can be no closer to entry end 35 of housing 30 than the width of cross-piece 19 so that cross-piece 19 can fit into the position shown in FIG. 6. Third, the tip of lip 300 can be no closer to second long side wall 32 than the thickness of cross-piece 19, so that cross-piece 19 can fit between lip 300 and second long side wall 32 as shown in FIG. 5A. Fourth, the difference between the distance from

lip 300 to second long side wall 32 and the distance that rail members 301 project from second long side wall 32 must be less than the thickness of cross-piece 19, otherwise cross-piece 19 will not be retained by lip 300. Fifth, the distance between the surfaces of rail members 301 and the plane of surface 302 (the distance between the tip of lip 300 and surface 302 defining the "lip height" of lip 300) must be at least the thickness of cross-piece 19, so that cross-piece 19 can fit into the position shown in FIG. 6A. However, the distance can be greater, as it is in FIG. 6A, allowing terminal number 10 to have a small degree of "float" within the housing.

When terminal member 10 and housing 30 have been assembled to form a jumper, the jumper can then be pressed onto the pins which are desired to be connected. For removal of the jumper from the pins, housing 30 is provided with raised portion 303 on the exterior of first long side wall 31 which provides a gripping surface for a jumper removal tool. In addition, cutouts 304 are provided in long side walls 31, 32 to expose exit end cross-piece 101 for gripping by a jumper removal tool.

In addition to the single jumper described above, this invention also includes several types of multiple jumpers. FIG. 7 shows the exterior of the entry end of two different types 80, 81 of multiple jumpers, the cross sections of which are shown in FIGS. 8A and 8B, respectively. Both types can have any even multiple of apertures 37, each pair of apertures separated from adjacent pairs of apertures by partitions 70, or, in the case of a pair of apertures at the end of the jumper, separated on one side from an adjacent pair by a partition 70, and bounded on the other side by a short side wall 71. In both types 80, 81, a latch 38 extends from first long side wall 72 between each pair of apertures 37, and rail members 301 project from second long side wall 73 adjacent short side walls 71 or partitions 70. Latches 38 and rail members 301 cooperate in the same manner as in the single jumper of FIGS. 1-6A to retain a terminal member associated with each pair of apertures within the jumper.

Multiple jumper 80 is essentially a plurality of the single jumpers shown in FIGS. 1-6A arranged with their short sides adjacent one another. One terminal member 10 is associated with each pair of apertures 37, and the separate terminal members are electrically isolated from one another.

Multiple jumper 81 is similar to jumper 80, but the partitions 70 do not extend all the way to the exit end of the jumper. The ends of partitions 70 in jumper 81 are spaced from the exit end by a distance equal to the width of exit end cross-piece 101 of terminal member 10. A strip 90 of the terminal members 91 used in jumper 81 is shown in FIG. 9. It is identical to strip 20 of terminal

members 10, except that score lines 23 are missing. When terminal members 91 are separated from strip 90, exit end cross-pieces 101 form a continuous bar electrically interconnecting the terminal members 91. The continuous bar fits into the gaps between the ends of partitions 70 and the exit end of jumper 81. Jumper 81 is therefore a bus bar configuration, used to electrically interconnect many pins in one row.

FIG. 10 shows the exterior of the entry end of another type of multiple jumper 100. Jumper 100 is essentially a plurality of the jumpers of FIGS. 1-6A with their long sides adjacent one another. Where the partitions 70 in jumpers 80, 81 replaced short side walls 33, 34, partitions 110 in jumper 100 replace long side walls 31, 32. Latches 38 extend from either first short side wall 111 or a partition 110 toward another partition 110 or second short side wall 113. Rails 301 extend from entry end to exit end along partitions 110 and second short side wall 113 where they meet long side walls 112. Each terminal member 10 of jumper 100 is electrically isolated from the other terminal members 10.

Thus, an electrical jumper has been described which can be easily assembled without the need to align terminal arms with slots in a housing, and whose terminal member is easily fabricated from a single piece of metal. Because no part of the terminal member is bent more than 90° during fabrication, there is no obstacle to using metal which has been plated before fabrication of the terminal because there is little danger that the base metal will break through the plating. One skilled on the art will recognize that the invention disclosed herein can be practiced by other than the embodiments described, which are presented for purposes of illustration and not of limitation, and the present invention is limited only by the claims which follow.

Claims

1. A jumper for electrically connecting terminal pins, said jumper comprising: a housing (30) of dielectric material, having a solid rectangular shape, an entry end (35) having at least one pair of apertures (37) for receiving said pins, an open exit end (36) opposite said entry end, first and second long side walls (31, 32) parallel to each other and perpendicular to said entry and exit ends, first and second short side walls (33, 34) parallel to each other and perpendicular to said entry and exit ends and to said long side walls and rail members (301) extending along said long side walls (32) from said entry end (35) to said exit end (36) on either side of each said pair of apertures (37), each of said rail members (301) projecting a



lip 300 to second long side wall 32 and the distance that rail members 301 project from second long side wall 32 must be less than the thickness of cross-piece 19, otherwise cross-piece 19 will not be retained by lip 300. Fifth, the distance between the surfaces of rail members 301 and the plane of surface 302 (the distance between the tip of lip 300 and surface 302 defining the "lip height" of lip 300) must be at least the thickness of cross-piece 19, so that cross-piece 19 can fit into the position shown in FIG. 6A. However, the distance can be greater, as it is in FIG. 6A, allowing terminal number 10 to have a small degree of "float" within the housing.

When terminal member 10 and housing 30 have been assembled to form a jumper, the jumper can then be pressed onto the pins which are desired to be connected. For removal of the jumper from the pins, housing 30 is provided with raised portion 303 on the exterior of first long side wall 31 which provides a gripping surface for a jumper removal tool. In addition, cutouts 304 are provided in long side walls 31, 32 to expose exit end cross-piece 101 for gripping by a jumper removal tool.

In addition to the single jumper described above, this invention also includes several types of multiple jumpers. FIG. 7 shows the exterior of the entry end of two different types 80, 81 of multiple jumpers, the cross sections of which are shown in FIGS. 8A and 8B, respectively. Both types can have any even multiple of apertures 37, each pair of apertures separated from adjacent pairs of apertures by partitions 70, or, in the case of a pair of apertures at the end of the jumper, separated on one side from an adjacent pair by a partition 70, and bounded on the other side by a short side wall 71. In both types 80, 81, a latch 38 extends from first long side wall 72 between each pair of apertures 37, and rail members 301 project from second long side wall 73 adjacent short side walls 71 or partitions 70. Latches 38 and rail members 301 cooperate in the same manner as in the single jumper of FIGS. 1-6A to retain a terminal member associated with each pair of apertures within the jumper.

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members 10, except that score lines 23 are missing. When terminal members 91 are separated from strip 90, exit end cross-pieces 101 form a continuous bar electrically interconnecting the terminal members 91. The continuous bar fits into the gaps between the ends of partitions 70 and the exit end of jumper 81. Jumper 81 is therefore a bus bar configuration, used to electrically interconnect many pins in one row.

FIG. 10 shows the exterior of the entry end of another type of multiple jumper 100. Jumper 100 is essentially a plurality of the jumpers of FIGS. 1-6A with their long sides adjacent one another. Where the partitions 70 in jumpers 80, 81 replaced short side walls 33, 34, partitions 110 in jumper 100 replace long side walls 31, 32. Latches 38 extend from either first short side wall 111 or a partition 110 toward another partition 110 or second short side wall 113. Rails 301 extend from entry end to exit end along partitions 110 and second short side wall 113 where they meet long side walls 112. Each terminal member 10 of jumper 100 is electrically isolated from the other terminal members 10.

Thus, an electrical jumper has been described which can be easily assembled without the need to align terminal arms with slots in a housing, and whose terminal member is easily fabricated from a single piece of metal. Because no part of the terminal member is bent more than 90° during fabrication, there is no obstacle to using metal which has been plated before fabrication of the terminal because there is little danger that the base metal will break through the plating. One skilled on the art will recognize that the invention disclosed herein can be practiced by other than the embodiments described, which are presented for purposes of illustration and not of limitation, and the present invention is limited only by the claims which follow.

Claims

1. A jumper for electrically connecting terminal pins, said jumper comprising: a housing (30) of dielectric material, having a solid rectangular shape, an entry end (35) having at least one pair of apertures (37) for receiving said pins, an open exit end (36) opposite said entry end, first and second long side walls (31, 32) parallel to each other and perpendicular to said entry and exit ends, first and second short side walls (33, 34) parallel to each other and perpendicular to said entry and exit ends and to said long side walls and rail members (301) extending along said long side walls (32) from said entry end (35) to said exit end (36) on either side of each said pair of apertures (37), each of said rail members (301) projecting a



first preselected distance from said long side wall (32); a terminal member (10) associated with said pair of apertures (37) comprising a pair of terminals (11, 12) of resilient, electrically conductive material for alignment with said apertures, each of said terminals having an entry end (18) and an exit end (17) the entry and exit ends of each of said terminals being connected to the entry and exit ends, respectively, of the other of said terminals by a respective electrically conductive cross-piece (19, 101), said terminal member (10) further having four tabs (103-106) extending laterally outwardly from the corners thereof, said tabs being formed by extensions of said cross-pieces (19, 101); with said terminal member (10) being supported by said tabs (103-106) on said rail members (301) and spaced by said rail members (301) from said second long side wall (32), and a latch (38) associated with each said pair of apertures (37), characterised in that the terminals (11, 12) are twin-beam (13, 14 and 15, 16) terminals providing a rectangular opening (102) formed by each pair of twin beams (13, 14 and 15, 16) and said cross-pieces (19, 101), to provide positive frictional and electrical contact between each terminal (11, 12) and each terminal pin inserted therein, the latch (38) has a ramp (39) having a latch width and extending from said first long side wall (31) toward said entry end (35) and toward said second long side wall (32) between the two apertures of said pair of apertures (37) and further having a lip (300) adjacent said entry end (35) and said second long side wall (32), said lip (300) of said latch engaging the cross-piece (19) of said terminal member (10) which connects the entry ends of said terminals (11, 12), said latch (38) extending into said rectangular opening (102), thereby retaining said terminal member (15) in said housing (30), said lip (300) having a lip height and being a second preselected distance from said second long side wall (32) and a third preselected distance from said entry end (35), the sum of said lip height and said second preselected distance defining a fourth preselected distance, the cross-piece (19) having a thickness greater than the difference between said first preselected distance and said second preselected distance, no greater than the difference between said first preselected distance and said fourth preselected distance, and no greater than said second preselected distance, and a width approximately equal to and no greater than said third preselected distance.

2. The jumper of claim 1 wherein the number of

pairs of apertures (37) is one, the number of said latches (38) is one, the number of said terminal members (10) is one, the number of said rail members (301) is two, each of said rail members (301) extending along and inwardly of the intersection of said second long side wall (32) and a respective one of said short side walls (33, 34).

3. The jumper of claim 1 wherein the number of pairs of apertures (37) is at least two, each said pair of apertures (37) having an associated latch (38), an associated terminal member (10), and two associated rail members (301), said housing (30) further comprising a respective partition (70) for separating each said pair of apertures (37) from the next adjacent pair of apertures (37), each said partition (70) being parallel to and spaced from said short side walls (71) each of said rail members (301) extending along and inwardly of the intersection of said second long side wall (73) and a respective one of said partitions (70) and short side walls (71).

4. The jumper of claim 3 wherein said partitions (70) are coextensive with said short side walls (71), such that the terminal member (10) associated with each said pair of apertures (37) is electrically insulated from the terminal members (10) associated with each other of said pairs of apertures.

5. The jumper of claim 3 wherein each said partition (70) extends from said entry end (35) of said housing to a point spaced from said exit end (36) by a distance approximately equal to and no less than the width of the cross-piece (101) which connects the exit ends (17) of said terminals (11, 12) thereby defining an interconnecting gap in each said partition (70) adjacent the exit end (36) of said housing, said tabs (105, 106) at said exit end (17) of said terminal member (10) associated with each said pair of apertures (37) being extended toward, and in electrical contact with, the tabs (105, 106) at the exit ends (17) of the terminal members (10) associated with each adjacent pair of apertures (37), said exit end tabs (105, 106) extending through said interconnecting gaps, whereby the terminal member (10) associated with each said pair of apertures (37) is in electrical contact with the terminal member (10) associated with each other pair of apertures (37) in said housing.

6. The jumper of claim 5 wherein all of said terminal members (10) are formed from one



piece (90) of electrically conductive material, the exit end tabs of each said terminal member (10) being unitary with the exit end tab of the next adjacent terminal member.

7. The jumper of claim 1 wherein said terminal member (10) is formed from one piece of electrically conductive material.
8. The jumper of claim 6 or 7 wherein said electrically conductive material is hard phosphor bronze plated with nickel and overplated with gold.
9. The jumper of any one of claims 1 to 8 wherein said dielectric material is a plastic such as a glass-filled polyester.

Patentansprüche

1. Verbindungsvorrichtung zum elektrischen Verbinden von Anschlußstiften, bestehend aus einem Gehäuse (30) aus einem dielektrischen Material, welches eine räumlich rechteckförmige Gestalt hat, ferner ein Eingangsende (35) mit wenigstens einem Paar von Öffnungen (37) zur Aufnahme der Stifte, ein offenes Ausgangsende (36) gegenüber dem Eingangsende, erste und zweite parallel zueinander verlaufende und senkrecht zu dem Eingangsende und dem Ausgangsende angeordnete längliche Seitenwände (31, 32), erste und zweite parallel zueinander verlaufende und senkrecht zum Eingangsende und zum Ausgangsende und zu den länglichen Seitenwänden verlaufende kurze Seitenwände (33, 34) aufweist, Schienenteile (301), die entlang der langen Seitenwände (32) vom Eingangsende (35) zum Ausgangsende (36) auf einer der Seiten jedes Paares der Öffnungen (37) verlaufen, wobei jedes der Schienenteile (301) eine erste vorgewählte Strecke von der langen Seitenwand (32) vorspringt, ein Anschlußteil (10) vorgesehen ist, welches dem Paar von Öffnungen (37) zugeordnet ist und ein Paar von Anschlüssen (11, 12) aus einem nachgiebigen, elektrisch leitenden Material für eine Ausrichtung mit den Öffnungen umfaßt, wobei jeder der Anschlüsse ein Eingangsende (18) und ein Ausgangsende (17) besitzt und das Eingangsende und das Ausgangsende jedes Anschlusses mit dem Eingangsende und dem Ausgangsende des anderen der Anschlüsse durch ein jeweiliges elektrisch leitendes Kreuzteil (19, 101) jeweils verbunden ist, wobei das Anschlußteil (10) ferner vier Nasen (103-106) aufweist, die von den Ecken desselben seitlich nach außen ragen, wobei die Nasen durch Verlängerungen der

Kreuzteile (19, 101) ausgeformt sind, wobei ferner das Anschlußteil (10) durch die Nasen (103-106) auf den Schienenteilen (301) abgestützt ist und durch die Schienenteile (301) von der langen Seitenwand (32) beabstandet sind, und eine Klinke (38) jedem Paar von Öffnungen (37) zugeordnet ist, dadurch gekennzeichnet, daß die Anschlüsse (11, 12) Zwillingsstrebenanschlüsse (13, 14 und 15, 16) sind, die eine rechteckförmige Öffnung (102) vorsehen, die durch jedes Paar der Zwillingsstreben (13, 14 und 15, 16) und die Kreuzteile (19, 101) gebildet ist, um einen positiven Reibungs- und elektrischen Kontakt zwischen jedem Anschluß (11, 12) und jedem Anschlußstift, der in diesen eingeschoben wird, vorzusehen, wobei die Klinke (38) eine Rampe bzw. Auflaufabschnitt (38) mit einer Klinkenweite besitzt und sich von der ersten langen Seitenwand (31) zum Eingangsende (35) und zur zweiten langen Seitenwand (32) zwischen den zwei Öffnungen des Paares der Öffnungen (37) erstreckt und eine Lippe (300) nahe bei dem Eingangsende (35) und der zweiten langen Seitenwand (32) aufweist, wobei die Lippe (300) der Klinke in das Kreuzteil (19) des Anschlußteiles (10) eingreift, welches die Eingangsenden der Anschlüsse (11, 12) verbindet, und wobei die Klinke (38) in die rechteckförmige Öffnung (102) ragt, wodurch das Anschlußteil (15) in dem Gehäuse (30) zurückgehalten wird und wobei die Lippe (300) eine Lippenhöhe besitzt und einen zweiten vorgewählten Abstand von der zweiten langen Seitenwand (32) und einen dritten vorgewählten Abstand von dem Eingangsende (35) aufweist, ferner die Summe zwischen der Lippenhöhe und dem zweiten vorgewählten Abstand einen vierten vorgewählten Abstand definiert, das Kreuzteil (19) eine Dicke besitzt, die größer ist als die Differenz zwischen dem ersten vorgewählten Abstand und dem zweiten vorgewählten Abstand, ferner nicht größer ist als die Differenz zwischen dem ersten vorgewählten Abstand und dem vierten vorgewählten Abstand und nicht größer ist als der zweite vorgewählte Abstand, und eine Weite oder Breite besitzt, die angenähert gleich ist dem dritten vorgewählten Abstand und nicht größer ist als dieser dritte vorgewählte Abstand.

2. Verbindungsvorrichtung nach Anspruch 1, bei der die Zahl der Öffnungspaare (37) Eins ist, ferner die Zahl der Klinken (38) Eins ist, die Zahl der Anschlußteile (10) Eins ist, die Zahl der Schienenteile (301) Zwei ist, ferner jedes der Schienenteile (301) sich entlang und innerhalb der Schnittstelle der zweiten Seitenwand



(32) und einer betreffenden einen kurzen Seitenwand der kurzen Seitenwände (33, 34) erstreckt.

3. Verbindungsvorrichtung nach Anspruch 1, bei der die Zahl der Öffnungspaare (37) wenigstens Zwei ist, jedes der Öffnungspaare (37) eine zugeordnete Klinke (38), ein zugeordnetes Anschlußteil (10) und zwei zugeordnete Schienenteile (301) aufweist und bei der das Gehäuse (30) eine jeweilige Trennwand (70) zum Trennen jedes Öffnungspaares (37) von dem nächsten benachbarten Öffnungspaar (37) aufweist, wobei jede Trennwand (70) parallel zu den kurzen Seitenwänden (31) und von diesen beabstandet verläuft und wobei die Schienenteile (301) sich entlang und innerhalb der Schnittstelle der zweiten langen Seitenwand (73) und einer entsprechenden einen Trennwand der Trennwände (70) und der kurzen Seitenwände (71) erstreckt.

4. Verbindungsvorrichtung nach Anspruch 3, bei der die Trennwände (70) sich zusammen mit den kurzen Seitenwänden (71) erstrecken, derart, daß das Anschlußteil (10), welches jedem der Öffnungspaare (37) zugeordnet ist, elektrisch von den Anschlußteilen (10) isoliert ist, die jedem anderen der Öffnungspaare zugeordnet sind.

5. Verbindungsvorrichtung nach Anspruch 3, bei der jede Trennwand (70) sich von dem Eingangsende (35) des Gehäuses zu einer Stelle erstreckt, die von dem Ausgangsende (36) um eine Strecke beabstandet ist, die im wesentlichen gleich ist der und nicht kleiner ist als die Weite oder Breite des Kreuzteiles (101), welches die Ausgangsenden (17) der Anschlüsse (11, 12) verbindet, so daß dadurch ein Zwischenverbindungsspalt in jeder Trennwand (70) nahe dem Ausgangsende (36) des Gehäuses definiert ist, wobei sich die Nasen (105, 106) am Ausgangsende (17) des Anschlußteils (10), welches zu jedem der Öffnungspaare (37) zugeordnet ist, sich zu den Nasen (105, 106) an den Ausgangsenden (17) der Anschlußteile (10) erstrecken und mit diesen elektrischen Kontakt haben, die zu jedem benachbarten Öffnungspaar (37) zugeordnet sind, wobei die Ausgangsendnasen (105, 106) sich durch die Zwischenverbindungsspalte erstrecken, so daß das Anschlußteil (10), welches jedem der Öffnungspaare (37) zugeordnet ist, in elektrischem Kontakt mit dem Anschlußteil (10) steht, welches jedem anderen Öffnungspaar (37) in dem Gehäuse zugeordnet ist.

6. Verbindungsvorrichtung nach Anspruch 5, bei der alle Anschlußteile (10) aus einem Stück (19) aus elektrisch leitendem Material gebildet sind und bei der die Ausgangsendnasen jedes Anschlußteiles (10) einheitlich mit der Ausgangsendnase des nächsten benachbarten Anschlußteiles ausgebildet sind.

7. Verbindungsvorrichtung nach Anspruch 1, bei der das Anschlußteil (10) aus einem Stück eines elektrisch leitenden Materials gebildet bzw. geformt ist.

8. Verbindungsvorrichtung nach Anspruch 6 oder 7, bei der das elektrisch leitende Material Hart-Phosphorbronze ist, die mit Nickel plattiert und mit Gold überplattiert ist.

9. Verbindungsvorrichtung nach einem der Ansprüche 1 bis 8, bei der das dielektrische Material Kunststoff ist wie mit Glas versetztes Polyester.

Revendications

1. Un cavalier destiné à relier électriquement des bornes, ledit cavalier comprenant : un boîtier (30) en un matériau diélectrique de forme pleine rectangulaire, avec une extrémité d'entrée (35) munie d'au moins une paire d'ouvertures (37) pour recevoir lesdites broches, une extrémité de sortie (36) ouverte opposée à ladite extrémité d'entrée, une première et une deuxième parois latérales longues (31, 32) parallèles et perpendiculaires auxdites extrémités d'entrée et de sortie, une première et une deuxième parois latérales courtes (33, 34) parallèles et perpendiculaires auxdites extrémités d'entrée et de sortie et auxdites parois latérales longues, et des éléments de rails (301) qui s'étendent le long desdites parois latérales longues (32) à partir de ladite extrémité d'entrée (35) à ladite extrémité de sortie (36) de part et d'autre de chaque paire desdites ouvertures (37), chacun desdits éléments de rails (301) s'étendant sur une première distance prédéterminée à partir de ladite paroi latérale longue (32); un organe terminal (10) associé à ladite paire d'ouvertures (37) composé d'une paire de terminaux (11, 12) réalisés en un matériau élastique et électroconducteur prévus pour être alignés avec lesdites ouvertures, chacun desdits terminaux ayant une extrémité d'entrée (18) et une extrémité de sortie (17), l'extrémité d'entrée et de sortie de chacun desdits terminaux étant reliée à l'extrémité d'entrée et de sortie respectivement de l'autre desdits terminaux par une barre de liaison (19, 101) corres-



pondante, électroconductrice, ledit organe terminal (10) étant muni de quatre oreilles (103-106) qui s'étendent latéralement vers l'extérieur à partir des angles dudit élément, lesdites oreilles étant constituées d'une extension desdites barres de liaison (19, 101); ledit organe terminal (10) étant supporté au moyen desdites oreilles (103-106) sur lesdits éléments de rails (301) et étant espacé au moyen de ceux-ci par rapport à ladite deuxième paroi latérale longue (32), et un verrou (38) associé à chaque paire d'ouvertures (37), caractérisé en ce que les terminaux (11, 12) sont des bornes à double bras ou conducteur-poutre (13, 14 et 15, 16) assurant une ouverture rectangulaire (102) constituée par chaque paire de bras double (13, 14 et 15, 15) et lesdites barres de liaison (19, 101), afin de réaliser un contact solidaire à friction et électrique entre chaque terminal (11, 12) et chaque borne qui est enfilée dans ce terminal, le verrou (38) ayant une partie en forme de coin (39) de même largeur que le verrou et s'étendant à partir de ladite première paroi latérale longue (31) vers ladite extrémité d'entrée (35) et vers ladite deuxième paroi latérale longue (32) entre les deux ouvertures de ladite paire d'ouvertures (37) et étant muni d'une lèvre (300) à proximité de ladite extrémité d'entrée (35) et de ladite deuxième paroi latérale longue (32), ladite lèvre (300) dudit verrou venant en prise avec la barre de liaison (19) dudit organe terminal (10) et qui relie les extrémités d'entrée desdits terminaux (11, 12), ledit verrou (38) s'étendant à l'intérieur de ladite ouverture rectangulaire (102) et réalisant, de ce fait, le maintien dudit organe terminal (15) à l'intérieur dudit boîtier (30), ladite lèvre (300) possédant une hauteur de lèvre et se trouvant à une deuxième distance prédéterminée de ladite deuxième paroi latérale longue (32) et à une troisième distance prédéterminée de ladite extrémité d'entrée (35), la somme de ladite hauteur de lèvre et de ladite deuxième distance prédéterminée définissant une quatrième distance prédéterminée, la barre de liaison (19) ayant une épaisseur qui est supérieure à la différence entre ladite première distance prédéterminée et ladite deuxième distance prédéterminée mais pas supérieure à la différence entre ladite première distance prédéterminée et ladite quatrième distance prédéterminée, et pas supérieure à ladite deuxième distance prédéterminée, et une largeur qui est approximativement égale, et non supérieure à ladite troisième distance prédéterminée.

2. Le cavalier selon la revendication 1, dans le-

quel le nombre de paires d'ouvertures (37) est de un, le nombre desdits verrous (38) est de un, le nombre desdits éléments de bornes (10) est de un, le nombre desdits éléments de rails (301) est de deux, chacun desdits éléments de rails (301) s'étendant le long de, à l'intersection de ladite deuxième paroi latérale longue (32) et intérieurement par rapport à elles et le long de l'une desdites parois latérales courtes (33, 34) qui lui correspond.

3. Le cavalier selon la revendication 1, dans lequel le nombre de paires d'ouvertures (37) est d'au moins deux, chaque paire d'ouvertures (37) ayant un verrou (38) qui lui est associé, ainsi qu'un organe terminal (10) et deux éléments de rails (301), ledit boîtier (30) comprenant, de plus, une cloison (70) respective de séparation de chacune desdites paires d'ouvertures (37) de la paire d'ouvertures (37) voisine adjacente, chacune desdites cloisons (70) étant parallèle à, et espacée par rapport auxdites parois latérales courtes (71), chacun desdits éléments de rails (301) s'étendant intérieurement à l'intersection de ladite deuxième paroi latérale longue (73) et le long de celle-ci et le long d'une desdites cloisons (70) et desdites parois latérales courtes (71) qui lui correspond.

4. Le cavalier selon la revendication 3, dans lequel lesdites cloisons (70) s'étendent sur la même distance que lesdites parois latérales courtes (71) de manière à ce que l'organe terminal (10) associé avec chacune desdites paires d'ouvertures (37) se trouve isolé électriquement de l'organe terminal (10) associé à chacune desdites autres paires d'ouvertures.

5. Le cavalier selon la revendication 3, dans lequel chaque cloison (70) s'étend à partir de ladite extrémité d'entrée (35) dudit boîtier jusqu'à une position espacée de ladite extrémité de sortie (36) d'une distance approximativement égale, et non intérieure à la largeur de la barre de liaison (101) qui relie les extrémités de sortie (17) desdits terminaux (11, 12) en définissant ainsi un intervalle d'interconnexion dans chacune desdites cloisons (70) adjacente à l'extrémité de sortie (36) dudit boîtier, lesdites oreilles (105, 106) disposées à ladite extrémité de sortie (17) desdits organes de terminaux (10) associés à chacune desdites paires d'ouvertures (37) se prolongeant vers les oreilles (105, 106) et étant en contact électrique avec elles aux extrémités de sortie (17) des organes de terminal (10) associés à chaque paire adjacente d'ouvertures (37), lesdites oreilles (105, 106) disposées à l'extrémité de

sortie s'étendant à travers lesdits intervalles d'interconnexion de façon à ce que l'organe terminal (10) associé à chacune desdites paires d'ouvertures (37) soit en contact électrique avec son homologue associé à chacune des autres paires d'ouvertures (37) à l'intérieur du dit boîtier.

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6. Le cavalier selon la revendication 5, dans lequel tous lesdits organes terminaux (10) sont formés d'un seul tenant (90) en un matériau conducteur d'électricité, les oreilles disposées à l'extrémité de sortie de chacun desdits organes terminaux (10) étant d'un seul tenant avec l'oreille disposée à l'extrémité de sortie de l'organe de terminal voisin et adjacent.

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7. Le cavalier selon la revendication 1, dans lequel ledit organe terminal (10) est réalisé en un seul tenant à partir d'un matériau conducteur de l'électricité.

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8. Le cavalier selon la revendication 6 ou 7, dans lequel ledit matériau électroconducteur est du bronze phosphoreux dur plaqué avec du nickel et portant un placage en or extérieur.

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9. Le cavalier selon l'une quelconque des revendications 1 à 8, dans lequel ledit matériau diélectrique est un matériau plastique tel qu'un polyester avec une charge de verre.

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