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(54) Power track system

(57) A power track system comprises power track sections 10 formed in the normal way from a channel member and a cover means for closing the open face of the channel member, with a plurality of electrically conductive strips 31,32,33,34 and 35 located in the channel member, the power track sections being placeable end to end. A coupler means 70 is provided for coupling power track portions placed end to end, the coupler means 70 having a first set of electrically conductive connectors 101,102,103,104,105 and 106 projecting from the coupler means 70 for engaging electrically conductive strips 31,32,33,34,35 and the metal wall 14 of the power track. The coupler means 70 comprises a second set of electrically conductive connectors, connected to corresponding connectors of the first set, for engaging the electrically conductive strips of a second power track. The connectors of the first and second set each comprise a first connector portion 121 and a second connector portion 122 resiliently mounted with respect to the first connector portion 121 and facing the first connector portion 121 for gripping an electrically conductive strip 31,32,33,34,35 or the metal wall 14 of the power track therebetween.

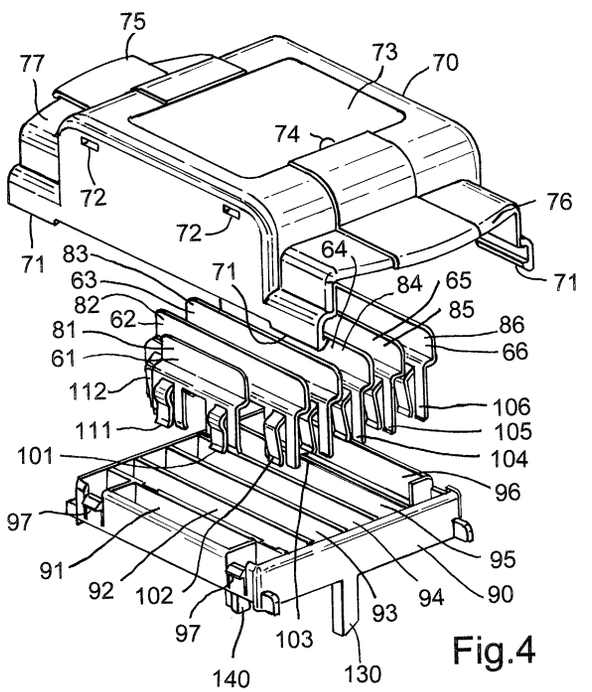

Fig.4

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Description

[0001] The present invention relates to a power track system comprising power track sections and coupler means for connecting them.

[0002] Power tracks are used in a number of environments, for example beneath raised floors of buildings or above false ceilings of buildings. The power tracks are typically used to provide a protected track for electrical power supplies. The electrical power supply may be a normal power supply obtainable from the mains or a clean power supply which is characterised by a small voltage range and a low number of voltage peaks. Clean power supplies are typically required for sensitive computer equipment. Power tracks can also provide a duct for other services such as voice signal transmission and data signal transmission.

[0003] Power tracks typically comprise a longitudinally extending channel member and a cover means. A plurality of electrically conductive strips or busbars are located inside the channel member. In use, the cover prevents users and people maintaining the system from touching conductors which may be electrically live.

[0004] A power track is typically built up out of a plurality of power tracks sections which are placed end to end and connected together.

[0005] Couplers for power tracks are known in which the power track sections placed end to end have electrically conductive strips exposed at their ends. A coupler comprising a bridging piece which has a corresponding number of electrically conductive strips is placed with its electrically conductive strips in contact with respective electrically conductive strips of the power track sections to provide electrical connection between the power tracks.

[0006] Such designs have the disadvantage that in order to obtain good electrical connection between the strips in the track sections and the strips of the bridge part, high manufacturing standards are required and the system can be difficult to use.

[0007] Where an ordinary power supply and a clean power supply are to be provided in the same track, completely separate from one another, as many as six conductors may be required - the normal live, neutral earth and the clean live, neutral and earth.

[0008] In order to reduce the number of electrically conductive strips required in the power track, it has been proposed to use a metal casing of the power track itself to act as a conductor, for example as the earth conductor for the normal power supply. Such a system is described for example in GB-A-2332306.

[0009] There is a further problem if a power supply with six conductors, one of which is the power track cover or member itself, is provided with a bridging piece. There is a problem in maintaining earth continuity between adjacent power track sections of this design. It is of course very important to provide a secure earth connection, otherwise there is a risk of electric shock for users touching apparatus which is not properly earthed.

[0010] A coupler for connecting together power track sections which are installed end to end and for providing good earth continuity between the metal casings of the power track sections is described in EP-A-0910137. In this disclosure, contact between the electrically conductive strips within the power track sections is provided by arranging that the casing of the power track is cut away at the end of the respective power track sections so that the power track sections can be placed in contact with one another with conductors overlapping.

[0011] The coupler device used in EP-A-0910137 is a separate, metallic construction having two hinged parts which form a strong contact with the metallic members of the respective power track sections. However, this arrangement is mechanically complicated and requires a large number of parts. It is difficult to install.

[0012] The coupler disclosed in EP-A-0 910 137 may also be used to connect a power track section to an infeed unit. An infeed unit is a unit in which wires of a cable type power supply are connected to conductor strips or busbars of a power track. The connector may also be used to connect a power track to an interlink unit. An interlink unit comprises two connector portions connected by a flexible cable type portion. This allows the power supply to bridge major obstacles, turn round comers etc. The infeed unit or interlink units each comprise a short section of power track which is connectable to the power track by the coupler. This connection suffers from the disadvantages as described above.

[0013] The present inventors have set out to provide a power track system including a coupler which solves the problems set out above.

[0014] The present inventors have realised that good electrical contact can be obtained by using grip-type connectors.

[0015] Accordingly, the present invention provides a power track system, comprising;

a plurality of power track sections, each power track section comprising:

a channel member, and a plurality of electrically conductive strips located in the channel member,
the power track sections being placeable end to end, and
a coupler means for coupling power track sections placed end to end, the coupler means having a first set of electrically conductive connectors projecting therefrom for connecting to the electrically conductive strips of a first power track section and a second set of electrically conductive connectors projecting from the coupler means for connecting to the electrically conductive strips of a second power track section, each connector of the first set being electrically connected to a corresponding connector

in the second set,

the connectors of the first and second set each comprising a first connector portion and a second connector portion resiliently mounted with respect to the first connector portion and facing the first connector portion for gripping an electrically conductive strip of a power track section therebetween.

[0016] The grip-type connectors used in the present invention provide a relatively secure electrical connection between the electrically conductive strips of power track sections connected by the coupler means.

[0017] Suitably, the channel member comprises a longitudinally extending base, with upwardly extending side walls extending from the base. Suitably, the side walls are integral with the base. The electrically conductive strips located in the channel member are suitably arranged generally parallel to one another and to the walls of the channel member. The distance between adjacent strips in the cross track direction is suitably substantially constant.

[0018] In the following description, the direction parallel to the direction of elongation of the channel member will be referred to as the "track direction". The direction generally parallel to the plane of the base of the channel member and perpendicular to the direction of elongation of the track will be referred to as the "cross track" direction.

[0019] The power track section may be provided in any suitable length, for example in the range of 1.2 metres to up to 3.6 metres.

[0020] The channel may be formed of any suitable material, but is preferably made of metal such as steel or aluminium, particularly preferably stainless steel or galvanised steel.

[0021] The channel member is formed in a suitable way, for example by extrusion, by rolling or by forming of sheet material into appropriate shapes.

[0022] Preferably, the power track sections each comprise cover means for cooperating with a respective channel member.

[0023] The cover means may be formed of any suitable material, for example thermoplastic or metal. Preferably, there are co-operating formations on the walls of the channel member and on the edges of the cover means to allow the cover means to be snap fitted into place on the channel member.

[0024] The cover means may be provided at intervals with access means such as power tap offs, sockets, voice or data communications tap offs, interlinks, or feed units to be engaged with the channel member to allow access to the electrically conductive strips or other services contained in the channel member.

[0025] Suitably, the ends of the power track sections are normal to their length. This allows great flexibility in placing respective power track sections end to end. Mechanical coupling formations may be formed on the ends of the power track sections to allow them to be firmly located with respect to one another and fixed together mechanically.

[0026] The coupler means of the present invention is releasably engageable with both power track sections.

[0027] Preferably, the power track system of the present invention further comprises bracket means for fixing the power track section to a surface. Preferably, bracket means are engaged with the power track section as close to the coupler means as possible, to minimise movement of the power track sections whereby the coupler means might be released accidentally.

[0028] Means may be provided for preventing accidental release of the coupler means from the power track sections when in place.

[0029] Locking means may be provided for locking the coupler means to at least one power track section. Typically, it will be sufficient if the coupler means is locked with respect to at least one of the power track sections. When assembled, power track sections are typically fixed to a surface by bracket means. If a first power track section is fixed to the surface by bracket means and the coupler means is locked with respect to the first power track section, a second power track section may be connected to the coupler means and fixed with respect to the surface by bracket means, and will then be substantially fixed with respect to the coupler means without using separate locking means.

[0030] The locking means may comprise any suitable means. For example, a screw could be used. Alternatively, there may be a projection on one of the coupler means or track section for forming a snap fit engagement with a corresponding recess on the other of the power track section or coupler means. Preferably. the locking means are configured so that they may be released by the use of a special tool, but not accidentally for example by an impact.

[0031] The coupler means preferably comprises a body part in which the connectors are mounted. The body part may be formed of any suitable material, for example thermoplastic material such as ABS or polycarbonate. It is suitably made by moulding.

[0032] Preferably, the coupler means comprises gripping parts for releasably engaging the channel members or cover means so that the coupler means can be fixed in position securely and removed when required. For example, the channel member or cover means may comprise a longitudinally extending shoulder formation on at least one side, the coupler means having at least one resilient depending claw configured to snap fit into place under the shoulder formation when the coupler is in position, In this case, the coupler means will be releasable by flexing the depending claw to remove it from engagement with the shoulder means. The gripping parts are preferably distinct from the locking means referred to above, in that the gripping part are more easy to release than the locking means. For example, a power track system may be supplied comprising a first pow-

er track section with coupler means engaged therewith and locked thereto and a second power track section, the coupler means being engageable with the second power track section and fixable thereto using the gripping parts, the gripping parts being readily releasable if it is necessary to release the second power section during assembly. This allows realignment to be made if necessary during assembly, before the power track sections are fixed to the surface.

[0033] The first set of electrically conductive connectors may be electrically connected to the second set of electrically conductive connectors by any suitable means. For instance, they may be connected by a flexible wire coupling. Preferably, they are rigidly connected together. Preferably, they are integral.

[0034] A structure in which one electrically conductive connector is connected rigidly to a respective second electrically conductive connector is herein referred to as a bridge. A bridge may be formed from a single sheet of conductive material bent into shape. Preferably, there are as many bridges as there are electrically conductive strips in the power track. Preferably, the bridges are arranged substantially parallel to one another extending in the track direction.

[0035] The electrically conductive connectors are formed of any suitable material, particularly a metal, for example copper or brass which has good electrical conductivity and strength.

[0036] The grip type connectors used in the present invention each comprise a first connector portion and a second connector portion resiliently mounted with respect to the first connector portion and facing the first connector portion for gripping an electrically conductive strip of a power track therebetween The first and second portions may be separate from one another. It is possible that only one of the first and second portions is electrically conductive, the other portion serving to urge the conductive strip into close contact with the electrically conductive connector portion. Preferably, however, both of the first and second connector portion are electrically conductive. They are preferably electrically connected to one another. For example, they may be electrically connected to one another by a wire extending from one to the other. Preferably, however, the first and second portions are integral with one another. They may, for example, be cut from a single strip of conductive material and bent into shape. Suitably, the first connector portion extends substantially parallel to the second connector portions. The spacing between the first and second connector portions is suitably slightly less than the width of a conductor strip, so that when the connector is pushed into contact with the electrically conductive strip, the strip is firmly gripped between the connector portions. Preferably, there are three connector portions, two of the connector portions being arranged to lie on one side of an electrically conductive strip in use and the other one being configured to lie on the opposite side of an electrically conductive strip in use . Preferably, when looking normal to the electrically conductive strip, the third connector portion lies between the first and second so that the grip type connector resembles the tines of a fork This type of connector may be formed from a single sheet of conductive material by cutting the shapes of the first, second and third connector portions and bending the third connector portion away from the first and second connector portions.

[0037] Preferably, the coupler means comprises a single, rigid structure with the first set of electrically conductive connectors substantially rigidly fixed with respect to the second set of electrically conductive connectors.

[0038] Preferably, the coupler means comprises a body part in which the connectors are mounted and support means for firmly holding the connectors in position, the support means being fixed within the body part. Suitably, the connectors are supported on one side by the support means and on the other side by the body part. This allows for particularly easy manufacture. The support means serves to ensure that the connectors are maintained correctly aligned with one another. It also holds them in position so that they can engage the appropriate electrically conductive strips of the power track section. The support means is suitably formed of material such as thermoplastic. It may be formed by moulding.

[0039] Preferably, the end part of each power track section comprises an access part, closing the open face of the channel, the access part having a hole above each conductive strip.

[0040] The access part serves to prevent a user accidentally touching the electrically conductive strips but allows access to the electrically conductive strips by the electrically conductive connectors. Accordingly, a particularly safe but simple structure is provided which is easy to use. The access part may be formed in a separate structure. The structure may be formed of any suitable material, but is preferably electrically non-conductive, such as thermoplastic material.

[0041] The access part may further comprise a shutter means for closing at least one of the holes when it is not engaged with an electrically conductive connector. The shutter means may be disengaged with the respective hole for example by the action of engaging the electrically conductive connectors or by the action of a separate shutter means actuator formed on the coupler means.

[0042] Preferably, there is an access part at each end of each power track section. The access parts at the respective ends may be the same or different. For example, a power track section may comprise a first and second access part, only one of the first and second parts having means for engaging with locking means of the coupler means as described above.

[0043] In a preferred embodiment, the coupler means preferably comprises at least one formation of a distinctive design and at least one power track section com-

prises a corresponding formation of distinctive design, whereby the coupler means can only be engaged with the power track portion if the distinctive designs match. This allows different configurations of power track and/or coupler means to be protected from engagement with one another. Suitably, the formation of distinctive design comprises a key and a keyway of corresponding shape. Suitably, the key projects from the coupler and the keyway is located in the power track section.

[0044] The coupler means may be provided with a formation of distinctive design for one or both of the power track section to which it is to be connected. It may be sufficient for the coupler means locked to one power track section by locking means as described above and to have a formation of distinctive design to ensure that the first power track section and coupler means are only engaged with a second power track section having a corresponding formation of distinctive design. It may not be necessary to provide the coupler means and the first power track section with formation of a distinctive design, as they will be locked together and it is relatively unlikely that they will be disconnected by user, thus reducing the risk of assembling the system incorrectly.

[0045] In a preferred embodiment, each power track section comprises a first access part having means for engaging the locking means of the coupler means and a second access part having a formation of distinctive design for engaging a further coupler means having a formation of corresponding distinctive design.

[0046] Power track sections having different ratings can be protected from engagement. Power track sections with different numbers of conductors can be protected from engagement with one another. Tracks and coupler means can have distinctive colour coding to help prevent different types being engaged with one another.

[0047] In a particularly preferred embodiment, the present invention provides a power track arrangement comprising a first power track system according to the invention, having first power track sections and first coupler means, the first power track sections having formations of a first distinctive design and the coupler means having a corresponding formation engageable with the formation of the first distinctive design, and a second power track system according to the present invention, comprising second power track sections and second coupler means, wherein the second power track sections have formations of a second distinctive design and the second coupler means have corresponding formations engageable with the formations of the second distinctive design but not engageable with the formations of the first distinctive design, whereby the first power track system is kept separate from the second power track system.

[0048] Preferably, the first power track system is distinguished from the second power track system in that the channel members thereof comprise a different number of conductors.

[0049] Preferably, the first coupler means is identical in design to the second coupler means except for the formation of distinctive design which is for cooperation with the respective formation of distinctive design of the power track sections.

[0050] In a further embodiment, the formation of distinctive design of the coupler or the formation of distinctive design of the power track or both of them may be formed from members which are releasably engageable with the coupler means or power track sections, so that they can be replaced if the design of the power track or coupler is changed. This is suitably carried out by the manufacturer or before assembly of the power track system, to prevent confusion. It will allow different power track systems to be assembled from a minimum number of common parts.

[0051] Similarly, means may be provided for preventing the coupler means from being engaged with the respective power track sections the wrong way round. Preferably, the power track sections do not have a plane of symmetry extending parallel to the track direction. This may be achieved by positioning the respective conductor strips in a pattern which has no plane of symmetry extending in the track direction.

[0052] In a preferred embodiment, there is an array of electrically conductive connectors projecting from the coupler means for connecting to respective electrically conductive strips, the array of electrically conductive connectors being arranged in a pattern, the power track sections being each covered by access means having a plurality of passages therethrough, through which the electrically conductive connectors of the coupler means may pass, the passages being formed in an array having a pattern corresponding to the pattern of electrically conductive connectors of the coupler means, the pattern having an order of rotational symmetry of one. That is, if the coupler means is rotated through 180°, it will not be able to engage the pattern of passages.

[0053] The pattern of electrically conductive connectors may be provided by any suitable means. In a particularly preferred embodiment, the coupler means comprises a plurality of electrically conductive bridges, at least one of the bridges being shorter than the rest of the bridges.

[0054] In a preferred embodiment, there are a predetermined number of electrically conductive strips in each power track section, and the same number of bridges in the coupler means, one of the bridges being shorter than the rest of the bridges. Preferably, the rest of the bridges are identical to one another. Such a structure is particularly easy to assemble.

[0055] Because the electrically conductive connectors comprise two parts for engaging respective sides of an electrically conductive strip, the electrically conductive connectors are relatively wide. It is essential that the electrically conductive connectors for connecting to a first electrically conductive strip do not contact the electrically conductive connectors for connecting to an

adjacent strip, otherwise, there would be a risk of an electrical short circuit. This may be achieved by arranging that the spacing between respective electrically conductive connectors is sufficiently wide so that they do not contact one another.

[0056] Alternatively, an electrically conductive connector may be spaced from other electrically conductive connectors in the track direction to thereby avoid contact.

[0057] Preferably, the coupler means comprises a plurality of bridges for connecting respective electrically conductive strips of the power track sections, at least one bridge being shorter than the other bridges, the shorter bridge being placed adjacent to a longer bridge so that the electrically conductive connectors of the shorter bridge will not contact the electrically conductive connectors of the longer bridge, as they are longitudinally separated. This allows the whole structure to be narrower in the cross track direction. Preferably, there are only two possible lengths of bridge, to simplify manufacture.

[0058] In a preferred embodiment, the channel member is formed of metal and acts a conductor for a power supply. Preferably, the power track comprises an electrically conductive strip connected to the live terminal of a power supply and an electrically conductive strip connected to the neutral terminal of a power supply, the metal channel member being connected to the earth terminal of the power supply. Preferably, the power track comprises live, neutral and earth conductors as described above for a normal power supply and, separately, live, neutral and earth conductors for a clean power supply.

[0059] Preferably, the coupler means has electrically conductive connectors, electrically connected to one another, the connectors each comprising first and second connector parts resiliently mounted with respect to one another, for gripping therebetween a wall of the channel member. In this way, a secure earth connection can be provided between the two channel members.

[0060] Preferably, a bridge is provided having electrically conductive connectors for gripping therebetween the walls of the channel members of respective power track section. In a particularly preferred embodiment, this bridge part is shorter than bridges used to join electrically conductive strips held within the channel member. The advantages of this arrangement are as described above.

[0061] The coupler means may be provided with indications to indicate to a user what type of coupler means it is, what types of conductive strip may be connected, which way round the coupler means may be connected etc. It may be colour coded to represent an indication of its function. Indications may be applied to the coupler by any suitable means, for example by printing onto the coupler means itself or by providing an adhesive label. A label receiving area may be provided for receiving a label on the coupler means. The label receiving area may be textured to provide good adhesion to the label. The label receiving area may be configured so that it can only receive the label in one configuration, to prevent errors during manufacture leading to a label being attached the wrong way round. This is particularly important where the coupler means has to be engaged in a particular orientation. For example, a locating means may be provided in the label receiving area for engaging a respective formation in a label, the locating means and the formation being only engageable in one configuration.

[0062] The coupler means of the invention may also be used to connect a power track section to power supply means, the power supply means comprising a power track section comprising a channel member and a plurality of electrically conductive strips located in the channel member, the electrically conductive strips comprising at one end connectors for connection to the wires of a power supply cable, the power track section being placeable with its other end adjacent to a second power track section and couplable thereto by coupler means according to the invention.

[0063] The power supply means or infeed unit, which may be thought of as comprising a short power track section in its own right, is used to connect the power track to a cable type power supply.

[0064] The coupler of the present invention may be further employed to connect the power track to a interlink unit. The interlink unit preferably comprises a first power track section comprising a channel member having a plurality of electrically conductive strips located therein, the electrically conductive strips being connected at one end to the wires of an electrically conductive cable, the first power track portion being couplable at the other end to a second power track section by coupler means according to the invention,

a third power track section comprising a channel member having a plurality of electrically conductive strips located therein, the electrically conductive strips being connected at one end to the electric wires of the electrically conductive cable, the third power track section being couplable at its other end to a fourth power track section using coupler means according to the invention. In this way, the second and fourth power track sections can be connected together, via the first power track section, cable and third power track sections.

[0065] By providing a coupler which can be used to couple not only power track sections together but also for coupling power track sections to a power supply means or to an interlink unit, a flexible and adaptable power track system can be provided which has a minimum number of different parts. This provides lower manufacturing costs and increases the ease of installation.

[0066] The power supply means of the present invention and interlink unit of the present invention may each be provided with formations of distinctive design, so that they can only be engaged with coupler means having a formation of corresponding distinctive design, as de-

scribed further above.

[0067] The term 'power track section' as used in the present application covers power supply means and interlink units as well as ordinary power track sections.

[0068] In use, an installer of a power track system will place a power supply means in position. The user then places a power track section end to end with the power supply unit and connects the power track section and the power supply means using the coupler means. Subsequently, further power track sections are placed end to end, in succession from the first power track section and coupled to one another with coupler means.

[0069] Interlink unit as described above may be used to connect a first run of coupled power track sections to a second run of coupled power sections. The interlink unit may be used to negotiate obstacles or turn corners. The coupler means is preferably for engaging the power track sections by being pushed down onto the power track sections so that the electrically conductive connectors engage with and grip a respective electrically conductive strip of a respective power track section, the coupler being pushed into position so that it is firmly held and so that good electrical contact is made by the electrically conductive connectors with their respective electrically conductive strips.

[0070] The coupler means of the invention is easy to use and forms a good electrical contact between the power track sections.

[0071] The present invention will be further described by way of example only with reference to the accompanying drawings, in which;

BRIEF DESCRIPTION OF DRAWINGS

[0072]

Figure 1 is an isometric drawing of a frost power track section according to the present invention.

Figure 2 is an isometric drawing of a second power track section, to be connected to the first power track section of figure 1.

Figure 3 is an isometric cross section through figure 1 on line II-II

Figure 4 is an isometric drawing of a coupler for use in the present invention, in a disassembled state.

Figure 5 is a schematic cross sectional view through a coupler of the present invention engaged with a power track portion.

Figure 6 is schematic side view of the coupler of figure 4, in the assembled state.

Figure 7is a side view of an electrically conductive element as used in the coupler means.

Figure 8 is an end view of the electrically conductive element of Figure 7.

DETAILED DESCRIPTION OF THE DRAWINGS

[0073] Figure 1 shows the end of an embodiment of a first power track section according to the present invention. The power track section extends for a predetermined length from the end A of figure 1. Suitably, the further end of the power track section corresponds in design to that shown in figure 1.

[0074] The power track comprises an elongate channel member 10 formed of rolled and formed steel. The channel member 10 has a generally U-shaped cross section with a flat base 12 and upwardly extending side walls 13 and 14 which are integral with the base 12. Each side wall 13, 14 comprises a shoulder portion 11 and a rebate 15,16 as will be further described in relation to figure 2. A direction parallel to the direction of elongation of the channel member will be referred to as the 'track direction', a direction generally parallel to the plane of the base 12 and perpendicular to the direction of elongation of the track will be referred to as the 'cross track direction'

[0075] Cover means 20 is shown covering a part of the channel member 10. In use, the cover means 20 would entirely cover the channel member so that the open face of the channel member is completely closed. However, the cover means is shown incomplete to reveal the inside of the channel member which comprises five electrically conductive strips 31, 32, 33, 34 and 35. Normally, these are covered by the cover means 20 to prevent a danger of electric shock to users. The five electrically conductive strips 31, 32, 33, 34 and 35 are arranged generally parallel to one another and to walls 13, 14. The distance between adjacent strips in the cross track direction is substantially constant. The distance between wall 14 and end strip 31 and wall 13 and end strip 35 is smaller than the distance between the strips themselves. This will be explained in more detail with reference to figures 3 and 4.

[0076] At the end of the power track portion, an access part is provided, formed of moulded plastic. The access part has five holes 41, 42, 43, 44 and 45 located above the electrically conductive strips 31, 32, 33, 34 and 35 respectively. There is also a gap 46 in the access part directly above wall 14 of the channel member 10. The holes 41, 42, 43, 44 and 45 are located in a line running in a cross track direction. The gap 46 provided directly above wall 14 is offset from this line and is provided between the line and the said end of the power track.

[0077] The access part comprises a shutter actuating slot 47 and coded keyways 48, whose function will be described below. The power track section is provided with a profiled stop end 50 having a pair of recesses 51 and 52.

[0078] The access part is fixed to the power track by

a projection (not shown) which engages in a slot 17 formed in the cover means 20.

[0079] Figure 2 shows a second power track section according to the invention for engagement with a first power track section of figure 1. Identical parts have the same reference numerals. However, the stop end of the second power track section which is to be placed abutting stop end 50 of the power track section of figure 1 has corresponding formations 53 and 54 which fit exactly in the recesses 51 and 52 so that the assembler knows the power track sections have been assembled correctly. Further, the power track section 52 does not have coded keyways 48 as shown in figure 1. A slot 18 is provided to receive a locking means from a coupler which is used to connect the second power track section to the first power track section. The locking means and coupler will be described in detail with reference to figures 4 and 5.

[0080] As shown in figure 3, the cover means comprises a top 21, two sides 22 and 23, each side having a shoulder portion for resting against the shoulder portion 11 and gripping means 24 and 25. In use, the cover means has sufficient resilient deformability that the gripping means 24 and 25 can be pushed over the shoulders 11 and pushed down until they snap into place beneath the rebates 15 and 16 respectively. The shoulder parts 11 are formed slightly inclined to make assembly easier.

[0081] The channel member further comprises the five electrically conductive strips or busbars 31, 32, 33, 34 and 35. These are arranged to provide a normal live conductor (L_N) a normal neutral (N_N) a clean live conductor (L_C), a clean neutral conductor (N_C) and a clean earth conductor (E_C) respectively. The steel channel member 10 provides the normal earth conductor and is shown schematically connected to electrical earth.

[0082] The electrically conductive strips are held in place by a busbar clip 60 which is formed of insulating material such as plastic. A plurality of busbar clips are provided at intervals along the channel member 10.

[0083] In use, the first power track section of figure 1 and the second power track section (of figure 2) will be placed with their stop ends 50 contacting. An electrical contact between respective live, neutral and earth conductors can then be formed using the coupler means shown in figure 4.

[0084] Figure 4 shows the coupler in disassembled form. It comprises a moulded plastic cover 70, brass electrically conductive elements 61, 62, 63, 64, 65 and 66 and a moulded thermoplastic support member 90.

[0085] The coupler cover 70 is provided with first and second ends 76 and 77 located at opposite ends of the cover 70, each being configured to receive a power track of the type described with reference to figures 1 and 2. A direction in the coupler parallel to the direction of elongation of the channel member when it is joined to the coupler will still be referred to as the 'track direction'. A direction in the coupler generally parallel to the plane of the base 12 of the channel member when it is joined to the coupler and perpendicular to the direction of elongation of the track will still be referred to as the 'cross track direction'

[0086] The coupler cover 70 is of a suitable shape to prevent access to electrically conductive parts and to provide an aesthetic finish. It is provided at each end with gripping parts 71 which, when the coupler is assembled are configured to engage underneath the rebates 15 16 of the channel member as shown in figure 4, to fix the coupler means into position.

[0087] The coupler cover 70 is also provided with a locking means 75 provided at the second end 77. The locking means is configured to lock into the slot 18 on the power track cover 20 (figure 2). In this specific example, the locking means is a lip 75 which is configured to locate in the slot 18. However, the locking means may take many forms, for example, the locking means may comprise at least one projection which is configured to locate in at least one corresponding recess or hole provided on the power track cover 20.

[0088] The cover 70 further comprises recesses 72 into which resilient tongues 97 of the support member 90 fit whereby the support member 90 is firmly held in the cover 70. This allows the coupler means to be assembled from a small number of parts very easily.

[0089] To ensure clarity of identification of various configurations, a secure recessed labelling area 73 is provided on the cover 70. The secure recessed labelling area 73 may be provided with at least one locating means or guide means about its circumference such that the correct orientation of a label can be determined. In this example, a projection 74 is provided on the circumference of labelling area 73 and extending into said labelling area. A suitable label for this labelling area will be provided with recess which is configured to receive said projection.

[0090] Each of the electrically conductive elements 61, 62, 63, 64, 65 and 66 comprises an electrically conductive elongate bridge 81, 82,83, 84, 85 and 86. There is a first set of the electrically conductive connectors 101, 102, 103, 104,105 and 106, each depending from a corresponding end of each of bridges 81, 82, 83, 84, 85 and 86. There is a second set of electrically conductive connectors, of which only two, 111 and 112 are visible, each depending from the opposite end of the respective bridge 81, 82, 83, 84, 85 and 86.

[0091] Each electrically conductive connector 101, 102, 103, 104, 105 and 106 is firmly held in the support member 90 by a moulded compartment 91, 92, 93, 94, 95 or 96 respectively conductive. The individual compartments support and grip the connectors and insulate them from one another to prevent an electrical short circuit. The support member helps to ensure alignment of the respective electrically conductive connectors parallel to the orientation of the electrically conductive strips at the ends of the power track sections.

[0092] The elongate bridges 81, 82, 83, 84, 85 and 86 are arranged with their elongate directions parallel to

one another and the track direction.

[0093] Bridges 82, 83, 84, 85 and 86 are of equal length in the track direction and bridge 81 is shorter than the other bridges 82 to 86 in the this direction. Thus, as the pattern of bridges 81 to 86 is not symmetric about a central axis parallel to the track direction, the cover 70 can only be fitted onto the conductive elements 61, 62, 63, 64, 65 and 66 in one orientation.

[0094] Bridges 82, 83, 84, 85 and 86 are arranged with equal distances therebetween in a cross track direction. Bridges 81 and 82 are arranged with a smaller separation than the other bridges in a cross track direction.

[0095] The shape of the connectors 101 to 106, 11 and 112 and bridges 81 to 86 will be described in detail later with reference to figures 5 and 6. However, it should be noted at this stage that the connectors are wider than the bridges in the cross track direction. The bridges 81 to 86 are arranged with enough spacing between to ensure that the connectors of adjacent bridges do not contact one another, especially when the coupler is in use.

[0096] The connectors 102 to 106 of bridges 82 to 86 are aligned in a cross track direction. Bridge 81 is shorter than the other bridges 82, 83, 84, 85 and 86 in the track direction. Thus, its connectors 101 and 111 are not aligned with the corresponding connectors 102, 112 of adjacent bridge 82 and the separation between bridges 81 and 82 can be made smaller than the separation between bridges 82 and 83 and the other adjacent bridges which have aligned connectors.

[0097] Figure 5 shows the completed coupler means fixed in position on a power track.

[0098] Each electrically conductive connector comprises a first connector part 121 and second connector part 122, resiliently mounted with respect to the first conductor part 121, for gripping therebetween an electrically conductive strip, for example 31 as shown in figure 5.

[0099] This arrangement allows a good electrical contact to be formed between the respective electrically conductive connector and electrically conductive strip.

[0100] Connectors 102, 103, 104, 105 and 106 contact electrical strips 31, 32, 33, 34 and 35 respectively, and connector 101 contacts channel wall 14. Connector 101 is located at a different longitudinal position in the track direction to that of the connector 102 connected to adjacent conductive strip 31.

[0101] Thus, the distance between conductive strip 31 and channel wall 14 can be made smaller than the distance between conductive strips 31, 32, 33, 34 and 35 where the connectors are aligned and the conductive strips must be sufficiently separated to prevent the connectors contacting more than one strip 31, 32, 33, 34 and 35.

[0102] The above described arrangement allows the channel member 10 to be made narrower. This also in turn allows the cover 20 to be made narrower as the gap for receiving the connector 101 for the earth (casing) is gap 46 which is longitudinally spaced from holes 41, 42, 43, 44 and 45.

[0103] Figure 5 shows the gripping parts 71 of the cover 70 engaged beneath the rebates 15, 16 of the channel member to fix coupler means in position. The busbar clip 60 is omitted, for clarity.

[0104] The electrically conductive connectors 102,103,104,105,106 are shown engaging electrically conductive strips 31, 32, 33, 34, 35 respectively. The sixth electrically conductive connector 101 is shown gripping the wall 14 of the channel member. The electrically conductive connectors are securely mounted in the moulded plastic supported member 90, with the first and second gripping parts projecting through holes formed in support member 90.

[0105] At the other end of the coupler means, the electrically conductive connectors of the second set will be engaging the electrically conductive strips of a second power track section (not shown) placed end to end with the first power track section, whereby the electrically conductive elements 61, 62, 63, 64, 65 and 66 provide a secure electrical connection between the conductors of one power track and the corresponding conductors of a second power track placed end to end with it.

[0106] The mounting member 90 comprises a pair of shutter actuators of which only one, 130 is visible.

[0107] The support 90 further comprises two keys of which one, 140, is visible. The keys 140 are configured so that they fit exactly into the coded key ways 48 of the access part of the power track section of figure 2 if the correct types of power track section have been placed together. For example, if different types of power track section had been placed end to end, the coded key way for one would be different from the coded key way for the other and the coupler means, which has just one shape of key 140, will fail to engage with one of them.

[0108] Figure 6 shows a side view of the completed coupler. The locking means 75 can be seen projecting from the left hand side.

[0109] The connectors 111 and 101 of the conductive element 61 can be seen. The connector 102 of conductive element 62 can be seen. Connector parts 121,122 and 125 of connector 102 can also been seen. They will be described further below in relation to the figure 7.

[0110] The depending coded peg 140 can be seen. The shutter pin 130 can also be seen. In practice, a power track section will be supplied which at one end is configured as shown in figure 2, and the other end is configured as shown in figure 1. The power track section is supplied with coupler 70 already engaged with the first end. In particular, the locking means 75 is engaged in slot 18 to make it difficult for the coupler means to be removed from the end of the power track as shown in figure 2. During assembly the power track section is placed end to end with a further power track section as shown in figure 2 and the coupler 70 is engaged with the access part of the further power track section.

[0111] Shutter actuators 130 engage in the shutter actuator holes 47 to displace a movable shutter (not

shown) which covers the holes 41, 42, 43, 44, 45 when the cover coupler means is absent.

[0112] If the correct types of power track section have been placed end to end, the key 140 will successfully engage in key way 48 allowing further engagement of the coupler means with the access part. As the coupler means is pushed into its final position, the gripping parts 71 click into place underneath the rebates 15 and 16 and the respective electrically conductive connectors engage their respective electrically conductive strips or the channel wall 14 of the respective power track section, allowing full electrical connection between all six electrical conductors.

[0113] Figure 6 shows a side view of an electrically conductive element 62 as used in the coupler means of the invention. Elements 62, 64, 65 and 66 correspond in size and shape. Element 61 corresponds in shape, but is shorter. The element 61 is provided for joining the respective channel member sections which are made of an electrically conductive material, whereby the live earth for the normal power supply is provided.

[0114] Element 62 comprises a bridge section 82 connected by a shoulder portion 123 to a grip portion 124. The upper portion 82 and the shoulder portion 123 serve to provide a structure which is gripped and held firmly by the support member 90.

[0115] The grip portion 124 comprises a first connector portion 121, a second connector portion 122 and a third connector portion 125. It can be seen that the first and third connector portions 121 and 125 are coplanar and aligned. The second connector portion 122 is bent away from the first and third connector portions 121 and 125 so that it faces the first and third connector portions defining a space for gripping therebetween an electrically conductive strip of a power track. The connector 102 is made of a metal such as brass. Due to the inherent resilience of the material, the second connector portion can be flexed with the first and third connector portions 121 so that the electrically conductive strip held therebetween can be placed under gripping pressure to further improve the contact. The second connector portion 122 includes a short angled section 126 which provides a smooth entry for the electrically conductive strip to the space between the connector portions. This further assists the ease with which the coupler means is used to engage the electrically conductive strips.

[0116] The present invention has been described above by way of example only and modification can be made within the spirit of the invention, which extends to equivalents of the features described. The invention also consist in any individual features described or implicit herein or shown or implicit in the drawings or any combination of any such features or any generalisation of any such features or combination.

Claims

1. A power track system, comprising:

a plurality of power track sections, each power track section comprising:

a channel member
a plurality of electrically conductive strips located in the channel member, the power track sections being placeable end to end, and
a coupler means for coupling power track sections placed end to end, the coupler means having a first set of electrically conductive connectors projecting therefrom for engaging with the electrically conductive strips of a first power track and a second set of electrically conductive connectors projecting from the coupler means for engaging the electrically conductive strips of the second power track, each connector of the first set being electrically connected to a corresponding connector in the second set,

the connectors of the first and second set each comprising a first connector portion and a second connector portion resiliently mounted with respect to the first connector portion and facing the first connector portion, for gripping an electrically conductive strip of a power track therebetween.

2. The power track system according to claim 1, wherein the coupler means comprises gripping parts for releasably engaging the channel members or cover means, so that the coupler means can be fixed in position.

3. The power track system according to claim 2 wherein the channel comprises a longitudinally extending shoulder formation on at least one side, the coupler means having at least one resilient depending claw configured to snap fit into place under the shoulder formation when the coupler is in position.

4. A power track system according to any preceding claim, wherein the coupler means comprises at least one formation of a distinctive design and at least one power track section comprises a corresponding formation of distinctive design whereby the coupler means can only be engaged with the power track section if the distinctive designs match.

5. A power track system according to any preceding claim, wherein the channel member is formed of metal and acts as a conductor for a power supply.

6. A power track system according to claim 5, wherein the power track comprises an electrically conductive strip connected to the live terminal of the power supply and an electrically conductive strip connected to the neutral terminal of a power supply, the metal channel member being connected to the earth terminal of the power supply.

7. A power track system according to claim 6, wherein the power track comprises live, neutral and earth conductors according to claim 6 for a normal power supply and, separately, live, neutral and earth conductors for a clean power supply.

8. A power track system according to claims 5,6 or 7, wherein the coupler means has electrically conductive connectors, electrically connected to one another, the connectors each comprises first and second connector parts resiliently mounted with respect of one another for a gripping therebetween a wall of the channel member.

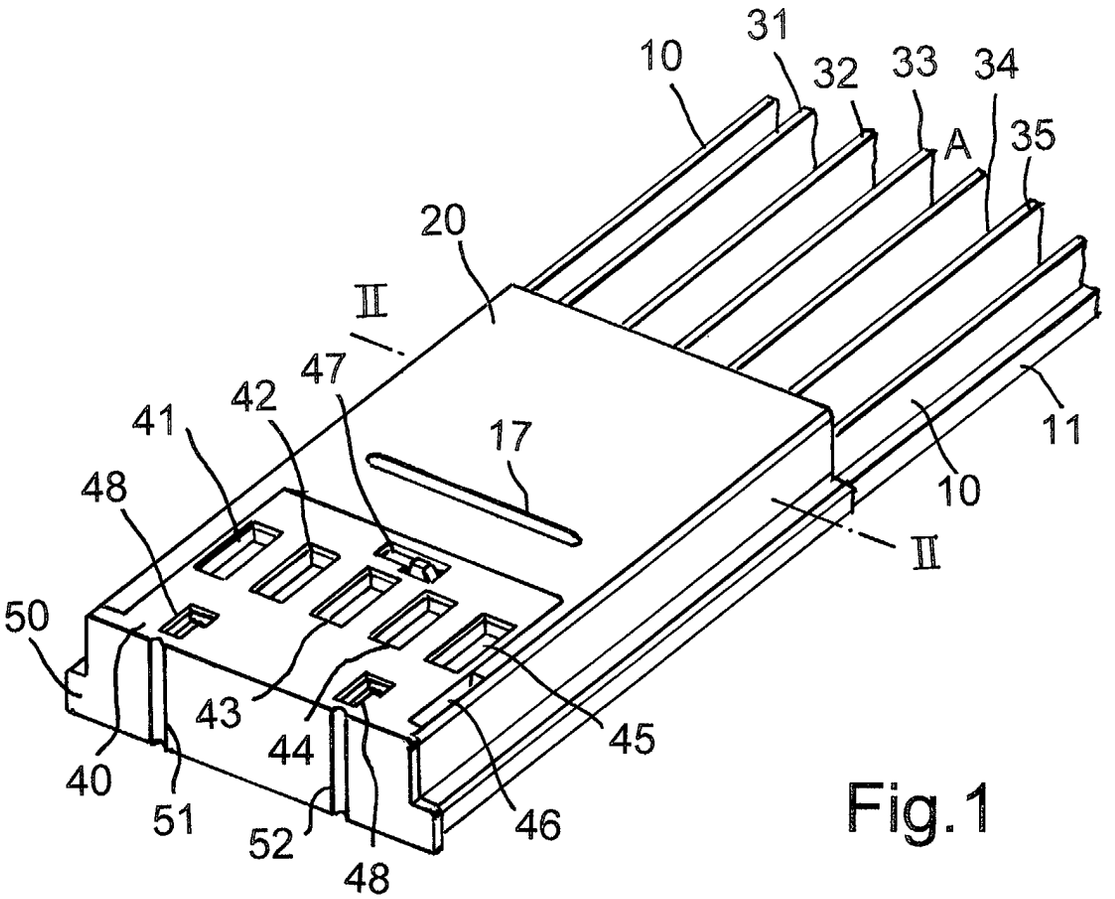
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Fig.1

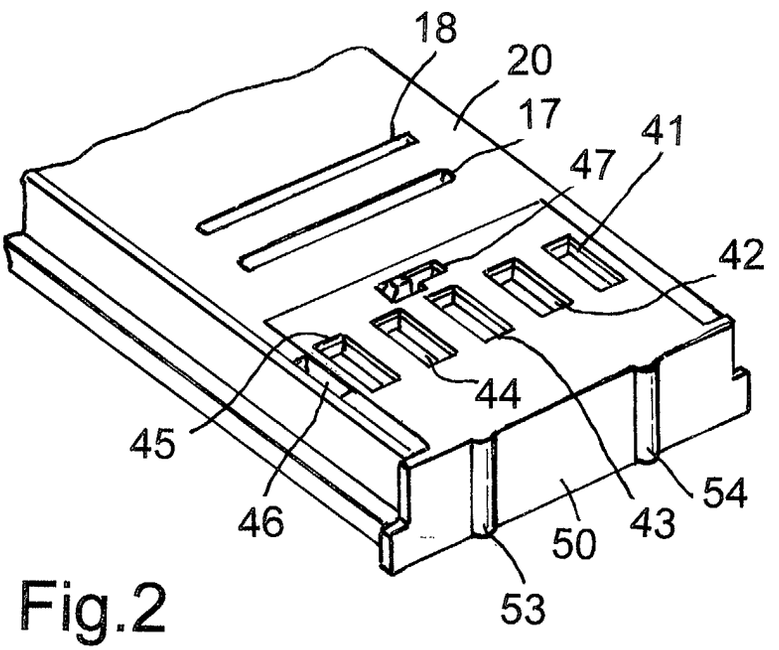
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Fig.2

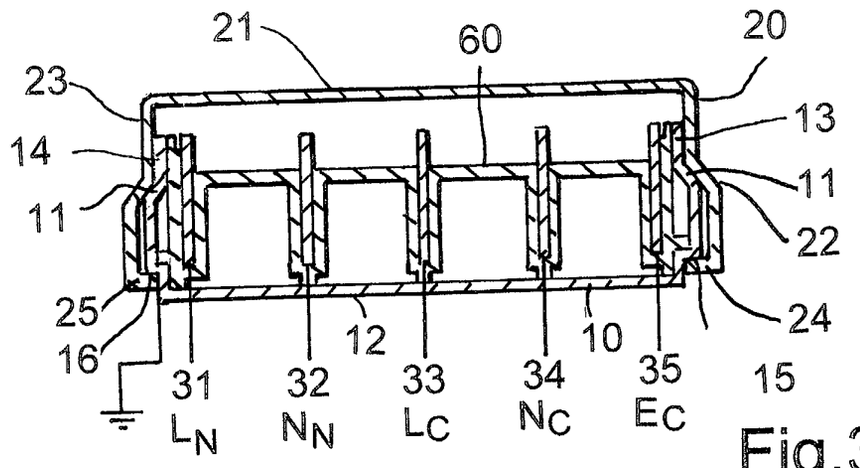
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Fig.3

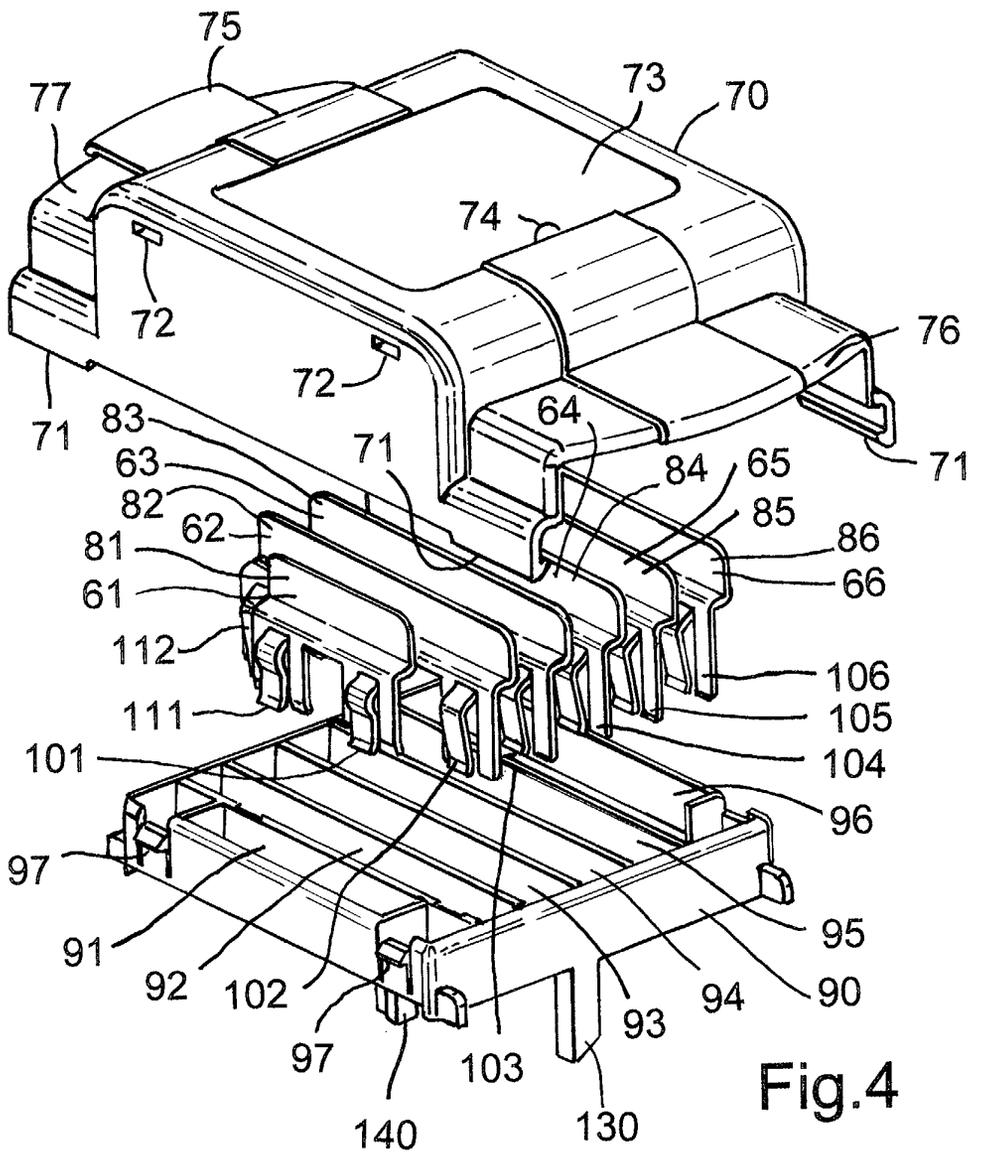
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Fig.4

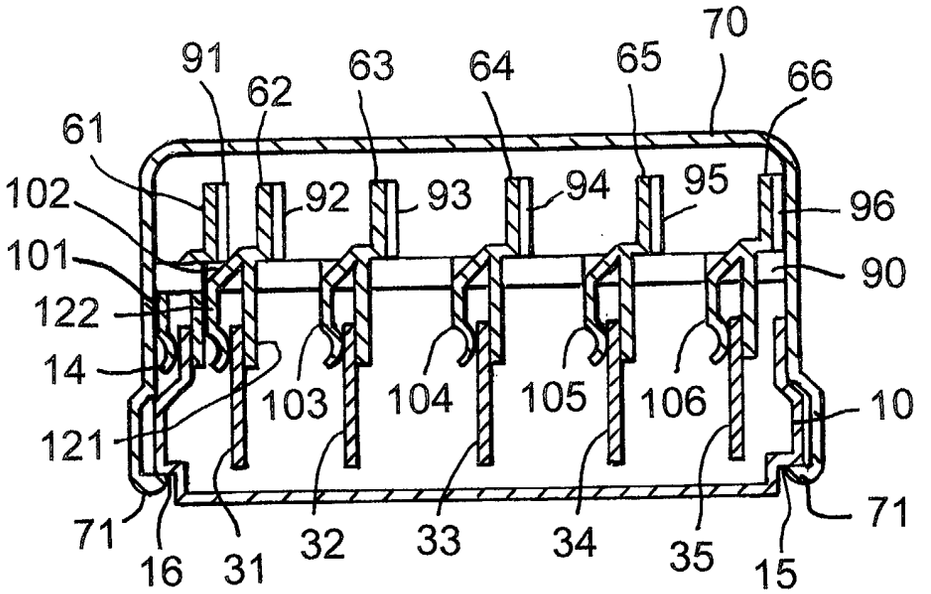
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Fig.5

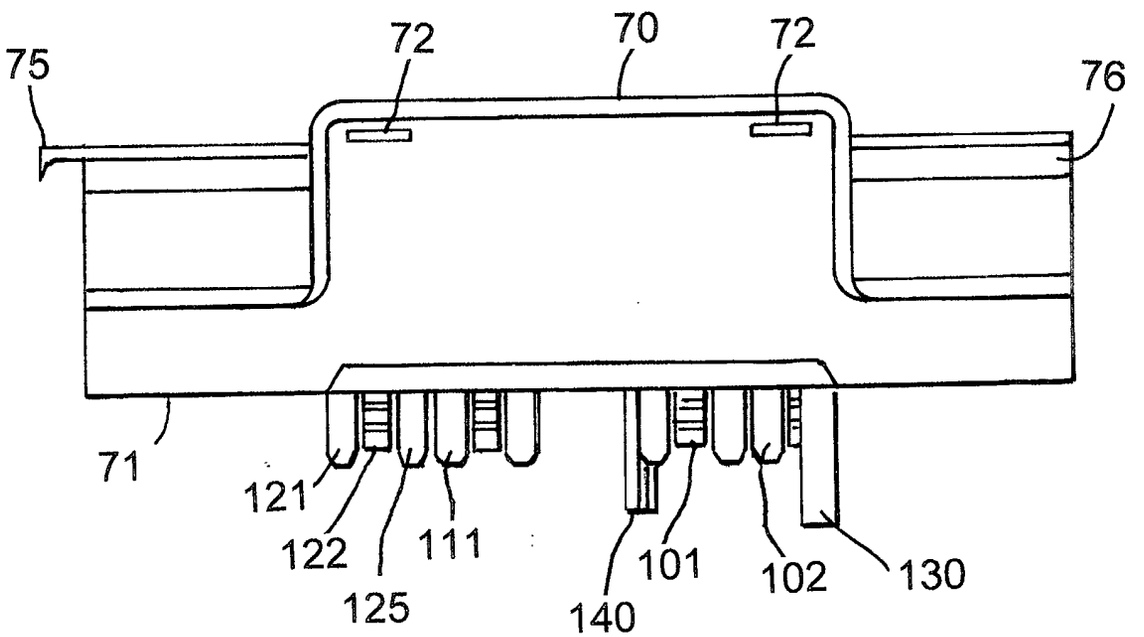
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Fig.6

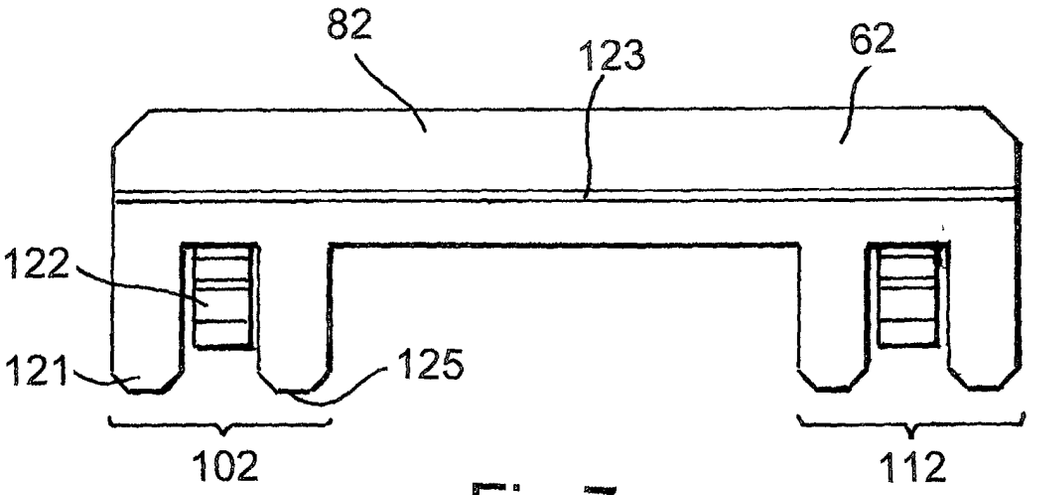

Fig.7

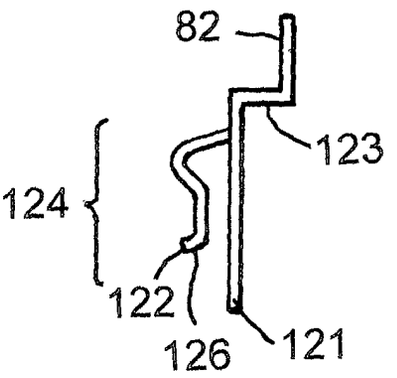

Fig.8

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 30 2823

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 5 655 922 A (DUX DIETMAR ET AL) 12 August 1997 (1997-08-12) * abstract; figures 3,4 * * column 3, line 43 - column 5, line 42 *	1	H01R25/16
A	DE 41 41 799 A (VAHLE PAUL KG) 1 July 1993 (1993-07-01) * abstract; figure 1 * * column 1, line 3 - column 2, line 26 *	1,6,8	
A	EP 0 299 811 A (TELEMECANIQUE ELECTRIQUE) 18 January 1989 (1989-01-18) * abstract; figures 1-3 * * column 4, line 27 - column 6, line 55 *	1,5	
A,D	GB 2 332 306 A (ACKERMANN LTD) 16 June 1999 (1999-06-16) * abstract; figures 1,2 * * page 3, line 33 - page 5, line 31 *	1,2	
A,D	EP 0 910 137 A (ACKERMANN LTD) 21 April 1999 (1999-04-21) * abstract; figures 1,2,7 * * column 2, line 55 - column 4, line 31 *	1	TECHNICAL FIELDS SEARCHED (Int.Cl.7) H01R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	17 September 2001	Serrano Funcia, J

CATEGORY OF CITED DOCUMENTS

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17-09-2001

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5655922 A	12-08-1997	DE 4438801 C1	04-01-1996
		AT 173565 T	15-12-1998
		DE 59504255 D1	24-12-1998
		EP 0709920 A1	01-05-1996
		ES 2124945 T3	16-02-1999
		JP 8264242 A	11-10-1996
DE 4141799 A	01-07-1993	DE 4141799 A1	01-07-1993
EP 0299811 A	18-01-1989	FR 2618026 A1	13-01-1989
		DE 3865562 A1	21-11-1991
		EP 0299811 A1	18-01-1989
		ES 2027396 T3	01-06-1992
GB 2332306 A	16-06-1999	NONE	
EP 0910137 A	21-04-1999	GB 2330459 A	21-04-1999
		EP 0910137 A1	21-04-1999

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82