(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 784 879 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
01.10.2014 Bulletin 2014/40

(51) Int Cl.:
H01R 13/52 *(2006.01)*

(21) Application number: **13161806.8**

(22) Date of filing: **28.03.2013**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

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(54) Mat sealing joint for connector

(57) A mat sealing joint (20) for a connector (1), the mat sealing joint is adapted to be placed between a housing body (4) and a rear grid (15) of the connector, the mat sealing joint comprises a central sealing portion (21a) defining a plurality of passageways (22), each of the plurality of passageways extends along a longitudinal direction (X) and is adapted to sealingly receive a terminal (13), wherein each of the plurality of passageways comprises an internal region (22c) delimited by at least two wire-sealing ribs (23), wherein the internal region has a cross-section in the section plane (Y ; Z) with an elongated profile extending along one direction comprised in the section plane (Y ; Z).

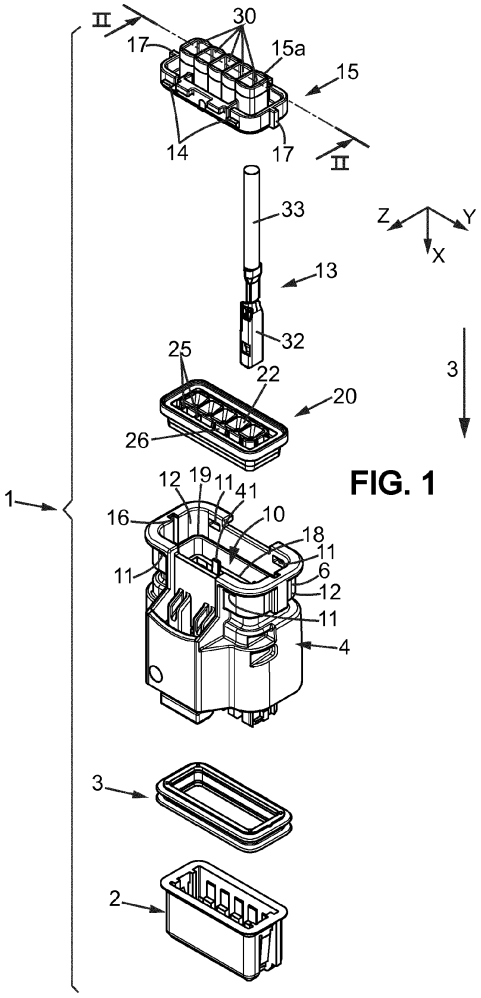

FIG. 1

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Description

FIELD OF THE INVENTION

[0001] The instant invention relates to mat sealing joints for electrical, optical or electro-optical connectors.

BACKGROUND OF THE INVENTION

[0002] Electrical connectors comprising a mat sealing joint are notably used for electrical or electro-optical connections such as those in automotive applications, for example. Mat-type sealing joints (also known as "grommets") commonly used in these connectors are integrally made of an elastomeric material, to efficiently protect electrical connection from humidity, dust or other elements, and thus to ensure a proper behaviour of electrical or electro-optical connectors. Such connectors usually comprise a housing (main part of the connector), at least one grid (rear part of the connector) and a mat sealing joint being inserted between the housing and the grid. The mat sealing joint has usually a plurality of passageways through which at least one terminal of an electrical terminal can pass. Sealing is performed peripherally by the sealing joint which is to be compressed on the housing. Further, the sealing joint exerts sealing on each wire.
[0003] WO 2011/030,187 already describes such a mat sealing joint. Although this mat sealing joint is rather satisfactory, tearing may occur from time to time at unmolding, in which case the mat sealing joint must be discarded.
[0004] The instant invention has notably for object to provide a mat sealing joint which would be easily manufactured at high operating speed, while still providing high sealing efficiency and without raising its manufacture cost.

SUMMARY OF THE INVENTION

[0005] To this aim, according to the invention, such a mat sealing joint intended to be inserted between a housing and a grid of an electrical connector, and defining a longitudinal direction and a section plane normal to the longitudinal direction, comprises :

a central sealing portion defining a plurality of passageways, each of the plurality of passageways extending along the longitudinal direction and being adapted to sealingly receive a terminal,
wherein each of the plurality of passageways comprises an internal region delimited by at least two wire-sealing ribs, wherein the internal region has a cross-section in the section plane with an elongated profile extending along one direction comprised in the section plane.

[0006] In some embodiments, one might also use one or more of the following features taken alone or in combination :

- the mat sealing joint comprises
  a peripheral portion extending normal to the longitudinal direction and all along a periphery of the mat sealing joint,
  an intermediate portion, located between the central sealing portion and the peripheral portion, the intermediate portion comprises :
  - an outer lateral wall extending in the longitudinal direction all around the sealing portion,
  - at least one first lateral recess located in the outer lateral wall of the intermediate portion and extending in a transversal direction normal to the longitudinal direction ;
- the internal region of each of the plurality of passageways having the same elongated profile along one of the directions of the section plane comprises at least two inner flat walls extending parallel to the one of the directions comprised in the section plane ;
- inner flat walls of two adjacent internal regions form an inner barrier separating the two adjacent internal regions, each of the inner barriers separating the two adjacent internal regions has a first thickness ;
- the central sealing portion comprises at least two extreme passageways, and each of the at least one lateral recess located in the outer lateral wall of the intermediate portion comprises a partition wall separating the lateral recess and the internal region of the extreme passageway of the sealing portion, the partition wall is parallel to the inner flat wall of the internal region extending parallel to the one of the directions comprised in the section plane ;
- the partition wall separating the lateral recess and the internal region of the extreme passageway form an outer barrier, the outer barrier has a second thickness being at least the same as the first thickness of the inner barrier separating two adjacent internal regions of the plurality of passageways ;
- the mat sealing joint is made of a deformable material.

[0007] According to another aspect of this invention, it is provided an electrical or electro-optical connector intended to receive the mat sealing joint and the corresponding terminal, the connector comprises :

a housing body and at least one grid ,
a mat sealing joint placed between the housing body and the grid, the mat sealing joint comprises all the features as described above ;
the terminal, chosen among a wire, fibre or cable, passing through the internal region of at least one of the plurality of passageways, the terminal comprises a terminal member with an elongated shape extend-

ing in the longitudinal direction and adapted to be inserted into the housing body.

[0008] Any of the embodiments of a connector with a sealing element as described above may be used in an assembly comprising any of the above described connectors and a complementary device. The sealing element is then compressed between the connector and the complementary device in order to obtain the best sealing properties.

[0009] Further information is provided in the detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] Other characteristics and advantages of the invention will readily appear from the following description of two of its embodiments, provided as a non-limitative example, and of the accompanying drawings.

[0011] On the drawings :

- Fig. 1 is an exploded perspective view of a connector according to a first embodiment,
- Fig. 2 presents different views of a mat sealing joint of the PRIOR ART,
- Fig. 3 is a perspective view of a mat sealing joint taken from a mating way (W) along the longitudinal direction (X),
- Fig. 4 illustrates a perspective view of a mat sealing joint taken against the mating way (W) along the longitudinal direction (X),
- Fig. 5 is sectional view of the mat sealing joint taken along lines V-V of Fig. 3,
- Fig. 6 illustrates a sectional view of the mat sealing joint taken along lines VII-VII of Fig. 4,
- Fig. 7 is a sectional view of the mat sealing joint taken along lines VI-VI of Fig. 3,
- Fig. 8 illustrates a sectional view of the connector assembly comprising the mat sealing joint taken along lines II-II of Fig. 1,
- Fig. 9 is a partial enlarged view of a section IX from Fig. 8,
- Fig. 10A and 10B illustrate particular steps of a manufacturing process.

[0012] On the different Figures, the same reference signs designate like or similar elements.

DETAILED DESCRIPTION

[0013] Figures 1 and 8 demonstrate an example of an electrical connector 1 to be connected to a mating connector (not shown). This connector comprises a front grid 2, a front joint 3, a housing body 4, a rear mat sealing joint 20, and a rear grid 15. At least one electrical or electro-optical terminal 13 is intended to be assembled to the electrical connector 1 in order to be coupled with the mating connector (not shown). All these parts are intended to be assembled in the mating way (W) of the longitudinal direction (X). Moreover, the housing body 4 further comprises a sealing portion 19 (will be described later) adapted to sealingly receive the rear mat sealing joint 20.

[0014] However, the front grid 2 and the front joint 3 shown in Fig. 1 may be optional according to this invention. The joint 3 may be interposed between the connector 1 and the mating connector for sealing this connection. The front grid 2 is locked to a front mating end of the housing body 4 before assembly to the mating connector.

[0015] The connector 1 has a front face 8 which is a mating face with the mating connector, a connection portion 5 and a receiving space 10. The receiving space 10 is adapted to receive the rear grid 15 together with the rear mat sealing joint 20. The rear mat sealing joint 20 is interposed between the housing body 4 and the rear grid 15 in order to provide a suitable sealing of the electrical or electro-optical connection between the connector and appropriate electrical or electro-optical terminals. The front joint 3 may be made of any suitable shape and material, and may be interposed between the housing body 4 and the front grid 2 in order to enhance sealing of the connection. Both the front joint 3 and the rear mat sealing joint 20 may be made of an elastomer material, such as rubber or silicone.

[0016] In the example shown, the housing body 4, the front grid 2 and the rear grid 15 are preferably made of a dielectric thermoplastic material. The connection portion 5 of the housing body 4 comprises one or more pathways 7 (see Fig. 8) extending along a longitudinal direction (X) from the receiving space 10 to the front face 8. The pathways 7 are adapted to receive the electrical or electro-optical terminals 13. In the example shown in Fig 8, there are five pathways 7.

[0017] The receiving space 10 is defined by a receiving sleeve 6 extending all around the receiving space 10 and consisting of four lateral walls 12 all extending along the longitudinal direction (X). The lateral walls 12 inside the receiving space 10 may further comprise locking features. The locking features may take a shape of holes or protrusions 11 formed in at least one of the walls. Preferably, the holes or protrusions 11 are formed in the opposing walls of both the housing 4 and the rear grid 15, as shown in the Figures. The holes of protrusions 11 are adapted to cooperate with complementary locking features such as holes or protrusions 14 of the rear grid 15. In the example shown in the Figure 1, the housing 4 comprises holes 11, while the rear grid 15 comprises protrusions 14. Upon insertion, the protrusions 14 of the rear grid 15 are snap-fitted into the holes 11 of the housing, thus helping retention of the rear grid 15 in the housing 4. Moreover, when the rear mat sealing joint 20 is inserted between the housing 4 and the rear grid 15, the rear grid 15 may prevented from moving relative to the housing body 4 along the longitudinal direction (X) and also in a plane (Y ; Z) normal to the longitudinal direction (X).

[0018] The receiving space 10 may further comprise guiding features, such as grooves or protrusions 16 ex-

tending along the longitudinal direction (X) in the walls 12. These grooves or protrusions 16 are designed to cooperate with complementary guiding features such as grooves or protrusions 17 of the rear grid 15 upon a mating process. In the example shown in the Figures, the receiving space 10 comprises a pair of guiding grooves 16, positioned in the opposing walls 12 of the receiving space 10, while the rear grid 15 comprises a pair of complementary guiding protrusions. Once the guiding features are provided, they may help correct positioning of the rear grid 15 in the receiving space 10.

[0019] Inside said receiving space 10, there is also a lower edge 18 extending along the periphery of the receiving space 10 and facing upward. Said lower edge 18 may include a plurality of alignment parts 41 projecting upwardly from the lower edge 18. Said two alignment parts 41 of the housing body 4 may be introduced in corresponding recesses 26 of the mat sealing joint in order to maintain the rear mat sealing joint 20 in place during insertion.

[0020] As already mentioned, the receiving space 10 of the housing body 4 is adapted to receive the rear grid 15. This rear grid 15 may contain a plurality of pathways 30 aligned in the transverse direction (Y). Preferably, the number of pathways 30 corresponds to the number of pathways 7. For example, the rear grid 15 may have 2, 3, 4, 5 or more pathways 30; in an example shown on Figs 1 and 3, the number of pathways is 5 and 4, respectively. Each pathway 30 is designed to receive one terminal 13. Between the receiving space 10 and the rear grid 15, the rear mat sealing joint 20 is to be inserted. The geometry and use of this mat sealing joint 20 will be described in more details below.

[0021] The rear grid 15 comprises an upper portion 15a and a bottom portion 15b. The bottom portion 15b of the grid 15 may comprise a sealing portion 50 (Fig. 8) projecting downward from the bottom portion of the rear grid 15. In the assembled state of the connector 1, the sealing portion 50 of the bottom portion 15b of the rear grid 15 compresses the mat sealing joint 20 onto the sealing portion 19 of the housing 4 (will be described later).

[0022] Each pathway 7 of the housing body 4 is shaped to receive at least one electrical or electro-optical terminal 13 which usually comprises a terminal member 32 connected to a wire 33, for example by crimping (see Fig. 1). Only one such terminal is shown on Fig. 1. For example, the terminal 13 may have an elongated shape, generally speaking a rectangular shape in section plane (Y ; Z) and also in section plane (X ; Y) but it is not limited thereto. In some cases, the terminal 13 might comprise a plurality of wires bundled into a cable or a bundle of wires.

[0023] The connector 1 further comprises a mat sealing joint 20 made of an elastically deformable material, for example an elastomeric polymer, some suitable silicones or rubber. The mat sealing joint 20 is intended to seal the connector 1 against water, dust and/or other impurities which could worsen the electrical or electro-optical connection between the terminal 13 and its complementary contact.

[0024] The rear mat sealing joint 20 of Fig. 1 may comprise one row of passageways 22 aligned in the direction (Y). In an alternative embodiment, the passageways 22 may be arranged in several rows. In an alternative embodiment, the passageways 22 may be not aligned, but offset. The number of passageways 22 preferably corresponds to the number of pathways 30 provided on the rear grid 15, and to the number of pathways 7 provided in the housing 4.

[0025] Referring to Figures 3 to 7, the mat sealing joint 20 comprises a central sealing portion 21a, a peripheral portion 24 and an intermediate portion 28.

[0026] The peripheral portion 24 extends outwardly from the central sealing portion 21a. The peripheral portion 24 extends all along a periphery of the rear mat sealing joint 20. The peripheral portion 24 defines a loop having an upper surface 24a and a lower surface 24b. As shown in Figures 5 and 9, the peripheral portion 24 thus forms a loop with a narrow part 36 extending from the rear mat sealing joint 20, and a bulge 37, forming an outermost boundary of the peripheral portion 24 of the mat sealing joint 20.

[0027] The narrow part 36 has an upper surface and a lower surface corresponding to the upper surface 24a and lower surface 24b of the peripheral portion 24. The lower surface 24b of the narrow part 36 is designed to face a sealing portion 19 of the housing body 4. More specifically, the narrow part 36 is pressed between the sealing portion 19 of the housing body 4 and the sealing portion 50 of the rear grid 15 all along the periphery of the joint 20. The pressing surfaces of these sealing portions 19, 50 compress the narrow part 36 substantially along a direction parallel to the longitudinal direction (X) (so-called "longitudinal peripheral sealing"), so as to achieve the desired degree of sealing.

[0028] The bulge 37 comprises an external surface 37a facing toward the inner walls 12 of the housing 4, and two opposite inwardly-facing abutting faces 37b and 37c. The abutting face 37b cooperates with a lateral abutting surface 52 of the sealing portion 19 of the housing body 4. The abutting face 37c cooperates with a lateral abutting surface 53 of the sealing portion 50 of the bottom portion 15b of the rear grid 15. The abutting faces 37b and 37c may improve sealing properties of the mat sealing joint 20 in the assembled state.

[0029] The bulge 37 can be tight fitted inside the housing 4 in such a way that the transverse compression is performed between the housing 4 and the external surface 37a of the rear mat sealing joint 20.

[0030] In the assembled state of the connector 1, the sealing portion 50 of the bottom portion 15b of the rear grid 15 compresses the narrow part 36 of the peripheral portion 24 of the mat sealing joint 20 onto the sealing portion 19 of the housing 4. More precisely, to assure good sealing properties between the rear grid 15 and the housing 4, the sealing portion 50 of the bottom portion

15b should be in a contact with the upper surface 24a of the peripheral portion 24, and the lower surface 24b of the peripheral portion 24 should be in a contact with the sealing portion 19 of the housing body 4.

[0031] The intermediate portion 28 is located between the central sealing portion 21a and the peripheral portion 24. The intermediate portion 28 comprises an outer lateral wall 28a extending all around the sealing portion, and at least one first lateral recess 35 located in the outer lateral wall of the intermediate portion just below the peripheral portion 24 in the mating way (W) and extending in a transversal direction (Y) normal to the longitudinal direction (X). In the example shown in the Figures 7 and 8, there are two lateral recesses 35, positioned in the opposing walls of the rear mat sealing joint 20. As illustrated in Fig. 9, for example, said first lateral recesses 35 have an L-shaped cross-section defining a top face 35a and an opposed bottom face 35b, the top and bottom faces 35a, 35b extending normal to the longitudinal direction (X). Furthermore, the recess 35 includes also a partition face 35c extending normal to top 35a and bottom faces 35b. Alternatively, the shape of the recess 35 may be formed in a T-shape or the like.

[0032] As it is illustrated in Fig. 4, the rear mat sealing joint 20 includes a mating side intended to cooperate with the receiving space 10 of the housing body 4 upon inserting. This mating side may comprise a plurality of peripheral ribs 31 extending from the intermediate portion 28 to an external wall 21c of the central sealing portion 21a. The peripheral ribs 31 might be deployed all around the periphery of the external wall 21c of the central sealing portion 21a. They may exhibit a triangular cross-section as shown on Fig. 4. In general, the ribs 31 may help to centre the rear mat sealing joint 20 into the receiving space 10 of the housing body 4 upon their mating process.

[0033] Moreover, referring to Fig. 6, the mating side of the rear mat sealing joint 20 comprises also a plurality of grooves 35d. These grooves 35d may have a different cross-section compared to the cross-section of the first lateral recess 35. These grooves 35d may, for example, help to retain the rear mat sealing joint 20 within a mould upon a manufacturing process.

[0034] As shown in Figures 5 and 6, the central sealing portion 21a is mechanically connected to the intermediate portion 28 by a plurality of flexible ribs 25 extending outwards from the central sealing portion 21a in the section plane (Y ; Z). The ribs 25 may be oriented in the plane (Y ; Z) normal to the longitudinal direction (X). In the described embodiment, the upper surface 22a of the central sealing portion 21a projects upward with respect to the upper surface 24a of the peripheral portion 24. Hence, the ribs 25 can extend upward from the upper surface 24a of the peripheral portion 24 to the upper surface 22a of the central sealing portion 21a.

[0035] For example, two neighbouring ribs 25 joining one face of the central sealing portion 21a to the corresponding face of the peripheral portion together form a V-shape, possibly truncated, with the edge of the V-shape closer to the surface of the central portion 21a.

[0036] Furthermore, between each two flexible ribs 25, there is a second recess 26. Said recesses 26 enable to manufacture a mat sealing joint with less material and thus cheaper. Moreover, the recess 26 may receive at least one of the alignment parts 41 and thus may help to maintain the rear mat sealing joint 20 in place during insertion.

[0037] As illustrated in Fig. 5, the central sealing portion 21a has a plurality of passageways 22 extending along the longitudinal direction X, from an upper surface 22a to a lower surface 22b. Each of the passageways 22 is designed to receive an electrical or electro-optical terminal 13 (see Fig. 8). Each passageway 22 comprises an internal region 22c delimited by at least two wire sealing ribs 23 of reduced diameter and of suitable geometry. The passageways 22 may comprise an internal membrane to be torn upon insertion of the electrical terminal 13. The reduced diameter of the ribs 23 is intended to compress the wire 33 of the terminal 13 in the section plane (Y ; Z) normal to the longitudinal direction (X), therefore to help to prevent a movement of the wire 33 in the longitudinal direction (X) and to help to prevent a penetration of dust or other elements into the connector 1.

[0038] The internal region 22c has a cross-section with an elongated profile extending along one direction comprised in the section plane (Y ; Z). Moreover, each of the plurality of passageways 22 has the same elongated profile along one of the directions of the section plane (Y ; Z). The elongated profile of the internal region 22c comprises at least two inner flat walls 38 extending parallel to the one of the directions comprised in the section plane (Y ; Z). In the example shown in the figure 7, the elongated profile of the internal region 22c comprised in the section plane (Y ; Z) may look like a circle having rounded edges cut off in a plane (X ; Z). The cutting off of rounded edges may help to increase a thickness between two neighbouring internal regions 22c and thus to decrease a risk of the inner flat walls 38 to be torn upon unmolding or upon insertion of the electrical terminal 13.

[0039] The inner flat walls 38 of two adjacent internal regions form an inner barrier 21b separating the two adjacent inner regions 22c. Each of these inner barriers 21b has a first thickness T1.

[0040] Nevertheless, the profile of the internal region 22c comprised in the section plane (Y ; Z) might also be, for example, of an oval shape or rectangular shape, or the like.

[0041] In the example shown in the Figure 7, the elongated profile extending along one direction comprised in the section plane (Y ; Z) is performed by elongating a central part of the circular cross-section in one direction comprised in the section plane (Y ; Z) normal to the longitudinal direction (X). In this embodiment, an axis of the orientation of the elongated profile of the internal region 22c extends in the direction (Z). However, an axis of the orientation of the elongated profile of the internal region

22c may also be deviated relative to the direction (Z).

[0042] Among the plurality of passageways 22, there are at least two extreme passageways 22d.

[0043] Since the lateral recesses 35 located in the outer lateral wall 28a of the intermediate portion 28 comprise a partition wall 35c separating the lateral recess 35 and the internal region 22c of the extreme passageway 22d of the sealing portion 21a, the partition wall 35c is parallel to the inner flat wall 38 of the central sealing region 21a extending parallel to the one of the directions comprised in the section plane (Y ; Z). The partition wall 35c separating the lateral recess 35 and the extreme passageway 22d of the internal region 22c form an outer barrier 39 having a second thickness T2. The second thickness T2 is preferably at least the same as the first thickness T1 of the inner barrier 21b which separates two adjacent internal regions 22c of the plurality of passageways 22. More preferably, the second thickness T2 is greater than the first thickness T1.

[0044] When the electrical terminal 13 is introduced into the connector 1, the sealing ribs 23 are compressed by the external surface of the wire 33 so as to enhance sealing of the wire 33 (Fig. 8).

[0045] Referring to Fig. 8, in the assembled state of the connector 1, the lower surface 22b of the central sealing portion 21a rests on the lower edge 18 of the housing body 4. Two alignment lances 41 of the housing body are to be 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 rear mat sealing joint 20. The transverse compression is the compression exerted in a plane transverse to the longitudinal direction (X). A distance between the connection portion 5 of the housing body and the mat sealing joint 20 along the longitudinal direction (X) 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. A distance between the rear grid 15 and the mat sealing joint 20 along the longitudinal direction (X) is defined by a gap 42 between the lower face 15b of the grid and the upper face 22a of the mat sealing joint 20 (Fig. 8). Thanks to the gaps 34 or 42, free space is available allowing the ribs 23 to bent forward or rearward along the longitudinal direction (X) without being stressed when a terminal member 32 is introduced or withdrawn through the joint. This decreases the risk of damaging the ribs.

[0046] When manufacturing the mat sealing joint 20, an elastomeric polymer material, such as silicone, is usually used. This material is to be injected into a suitable mould 43 to fill the cavity and to take the shape imparted by the mould 43. Then, the rear mat sealing joint 20 is pulled out from the mould 43 (see Figures 10A and 10B). In the embodiment shown in Figures 10A and 10B, the mould 43 comprises a lower base 47, a lid 46, and at least one lateral stiffener 45. To form internal regions 22c of the mat sealing joint 20, the lower base 47 and the lid 46 may comprise maintaining structures 46a, 47a being connected to the lower base or lid by pin 46c, 47c. Since the material is deformable, it easily deforms out of the lid 46 and the lower base 47.

[0047] In the embodiment shown in Figures 10A and 10B, upon a moulding process of the rear mat sealing joint 20, the maintaining structures 46a of the lid 46 are intended to be in contact with a complementary portion 47b of the lower base 47. In the embodiment shown in Figures 10A and 10B, upon a moulding process of the rear mat sealing joint 20, the maintaining structures 47a of the lower base 47 are intended to be in contact with a complementary portion 46b of the lid 46. As it can be seen in Figures 10A and 10B, the maintaining structures 46a and 47a may be organized in zigzag relative to each other. This zigzag arrangement may help to push the mat sealing joint 20 out from the mould 43 when the moulding process is finished.

[0048] In the example shown in the Figures, the maintaining structures 46a and 47a have an elongated profile extending along one direction comprised in the section plane (Y ; Z). This elongated profile of the maintaining structures 46a and 47a is designed to correspond to the elongated profile of the internal region 22c of the passageways 22 (see Fig. 7).

[0049] When one uses a soft material, such as a silicone, for optimizing the sealing properties while reducing a quantity of material, it becomes difficult to unmould the sealing joint 20 from the mould 43 properly, reproducibly and reliably.

[0050] With the features as described above, the cross-section of the maintaining structures 46a and 47a as well as the cross-section of the internal region 22c of the passageways 22 is of the elongated shape. This elongated shape enables to make the inner barriers 21b between the particular internal regions 22c thicker compared to what is shown in Fig. 2. This feature may help to efficiently reduce a risk of said barrier to be torn upon pushing the mat sealing joint out from the mould 43 (see Fig.10B).

[0051] The maintaining structures 46a and 47a may also allow to reliably keep the rear mat sealing joint 20 always on the part of the mould and thus to avoid adhesion of the rear mat sealing joint 20 to another part when the mould 43 is opened.

[0052] As shown in Fig. 10B, at this stage, the joint 20 is efficiently retained within the stiffener 45 thanks to the recesses 35. Hence, opposed top and bottom faces 45a and 45b of the stiffener 45 each correspond with a respective top and bottom face 35a, 35b of the recess 35. The stiffener 45 ensures that, during the previous unmoulding step, the rear mat sealing joint 20 will not remain stuck to the lid 46 or to the bottom part 47. Hence, reproducibility of the unmoulding step is enhanced, and a manufacturing device may so fabricate the rear mat sealing joint 20 in high quantity and speed.

[0053] As it will be apparent to the person skilled in the art, the above embodiments may be combined, when appropriate.

Claims

1. A mat sealing joint (20) for a connector (1), the mat sealing joint defining a longitudinal direction (X) and a section plane (Y ; Z) normal to the longitudinal direction (X), the mat sealing joint comprising:

   a central sealing portion (21a) defining a plurality of passageways (22), each of the plurality of passageways extends along the longitudinal direction (X) and is adapted to sealingly receive a terminal (13),
   wherein each of the plurality of passageways comprises an internal region (22c) delimited by at least two wire-sealing ribs (23), wherein the internal region has a cross-section in the section plane (Y ; Z) with an elongated profile extending along one direction comprised in the section plane (Y ; Z).

2. Mat sealing joint (20) according to claim 1, wherein the internal region (22c) of each of the plurality of passageways (22) having the same elongated profile along one of the directions of the section plane (Y ; Z) comprises at least two inner flat walls (38) extending parallel to the one of the directions comprised in the section plane (Y ; Z).

3. Mat sealing joint according to claim 2, wherein inner flat walls (38) of two adjacent internal regions form an inner barrier (21b) separating the two adjacent internal regions (22c), each of the inner barriers separating the two adjacent internal regions has a first thickness (T1).

4. Mat sealing joint according to any of claims 1 to 3, further comprising :

   a peripheral portion (24) extending normal to the longitudinal direction (X) and all along a periphery of the mat sealing joint,
   an intermediate portion (28), located between the central sealing portion (21a) and the peripheral portion, the intermediate portion comprises :

   - an outer lateral wall (28a) extending in the longitudinal direction (X) all around the sealing portion,
   - at least one first lateral recess (35) located in the outer lateral wall of the intermediate portion and extending in a transversal direction (Y) normal to the longitudinal direction (X).

5. Mat sealing joint (20) according to claim 4, wherein the central sealing portion (21a) comprises at least two extreme passageways (22d), and wherein each of the at least one lateral recess (35) located in the outer lateral wall (28a) of the intermediate portion (28) comprises a partition wall (35c) separating the lateral recess and the internal region (22c) of the extreme passageway (22d) of the sealing portion (21a), the partition wall is parallel to the inner flat wall (38) of the internal region extending parallel to the one of the directions comprised in the section plane (Y ; Z).

6. Mat sealing joint according to claim 3 and to any of claims 4 or 5, wherein the partition wall (35c) separating the lateral recess (35) and the internal region (22c) of the extreme passageway (22d) form an outer barrier (39), the outer barrier has a second thickness (T2) being at least the same as the first thickness (T1) of the inner barrier (21b) separating two adjacent internal regions of the plurality of passageways (22).

7. A mat sealing joint (20) according to any of claims 1 to 6, wherein the mat sealing joint is made of a deformable material.

8. Connector (1) comprising :

   a housing body (4) and at least one grid (15),
   a mat sealing joint (20) according to any of claims 1 to 7, adapted to be placed between the housing body and the grid of the connector.

9. Connecting system comprising a connector (1) according to claim 8, and a terminal (13), chosen among a wire, fibre or cable, passing through the internal region (22c) of at least one of the plurality of passageways (22), the terminal comprises a terminal member (32) with an elongated shape extending in the longitudinal direction (X) and inserted into the housing body (4).

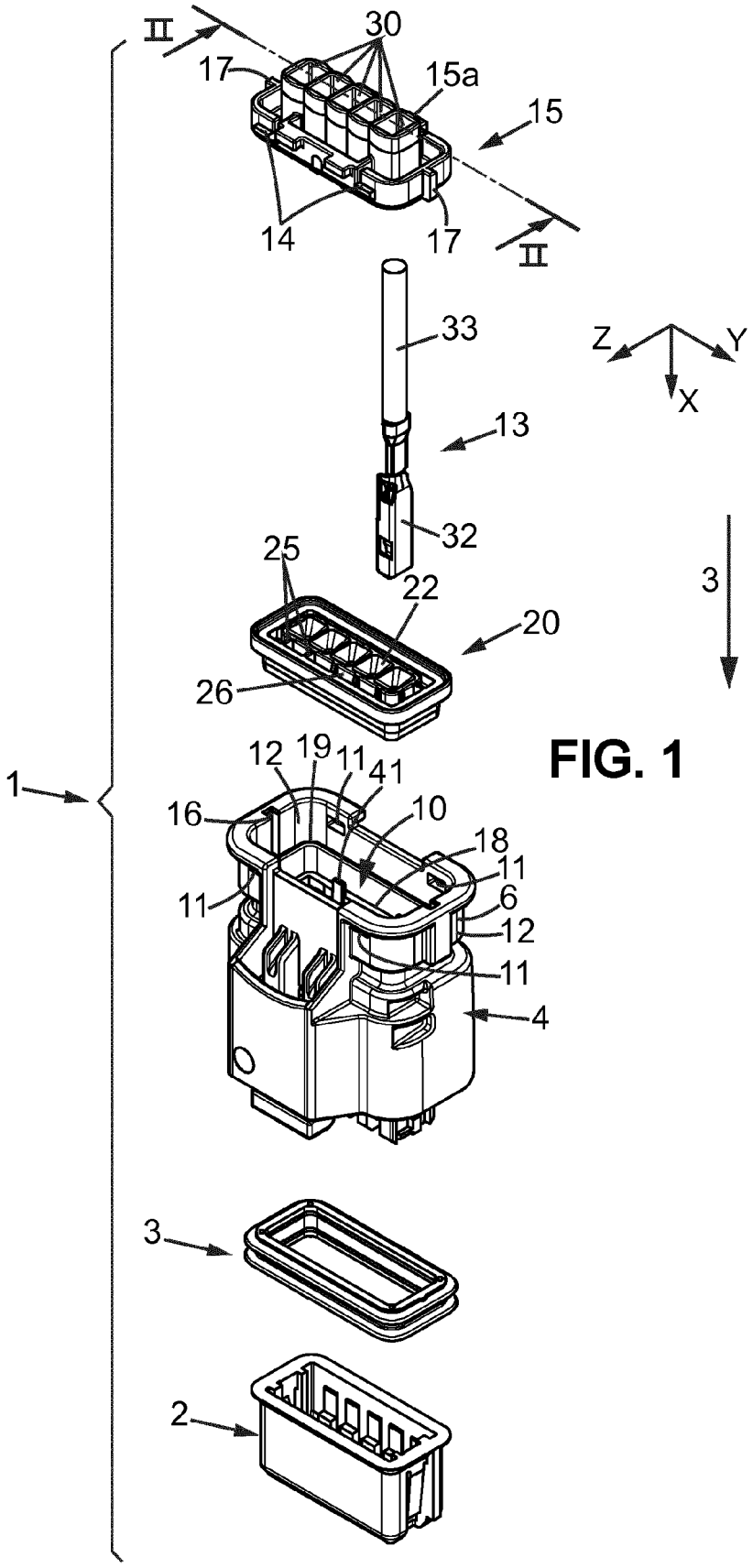
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FIG. 1

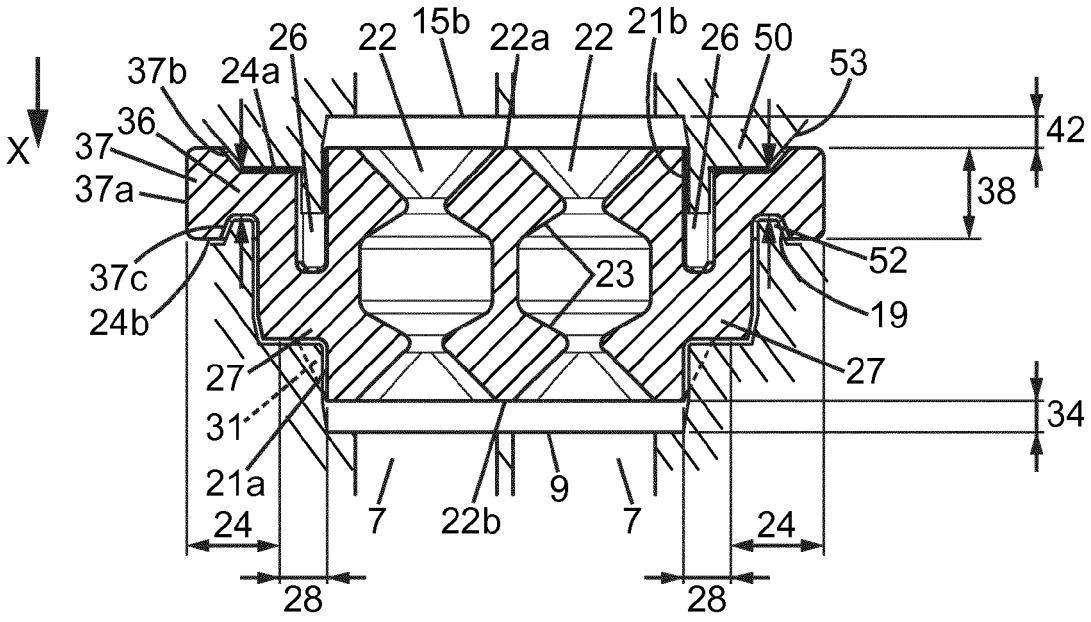


FIG. 2
(PRIOR ART)

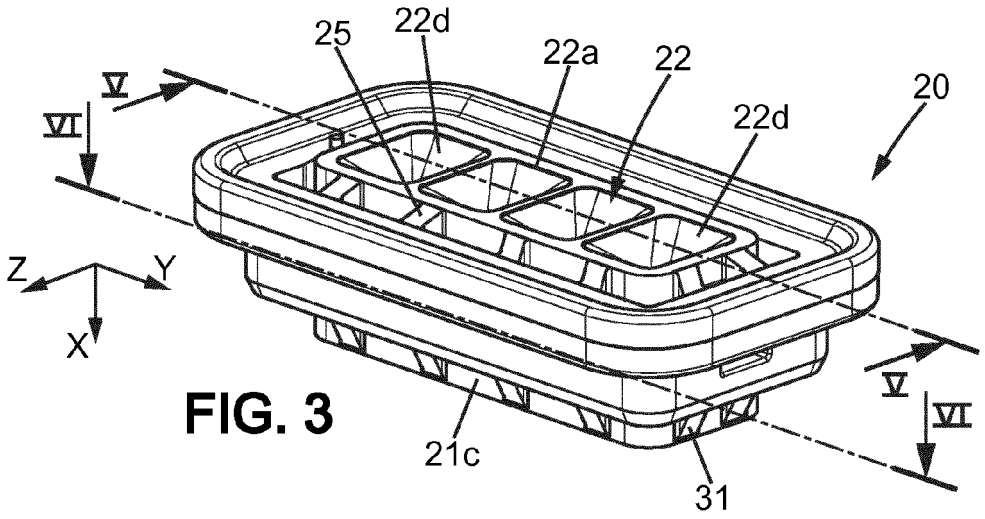


FIG. 3

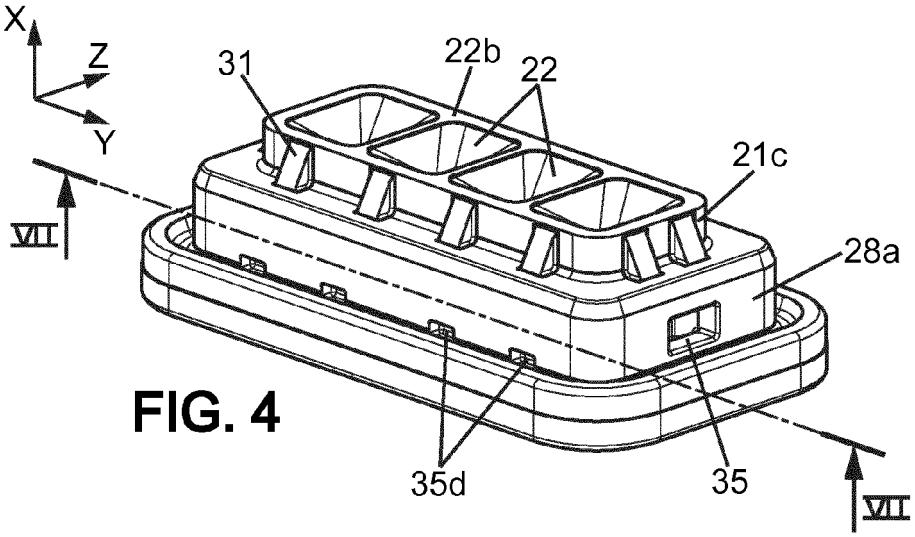


FIG. 4

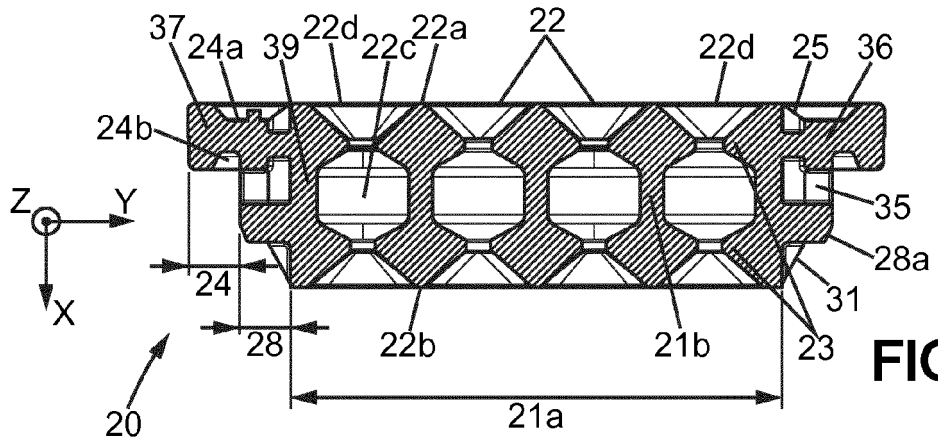


FIG. 5

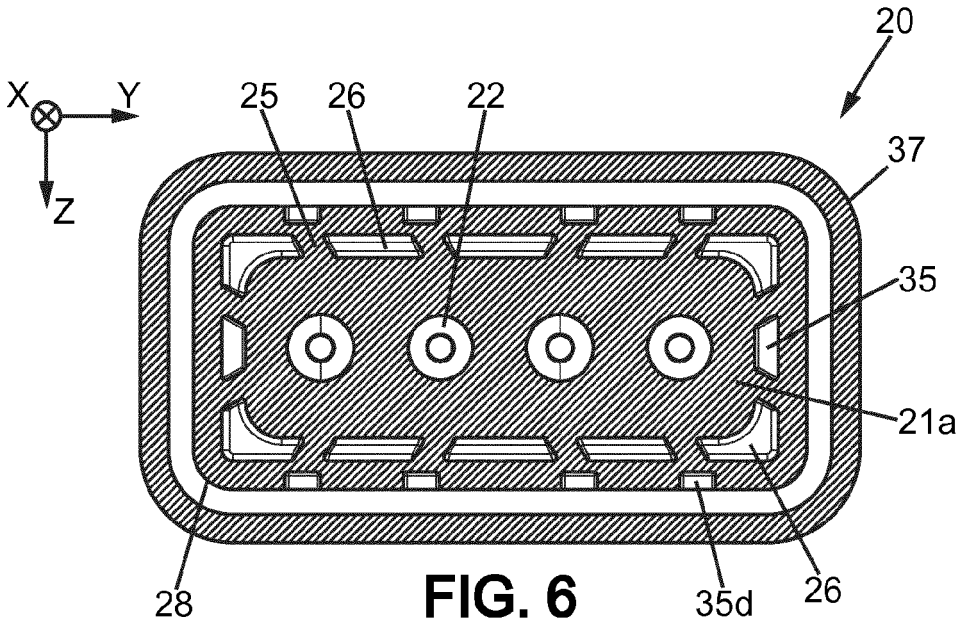

20
X
Y
Z
25
26
22
37
35
21a
28
35d
26

FIG. 6

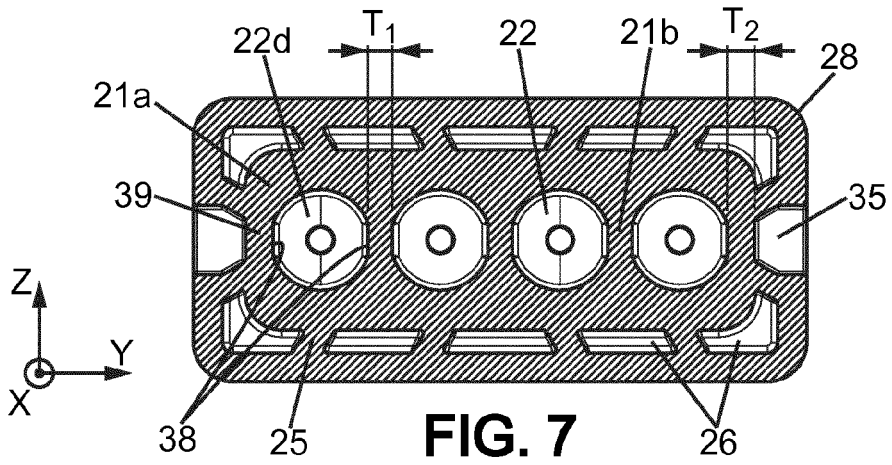
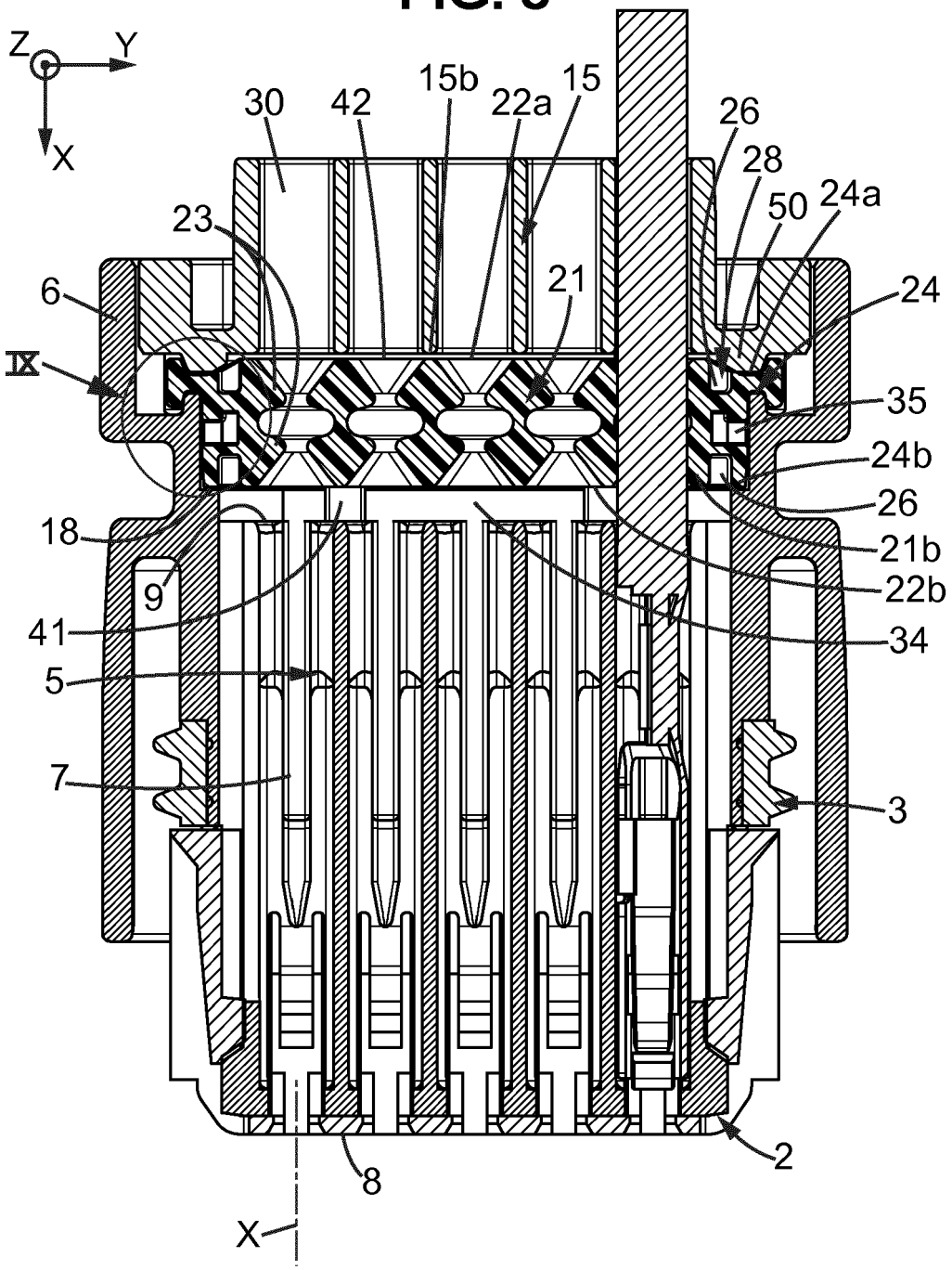

22d
T_1
22
21b
T_2
28
21a
39
35
Z
Y
X
38
25
26

FIG. 7

FIG. 8


Z
Y
X
30
42
15b
22a
15
26
28
50
24a
23
6
21
24
IX
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22b
41
34
5
7
3
8
2
X

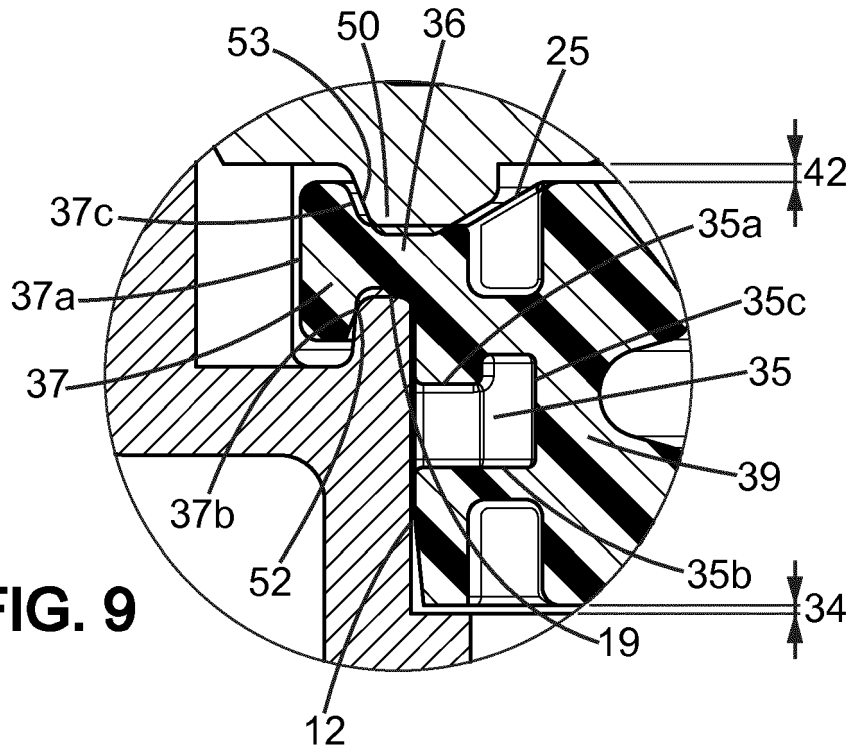

FIG. 9

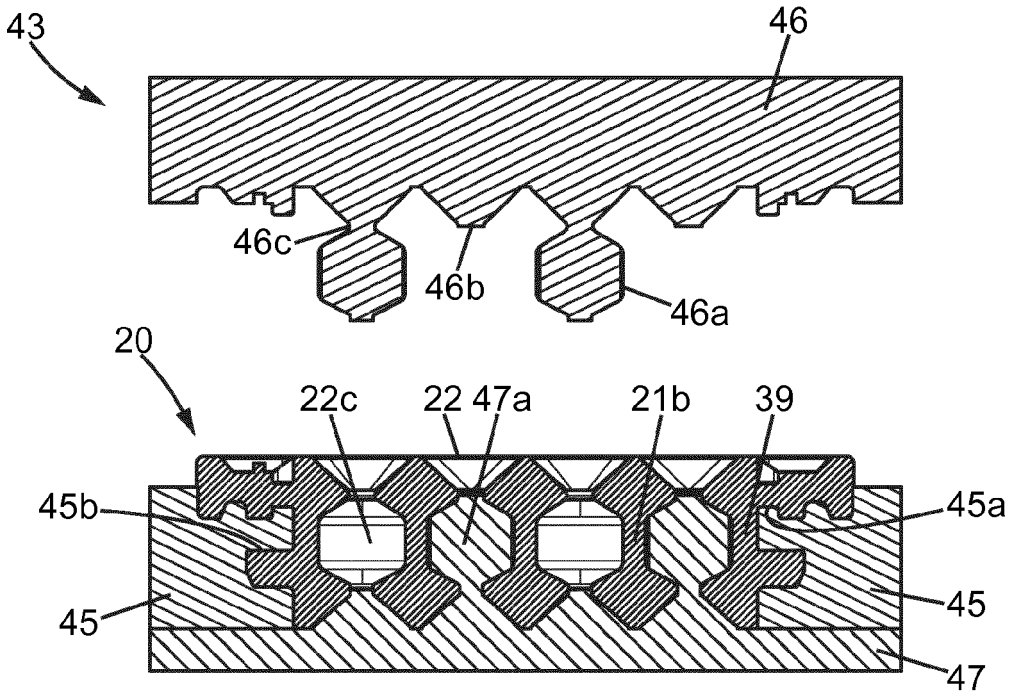

FIG. 10A

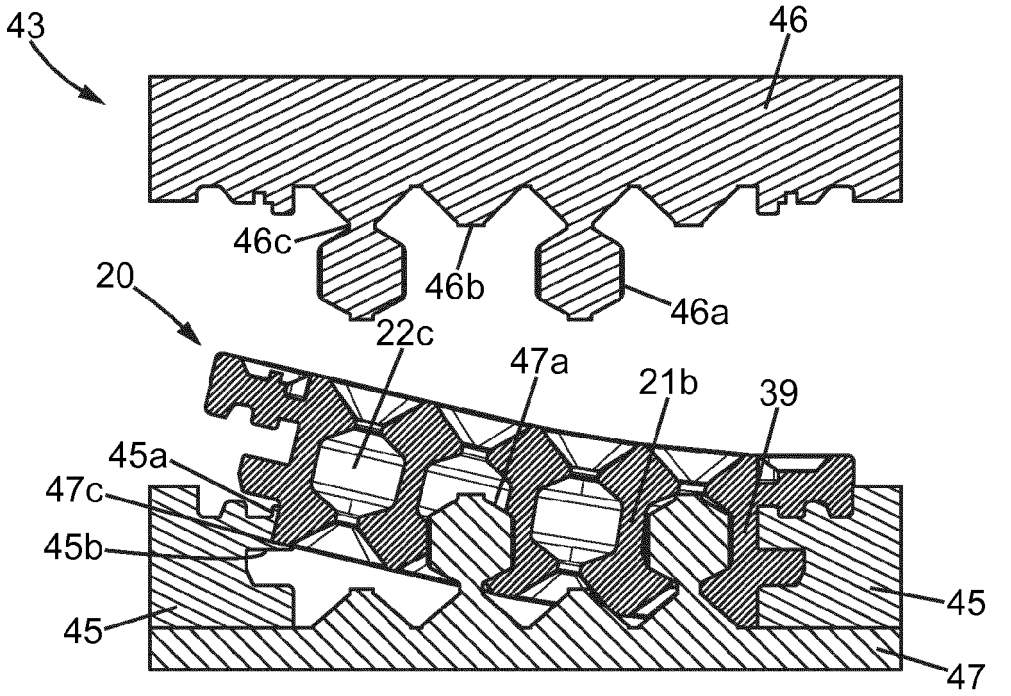

FIG. 10B

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EUROPEAN SEARCH REPORT

Application Number
EP 13 16 1806

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	5 August 2013	Hugueny, Bertrand

CATEGORY OF CITED DOCUMENTS

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