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(54) System comprising a patch panel and a plurality of communication connector assemblies

(57) A system comprising a patch panel (11) and a plurality of communication connector assemblies (12) mounted on the patch panel, whereby the patch panel (11) comprises a mounting wall (13) with at least one mounting opening (14) for receiving a plurality of communication connector assemblies (12), whereby each communication connector assembly (12) comprises a housing (21) for receiving at least one connection module (22a, 22b); the mounting wall (13) of the patch panel (11) comprises in the region of the or each mounting opening (14) insertion recesses (18) extending from the respective mounting opening (14), whereby each communication connector assembly (12) to be mounted is insertable into the respective mounting opening (14) through the insertion recesses (18) along a first direction, and whereby the or each communication connector assembly (12) being inserted into the respective mounting opening (14) can be moved inside the mounting opening along a second direction; the housing (21) of each communication connector assembly (12) receives a first connection module (22a) and a second connection module (22b) stacked in a third direction; whereby opposite walls (24, 25) of the housing (21) comprise protrusions (26) which can be inserted into the insertion recesses (18) when inserting the respective communication connector assembly into the respective mounting opening (14) through the insertion recesses along the first direction and which hold the respective communication connector assembly inside the mounting opening (14) when the same is moved relative to the insertion recesses (18) along the second direction. (Figure 1)

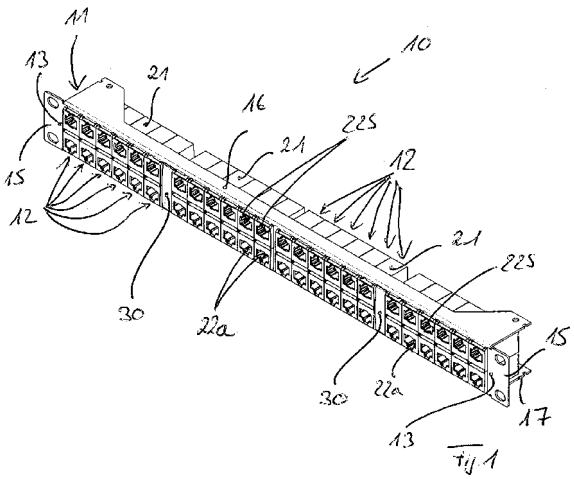

Fig 1

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Description

[0001] The present patent application relates to a system comprising a patch panel and a plurality of communication connector assemblies. Further on, the application relates to a patch panel and to a communication connector assembly for such a system.

[0002] The product leaflet "FutureCom EA System, SOLUTION SHEET FUT-0902-EN, Corning Cable Systems, year 2009" discloses a system comprising a patch panel and a plurality of communication connector assemblies mounted on the patch panel. The patch panel comprises a mounting wall for receiving a plurality of communication connector assemblies. Each communication connector assembly comprises a housing for receiving one connection module, whereby the one connection module provides one connection port. The housing of the respective communication connector assembly comprises snap hook mounting means assigned to walls of the housing acting together with snap hook mounting means assigned to a mounting opening of the patch panel in which the respective communication connector assembly is mounted.

[0003] From the above mentioned prior art is further known to provide a density of 24 connection ports in 1 unit of height of a 19" patch panel or a density of 48 connection ports in 1.5 units of height of a 19" patch panel by attaching two communication connector assemblies next to each other. However, it is not possible to further increase the density of connection ports with respect to the height of e.g. such a 19" patch panel.

[0004] Against this background, the problem to be solved is to provide a novel system comprising a novel patch panel and a plurality of novel communication connector assemblies providing an increased density of connection ports. This problem is solved by a system according to claim 1.

[0005] Within the novel system the mounting wall of the patch panel comprises in the region of the or each mounting opening insertion recesses extending from the respective mounting opening. Each communication connector assembly to be mounted in a mounting opening is insertable into the respective mounting opening through the insertion recesses along a first direction. The or each communication connector assembly being inserted into the respective mounting opening can be moved inside the respective mounting opening along a second direction. Further on, within the novel system the housing of each communication connector assembly receives a first connection module and a second connection module stacked in a third direction. Opposite walls of the housing comprise protrusions which can be inserted into the insertion recesses when inserting the respective communication connector assembly into the respective mounting opening through the insertion recesses along the first direction and which hold the respective communication connector assembly inside the respective mounting opening when the same is moved relative to the respective insertion recesses along the second direction.

[0006] The novel system provides an increased density of connection ports. The novel system allows to provide a density of 48 connection ports in 1 unit of height of a 19" patch panel.

[0007] According to a preferred development, the novel system comprises at least one locking bracket for blocking at least one insertion recess of at least one of the mounting openings. Each locking bracket prevents a movement of the communication connector assemblies along the second direction when the respective mounting opening is fully equipped with communication connector assemblies.

[0008] According to a further preferred development, the novel system comprises contact springs assigned the housing of communication connector assemblies. The contact springs limit the relative movement between the respective communication connector assembly and the patch panel in the third direction. Further on, the contact springs provide a defined shielding contact between the housing of a shielded electrical connector assembly and the patch panel.

[0009] The novel patch panel for the novel system is defined in claim 13 and the novel communication connector assembly for the novel system is defined in claim 15.

[0010] Preferred embodiments of the handling device are given in the dependent claims and the description below. Exemplary embodiments will be explained in more detail with reference to the drawing, in which:

Figure 1	shows a perspective view of a novel system comprising a patch panel and a plurality of communication connector assemblies;
Figure 2	shows a detail of the system of Figure 1;
Figures 3a to 3j	each show the detail of Figure 2 in different assembling states;
Figures 4a and 4b	each show cross sections through the detail of Figure 2 in different assembling states;
Figure 5	shows a perspective view of a shielded communication connector assembly for the novel system;
Figure 6	shows another perspective view of the shielded communication connector assembly of Figure 5;

Figure 7 shows a detail of the shielded communication connector assembly of Figures 5 and 6;

Figures 8a and 8b each show cross sections through the detail of Figure 2 in different assembling states when using the shielded communication connector assembly of Figures 5 and 6,

Figure 9 shows the novel system comprising fiber optic communication connector assemblies; and

Figure 10 shows the novel system comprising fiber optic communication connector assemblies and electrical communication connector assemblies positioned in one mounting opening, whereby from the fiber optic communication connector assemblies only housings acting as adapters are shown.

[0011] Figures 1 to 4b show a first embodiment of a novel system 10 comprising a patch panel 11 and a plurality of communication connector assemblies 12 mounted on the patch panel 11. The patch panel 11 comprises a mounting wall 13 with mounting openings 14 each for receiving a plurality of communication connector assemblies 12.

[0012] The patch panel 11 shown in Figures 1 to 4b is a 19" patch panel having four (4) mounting openings 14 each for receiving six (6) communication connector assemblies 12 in 1 unit of height of the 19" patch panel 11.

[0013] As shown in Figure 1, the mounting wall 13 of the patch panel 11 comprises lateral protrusions 15 through which the system 10 is mountable to a not shown distribution rack or distribution cabinet.

[0014] A top wall 16 and a bottom wall 17 of the patch panel 11 run approximately perpendicular to the mounting wall 13 having the mounting openings 14.

[0015] The mounting wall 13 of the patch panel 11 comprises in the region of the or each mounting opening 14 insertion recesses 18 extending from or into the respective mounting opening 14, whereby each communication connector assembly 12 to be mounted is insertable into the respective mounting opening 14 through the insertion recesses 18 along a first direction 19 (see e.g. Figure 3a), and whereby the or each communication connector assembly 12 being inserted into the respective mounting opening 14 can be moved inside the mounting opening 14 along a second direction 20 (see e.g. Figure 3c).

[0016] The insertion recesses 18 extending from the respective mounting opening 14 provide mounting means of the patch panel 11 being assigned to the mounting openings 14 of the same for mounting the communication connector assemblies 12 on the mounting wall 13 of the patch panel 11.

[0017] The first direction 19 runs approximately perpendicular to the plane of the mounting wall 13. The second direction 20 runs approximately perpendicular to the first direction 19 in the plane of the mounting wall 13. The plurality of communication connector assemblies 12 are mounted side by side on the mounting wall 13 along the second direction 20.

[0018] Each communication connector assembly 12 comprises a housing 21 for receiving two (2) connection modules 22a, 22b. Details of the connection modules 22a, 22b are not shown. Each connection module provides one (1) connection port. So, within the shown embodiment the 19" patch panel receives twenty-four (24) communication connector assemblies 12 each providing two (2) connection ports thereby providing a density of forty-eight (48) connection ports in 1 unit of height of the 19" patch panel.

[0019] The first connection module 22a and a second connection module 22b of each communication connector assembly 12 are stacked in the housing 21 of the communication connector assembly 12 in a third direction 23. The connection modules 22a, 22b are positioned side by side in the third direction 23, the third direction 23 running approximately perpendicular to the first direction 19 and the second direction 20 in the plane of the mounting wall 13.

[0020] The housing 21 of each communication connector assembly 12 receives preferably the first connection module 22a in a first orientation and the second connection module 22b in a second orientation turned up side down with respect to the first connection module 22a, whereby not shown plug connectors can be contacted with the connection modules 22a, 22b from the front of the respective communication connector assembly 12.

[0021] Opposite walls 24, 25 of the housing 21 of each communication connector assembly 12, namely a top wall 24 and a bottom wall 25 of the housing 21, comprise protrusions 26 which can be inserted into the insertion recesses 18 when inserting the respective communication connector assembly 12 into the respective mounting opening 14 through the insertion recesses 18 along the first direction 19. The protrusions 26 provide mounting means assigned to walls of the housing 21 of the respective communication connector assembly 12 which act together with the mounting means, namely the insertion recesses 18, assigned to the respective mounting opening 14 of the patch panel 11 in which the respective communication connector assembly 12 is mounted.

[0022] The protrusions 26 provide arresting means and comprise cut-outs 27 acting together with a rim or an edge 28 of the respective mounting opening 14 thereby allowing a movement of the respective communication connector assembly 12 inside the respective mounting opening 14 along the second direction 20 and holding the same inside the respective mounting opening 14 when the same is moved relative to the insertion recesses 18 along the second direction 20. The insertion recesses 18 are recesses with the rim or edge 28 of the respective mounting opening 14.

[0023] Figures 3a to 3j each show the systems 10 in different assembling states and Figures 4a and 4b show cross

sections through the same.

[0024] In Figures 3a and 3b, a first communication connector assembly 12 comprising the connection modules 22a, 22b is inserted into one of the mounting openings 14 of the mounting wall 13 of the patch panel 11 in the first direction 19, namely from the back of the patch panel 11. The protrusions 26 assigned to the top wall 24 and bottom wall 25 of the housing 21 of the first communication connector assembly 12 are inserted (see Figure 3b) into the insertion recesses 18 of the mounting wall 13, whereby this insertion along the first direction 19 is limited by strokes 29 (see also Figures 4a and 4b) assigned to the top wall 24 and bottom wall 25 of the housing 21.

[0025] When the strokes 29 contact the rim 28 of the mounting opening 14 (see Figure 4b), the rim 28 is aligned with the cut-outs 27 of the protrusions 26 so that the first communication connector assembly 12 can be moved within the respective mounting opening 14 along the second direction 20 (see Figure 3c) until the same reaches its final position within the mounting opening 14 (see Figure 3d).

[0026] Then, a second communication connector assembly 12 (see Figures 3e and 3f) comprising the connection modules 22a, 22b is inserted into the mounting openings 14 of the mounting wall 13 of the patch panel 11 in the first direction 19. The protrusions 26 assigned to the top wall 24 and bottom wall 25 of the housing 21 of the second communication connector assembly 12 are inserted (see Figure 3f) into the insertion recesses 18 of the mounting wall 13, whereby this insertion is limited by the strokes 29 assigned to the top wall 24 and bottom wall 25 of the housing 21.

[0027] When the strokes 29 contact the rim 28 of the mounting opening 14 (see Figure 4b), the rim 28 is aligned with the cut-outs 27 of the protrusions 26 so that the second communication connector assembly 12 can be moved with the mounting opening 14 along the second direction 20 (see Figure 3g) until the same reaches its final position within the mounting opening 14 (see Figure 3h).

[0028] These steps are repeated until the respective mounting opening 14 of the mounting wall 13 is fully equipped with communication connector assemblies 12 (see Figure 3i).

[0029] The second direction 20 along which the communication connector assemblies 12 can be moved within the respective mounting opening 14 when the same are inserted into the respective mounting opening 14 depends on the position of the insertion recesses 18. In Figures 3a to 3j the insertion recesses 18 are positioned on the right hand side of the mounting opening 14 receiving the assemblies 12, so that the second direction 20 is directed from the right to the left.

[0030] For the adjacent mounting opening 14 this direction is inverted from the left to the right, because the insertion recesses 18 of the mounting opening 14 are positioned on the left hand side of the same.

[0031] The system 10 further comprises locking brackets 30 for blocking at least one insertion recess 18 of at least one of the mounting openings 14. In the shown embodiment each locking bracket 30 blocks insertion recesses 18 of two adjacent mounting openings 14. Each locking bracket 30 prevents a movement of the communication connector assemblies 12 along the second direction 20 when the respective mounting opening 14 is fully equipped with communication connector assemblies 12. Further on, the each locking bracket 30 prevents that a communication connector assemblies 12 can be removed from the respective mounting opening 14 in the first direction 19 through the blocked insertion recesses 18.

[0032] As shown in Figure 3j, each locking bracket 30 comprises elastic or flexible protrusions 31 which can be snapped into insertion recesses 18 of two adjacent mounting openings 14 so that each locking bracket 30 locks two adjacent mounting openings 14.

[0033] The communication connector assemblies 12 shown in Figures 1 to 4b comprise electrical copper connection modules 22a, 22b (details of the same not shown) providing electrical communication connector assemblies 12.

[0034] When a shielding function for such electrical communication connector assemblies 12 is needed, the housings 21 of the communication connector assemblies 12 are electrically connected to the patch panel 11 in order to provide the shielding for the electrical connection modules 22a, 22b. In that case, the housing 21 the communication connector assemblies 12 and the patch panel 11 are made from a metallic material and/or from a plastic material carrying a metallic coating for providing the electrical conductivity of the housings 21 and the patch panel 11 needed for a shielded system 11.

[0035] Figures 5 to 7 show details of a shielded electrical communication connector assembly 12 preferably used for providing such a shielded system 11. According to Figures 5 to 7, a contact spring 32 is assigned to the shielded electrical communication connector assembly 12. Figures 8a and 8b each show a cross section through a system 10 comprising at least one such shielded electrical communication connector assembly 12.

[0036] The contact spring 32 of the respective communication connector assembly 12 is assigned the housing 21 of the same, namely to the top wall 24 of the housing 21. The contact spring 32 limits the relative movement between the respective communication connector assembly 12 and the patch panel 11 along the third direction 23, thereby providing a defined shielding contact between the housing 21 of a shielded connector assembly 12 and the patch panel 11.

[0037] The contact spring 32 of the respective communication connector assembly 12 comprises mounting legs 33 for fixing the contact spring 32 on the housing 21 of the communication connector assembly 12, whereby the mounting legs 33 mesh with recesses 34 provided in side walls of the housing when the contact spring 32 is fixed on the housing 21 of the communication connector assembly 12. The contact spring 32 of the respective communication connector assembly 12 comprises further a flexible or elastic contact pin 35. The contact pin 35 is positioned above the top wall

24 of the housing 21 when the contact spring 32 is fixed on the housing 21 of the communication connector assembly 12.

[0038] As shown in Figures 8a and 8b, the flexible or elastic contact pin 35 of the contact spring 32 is pressed down in the direction to the top wall 24 of the housing 21 when such a communication connector assembly 12 becomes inserted into a mounting opening 14 of the mounting wall 13 of the patch panel 11, whereby after the insertion the flexible or elastic contact pin 35 is positioned between the top wall 24 of the housing 21 and the top wall 16 of the patch panel 11 and contacts the top wall 16 of the patch panel 11 thereby providing a secure shielding contact between the housing 21 of a shielded connector assembly 12 and the patch panel 11.

[0039] The contact springs 32 can also be used for unshielded communication connector assemblies 12 for limiting the relative movement between the respective communication connector assembly 12 and the patch panel 11 along the third direction 23.

[0040] It is also possible that fiber optic communication connector assemblies 36 comprising fiber optic connection modules 38a, 38b are mounted within the mounting openings 14 of the patch panel 11 (see Figures 9 and 10). The fiber optic connection modules 38a, 38b are stacked within a common housing 37 acting as an adapter for mounting the same in the respective mounting opening 14 of the patch panel 11.

[0041] The housing 37 of the fiber optic communication connector assembly 36 comprising the fiber optic connection modules 36a, 36b is mountable along the first direction 19 in an mounting opening 14 of the patch panel 11, namely from the front of the patch panel 11, and is moveable with the mounting opening 14 in the second direction 20.

[0042] The housing 37 of the fiber optic communication connector assembly 36 having the fiber optic connection modules 36a, 36b comprise like the housings 12 of the electrical communication connector assemblies 12 having the electrical connection modules 36a, 36b the protrusions 26 acting together with the insertion recesses 18 of the patch panel 11 allowing the insertion of the same into the respective mounting opening 14.

[0043] Further on, the housing 37 of the fiber optic communication connector assembly 36 comprise the cut-outs 27 within the protrusions 26 and the strokes 29 acting together with the rim or edge 28 of the respective mounting opening 14 allowing the movement of the communication connector assemblies 36 in the second direction 20 when same are inserted into the respective mounting opening 14.

[0044] According to Figure 10, with in the same mounting opening fiber optic communication connector assemblies 36 and electrical communication connector assemblies 12 are mounted.

[0045] It is also possible that not shown hybrid optic communication connector assemblies each comprising a fiber optic connection module and an electrical connection module are mounted in a mounting opening 14 of the patch panel 11.

List of reference numerals

[0046]

10	system
11	patch panel
12	communication connector assembly
13	mounting wall
14	mounting opening
15	protrusion
16	top wall
17	bottom wall
18	insertion recess
19	first direction
20	second direction
21	housing

22a, 22b	connection module
23	third direction
24	top wall
25	bottom wall
26	protrusion
27	cut-out
28	edge
29	stroke
30	locking bracket
31	protrusion
32	contact spring
33	mounting leg
34	recess
35	contact pin
36	communication connector assembly
37	housing / adapter
38a, 38b	connection module

Claims

1. A system comprising a patch panel (11) and a plurality of communication connector assemblies (12; 36) mounted on the patch panel, whereby the patch panel comprises a mounting wall (13) with at least one mounting opening (14) for receiving a plurality of communication connector assemblies, whereby each communication connector assembly comprises a housing (21; 37) for receiving at least one connection module (22a, 22b; 38a, 38b), and whereby the housing (21; 37) of the respective communication connector assembly (12; 36) comprises mounting means assigned to walls of the housing acting together with mounting means assigned to the respective mounting opening of the patch panel in which the respective communication connector assembly is mounted; **characterised in that**
the mounting wall (13) of the patch panel (11) comprises in the region of the or each mounting opening (14) insertion recesses (18) extending from the respective mounting opening (14), whereby each communication connector assembly (12; 36) to be mounted is insertable into the respective mounting opening (14) through the insertion recesses (18) along a first direction, and whereby the or each communication connector assembly (12; 36) being inserted into the respective mounting opening (14) can be moved inside the mounting opening along a second direction;
the housing (21; 37) of each communication connector assembly receives a first connection module (22a; 36a) and a second connection module (22b; 36b) stacked in a third direction, whereby opposite walls (24, 25) of the housing comprise protrusions (26) which can be inserted into the insertion recesses (18) when inserting the respective communication connector assembly into the respective mounting opening (14) through the insertion recesses along the first direction and which hold the respective communication connector assembly inside the mounting opening when the same is moved relative to the insertion recesses (18) along the second direction.

2. The system as claimed in claim 1, **characterised in that** the first direction runs (19) approximately perpendicular

to the plane of the mounting wall (13) and that the second direction (20) runs approximately perpendicular to the first direction (21) in the plane of the mounting wall (13), whereby the plurality of communication connector assemblies (12; 36) are mounted side by side on the mounting wall (13) along the second direction (20).

3. The system as claimed in claim 1 or 2, **characterised by** at least one locking bracket (30) for blocking at least one insertion recess (18) of at least one of the mounting openings (14).

4. The system as claimed in claim 3, **characterised in that** each locking bracket (30) blocks insertion recesses (18) of two adjacent the mounting openings (14).

5. The system as claimed in claim 3 or 4, **characterised in that** each locking bracket (30) prevents a movement of the communication connector assemblies (12; 36) along the second direction (20) when the respective mounting opening (14) is fully equipped with communication connector assemblies (12; 36).

6. The system as claimed in one of claims 1 to 5, **characterised in that** the housing (11) of an electrical communication connector assembly (12) receives a first electrical connection module (22a) in a first orientation and a second electrical connection module (22b) in a second orientation turned up side down with respect to the first connection module (22a), whereby the first connection module (22a) and the second connection module (22b) are positioned side by side in the third direction (23) running approximately perpendicular to the first direction (19) and the second direction (20) in the plane of the mounting wall (13).

7. The system as claimed in one of claims 1 to 6, **characterised in that** an electrical communication connector assembly (12) comprises electrical connection modules (22a, 22b), whereby the housing (21) of the communication connector assembly (12) is electrically connected to the patch panel (11) in order to provide shielding for the electrical connection modules (22a, 22b).

8. The system as claimed in one of claims 1 to 5, **characterised in that** a fiber optic communication connector assembly (36) comprises fiber optic connection modules (38a, 38b).

9. The system as claimed in one of claims 1 to 5, **characterised in that** a hybrid optic communication connector assembly comprises a fiber optic connection module and an electrical connection module.

10. The system as claimed in one of claims 1 to 9, **characterised in that** a contact spring (32) is assigned to the housing (21 ;37) of a communication connector assembly (12; 36), the contact spring (32) limits the relative movement between the respective communication connector assembly (12) and the patch panel (11).

11. The system as claimed in claim 10, **characterised in that** the contact springs (32) limit the relative movement between the respective communication connector assembly (12; 36) and the patch panel (11) along the third direction (23).

12. The system as claimed in claim 10 or 11, **characterised in that** the contact spring (32) provides a defined shielding contact between the housing (21) of a shielded electrical connector assembly (12) and the patch panel (11).

13. A patch panel (11) for system as claimed in one of claims 1-12, the mounting wall (13) of the patch panel (11) comprising in the region of the or each mounting opening (14) insertion recesses (18) extending from the respective mounting opening (14), whereby each communication connector assembly to be mounted on the patch panel is insertable into the respective mounting opening (14) through the insertion recesses (18) along a first direction, and whereby the or each communication connector assembly being inserted into the respective mounting opening (14) can be moved inside the mounting opening along a second direction.

14. The patch panel as claimed in claim 13, **characterised by** features of one of claims 1-12.

15. A communication connector (12; 36) assembly for system as claimed in one of claims 1-12, a housing (21, 37) of the communication connector assembly receiving a first connection module (22a; 36a) and a second connection module (22b; 36b) stacked in a third direction; whereby opposite walls (24, 25) of the housing (21, 37) comprise protrusions (26) which can be inserted into the insertion recesses (18) when inserting the communication connector assembly (12; 36) into the respective mounting opening (14) through the insertion recesses (18) along a first direction and which hold the communication connector assembly inside the mounting opening (14) when the same is moved

relative to the insertion recesses (18) along a second direction.

16. The communication connector assembly as claimed in claim 15, **characterised by** features of one of claims 1-12.

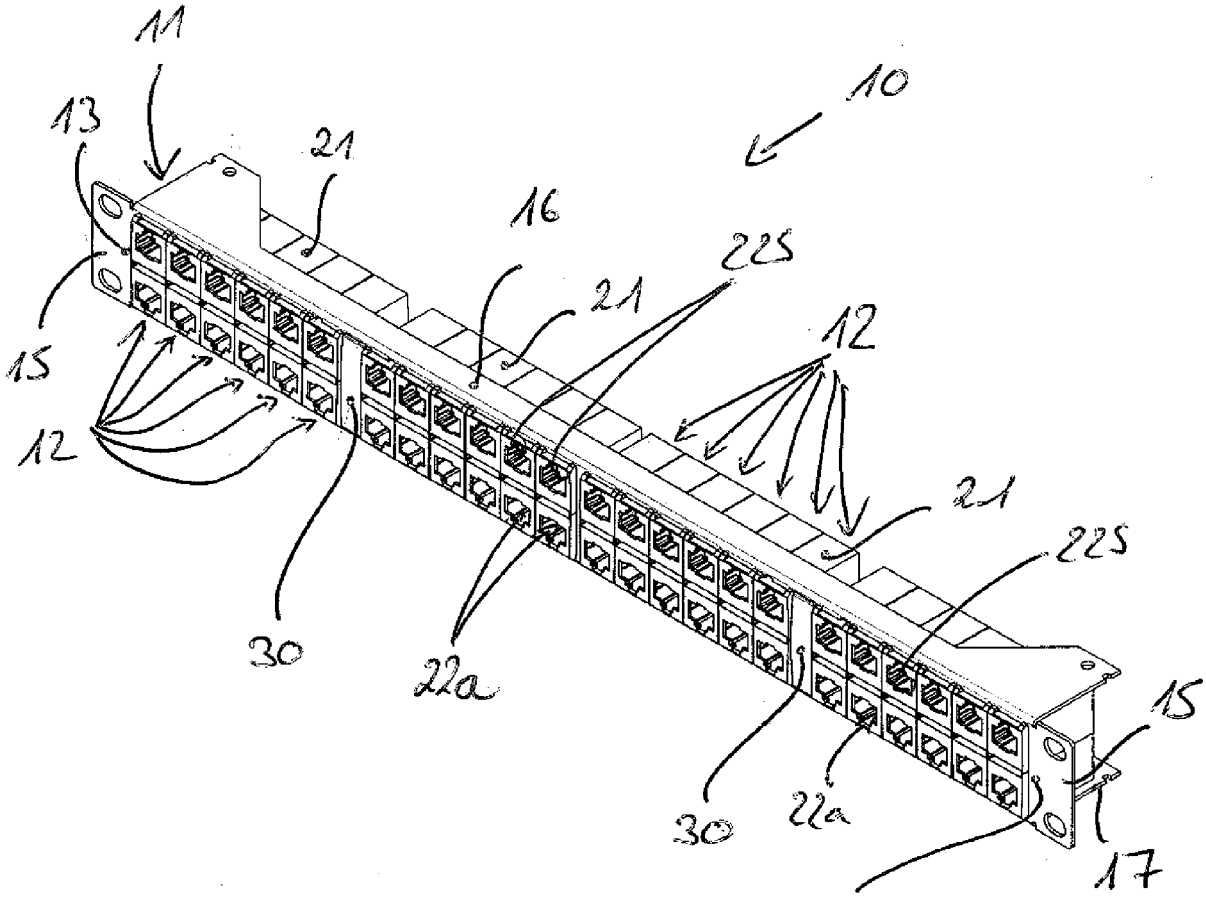
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Fig. 1

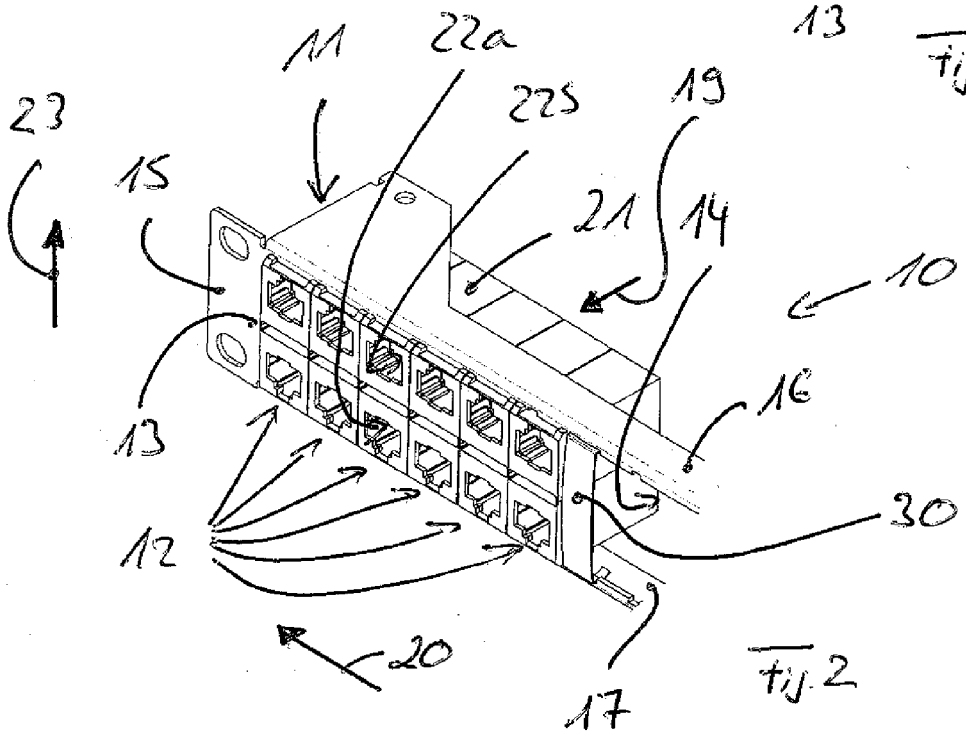
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Fig. 2

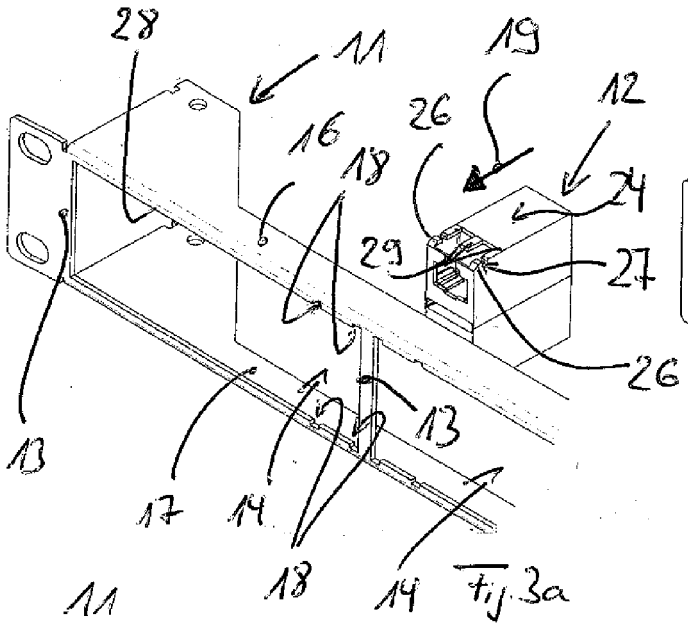


Fig. 3a

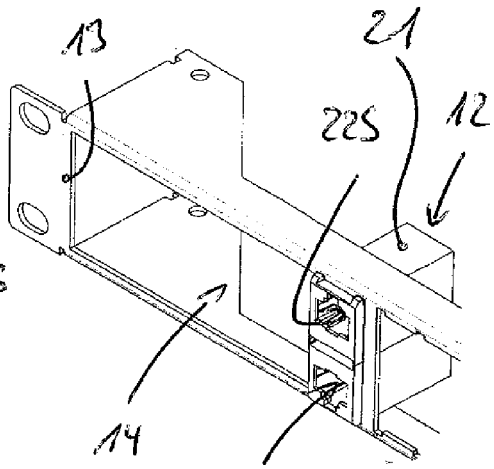


Fig. 3b

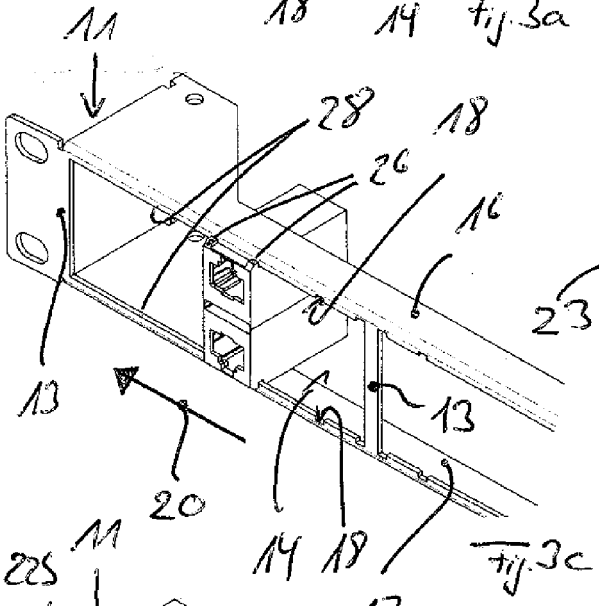


Fig. 3c

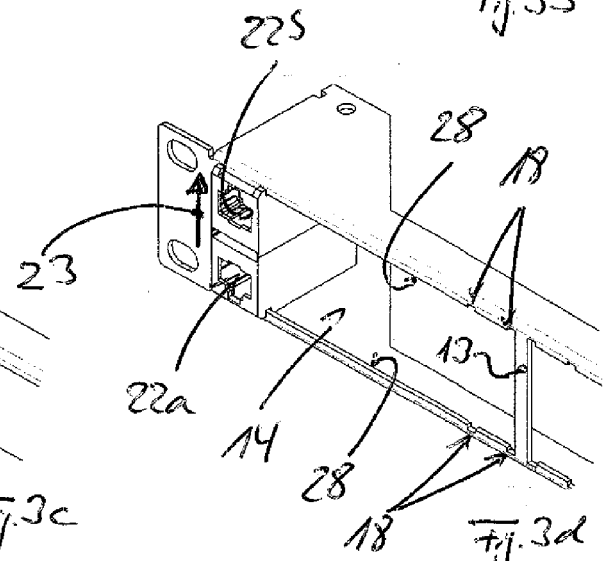


Fig. 3d

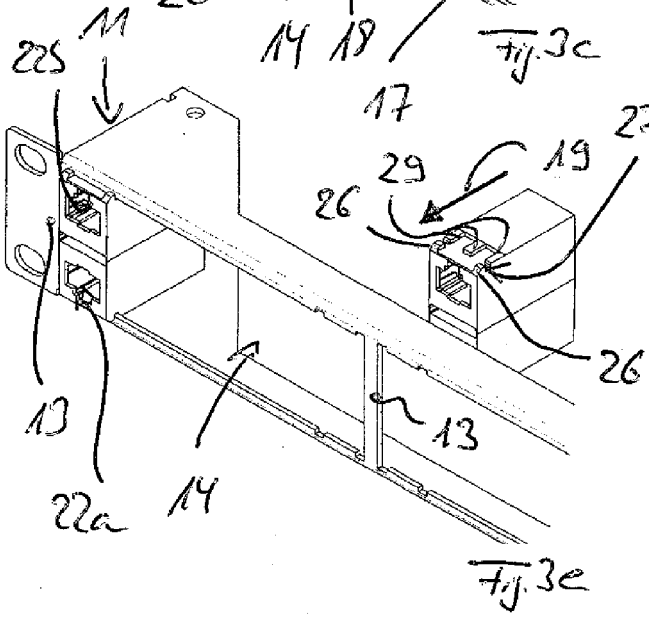


Fig. 3e

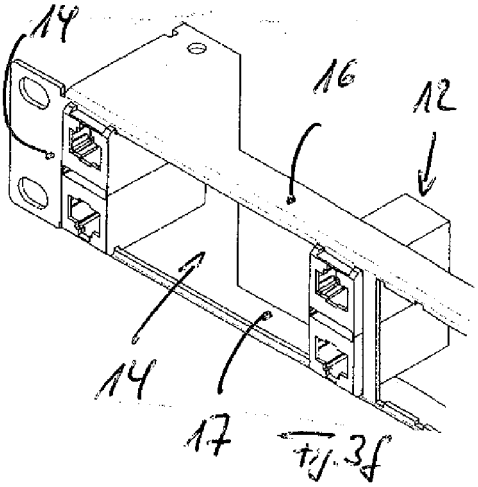


Fig. 3f

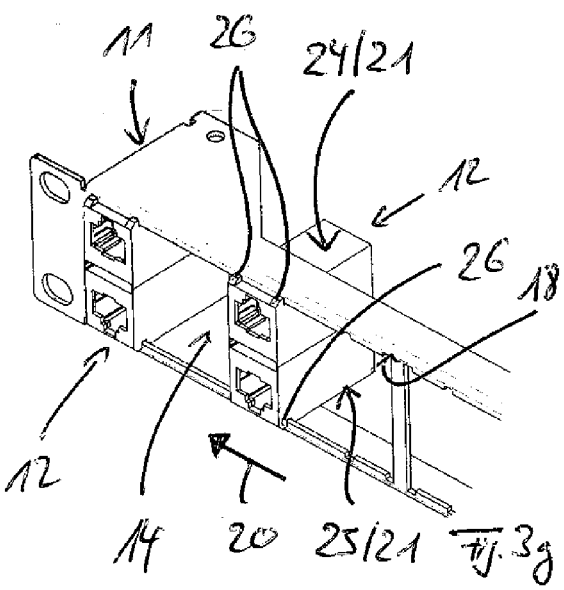


Fig. 3g

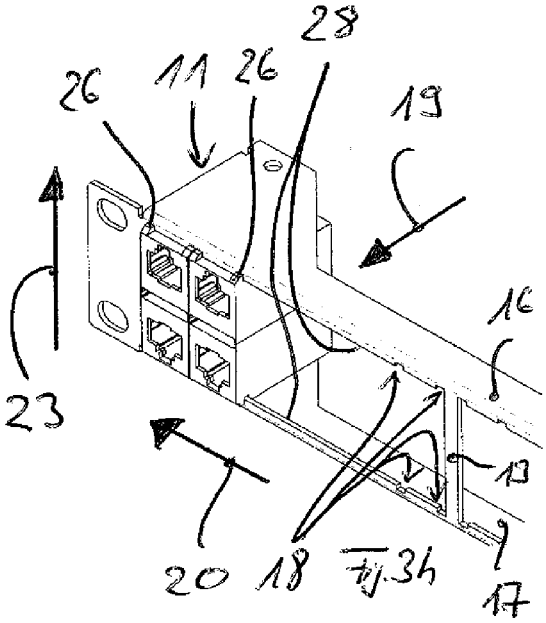


Fig. 3h

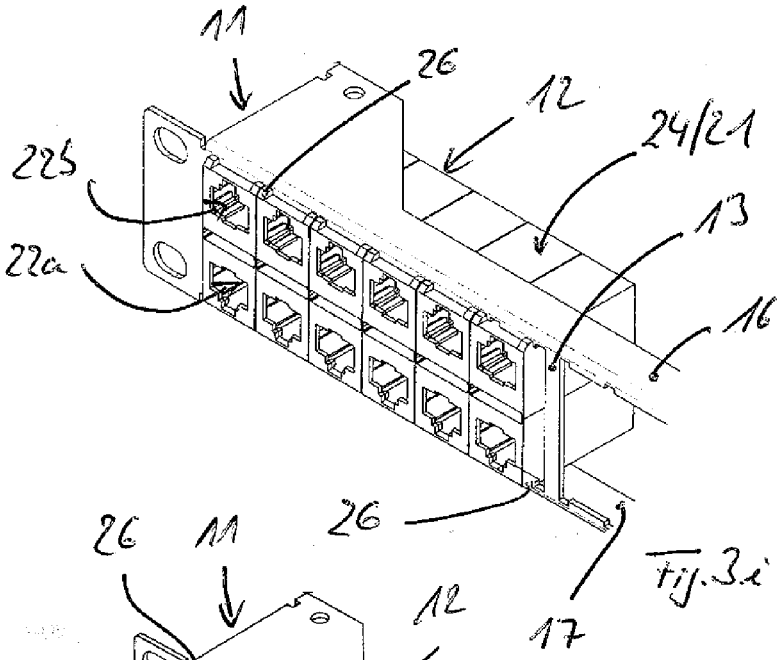


Fig. 3i

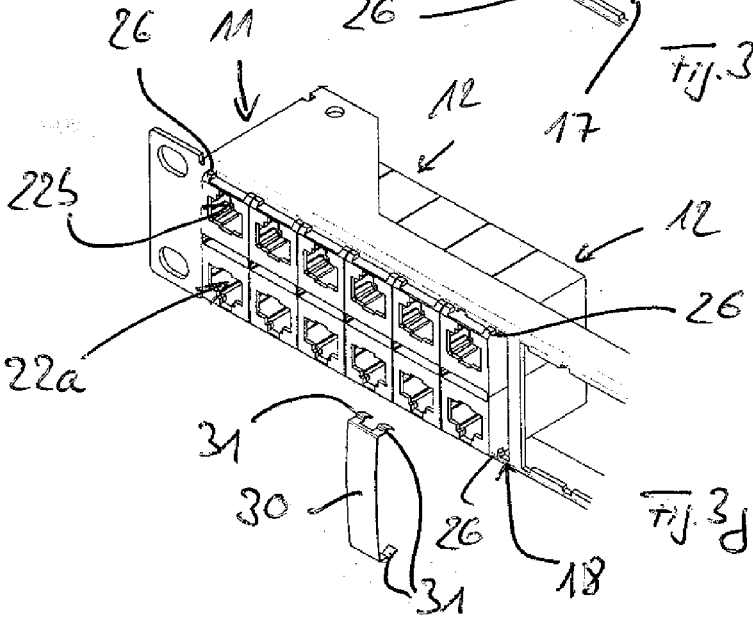
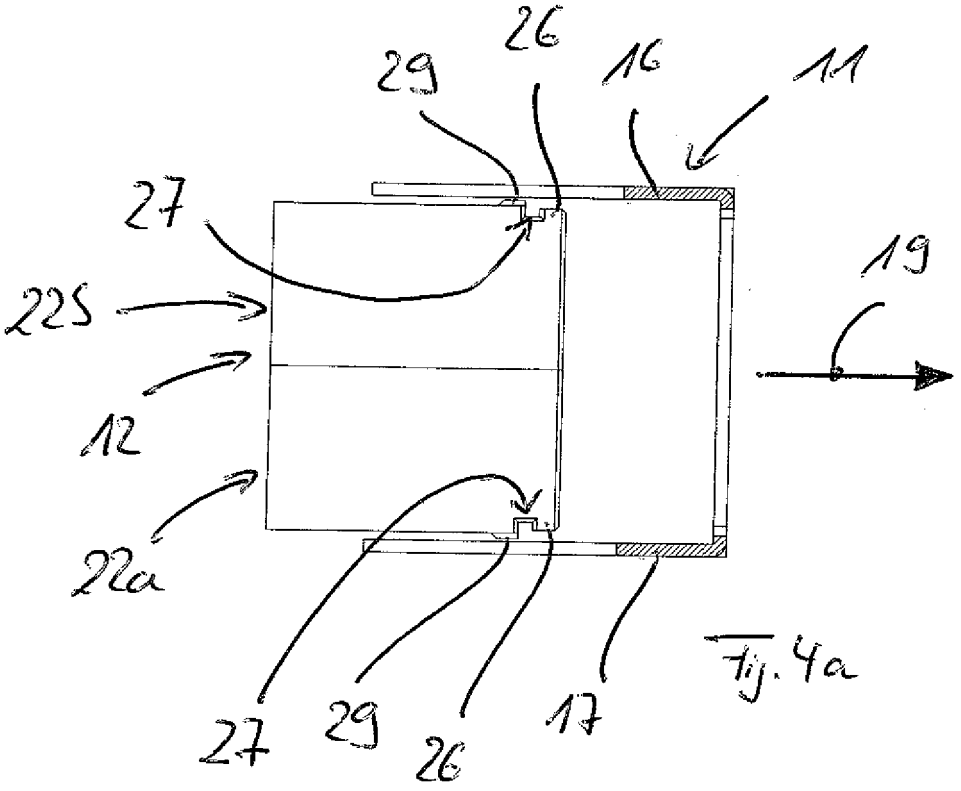


Fig. 3j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16
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22S
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22a
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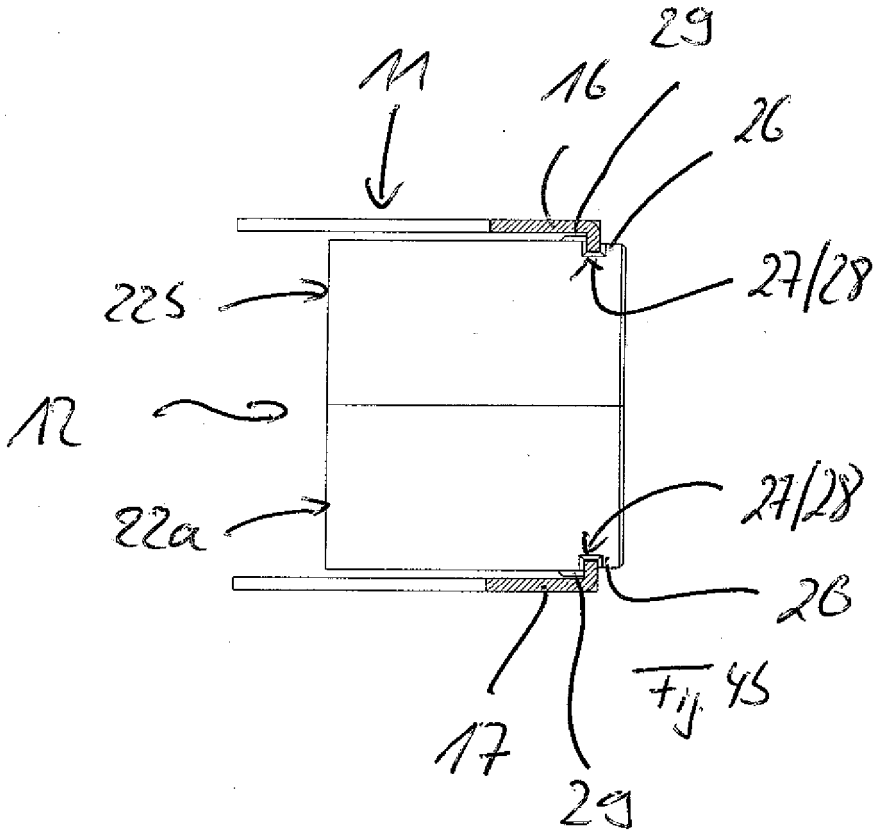
Fig. 4a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22S
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22a
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Fig. 4b

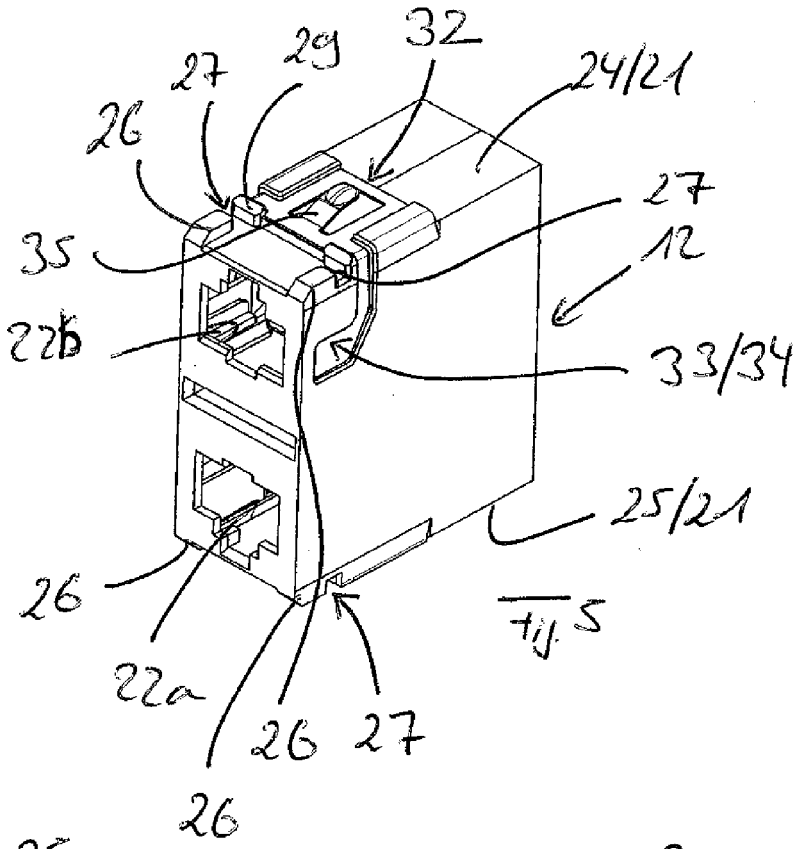


fig. 5

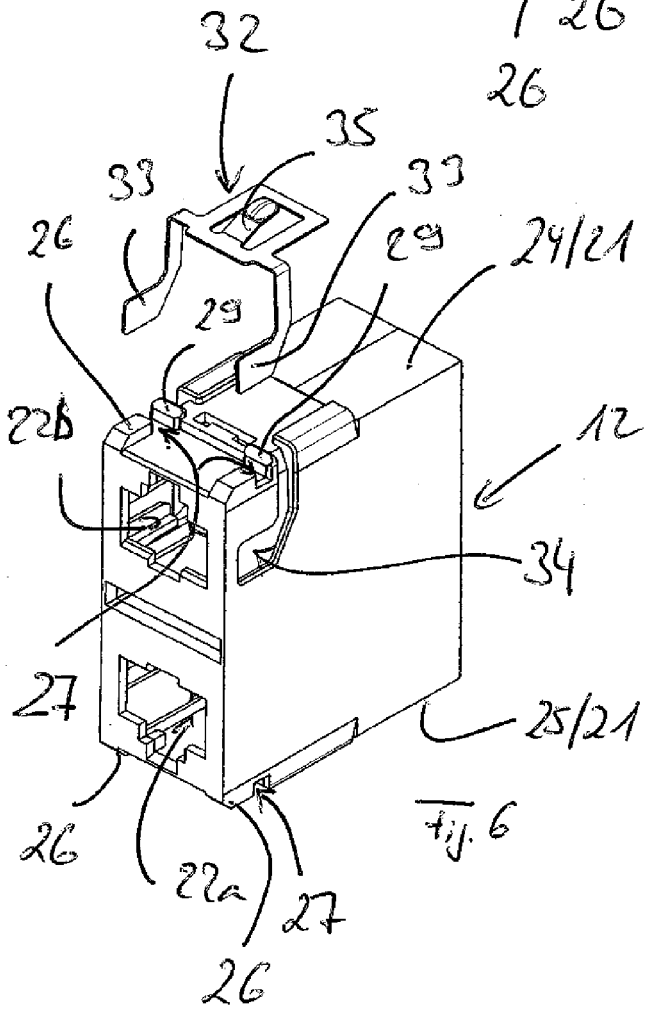


fig. 6

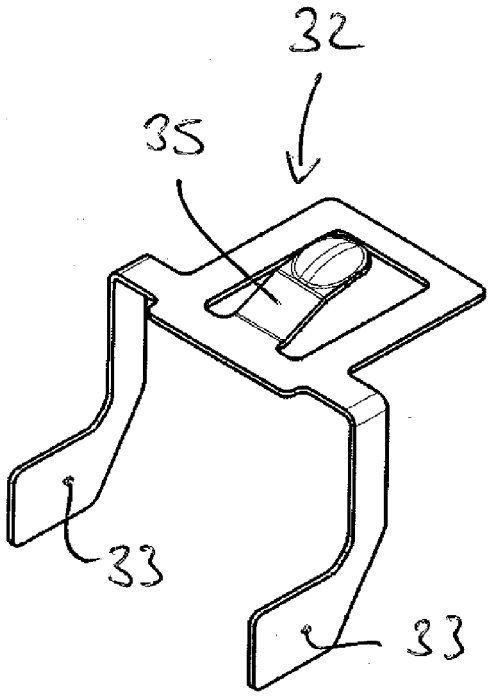
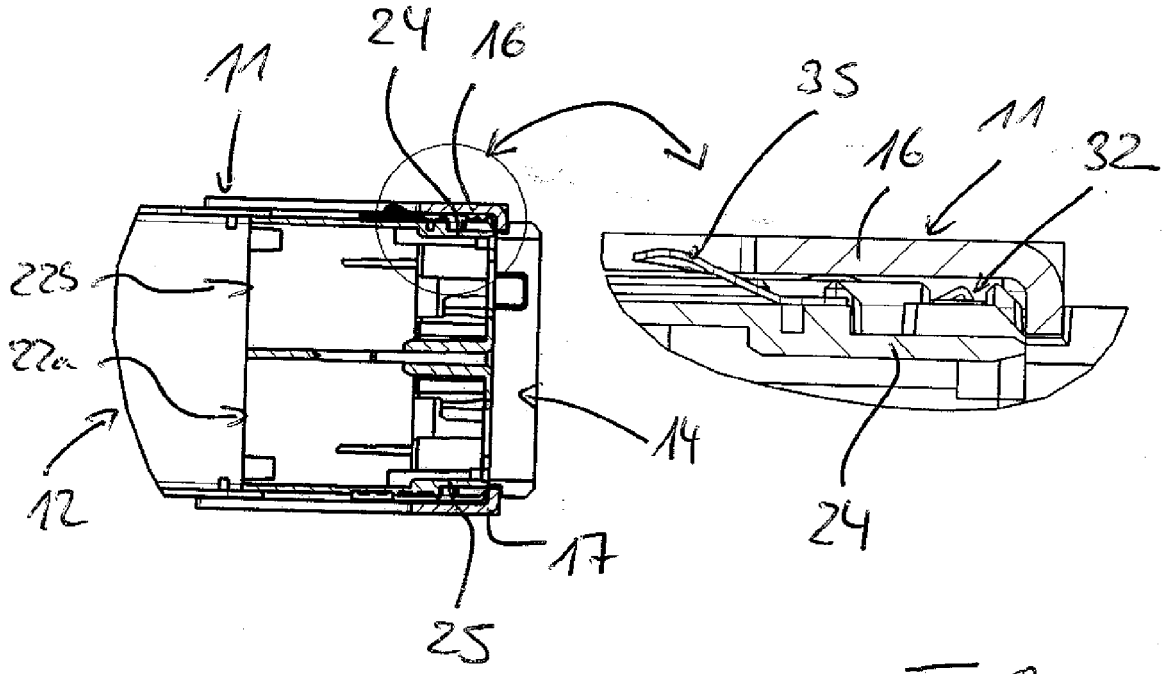


fig. 7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22b
22a
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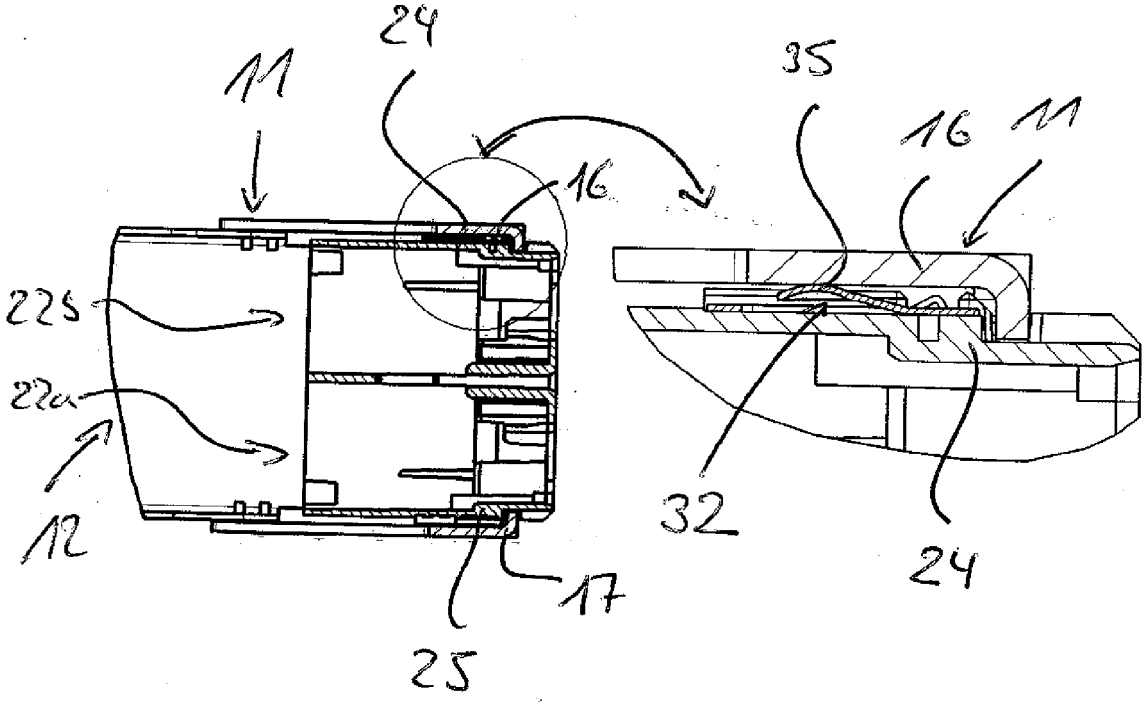
Fig. 8a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22b
22a
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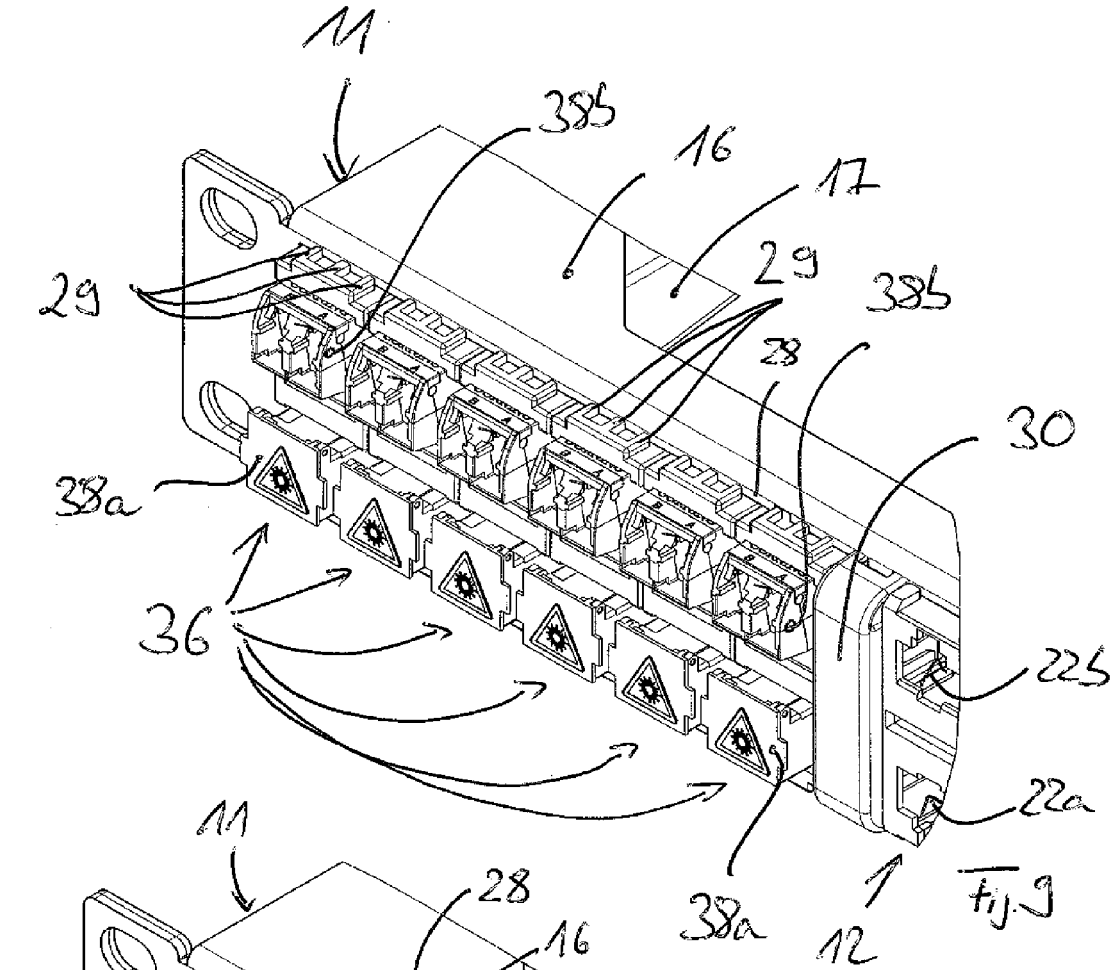
Fig. 8b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38a
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22b
22a
38a
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Fig. 9

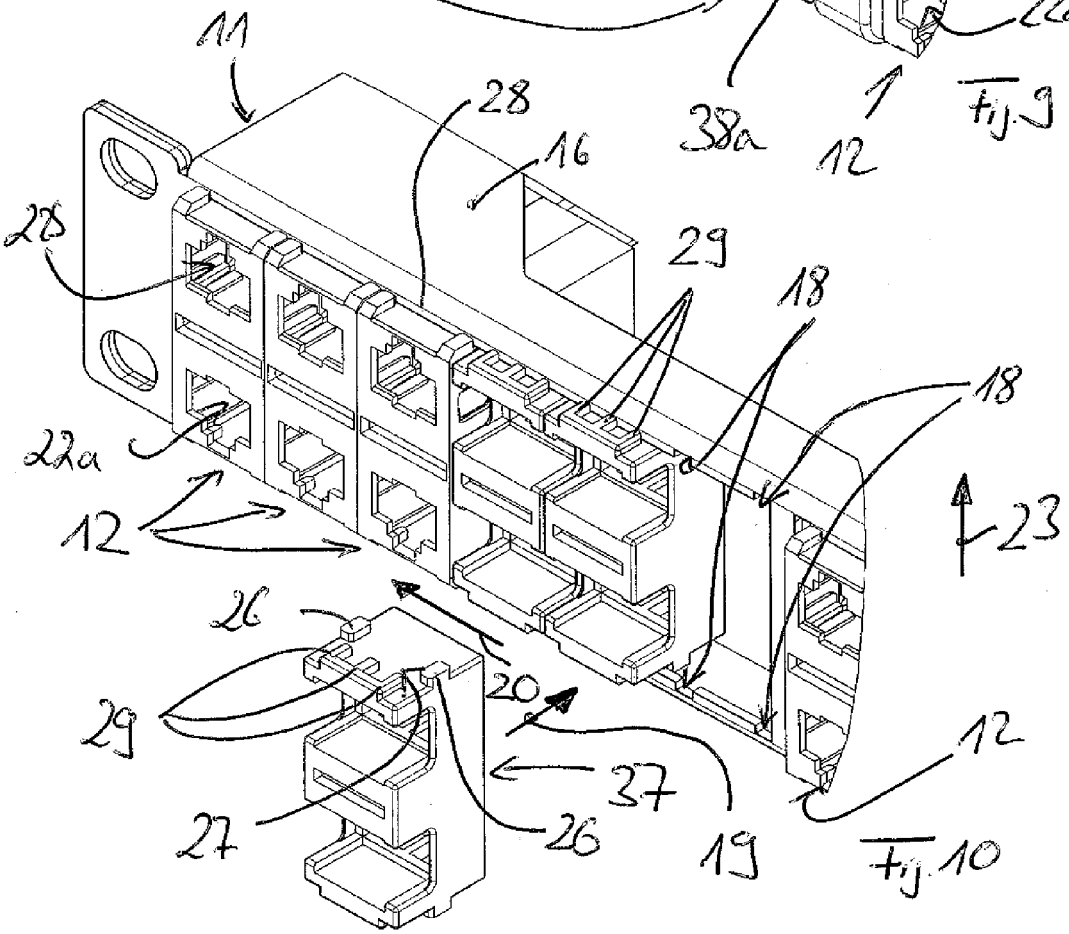
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Fig. 10

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EUROPEAN SEARCH REPORT

Application Number
EP 11 17 1540

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X Y	US 5 356 311 A (LIU DANNY [TW]) 18 October 1994 (1994-10-18) * column 2, line 57 - column 3, line 47; figure 4 *	1-9, 13-16 1-13,15	INV. H01R13/518 H01R24/64
Y	US 2009/239413 A1 (MILETTE LUC [CA]) 24 September 2009 (2009-09-24) * paragraph [0018] - paragraph [0021]; figures 3,4 *	1-9,13, 15	
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Y A	US 2010/227493 A1 (GUY JASON [US] ET AL) 9 September 2010 (2010-09-09) * paragraph [0040] - paragraph [0040]; figure 2 *	10-12 1	

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H01R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	18 November 2011	Bouhana, Emmanuel

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1

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