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

(11) **EP 3 633 798 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
08.04.2020 Bulletin 2020/15

(51) Int Cl.:
H01R 13/41 *(2006.01)* ***H01R 43/20*** *(2006.01)*
H01R 13/506 *(2006.01)* *H01R 4/02* *(2006.01)*

(21) Application number: **18465586.8**

(22) Date of filing: **01.10.2018**

(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
Designated Validation States:
KH MA MD TN

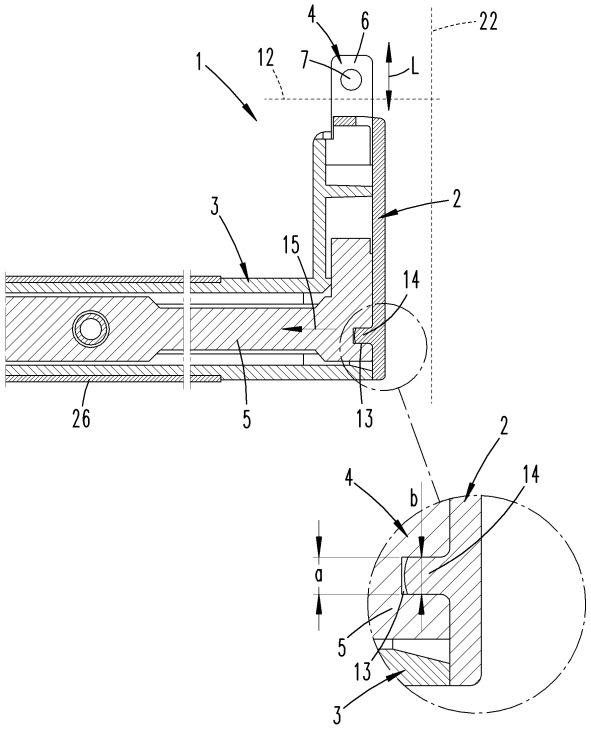
(71) Applicant: **Continental Automotive GmbH**
30165 Hannover (DE)

(72) Inventor: **Ciuca, Eugen**
307311 Dinias (RO)

(54) **CONNECTOR AND METHOD FOR ASSEMBLING A CONNECTOR**

(57) A connector, in particular plug-in connector (1), is disclosed. The connector (1) comprises a base plate (2), a housing (3) and at least one lead frame (4). The lead frame (4) comprises a mounting section (5) and a first end section (6), wherein the mounting section (5) is inserted in the housing (3) so that the first end section (6) juts out from the housing (3) . A first flat geometrical reference plane (12) is defined in that the first end section (6) passes through the first flat geometrical reference plane (12). According to one aspect, the mounting section (5) has a recess (13) and the base plate (2) has a protrusion (14) or vice versa. The protrusion (14) extends into the recess (13) in a direction (15) which is parallel to the first flat geometrical reference plane (12) and/or transversal to a longitudinal direction (L) of the first end section (6). A further aspect relates to the base plate (2) and the housing (3) being connected with each other by means of at least one press fit connection (16) . Another aspect of the invention refers to a method for assembling a connector (1).

Fig: 4



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Description

Technical Field

[0001] The present disclosure, according to a first aspect, refers to a connector, for example to a plug-in connector, wherein said connector at least comprises a base plate, a housing and at least one lead frame, wherein the lead frame comprises at least a mounting section and a first end section, wherein the mounting section is inserted in the housing, so that the first end section juts out from the housing and wherein a first flat geometrical reference plane is defined in that the first end section passes through the first flat geometrical reference plane.

[0002] The present disclosure, according to a second aspect, relates to a method for assembling a connector, for example a plug-in connector.

Background Art

[0003] There are known connectors of the above described generic type which are in accordance to an embodiment as shown by Figs. 1 and 2. As a drawback, in such known connectors the lead frame is free in the direction as indicated by Y, which can cause problems in a welding process which is used in the prior art to connect the first end section of the lead frame with a contact of an electrical device or the like. A problem is seen in that the known connectors provide no precise position of the lead frame in the direction Y which is parallel to a longitudinal direction of the first end section relative to the base plate and in particular to the housing. The problem is typically caused by the fact that after assembly of the connector some play remains between components of the connector and that on performing welding, brazing or soldering another contact to the free end section of the lead frame certain forces are applied to the first end section, which might cause a movement of the lead frame within a given play.

Summary of Invention

[0004] A connector is disclosed. The connector is in particular a plug-in connector. The connector at least comprises a base plate, a housing and at least one lead frame. The lead frame comprises at least a mounting section and a first end section. The mounting section is inserted in the housing in such fashion that the first end section juts out from the housing. A first flat geometrical reference plane is defined in that the first end section passes through the first flat geometrical reference plane.

[0005] Regarding the first aspect of the present disclosure it is an underlying object to enhance the connector, in particular to reduce or to even completely avoid a play of the lead frame or the lead frames in a direction which is transversal to the first flat geometrical reference plane and/or parallel to the longitudinal direction of the respective first end section of the lead frame or lead frames. Regarding the second aspect of the invention it is an underlying object to provide an appropriate method for assembling a connector in accordance to the invention.

[0006] According to the first aspect in order to solve the object the invention suggests that the mounting section has a recess and the base plate has a protrusion which extends into the recess in a direction which is parallel to the first flat geometrical reference plane and/or transversal to a longitudinal direction of the first end section. Alternatively, for solving the object the invention suggests that the base plate has a recess and the mounting section has a protrusion which extends into the recess in a direction which is parallel to the first flat geometrical reference plane and/or which is transversal to a longitudinal direction of the first end section.

[0007] As an advantageous effect this may enable a lead frame fixation for limiting a play or even for avoiding any play of the first end section of the lead frame relative to the base plate in a direction which is transversal to the first flat geometrical plane. Hence, the invention can improve the precision of the position of the lead frame, in particular the precision of the first end section of the lead frame, for welding, brazing or soldering in order to connect the first end section to an electrical contact of a device or the like. Further advantages may be that wear of the components may be limited or avoided, that the invention is easy to implement on an assembly line, that the proposed features may be fit in an existing environment space and that the invention can be realized at low costs. Preferably, the recess may be formed as a cut. The protrusion for example may be a bumper. The bumper from the base plate will keep the lead frame in a correct position with regard to a direction which can be transversal to the first flat geometrical plane. In this way it is possible to achieve a better positioning for a welding process or the like.

[0008] The first flat geometrical reference plane is an imaginary infinite plane used for explaining geometrical relationships. The term "transversal" allows but does not require that the referred directions cross each other; the term "transversal" also include as a possible meaning that the directions are skew directions with regard to each other. The invention may also be applied at all mechanisms with the requirement to keep a certain component in a fixed position when a determined force is applied.

[0009] According to another aspect of the present disclosure, i.e. alternatively or additionally, the base plate and the housing are connected with each other by means of at least one press fit connection wherein said press fit connection is a connection which is free of play in at least a direction which is perpendicular to the first flat geometrical reference plane.

[0010] As an advantageous effect this may improve a base plate fixation for a better lead frame positioning. In particular, it enables to limit or to even avoid any play of the first end section of the lead frame relative to the housing of the connector and hence may improve the precision of the position of the lead frame for welding, brazing or

soldering. Additional advantages may be that wear of the components may be limited or avoided, that the invention is easy to implement on an assembly line, that the proposed features may be fit in an existing environment space and that the invention can be realized at low costs. This also may be realized at all mechanisms with the requirement to keep a certain component in a fixed position when a determined force is applied.

[0011] If the described combination of a protrusion and a recess at the lead frame is combined with the described press fit connection, with advantage, any play between the lead frame and the housing may be avoidable in a direction which is transversal to the first flat geometrical reference plane and/or parallel to the longitudinal direction of the first end section of the lead frame.

[0012] There are many possibilities for performing expedient modifications:

For example, in one embodiment, a width of the recess and a thickness of the protrusion are adapted to each other so that the protrusion extends in the recess free of play in a direction which is perpendicular to the first flat geometrical reference plane. As an advantageous effect this contributes to avoid any play of the first end section of the lead frame relative to the base plate and hence improves the precision of the position of the lead frame for welding, brazing or soldering. Preferably, the recess and the protrusion are adapted to interact as a medium fit or press fit at least with regard to the direction (Y) which is perpendicular to the first flat geometrical reference plane.

[0013] In another embodiment it is provided that the connector comprises a plurality of lead frames, wherein each lead frame comprises a mounting section and a first end section, respectively, and wherein regarding each individual lead frame said lead frame is inserted in the housing, so that the first end section of said lead frame juts out from the housing and passes through said first flat geometrical reference plane, wherein the lead frames in particular are arranged side by side in a row. Preferably, the row extends along a row direction which is transversal to the direction in which the protrusion extends into the recess as explained before.

[0014] In a further embodiment, the first flat geometrical reference plane is defined in that the first end section of the at least one lead frame passes at a right angle through the first flat geometrical reference plane or that the respective first end section of each lead frame pass at a respective right angle through the first flat geometrical reference plane, and/or that the first flat geometrical reference plane extends at a right angle with regard to a second flat geometrical reference plane which is spanned by the base plate. Also the second flat geometrical reference plane is an imaginary infinite plane used for explaining geometrical relationships.

[0015] In one embodiment, the at least one press fit connection is a connection which is free of play in all directions which are parallel to a second flat geometrical reference plane which is spanned by the base plate. Of course, the press fit connections can also avoid any play in a direction which is transversal to the second flat geometrical reference plane. Preferably the direction in which the protrusion extends into the recess may be transversal to the second flat geometrical reference plane.

[0016] According to one development, the bore at its circumference comprises a plurality of recesses, in particular three recesses, which are evenly spaced from each other with regard to a circumferential direction of the bore and which extend outwards from the bore diameter. Between each two recesses which are neighbored to each other, a wall section is formed which bounds the bore and which can be denoted as a bumper or as a crushing section. Advantageously, such development can contribute to a better orientation and to a smaller force in the press fit process.

[0017] In one embodiment, the base plate and the housing are connected with each other by two press fit connections, which are spaced from each other, wherein each individual press fit connection comprises a bore having a bore diameter and comprises a pin having a pin diameter, wherein the bore diameter and the pin diameter are adapted to each other to interact for a press fit and wherein the pin is plugged in the bore so that the press fit is achieved, and wherein either the bore is formed in the housing and the pin is formed at the base plate or the bore is formed in the base plate and the pin is formed at the housing. In this way the press-fit connections will keep the base plate in a fixed position relative to the housing in all directions and will result in a precise position of the lead frame or lead frames for a process of welding, brazing or soldering. Preferably the both press-fit connections are formed correspondingly to each other.

[0018] In a further embodiment, it is provided that the position of the lead frame relative to the housing in directions which are different from a direction which is perpendicular to the first flat geometrical reference plane is defined by the housing. This may be achieved for example by that in the housing at least one alignment recess is formed and that the mounting section of the lead frame or the mounting section of at least one of the lead frames is accommodated within said alignment recess, wherein the alignment recess is bounded by a plurality of aligning supports which are spaced from each other and which support the lead frame at different positions, respectively, wherein the aligning supports are geometrically adapted to a shape of the lead frame so that the mounting section of lead frame is accommodated within the alignment recess relative to the housing in a predetermined alignment when it is supported by the aligning supports. Preferably said alignment includes one direction or more directions which is/are different from the direction, which in particular is transversal to the first flat geometrical reference plane, in which an alignment of the lead frame is achieved by the protrusion which extends into the recess.

[0019] In another embodiment, the housing includes a plurality of alignment recesses and that each individual

alignment recess is adapted to accommodate the mounting section of one of the lead frames relative to the housing in a predetermined alignment. In a preferred embodiment it is provided that the housing and/or the base plate is/are made from plastic.

[0020] According to the second aspect, in particular in order to solve the object, the method comprises the following steps:

- providing a base plate, a housing and at least one lead frame, wherein the lead frame comprises at least a mounting section and a first end section, wherein either the mounting section has a recess and the base plate has a protrusion
  or the base plate has a recess and the mounting section has a protrusion,

- inserting the protrusion into the recess in a direction which is parallel to the first flat geometrical reference plane and/or which is transversal to a longitudinal direction of the first end section.

[0021] There are many possibilities for performing expedient modifications:
In one embodiment, subsequent to inserting the protrusion in the recess, the lead frame is inserted into the housing so that said first end section juts out from the housing. Further, after inserting the lead frame in the housing, the base plate and the housing may be connected with each other by at least one press fit connection wherein said press fit connection is a connection which is free of play in at least a direction which is perpendicular to a first flat geometrical reference plane which is defined in that regarding one lead frame or more lead frames its respective first end section passes through said first flat geometrical reference plane.

Brief Description of Drawings

[0022] Exemplary embodiments of a known connector and of a preferred embodiment of a connector according to the invention will now be described with reference to the accompanying drawings.

[0023] In the drawings:

Fig. 1 is a partial side view of a connector which is known from the prior art;

Fig. 2 is a partial cross section of the known connector;

Fig. 3 is a perspectival view showing a preferred embodiment of a connector in accordance to the present invention;

Fig. 4 shows in a broken view a partial cross section of the connector along sectional plane IV-IV in Fig. 3;

Fig. 5 shows a partial cross section of the connector along a sectional plane V-V in Fig. 3;

Fig. 6 is a side view of the connector along viewing direction VI in Fig. 3;

Fig. 7 is a perspectival view of the base plate of the connector which is shown in Figs. 3-6;

Fig. 8 is a perspectival view of the housing of the connector which is shown by Figs. 3-6;

Fig. 9 is a perspectival view of a lead frame of the connector which is shown by Figs. 3-6;

Fig. 10 is a cross section of the connector along sectional plane X-X in Fig. 6 and

Fig. 11 is a partial sectional view and partial side view of the connector along line XI-XI in Fig. 10.

Description of Embodiments

[0024] With reference to Figs. 1-2 it is described a connector 1' which is known from the prior art. The connector 1' comprises a base plate 2', a housing 3' and a number of lead frames 4'. Each lead frame 4' comprises a mounting section 5' which is mounted within the housing 3' and further comprises a first end section 6' which juts out from the housing 3'. The first end section 6' is determined to be connected, preferably by welding, brazing or soldering, to a contact of another device or the like. A respective connecting area is indicated by 7' in Fig. 1. It is mentioned that the mounting section 5' and the first end section 6' are connected with each other out of the drawing plane of Fig. 2. The first end section 6' extends along its longitudinal direction L' which is also parallel to a direction Y' which indicates a direction in which the lead frame, or in more detail its first end section 6', is moveable with a certain play relative to other components of the connector 1'. As shown by Fig. 1, the base plate 2' comprises clips 8' for encompassing bumpers 9' of the housing 3' in order to connect the base plate 2' to the housing 3'. Between the bumpers 9' and the clips 8' are gaps 10'. A width of the gap 10' might be in a range of for example about 0.15 mm for causing a play between the base plate 2' and the housing 3' in the direction Y' which might be about 0.3 mm or the like. Accordingly, there is no precise position of the lead frame 4' in the direction Y' which can cause problems during welding, brazing or soldering.

[0025] With regard to Figs. 3-11 it is described by way of example a preferred embodiment of a connector 1 according to the present invention. The connector 1 comprises a base plate 2, a housing 3 made by plastic and in the example three lead frames 4. Each of the lead frames 4 comprises a mounting section 5, a first end section 6 and a second end section 11 (see also Fig. 9) which, in the example, extends in a direction which is at

a right angle to the longitudinal direction L of the first end section 6. As for example shown by Fig. 4, the mounting section 5 is inserted into a hollow space within the housing 3, so that the first end section 6 projects beyond the housing 3. At each of the first end sections 6 a preferred connecting area 7 is provided for performing for example soldering, brazing or welding. As shown for example by Figs. 3 and 5, a first flat geometrical reference plane 12 is defined in that the first end sections 6 pass through the first flat geometrical reference plane 12, wherein in the present example (i.e. not necessarily) the longitudinal direction L of the first end sections 6 extend orthogonally to the first flat geometrical reference plane 12.

[0026] As shown for example by Fig. 4, the mounting section 5 of the lead frame 4 has a recess 13 which in the example is made by a cut. The base plate 2 has a protrusion 14 which extends into the recess 13 in a direction 15 which is parallel to the first flat geometrical reference plane 12 and which is transversal to the longitudinal direction L of the first end section 6. As also shown by Fig. 4, a width a of the recess 13 and a thickness b of the protrusion 14 are adapted to each other so that the protrusion 14 extends into the recess 13 free of play in the direction Y which is parallel to the longitudinal direction L.

[0027] As it is clear from Figs. 5-8 and 10-11 the base plate 2 and the housing 3 are connected with each other by means of two press fit connections 16, which are spaced from each other. Each press fit connection 16 comprises a bore 17 having a bore diameter 18 and a pin 19 having a pin diameter 20. The bore diameter 18 and the pin diameter 20 are adapted to each other to interact for a press fit. In the assembled situation shown by Fig. 10, the pin 19 is plugged into the bore 17 so that the press fit is achieved. As shown in more detail by Fig. 12, in the depicted example the bores 17 of the press fit connections 16 are formed in the housing 3 and the pins 19 are formed at the base plate 2, however for a person skilled in the art it is obvious that this might be contrary, if preferred. Furthermore, in the shown example each bore 17 at its circumference comprises three pocket-like recesses 21 which are evenly spaced from each other and which extend outwardly from the outer bore diameter 18. The two press fit connections 16 both are connections which are free of play in all directions which are parallel to a second flat geometrical reference plane 22 which is spanned by the main extending directions of the base plate 2 and which is shown by Figs. 3 and 11 for example. As depicted by Fig. 3, the first flat geometrical reference plane 12 and the second flat geometrical reference plane 22 extend at a right angle between each other.

[0028] As shown for example by Figs. 3, 5, 6, 7, 8 and 10 in the shown example in addition to the press fit connections 16 there are provided clips 8 at the base plate 2 and bumpers 9 at the housing 3 for interacting as an additional form fit. Even if a gap remains between the clips 8 and the bumpers 9 in the direction Y, it does not matter at the connector 1 in accordance to the present invention. In the present example there is no play between the base plate 2 and the lead frames 4 in the direction Y because of the respective interaction of a recess 13 and a protrusion 14 which is free of play in direction Y. Furthermore, because of the press fit connections 16 there is no play between the base plate 2 and the housing 3 in the direction Y. Hence, in summary there is also no play between the lead frames 4 and the housing 3 in the direction Y.

[0029] In the shown embodiment, the position of the lead frames 4 relative to the housing 3 in such directions which are different from the direction Y (which is orthogonal to the first flat geometrical reference plane 12) is defined by the housing 3. In the example, the housing 3 and the base plate 2 are made from plastic. In the example, the housing 3 comprises three alignment recesses 23 for providing a hollow space, respectively, each for accommodation of one of the mounting sections 5 of the lead frames 4. Each alignment recess 23 is bounded by a plurality of aligning supports 24, which in the present example comprise different means which however are denoted by the same reference numbers 24. The aligning supports 24 are spaced from each other and support the lead frames 4 at different positions, respectively. The aligning supports 24 are geometrically adapted to the shape of the lead frames 4 so that the lead frames 4 are accommodated within the alignment recesses 23 relative to the housing 3 in an intended alignment when the connector 1 is assembled.

[0030] In the example, in addition aligning members 25 for the lead frames 4 are provided by the base plate 2, as depicted by Fig. 7, for example.

[0031] Furthermore, as shown by the Figs., the connector 1 can be used together with, in particular plugged into, an additional connecting device 26, which for example may have plug sockets (not shown in the Figs.) each for receiving one of the second end sections 11 of the lead frames 4. However, for a skilled person it is obvious that other uses of the connector 1 are also possible.

[0032] All disclosed features are (for its own, but also in combination) relevant for the invention. The features of the dependent claims characterize also independent inventive improvements of the prior art, in particular for filing divisional applications on a basis of these claims.

Claims

1. Connector (1), in particular plug-in connector, wherein said connector (1) at least comprises a base plate (2), a housing (3) and at least one lead frame (4), wherein the lead frame (4) comprises at least a mounting section (5) and a first end section (6), wherein the mounting section (5) is inserted in the housing (3), so that the first end section (6) juts out from the housing (3) and wherein a first flat geometrical reference plane (12) is defined in that the first end section (6) passes through the first flat geomet-

rical reference plane (12), characterized either in that the mounting section (5) has a recess (13) and the base plate (2) has a protrusion (14) which extends into the recess (13) in a direction (15) which is parallel to the first flat geometrical reference plane(12) and/or transversal to a longitudinal direction (L) of the first end section (6),
or in that the base plate (2) has a recess and the mounting section (5) has a protrusion which extends into the recess in a direction which is parallel to the first flat geometrical reference plane (12) and/or which is transversal to a longitudinal direction (L) of the first end section (6).

2. Connector (1) according to claim 1, **characterized in that** a width (a) of the recess (13) and a thickness (b) of the protrusion (14) are adapted to each other so that the protrusion (14) extends into the recess (13) free of play in a direction (Y) which is perpendicular to the first flat geometrical reference plane (12).

3. Connector (1) according to any of the preceding claims, **characterized in that** the base plate (2) and the housing (3) are connected with each other by means of at least one press fit connection (16) wherein said press fit connection is a connection which is free of play in at least a direction (Y) which is perpendicular to the first flat geometrical reference plane (12).

4. Connector (1) according to any of the preceding claims, **characterized in that** the connector (1) comprises a plurality of lead frames (4), wherein each lead frame (4) comprises a mounting section (5) and a first end section (6), respectively, and wherein regarding each individual lead frame (4) said lead frame (4) is inserted in the housing (3), so that the first end section (6) of said lead frame (4) juts out from the housing (3) and passes through said first flat geometrical reference plane (12), wherein the lead frames (4) in particular are arranged side by side in a row.

5. Connector (1) according to any of the preceding claims, **characterized in that** the first flat geometrical reference plane (12) is defined **in that** the first end section (6) of the at least one lead frame (4) passes at a right angle through the first flat geometrical reference plane (12) or that the respective first end section (6) of each lead frame (4) pass at a respective right angle through the first flat geometrical reference plane (12), and/or that the first flat geometrical reference plane (12) extends at a right angle with regard to a second flat geometrical reference plane (22) which is spanned by the base plate (2).

6. Connector (1) according to any of the preceding claims, **characterized in that** the at least one press fit connection (16) is a connection which is free of play in all directions which are parallel to a second flat geometrical reference plane (22) which is spanned by the base plate (2).

7. Connector (1) according to any of the preceding claims, **characterized in that** the base plate (2) and the housing (3) are connected with each other by two press fit connections (16), which are spaced from each other, wherein each individual press fit connection (16) comprises a bore (17) having a bore diameter (18) and comprises a pin (19) having a pin diameter (20), wherein the bore diameter (18) and the pin diameter (20) are adapted to each other to interact for a press fit and wherein the pin (19) is plugged into the bore (17) so that the press fit is achieved, and wherein either the bore (17) is formed in the housing (3) and the pin (19) is formed at the base plate (2) or the bore is formed in the base plate and the pin is formed at the housing.

8. Connector (1) according to any of the preceding claims, **characterized in that** the bore (17) at its circumference comprises a plurality of, in particular three, recesses (21) which are evenly spaced from each other with regard to a circumferential direction of the bore and which extend outwards from the bore diameter (18).

9. Connector (1) according to any of the preceding claims, **characterized in that** the position of the lead frame (4) relative to the housing (3) in directions which are different from a direction (Y) which is perpendicular to the first flat geometrical reference plane (12) is defined by the housing (3).

10. Connector (1) according to any of the preceding claims, **characterized in that** in the housing (3) at least one alignment recess (23) is formed and that the mounting section (5) of the lead frame or the mounting section (5) of at least one of the lead frames (4) is accommodated within said alignment recess (23),
wherein the alignment recess (23) is bounded by a plurality of aligning supports (24) which are spaced from each other and which support the lead frame (4) at different positions, respectively,
wherein the aligning supports (24) are geometrically adapted to a shape of the lead frame (4) so that the mounting section (5) of lead frame (4) is accommodated within the alignment recess (23) relative to the housing (3) in a predetermined alignment when it is supported by the aligning supports (23).

11. Connector (1) according to any of the preceding claims, **characterized in that** the housing (3) includes a plurality of alignment recesses (23) and that

each individual alignment recess (23) is adapted to accommodate the mounting section (5) of one of the lead frames (4) relative to the housing (3) in a predetermined alignment.

12. Connector (1) according to any of the preceding claims, **characterized in that** the housing (3) and/or the base plate (2) is/are made from plastic.

13. Method for assembling a connector (1), in particular a plug-in connector, **characterized in that** the method comprises the steps:

- providing a base plate (2), a housing (3) and at least one lead frame (4),

wherein the lead frame (4) comprises at least a mounting section (5) and a first end section (6), wherein either the mounting section (5) has a recess (13) and the base plate (2) has a protrusion (14) or the base plate (2) has a recess (13) and the mounting section (5) has a protrusion,

- inserting the protrusion (14) into the recess (13) in a direction (15) which is parallel to the first flat geometrical reference plane (12) and/or which is transversal to a longitudinal direction (L) of the first end section (6).

14. Method according to the preceding claim, wherein, after inserting the protrusion (14) in the recess (13), the lead frame (4) is inserted into the housing (3) so that said first end section (6) juts out from the housing (3).

15. Method according to the preceding claim, wherein, after inserting the lead frame (4) in the housing (3), the base plate (2) and the housing (3) are connected with each other by at least one press fit connection wherein said press fit connection is a connection which is free of play in at least a direction (Y) which is perpendicular to a first flat geometrical reference plane (12) which is defined in that regarding one lead frame (4) or more lead frames (4) its respective first end section (6) passes through said first flat geometrical reference plane (12).

Fig: 1

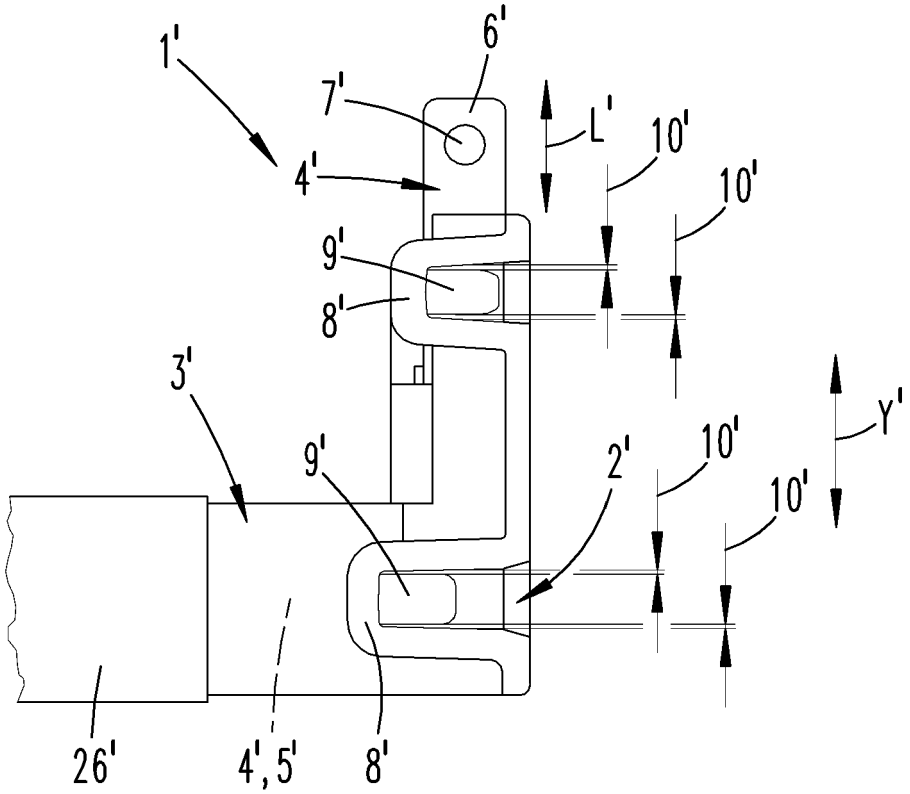

Fig: 2

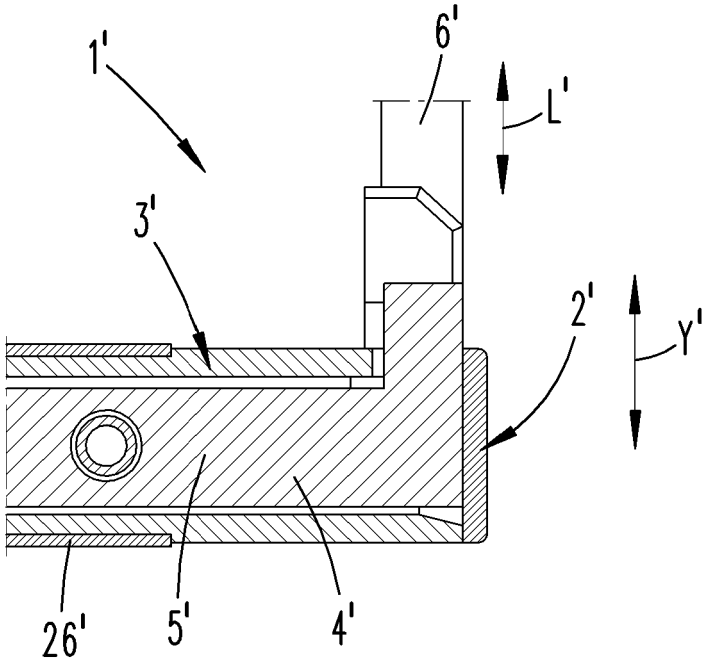

Fig. 3

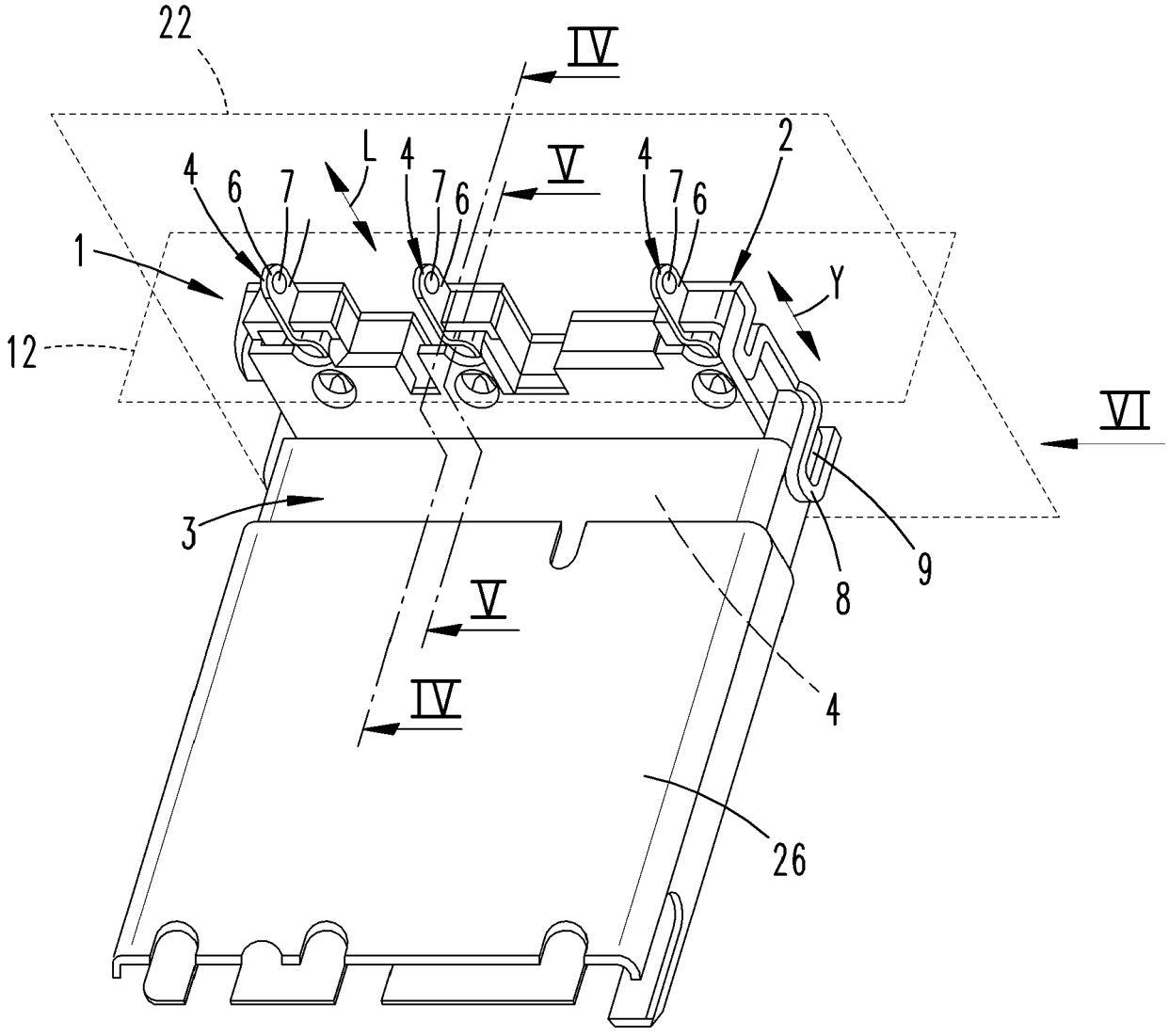

Fig: 4

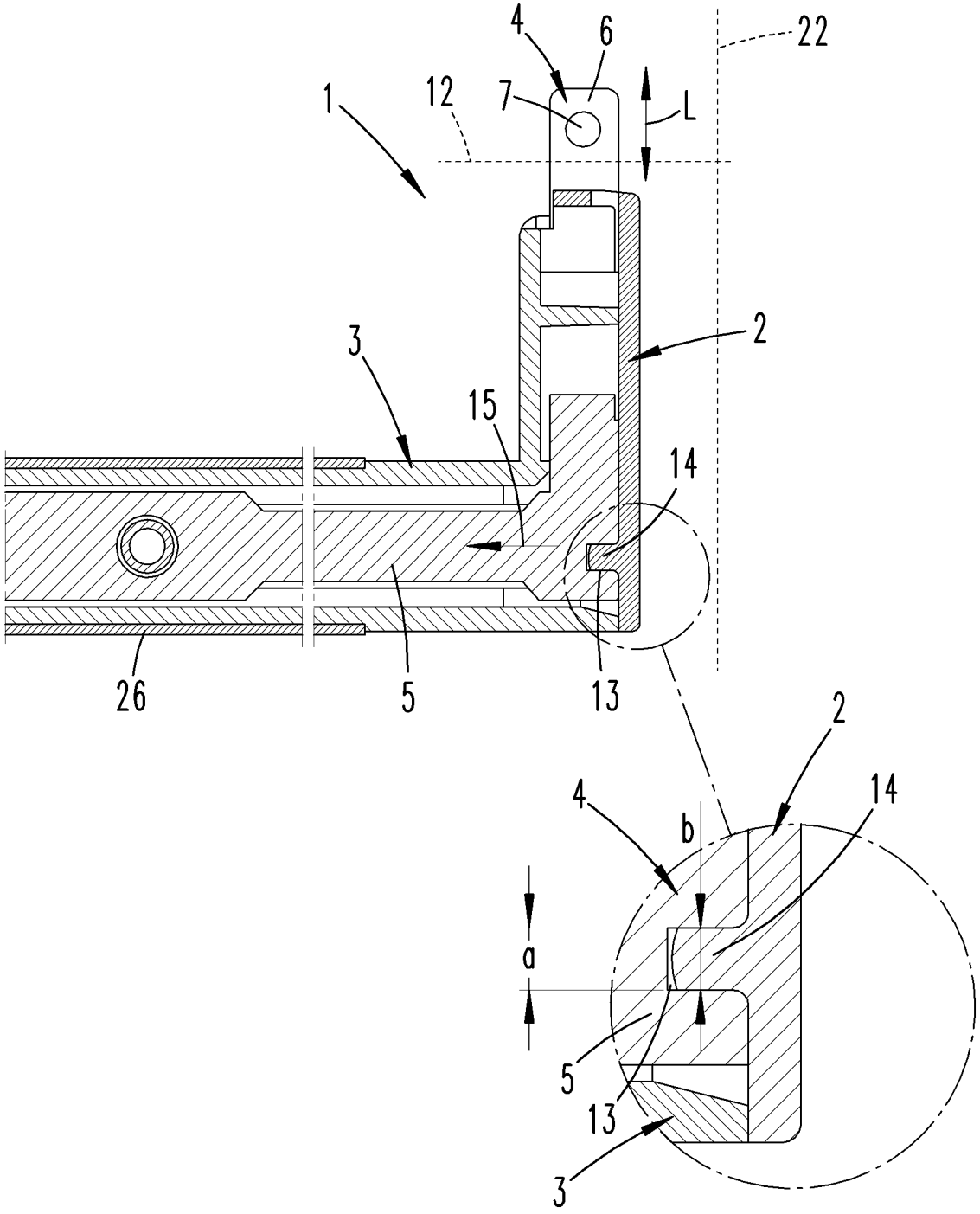

Fig: 5

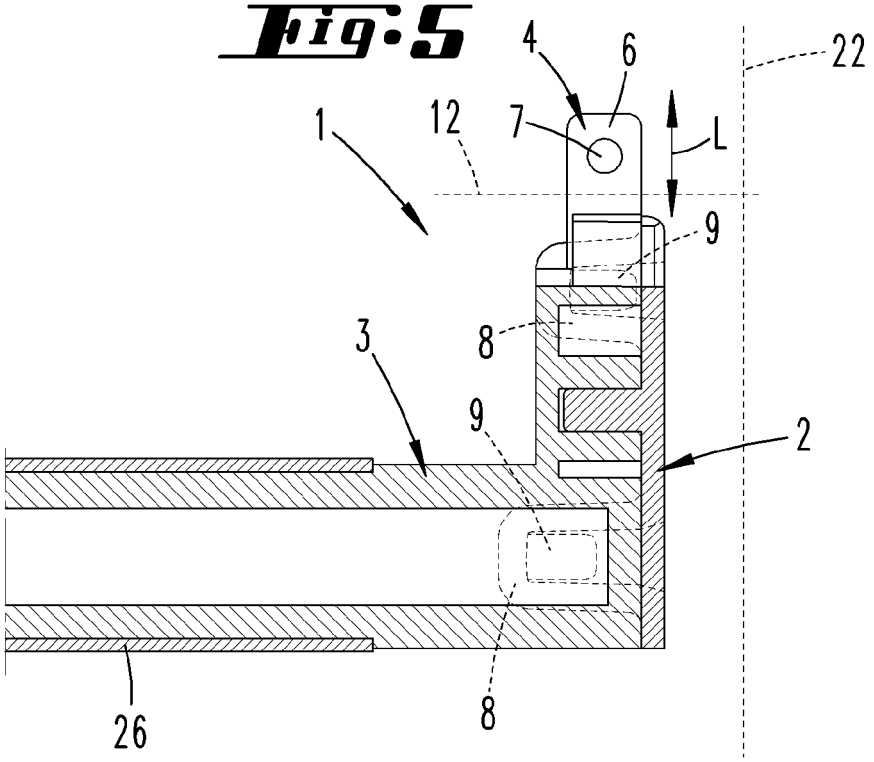

Fig: 6

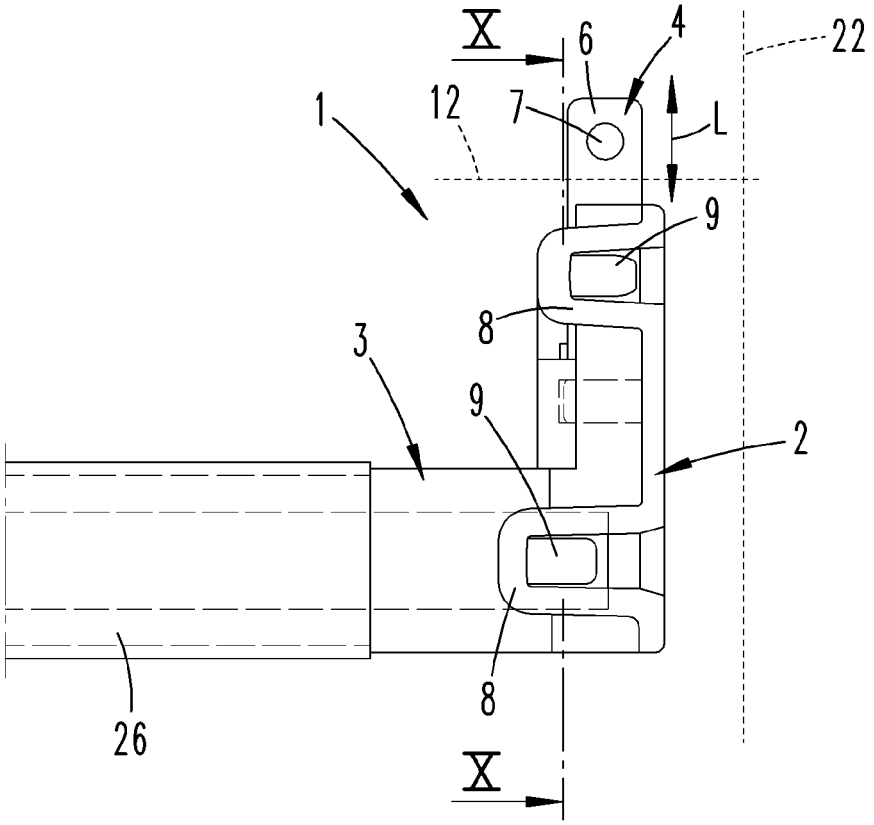

Fig: 7

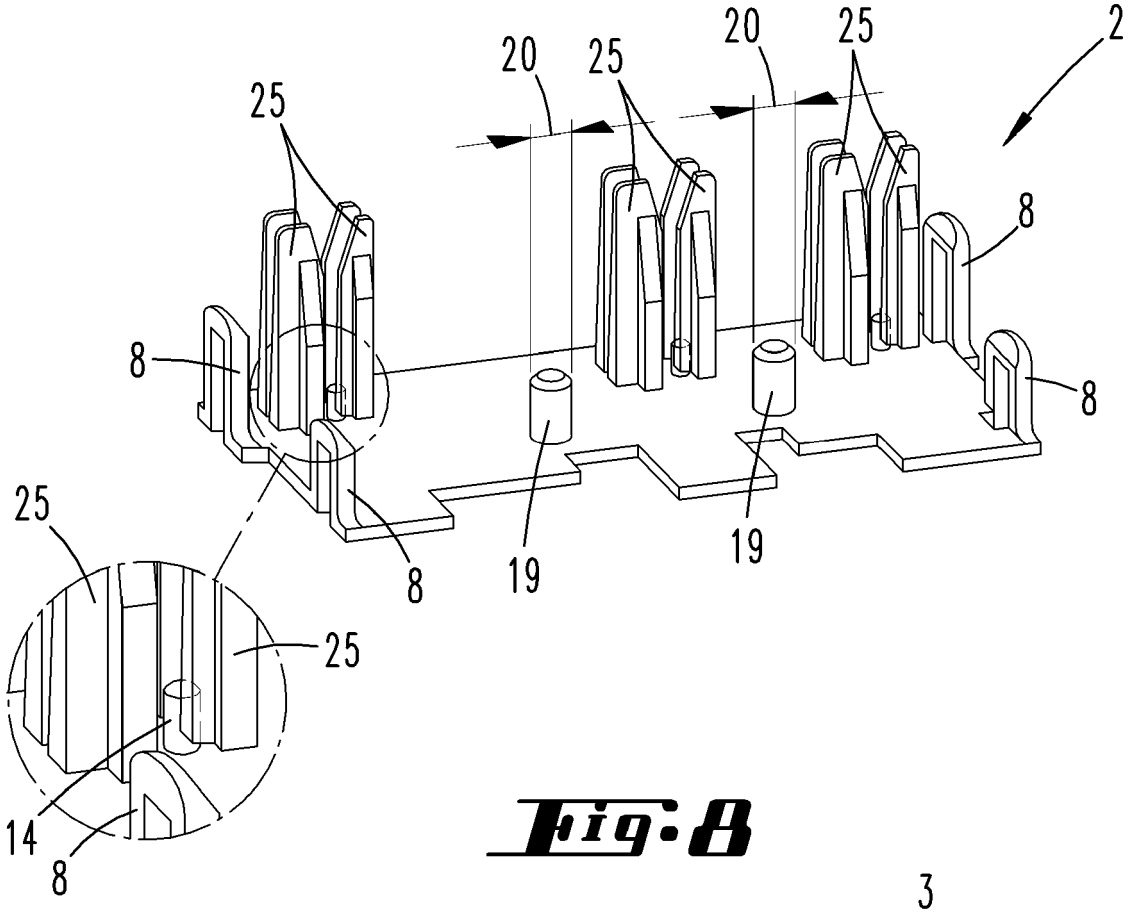
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Fig: 8

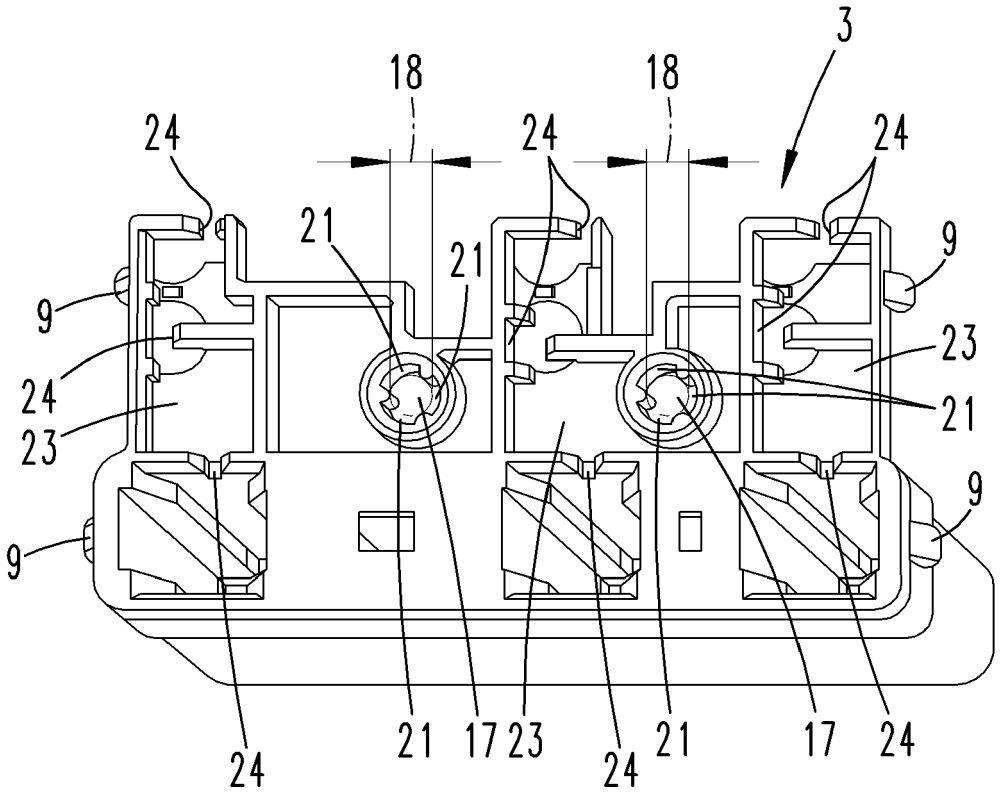
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Fig. 9

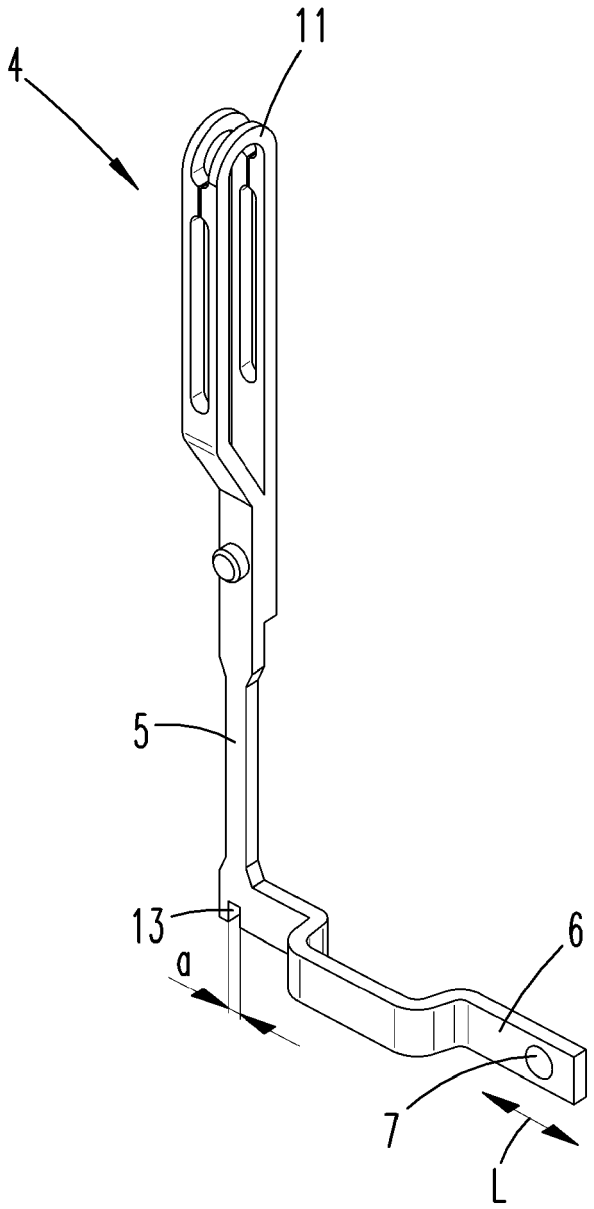


Fig: 10

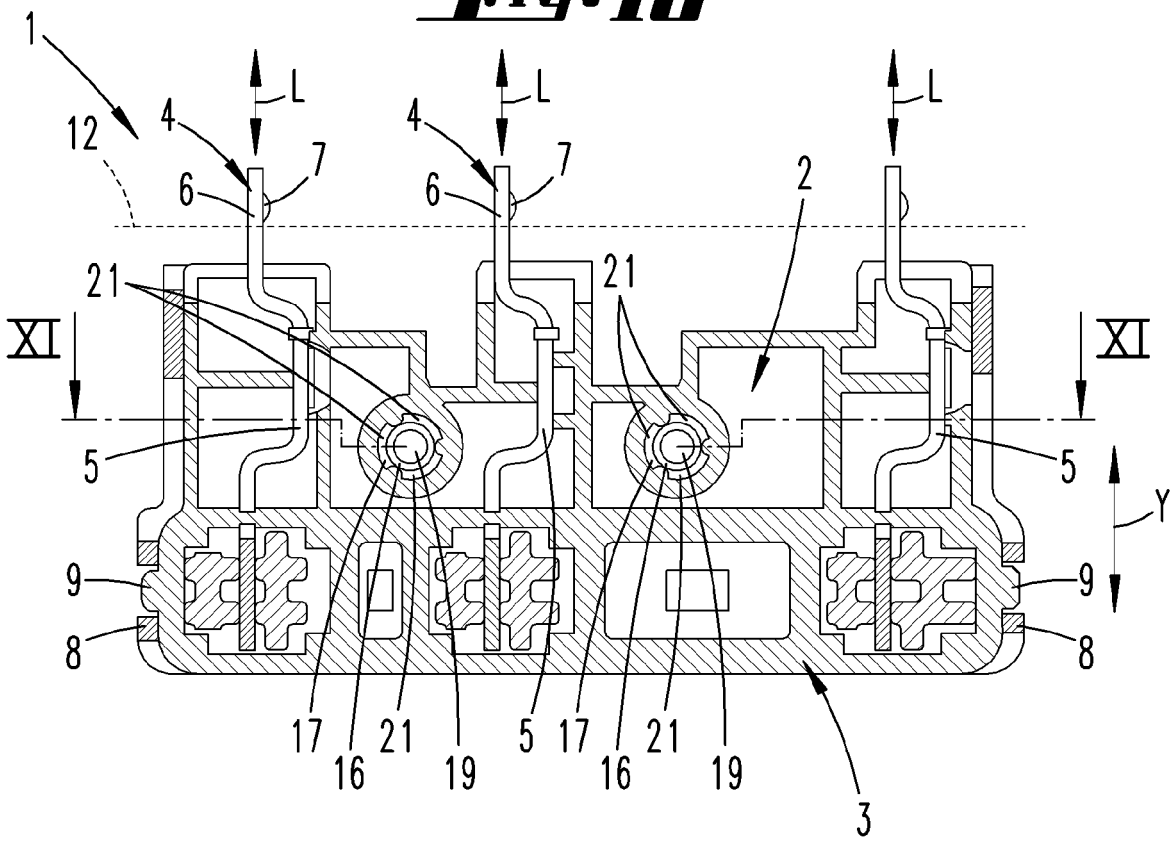
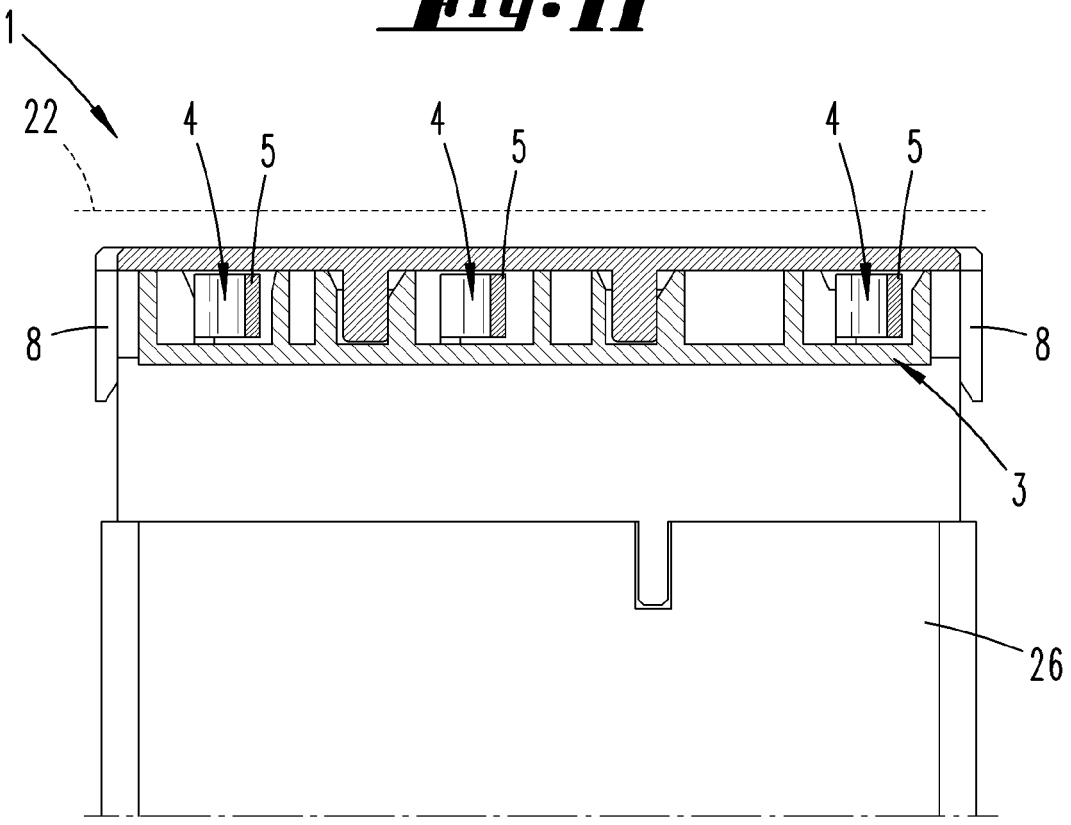


Fig: 11



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EUROPEAN SEARCH REPORT

Application Number
EP 18 46 5586

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 201 638 967 U (FOXCONN KUNSHAN COMP INTERFACE; HON HAI PREC IND CO LTD) 17 November 2010 (2010-11-17) * abstract; figures 1-4 *	1-15	INV. H01R13/41 H01R43/20 H01R13/506
X	WO 2018/070204 A1 (AUTONETWORKS TECHNOLOGIES LTD [JP]; SUMITOMO WIRING SYSTEMS [JP]; SUMI) 19 April 2018 (2018-04-19) * paragraphs [0034] - [0035]; claim 1; figures 1-4 *	1-6, 12-15	ADD. H01R4/02

TECHNICAL FIELDS SEARCHED (IPC)

H01R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	26 February 2019	Jiménez, Jesús

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26-02-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CN 201638967 U	17-11-2010	NONE	
WO 2018070204 A1	19-04-2018	JP 2018063797 A	19-04-2018
		WO 2018070204 A1	19-04-2018

EPO FORM P0459

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