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(54) **METHOD OF MAKING A CONNECTOR AND CONNECTOR ITSELF**

VERFAHREN ZUR HERSTELLUNG EINER KONTAKTANORDNUNG UND KONTAKTANORDNUNG
SELBST

PROCEDE DE FABRICATION D'UN CONNECTEUR ET CONNECTEUR LUI-MEME

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Description

[0001] The present invention relates to electrical connectors and more particularly to contacts insertable into a connector housing.

[0002] Several varieties of electrical connectors are known in which the contact sections of a plurality of contacts of the connector are arrayed in rows and columns along the mating face, and optionally along another interconnection face such as a board-mounting face. In one such connector as disclosed in U.S. Patent No. 5,065,236, several contacts include socket contact sections aligned in a column of the mating face and include right-angle rear portions along the connector's board-mounting face for connection to an array of through-holes of a circuit board to which the connector is to be mounted. The contacts are initially stamped and formed in lead frame form and then insulative material is molded to body sections of the contacts while the contacts are joined to a carrier strip, after which the joints of the contacts to the carrier strip are severed to separate the contacts. The unit thus formed is easily assembled along an assembly face of a housing opposite the mating face, along with a plurality of other such units to define the connector.

[0003] In US-A-5,085,601 is disclosed a connector having a plurality of first contact sections arrayed along the mating face in two rows, where each of the first contact sections is a cantilever beam arm that cooperates with the arm of another contact to define a socket, the contacts each defining a discrete circuit electrically connectable with a discrete contact of a mating connector and extending to a board-connecting section remote from the mating face.

[0004] In US-A-5,104,341 is disclosed a connector wherein a plurality of contacts are affixed within an insulative housing by the housing being molded over the body sections of the contacts, with the housing becoming an insert for placement with other like housings into a larger housing. Initially the contacts are joined to a common strip for handling prior to molding, with the strip being severed after molding to electrically isolate the contacts.

[0005] It is desired to provide a compact multi-contact connector with simplified assembly.

[0006] It is further desired to provide a method of forming multi-contact units for insertion into a housing such that the contacts of the units are multifunctional.

[0007] It is also desired to provide a compact high-density connector.

[0008] The present invention provides a contact assembly in an electrical connector in which a plurality of isolated conductive members are fabricated into a discrete contact assembly unit insertable into a connector housing.

[0009] In the present invention, by an insert molding process, insulative material is molded about and embeds body sections of the pair of now-severed contact

halves to join the halves into a physical unit for convenience of manipulation as a unit during connector assembly as well as during service and repair, while exposing the contact sections and arms thereof for electrical connection. Preferably the contact halves are stamped from a sheet metal blank and remain joined to the carrier strip remote from the body sections during molding with a body section joining the contact section and arm of each half, and the body sections of each half being isolated from each other within the insulative material. The insulative material also maintains the desired spacing between the contact arms at their bases for assured electrical isolation therebetween when unmated while enabling assured mating with a pin contact of a mating connector, since retention sections of the contacts may be defined by housing-engaging barbs along the bases for force-fit into housing passageways.

[0010] One embodiment of a contact assembly unit defines a switch that provides an electrical indication whether or not a mated condition exists. The mating indicator is an assembly of two (or more, in certain embodiments) electrically isolated conductive members that may be disposed in a single contact position or in a multi-contact column position of a multi-contact connector, with a first contact section being a socket having two cantilever beam arms, each of the arms being on a separate one of the conductive members. One member containing one of the two arms or beams of the socket contact, may also contain commoned therewith a second socket contact and its associated board-engaging contact section and a body section therebetween. Body sections of the conductive members join the arms to respective second contact sections that, when connected to separate circuit paths of a second electrical article such as a circuit board, provide an electrical signal when the arms of the socket are commoned by being engaged by a complementary contact of the mating connector during mating. The conductive members are physically held by insulative material molded about the body sections, for the mating indicator to be manipulated as a unit during assembly.

[0011] In another embodiment, a connector initially having a selected number of socket contacts in rows and columns along the mating face, can have its contact density doubled without enlarging the size of the connector or noticeably increasing connector mating forces. Each socket contact is bisected longitudinally such that each conductive member includes a rearward second contact section such as a board-mount post, with a body section joining the post to one beam of the original socket contact section. Upon mating with a laminated pin of a mating connector having isolated circuits on opposed sides of the pin, two independent isolated circuits are completed when each pin circuit engages a respective socket contact beam. One contact position can for example be a mating indicator by a conventional pin commoning the two beams of the socket contact assembly, or the beams of the socket contact assembly can be

formed to be spring biased to an initially commoned engagement so that mating with a laminated pin separates the previously engaged beams and thus breaks the circuit.

[0012] Embodiments of the invention will now be described by way of example with reference to the accompanying drawings, in which

FIGURE 1 is an isometric view of the connector containing the present invention;

FIGURES 2 and 3 are isometric views of a ground contact, and also the conductive members of a mating indicator contact assembly of the connector of FIG. 1 the contact of figure 1 being not part of the present invention;

FIGURE 4 is an isometric view of the mating indicator contact of FIG. 3 after molding of insulative material thereto;

FIGURES 5 and 6 are isometric views similar to FIG. 3, of additional embodiments of the present invention;

FIGURES 7 and 8 illustrate another embodiment of contact assembly of the present invention, in which each socket contact section is bisected so that the beams are defined on separate conductive members to form two isolated circuits when mated with a complementary pin having two separate and isolated conductive portions; and

FIGURES 9 to 12 illustrate the fabrication of the contact assembly of FIGS. 7 and 8 from stamped blank to fabricated unit.

[0013] Connector 10 in FIG. 1 includes an insulative housing 12 and an array of signal contacts 14 and ground (or power) contacts 16 (FIG. 2) extending from mating face 18 to board-mounting face 20, and is shown mounted onto a circuit board 22. Signal contacts 14 and ground contacts 16 include socket contact sections 24 exposed along mating face 18 to become mated with respective pin contact sections of contacts of a mating connector (not shown), and further include posts 26 extending from board-mounting face 20 to become electrically connected with circuits of a circuit board. Also shown is a conductive shell 28 surrounding housing 12 between mating face 18 and board-mounting face 20. Such a connector is disclosed in U.S. Patent No. 4,808,125.

[0014] In FIG. 2 is shown a ground contact 16, with body sections 30 extending between each socket contact section 24 and a respective pair of posts 26, and is stamped from a blank. Providing a pair of posts for each socket contact section allows removal of one thereof, if only one is needed to transmit the particular current levels transmitted over the circuit defined by the contact, in order to correspond to the particular positioning of the rows of the corresponding through holes of the circuit board circuit. Since socket contact sections 24 may be commoned for grounding, body section 30 is integrally

joined at isthmus 32 for ground contact 16 to be handled as a unit facilitating insertion. The ground contact is insertable into a slot of connector housing 12, with contact retention barbs 34 on edges of each body section 30 to achieve an interference fit with side walls of passage-way portions of the housing adjacent the mating face and in communication with the vertical slot rearwardly therefrom. Each body section 30 also is seen to include an embossment 36 in engagement with one of the walls of the slot to optionally urge the contact against the opposed wall, thus stabilizing the position of the contact laterally. The embossment may also be utilized as a push surface to install the contact into the housing, remaining exterior to the housing cavity. Rearward body portions 38 adjacent pairs of posts 26 will extend rearwardly from the connector housing, and are spaced from each other.

[0015] In FIG. 3 and 4 is shown the mating indicator 40 of the present invention. Firstly, the mating indicator is stamped from a blank as with ground contact 16, but is also stamped such that two separate pieces are defined. A first piece 42 includes first socket contact section 44 and one set of posts 46 joined by rearward body portion 48 to a body section 50. First piece 42 further includes one cantilever beam 52 that defines half of a second socket contact section 54, with beam 52 being joined to body section 50 by isthmus 56. Second piece 60 includes a second cantilever beam 62 that defines the other half of second socket contact section 54, and second piece 60 further includes a body section 64 joining second cantilever beam 62 to rearward body portion 66 and a second set of posts 68. A gap 70 of selected narrow dimension is defined between bases 72 of cantilever beams 52,62 of the two pieces and between body sections 50,64 to communicate with large recess 74 between rearward body portions 48,66, with the narrow dimension being sufficient to assure electrical isolation of pieces 42,60. Preferably a small aperture 76 is stamped through isthmus 56. An embossment 78 is formed on body section 50, as in ground contact 16 of FIG. 2, to stabilize the mating indicator in the housing slot upon assembly, or to be utilized as a push surface to install the contact into the housing, remaining exterior to the housing cavity. Section 80 of body section 64 rearwardly of isthmus 56 is embedded within the insulative material 90 (FIG. 4), providing for an enhanced physical gripping of the plastic material on the conductive member, and also stabilizing first cantilever beam 52 against lateral stresses during handling and also during in-service use of the connector. Also, side edges of bases 72 are seen to be provided with retention barbs 82, as in ground contacts 16 of FIG. 2.

[0016] FIG. 4 illustrates indicator 40 after molding of insulative material 90 about body sections 50,64 of pieces 42,60 thus defining a physical unit for handling and assembly of the mating indicator into the housing. Insulative material 90 includes side portions 92,94 defining major surfaces parallel to the axes of the contacts of the

connector, with the two side portions integrally joined at several locations including gap 70 and large recess 74 between the rearward body portions of the two pieces that extend rearwardly from the rear face of the connector housing. Insulative material is disposed within aperture 76 to form a column of material extending between and joining side portions 92,94 adjacent forward edges 96 of insulative material 80. A narrow flange 98 is also defined between base portions of cantilever beams 52,62 of second contact section 54, for supporting retention barbs 34 of beams 52,62 against wall portions of the forward housing passageway portion within which socket contact section 54 is disposed.

[0017] The metal utilized to define the conductive members may be for example phosphor bronze plated at the socket contact sections preferably with gold to enhance longevity of the contact during repeated mating cycles during in-service use of the connector, and plated at the board-mounting contact sections preferably with tin/lead to facilitate soldering. Various plastic materials may be used in the molding process, preferably that are temperature-stable, nonhygroscopic such as liquid crystal polymer.

[0018] Upon mating of connector 10 and a mating connector (not shown), a pin contact becomes electrically engaged with second socket contact section 54 electrically commoning first and second cantilever beams 52,62 thereof and thus completing the circuit between members 42,60 which is detected by the circuitry of the circuit board to indicate the mated condition.

[0019] It may be discerned that a mating indicator may be devised that comprises only a single socket contact portion, with the respective cantilever beam arms joining respective body sections extending to respective ones of the pair of board-engaging posts, such that the posts are connectable to respective circuits paths of the circuit board. Such separate conductive members may easily be insert molded to provide insulative material surrounding the body sections and filling the gap or spacing therebetween.

[0020] FIGS. 5 and 6 illustrate additional embodiments of the present invention. In FIG. 5, a mating indicator 400 is shown that is similar to the indicator of FIGS. 3 and 4 after molding insulative material about the separate conductive members stamped from a common blank. However, in FIG. 5 the separate conductive members 402,404 each include one of the beams 406,408 of the lower socket contact section 410. Upper conductive member 402 defines the entirety of the upper socket contact section 412 and the second contact section 414 associated therewith. Lower conductive member 404 includes the second contact section 416 associated with the lower socket contact section 410. Insulative material 430 is molded over body sections 418,420 similarly to what is shown in FIG. 4, and manipulation as a unit would also be similarly enabled during connector assembly as well as during service and repair. Insulative material 430 preferably is molded to extend beyond at

least portions of the upper edge 422 of upper conductive member 402 and the lower edge 424 of lower conductive member 404 thereby surrounding and embedding body sections 418,420, as well as fill gap 426 between the conductive members to maintain the members a fixed selected distance from each other for assured electrical isolation.

[0021] In FIG. 6 mating indicator embodiment 500 shows three discrete conductive members 502,504,506 formed from a single metal blank with insulative material 550 molded thereto. Central conductive member 504 includes body sections 508,510 joined by an isthmus 512, with body section 508 mechanically and electrically integral with lower beam 514 of upper socket contact 516, upper beam 518 of lower socket contact section 520, forward post 522 of second contact section 524 associated with upper socket contact section 516, and rearward post 526 of second contact section 528 associated with lower socket contact section 520. Upper conductive member 502 comprises upper beam 530 of upper socket contact section 516 and rearward post 532 of second contact section 524, joined by body section 534. And lower conductive member 506 comprises lower beam 536 of lower contact section 520 and forward post 538 of second contact section 528, joined by body section 540. Insulative material 550 preferably is molded to extend beyond at least portions of the upper edge 542 of upper conductive member 502 and the lower edge 544 of lower conductive member 506 thereby surrounding and embedding all body sections 534,508,510,540, as well as fill gaps 546,548 between the three conductive members to maintain the members a fixed selected distance from each other for assured electrical isolation. Pin contacts received into upper and lower socket contact sections 516,520 common the upper and lower conductive members 502,506 to central conductive member 504, thus closing the respective circuits on the circuit board to which posts 532,538 and commoned posts 522,526 are electrically connected.

[0022] A high density connector may be derived from the matable contact assembly embodiment 600 of FIGS. 7 to 12, useful in many industries such as the computer industry wherein space requirements are more and more critical. In FIGS. 7 and 8 is shown contact assembly 604 being mated with complementary pin contact assemblies 602. Contact assembly 604 includes upper and lower sockets 606,608 each comprising upper and lower cantilever beam arms 610,612; 614,616; each socket is matable with a respective composite pin 618,620 each comprising upper and lower conductors 622,624;626,628 associated with the respective arms of the sockets.

[0023] Each pin, for example, includes its pair of conductors as discrete stamped and formed members about which insulative material 630,632 is molded such as by using temperature stable, nonhygroscopic liquid crystal polymer having limited shrinkage after molding, and which is sufficiently adherable to the conductors, for

contact surfaces 634 to be exposed along the pin in the front, and post sections 636,638 along the rear face for electrical connection. The conductors of the pins are stamped of a stock of sufficient thickness to allow for the insert molding to be accomplished without violating the outside envelope of a pin of standard thickness, thus allowing for the doubling of the number of signal contacts without increasing the required mating forces. The pin contact assemblies may be mounted into a common insulative housing (not shown) or may be mounted onto a circuit element such as a circuit board (not shown) by soldering the posts in through-holes.

[0024] Each beam 610,612;614,616 is defined at a first end of a respective conductive member 640,642;644,646 isolated from the other conductive members. A second contact section 648,650,652,654 is defined at a second end of a conductive member, and the beams and second contact sections are integrally joined by a respective body section 656,658,660,662. As a result, isolated electrical circuits are created extending from mating face 664 to an other face such as board-mounting face 666 of the assembly. Insulative material 670 is molded around the body sections of the conductive members to define an integral assembly manipulatable as a unit during handling facilitating connector assembly and also repair and servicing. Retention barbs 668 are defined along outer edges of bases of all sockets 606,608, for establishing an interference fit within passageway portions of the housing (see FIG. 1) into which contact assembly 604 is inserted.

[0025] Upon mating, pins 618,620 are received into respective ones of sockets 606,608, with conductors 622,624;626,628 electrically engaged with respective ones of beams 610,612;614,616 to complete respective circuits within the mated assembly, as illustrated in FIG. 8.

[0026] FIGS. 9 to 12 illustrate the fabrication procedure for manufacture of contact assembly 604 such as by using progressive dies and a mold apparatus. A blank of the assembly is stamped in FIG. 9 to define sockets 606,608 having beams 610,612;614,616, and to have posts 648,650,652,654 for board-mountable second contact sections, and preferably the blank is kept on carrier strip 682 for convenience in manufacture for further stamping and forming and for plating.

[0027] In FIG. 10, further stamping has defined a lead frame wherein the body sections 640,642,644,646 are given general form and defining precisely dimensioned gaps 674, but remain joined temporarily at bights 686 at bases of the beams and the posts.

[0028] In FIG. 11, insulative material 670 such as temperature-stable, nonhygroscopic liquid crystal polymer, has been molded about body sections 640,642,644,646 in a manner exposing bights 686 and filling gaps 674 especially forming flanges 672 of insulative material at the bases of the beams 610,612,614,616 inwardly of retention barbs 668, all defining a "chicklet". Carrier strips 682 are now removed.

[0029] In FIG. 12, bights 686 are removed, fully separating the conductive members into discrete separate circuits, defining contact assembly 604.

Claims

1. A method of fabricating a contact assembly (40,400,500,604) for insertion into a housing (12) of an electrical connector (10) having a mating face (18) and an other face (20) for electrical connection of contacts (14,16) thereof to other electrical articles, comprising the steps of:

defining at least two conductive members (42,60;402,404;502,504,506;640,642;644,646) extending from respective beams (52,62;406,408;514,518;530,536; 610,612;614,616) at first ends thereof to contact sections (46,68;414,416;524,528;648,650;652,654) at second ends thereof joined by body sections (50,64;418,420;508,510;534,540;656,658;660,662) to said first ends, with said conductive members separated from each other a selected distance therealong; molding insulative material (90,430,550,670) about said body sections at least substantially embedding said body sections while exposing said contact sections and said beams including bases (62) of said beams, and also separating said beams a selected distance, with said conductive members electrically isolated from each other within said insulative material,

whereby an integral assembly is defined manipulatable as a unit to include pairs of beams defining socket contact sections (54,410,516,520,606,608) exposed for mating with complementary pin contacts such that free ends of said beams are deflectable apart with bases of said beams resistant to compressive forces urging them toward each other.

2. The method of claim 1 wherein the step of defining the conductive members (656,658;660,662) includes defining (686) at least initially joining selective portions of adjacent ones of the conductive members outside of said insulative material.

3. The method of claim 2 further including the step following the molding step of removing the bights (686) and completely isolating the conductive members (656,658;660,662) from each other.

4. The method of claim 1 wherein said body section (50) of at least one of said conductive members (42) includes a through aperture (76) within which a portion of said insulative material is disposed extending

between opposed sides of said one of said conductive members and integrally joins other portions of said insulative material disposed along said opposed sides thereof proximate a base (72) of said cantilever beams.

5. The method of claim 1 wherein the molding step includes defining flanges (98,672) of insulative material in gaps (70,426,546,548,674) between bases (72) of the beams of each said socket contact section.
6. The method of claim 5 wherein the defining step includes defining retention barbs (34,668) along outer edges of the bases (72) of the beams of each said socket contact section.
7. The method of fabricating an electrical connector comprising the step of inserting the integral assembly (40,400,500,604) of claim 5 into a slot of an insulative housing (12) such that said beams are exposed along said mating face (18) to define said socket contact sections, and said contact sections (46,68;414,416;524,528;648,650;652,654) are exposed along said other face (20).
8. An electrical connector (10) of the type being electrically connectable to a mating connector along a mating face (18) and to another electrical article along an other face (20), the connector (10) having a plurality of contacts disposed in an insulative housing (12) having respective first contact sections arranged in at least two rows of contact-receiving positions along said mating face (18), and at least one of said first contact sections comprises a socket contact section (54,410,516,520,606,608) exposed along said mating face to be electrically engaged by a complementary contact section of said mating connector during mating, said socket contact section including two cantilever beam arms (52,62;406,408;514,518;530,536;610,612; 614,616), **characterized in that:**

said two cantilever beam arms are defined by two electrically isolated conductive members (42,60;402,404;502,504,506;640,642; 644,646), a first one (42,402,502,506,640,644) of said conductive members having a body section (50,418,534,540,656,660) integrally joining one (52,406,530,536,610,614) of said cantilever beam arms and a second contact section (46,416,532,538,648,652) exposed along said other face (20) of said housing (12) to become electrically connected to a complementary conductor of said another electrical article, with a second one (60,404,504,642,646) of said conductive members having a body section (64,420,510,658,662) integrally joining the oth-

er (62,408,514,516,616) of said cantilever beam arms and an other second contact section (68,414,522,526,650,654); said body sections (50,418,534,540,656,660; 64,420,510,658,662) being embedded in insulative material (90,430,550,670) molded thereover, forming a contact assembly manipulatable as a unit to be inserted into a connector housing; and said body sections (50,64;418,420;508,510; 534,540;656,658;660,662) of said first and second conductive members are disposed in a common plane and are separated by a gap (70,426,546,548,674) of minimum selected width within which is disposed insulative material (90,430,550,670) molded to said first and second conductive members prior to assembly of said connector defining a contact assembly (40,400,500,604) assemblable to said connector (10) as a unit.

9. The electrical connector (10) of claim 8 wherein said one and said other of said cantilever beam arms of said socket contact section (54,410,516,520,606,608) including retention members (34,668) therealong in interference fit with said housing (12) upon full insertion of said contact assembly unit (40,400,500,604) thereinto, and said insulating material (90,430,550,670) defines a flange (98,672) extending forwardly between bases (72) of said one and said other of said cantilever beam arms for supporting said retention members (34,668) to obtain said interference fit.
10. The electrical connector (10) of claim 8 wherein one (42,402) of said first and second conductive members defines an additional contact section (44,412) joined by said body section (50,418) thereof to said contact section (46,414) thereof.
11. The electrical connector (10) of claim 10 wherein said additional contact section (44,412) is a socket contact section.
12. The electrical connector (10) of claim 8 wherein one (504) of said first and second conductive members (502,504) defines a first beam (518) of a second socket contact section (520) joined by said body section (508,510) thereof to one contact section (522,526) associated therewith, and a third conductive member (506) defines a second beam (536) of said second socket contact section (520) joined by a respective body section (540) thereof to an other contact section (538) also associated with second socket contact section (520).
13. An electrical connector (10) of the type being electrically connectable to a mating connector along a

mating face (18) and to another electrical article along an other face (20), the connector (10) having a plurality of contacts disposed in an insulative housing (12) having respective first contact sections arranged in at least two rows of contact-receiving positions along said mating face (18), and at least one of said first contact sections comprises a socket contact section (54,410,516,520,606,608) exposed along said mating face to be electrically engaged by complementary contact section of said mating connector during mating, said socket contact section including two cantilever beam arms (52,62;406,408;514,518;530,536;610,612;614,616), **characterized in that:**

said two cantilever beam arms are defined by two electrically isolated conductive members (42,60;402,404;502,504,506;640,642;644,646), a first one (42,402,502,506,640,644) of said conductive members having a body section (50,418,534,540,656,660) integrally joining one (52,406,530,536,610,614) of said cantilever beam arms and a second contact section (46,416,532,538,648,652) exposed along said other face (20) of said housing (12) to become electrically connected to a complementary conductor of said another electrical article, with a second one (60,404,504,642,646) of said conductive members having a body section (64,420,510,658,662) integrally joining the other (62,408,514,516,616) of said cantilever beam arms and an other second contact section (68,414,522,526,650,654); said body sections (50,418,534,540,656,660; 64,420,510,658,662) being embedded in insulative material (90,430,550,670) molded thereover, forming a contact assembly manipulatable as a unit to be inserted into a connector housing; and one (42,402) of said first and second conductive members defines an additional contact section (44,412) joined by said body section (50,418) thereof to said contact section (46,414) thereof.

14. The electrical connector (10) of claim 13 wherein said body sections of said first and second conductive members are disposed in a common plane and are separated by a gap (70,426,546,548,674) of minimum selected width within which is disposed insulative material (90,430,550,670) molded to said first and second conductive members prior to assembly of said connector (10), defining a contact assembly (40,400,500,604) assemblable to said connector as a unit.

15. The electrical connector (10) of claim 13 wherein said body section (50) of said first conductive mem-

ber (42) includes an elongate stabilizer (80) extending rearwardly from a base (72) of said one of said cantilever beam arms (52), and portions of said insulative material (90,430,550,670) molded about said elongate stabilizer and is engageable with adjacent surfaces of said slot for preventing movement of said base (72) of said one (52) of said cantilever beam arms after connector assembly.

16. A mating indicator (40,400,500,604) for an electrical connector, the connector (10) being of the type being electrically connectable to a mating connector along a mating face (18) and to another electrical article along an other face (20), the connector having a plurality of contacts (14,16) disposed in an insulative housing (12) having respective first contact sections arranged in at least two rows along said mating face (18), said mating indicator comprising:

at least one of said first contact sections thereof comprising a socket contact section (54,410,516,520,606,608) exposed along said mating face (18) to be electrically engaged by complementary contact section of said mating connector during mating, said at least one socket contact section including at least two cantilever beam arms (52,62;406,408;530,536;610,612;614,616);

said two cantilever beam arms being defined by two isolated conductive members (42,60;402,404;502,504,506;640,642;644,646), a first one (42,402,502,506,640,644) of said conductive members having a body section (50,418,534,540,656,660) integrally joining one (52,406,530,536,610,614) of said arms to a second contact section (46,416,532,538,648,652,654) exposed along said other face (20) of said housing (12) to be electrically engaged by said another electrical article, with a second one (60,404,504,642,646) of said conductive members having a body section (64,420,510,658,662) integrally joining the other (62,408,514,516,616) of said arms and an other second contact section (68,414,522,526,650,654);

said body sections (50,418,534,540,656,660; 64,420,510,658,662) being embedded in insulative material (90,430,550,670) molded thereover, forming a contact assembly manipulatable as a unit to be inserted into a connector housing; and

one (42,402) of said first and second conductive members defines an additional socket contact section (44,412) joined by said body section (50,418) thereof to said contact section (46,414) thereof,

whereby when said second contact sections are joined to separate portions of a sensing circuit of said other electrical article and a complementary contact section of the mating connector becomes electrically engaged with said two cantilever beam arms during connector mating, said mating indicator commons said separate portions of said sensing circuit and indicates connector mating.

Patentansprüche

1. Verfahren zur Herstellung einer Kontaktanordnung (40, 400, 500, 604) zur Einführung in ein Gehäuse (12) eines elektrischen Verbinders (10) mit einer Paßfläche (18) und einer anderen Fläche (20) zur elektrischen Verbindung von Kontakten (14, 16) davon mit anderen elektrischen Gegenständen, mit den folgenden Schritten:

Definieren mindestens zweier leitender Glieder (42, 60; 402, 404; 502, 504; 640, 642; 644, 646) die sich an ersten Enden von jeweiligen Armen (52, 62; 406, 408; 514, 518; 530, 536; 610, 612; 614, 616) von diesen erstrecken und so Abschnitte (46, 68; 414, 416; 524, 528; 648, 650; 652, 654) an zweiten Enden davon kontaktieren, die durch Körperabschnitte (50, 64; 418, 420; 508, 510; 534, 540; 656, 658; 660, 662) mit den ersten Enden verbunden sind, wobei die leitenden Glieder über eine gewählte Strecke daran entlang voneinander getrennt sind;

Formen von Isoliermaterial (90, 430, 550, 670) um die Körperabschnitte herum, das die Körperabschnitte zumindest im wesentlichen einbettet und dabei die Kontaktabschnitte und die die Arme enthaltenden Träger (62) der Arme freiläßt und des weiteren die Arme um einen gewählten Abstand trennt, wobei die leitenden Glieder in dem Isoliermaterial voneinander elektrisch isoliert sind,

wodurch eine als Einheit handhabbare integrale Anordnung so definiert wird, daß sie Buchsenkontaktabschnitte (54, 410, 516, 520, 606, 608) definierende Arme enthält, die zum Zusammenfügen mit Stiftkontakten freiliegen, so daß freie Enden der Arme mit Trägern der Arme auseinandergebogen werden können, die sie aufeinander zu schiebenden Druckkräften Widerstand entgegensetzen.

2. Verfahren nach Anspruch 1, bei dem der Schritt des Definierens der leitenden Glieder (656, 658; 660, 662) Definieren (686) zumindest anfangs miteinander verbundener ausgewählter Teile benachbarter der leitenden Glieder außerhalb des Isoliermaterials umfaßt.

3. Verfahren nach Anspruch 2, das weiterhin den dem Formschrift folgenden Schritt des Entferns der Einbuchtungen (686) und vollständigen Isolierens der leitenden Glieder (656, 658; 660, 662) voneinander umfaßt.

4. Verfahren nach Anspruch 1, bei dem der Körperabschnitt (50) mindestens eines der leitenden Glieder (42) eine Durchgangsöffnung (76) enthält, in der ein Teil des Isoliermaterials so angeordnet ist, daß er sich zwischen einander gegenüberliegenden Seiten des einen der leitenden Glieder erstreckt und andere Teile des entlang den einander gegenüberliegenden Seiten davon angeordneten Isoliermaterials nahe einem Träger (72) der freitragenden Arme integral miteinander verbindet.

5. Verfahren nach Anspruch 1, bei dem der Formschrift das Definieren von Flanschen (98, 672) aus Isoliermaterial in Lücken (70, 426, 546, 548, 674) zwischen Trägern (72) der Arme jedes Buchsenkontaktabschnitts umfaßt.

6. Verfahren nach Anspruch 5, bei dem der Schritt des Definierens das Definieren von Halterungswiderhaken (34, 668) entlang äußeren Rändern der Träger (72) der Arme jedes Buchsenkontaktabschnitts umfaßt.

7. Verfahren zur Herstellung eines elektrischen Verbinders mit dem Schritt des Einführens der integralen Anordnung (40, 400, 500, 604) nach Anspruch 5 in einen Schlitz eines Isoliergehäuses (12), so daß die Träger entlang der Paßfläche (18) freiliegen, um die Buchsenkontaktabschnitte zu definieren und die Kontaktabschnitte (46, 68; 414, 416; 524, 528; 648, 650; 652, 654) entlang der anderen Fläche (20) freiliegen.

8. Elektrischer Verbinder (10) jener Art, die entlang einer Paßfläche (18) mit einem Gegenverbinder und entlang einer anderen Fläche (20) mit einem anderen elektrischen Gegenstand elektrisch verbindbar ist, wobei der Verbinder (10) mehrere Kontakte aufweist, die in einem Isoliergehäuse (12) angeordnet sind, das jeweilige erste Kontaktabschnitte aufweist, die in mindestens zwei Reihen von Kontaktaufnahmepositionen entlang der Paßfläche (18) angeordnet sind, und wobei mindestens einer der ersten Kontaktabschnitte einen Buchsenkontaktabschnitt (54, 410, 516, 520, 606, 608) umfaßt, der entlang der Paßfläche freiliegt, damit er beim Zusammenfügen von einem komplementären Kontaktabschnitt des Gegenverbinders elektrisch in Eingriff genommen werden kann, wobei der Buchsenkontaktabschnitt zwei freitragende Arme (52, 62; 406, 408; 514, 518; 530, 536; 610, 612; 614, 616) enthält, **dadurch gekennzeichnet, daß**

die beiden freitragenden Arme durch zwei elektrisch isolierte leitende Glieder (42, 60; 402, 404; 502, 504, 506; 640, 642; 644, 646) definiert werden, wobei ein erstes (42, 402, 502, 506, 640, 644) der leitenden Glieder einen Körperabschnitt (50, 418, 534, 540, 656, 660) aufweist, der einen (52, 406, 530, 536, 610, 614) der freitragenden Arme und einen zweiten Kontaktabschnitt (46, 416, 532, 538, 648, 652), der entlang der anderen Fläche (20) des Gehäuses (12) freiliegt, um mit einem komplementären Leiter des anderen elektrischen Gegenstands elektrisch verbunden zu werden, integral miteinander verbindet, wobei ein zweites (60, 404, 504, 642, 646) der leitenden Glieder einen Körperabschnitt (64, 420, 510, 658, 662) aufweist, der den anderen (62, 408, 514, 516, 616) der freitragenden Arme und einen anderen zweiten Kontaktabschnitt (68, 414, 522, 526, 650, 654) integral miteinander verbindet;

wobei die Körperabschnitte (50, 418, 534, 540, 656, 660; 64, 420, 510, 658, 662) in einem darübergeformten Isoliermaterial (90, 430, 550, 670) eingebettet sind, wodurch eine als eine in ein Verbindergehäuse einzuführende Einheit handhabbare Kontakthanordnung gebildet wird; und

die Körperabschnitte (50, 64; 418, 420; 508, 510; 534, 540; 656, 658; 660, 662) der ersten und der zweiten leitenden Glieder in einer gemeinsamen Ebene angeordnet sind und durch einen Spalt (70, 426, 546, 548, 674) mit minimaler gewählter Breite getrennt werden, in dem Isoliermaterial (90, 430, 550, 670) angeordnet ist, das vor Montage des eine an den Verbinder (10) als eine Einheit montierbare Kontakthanordnung (40, 400, 500, 604) definierenden Verbinders an das erste und zweite leitende Glied angeformt wird.

9. Elektrischer Verbinder (10) nach Anspruch 8, bei dem der eine und der andere der freitragenden Arme des Buchsenkontaktabschnitts (54, 410, 516, 520, 606, 608) daran entlang Halteglieder (34, 668) aufweisen, die bei vollständiger Einführung der Buchsenkontakthanordnungseinheit (40, 400, 500, 604) darin in Preßpassung mit dem Gehäuse (12) stehen, und das Isoliermaterial (90, 430, 550, 670) einen Flansch (98, 672) definiert, der sich zwischen den Trägern (72) des einen und des anderen der freitragenden Arme zur Abstützung der Halteglieder (34, 668) nach vorne erstreckt, um die Preßpassung zu bilden.

10. Elektrischer Verbinder (10) nach Anspruch 8, bei dem eines (42, 402) der ersten und zweiten leitenden

den Glieder einen zusätzlichen Kontaktabschnitt (44, 412) definiert, der durch seinen Körperabschnitt (50, 418) mit seinem Kontaktabschnitt (46, 414) verbunden ist.

11. Elektrischer Verbinder (10) nach Anspruch 10, bei dem der zusätzliche Kontaktabschnitt (44, 412) ein Buchsenkontaktabschnitt ist.

12. Elektrischer Verbinder (10) nach Anspruch 8, bei dem eines (504) der ersten und zweiten leitenden Glieder (502, 504) einen ersten Arm (518) eines zweiten Buchsenkontaktabschnitts (520) definiert, der durch seinen Körperabschnitt (508, 510) mit einem ihm zugeordneten Kontaktabschnitt (522, 526) verbunden ist, und ein drittes leitendes Glied (506) einen zweiten Arm (536) des zweiten Kontaktabschnitts (520) definiert, der durch einen jeweiligen Körperabschnitt (540) davon mit einem anderen Kontaktabschnitt (538) verbunden ist, der auch dem zweiten Buchsenkontaktabschnitt (520) zugeordnet ist.

13. Elektrischer Verbinder (10) jener Art, die entlang einer Paßfläche (18) mit einem Gegenverbinder und entlang einer anderen Fläche (20) mit einem anderen elektrischen Gegenstand elektrisch verbunden werden kann, wobei der Verbinder (10) mehrere Kontakte aufweist, die in einem Isoliergehäuse (12) mit jeweiligen ersten Kontaktabschnitten angeordnet sind, die in mindestens zwei Reihen von Kontaktaufnahmepositionen entlang der Paßfläche (18) angeordnet sind, und wobei mindestens einer der ersten Kontaktabschnitte einen Buchsenkontaktabschnitt (54, 410, 516, 520, 606, 608) umfaßt, der entlang der Paßfläche freiliegt, damit er beim Zusammenfügen durch einen komplementären Kontaktabschnitt des Gegenverbinders elektrisch in Eingriff genommen werden kann, wobei der Buchsenkontaktabschnitt zwei freitragende Arme (52, 62; 406, 408; 514, 518; 530, 536; 610, 612; 614, 616) enthält, **dadurch gekennzeichnet, daß**

die beiden freitragenden Arme durch zwei elektrisch isolierte leitende Glieder (42, 60; 402; 404; 502, 504; 640, 642; 644, 646) definiert werden, wobei ein erstes (42, 402, 502, 506, 640, 644) der leitenden Glieder einen Körperabschnitt (50, 418, 534, 540, 656, 660) aufweist, der einen (52, 406, 530, 536, 610, 614) der freitragenden Arme und einen zweiten Kontaktabschnitt (46, 416, 532, 538, 648, 652), der entlang der anderen Fläche (20) des Gehäuses (12) freiliegt, um mit einem komplementären Leiter des anderen elektrischen Gegenstands elektrisch verbunden zu werden, integral miteinander verbindet, wobei ein zweites (60, 404, 504, 642, 646) der leitenden Glieder einen Körperabschnitt (64, 420, 510, 658, 662) aufweist, der den anderen (62, 408, 514, 516, 616) der freitragenden Arme und einen anderen zweiten Kontaktabschnitt (68, 414, 522, 526, 650, 654) integral miteinander verbindet;

perabschnitt (64, 420, 510, 658, 662) aufweist, der den anderen (62, 408, 514, 516, 616) der freitragenden Arme und einen anderen zweiten Kontaktabschnitt (68, 414, 522, 526, 650, 654) integral miteinander verbindet;

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wobei die Körperabschnitte (50, 418, 534, 540, 656, 660; 64, 420, 510, 658, 662) in einem dar-
übergeformten Isoliermaterial (90, 430, 550, 670) eingebettet sind, wodurch eine als eine in
ein Verbindergehäuse einzuführende Einheit
handhabbare Kontaktanordnung gebildet wird;
und

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eines (42, 402) der ersten und zweiten leitenden Glieder einen zusätzlichen Kontaktabschnitt (44, 412) definiert, der durch seinen Körperabschnitt (50, 418) mit seinem Kontaktabschnitt (46, 414) verbunden ist.

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14. Elektrischer Verbinder (10) nach Anspruch 13, bei dem die Körperabschnitte der ersten und zweiten leitenden Glieder in einer gemeinsamen Ebene angeordnet sind und durch einen Spalt (70, 426, 546, 548, 674) mit minimaler gewählter Breite getrennt werden, in dem Isoliermaterial (90, 430, 550, 670) angeordnet ist, das vor Montage des eine an den Verbinder (10) als eine Einheit montierbare Kontaktanordnung (40, 400, 500, 604) definierenden Verbinders an das erste und zweite leitende Glied angeformt wird.

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15. Elektrischer Verbinder (10) nach Anspruch 13, bei dem der Körperabschnitt (50) des ersten leitenden Glieds (42) einen länglichen Stabilisator (80), der sich von einem Träger (72) des einen der freitragenden Arme (52) nach hinten erstreckt, und um den länglichen Stabilisator herumgeformte Teile des Isoliermaterials (90, 430, 550, 670) enthält und mit benachbarten Flächen des Schlitzes in Eingriff gebracht werden kann, um nach der Montage des Verbinders eine Bewegung des Trägers (72) des einen (52) der freitragenden Arme zu verhindern.

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16. Verbindungsanzeiger (40, 400, 500, 604) für einen elektrischen Verbinder, wobei der Verbinder (10) jener Art ist, die entlang einer Paßfläche (18) mit einem Gegenverbinder und entlang einer anderen Fläche (20) mit einem anderen elektrischen Gegenstand elektrisch verbindbar ist, wobei der Verbinder mehrere Kontakte (14, 16) aufweist, die in einem Isoliergehäuse (12) angeordnet sind, das jeweilige erste Kontaktabschnitte aufweist, die in mindestens zwei Reihen entlang der Paßfläche (18) angeordnet sind, wobei beim Verbindungsanzeiger

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mindestens einer seiner ersten Kontaktabschnitte einen entlang der Paßfläche (18) frei-

liegenden Buchsenkontaktabschnitt (54, 410, 516, 520, 606, 608) umfaßt, der beim Zusammenfügen durch einen komplementären Kontaktabschnitt des Gegenverbinders elektrisch in Eingriff genommen werden soll, wobei mindestens ein Buchsenkontaktabschnitt mindestens zwei freitragende Arme (52, 62; 406, 408; 530, 536; 610, 612; 614, 616) enthält;

wobei die beiden freitragenden Arme durch zwei isolierte leitende Glieder (42, 60; 402, 404; 502, 504, 506; 640, 642; 644, 646) definiert werden, wobei ein erstes (42, 402, 502, 506, 640, 644) der leitenden Glieder einen Körperabschnitt (50, 418, 534, 540, 656, 660) aufweist, der einen (52, 406, 530, 536, 610, 614) der Arme mit einem zweiten Kontaktabschnitt (46, 416, 532, 538, 648, 652, 654) verbindet, der entlang der anderen Fläche (20) des Gehäuses (12) freiliegt, damit er durch den anderen elektrischen Gegenstand elektrisch in Eingriff genommen werden kann, wobei ein zweites (60, 404, 504, 642, 646) der leitenden Glieder einen Körperabschnitt (64, 420, 510, 658, 662) aufweist, der den anderen (62, 408, 514, 516, 616) der Arme und einen anderen zweiten Kontaktabschnitt (68, 414, 522, 526, 650, 654) integral miteinander verbindet;

wobei die Körperabschnitte (50, 418, 534, 540, 656, 660, 64, 420, 510, 658, 662) in einem darübergeformten Isoliermaterial (90, 430, 550, 670) eingebettet sind und eine als eine in ein Verbindergehäuse einzuführende Einheit handhabbare Kontaktanordnung bilden; und

eines (42, 402) der ersten und zweiten Glieder einen zusätzlichen Buchsenkontaktabschnitt (44, 412) definiert, der durch seinen Körperabschnitt (50, 418) mit seinem Kontaktabschnitt (46, 414) verbunden ist,

wodurch nach Verbindung der zweiten Kontaktabschnitte mit getrennten Teilen einer Detektorschaltung des anderen elektrischen Gegenstands und elektrischem Eingriff eines komplementären Kontaktabschnitts des Gegenverbinders mit den beiden freitragenden Armen der Verbindungsanzeiger die getrennten Teile der Detektorschaltung verbindet und eine Zusammenfügung des Verbinders anzeigt.

Revendications

1. Méthode de fabrication d'un ensemble de contact (40, 400, 500, 604) pour l'insertion dans un boîtier (12) d'un connecteur électrique (10) ayant une face

de couplage (18) et une autre face (20) pour un raccordement électrique de contacts (14, 16) de celles-ci à d'autres articles électriques, comprenant les étapes suivants:

définition d'au moins deux éléments conducteurs (42, 60; 402, 404; 502, 504, 506; 640, 642; 644, 646) s'étendant à partir de branches respectives (52, 62; 406, 408; 514, 518; 530, 536; 610, 612; 614, 616) à des premières extrémités de celles-ci jusqu'à des sections de contact (46, 68; 414, 416; 524, 528; 648, 650; 652, 654) à des secondes extrémités de celles-ci jointes par des sections de corps (50, 64; 418, 420; 508, 510; 534, 540; 656, 658; 660, 662) auxdites premières extrémités, lesdits éléments conducteurs étant séparés les uns des autres sur une distance déterminée le long de ceux-ci;

moulage d'un matériau d'isolation (90, 430, 550, 670) autour desdites sections de corps enrobant au moins substantiellement lesdites sections de corps tout en exposant lesdites sections de contact et

lesdites branches, y compris les bases (62) desdites branches, et séparant aussi lesdites branches sur une distance déterminée, lesdits éléments conducteurs étant électriquement isolés les uns des autres à l'intérieur dudit matériau d'isolation,

dans laquelle on définit ainsi un ensemble intégré qui peut être manipulé comme une unité pour inclure des paires de branches définissant des sections de contact à pinces (54, 410, 516, 520, 606, 608) exposées pour un couplage avec des contacts de broche complémentaires de telle sorte que les extrémités libres desdites branches puissent être défléchies par rapport aux bases desdites branches en résistant aux forces de compression qui les poussent l'une vers l'autre.

2. Méthode conformément à la revendication 1, dans laquelle l'étape de définition des éléments conducteurs (656, 658; 660, 662) comprend la définition (686) de portions sélectives au moins initialement jointives d'éléments conducteurs adjacents parmi les éléments conducteurs à l'extérieur dudit matériau d'isolation.

3. Méthode conformément à la revendication 2, comprenant en outre, suivant l'étape de moulage, l'étape d'enlèvement des nervures (686) et d'isolation complète des éléments conducteurs (656, 658; 660, 662) les uns des autres.

4. Méthode conformément à la revendication 1, dans laquelle ladite section de corps (50) d'au moins un

premier desdits éléments conducteurs (42) comprend une ouverture de passage (76) à l'intérieur de laquelle est disposée une portion dudit matériau d'isolation s'étendant entre les côtés opposés dudit premier élément conducteur parmi lesdits éléments conducteurs et joint intégralement d'autres portions dudit matériau d'isolation disposé le long desdits côtés opposés de ceux-ci à proximité d'une base (72) desdites branches en porte-à-faux.

5. Méthode conformément à la revendication 1, dans laquelle l'étape de moulage comprend la définition de brides (98, 672) du matériau d'isolation dans des espaces (70, 426, 546, 548, 674) entre les bases (72) des branches de chaque section de contact à pinces.

6. Méthode conformément à la revendication 5, dans laquelle l'étape de définition comprend la définition de barbes de retenue (34, 668) le long des bords extérieurs des bases (72) des branches de chaque section de contact à pinces.

7. Méthode de fabrication d'un connecteur électrique comprenant l'étape d'insertion de l'ensemble intégré (40, 400, 500, 604) de la revendication 5 dans une fente d'un boîtier d'isolation (12) de telle sorte que lesdites branches soient exposées le long de ladite face de couplage (18) de manière à définir lesdites sections de contact à pinces, et que lesdites sections de contact (46, 68; 414, 416; 524, 528; 648, 650; 652, 654) soient exposées le long de ladite autre face (20).

8. Connecteur électrique (10) du type électriquement raccordable à un connecteur de couplage le long d'une face de couplage (18) et à un autre article électrique le long d'une autre face (20), le connecteur (10) ayant une pluralité de contacts disposés dans un boîtier d'isolation (12) ayant des premières sections de contact respectives arrangées en au moins deux rangées de positions de réception de contact le long de ladite face de couplage (18), et au moins une desdites premières sections de contact comprenant une section de contact à pinces (54, 410, 516, 520, 606, 608) exposée le long de ladite face de couplage de manière à être électriquement engagée par une section de contact complémentaire dudit connecteur de couplage au cours du couplage, ladite section de contact à pinces comprenant deux bras de branche en porte-à-faux (52, 62; 406, 408; 514, 518; 530, 536; 610, 612; 614, 616), **caractérisé en ce que**

lesdits deux bras de branche en porte-à-faux sont définis par deux éléments conducteurs électriquement isolés (42, 60; 402, 404; 502, 504, 506; 640, 642; 644, 646), un premier (42,

402, 502, 506, 640, 644) desdits éléments conducteurs ayant une section de corps (50, 418, 534, 540, 656, 660) joignant intégralement un (52, 406, 530, 536, 610, 614) desdits bras de branche en porte-à-faux à une seconde section de contact (46, 416, 532, 538, 648, 652) exposée le long de ladite autre face (20) dudit boîtier (12) de manière à devenir électriquement connectée à un conducteur complémentaire dudit autre article électrique, et le deuxième (60, 404, 504, 642, 646) desdits éléments conducteurs ayant une section de corps (64, 420, 510, 658, 662) joignant intégralement l'autre (62, 408, 514, 516, 616) desdits bras de branche en porte-à-faux à une autre section de contact (68, 414, 522, 526, 650, 654);

lesdites sections de corps (50, 418, 534, 540, 656, 660; 64, 420, 510, 658, 662) étant enrobées dans un matériau d'isolation (90, 430, 550, 670) moulé sur elles, formant un ensemble de contact pouvant être manipulé comme une unité à insérer dans un boîtier de connecteur; et lesdites sections de corps (50, 64; 418, 420; 508, 510; 534, 540; 656, 658; 660, 662) desdits premier et deuxième éléments conducteurs sont disposées dans un plan commun et sont séparées par un espace (70, 426, 546, 548, 674) d'une largeur déterminée minimum à l'intérieur duquel est disposé le matériau d'isolation (90, 430, 550, 670) moulé sur lesdits premier et deuxième éléments conducteurs avant l'assemblage dudit connecteur définissant un ensemble de contact (40, 400, 500, 604) pouvant être assemblé audit connecteur (10) en une unité.

9. Connecteur électrique (10) conformément à la revendication 8, dans lequel l'un et l'autre desdits bras de branche en porte-à-faux de ladite section de contact à pinces (54, 410, 516, 520, 606, 608) comprennent des éléments de retenue (34, 668) le long d'eux-mêmes en ajustement serré avec ledit boîtier (12) lors de l'insertion complète de ladite unité d'ensemble de contact (40, 400, 500, 604) dans celui-ci, et ledit matériau d'isolation (90, 430, 550, 670) définit une bride (98, 672) s'étendant vers l'avant entre les bases (72) de l'un et l'autre desdits bras de branche en porte-à-faux de manière à supporter lesdits éléments de retenue (34, 668) pour obtenir ledit ajustement serré.

10. Connecteur électrique (10) conformément à la revendication 8, dans lequel un (42, 402) desdits premier et deuxième éléments conducteurs définit une section de contact supplémentaire (44, 412) jointe par ladite section de corps (50, 148) de celui-ci à ladite section de contact (46, 414) de celui-ci.

11. Connecteur électrique (10) conformément à la revendication 10, dans lequel ladite section de contact supplémentaire (44, 412) est une section de contact à pinces.

12. Connecteur électrique (10) conformément à la revendication 8, dans lequel un (504) desdits premier et deuxième éléments conducteurs (502, 504) définit une première branche (518) d'une seconde section de contact à pinces (520) jointe par ladite section de corps (508, 510) de celui-ci à une section de contact (522, 526) associée à celui-ci, et un troisième élément conducteur (506) définit une seconde branche (536) de ladite seconde section de contact à pinces (520) jointe par une section de corps respective (540) de celui-ci à une autre section de contact (538) également associée à la seconde section de contact à pinces (520).

13. Connecteur électrique (10) du type électriquement raccordable à un connecteur de couplage le long d'une face de couplage (18) et à un autre article électrique le long d'une autre face (20), le connecteur (10) ayant une pluralité de contacts disposés dans un boîtier d'isolation (12) ayant des premières sections de contact respectives arrangées en au moins deux rangées de positions de réception de contact le long de ladite face de couplage (18), et au moins une desdites premières sections de contact comprenant une section de contact à pinces (54, 410, 516, 520, 606, 608) exposée le long de ladite face de couplage de manière à être électriquement engagée par une section de contact complémentaire dudit connecteur de couplage au cours du couplage, ladite section de contact à pinces comprenant deux bras de branche en porte-à-faux (52, 62; 406, 408; 514, 518; 530, 536; 610, 612; 614, 616), **caractérisé en ce que:**

lesdits deux bras de branche en porte-à-faux sont définis par deux éléments conducteurs électriquement isolés (42, 60; 402, 404; 502, 504, 506; 640, 642; 644, 646), un premier (42, 402, 502, 506, 640, 644) desdits éléments conducteurs ayant une section de corps (50, 418, 534, 540, 656, 660) joignant intégralement un (52, 406, 530, 536, 610, 614) desdits bras de branche en porte-à-faux à une seconde section de contact (46, 416, 532, 538, 648, 652) exposée le long de ladite autre face (20) dudit boîtier (12) de manière à devenir électriquement raccordable à un conducteur complémentaire dudit autre article électrique, et le deuxième (60, 404, 504, 642, 646) desdits éléments conducteurs ayant une section de corps (64, 420, 510, 658, 662) joignant intégralement l'autre (62, 408, 514, 516, 616) desdits bras de branche en porte-à-faux à une autre

deuxième section de contact (68, 414, 522, 526, 650, 654);

lesdites sections de corps (50, 418, 534, 540, 656, 660; 64, 420, 510, 658, 662) étant enrobées dans un matériau d'isolation (90, 430, 550, 670) moulé sur elles, formant un ensemble de contact pouvant être manipulé comme une unité à insérer dans un boîtier de connecteur; et un (40, 402) desdits premier et deuxième éléments conducteurs définit une section de contact supplémentaire (44, 412) jointe par ladite section de corps (50, 418) de celui-ci à ladite section de contact (46, 414) de celui-ci.

14. Connecteur électrique (10) conformément à la revendication 13, dans lequel lesdites sections de corps desdits premier et deuxième éléments conducteurs sont disposées dans un plan commun et sont séparées par un espace (70, 426, 546, 548, 674) d'une largeur déterminée minimum à l'intérieur duquel est disposé le matériau d'isolation (90, 430, 550, 670) moulé sur lesdits premier et deuxième éléments conducteurs avant l'assemblage dudit connecteur (10), définissant un ensemble de contact (40, 400, 500, 604) pouvant être assemblé sur ledit connecteur en une unité.

15. Connecteur électrique (10) conformément à la revendication 13, dans lequel ladite section de corps (50) dudit premier élément conducteur (42) comprend un stabilisateur allongé (80) s'étendant vers l'arrière à partir d'une base (72) dudit un desdits bras de branche en porte-à-faux (52), et des portions dudit matériau d'isolation (90, 430, 550, 670) moulé autour dudit stabilisateur allongé et peut être engagée avec des surfaces adjacentes de ladite fente afin d'empêcher un mouvement de ladite base (72) dudit un (52) desdits bras de branche en porte-à-faux après l'assemblage du connecteur.

16. Indicateur de couplage (40, 400, 500, 604) pour un connecteur électrique, le connecteur (10) étant du type électriquement raccordable à un connecteur de couplage le long d'une face de couplage (18) et à un autre article électrique le long d'une autre face (20), le connecteur ayant une pluralité de contacts (14, 16) disposés dans un boîtier d'isolation (12) ayant des premières sections de contact respectives arrangées en au moins deux rangées le long de ladite face de couplage (18), ledit connecteur de couplage comprenant:

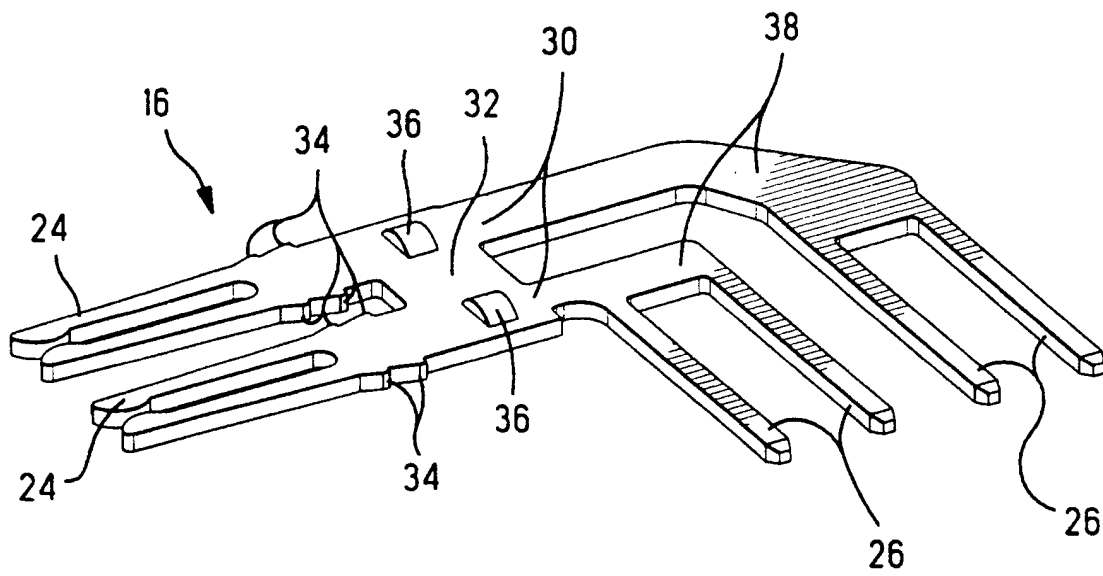
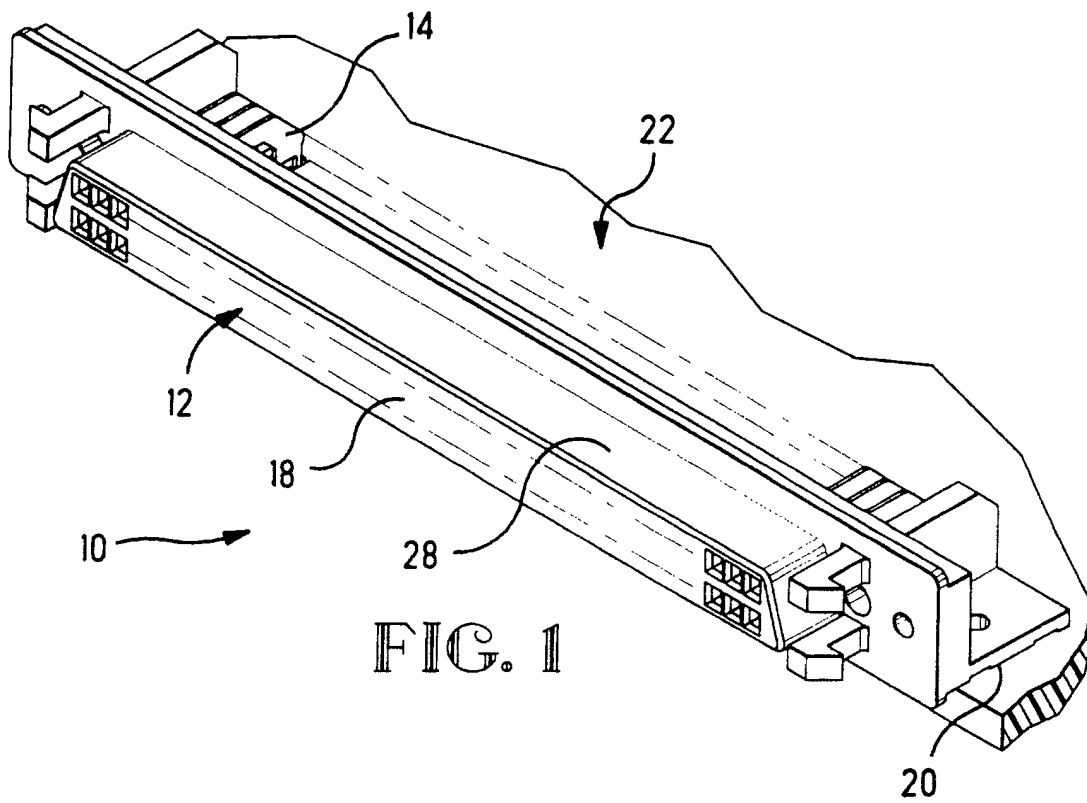
au moins une desdites premières sections de contact de celui-ci comprenant une section de contact à pinces (54, 410, 516, 520, 606, 608) exposée le long de ladite face de couplage (18) de manière à être électriquement engagée par une section de contact complémentaire dudit

connecteur de couplage au cours du couplage, ladite au moins une section de contact à pinces comprenant au moins deux bras de branche en porte-à-faux (52, 62; 406, 408; 530, 536; 610, 612; 614, 616);

lesdits deux bras de branche en porte-à-faux étant définis par deux éléments conducteurs électriquement isolés (42, 60; 402, 404; 502, 504, 506; 640, 642; 644, 646), un premier (42, 402, 502, 506, 640, 644) desdits éléments conducteurs ayant une section de corps (50, 418, 534, 540, 656, 660) joignant intégralement un (52, 406, 530, 536, 610, 614) desdits bras à une seconde section de contact (46, 416, 532, 538, 648, 652, 654) exposée le long de ladite autre face (20) dudit boîtier (12) de manière à être électriquement engagée par ledit autre article électrique, et le deuxième (60, 404, 504, 642, 646) desdits éléments conducteurs ayant une section de corps (64, 420, 510, 658, 662) joignant intégralement l'autre (62, 408, 514, 516, 616) desdits bras à une autre section de contact (68, 414, 522, 526, 650, 654);

lesdites sections de corps (50, 418, 534, 540, 656, 660; 64, 420, 510, 658, 662) étant enrobées dans un matériau d'isolation (90, 430, 550, 670) moulé sur elles, formant un ensemble de contact pouvant être manipulé comme une unité à insérer dans un boîtier de connecteur; et un (42, 402) desdits premier et deuxième éléments conducteurs définit une section de contact à pinces supplémentaire (44, 412) jointe par ladite section de corps (50, 418) de celui-ci à ladite section de contact (46, 414) de celui-ci,

dans lequel lorsque lesdites secondes sections de contact sont jointes à des portions séparées d'un circuit de détection dudit autre article électrique et qu'une section de contact complémentaire du connecteur de couplage devient électriquement engagée avec lesdits deux bras de branche en porte-à-faux au cours du couplage du connecteur, ledit indicateur de couplage relie lesdites portions séparées dudit circuit de détection et indique le couplage du connecteur.



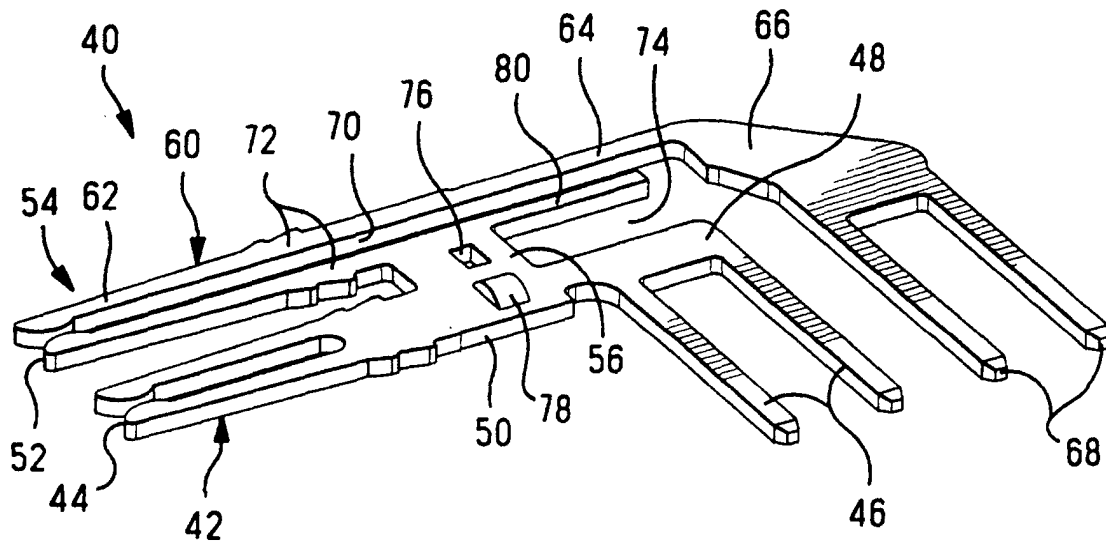


FIG. 3

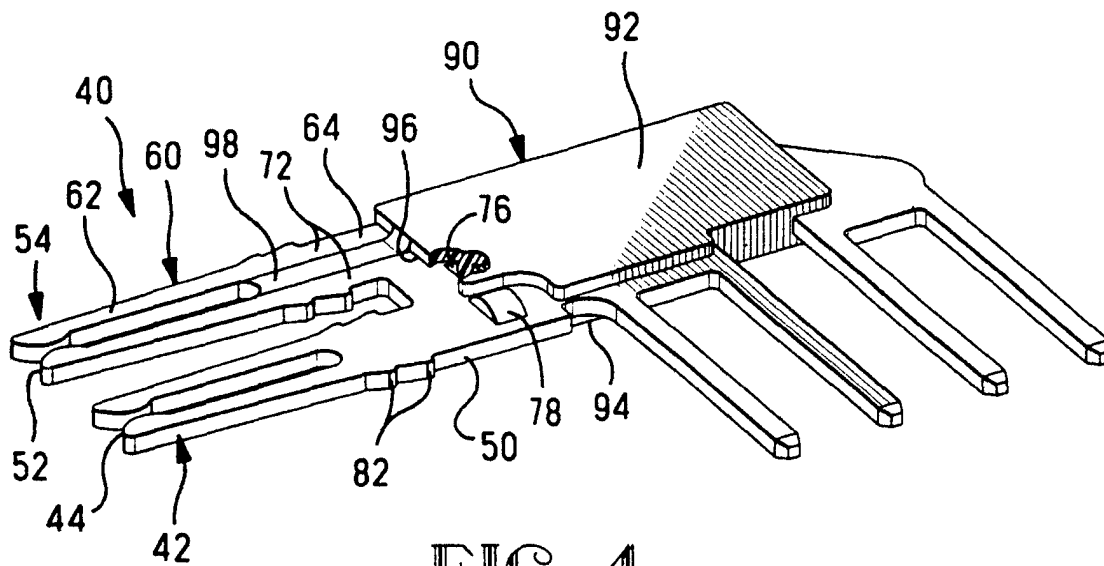
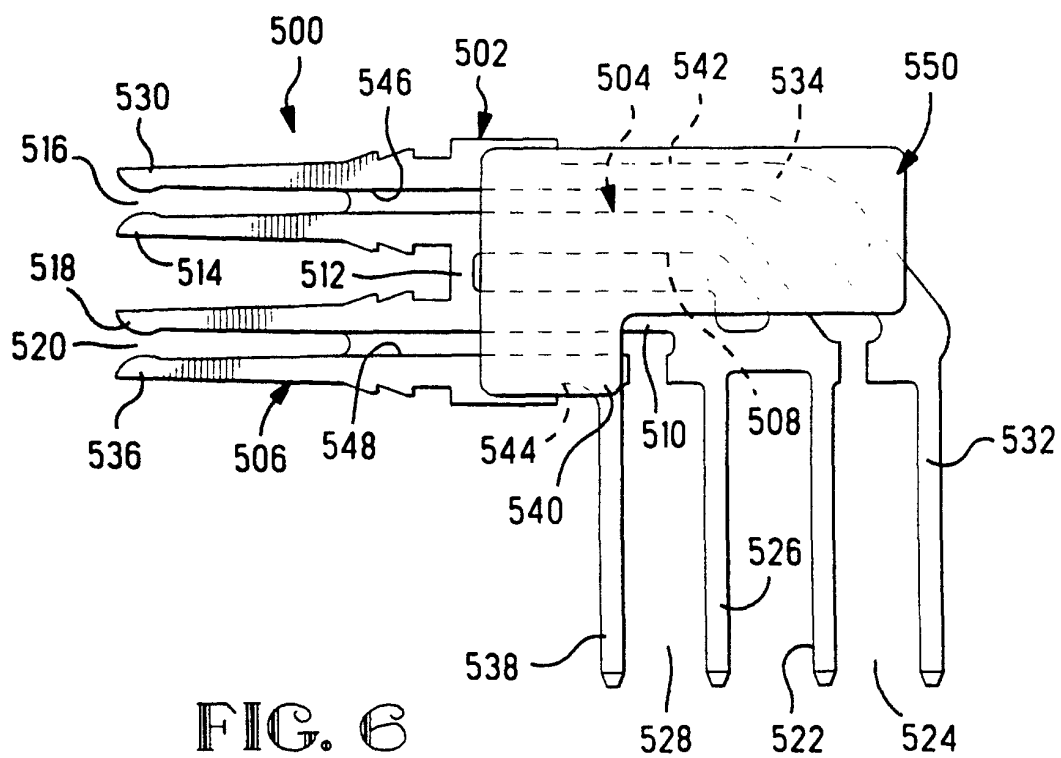
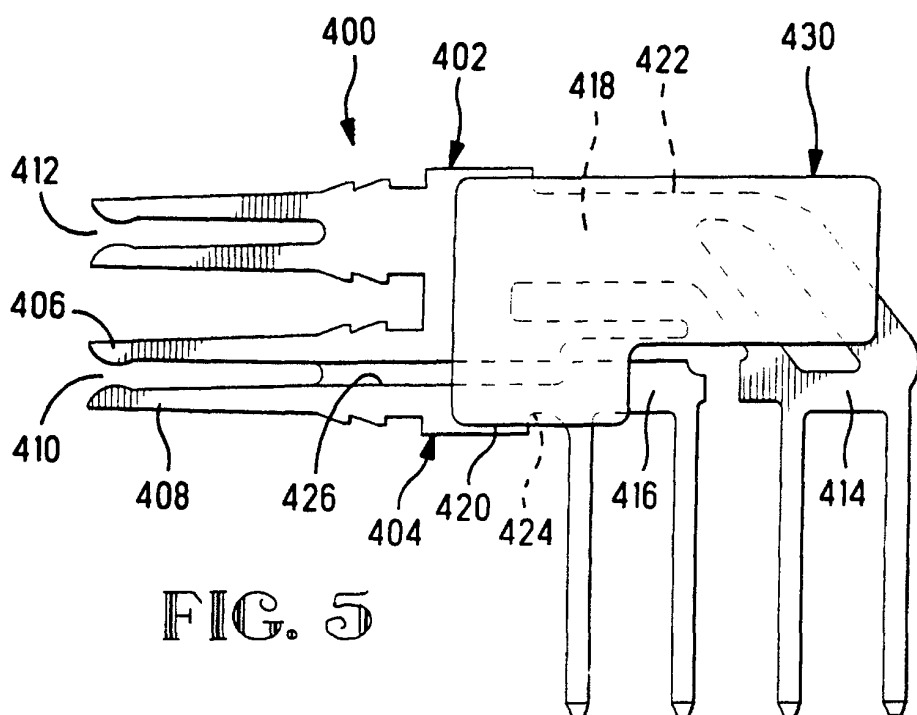


FIG. 4



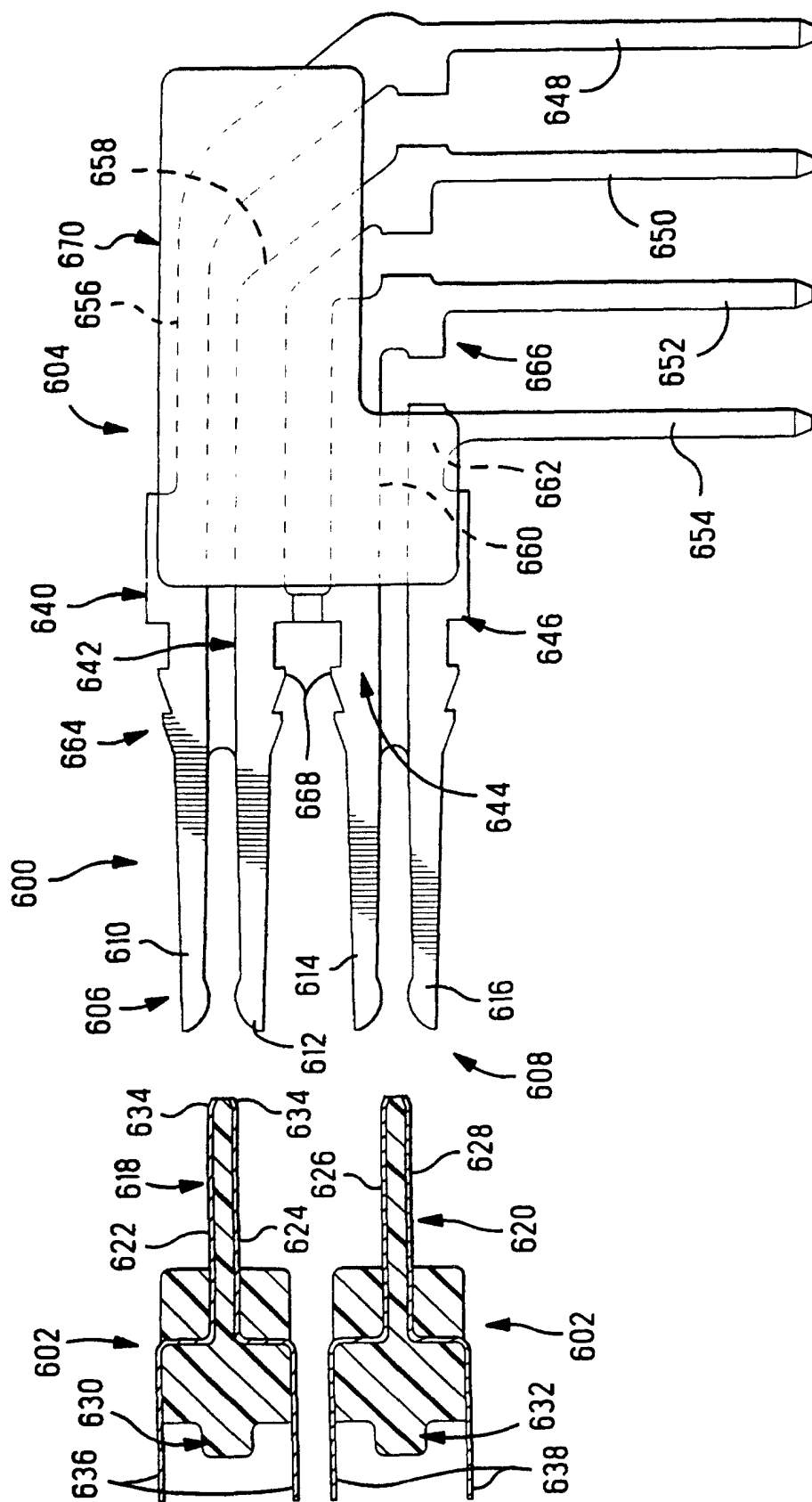


FIG. 7

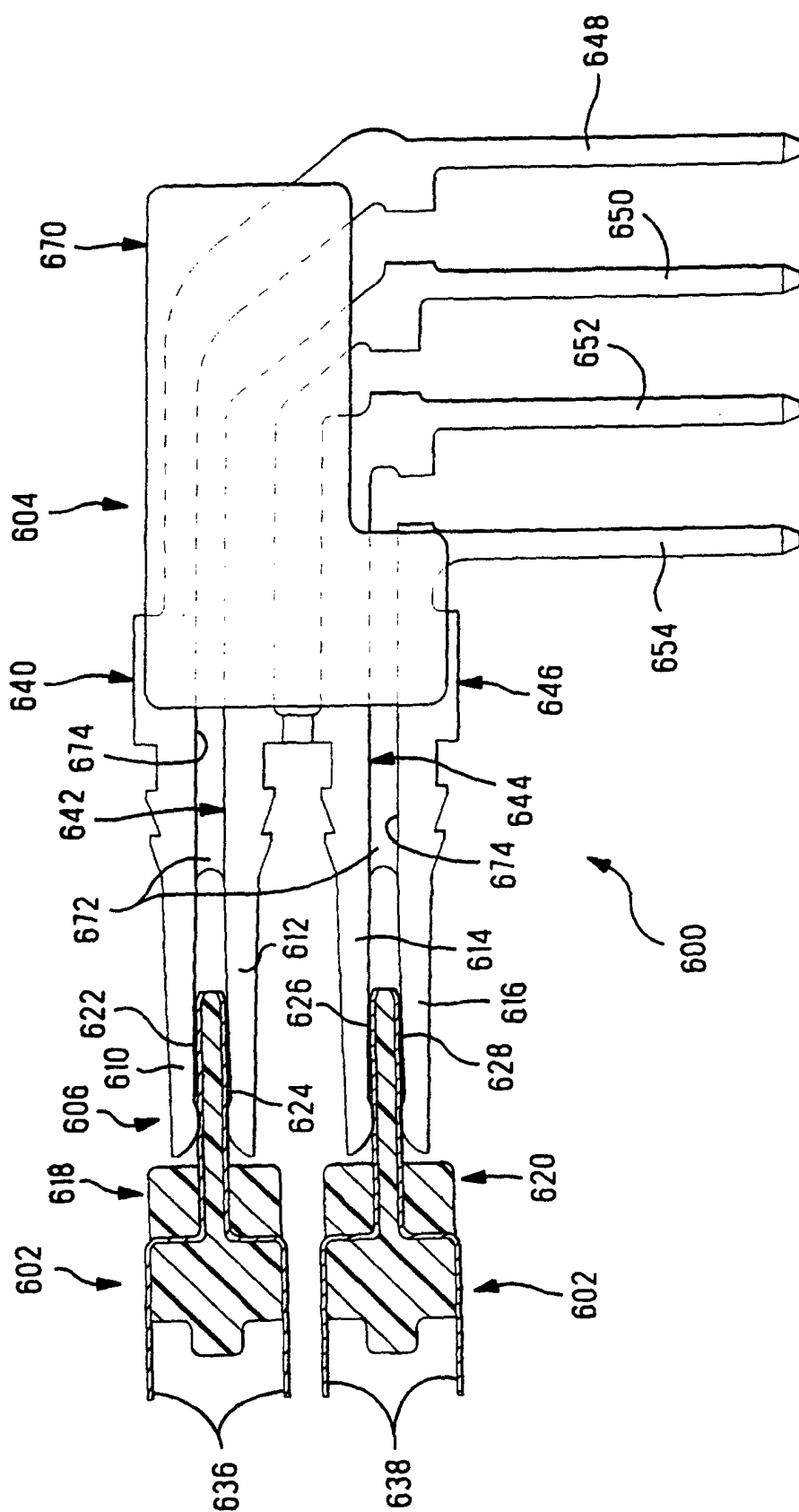
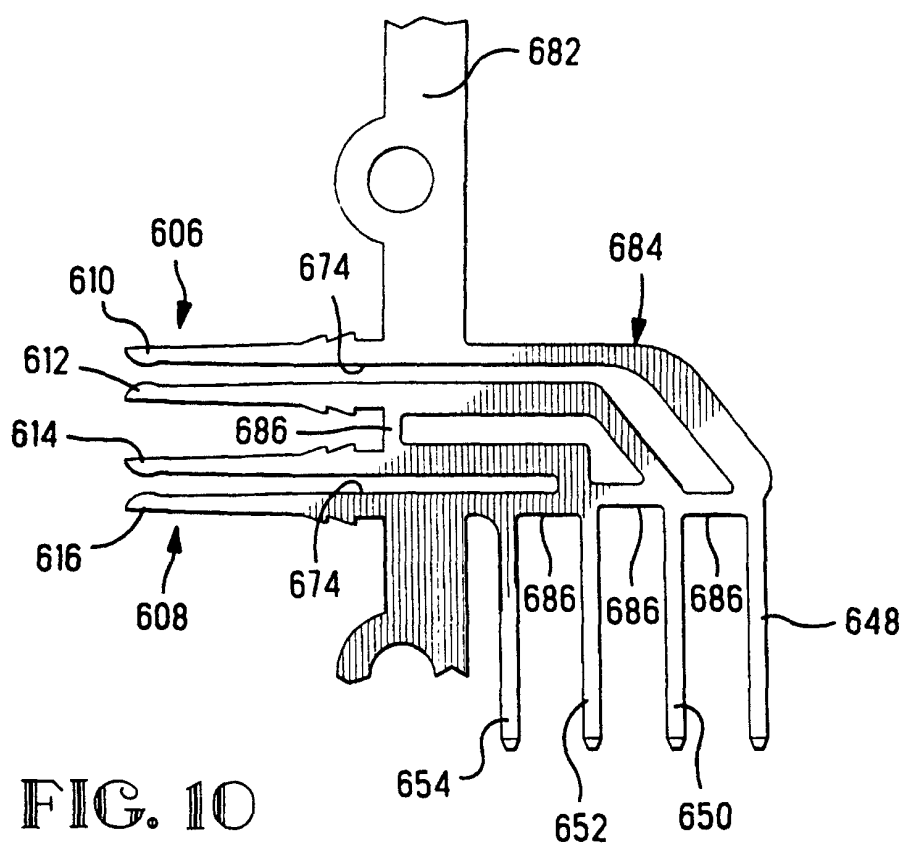
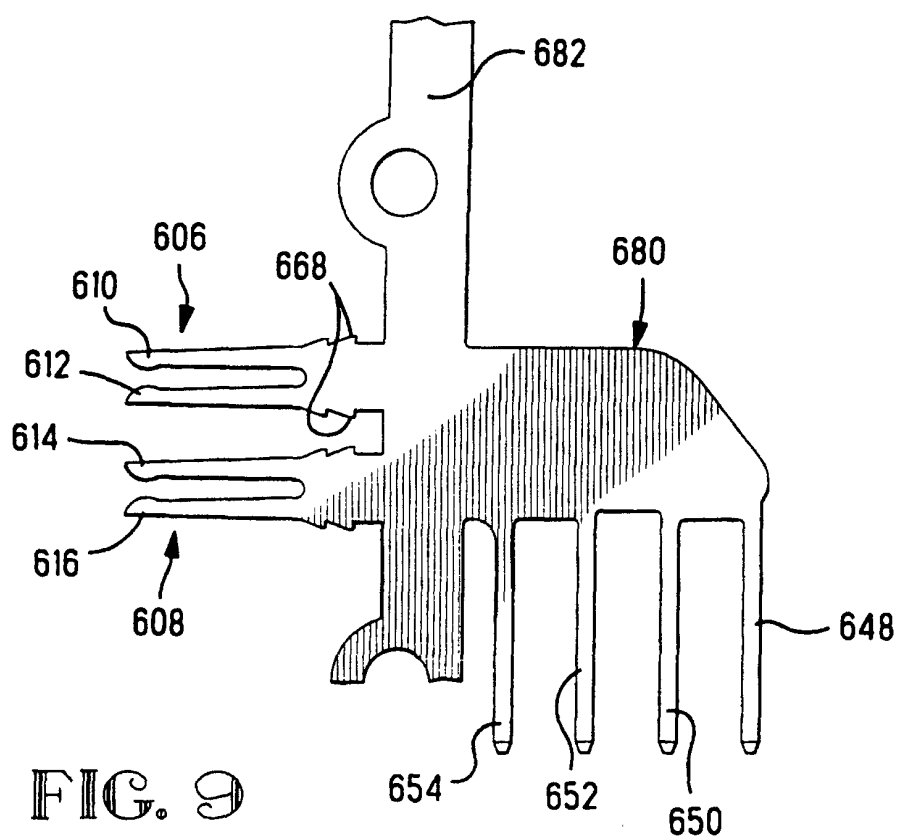


FIG. 8



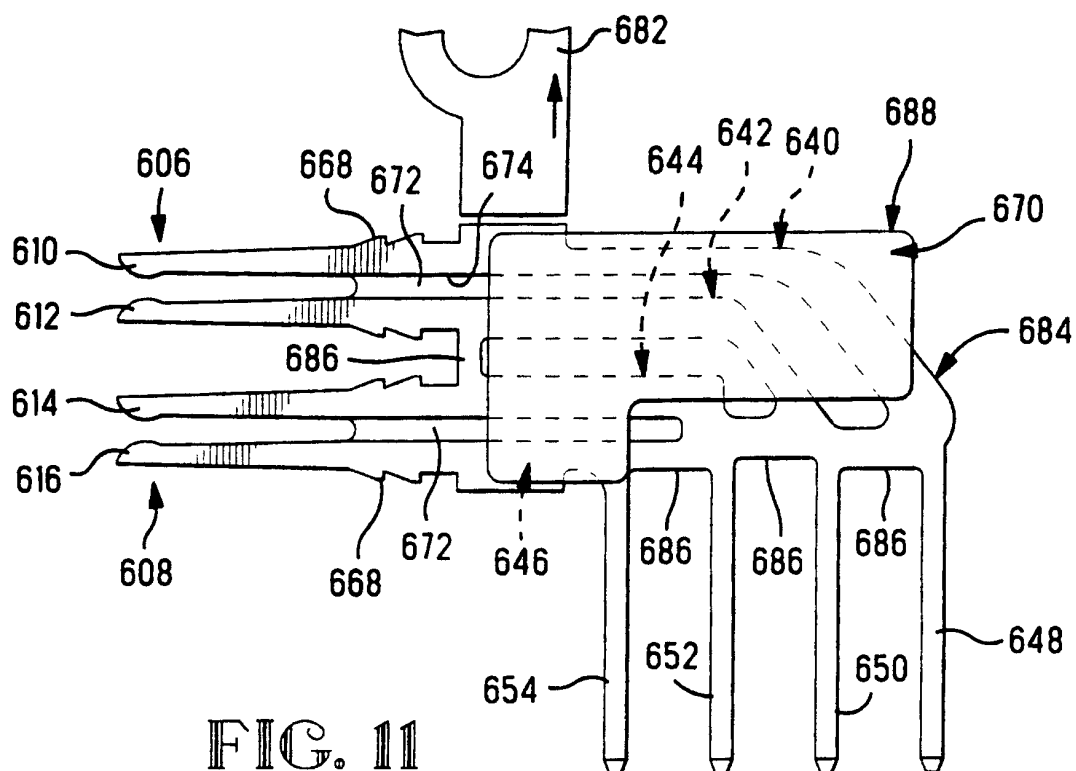


FIG. 11

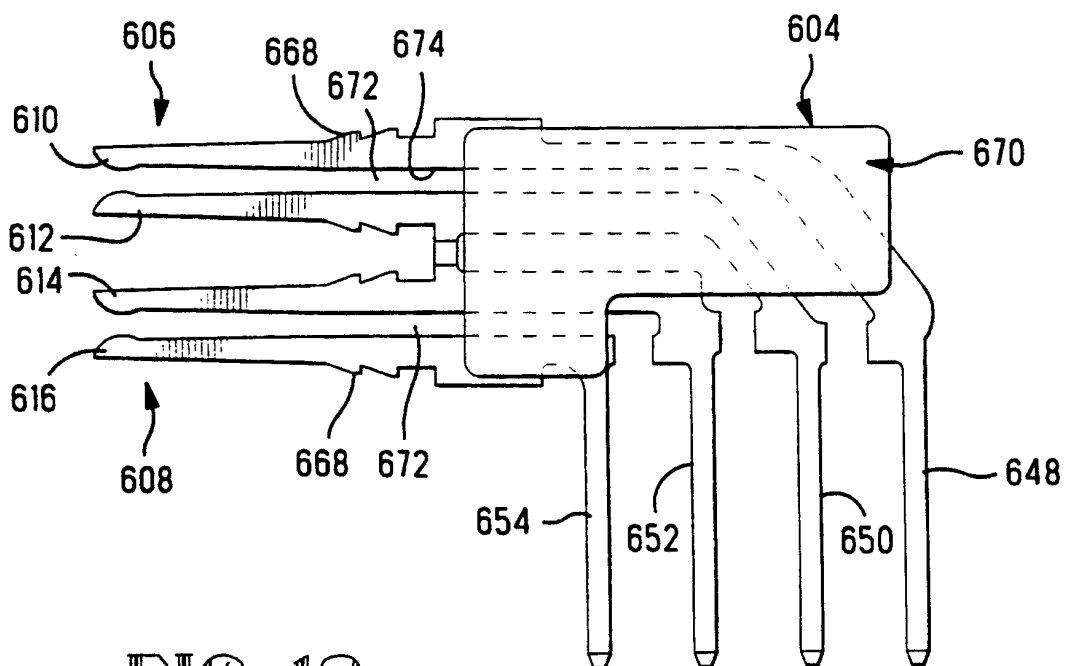


FIG. 12