

(19)



(11)

EP 4 819 400 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
07.10.2026 Bulletin 2026/41

(21) Application number: **25168567.3**

(22) Date of filing: **04.04.2025**

(51) International Patent Classification (IPC):
H01R 13/506^(2006.01) H01R 13/405^(2006.01)
H01R 13/41^(2006.01) H01R 13/504^(2006.01)
H01R 13/514^(2006.01) H01R 13/518^(2006.01)

(52) Cooperative Patent Classification (CPC):
H01R 13/518; H01R 13/506; H01R 13/514;
H01R 13/405; H01R 13/41; H01R 13/504

(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 ME MK MT NL
NO PL PT RO RS SE SI SK SM TR

Designated Extension States:

BA

Designated Validation States:

GE KH LA MA MD TN

(71) Applicant: **Aptiv Technologies AG**
8200 Schaffhausen (CH)

(72) Inventors:

- **URBANIAK, Andreas**
8200 Schaffhausen (CH)

- **GAERTNER, Markus**
8200 Schaffhausen (CH)
- **GANESAN, Uvaraj**
8200 Schaffhausen (CH)
- **KUMARESH, Rajan**
8200 Schaffhausen (CH)
- **MOORTHY, Vijay Babu**
8200 Schaffhausen (CH)

(74) Representative: **Bardehle Pagenberg**
Partnerschaft mbB
Patentanwälte Rechtsanwälte
Prinzregentenplatz 7
81675 München (DE)

(54) **PIN BLOCK FOR MODULAR CONNECTORS**

(57) Modular pin block for mounting into a housing of a modular connector, the pin block comprising a pin block support having a first connection surface and a second connection surface opposite the first connection surface,

and at least one pin extending through the pin block support such that it protrudes from the first connection surface and from the second connection surface.

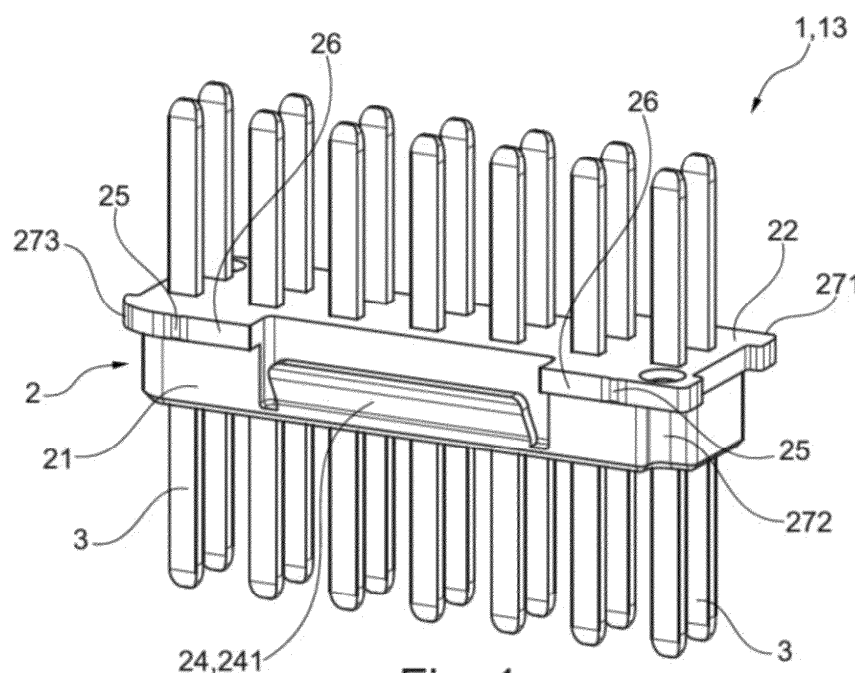


Fig. 1

Description

1. Field of the invention

[0001] The present disclosure relates to a modular pin block for mounting into a housing of a modular connector. Specifically, the present disclosure relates to a pin block support with at least one pin extending through it, protruding from both a first and a second connection surface.

2. Prior art

[0002] In the field of modular connectors, it is common to utilize pin blocks for establishing electrical connections within various types of electronic and mechanical systems. Known systems typically involve pin blocks that are integrated into connector housings, allowing for the transmission of electrical signals between different components. These pin blocks are crucial for ensuring reliable connectivity, especially in environments where connectors are frequently engaged and disengaged. Despite their widespread use, traditional pin blocks often face challenges related to ease of installation, secure attachment, and adaptability to different configurations.

[0003] Existing approaches in modular connector systems frequently rely on pin blocks that are either permanently fixed within the connector housing or require complex assembly processes. This can lead to increased manufacturing costs and difficulties in maintenance or replacement of individual components. Furthermore, known systems may lack flexibility in accommodating various pin sizes and configurations, which can limit their applicability across different use cases. The secure attachment of pin blocks within the housing is another area of concern, as inadequate latching mechanisms can result in poor connectivity. Additionally, ensuring proper alignment and orientation of pin blocks during installation is critical to prevent misalignment and ensure optimal performance.

[0004] Despite the substantial advances in the field of modular connectors, there remains a need for improved solutions that address these challenges. Specifically, there is a demand for pin blocks that can be easily and securely mounted into connector housings, while offering flexibility in terms of pin arrangements and sizes. Enhanced latching mechanisms that provide reliable attachment without compromising ease of installation are also desirable. Moreover, solutions that ensure proper alignment and orientation of pin blocks during installation would significantly enhance the reliability and performance of modular connector systems. It is therefore a technical problem underlying the present invention to provide a modular pin block system that at least partially overcomes the disadvantages of known systems.

3. Summary of the invention

[0005] The above-mentioned object is at least partially

realized by a pin block according to claim 1.

[0006] A first aspect of the invention provides a modular pin block for mounting into a housing of a modular connector, the pin block comprising a pin block support having a first connection surface and a second connection surface opposite the first connection surface, and at least one pin extending through the pin block support such that it protrudes from the first connection surface and from the second connection surface.

[0007] The described modular pin block is intended for installation within the housing of a modular connector. This modular pin block includes a pin block support, which has two connection surfaces positioned opposite each other, referred to as the first connection surface and the second connection surface. Additionally, at least one pin extends through the pin block support in such a manner that it protrudes from both the first and second connection surfaces.

[0008] The term "modular pin block" refers to a component designed to be part of a larger system, specifically a modular connector, which allows for flexibility and ease of assembly or replacement. The "pin block support" is the structure that holds and supports the pins, providing the necessary stability and alignment. The "first connection surface" and "second connection surface" are the two opposing faces of the pin block support where the pins extend through and protrude from. The "pin" is a conductive element that facilitates electrical connection by extending through the pin block support and allowing electrical contact on both sides.

[0009] The advantages of this configuration include enhanced versatility and ease of integration into various modular connector systems, leading to more efficient manufacturing processes and easier maintenance or replacement of parts.

[0010] In a first implementation, the pin block support comprises latching means designed to allow insertion of the pin block into a seat of the connector housing and to latch the pin block onto said seat by impeding movement of the pin block against the direction of insertion. This way the pin block remains securely in place once inserted. Preferably the latching means are one or more of: resilient arms, bars or one or more indentations.

[0011] The latching means enhance the stability and security of the pin block within the connector housing by providing a reliable method of attachment. The use of resilient arms or bars allows for a degree of flexibility and adaptability, accommodating slight variations in the dimensions of the seat or the pin block itself. This flexibility can help to absorb shocks or vibrations, reducing the risk of disconnection or damage to the components. Indentations provide a simple yet effective means of creating a secure fit of the pin block. By impeding movement against the direction of insertion, the latching means ensure that the pin block cannot be easily dislodged, even under conditions of mechanical stress or external force, such as in applications where the connector is subject to frequent handling or movement.

[0012] In a further implementation the pin block support comprises side edges between the first connection surface and the second connection surface, and the latching means comprises a long flexible bar resiliently attached to at least half of the length of least one side edge and extending substantially perpendicular to the longitudinal extension of the at least one pin. The long flexible bar faces a seat of the housing in a mounted condition.

[0013] The resilient attachment of the bar to the side edge allows it to flex and latch securely into place when the pin block is inserted into the housing. With an attachment length of at least half the length of a side edge, a linear latching is provided which reliably prevents dislodgement due to vibrations or external forces. Additionally, the resilient nature of the bar allows for some degree of flexibility and tolerance during the insertion process, making it easier to mount the pin block into the housing without requiring precise alignment.

[0014] In a further implementation of the pin block support, it comprises at least one distance pad designed to eliminate any gap between the pin block support and the seat of the connector housing in a mounted condition. This at least one distance pad is provided preferably on the side edges of the pin block support. It ensures a snug fit between the pin block support and the connector housing. By eliminating any gaps, the distance pad prevents potential issues such as misalignment, movement, or vibration of the pin block within the housing, which could otherwise lead to poor electrical connections or mechanical failures. The presence of the distance pad also simplifies the assembly process by providing a clear and defined seating position for the pin block support within the connector housing, reducing the likelihood of assembly errors. Advantageously, each side edge has a distance pad close to each corner of the pin block support. This way, when the distance pads cover the whole length of each side edge, the pin block support cannot be inserted obliquely as the distance pads will realign the pin block support.

[0015] In a further implementation of the pin block support, it includes a skirt designed to hold the pin block within the seat of the connector housing. Such a skirt can be positioned on at least part of the side edges near their vertex. To hold the pin block securely within the seat of the connector housing, the skirt impedes any movement of the pin block beyond the seat in the direction of insertion. In other words, it effectively acts as a stop, preventing the pin block from being pushed too far into the housing. By preventing over-insertion, the skirt also protects the pins from potential damage that could occur if the pin block were to be inserted too deeply and were to protrude over the connector housing.

[0016] In a further implementation, the skirt protrudes outwardly from one of the contact surfaces in a direction perpendicular to the longitudinal extension of the at least one pin.

[0017] The skirt's protrusion outwardly from one of the

contact surfaces (like in form of a flange) provides an additional structural element that can enhance the stability and alignment of the pin block when mounted into the housing of a modular connector. The skirt's protrusion can serve as a guide or stop that ensures the pin block is correctly positioned within the housing, as the skirt can provide a tactile or visual reference point for alignment.

[0018] The outer shape of the first connection surface and/or the second connection surface can define the mounting orientation of the pin block into the connector housing.

[0019] Defining the mounting orientation prevents incorrect insertion of the pin block, which is especially important when the pins are not placed symmetrically, for example because of differently sized pins, or because of splices integrated into the pin block support, or when not all pin positions are filled. Incorrect insertion can therefore lead to improper functioning of the modular connector. By ensuring that the pin block can only be inserted in the correct orientation, the design enhances the reliability and ease of assembly of the modular connector system. The asymmetrical design of the connection surfaces serves as a physical keying mechanism, guiding the user to insert the pin block correctly without the need for additional visual or instructional aids. This feature also simplifies the design of the housing, as it does not require additional components or mechanisms to ensure correct orientation, making it more user-friendly.

[0020] For example, one way to obtain that the outer shape dictates the mounting orientation of the pin block into the housing is to design the shorter end edges of the pin block support asymmetrically, meaning that they are not identical to each other. Then the pin block can only be inserted into the housing in one predefined direction.

[0021] Generally, the pin block supports are designed to accommodate a certain number of pins. Specific configurations for the arrangement of pins on the pin block support, specifying the number and size of pins that can be accommodated, are two rows of 13 pins of size 0.50, two rows of 9 pins of size 0.63, two rows of 7 pins of size 1.2, one row of 4 pins of size 2.8, or one row of 3 pins of size 4.8. This adaptability is crucial for meeting various application requirements, as different electronic or electrical systems may necessitate different pin sizes and quantities.

[0022] The range of possible configurations is enhanced when arranging as many pins as can be accommodated on the pin block support as well as arranging less pins than can be accommodated on the pin block support. The pin block therefore allows for a large versatility and a high degree of customization, making it suitable for complex and varied connection requirements, enabling the pin block to be used in a wide variety of modular connectors.

[0023] A further embodiment of the present invention covers a connector housing comprising at least one modular pin block. The connector housing is substantially

box-shaped and includes circumferential side walls designed to provide protection to the pins of the pin block, ensuring that the pins are shielded from potential damage or environmental factors that could impair their functionality. The connector housing further comprises a connector interface with one or more seats. The connector interface is substantially perpendicular to and received within the side walls, creating a secure and stable structure for the modular pin block. The at least one pin block is received in the at least one seat. By incorporating circumferential side walls, the housing provides a protective barrier around the pins, reducing the risk of physical damage and contamination. These features collectively contribute to a more durable and reliable modular connector system, capable of withstanding various environmental and operational challenges.

[0024] Depending on the intended use of the connector housing, it is possible to add shielding walls between the seats and thus between the modular pin block within the circumferential side walls to shield the different pin blocks and avoid interferences.

[0025] Conveniently, the at least one pin block and the at least one seat are complementary shaped. This complementary shaping ensures that the pin block and the seat fit together precisely, enhancing the stability and alignment of the pin block within the connector housing and facilitating easier assembly and disassembly of the connector, as the parts will naturally align and fit together without requiring excessive force or adjustment.

[0026] When the pin block support comprises orientation features, the seat also can comprise orientation details which are complementary shaped to the orientation features. It ensures that the pin block is correctly oriented within the housing, which is crucial for the proper functioning of the modular connector. As previously mentioned, incorrect orientation can lead to significant issues, including electrical faults.

[0027] In a further implementation, the at least one pin block is secured by laser welding to the connector interface.

[0028] Laser welding provides a strong and reliable bond between the pin block and the connector housing, ensuring that the pin block remains securely in place during operation. This is particularly important in environments where the connector may be subjected to vibrations, mechanical stresses, or thermal cycling, as the laser-welded joint can withstand such conditions without compromising the integrity of the connection. Additionally, laser welding allows for precise and localized application of heat, which minimizes the risk of damage to surrounding components and materials. This precision is crucial in modular connectors where space is often limited and components are densely packed. The use of laser welding also enhances the overall durability and longevity of the connector by creating a permanent and robust attachment that is less likely to degrade over time compared to other methods such as adhesive bonding or mechanical fastening. Furthermore, laser welding can be

automated, which improves manufacturing efficiency and consistency. To that end, pick-up parts of the pin block support such as through-holes, which are first used for automatic positioning of the pin block within the connector housing, can later be used as laser welding points to secure pin blocks to the connector housing. The pin block can be secured to the connector interface of the connector housing by welding in addition to or in replacement of latching means.

[0029] When the pin block supports comprises resilient legs or bars, the seats of the connector interface advantageously comprise indentations complementary to the resilient legs or bars. When the pin block support comprises indentations, the seats of the connector interface advantageously comprise resilient legs or bars complementary to the indentations.

[0030] The complementary design of indentations and resilient legs or bars provides flexibility and resilience, allowing for slight movements and adjustments while maintaining a firm connection. Additionally, it simplifies the assembly process, as the components can be easily aligned and fitted together without the need for additional fastening mechanisms. This reduces the complexity and cost of manufacturing the modular connector while maintaining high performance and reliability.

[0031] When the connector housing incorporates at least a first and a second pin block, the outer shape of the pin block support of both pin blocks as well as the shape of the seats are identical. This identical outer shape ensures that the pin blocks are interchangeable and can fit any seat of the connector interface without requiring modifications to the housing or the pin block supports. The first pin block may include pins of a different pin size than the second pin block. This standardization of the shape of the seat and of the outer shape of the pin block support simplifies the assembly process and reduces manufacturing complexity. Additionally, the ability to use pin blocks with different pin sizes within the same housing can lead to cost savings, as it reduces the need for multiple types of housings and connectors, streamlining inventory and production processes.

[0032] Two main production methods are foreseen to obtain a pin block according to the invention. According to the first production method, the pin block support comprises pin holes according to a desired pattern, and at least one pin is stitched through the pin block support. It is possible that as many pins are stitched through the pin block support as can be accommodated, or that less pins are stitched through the pin block support than can be accommodated.

[0033] Alternatively, at least one pin is arranged according to a desired pattern, meaning that the pin is positioned according to its final position within the pin block, and subsequently the pin block support is molded around the at least one pin. Integrating the pins into the pin block support by encasing them within the molded material enhances the structural integrity and durability of the pin block. Also with this production method, it is

possible to arrange as many pins as can be accommodated on the pin block support before molding the pin block support, or to arrange less pins than can be accommodated on the pin block support before molding the pin block support.

4. Short description of the drawings

[0034] In the following, preferred embodiments of the disclosure are disclosed by reference to the accompanying figures, in which:

Fig. 1: shows an embodiment of a modular pin block with pins extending through a pin block support.

Fig. 2a: shows a connector housing with empty seats for receiving modular pin blocks.

Fig. 2b: shows the connector housing with various modular pin blocks inserted into the seats.

Fig. 3: shows an embodiment of a modular pin block with pins extending through the pin block support.

Fig. 4: illustrates a cross-sectional view of the pin block, highlighting the pins, connection surfaces, and latching means.

Fig. 5: depicts a 3D cross-sectional view of a connector housing with a pin block mounted within.

Fig. 6: shows a pin block support and a pin prior to stitching the pin to the pin block support.

Fig. 7a: depicts a first embodiment of a modular pin block with pins extending through each pin hole of the pin block support.

Fig. 7b: depicts a second embodiment of a modular pin block with less pins through the pin block support than pin holes on the pin block support.

Fig. 8: shows multiple pins arranged in a pattern prior to molding the pin block support.

Fig. 9a: shows a first embodiment of a modular pin block after molding the pin block support onto the pins arranged in the pattern shown in Fig. 8.

Fig. 9b: shows a second embodiment of a modular pin block after molding the pin block support onto pins arranged on a different pattern than shown in Fig. 8.

Fig. 10a: shows a first embodiment of a half-module pin block.

Fig. 10b: shows a second embodiment of a half-module pin block.

Fig. 11: shows laser welding points on the connector housing and laser welding on a pin block.

5. Detailed description of preferred embodiments

[0035] In the following, preferred embodiments of the present disclosure are described in detail with respect to the figures.

[0036] Fig. 1 shows a modular pin block 1 designed for mounting into a housing 4 of a modular connector (not shown in Fig. 1). The pin block 1 comprises a pin block support 2 with a general rectangular shape and featuring side edges 21 that extend between a first connection surface 22 and a second connection surface 23 (not visible in Fig. 1) opposite the first connection surface 22. In other words, the pin block support 2 includes side edges 21 that run between the first and second connection surfaces. In the shown pin block 1, in the following also labeled "third modular pin block 13 of the type 1.2", two rows of nine pins 3 of the size 1.2 extend through the pin block support 2, protruding from both the first connection surface 22 and the second connection surface 23. Latching means 24, which may include resilient arms or resilient bars 241, are designed to facilitate the insertion of the pin block 1 into a seat 44 of the connector housing 4 and to latch it securely onto the seat 44. Additionally, the pin block support 2 is equipped with distance pads 25 on the side edges 21, intended to eliminate any gap between the pin block support 2 and the seat 44 when mounted. The support 2 also features a skirt 26 near the vertex of the side edges 21, designed to hold the pin block 1 within the seat 44 by impeding movement beyond the seat in the direction of insertion. In the shown example embodiment, the outer shape of the first connection surface 22 and the outer shape of the second connection surface 23 both define the mounting orientation, ensuring that the pin block 1 can only be inserted in one predefined direction into the housing 4. Specifically, on a shorter side, the first connection surface has first orientation features 271 in the shape of angled corners that are continued on the skirt, and the second connection surface has recessed corners as second orientation feature 272 that are continued on the side edges. On the opposite side the first connection surface has third orientation features 273 in the shape of rounded corners that are continued on the skirt.

[0037] Fig. 2 illustrates the connector housing 4 in two views: Fig. 2a and Fig. 2b. In Fig. 2a, the housing 4 is shown in a top view as substantially box-shaped with circumferential side walls 41 that provide protection to the pins 3 of the pin block 1. The connector interface 42,

which is substantially perpendicular to and received within the side walls 41, includes multiple (8) seats 44. Each seat 44 is designed to receive a pin block 1. The seats 44 feature a pair of indentations 441 on each long side of the seat that are complementary to the resilient bars 241 of the pin block support 2, ensuring secure latching. The housing 4 also includes orientation details 471, 472, and 473 that are complementary to the orientation features 271, 272, 273 of the pin block 1, ensuring proper alignment and insertion.

[0038] In Fig. 2b, the housing 4 is shown with multiple (8) pin blocks 11, 12, 13, 14, and 15 mounted within the seats 44. Each pin block is secured within the housing 4, with the outer shape of the pin block support of each pin block being essentially identical. The pin blocks include pins of different sizes, demonstrating the modularity and flexibility of the design. Specifically, in the shown example, two first modular pin blocks 11 are shown, having two rows of 13 pins 3 of size 0.50, one second modular pin block 12, having two rows of 9 pins 3 of size 0.63, two third modular pin blocks 13, having two rows of 7 pins 3 of size 1.2, one fourth modular pin block 14, having one row of 4 pins 3 of size 2.8, and finally two fifth modular pin blocks 15, having one row of 3 pins 3 of size 4.8. In particular the use of modular pin blocks obviates the risk of damaging pins 3, which is particularly applicable to the first and second modular pin blocks 11, 12 as these have especially thin and fragile pins 3.

[0039] Fig. 3 illustrates a top view of a modular pin block 11, which is mounted into a housing 4' of a modular connector. The pin block 11 comprises a pin block support 2 with a first connection surface 22. The pin block support 2 is shown to have multiple (26) pins 3 extending through it, arranged in a grid pattern. These pins 3 protrude from both the first connection surface 22 and the opposite second connection surface 23, as seen in Fig. 4. The pin block support 2 includes latching means 24, which are resilient bars 241 designed to secure the pin block support 2 within the seat 44 of the connector housing 4'. Each resilient bar 241 cooperates with a pair of indentations 441 on the inner edge of the seat. The pin block 11 also features orientation features 271 and 273, which only allow a polarized insertion of the pin block support 2 into the seat 44.

[0040] Fig. 4 provides a cross-sectional view of the modular pin block 11 being arranged in the housing a', showing the pins 3 extending through the pin block support 2 from the first connection surface 22 to the second connection surface 23. The latching means 24 are depicted as resilient bars 241 that engage with the indentations 441 of the connector housing 4' to secure the pin block 11 in place. Additionally, the figure shows a skirt 26 on the pin block support 2, which is designed to hold the pin block within the seat of the connector housing by impeding movement beyond the seat in the direction of insertion. In the shown picture, part of the skirt is not visible because hidden behind the indentations. The height of the circumferential side walls 41 of the con-

necter housing 4' is at least equal to the length of the pins 3, which allows the connector housing 4' to protect the pins 3 from damage.

[0041] Fig. 5 illustrates the connector housing 4', which is substantially box-shaped and includes circumferential side walls 41. The housing 4' is designed to accommodate multiple modular pin blocks. The connector interface 42 is shown to be substantially perpendicular to and received within the side walls 41. The pin block 11 is received in a seat 44 of the connector interface 42. The figure highlights the complementary shaping of the pin block 11 and the seat 44, ensuring proper alignment and securement. The housing 4' provides protection to the pins 3 of the pin block 11, with the side walls 41 serving as a barrier against external elements. In the shown picture the circumferential side walls are substantially higher than the protruding pins 3. As depicted, the connector housing 4' can include shielding walls 43 between the seats 44 and thus between the modular pin blocks within the circumferential side walls 41 to shield the different pin blocks and avoid interferences. The figure also shows the presence of indentations 441 in the seat 44, which are complementary to the latching means 24 of the pin block 11, ensuring a secure fit. The skirt 26 is visible, protruding outwardly from the pin block support 2, further securing the pin block 11 within the housing 4'. The connector interface 42 is designed to facilitate the connection of the pin block 11 to external components, with the pins 3 extending through the interface for electrical connectivity. The overall design ensures that the pin block 11 is held securely within the housing 4', with the latching means 24 and skirt 26 working in conjunction to prevent movement and maintain alignment.

[0042] Fig. 6 illustrates a pin block support 2 and a pin 3 prior to stitching the pin 3 to the pin block support 2. Further to the features already described in connection with the previous figures, the pin block support 2 includes pin holes 28, which are designed to accommodate the pins 3 according to a desired pattern. The pin 3 is shown with retention barbs 36 that interact with the pin block support 2 to secure the pin 3 in place.

[0043] Fig. 7a and 7b illustrate two different possibilities of accommodating pins within the pin block support 2. Fig. 7a depicts a first embodiment of a modular pin block 17 with pins 3 extending through each pin hole 28 of the pin block support 2. Fig. 7b depicts a second embodiment of a modular pin block 17' with less pins through the pin block support than pin holes on the pin block support. These figures illustrate the modular nature of the pin block, allowing for various configurations of pins 3 to be arranged on the pin block support 2, depending on the specific requirements of the connector housing.

[0044] Fig. 8 illustrates multiple pins arranged in a pattern prior to molding the pin block support. The pins 3 are aligned in a parallel configuration, and extend through a molding plane 5, which is the plane in which the pin block support 2 is molded after the pins are arranged according to the desired pattern. The arrows

indicate the direction of the tools molding the pin block support.

[0045] Two embodiments of the modular pin blocks 19, 19' obtained after molding the pin block support 2 onto the pins 3 are shown in Fig. 9a and Fig. 9b. In the embodiment shown in Fig. 9a, the modular pin block 19 comprises as many pins 3 as can be arranged on the pin block support. In contrast, in the embodiment of the modular pin block 19' shown in Fig. 9b, the pin block support 2 has been molded onto pins 3 arranged in a different pattern than shown in Fig. 8, and in particular onto less pins 3 than can be accommodated in the pin block support 2.

[0046] Fig. 10 exemplifies split modular pin blocks or half-module pin blocks, with a combination of pins of different sizes. Fig. 10a shows a combination of pins 31 and pins 32 within one pin block, whereas Fig. 10b shows a combination of pins 33 and pins 34 within one pin block. Splitting modular pin blocks further increases the adaptability of the pin blocks to specific needs and allows more possibilities of modularity. In particular, half-module pin blocks allows saving space on the connector housing.

[0047] Fig. 11 indicates the location of laser welding points 6 on the connector housing 4. In this example, the laser welding points are on the indentations 441 and on two diagonal corners of each seat 44. On the bottom right seat a second modular pin block is shown and on the top right seat of the connector housing a fourth modular pin block 14 is shown. On the fourth modular pin block 14 the laser welding is indicated by oval spots. Welding spots make sure that the pin block does not detach from the connector housing in repeated mating and unmating operations.

List of reference signs

[0048]

1	modular pin block
11	first modular pin block for pins of the type 0.50
12	second modular pin block for pins of the type 0.63
13	third modular pin block for pins of the type 1.2
14	fourth modular pin block for pins of the type 2.8
15	fifth modular pin block for pins of the type 4.8
17, 17'	modular pin block
19, 19'	modular pin block
2	pin block support
21	side edge[s]
22	first connection surface
23	second connection surface
24	latching means
241	resilient bar[s]
25	distance pad[s]
26	skirt
271	first orientation feature
272	second orientation feature

273	third orientation feature
28	pin hole[s]
29	pick-up part[s]
3	pin[s]
5 31	pins of the type 0.50
32	pins of the type 0.63
33	pins of the type 1.2
34	pins of the type 2.8
35	pins of the type 4.8
10 36	retention barb[s]
4, 4', 4"	connector housing
41	circumferential side wall[s]
42	connector interface
43	shielding wall[s]
15 44	seat[s]
441	indentation[s]
471	first orientation detail
472	second orientation detail
473	third orientation detail
20 5	molding plane
6	laser welding point[s]

Claims

- 25 1. Modular pin block (1) for mounting into a housing (4) of a modular connector, the pin block (1) comprising
 - a pin block support (2) having a first connection surface (22) and a second connection surface (23) opposite the first connection surface (22), and
 - at least one pin (3) extending through the pin block support (2) such that it protrudes from the first connection surface (22) and from the second connection surface (23).
- 30 2. Pin block (1) according to claim 1, wherein the pin block support (2) comprises latching means (24) designed to allow insertion of the pin block (1) into a seat (44) of the connector housing (4) and to latch the pin block (1) onto said seat (44), wherein preferably the latching means (24) are one or more of: resilient arms or bars or one or more indentations.
- 45 3. Pin block (1) according to claim 2, wherein the pin block support (2) comprises side edges (21) between the first connection surface (22) and the second connection surface (23) and wherein the latching means (24) comprises a long flexible bar (241) resiliently attached to at least half of the length of least one side edge (21) and extending substantially perpendicular to the longitudinal extension of the at least one pin.
- 50 4. Pin block (1) according to any preceding claim, wherein the pin block support (2) comprises at least one distance pad (25) designed to eliminate any gap between the pin block support (2) and the seat (44) of

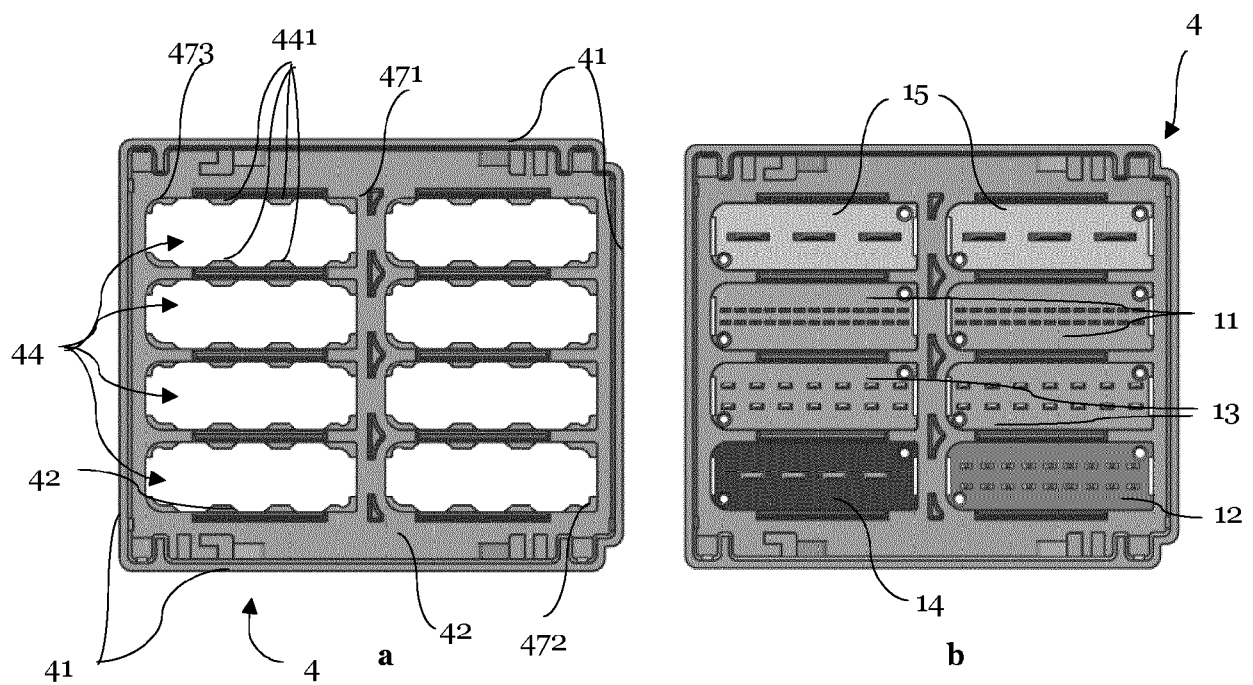
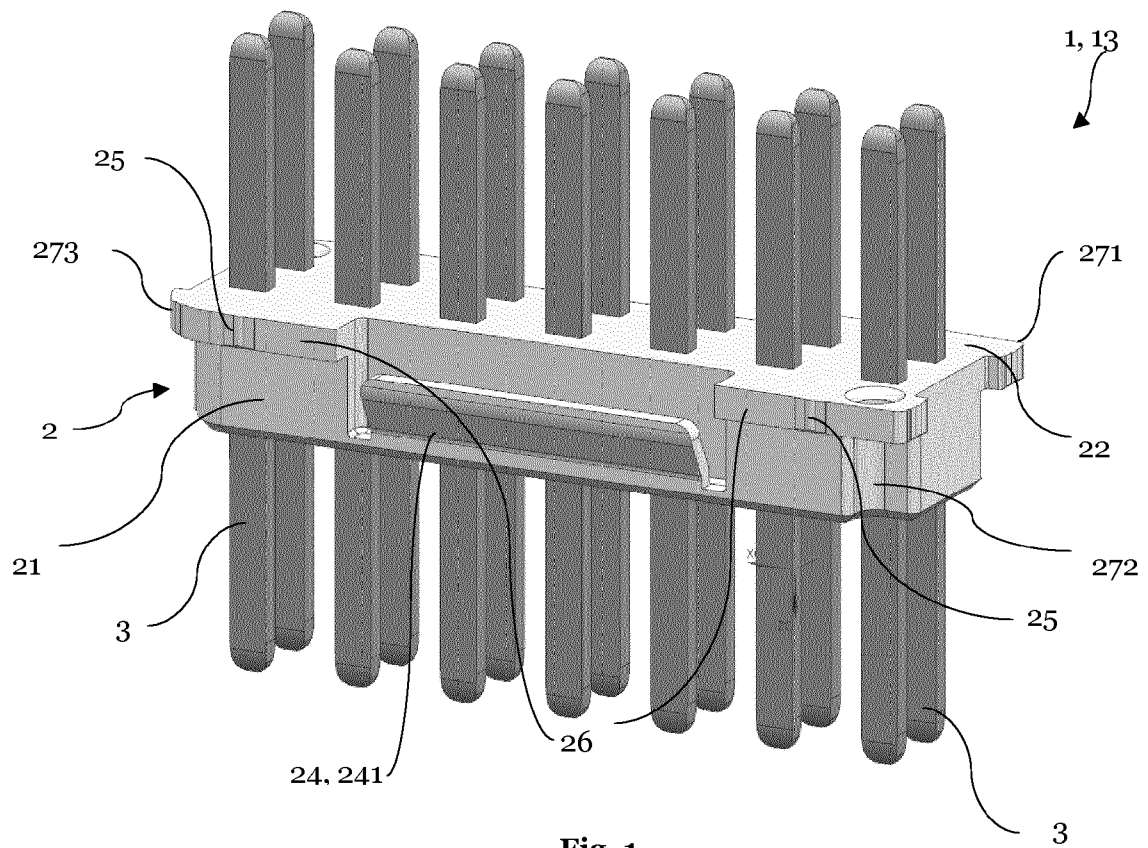
the connector housing (4) in a mounted condition.

5. Pin block (1) according to any preceding claim, wherein the pin block support (2) includes a skirt (26) designed to hold the pin block (1) within the seat (44) of the connector housing (4). 5
6. Pin block (1) according to the preceding claim, wherein the skirt (26) protrudes outwardly from one of the contact surfaces in a direction perpendicular to the longitudinal extension of the at least one pin (3). 10
7. Pin block (1) according to any preceding claim, wherein the outer shape of the first connection surface (22) and/or the second connection surface (23) defines the mounting orientation. 15
8. Pin block (1, 11, 12, 13, 14, 15) according to any preceding claim, wherein 20
 - two rows of 13 pins (31) of size 0.50, or
 - two rows of 9 pins (32) of size 0.63, or
 - two rows of 7 pins (33) of size 1.2, or
 - one row of 4 pins (34) of size 2.8, or
 - one row of 3 pins (35) of size 4.8, or
 - a defined quantity of pins (3) of the same size, or
 - a combination of pins (31, 32, 33, 34, 35) of different sizes can be accommodated on the pin block support (2) and wherein as many pins (3) are arranged on the pin block support (2) as can be accommodated. 25
9. Pin block (1, 11, 12, 13, 14, 15) according to any preceding claim 1 to 7, wherein 30
 - two rows of 13 pins (31) of size 0.50, or
 - two rows of 9 pins (32) of size 0.63, or
 - two rows of 7 pins (33) of size 1.2, or
 - one row of 4 pins (34) of size 2.8, or
 - one row of 3 pins (35) of size 4.8, or
 - a defined quantity of pins (3) of the same size, or
 - a combination of pins (31, 32, 33, 34, 35) of different sizes can be accommodated on the pin block support (2) and wherein less pins (3) are arranged on the pin block support (2) than can be accommodated. 35
10. Connector housing (4) comprising a least one modular pin block (1) according to any preceding claim, the housing (4) being substantially box-shaped and comprising circumferential side walls (41) and a connector interface (42) with one or more seats (44), wherein the connector interface (42) is substantially perpendicular to and received within the side walls and, wherein the at least one pin block (1) 40

is received in the at least one seat (44).

11. Connector housing (4) according to the preceding claim, wherein the at least one pin block (1) and the at least one seat (44) are complementarily shaped. 5
12. Connector housing (4) according to any preceding claim 10 or 11, wherein the at least one pin block (1) is secured by laser welding to the connector interface (42). 10
13. Connector housing (4) according to any preceding claim 10 to 12 in combination with claim 2 or 3, wherein the seats (44) of the connector interface (42) comprise indentations (441) complementary to the resilient legs or bars (241) or resilient legs or bars complementary to the indentations (441). 15
14. Connector housing (4) according to any preceding claim 10 to 12, comprising at least a first and a second pin block, wherein 20

the outer shape of the pin block support (2) of both pin blocks (1) is identical and wherein the first pin block includes pins (3) of a different pin size than the second pin block. 25
15. Method of producing a pin block (1) according to any claim 1 to 9, the method including 30
 - providing a pin block support (2) with pin holes (28) according to a desired pattern;
 - stitching the at least one pin (3) through the pin block support (2), or including
 - arranging the at least one pin (3) according to a desired pattern;
 - molding the pin support block around the at least one pin (3). 35



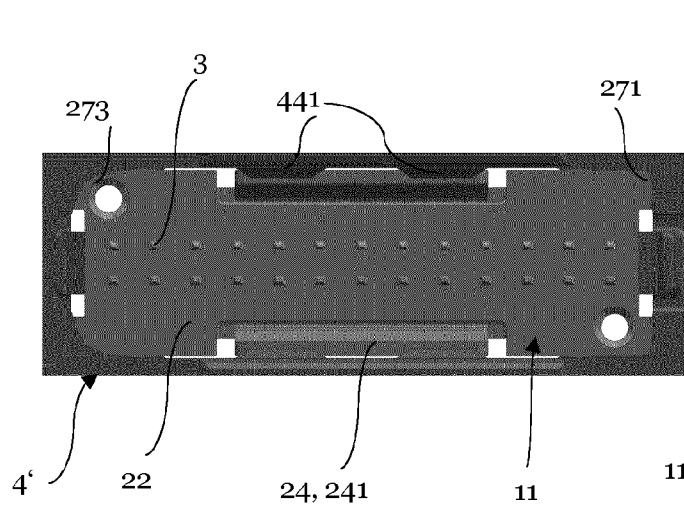


Fig. 3

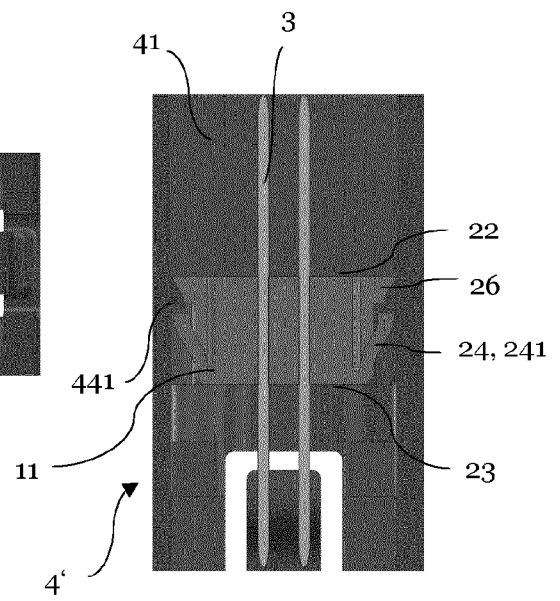


Fig. 4

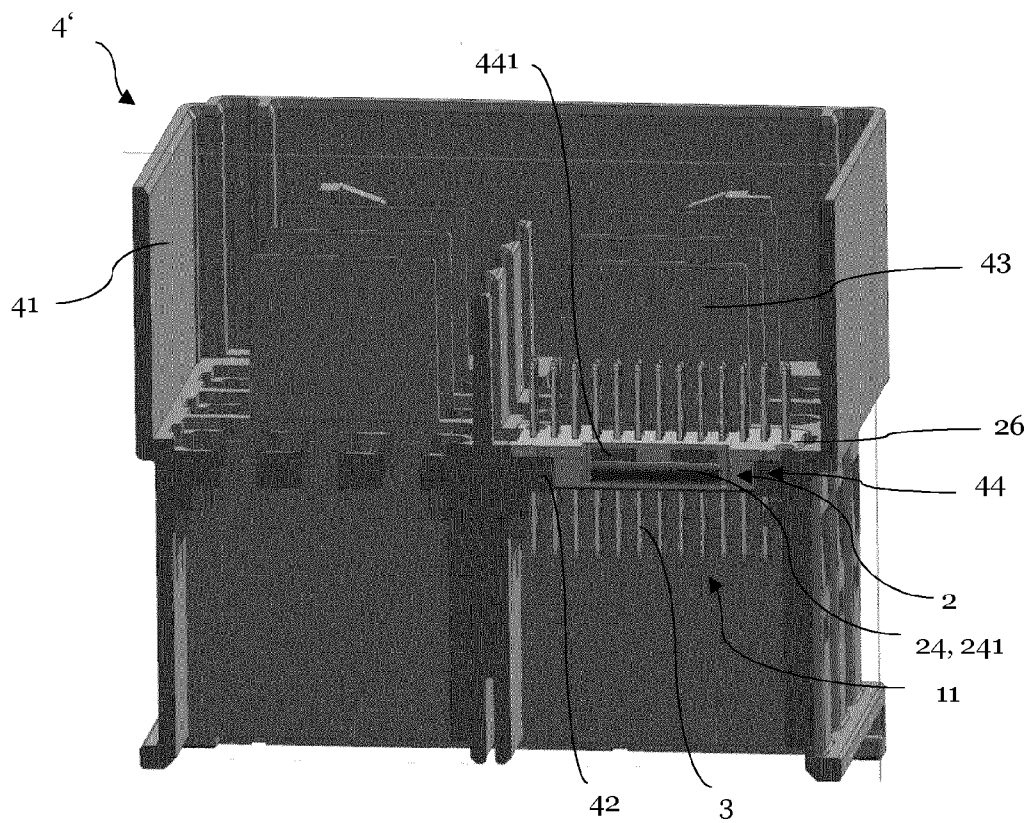


Fig. 5

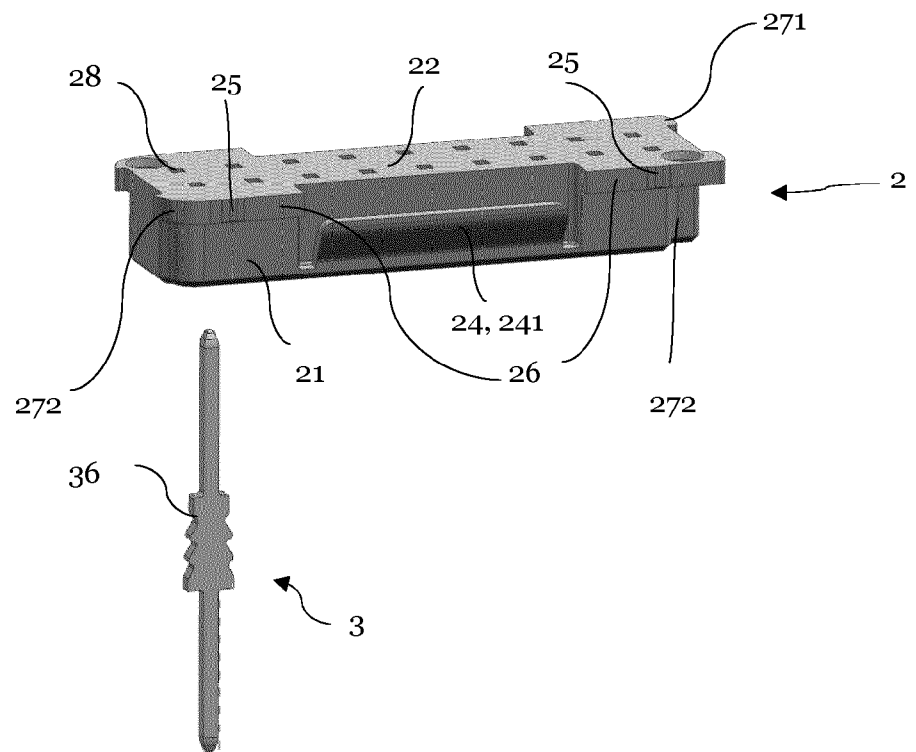


Fig. 6

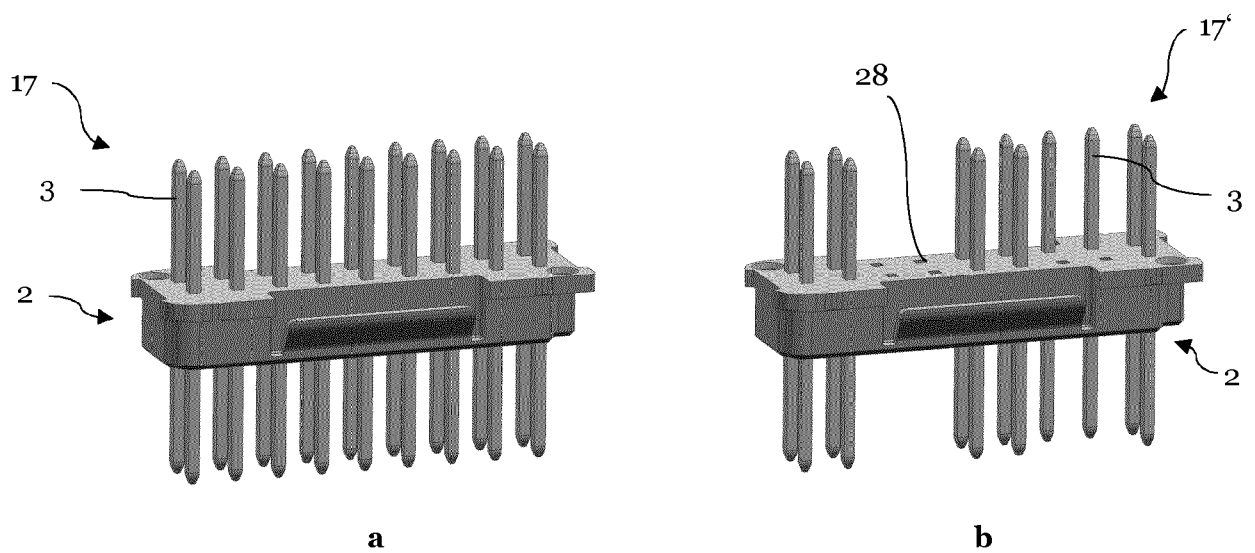


Fig. 7

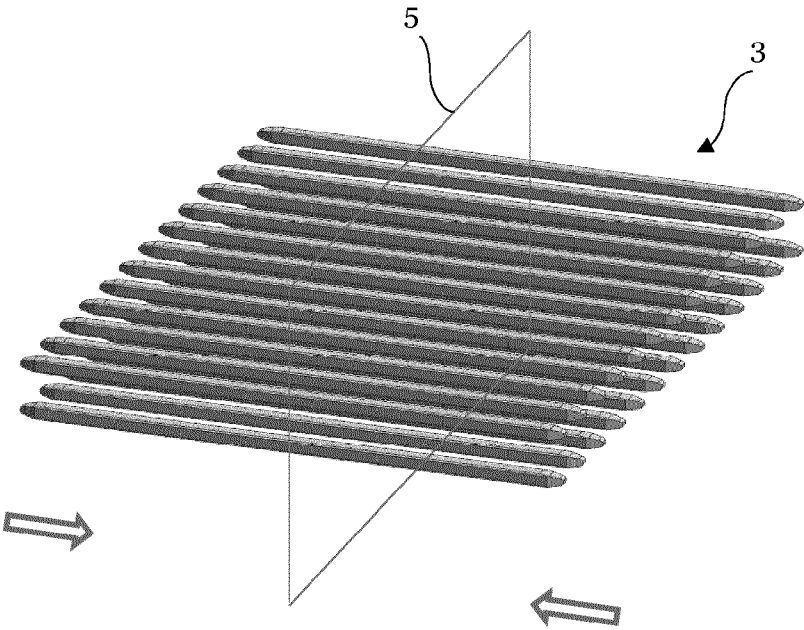


Fig. 8

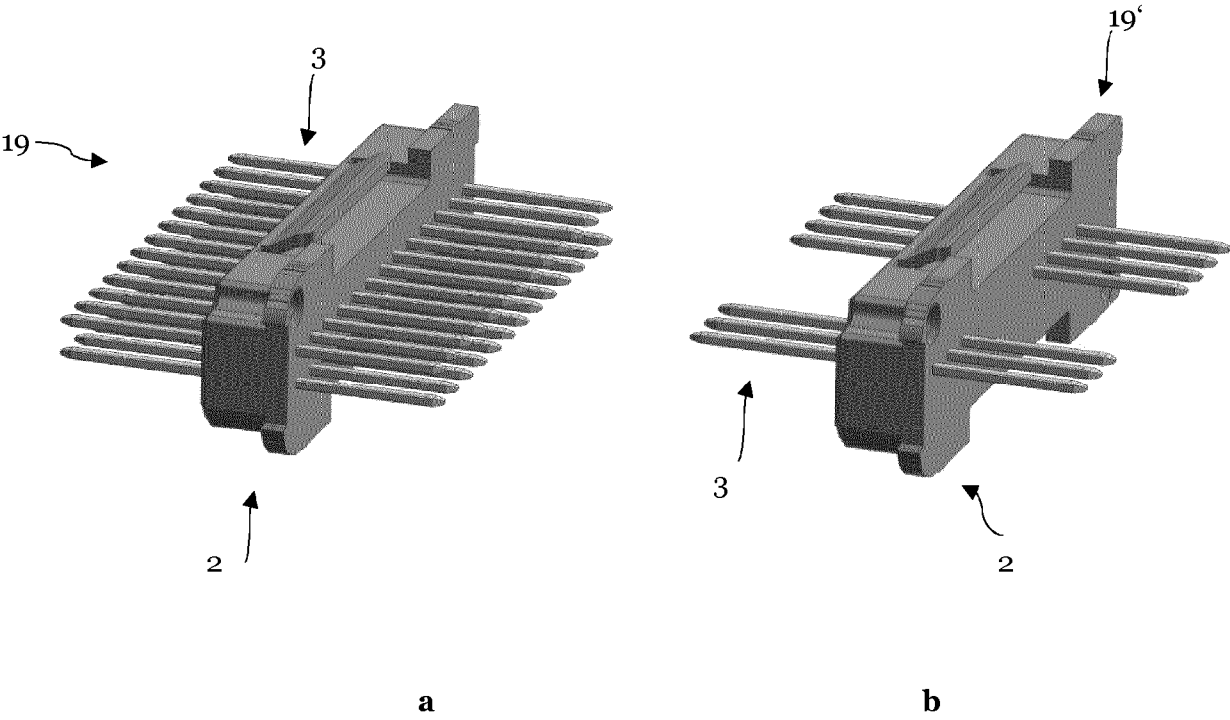


Fig. 9

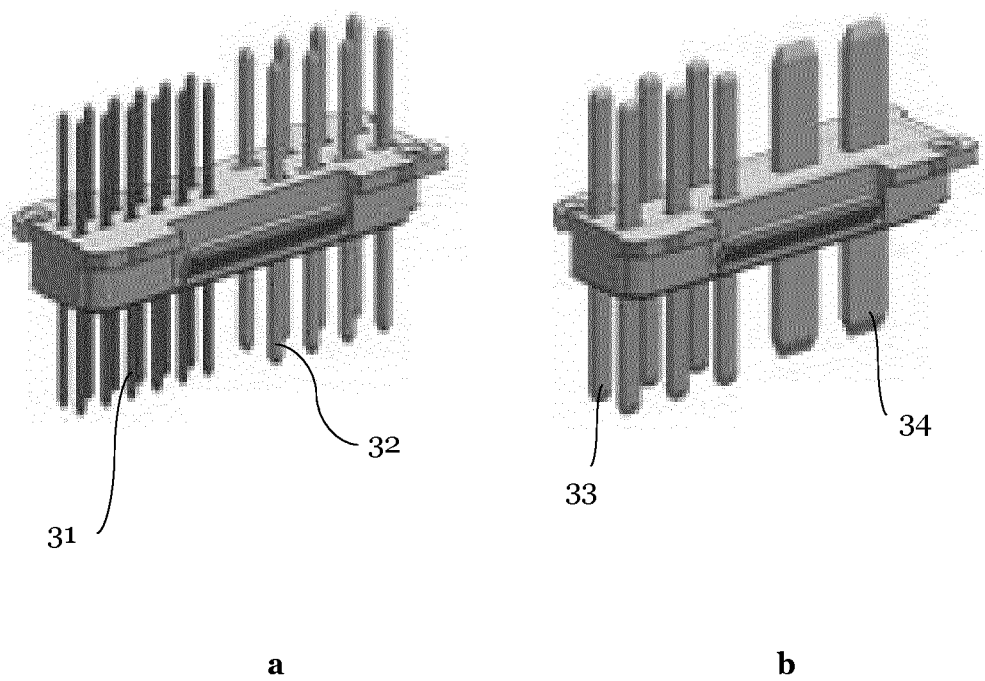


Fig. 10

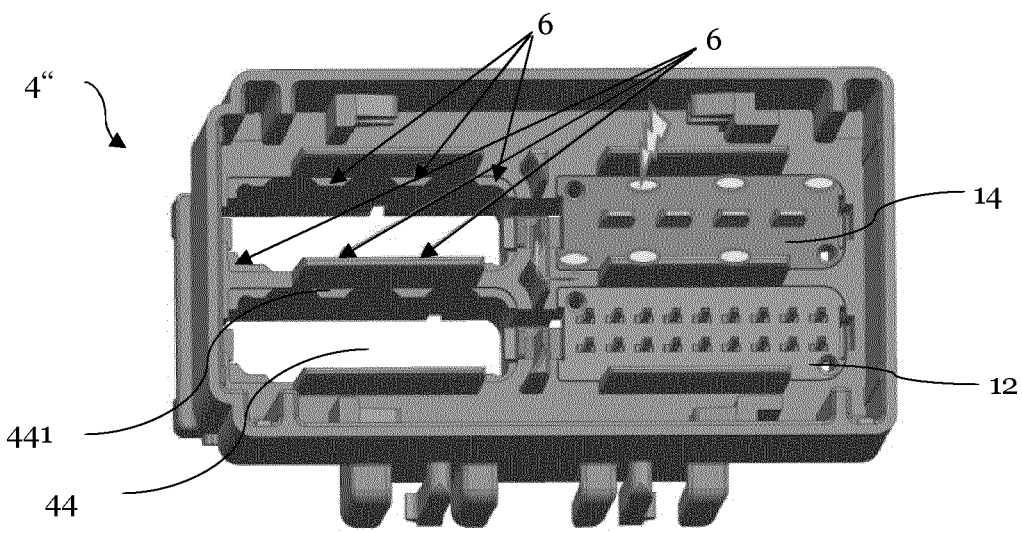


Fig. 11



EUROPEAN SEARCH REPORT

Application Number

EP 25 16 8567

5

10

15

20

25

30

35

40

45

50

55

1

EPO FORM 1503 03.82 (P24C01)

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	FR 3 150 352 A1 (SUMITOMO WIRING SYSTEMS [JP]) 27 December 2024 (2024-12-27)	1,2,4-15	INV.
Y	* paragraph [0054] - paragraph [0058] *	3	H01R13/506
	* figures 7-12 *		H01R13/405
	-----		H01R13/41
Y	EP 3 794 684 B1 (HARTING ELECTRIC STIFTUNG & CO KG [DE]) 24 July 2024 (2024-07-24)	3	H01R13/504
	* paragraph [0042] *		H01R13/514
	* figures 2a-2d *		H01R13/518

			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 August 2025	Henrich, Jean-Pascal
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone		T : theory or principle underlying the invention	
Y : particularly relevant if combined with another document of the same category		E : earlier patent document, but published on, or after the filing date	
A : technological background		D : document cited in the application	
O : non-written disclosure		L : document cited for other reasons	
P : intermediate document			
		& : member of the same patent family, corresponding document	

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 25 16 8567

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

26-08-2025

10

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
FR 3150352	A1	27-12-2024	CN	119171119 A	20-12-2024
			FR	3150352 A1	27-12-2024
			JP	2025001151 A	08-01-2025

EP 3794684	B1	24-07-2024	CN	112106260 A	18-12-2020
			DE	102018111733 A1	21-11-2019
			EP	3794684 A1	24-03-2021
			US	2021203095 A1	01-07-2021
			WO	2019219125 A1	21-11-2019

15

20

25

30

35

40

45

50

55

EPO FORM P0459

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