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

(72) Inventors:
• **URBANIAK, Andreas**
8200 Schaffhausen (CH)

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

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

(54) **INLAYS FOR MODULAR CONNECTORS**

(57) A connector assembly comprises a housing, and a plurality of inlays, each inlay being adapted to receive two terminals, wherein the housing comprises inlay reception chambers adapted to receive the inlays. A method of connecting an inlay for a connector assembly with a twisted wire pair comprises the steps: a) providing

the inlay, the wire pair and a twisting machine; b) twisting the wire pair on the twisting machine; c) connecting the inlay with the twisted wire pair without removing the wire pair from the twisting machine; and d) after steps a) to c): mounting the inlay into the housing.

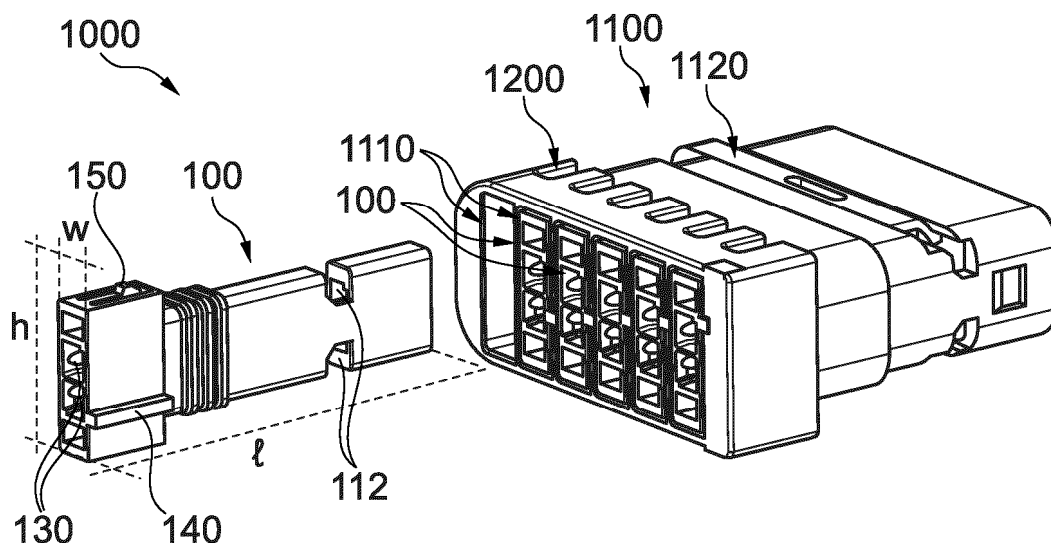


Fig. 1

Description

1. Field of the invention

[0001] The present disclosure relates to a connector assembly and a method for connecting inlays with twisted wire pairs. Specifically, the present disclosure pertains to a modular connector assembly with a housing comprising inlay reception chambers and sub-housings with connection means, and a method for integrating twisted wire pairs into the assembly.

2. Background

[0002] In the field of electrical connectors, it is common to use connector assemblies that facilitate the connection of cables and terminals for various applications, including telecommunications, automotive, and industrial systems. Known systems typically involve complex housing structures that accommodate multiple terminals and cables, often requiring precise alignment and secure retention to ensure reliable electrical connections. These systems often utilize intricate designs that can be challenging to assemble and maintain, for instance in automated manufacturing environments.

[0003] Traditional connector assemblies often rely on fixed housing designs that limit flexibility and adaptability. The integration of terminals and cables into these housings can be cumbersome, requiring manual intervention to ensure proper alignment and secure retention. This can lead to increased assembly time and potential errors, particularly when dealing with high-density connectors that require precise positioning of multiple terminals. Additionally, the need for manual assembly processes can increase production costs and limit scalability in high-volume manufacturing settings.

[0004] Despite the substantial advances in the field of electrical connectors, there remains a need for more efficient and flexible systems that can accommodate various terminal configurations and cable types. Current approaches often lack modularity, making it difficult to adapt to different application requirements without significant redesign or customization. This lack of modularity can also hinder the ability to automate the assembly process, as traditional designs may not be compatible with automated equipment or processes.

[0005] Furthermore, existing connector assemblies may not adequately address the challenges associated with maintaining secure and reliable connections in dynamic environments. Factors such as vibration, temperature fluctuations, and mechanical stress can compromise the integrity of electrical connections, leading to potential failures or performance issues. As such, there is a growing demand for connector systems that offer enhanced reliability and durability, particularly in demanding applications where environmental conditions can vary significantly.

[0006] It is therefore a technical problem underlying the

present invention to provide a connector assembly that at least partially overcomes the disadvantages of known systems.

3. Summary

[0007] The above objects are at least partially achieved by the subject matter of independent claim 1. Preferred embodiments are the subject of the dependent claims, and the skilled person will find clues to other suitable aspects of the present invention in the overall disclosure of the present application.

[0008] A first aspect of the invention relates to a connector assembly comprising: a housing, and a plurality of inlays, each inlay being adapted to receive two terminals, wherein the housing comprises inlay reception chambers adapted to receive the inlays.

[0009] The connector assembly includes a housing, and multiple inlays. Each inlay is designed to accommodate two terminals. The housing itself contains inlay reception chambers, which are specifically designed to hold the inlays.

[0010] The advantages of this configuration include modularity, allowing for easy assembly and disassembly, and the ability to accommodate multiple terminals securely within a single housing. This design enhances the robustness and flexibility of the connector assembly, making it suitable for various applications, including automated processes and complex wiring systems.

[0011] Further improvement is achieved when the housing comprises retaining means adapted to retain the inlays inside their respective reception chamber.

[0012] Such a connector assembly can enhance the functionality of the housing by incorporating retaining means. These retaining means are adapted to secure the inlays within their respective reception chambers. This feature can ensure that the inlays remain securely positioned within the housing's inlay reception chambers. The addition of retaining means can provide a more robust and reliable connection by preventing the inlays from becoming dislodged or misaligned during use.

[0013] Further improvement is achieved when each terminal is crimped onto a cable.

[0014] This feature can ensure a secure and reliable electrical connection between the terminal and the cable, enhancing the overall performance and durability of the connector assembly. By using crimped connections, the assembly enhances reliability while minimizing the risk of loose or faulty electrical contacts over time.

[0015] This embodiment can be further improved when the cable is a part of a twisted wire pair cable, and preferably each inlay is adapted to receive exactly two terminals.

[0016] The implementation introduces the feature that the cable is part of a twisted wire pair cable, which can improve signal integrity and reduce electromagnetic interference. Furthermore, each inlay is preferably adapted to receive exactly two terminals. This new feature en-

asures that the inlays are specifically designed to accommodate two terminals, which aligns with the structure of a twisted wire pair cable, thereby facilitating the proper connection and organization of the terminals within the connector assembly.

[0017] Further improvement is achieved when at least one inlay comprises: a rear grid disposed on a rear side of the inlay, the grid having a plurality of feed-through apertures adapted to receive electrical contacts; a sealing insert mountable to the rear grid, preferably made of an elastomeric material, wherein the sealing insert has feed-through holes for receiving the electrical contacts; an elongated insert module mountable to the sealing insert, sandwiching the sealing insert between the rear grid and the elongated insert module, said module comprising at least two cavities adapted to receive electrical contacts.

[0018] Such an implementation introduces several specific mechanisms of communication between components within the connector assembly. The rear grid is positioned on the rear side of the inlay and features multiple feed-through apertures designed to accommodate electrical contacts. This grid serves as a foundational element for the subsequent components. The sealing insert, preferably composed of elastomeric material, is mountable to the rear grid and includes feed-through holes for receiving electrical contacts. This insert provides a sealing function. The elongated insert module is then mountable to the sealing insert, effectively sandwiching the sealing insert between itself and the rear grid. This module contains at least two cavities designed to receive electrical contacts, facilitating the secure placement and alignment of these contacts within the assembly. The introduction of these features in the implementation can enhance the assembly's structural integrity and environmental protection, while also ensuring precise alignment and secure placement of electrical contacts, thereby improving the overall reliability and performance of the connector assembly. The skilled person knows that the rear side of the inlay is the rear side with regard to the insertion direction. An electrical contact is to be understood as a terminal, cable or the like.

[0019] Further improvement is achieved when the inlay has a substantially flat rectangular shape, having a length l in insertion direction and a height h and a width w , wherein the ratio of l/h and/or the ratio of l/w is at least 7, preferably at least 9, more preferably 11, most preferably 13.

[0020] Such an implementation specifies that the inlay has a substantially flat rectangular shape with defined dimensions, including a length in the insertion direction, a height, and a width. The new feature introduced the ratio of the length to the height and/or the length to the width, which can be at least 7, with a preference for ratios of at least 9, more preferably 11, and most preferably 13. This feature brings a specific geometric proportion to the inlays, which may enhance the stability, alignment, or ease of insertion of the inlays into the housing's reception chambers.

[0021] Further improvement is achieved when each inlay has exactly two channels extending in insertion direction from one end of the inlay to the opposite end, for the reception of electrical contact terminals.

[0022] This mechanism ensures that each inlay is structured to accommodate two terminals. The communication between the components is facilitated by the channels guiding the terminals into their designated positions. This feature can enhance the functionality of the connector assembly by ensuring that the terminals are correctly positioned and securely held within the inlays and facilitates an automatic assembly procedure.

[0023] Further improvement is achieved when at least one inlay has a t-shape, and coding means and fixing means are arranged in the bar of the t-shape.

[0024] Such a geometric configuration facilitates the integration of additional components like coding means and fixing means which are strategically positioned within the bar of the t-shape. The coding means serve to ensure proper alignment or orientation of the inlay within the housing. Meanwhile, the fixing means are intended to secure the inlay within the housing. The introduction of a t-shaped inlay with integrated coding and fixing means represents a refinement over the basic structure of the connector assembly, enhancing a more secure and correctly oriented connection interface.

[0025] In a further implementation of the connector assembly the housing comprises TPA (Terminal Position Assurance) means.

[0026] Such a feature can enhance the reliability and safety of the connector assembly by providing an additional layer of security for the terminals and/or inlays, by ensuring a secure position in the housing. The communication between components involves the housing incorporating these TPA means, which can interact with inlays to maintain their correct positioning. The inclusion of TPA means within the housing offers a robust solution to common issues associated with terminal and/or inlay misalignment or dislodgement.

[0027] In a further implementation of the connector assembly each inlay comprises TPA means.

[0028] The TPA means may provide a mechanism to ensure that the inlays, and thus the terminals, are properly positioned and secured within the housing. This feature can enhance the reliability and stability of the electrical connection by preventing the inlays from backing out or becoming loose during operation.

[0029] Further improvement can be achieved when the housing comprises at least two matching sub-housings each comprising sub-housing connection means, the sub-housing connection means being adapted to fit together like two pieces of a jigsaw to connect two sub-housings with each other to form the housing and wherein the sub-housing connection means preferably comprise dovetail joints, preferably sliding dovetail joints.

[0030] Such a modular housing design enables easy assembly and disassembly, making it beneficial for applications requiring flexible configurations or quick main-

tenance. The use of dovetail joints enhances mechanical stability, ensuring strong interlocking while allowing smooth sliding engagement. This design improves structural integrity, and furthermore prevents unintended separation, and provides a compact and robust enclosure for the electrical connections.

[0031] Further improvement can be achieved when the sub-housing connection means comprise locking means adapted to lock the sub-housings in a final position.

[0032] Such sub-housing connection means refer to components that facilitate the connection of sub-housings within the connector assembly. The locking means are adapted to secure the sub-housings in their final position, ensuring that they remain fixed and stable once connected. This feature is advantageous as it prevents the sub-housings from becoming dislodged or misaligned, which can be important for maintaining the integrity and functionality of the modular connector.

[0033] Further improvement is achieved when the inlays comprise polarization means, adapted to only allow one insertion orientation into the reception chambers, wherein the polarization means is preferably a polarization rib, which polarization rib is preferably axially extending in the mating direction of the inlays.

[0034] The implementation introduces the concept of inlays comprising polarization means that are designed to ensure that the inlays can only be inserted into the reception chambers in one specific orientation. This feature enhances the functionality of the connector assembly by preventing incorrect insertion, which could lead to improper connections or potential damage to the components. The polarization means is preferably a polarization rib, which is an axially extending feature in the mating direction of the inlays. This rib ensures that the inlays align correctly with the reception chambers, thereby facilitating a secure and accurate connection.

[0035] Another aspect of the invention is a method of connecting an inlay for a connector assembly according to any one of the implementations with a twisted wire pair comprising the steps: a) providing the inlay, the wire pair and a twisting machine; b) twisting the wire pair on the twisting machine; c) connecting the inlay with the twisted wire pair without removing the wire pair from the twisting machine; and d) after steps a) to c): mounting the inlay into the housing.

[0036] Such a method optimizes the manufacturing process by keeping the wire pair on the twisting machine during inlay connection. The advantage of this method is that it maintains the terminal crimp position of the twisted wire pair, preventing the loss of position when the machine gripper opens. This ensures a reliable connection and facilitates automation in the assembly process. The skilled person knows that the method of connecting the inlay with a twisted wire pair may be implemented in various ways depending on the production requirements. In one scenario, a wire pair that has already been twisted prior to assembly may be inserted into the inlay, which is subsequently mounted into the connector module. In an

alternative scenario, individual straight wires, each terminated with crimped terminals, may first be assembled into the inlay, and the inlay and wires together may then be introduced into a twisting machine to form the twisted pair.

[0037] This method can be further improved when the twisting machine comprises a gripping device and the twisted wire pair is engaged with the gripping device at the beginning, during and/or at the end of step c).

[0038] With such a method the gripping device engages with the twisted wire pair at various stages of the connection process, specifically at the beginning, during, and/or at the end of the step where the inlay is connected with the twisted wire pair. The inclusion of the gripping device provides a mechanism for securely holding the twisted wire pair in place, ensuring stability and precision during the connection process. This feature can enhance the method by potentially reducing the risk of misalignment or movement of the wire pair. By maintaining the wire pair in a fixed position, the gripping device facilitates a more efficient and reliable connection of the inlay to the twisted wire pair.

4. Brief description of the figures

[0039] In the following, preferred embodiments of the disclosure are disclosed by reference to the accompanying figures.

Figure 1: shows an embodiment of a connector assembly with a housing and inlays.

Figure 2: shows an exploded view of an inlay with a rear grid, sealing insert, and elongated insert module.

Figure 3: shows another embodiment of a connector assembly with a housing and an inlay being inserted into the housing.

Figure 4a: shows an embodiment of a sub-housing with connection means and locking means.

Figure 4b: shows another embodiment of a sub-housing with dovetail joints and connection means.

Figure 5A: shows the assembly of inlays with twisted wire pairs on a twisting machine.

Figure 5B: shows an assembled inlay with a twisted wire pair on a twisting machine.

5. Detailed description of the figures

[0040] The subsequent sections provide a detailed description of the invention, referencing the accompany-

ing illustrations for clarity. The descriptions represent examples only and are not intended to limit the invention's scope. Identical reference numerals across the figures and text denote the same components. The illustrations may not reflect actual size or scale; their dimensions, proportions, and depictions of elements might be enhanced for better understanding and visual convenience.

[0041] Figure 1 shows a connector assembly 1000 comprising a housing 1100 and several (six) inlays 100. The housing 1100 includes inlay reception chambers 1110, which are adapted to receive the inlays 100. The housing 1100 is depicted as an essentially rectangular block with multiple (six in the shown example) chambers 1110 arranged in a grid pattern at one side. Each chamber 1110 is designed to accommodate one inlay 100. The housing 1100 also features retaining means 1200, which are mechanisms designed to hold the inlays 100 securely within their respective chambers 1110. Additionally, the housing 1100 includes TPA means 1120, which are secondary locking mechanisms to ensure the inlays (and preferably also the terminals received in said inlays) are fully seated and locked in place.

[0042] The shown inlay 100 is a substantially flat rectangular component with a length l , height h , and width w , where the ratio of l/w is at least 7. The inlay 100 has a t-shape, with coding means 140 and fixing means 150 arranged in the bar of the t-shape. The inlay 100 also includes channels 130 extending in the insertion direction from one end of the inlay to the opposite end, designed for the reception of electrical contact terminals. The inlay 100 is adapted to receive exactly two terminals that are for instance part of a twisted wire pair cable.

[0043] Figure 2 illustrates an exploded view of the inlay 100, showing its components in detail. The inlay 100 comprises a rear grid 110, a sealing insert 120, and an elongated insert module 130. The rear grid 110 is disposed on the rear side of the inlay 100 and features a plurality (two in the shown embodiment) of feed-through apertures 112 adapted to receive electrical contacts. The sealing insert 120, preferably made of an elastomeric material, is mountable to the rear grid 110 and has a plurality (two in the shown embodiment) of feed-through holes 122 for receiving the electrical contacts. The elongated insert module 130 is mountable to the sealing insert 120, sandwiching the sealing insert 120 between the rear grid 110 and the elongated insert module 130. The elongated insert module 130 comprises two cavities 132 adapted to receive electrical contacts.

[0044] The feed-through apertures 112 in the rear grid 110 are small, evenly spaced holes that align with the feed-through holes 122 in the sealing insert 120. The sealing insert 120 fits snugly against the rear grid 110. The elongated insert module 130 is a rectangular component with two elongated cavities 132 designed to house the electrical contacts. The cavities 132 extend longitudinally along the length of the insert module 130, providing a secure channel for the electrical contacts.

[0045] The housing 1100 and inlay 100 are designed to work together to provide a secure and reliable connection for electrical contacts. The housing 1100's inlay reception chambers 1110 and retaining means 1200 ensure that the inlays 100 are held firmly in place, while the TPA means 1120 provide an additional layer of security. The inlay 100's rear grid 110, sealing insert 120, and elongated insert module 130 work together to protect and organize the electrical contacts, ensuring a reliable connection. The t-shaped design of the inlay 100, along with the coding means 140 and fixing means 150, ensures that the inlay 100 can only be inserted in the correct orientation, preventing incorrect connections.

[0046] Figure 3 illustrates a connector assembly 2000 with a housing 2100 and inlays 200. The retaining means 2200 is located on the top surface of the housing 2100. It consists of a series of parallel hooks 2220 extending longitudinally along the surface in mating direction of the inlays. These hooks are evenly spaced and retain the inlays within their respective reception chambers. The hooks are aligned in the direction of insertion, providing a secure grip on the inlays and preventing them from moving or becoming dislodged once inserted into the housing. The inlays comprise polarization means in form of a polarization rib 240, extending in insertion direction and further comprise channels 230 for the insertion of terminals.

[0047] Figure 4a and Figure 4b illustrate sub-housings 2300 and 2400, respectively, which may form part of the housing 2100. Each sub-housing 2300, 2400 includes sub-housing connection means 2310, 2410 that allow the sub-housings to fit together like two pieces of a jigsaw puzzle. The sub-housing connection means 2310, 2410 include dovetail joints 2312, 2412, which are preferably sliding dovetail joints. Additionally, the sub-housing connection means 2310, 2410 comprise locking means 2314 to lock the sub-housings 2300, 2400 in a final position, ensuring a secure and stable connection between the sub-housings. The element 2314 is a locking mechanism that is integrated into the side of the sub-housing 2300. It is characterized by a protruding structure that extends outward from the side surface of the sub-housing. This protrusion has a rectangular shape with a flat top and bottom surface, and it includes a small notch or indentation that is designed to engage with a corresponding feature in form of a snap-fit on another component to secure the sub-housing in place. The overall shape of the element 2314 ensures that it can effectively lock the sub-housings together when they are assembled.

[0048] Figure 5A illustrates a connector assembly in the process of connecting a twisted wire pair with an inlay. The twisted wire pair 1 is shown entering a twisting machine 2. The twisting machine 2 is designed to twist the individual wires 12 and 22 of the twisted wire pair 1. The individual wires 12 and 22 extend towards the inlays 500 and 500' arranged on the twisting machine 2. The gripping device 3, part of the twisting machine 2, is a clamp-like structure that holds the wires in place, ensur-

ing stability during the connection process. The gripping device 3 is securing the twisted wire pair 1, maintaining the position of the wires 12 and 22 as they approach the inlays 500 and 500'. The inlay 500 is depicted as a rectangular component with a substantially flat shape, adapted to receive terminals 10 and 20, crimped onto the ends of wires 12 and 22. The terminals 10 and 20 are shown as elongated elements extending from the ends of the wires 12 and 22, respectively. The inlay 500' is similarly structured and positioned right behind inlay 500, as a serial arrangement for subsequent connection. The twisted wire pair 1 is thus held in place by the gripping device 3 while the inlays 500 can be mounted with the terminals 10 and 20.

[0049] Figure 5B illustrates the setup of Figure 5A, with the terminals 10 and 20 of the twisted wire pair 1 mated with (inserted in) the inlay 500. The twisted wire pair 1 is held in place by the gripping device 3 while the inlay 500 is mounted onto the terminals 10 and 20. The figures 5A and 5B collectively depict the process of connecting the twisted wire pair 1 with the inlays 500 using the twisting machine 2 and the gripping device 3.

Reference list:

[0050]

1: twisted wire pair
 2: twisting machine
 3: gripping device
 10: terminal
 12: cable
 20: terminal
 22: cable
 100: inlay
 110: rear grid
 112: feed-through apertures
 120: sealing insert
 122: feed-through holes
 130: elongated insert module / channel
 132: cavities adapted to receive electrical contacts
 140: coding means
 150: fixing means
 200: inlay
 230: channel
 240: polarization means
 500: inlay
 500': inlay
 1000: connector assembly
 1100: housing
 1110: inlay reception chambers
 1120: TPA means
 1200: retaining means
 2100: housing
 2110: inlay reception chambers
 2200: retaining means
 2220: hooks
 2000: connector assembly

2300: sub-housing
 2310: sub-housing connection means
 2312: dovetail joints
 2314: locking means
 2400: sub-housing
 2410: sub-housing connection means
 2412: dovetail joints

10 Claims

1. A connector assembly (1000, 2000) comprising:
 a housing (1100, 2100), and a plurality of inlays (100, 200, 500, 500'), each inlay (100, 200, 500, 500') being adapted to receive two terminals (10, 20), wherein the housing (1100, 2100) comprises inlay reception chambers (1110, 2110) adapted to receive the inlays (100, 200, 500, 500').
2. The connector assembly (1000, 2000) according to claim 1, wherein the housing comprises retaining means (1200, 2200) adapted to retain the inlays (100, 200, 500, 500') inside their respective reception chamber (1110, 2110).
3. The connector assembly (1000, 2000) according to any one of the preceding claims, wherein each terminal (10, 20) is crimped onto a cable (12, 22).
4. The connector assembly (1000, 2000) according to the preceding claim, wherein the cable (12, 22) is a part of a twisted wire pair cable (1), and preferably each inlay (100, 200, 500, 500') is adapted to receive exactly two terminals (10, 20).
5. The connector assembly (1000, 2000) according to any one of the preceding claims, wherein at least one inlay (100, 200, 500, 500') comprises:
 a rear grid (110) disposed on a rear side of the inlay (100, 200, 500, 500'), the grid (110) having a plurality of feed-through apertures (112) adapted to receive electrical contacts;
 a sealing insert (120) mountable to the rear grid (110), preferably made of an elastomeric material, wherein the sealing insert (120) has feed-through holes (122) for receiving the electrical contacts;
 an elongated insert module (130) mountable to the sealing insert (120), sandwiching the sealing insert (120) between the rear grid (110) and the elongated insert module (130), said module comprising at least two cavities (132) adapted to receive electrical contacts.
6. The connector assembly (1000, 2000) according to any one of the preceding claims, wherein the inlay (100, 200, 500, 500') has a substantially flat rectan-

gular shape, having a length l in insertion direction and a height h and a width w , wherein the ratio of l/h and/or the ratio of l/w is at least 7, preferably at least 9, more preferably 11, most preferably 13.

7. The connector assembly (1000, 2000) according to any one of the preceding claims, wherein each inlay (100, 200, 500, 500') has exactly two channels (130, 230) extending in insertion direction from one end of the inlay (100, 200, 500, 500') to the opposite end, for the reception of electrical contact terminals (10, 20). 5
8. The connector assembly (1000, 2000) according to any one of the preceding claims, wherein at least one inlay (100, 200, 500, 500') has a t-shape, and coding means (140) and fixing means (150) are arranged in the bar of the t-shape. 10
9. The connector assembly (1000, 2000) according to any one of the preceding claims, wherein the housing (1100) comprises TPA means (1120). 15
10. The connector assembly (1000, 2000) according to any one of the preceding claims, wherein each inlay (100, 200, 500, 500') comprises TPA means (112). 20
11. A connector assembly (1000, 2000) according to any one of the preceding claims, wherein the housing comprises at least two matching sub-housings (2300, 2400) each comprising sub-housing connection means (2310, 2410), the sub-housing connection means being adapted to fit together like two pieces of a jigsaw to connect two sub-housings (2300, 2400) with each other to form the housing and wherein the sub-housing connection means preferably comprise dovetail joints (2312, 2412), preferably sliding dovetail joints. 25
12. A connector assembly (1000, 2000) according to any one of the preceding claims, wherein the sub-housing connection means (2310, 2410) comprise locking means (2314) adapted to lock the sub-housings (2300, 2400) in a final position. 30
13. The connector assembly (1000, 2000) according to any one of the preceding claims wherein the inlays (100, 200, 500, 500') comprise polarization means (240), adapted to only allow one insertion orientation into the reception chambers (1110, 2110), wherein the polarization means (240) is preferably a polarization rib, which polarization rib is preferably axially extending in the mating direction of the inlays (100, 200, 500, 500'). 35
14. A method of connecting an inlay (100,200) for a connector assembly (1000, 2000) according to any one of claims 1 to 13 with a twisted wire pair (1) comprising the steps: 40

- a) providing the inlay (100, 200, 500, 500'), the wire pair (1) and a twisting machine (2);
- b) twisting the wire pair (1) on the twisting machine (2);
- c) connecting the inlay (100, 200, 500, 500') with the twisted wire pair (1) without removing the wire pair (1) from the twisting machine (2); and
- d) after steps a) to c): mounting the inlay (100, 200, 500, 500') into the housing (1100, 2100). 45

15. The method of connecting an inlay (100, 200, 500, 500') according to claim 14, wherein the twisting machine (2) comprises a gripping device (3) and the twisted wire pair (1) is engaged with the gripping device (3) at the beginning, during and/or at the end of step c). 50

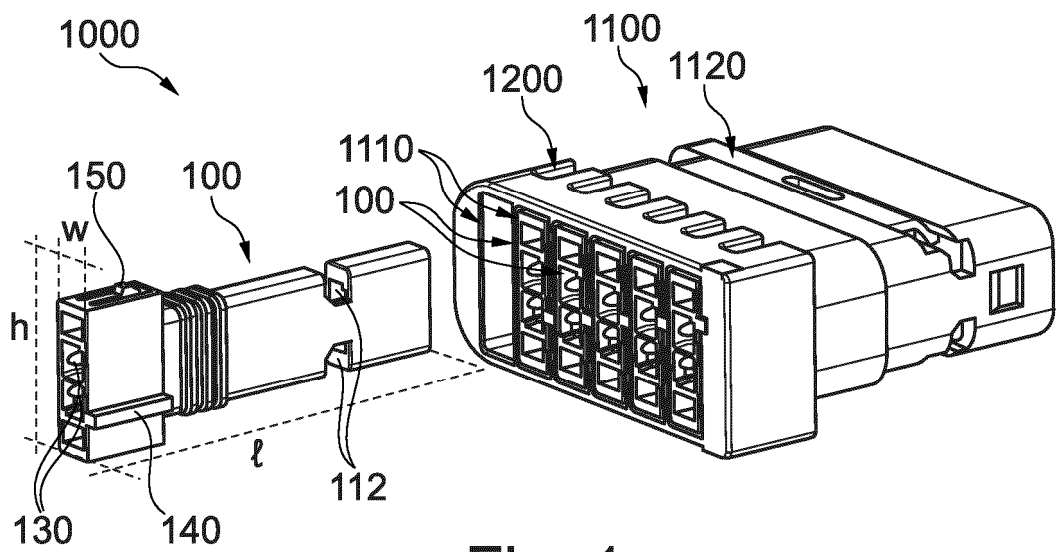


Fig. 1

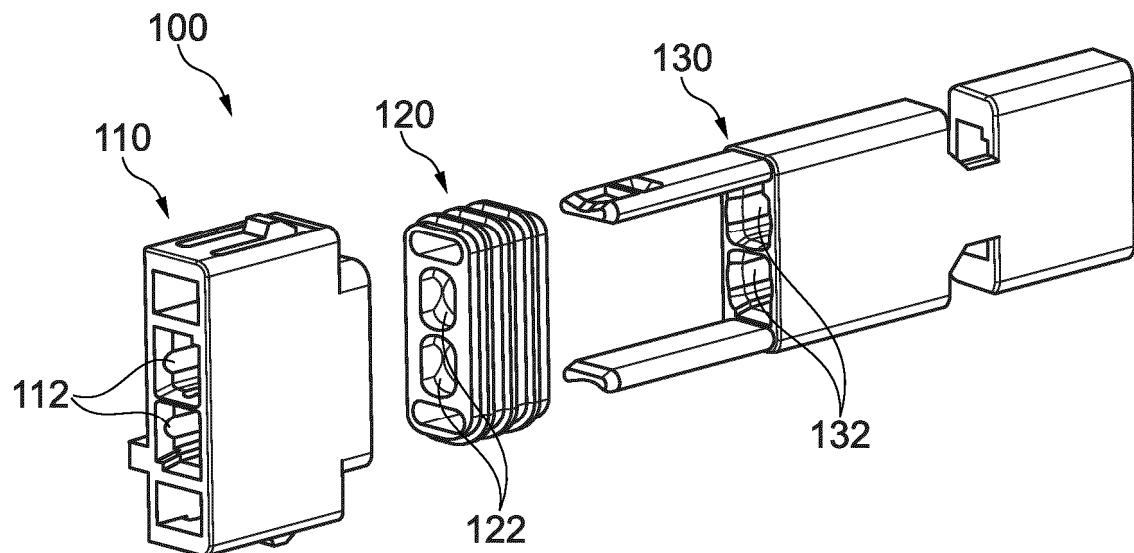


Fig. 2

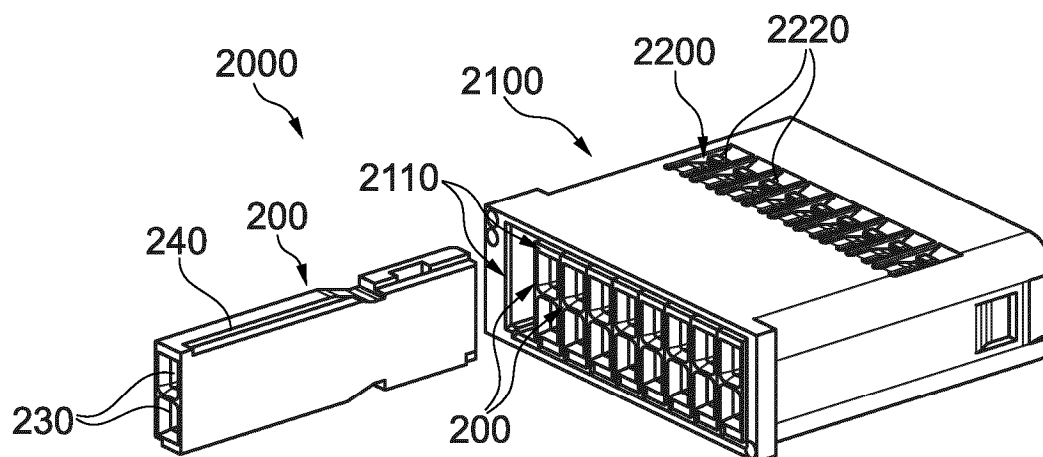


Fig. 3

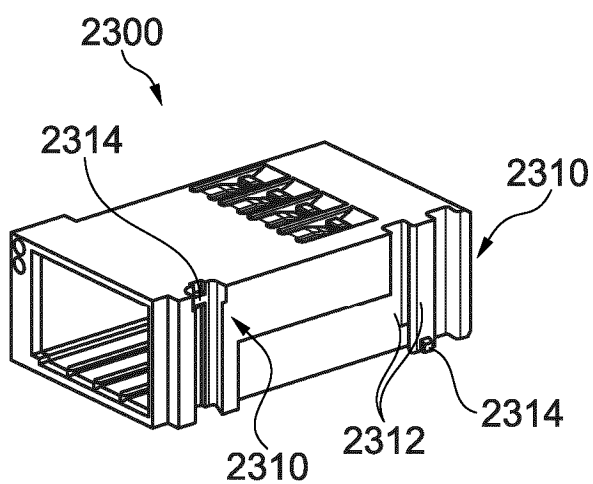


Fig. 4a

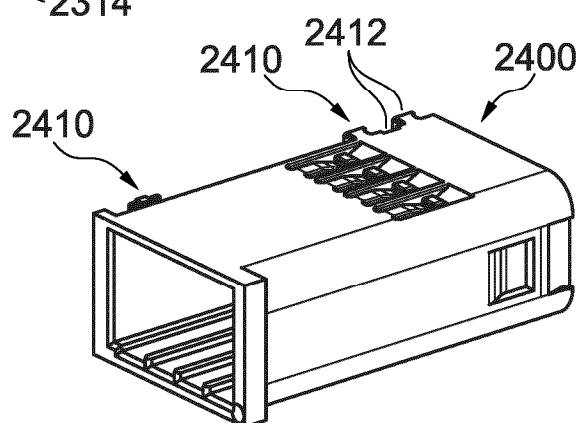


Fig. 4b

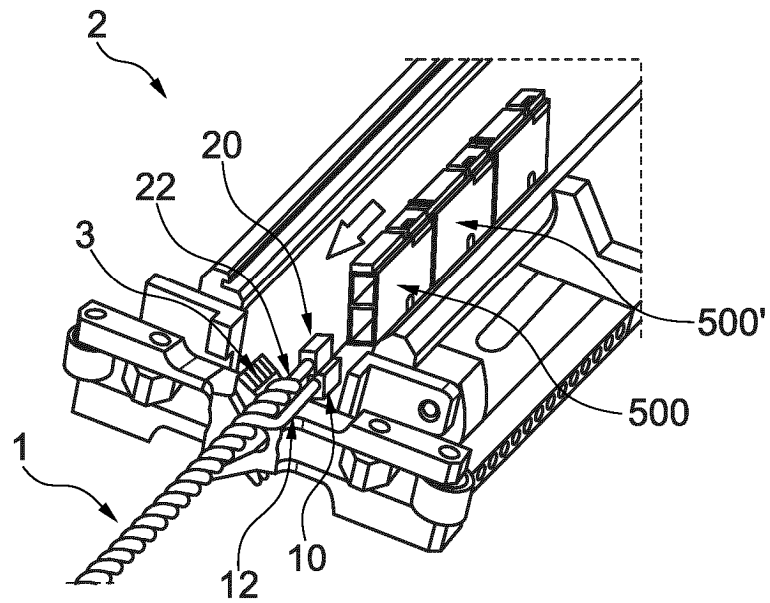


Fig. 5a

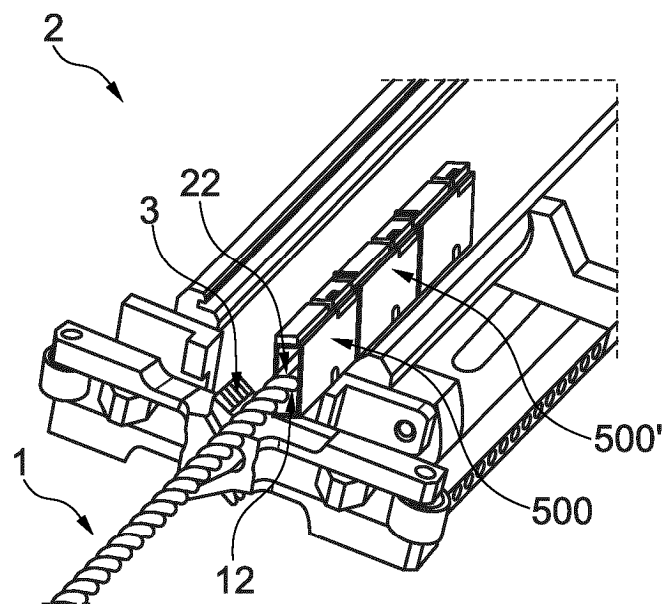


Fig. 5b



EUROPEAN SEARCH REPORT

Application Number

EP 25 16 8569

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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