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(54) ELECTRICAL CONNECTOR, MAT SEALING JOINT, HOUSING AND GRID FOR SUCH A CONNECTOR

ELEKTRISCHER VERBINDER, DICHTUNGSMATTE, GEHÄUSE UND GITTER FÜR EINEN SOLCHEN VERBINDER

CONNECTEUR ÉLECTRIQUE, JOINT D'ÉTANCHÉITÉ COMPRESSIBLE, BOÎTIER ET GRILLE POUR UN TEL CONNECTEUR

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Description

FIELD OF THE INVENTION

[0001] The instant invention relates to electrical connectors and mat sealing joints, housings and grids for such connectors.

BACKGROUND OF THE INVENTION

[0002] Electrical connectors are notably used for connecting an electrical apparatus to another, and can be found in any kind of electrical devices. Such connectors may for example be of the type comprising an electrically insulative housing in which electrical wires having electrical terminals are inserted.

[0003] Since it is undesirable that foreign bodies, such as dust and liquids, penetrate the inside of the connectors, it is preferable to seal the connectors against such foreign bodies. A given class of connectors therefore comprise a sealing joint disposed between a housing (front part of the connector) and a grid (back part of the connector). Sealing is performed peripherally, by the sealing joint being compressed between the housing and the grid. Further, the sealing joint exerts sealing on each wire. WO2006/108442 discloses an electrical connector according to the preamble of claim 1.

[0004] WO 2005/88,773 already describes an electrical connector comprising:

- a housing having a mating face to be mated with a complementary electrical connector, and a back face, the housing comprising a plurality of pathways extending between the mating face and the back face, each designed for receiving an electrical terminal,
- a grid comprising a plurality of pathways, and adapted to be mechanically connected to the housing,
- a mat sealing joint maintained between the housing and the grid, the mat sealing joint comprising a peripheral portion and a central body comprising a plurality of pathways each designed to seal a respective electrical wire extending through an aperture of the grid, a pathway of the mat sealing joint and a pathway of the housing along a longitudinal direction,

wherein the housing and the grid each comprise a sealing portion,
wherein the peripheral portion is compressed between the sealing portions of the housing and the grid so as to achieve sealing between the housing and the grid along a direction parallel to the longitudinal direction.

[0005] In such a connector, the peripheral sealing is performed "longitudinally", in that the seal is compressed between the housing and the grid mainly parallel to the longitudinal direction of the wires. This differs from other types of electrical connectors, in which the peripheral sealing is performed "transversely", i.e. the seal is compressed between the housing and the grid mainly transverse to the longitudinal direction of the wires.

[0006] An electrical connector such as described above has proven satisfactory up to now. Yet, there is a constant need to improve the sealing efficiency of the electrical connectors, for at least one of the following reasons: to cope with ever more aggressive operating conditions, and/or to enable suitable miniaturisation.

[0007] The instant invention has notably for object to provide such an improved connector.

SUMMARY OF THE INVENTION

[0008] To this aim, the invention provides an electrical connector comprising:

- a housing comprising a plurality of pathways extending along a longitudinal direction between a mating face of the housing and a back face of the housing for receiving an electrical member,
- a grid mechanically connected to the housing and comprising a plurality of pathways extending along the longitudinal direction, and
- a mat sealing joint, pressed between the housing and the grid, and comprising a peripheral portion and a central body comprising a plurality of pathways each extending along the longitudinal direction for sealing a respective electrical wire, each pathway of the grid corresponding to a pathway of the mat sealing joint and to a pathway of the housing,

wherein the housing and the grid each comprises a sealing portion,
wherein the peripheral portion of the mat sealing joint is compressed between a sealing portions of the housing and the grid,
and wherein the peripheral portion of the mat sealing joint, the housing and the grid each comprises an abutting surface oriented transverse to the longitudinal direction, the abutting surfaces abutting on one another characterized in that the peripheral portion has a cross-section shaped as a T, said T comprising
a foot and a head, the foot extending in a plane transverse to the longitudinal direction, and the head extending along the longitudinal direction,
wherein the foot is compressed between the sealing portions of the housing and of the grid,
wherein the sealing portion of the housing has a surface normal to the longitudinal direction and facing upward, facing a lower surface of the foot,
wherein the housing comprises a lateral abutting surface facing an abutting surface of the mat sealing joint,
wherein the sealing portion of the grid has a surface normal to the longitudinal direction and facing downward, facing an upper surface of the foot,
wherein the grid comprises a lateral abutting surface fac-

ing an abutting face of the mat sealing joint.

[0009] With these features, the peripheral portion is secured, in particular during the insertion and/or the removal of the wires through the sealing joint.

[0010] In some embodiments, one might also use one or more of the features defined in the dependent claims.

[0011] The invention also relates to the individual housing, mat sealing joint, and grid, taken individually, of the electrical connector.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] Other characteristics and advantages of the invention will readily appear from the following description of one of its embodiments, provided as a non-limitative example, and of the accompanying drawings.

[0013] On the drawings :

- Fig. 1 is an exploded perspective view of an electrical connector,
- Fig. 2 is a sectional view of the electrical connector of Fig. 1 along line II-II of Figure 1,
- Fig. 3 is an enlarged view of a part of Fig. 2,
- Fig. 4 is a sectional view of the electrical connector of Fig. 1 along line IV-IV on Fig. 2,
- Fig. 5 is a perspective top view of a mat sealing joint, and
- Fig. 6 is a schematic view of a step of an assembly process for the above connector.

[0014] On the different Figures, the same reference signs designate like or similar elements.

DETAILED DESCRIPTION

[0015] Fig. 1 shows an electrical connector 1 to be connected to a mating a front grid 2. An interfacial joint 3 of any suitable shape and material is interposed between the connectors 1 and a counterpart connector (not shown) for sealing this connection.

[0016] The electrical connector 1 comprises a housing 4, usually made of a dielectric material, comprising a front connection portion 5 and a back portion 6. The connection portion comprises a plurality of pathways 7 (see in particular Fig. 2) extending along a longitudinal direction X between a front face 8, which engages a front grid 2, and a back face 9. The pathways 7 are shaped to receive electrical members 13 which will be described in more details below.

[0017] The back portion 6 is somehow cylindrical of rectangular cross-section and comprises two opposite longitudinal walls 10 connected to one another by two opposite lateral walls 12. The inner faces 10a, 12a of these walls surround a reception space for a joint. The walls 10, 12 may further comprise locking features 11 such as through slots formed in the two longitudinal walls 10, for cooperation with complementary locking features 14 of a grid 15. The sealing portion may further comprise guiding features 16 such as, for example, longitudinal grooves extending along the longitudinal direction in the lateral walls 12, for cooperation with complementary guiding features 17 of the grid 15 to be described in more details below.

[0018] The back portion 6 further comprises a lower edge 18 extending along the periphery of the back portion 6, above the back face 9, and facing upward. Alignment parts 41 project upwardly from the lower edge 18 at suitable locations of the housing (See Fig. 4).

[0019] The back portion further comprises a sealing portion 19 located upward and laterally offset outwardly with respect to the lower edge 18. The geometry and use of the sealing portion 19 will be described in more details below.

[0020] The connector 1 further comprises a mat sealing joint 20, or "grommet", which will now be described in more detail in relation to Figure 5. Such a mat sealing joint is made of a material suitable for sealing the connector against water and/or dust such as, for example a deformable quasi-incompressible material such as some suitable silicones.

[0021] The mat sealing joint comprises a central portion 21 which comprises a plurality of pathways 22 extending along the longitudinal direction X, from an upper surface 22a to a lower surface 22b. For example, the thickness of the joint is about 4.8 mm, measured between the upper and lower surfaces 22a, 22b. Each of the pathways corresponds to a pathway 7 of the housing, for receiving an electrical member 13 (not shown on Figure 5). As it is visible for example on Fig. 2, the pathways 22 have an internal cross-sectional shape designed for sealing electrical wires attached to the electrical members 13, comprising for example two ribs 23 of reduced diameter and of suitable geometry.

[0022] The central portion 21 is mechanically connected to (integral with) an external portion 24 by way of a central peripheral rib 27 (Fig. 2) and flexible ribs 25 extending in recesses 26 of the joint. The flexible ribs 25 extend, along the longitudinal direction, from the central rib 27 to the upper or lower surface of the joint and, in a transverse direction, from an internal face of the external portion to an external face of the central portion. The external portion 24 defines a sensibly parallelepiped-shaped ring having an upper surface 24a and a lower surface 24b. The ribs 25 are designed to allow a play between the central portion 21 and the external portion 24. It should be noted that, in the described embodiment, the upper surface 22a of the central portion project upward with respect to the upper surface 24a of the external portion 24. Hence, the ribs 25 may extend sensibly upward from the upper surface 24a of the external portion to the upper surface 22a of the central portion 21. Further, the ribs may be angled (not orthogonal, for example by 20°-70°) with respect to the internal faces of these portions, so as to adjust the flexibility of the ribs. The recesses 26 also enable to manufacture a mat sealing joint with less material and thus ultimately cheaper.

[0023] The external portion 24, the ribs 25 and 27, the recesses 26 and the central portion 21 together define the central body 28 of the joint (See Fig. 6).

[0024] A peripheral portion 29 of the mat sealing joint extends from the central body 28 and, in particular in the present example, from the external portion 24, in the upper half of the mat sealing joint 20. The peripheral portion 29 will be described in more details below.

[0025] Referring back to Fig. 1, the connector 1 further comprises a grid 15 which has been already partially described above. The grid 15 comprises a plurality of pathways 30; each one extends along the longitudinal direction X between an upper face 15a and a lower face 15b, and corresponds to a corresponding pathway 22 of the mat sealing joint 20 and a corresponding pathway 7 of the housing.

[0026] The grid 15 may further comprise guiding features 17 such as ribs complementary to the grooves 16 of the housing.

[0027] Alignment lances 35 project downwardly from the lower face 15b at suitable locations of the grid.

[0028] The grid 15 may further comprise locking features 14 such as elastic tongues complementary to the openings 11 of the housing and adapted to be deformed upon insertion of the grid in the housing, and to spring back into the openings 11 to lock the grid to the housing.

[0029] The bottom portion of the grid further comprises a sealing portion 31 (See Fig. 2) projecting downward from the lower face 15b. The geometry and use of the sealing portion 31 will be described in more details below.

[0030] The connector 1 is shaped to receive electrical members 13 which are classically comprised of an electrical terminal member 32 connected to, for example by crimping, a wire 33. Only one such terminal is shown on Fig. 1. In the assembled state, the electrical terminal member 32 is located in a corresponding pathway 7 of the housing, while the wire 33 extends through the corresponding pathway 22 of the mat sealing joint 20 and through the corresponding pathway 30 of the grid, as shown in detail on Figure 2. The longitudinal direction X referred to above and below is defined as the longitudinal direction of extension of the tubular wire 33 at least in the mat sealing joint 20, from the grid side to the housing side. The expressions upward, downward, upper, lower, transverse, etc... are defined with respect to this longitudinal direction X, unless it is obvious from the description that these terms locally have another meaning. On the right side of Figure 2, where the electrical member 13 is shown introduced into the connector 1, the sealing ribs 23 are compressed onto the external surface of the wire 33 so as to achieve efficient sealing of the wire.

[0031] In the assembled state of the connector 1, as shown in particular on Figure 2, the lower face 22b of the central body of the mat sealing joint 20 rests on the lower edge 18 of the housing. As is visible on Figure 4, two alignment lances 41 of the housing are introduced in corresponding recesses 26 of the mat sealing joint, however without applying much transverse compression (in particular no transverse compression usable to attain the sealing requirements), to the material of the mat sealing joint. Transverse compression is compression exerted in a plane transverse to the longitudinal direction X. A play along the longitudinal direction between the connection portion 5 of the housing and the mat sealing joint 20 is defined by a gap 34 between the upper face 9 of the connection portion 5 of the housing and the lower face 22b of the joint.

[0032] With this localisation, no sealing transverse compression is exerted on the mat sealing joint by the internal faces 10a, 12a of the housing, but a mere contact may exist here or there.

[0033] The grid is mechanically connected to the housing by way of the cooperation of the locking features 14 of the grid and the locking features 11 of the housing. As is visible on Figure 4, the two locating lances 35, projecting from the bottom face of the grid, are introduced in corresponding recesses 26 of the mat sealing joint, however without applying much transverse compression to the material of the mat sealing joint. The locating lances 35 may, as shown, not be facing the alignment lances 41 of the housing. A play along the longitudinal direction between the grid and the mat sealing joint 20 is defined by a gap 42 between the lower face 15b of the grid and the upper face 22a of the joint.

[0034] The sealing between the grid 15 and the housing 4 is performed peripherally as detailed below in relation to Figure 3.

[0035] The peripheral portion 29 of the mat sealing joint has a T-shaped cross-section. The T comprises a foot 36 extending in a plane transverse to the longitudinal direction and a head 37 extending along the longitudinal direction. The foot 36 has upper 36a and lower 36b surfaces normal to the longitudinal direction.

[0036] The head 37 of the T comprises an external surface 37a facing toward the internal face of the housing, and two opposite inwardly-facing abutting faces 37b, 37c.

[0037] Locally, the housing comprises a sealing portion 19 which has a surface normal to the longitudinal direction and facing upward, facing the lower surface 36b of the foot 36. The housing further comprises a lateral abutting surface 38 facing the abutting face 37b of the joint.

[0038] Locally, the grid comprises a sealing portion 31 which has a surface normal to the longitudinal direction and facing downward, facing the upper surface 36a of the foot 36. The grid further comprises a lateral abutting surface 39 facing the abutting face 38c of the joint.

[0039] When the grid is mechanically connected to the housing, the mat sealing joint is pressed between the housing and the grid. More specifically, the foot 36 of the T is pressed between the sealing portion 19 of the housing and the sealing portion 31 of the grid all along the periphery of the joint. The pressing surfaces of these sealing portions 19, 31 compress the foot 36 sensibly along a direction parallel to the longitudinal direction (so-called "longitudinal peripheral sealing"), so as to achieve

the desired degree of sealing. For example, the degree of compression of the foot 36 is at least 20%, preferably at least 25%. No transverse sealing compression is performed by the housing on the external surface 37a of the joint. Indeed, the terms "compression" or "sealing compression" are used here to designate a compression of the material sufficient to achieve the sealing requirements. The mere fact that a face of the joint is in contact with a face of the housing, insufficiently to attain the sealing requirements, is not considered as "compression".

[0040] When an electrical member 13 is inserted into the assembled connector 1 along the longitudinal direction, the central portion is allowed a certain degree of freedom, without adversely affecting the peripheral sealing, thanks to the above described recesses 26 and gaps 34, 42. The plays respectively between the housing and the mat sealing joint or the mat sealing joint and the grid also allow a certain degree of freedom, but the alignment lances 41 and 35 of the housing and the grid participate to maintain the mat sealing joint in place during insertion. If, however, the insertion effort is so intense so as to tend to cause a transverse movement inward of the peripheral portion, the abutting surfaces 37b and 37c will abut on the abutting surfaces 38, 39, respectively, of the housing and grid, so as to maintain the peripheral sealing portion of the joint in place. The same applies to electrical members extraction efforts and bending efforts.

[0041] When submitted to thermal tests (for example heating at 175 °C for 240 hours), the recesses 26 in the mat sealing joint, and the gaps 34, 42 between the mat sealing joint and the housing or the grid, allow the mat sealing joint to expand more than the housing and the grid without deforming them.

[0042] On Figure 6, an example of a connector assembly method is described. The grid 15 is placed upside-down on a conveyor belt 40, which moves it to a number of stations. At a station, the mat sealing joint 20 (schematically shown with a single pathway) is placed onto the grid 15, as shown on Figure 6. The mat sealing joint is placed accurately thanks to the cooperation of the locating lances 35 of the grid (Fig. 4) with the corresponding recesses 36 of the joint and/or the illustrated complementary shapes of the sealing portion 31 of the grid and the grid-facing half of the T-profile of the joint.

[0043] At another station (not shown), the housing is moved along the longitudinal direction to the grid until it is locked to the grid as explained above, in a state where peripheral sealing is achieved. There is no forceful insertion of the housing on the grommet, since there is no transverse (or radial) sealing. In this state, the correct alignment of the pathways of the grid, the joint and the housing is guaranteed, since there is no transverse (or radial) sealing which might cause a mis-alignment of the pathways of the relative components of the connector.

Claims

1. Electrical connector comprising:

- a housing (4) comprising a plurality of pathways (7) extending along a longitudinal direction (X) between a mating face (8) of the housing (4) and a back face (9) of the housing (4) adapted to receive an electrical member (13),
- a grid (15) mechanically connected to the housing (4) and comprising a plurality of pathways (30) extending along the longitudinal direction (X), and
- a mat sealing joint (20), pressed between the housing and the grid(15), and comprising a peripheral portion (29) and a central body (28) comprising a plurality of pathways (22) each extending along the longitudinal direction (X) adapted to seal a respective electrical wire (33),

each pathway (30) of the grid (15) corresponding to a pathway (22) of the mat sealing joint (20) and to a pathway (7) of the housing (4),
wherein the housing (4) and the grid (15) each comprises a sealing portion (19, 31),
wherein the peripheral portion (29) of the mat sealing joint (20) is compressed between a sealing portions (19, 31) of the housing (4) and the grid (15), and
wherein the peripheral portion (29) of the mat sealing joint (20), the housing (4) and the grid (15) each comprises an abutting surface (37b, 37c, 38, 39) oriented transverse to the longitudinal direction (X), the abutting surfaces (37b, 27c, 38, 39) abutting on one another
characterized in that
the peripheral portion (29) has a cross-section shaped as a T, said T comprising a foot (36) and a head (37), the foot extending in a plane transverse to the longitudinal direction (X), and the head (37) extending along the longitudinal direction (X), wherein the foot (36) is compressed between the sealing portions (19, 31) of the housing (4) and of the grid (15), wherein the sealing portion (19) of the housing (4) has a surface normal to the longitudinal direction (X) and facing upward, facing a lower surface (36b) of the foot, wherein the housing (4) comprises a lateral abutting surface (38) facing an abutting surface (37b) of the mat sealing joint (20), wherein the sealing portion (31) of the grid (15) has a surface normal to the longitudinal direction and facing downward, facing an upper surface (36a) of the foot, wherein the grid comprises a lateral abutting surface (39) facing an abutting face (38c) of the mat sealing joint (20).

2. Electrical connector according to claim 1, wherein the degree of compression of the foot (36) is at least 20%.

3. Electrical connector according to claim 1 or 2, wherein the sealing portions (19, 31) of the housing (4) and the grid (15) comprises pressing surfaces compressing the foot (36) of the peripheral portion (29) of the mat sealing joint (20) along a direction parallel to the longitudinal direction (X).

4. Electrical connector according to any preceding claims, wherein before compressing the mat sealing joint (20) between the housing (4) and the grid (15), the grid (15) and the peripheral portion (29) of the peripheral portion (29) of the mat sealing joint (20) are cooperating by shape engagement.

5. Electrical connector according to any preceding claim, wherein the central body (28) comprises:

- a central portion (21) through which the pathways extend, and
- an external portion (24) to which the peripheral portion of the mat sealing joint (20) is connected,

wherein the central body (28) has at least one recess (26) between the central portion (21) and the external portion (24).

6. Electrical connector according to claim 5, wherein the mat sealing joint (20) has an external face (22a, 22b) facing at least one of the grid (15) and the housing (4),
wherein the recess (26) extends from the external face along the longitudinal direction (X), and wherein said at least one of the grid (15) and the housing (4) comprises an alignment member (35, 41) inserted in the recess.

7. Electrical connector according to claim 6, wherein the mat sealing joint (20) has external faces (22a, 22b) facing both the grid (15) and the housing (4), recesses extending from the respective external faces along the longitudinal direction (X), and wherein both the grid (15) and the housing (4) comprise an alignment member (35, 41) inserted in a respective recess.

8. Electrical connector according to any of claims 5 to 7, wherein the central portion (21) is connected to the external portion (24) by a plurality of flexible organs (25).

9. A mat sealing joint (20) for an electrical connector comprising

- a peripheral portion (29), and
- a central body (28) comprising a plurality of pathways (22) each extending along a longitudinal direction (X),

characterized in that the peripheral portion (29) has a cross-section shaped as a T, comprising a foot (36) and a head (37), the foot (36) extending in a plane transverse to the longitudinal direction (X), and the head (37) extending along the longitudinal direction (X), and
wherein the peripheral portion (29) further comprises an abutting surface (37b, 37c) oriented transverse to the longitudinal direction (X).

10. A mat sealing joint according to claim 9, wherein the central body (28) comprises:

- a central portion (21) through which extend the pathways (22),
- an external portion (24) to which the peripheral portion (29) of the mat sealing joint (20) is connected, and

wherein the central body (28) has at least one recess (26) between the central portion (21) and the external portion (24).

Patentansprüche

1. Elektrischer Verbinder, der aufweist:

- ein Gehäuse (4), das eine Vielzahl von Pfaden (7) aufweist, die sich entlang einer Längsrichtung (X) zwischen einer Verbindungsfläche (8) des Gehäuses (4) und einer Rückfläche (9) des Gehäuses (4) erstrecken, die ausgebildet sind zur Aufnahme eines elektrischen Elements (13),
- ein Gitter (15), das mit dem Gehäuse (4) mechanisch verbunden ist und eine Vielzahl von Pfaden (30) aufweist, die sich entlang der Längsrichtung (X) erstrecken, und
- eine Mattendichtungsverbindung (20), die zwischen dem Gehäuse und dem Gitter (15) eingepresst ist und einen peripheren Teil (29) und einen zentralen Körper (28) aufweist, eine Vielzahl von Pfaden (22) aufweisend, die sich jeweils entlang der Längsrichtung (X) erstrecken, die ausgebildet sind zum Abdichten einer jeweiligen elektrischen Leitung (33),

wobei jeder Pfad (30) des Gitters (15) einem Pfad (22) der Mattendichtungsverbindung (20) und einem Pfad (7) des Gehäuses (4) entspricht,
wobei das Gehäuse (4) und das Gitter (15) jeweils einen Dichtungsteil (19, 31) aufweisen,
wobei der periphere Teil (29) der Mattendichtungsverbindung (20) zwischen den Dichtungsteilen (19, 31) des Gehäuses (4) und des Gitters (15) komprimiert ist, und
wobei der periphere Teil (29) der Mattendichtungsverbindung (20), das Gehäuse (4) und das Gitter (15)

jeweils eine Stoßfläche (37b, 37c, 38, 39) aufweisen, die quer zu der Längsrichtung (X) ausgerichtet ist, wobei die Stoßflächen (37b, 27c, 38, 39) aneinander anliegen,
dadurch gekennzeichnet, dass
der periphere Teil (29) einen T-förmigen Querschnitt hat, wobei das T einen Fuß (36) und einen Kopf (37) aufweist, wobei sich der Fuß in einer Ebene quer zu der Längsrichtung (X) erstreckt und sich der Kopf (37) entlang der Längsrichtung (X) erstreckt, wobei der Fuß (36) zwischen den Dichtungsteilen (19, 31) des Gehäuses (4) und des Gitters (15) komprimiert ist, wobei der Dichtungsteil (19) des Gehäuses (4) eine Oberfläche normal zu der Längsrichtung (X) und nach oben gewandt hat, einer unteren Oberfläche (36b) des Fußes zugewandt, wobei das Gehäuse (4) eine laterale Stoßfläche (38) aufweist, die einer Stoßfläche (37b) der Mattendichtungsverbindung (20) zugewandt ist, wobei der Dichtungsteil (31) des Gitters (15) eine Oberfläche normal zu der Längsrichtung und nach unten gewandt hat, einer oberen Oberfläche (36a) des Fußes zugewandt, wobei das Gitter eine laterale Stoßfläche (39) aufweist, die einer Stoßfläche (38c) der Mattendichtungsverbindung (20) zugewandt ist.

2. Elektrischer Verbinder gemäß Anspruch 1, wobei der Grad der Komprimierung des Fußes (36) zumindest 20% ist.

3. Elektrischer Verbinder gemäß Anspruch 1 oder 2, wobei die Dichtungsteile (19, 31) des Gehäuses (4) und des Gitters (15) Drückoberflächen aufweisen, die den Fuß (36) des peripheren Teils (29) der Mattendichtungsverbindung (20) entlang einer Richtung parallel zu der Längsrichtung (X) komprimieren.

4. Elektrischer Verbinder gemäß einem der vorhergehenden Ansprüche, wobei vor dem Komprimieren der Mattendichtungsverbindung (20) zwischen dem Gehäuse (4) und dem Gitter (15) das Gitter (15) und der periphere Teil (29) des peripheren Teils (29) der Mattendichtungsverbindung (20) durch Formeingriff zusammenwirken.

5. Elektrischer Verbinder gemäß einem der vorhergehenden Ansprüche, wobei der zentrale Körper (28) aufweist:

- einen zentralen Teil (21), durch den sich die Pfade erstrecken, und
- einen äußeren Teil (24), mit dem der periphere Teil der Mattendichtungsverbindung (20) verbunden ist,

wobei der zentrale Körper (28) zumindest eine Ausnehmung (26) zwischen dem zentralen Teil (21) und dem äußeren Teil (24) hat.

6. Elektrischer Verbinder gemäß Anspruch 5, wobei die Mattendichtungsverbindung (20) eine Außenfläche (22a, 22b) hat, die zumindest einem des Gitters (15) und des Gehäuses (4) zugewandt ist,
wobei sich die Ausnehmung (26) von der Außenfläche entlang der Längsrichtung (X) erstreckt, und wobei das zumindest eine des Gitters (15) und des Gehäuses (4) ein Ausrichtungselement (35, 41) aufweist, das in die Ausnehmung eingesetzt ist.

7. Elektrischer Verbinder gemäß Anspruch 6, wobei die Mattendichtungsverbindung (20) Außenflächen (22a, 22b) hat, die sowohl dem Gitter (15) als auch dem Gehäuse (4) zugewandt sind, wobei sich Ausnehmungen von den jeweiligen Außenflächen entlang der Längsrichtung (X) erstrecken, und wobei sowohl das Gitter (15) als auch das Gehäuse (4) ein Ausrichtungselement (35, 41) aufweisen, das in eine entsprechende Ausnehmung eingesetzt ist.

8. Elektrischer Verbinder gemäß einem der Ansprüche 5 bis 7, wobei der zentrale Teil (21) mit dem äußeren Teil (24) durch eine Vielzahl von flexiblen Organen (25) verbunden ist.

9. Eine Mattendichtungsverbindung (20) für einen elektrischen Verbinder, die aufweist:

- einen peripheren Teil (29), und
- einen zentralen Körper (28), der eine Vielzahl von Pfaden (22) aufweist, die sich jeweils entlang einer Längsrichtung (X) erstrecken,

dadurch gekennzeichnet, dass der periphere Teil (29) einen T-förmigen Querschnitt hat mit einem Fuß (36) und einem Kopf (37), wobei sich der Fuß (36) in einer Ebene quer zu der Längsrichtung (X) erstreckt und sich der Kopf (37) entlang der Längsrichtung (X) erstreckt, und
wobei der periphere Teil (29) weiter eine Stoßfläche (37b, 37c) aufweist, die quer zu der Längsrichtung (X) ausgerichtet ist.

10. Eine Mattendichtungsverbindung gemäß Anspruch 9, wobei der zentrale Körper (28) aufweist:

- einen zentralen Teil (21), durch den sich die Pfade (22) erstrecken,
- einen äußeren Teil (24), mit dem der periphere Teil (29) der Mattendichtungsverbindung (20) verbunden ist, und

wobei der zentrale Körper (28) zumindest eine Ausnehmung (26) zwischen dem zentralen Teil (21) und dem äußeren Teil (24) hat.

Revendications

1. Connecteur électrique comprenant :

- un boîtier (4) comprenant une pluralité de passages (7) s'étendant le long d'une direction longitudinale (X) entre une face d'accouplement (8) du boîtier (4) et une face arrière (9) du boîtier (4), adapté pour recevoir un élément électrique (13),
- une grille (15) reliée mécaniquement au boîtier (4) et comprenant une pluralité de passages (30) s'étendant le long de la direction longitudinale (X), et
- un joint d'étanchéité en mat (20), comprimé entre le boîtier et la grille (15), et comprenant une portion périphérique (29) et un corps central (28) comprenant une pluralité de passages (22) s'étendant chacun le long de la direction longitudinale (X), adapté pour rendre étanche un fil électrique respectif (33), chaque passage (30) de la grille (15) correspondant à un passage (22) du joint d'étanchéité en mat (20) et à un passage (7) du boîtier (4),

dans lequel le boîtier (4) et la grille (15) comprennent chacun une portion d'étanchéité (19, 31),
dans lequel la portion périphérique (29) du joint d'étanchéité en mat (20) est comprimée entre des portions d'étanchéité (19, 31) du boîtier (4) et de la grille (15), et
dans lequel la portion périphérique (29) du joint d'étanchéité en mat (20), le boîtier (4) et la grille (15) comprennent chacun une surface de butée (37b, 37c, 38, 39) orientée transversalement par rapport à la direction longitudinale (X), les surfaces de butée (37b, 37c, 38, 39) butant les unes contre les autres,
caractérisé en ce que
la portion périphérique (29) a une section transversale en forme de T, ledit T comprenant un pied (36) et une tête (37), le pied s'étendant dans un plan transversal par rapport à la direction longitudinale (X), et la tête (37) s'étendant le long de la direction longitudinale (X), dans lequel le pied (36) est comprimé entre les portions d'étanchéité (19, 31) du boîtier (4) et de la grille (15), dans lequel la portion d'étanchéité (19) du boîtier (4) a une surface normale par rapport à la direction longitudinale (X) et tournée vers le haut, faisant face vers une surface inférieure (36b) du pied, dans lequel le boîtier (4) comprend une surface de butée latérale (38) faisant face vers une surface de butée (37b) du joint d'étanchéité en mat (20), dans lequel la portion d'étanchéité (31) de la grille (15) a une surface normale par rapport à la direction longitudinale et tournée vers le bas, faisant face vers une surface supérieure (36a) du pied, dans lequel la grille comprend une surface de butée latérale (39) faisant face vers une surface de butée (38c) du joint d'étanchéité en mat (20).

2. Connecteur électrique selon la revendication 1, dans lequel le degré de compression du pied (36) est au moins de 20 %.

3. Connecteur électrique selon la revendication 1 ou 2, dans lequel les portions d'étanchéité (19, 31) du boîtier (4) et de la grille (15) comprennent des surfaces de compression comprimant le pied (36) de la portion périphérique (29) du joint d'étanchéité en mat (20) le long d'une direction parallèle à la direction longitudinale (X).

4. Connecteur électrique selon l'une quelconque des revendications précédentes, dans lequel, avant de comprimer le joint d'étanchéité en mat (20) entre le boîtier (4) et la grille (15), la grille (15) et la portion périphérique (29) de la portion périphérique (29) du joint d'étanchéité en mat (20) coopèrent par engagement de forme.

5. Connecteur électrique selon l'une quelconque des revendications précédentes, dans lequel le corps central (28) comprend :

- une portion centrale (21) à travers laquelle s'étendent les passages, et
- une portion externe (24) à laquelle est connectée la portion périphérique du joint d'étanchéité en mat (20),

dans lequel le corps central (28) a au moins un renfoncement (26) entre la portion centrale (21) et la portion externe (24).

6. Connecteur électrique selon la revendication 5, dans lequel le joint d'étanchéité en mat (20) a une face externe (22a, 22b) faisant face vers au moins un élément parmi la grille (15) et le boîtier (4),
dans lequel le renfoncement (26) s'étend depuis la face externe le long de la direction longitudinale (X), et
dans lequel ledit au moins un élément parmi la grille (15) et le boîtier (4) comprend un élément d'alignement (35, 41) inséré dans le renfoncement.

7. Connecteur électrique selon la revendication 6, dans lequel le joint d'étanchéité en mat (20) a des faces externes (22a, 22b) faisant face à la fois vers la grille (15) et vers le boîtier (4), les renfoncements s'étendant depuis les faces externes respectives le long de la direction longitudinale (X), et dans lequel à la fois la grille (15) et le boîtier (4) comprennent un élément d'alignement (35, 41) inséré dans un renfoncement respectif.

8. Connecteur électrique selon l'une quelconque des

revendications 5 à 7, dans lequel la portion centrale (21) est connectée à la portion externe (24) par une pluralité d'organes flexibles (25).

9. Joint d'étanchéité en mat (20) destiné à un connecteur électrique, comprenant :

- une portion périphérique (29), et
- un corps central (28) comprenant une pluralité de passages (22) s'étendant chacun le long d'une direction longitudinale (X),

caractérisé en ce que
la portion périphérique (29) a une section transversale en forme de T, comprenant un pied (36) et une tête (37), le pied (36) s'étendant dans un plan transversal par rapport à la direction longitudinale (X), et la tête (37) s'étendant le long de la direction longitudinale (X), et
dans lequel la portion périphérique (29) comprend en outre une surface de butée (37b, 37c) orientée transversalement par rapport à la direction longitudinale (X).

10. Joint d'étanchéité en mat (20) selon la revendication 9, dans lequel le corps central (28) comprend :

- une portion centrale (21) à travers laquelle s'étendent les passages (22),
- une portion externe (24) à laquelle la portion périphérique (29) du joint d'étanchéité en mat (20) est connectée, et

dans lequel le corps central (28) a au moins un renfoncement (26) entre la portion centrale (21) et la portion externe (24).

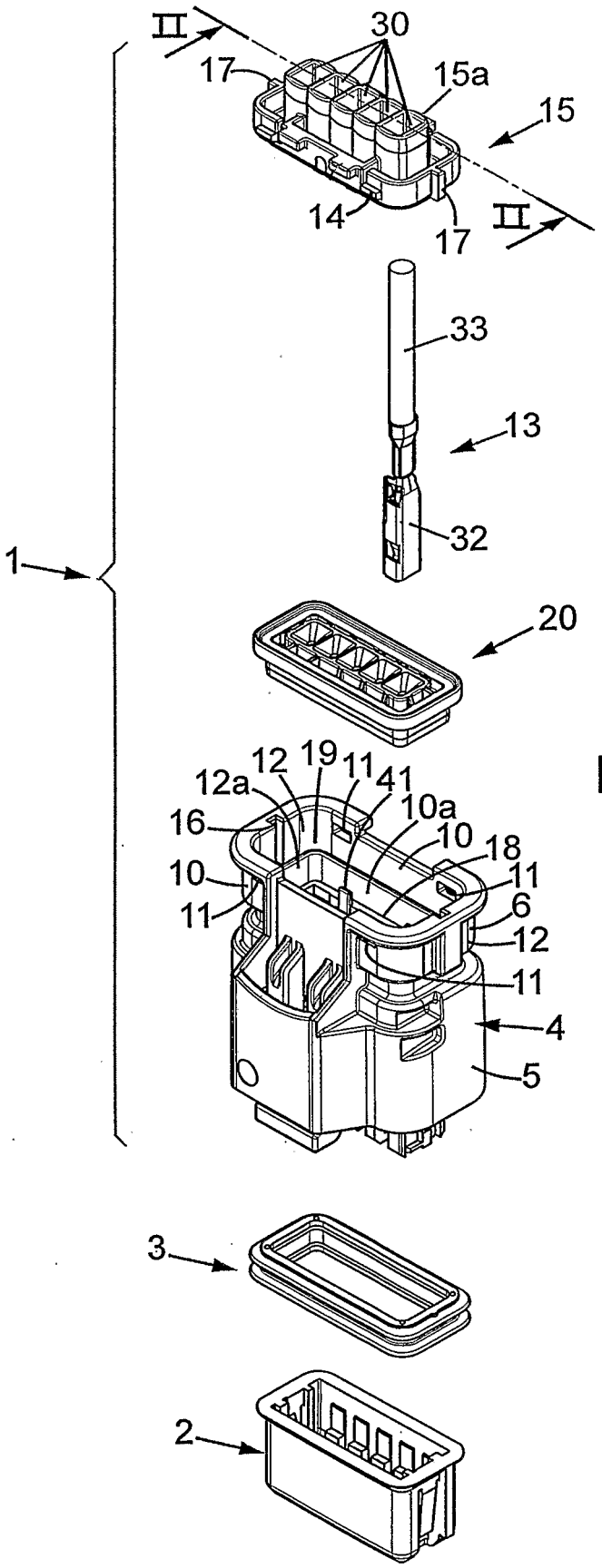
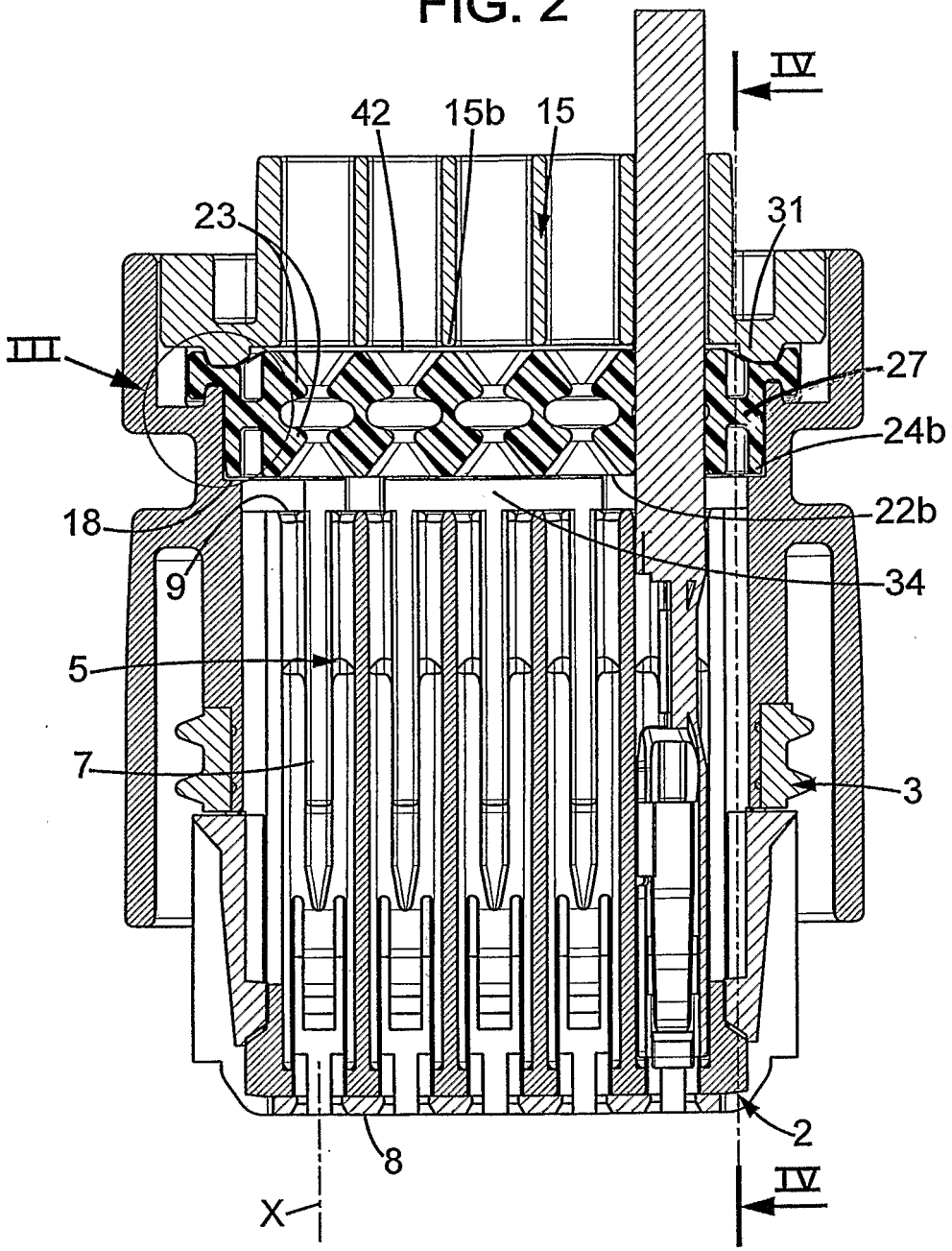

II
30
17
15a
15
14
17
II
33
13
32
1
20
12
19
11
41
12a
10a
16
10
18
10
11
11
6
12
11
4
5
3
2

FIG. 1

FIG. 2



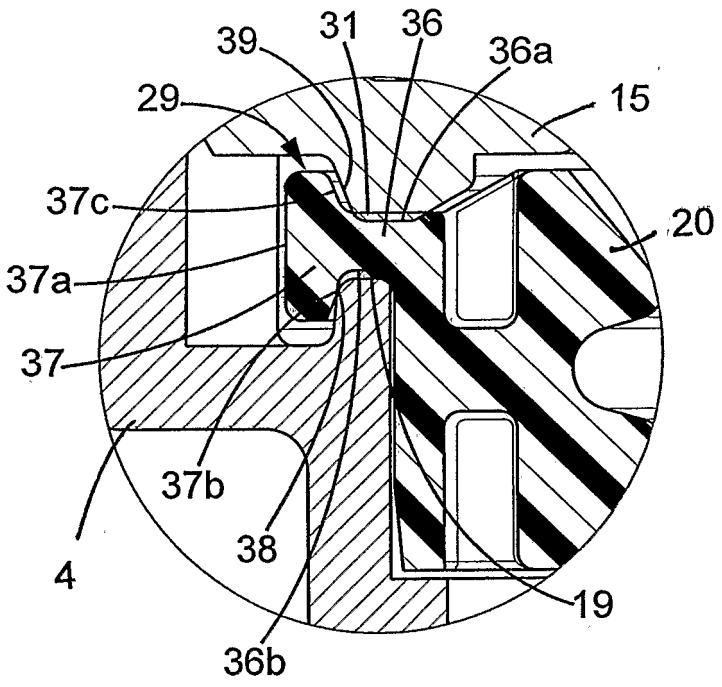


FIG. 3

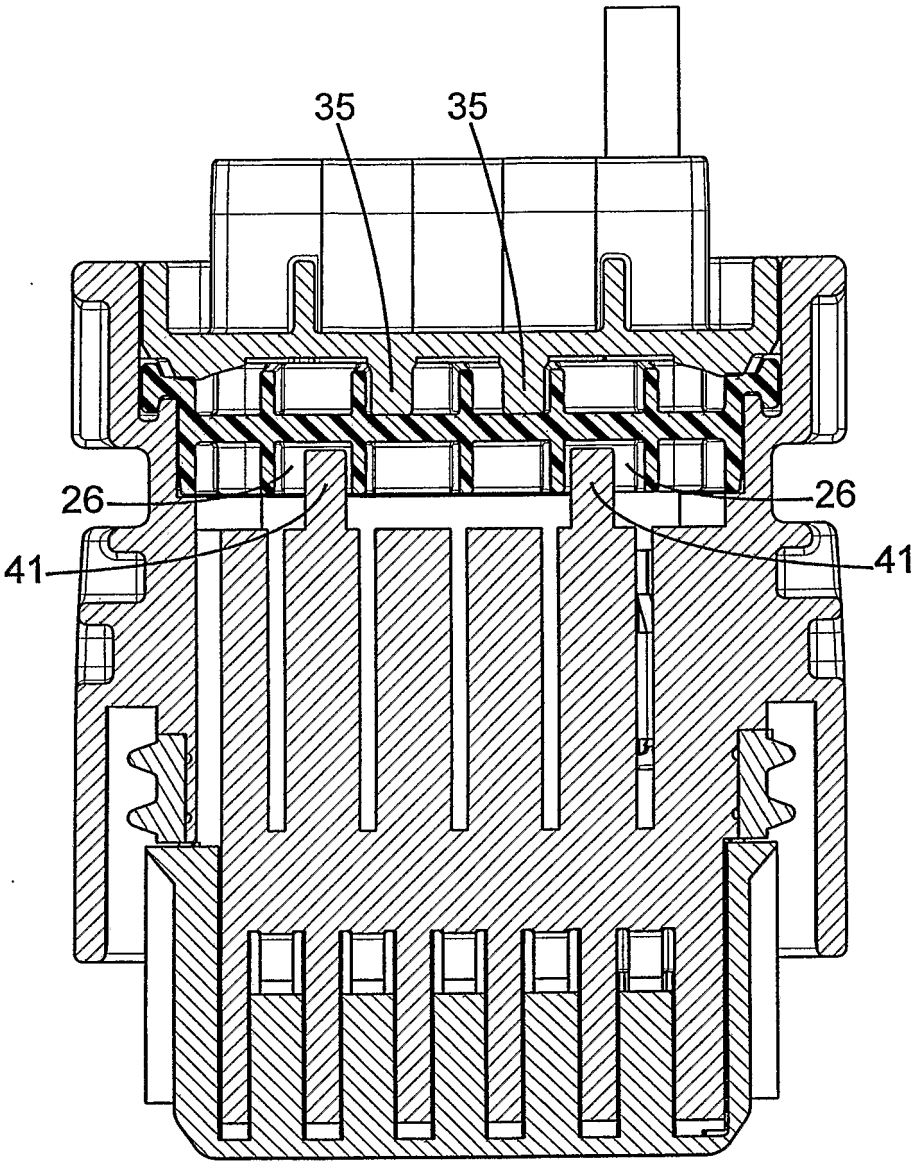


FIG. 4

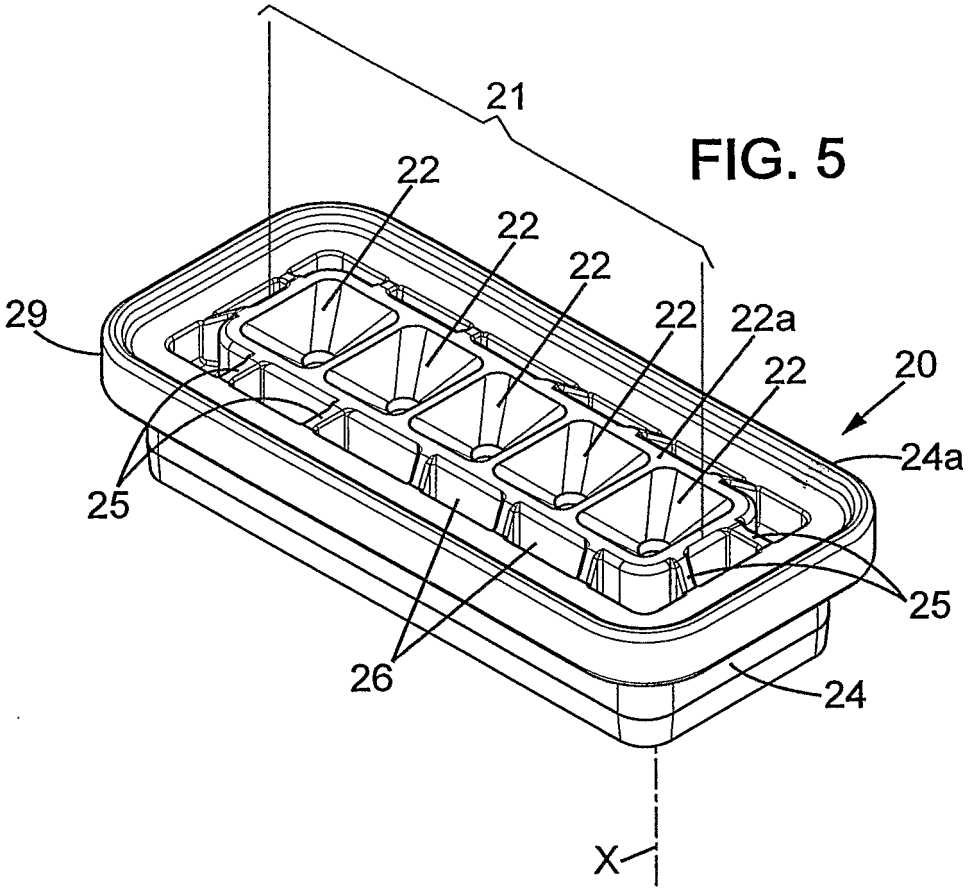

21
22
22
22
22
22a
22
20
29
24a
25
25
26
24
X

FIG. 5

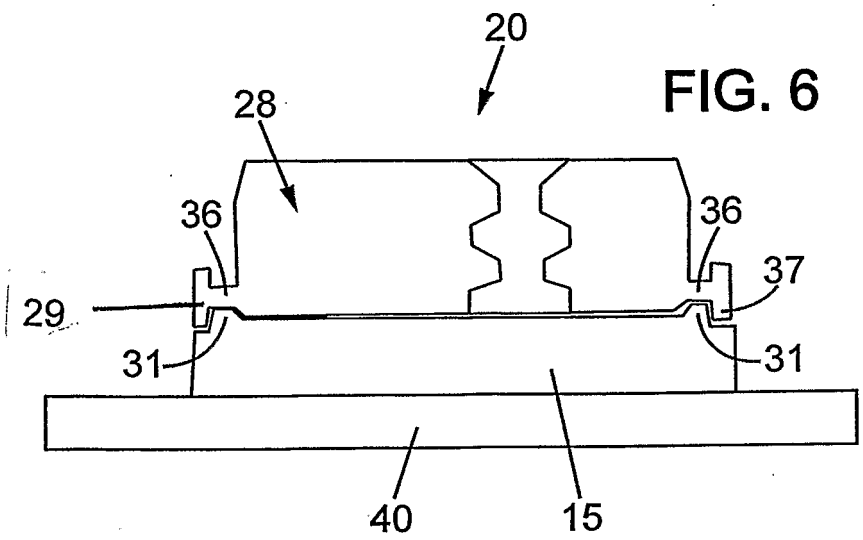

20
28
36
36
37
29
31
31
40
15

FIG. 6

REFERENCES CITED IN THE DESCRIPTION

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