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(54) Distribution unit for an electrical installation

(57) The invention is about a distribution unit (1) for an electrical installation, comprising a terminal block arrangement, in particular for connecting protective earth conductors and neutral conductors (PE/N terminal), said terminal block arrangement having a mounting strip (2) and modules (3) that can be fitted to the mounting strip (2) next to one another in a row, said modules (3) having an insulating housing (4), whereby each of the housings (4) and the mounting strip (2) have devices for the purpose of plugging the modules (3) to the mounting strip (2), transversely with respect to the longitudinal direction of the mounting strip (2), said distribution unit (1) having a first and a second support ((5, 6) for the mounting strip (2) being disposed at a spacing from one another on a substructure (7), the mounting strip (2) being secured to the supports (5, 6), said mounting strip (2) having coupling parts (8, 9) being formed at its opposing narrow

ends, each of said coupling parts (8, 9) having a latch (10) that can be released by pressing it in direction towards the free end of the mounting strip (2) by a tool or by a finger, and which biases into a retaining position, wherein the mounting strip (2) is formed as an elongated cube-shaped rod, which has two rectangular broad long-edged plates (11, 12) which are connected by two rectangular narrow short-edged plates (13, 14), wherein the long edges (15) of the broad long-edged plates (11, 12) and the narrow edges (16) of the narrow short-edged plates (13, 14) define two narrow long-edged side sections (17, 18), said two broad long-edged plates (11, 12) being bonded together by means of an elongated ligament (19) running from a first of the narrow short-edged plates (13) to the other narrow short-edged plate (14) in a meander-shaped course.

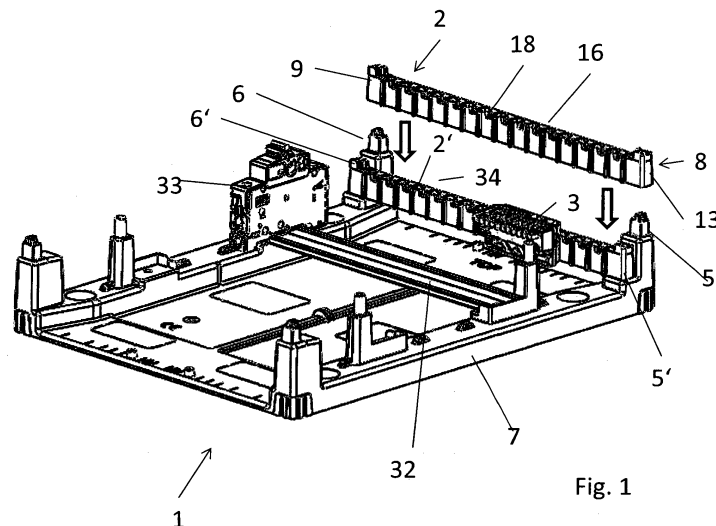


Fig. 1

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Description

[0001] The invention relates to a distribution unit for an electrical installation, comprising a terminal block arrangement, in particular for connecting protective earth conductors and neutral conductors (PE/N terminal), said terminal block arrangement having a mounting strip and modules that can be fitted to the mounting strip next to one another in a row, said modules having an insulating housing, whereby each of the housings and the mounting strip have devices for the purpose of plugging the modules to the mounting strip, transversely with respect to the longitudinal direction of the mounting strip, according to the preamble of claim 1.

[0002] EP 1217693B1 shows a terminal block arrangement for a distribution unit for an electrical installation, in particular for connecting protective earth conductors and neutral conductors (PE/N terminal), said terminal block arrangement having a mounting strip and modules that can be fitted to the mounting strip next to one another in a row, said modules having an insulating housing, whereby each of the housings and the mounting strip have devices for the purpose of plugging the modules to the mounting strip, transversely with respect to the longitudinal direction of the mounting strip, whereby said devices comprise a hook element which is connected to the housing, having a hook limb which engages behind the mounting strip, said mounting strip having coupling parts being formed at its opposing narrow ends, each of said coupling parts having a latch that can be released and which biases into a retaining position, whereby the mounting strip is formed by an angled profile having a first and second profile limb which each have a free edge, whereby the free edge of the first profile limb comes to be arranged between the hook limb of the hook element and the housing of the module when the module is plugged onto the mounting strip.

[0003] The object of the present invention is to create a novel type of distribution unit where the amount of material of the mounting strip is reduced to a very low amount, creating high functional strength with space-saving geometry.

[0004] According to the invention, the above object of material and space saving is achieved by a distribution unit with the features as pointed out in claim 1. According to the invention, the mounting strip is formed as an elongated cube-shaped rod, which has two rectangular broad long-edged plates which are connected by two rectangular narrow short-edged plates, wherein the long edges of the broad long-edged plates and the narrow edges of the narrow short-edged plates define two narrow long-edged side sections, said two broad long-edged plates being bonded together by means of an elongated ligament running from a first of the narrow short-edged plates to the other narrow short-edged plate in a meander-shaped course.

[0005] The advantage of a device according to the invention is that the cube-shaped rod can be made very

thin, in the kind of a hollow wall structure, which will save material, weight and space, and due to the meander shaped ligament in the space between the two broad long-edged plates a very stiff and stable design is achieved. The mechanical strength of the mounting strip is thereby related to its height and width in combination with the meander-shaped ligament and the wall thickness of the broad long-edged plates. The meander-shaped ligament can be formed as a meander-shaped rib. It serves for achieving a high bending resistance in a cube-shaped rod with small thickness. The cube-shaped rod according to the invention does not need any additional profiled limb to achieve the mechanical strength and a high bending resistance.

[0006] Advantageous embodiments are described in the characteristic features of the dependent claims.

[0007] According to an advantageous aspect of the invention, the distribution unit has a first and a second support for the mounting strip being disposed at a spacing from one another on a substructure, the mounting strip being secured to the supports, said mounting strip having coupling parts being formed at its opposing narrow ends, each of said coupling parts having a latch that can be released by pressing it in direction towards the free end of the mounting strip by a tool or by a finger, and which biases into a retaining position.

[0008] According to an advantageous aspect of the invention, the meander shaped course of the ligament or rib is a wave-shaped course. The wave can be any shape. Advantageous is a rectangular shape, or a triangle shape, a sinusoidal shape or a trapezoid shape of the wave-formed course, all could be advantageously applied.

[0009] According to an advantageous aspect of the invention the envelope of the wave shape is congruent with the narrow long-edged side sections. So in the advantageous example of a rectangular or a trapezoid wave form, the top and bottom lines of the rectangle or trapezoids will be located flush with the two narrow long-edged side sections. That means, that the upper and lower elongated side sections of the elongated cube-shaped rod are embodied by the top and bottom lines of the rectangle or trapezoids, in a general sense they are embodied by the envelope of the wave shape of the meander-shaped or wave-shaped ligament or rib.

[0010] According to an advantageous aspect of the invention the mounting strip has projecting bars, oriented transversely with respect to the longitudinal direction of the mounting strip, arranged in parallel to each other, formed to the outside of one of its rectangular broad long-edged plates, and each of the insulating housings has at least one slot oriented transversely with respect to the longitudinal direction of the mounting strip and adapted for positive locking of the bar into the slot when plugging the module housing to the mounting strip. The projecting bars in conjunction with the slots in the housing serve for fixing the modules housings to the mounting strip side wall, in absence of any additional profiled supporting

limb.

[0011] According to an advantageous aspect of the invention the coupling part has a blocking element to limit the permitted deflection of the latch in its release position.

[0012] According to an advantageous aspect of the invention the supports have the form of a cube or of a truncated pyramid and the coupling parts have the form of an open box, wherein the latch is a rod resiliently attached to one of the inner side walls of the open box, said rod having a locking member at its first end which is engaging in a recess formed at the support, and having a pushing member at its second end which is projecting above the narrow long-edged side sections, wherein the blocking element is formed as an extension of each of the three other side walls of the open box in the direction of and ending substantially flush with the pushing member.

[0013] According to an advantageous aspect of the invention said distribution unit has at least one third support located between the first and the second support for preventing a deflection of the mounting strip.

[0014] The invention will be described in greater detail by description of an embodiment with reference to the accompanying drawings, wherein

Fig. 1 shows an embodiment of a distribution unit according to the invention,

Fig. 2 shows an alternative embodiment of a distribution unit according to the invention,

Fig. 3 shows a module oriented towards a mounting strip according to the invention,

Fig. 4a shows a mounting strip according to the invention,

Fig. 4b shows the mounting strip as of fig. 4a seen from top,

Fig. 4c shows the mounting strip as of fig. 4a, cut along a plane parallel to its broad long-edged side,

Fig. 5 shows a detailed view of first supports,

Fig. 6 shows a detailed view of the coupling part of a mounting strip according to the invention engaged with a support part of the substructure, in a cut view.

[0015] Referring to figure 1, 4a, 4b, 4c and 3, there is shown a distribution unit 1 for an electrical installation. The distribution unit 1 has a substructure 7 in form of a mounting plate. There are two locations with means for installing a top hat rail 32, also called a DIN hat rail, to the substructure 7. Instead of the top hat rail 32 shown any other kind of profiled rails allowed in the various technical standards that are applied in different countries

throughout the world for electrical distribution boards may be applied. The top hat rail serves for mounting electrical installation devices, such as miniature circuit breakers (MCM), residual current circuit breakers (RCCB), contactor devices, overvoltage protection devices or the like. In fig. 1 as an example an MCB device 33 is mounted to the top hat rail 32. In the distribution board 1 shown in figure 1 two such top hat rails can be installed in parallel and at a distance apart from each other, although only one of them, the one close to the topside edge 34 of the mounting plate 7 distribution unit 1 is shown.

[0016] The distribution unit 1 is further comprising a terminal block arrangement, in particular for connecting protective earth conductors and neutral conductors (PE/N terminal). The terminal block arrangement is located at the topside edge 34 of the mounting plate 7. It could as well be located at the bottom side edge, opposite of the top-side edge 34, or there could be terminal block arrangements both at the top side 34 and at the bottom side. The terminal block arrangement has a mounting strip 2 and modules 3, only one module 3 shown in exemplary mode in figure 1, that can be fitted to the mounting strip 2 next to one another in a row.

[0017] The terminal block arrangement usually has a conductor rail and a number of connection elements for the purpose of connecting conductors to the conductor rail. Each of the modules 3 has at least one of the connection elements. The modules 3 have an insulating housing 4 and a conductor rail section (not shown here in figure 1) which is arranged within the housing 4. The conductor rail sections are forming the conductor rail, and the terminal block arrangement has links for the purpose of electrically connecting the conductor rail sections of modules which are fitted next to one another on the mounting strip.

[0018] Each of the housings 4 and the mounting strip 2 have devices for the purpose of plugging the modules 3 to the mounting strip 2, transversely with respect to the longitudinal direction of the mounting strip 2. Said devices on the side of the mounting strip 2 are formed as projecting bars 20, oriented transversely with respect to the longitudinal direction of the mounting strip 2, arranged in parallel to each other, formed to the outside of one of its rectangular broad long-edged plates 11, 12. Said devices on the side of the insulating housing are formed as at least one slot 21 oriented transversely with respect to the longitudinal direction of the mounting strip 2 and adapted for positive locking of the bar 20 into the slot 21 when plugging the module housing 4 to the mounting strip 2.

[0019] The distribution unit 1 has a first and a second support 5, 6 for the mounting strip 2 being disposed at a spacing from one another on the substructure 7. Located next to the first and second supports 5, 6, there are additional first and second supports 5', 6', situated a small distance below the first and second supports 5, 6. The height above the mounting plate 7 of the first and second supports 5, 6 is larger than the height above the mounting plate 7 of the additional first and second supports 5', 6'.

So the additional first and second supports 5', 6' allow for fixing the mounting strip 2 close to the mounting plate 7, and the first and second supports 5, 6 allow for mounting the mounting strip 2 at a certain distance above the mounting plate 7. It may even be the case that two mounting strips, each equipped with terminal blocks, are installed, one on the first and second supports 5, 6 and the other on the additional first and second supports 5', 6'. Figure 1 shows the situation where a first mounting strip 2' is fixed to the additional first and second supports 5', 6', a second mounting strip 2 is shown in a position before fixing to the supports, the arrows indicating the direction of insertion to the supports 5, 6. Figure 2 shows a situation where a mounting strip 2 is fixed to the upper first and second supports 5, 6.

[0020] The mounting strip 2 is being secured to the supports 5, 6, whereby for this purpose the mounting strip 2 has coupling parts 8, 9 being formed at its opposing narrow ends. Each of the coupling parts 8, 9 have a latch 10 that can be released by pressing it in direction towards the free end of the mounting strip 2 by a tool or by a finger. The latch 10 biases into a retaining position.

[0021] Figure 5 shows that the supports 5, 5', and of course also 6 and 6' although not shown in figure 5, have the form of a cube or of a truncated pyramid. On their top side each of the supports 5, 5', 6, 6' has an attachment part 35, which is a bit smaller in lateral extension than the top side of the supports 5, 5', 6, 6', and which provides a recess 26 that serves for locking purposes and allows the holding interaction of the latch with the supports 5, 5', 6, 6' when the latch is in the retaining position.

[0022] In the cross-sectional view of figure 6 it can be seen that the coupling parts 8, 9 have the form of an open box, wherein the latch 10 is a rod 23 resiliently attached to one of the inner side walls 24 of the open box. For attaching the rod 23 there is another, shorter rod 36. The rod 23 is situated to be oriented substantially in parallel to the vertical extension of the inner side wall 24 of the box. The attachment point of the additional rod 36 to the rod 23 is substantially in the middle between the two opposite ends of the rod 23. So by pressing the upper end of the rod 23, indicated as pushing member 27, in a direction towards the free end of the mounting strip 2, that means clockwise in figure 6, the lower end carrying the locking member 25 is being bent clockwise as well, and moved away from the free end of the mounting strip 2.

[0023] The rod 2 has a locking member 25, here in the form of a latching nose, at its first end, the lower end in the exposition according to figure 6. As figure 6 shows, in the retaining position the locking member 25 is engaging in the recess 26 formed in the attachment part 35 of the support 5.

[0024] For releasing the latch, one would press the pushing member 27 in clockwise direction in figure 6. As was described above, then the locking member 25 would as well rotate slightly in clockwise direction, and as a consequence the locking member would move out of the recess 26 to release the latch.

[0025] In order to have easy access to the pushing member 27 for a finger of a person or for a tool like a screwdriver, the pushing member 27 at its second end is projecting above the narrow long-edged side sections 17, 18.

[0026] When pushing the latch to release it, there is a certain danger of over-biasing or overpushing, that means pushing further even after the locking member 25 has already left the recess, continuing to push clockwise, with the risk of overloading and breaking the additional rod 36. In order to avoid that risk, the coupling part 8 has a blocking element 22 to limit the permitted deflection of the latch 10 in its release position. It is formed as an extension of each of the three other side walls 28, 29, 30 of the open box forming the coupling part 8, see figure 6, in the direction of and ending substantially flush with the pushing member 27. The distance of the edges of the additional walls to the pushing member 27 is just enough to let it rotate sufficiently for releasing the locking element 25 from the recess. When an attempt is made to push further, the finger or the tool is blocked at the free edges of these additional walls, so an overloading of the latch is avoided.

[0027] Referring now to figures 4a, 4b, 4c, the mounting strip 2 is formed as an elongated cube-shaped rod. The rod has two rectangular broad long-edged plates 11, 12 which are connected by two rectangular narrow short-edged plates 13, 14. The long edges 15 of the broad long-edged plates 11, 12 and the narrow edges 16 of the narrow short-edged plates 13, 14 define two narrow long-edged side sections 17, 18. The two broad long-edged plates 11, 12 are being bonded together by means of an elongated ligament 19, also called elongated rib, running from a first of the narrow short-edged plates 13 to the other narrow short-edged plate 14 in a meander-shaped course. The meander shaped course here is in the form of wave-shaped course with a trapezoid shaped wave form. The envelope of the wave shape is congruent with the narrow long-edged side sections 17, 18. So in example of the trapezoid wave form, the top and bottom lines of the trapezoids are located flush with the two narrow long-edged side sections. That means, that the upper and lower elongated side sections of the elongated cube-shaped rod are embodied by the top and bottom lines of the rectangle or trapezoids.

[0028] As is illustrated in the figures, the cube-shaped rod 2 can be made very thin, in the kind of a hollow wall structure, which will save material, weight and space. Due to the meander shaped ligament 9 or rib in the space between the two broad long-edged plates a very stiff and stable design is achieved. The ligament or rib 9 serves for achieving a high bending resistance in the cube-shaped rod with small thickness. The cube-shaped rod 2 as shown here does not need any additional profiled limb to achieve the mechanical strength and a high bending resistance.

[0029] As can be seen in figure 2, the distribution unit 1 can have at least one third support 31 located between

the first and the second support 5, 6 for preventing a deflection of the mounting strip 2. In figure 2 there are two such third supports 31. Such an embodiment is particularly useful in an application with a very wide distribution unit, where the mounting strip has to be very long, in order to prevent a deflection of the middle part of the mounting strip downwards towards the mounting plate 7.

List of reference signs

[0030]

1	distribution unit
2	mounting strip
2'	mounting strip
3	module
4	insulating housing
5	first support
5'	first support
6	second support
6'	second support
7	substructure
8	coupling part
9	coupling part
10	latch
11	broad long-edged plate
12	broad long-edged plate
13	narrow short-edged plate
14	narrow short-edged plate
15	long edge
16	narrow edge
17	narrow long-edged side section
18	narrow long-edged side section
19	elongated ligament
20	projecting bar
21	slot
22	blocking element
23	rod
24	one of the inner side walls
25	locking member
26	recess
27	pushing member
28	other side wall
29	other side wall
30	other side wall
31	third support
32	top hat rail
33	MCB
34	topside edge
35	attachment part
36	additional rod

Claims

1. Distribution unit (1) for an electrical installation, comprising a terminal block arrangement, in particular for connecting protective earth conductors and neu-

tral conductors (PE/N terminal), said terminal block arrangement having a mounting strip (2) and modules (3) that can be fitted to the mounting strip (2) next to one another in a row, said modules (3) having an insulating housing (4), whereby each of the housings (4) and the mounting strip (2) have devices for the purpose of plugging the modules (3) to the mounting strip (2), transversely with respect to the longitudinal direction of the mounting strip (2), **characterised in that** the mounting strip (2) is formed as an elongated cube-shaped rod, which has two rectangular broad long-edged plates (11, 12) which are connected by two rectangular narrow short-edged plates (13, 14), wherein the long edges (15) of the broad long-edged plates (11, 12) and the narrow edges (16) of the narrow short-edged plates (13, 14) define two narrow long-edged side sections (17, 18), said two broad long-edged plates (11, 12) being bonded together by means of an elongated ligament (19) running from a first of the narrow short-edged plates (13) to the other narrow short-edged plate (14) in a meander-shaped course.

2. Distribution unit (1) according to claim 1, **characterised in that** said distribution unit (1) has a first and a second support (5, 6) for the mounting strip (2) being disposed at a spacing from one another on a substructure (7), the mounting strip (2) being secured to the supports (5, 6), said mounting strip (2) having coupling parts (8, 9) being formed at its opposing narrow ends, each of said coupling parts (8, 9) having a latch (10) that can be released by pressing it in direction towards the free end of the mounting strip (2) by a tool or by a finger, and which biases into a retaining position,
3. Distribution unit (1) according to claim 1, **characterised in that** the meander shaped course is a wave-shaped course.
4. Distribution unit (1) according to claim 2, **characterised in that** the envelope of the wave shape is congruent with the narrow long-edged side sections (17, 18).
5. Distribution unit (1) according to claim 3, **characterised in that** the mounting strip (2) has projecting bars (20), oriented transversely with respect to the longitudinal direction of the mounting strip (2), arranged in parallel to each other, formed to the outside of one of its rectangular broad long-edged plates (11, 12), and that each of the insulating housings (4) has at least one slot (21) oriented transversely with respect to the longitudinal direction of the mounting strip (2) and adapted for positive locking of the bar (20) into the slot (21) when plugging the module housing (4) to the mounting strip (2).

6. Distribution unit (1) according to claim 1, **characterised in that** the coupling part (8) has a blocking element (22) to limit the permitted deflection of the latch (10) in its release position. 5
7. Distribution unit (1) according to claim 5, **characterised in that** the supports (5, 6) have the form of a cube or of a truncated pyramid and the coupling parts (8, 9) have the form of an open box, wherein the latch (10) is a rod (23) resiliently attached to one of the inner side walls (24) of the open box, said rod (23) having a locking member (25) at its first end which is engaging in a recess (26) formed at the support (5,6), and having a pushing member (27) at its second end which is projecting above the narrow long-edged side sections (17, 18), wherein the blocking element (22) is formed as an extension of each of the three other side walls (28, 29, 30) of the open box in the direction of and ending substantially flush with the pushing member (27). 10 15 20
8. Distribution unit (1) according to claim 1, **characterised in that** said distribution unit (1) has at least one third support (31) located between the first and the second support (5, 6) for preventing a deflection of the mounting strip (2). 25

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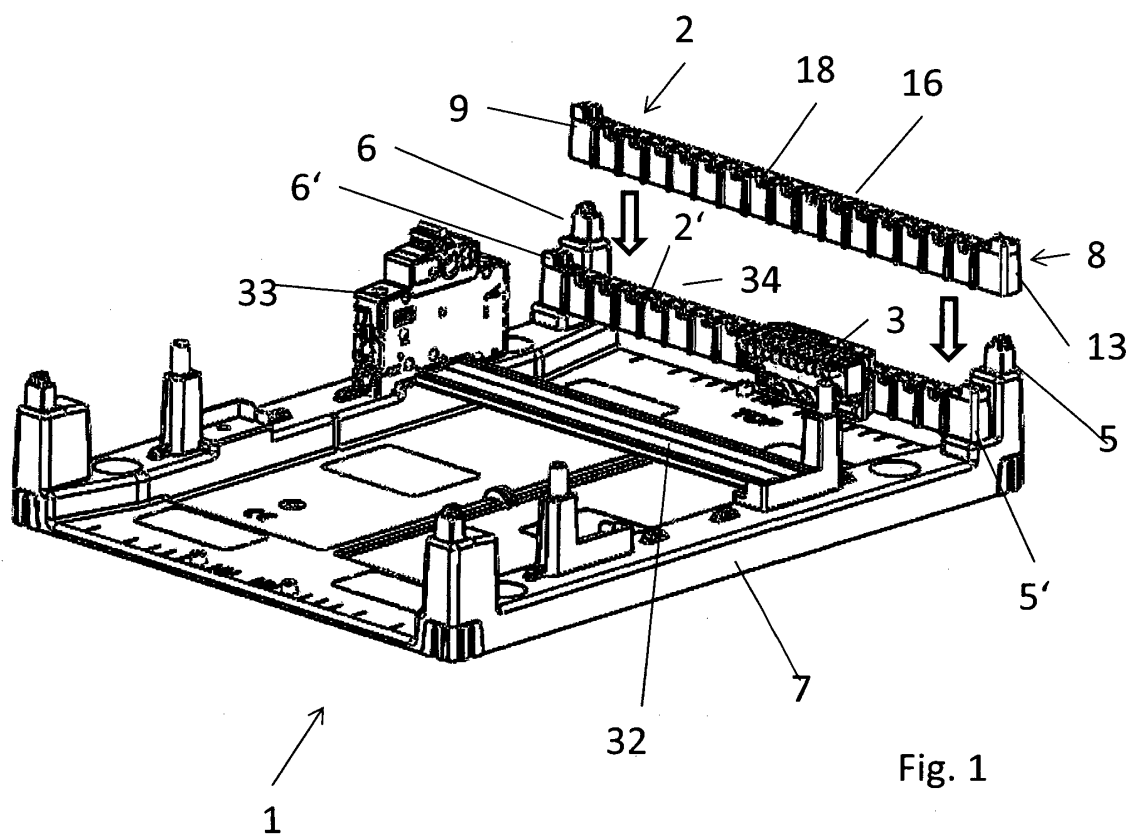
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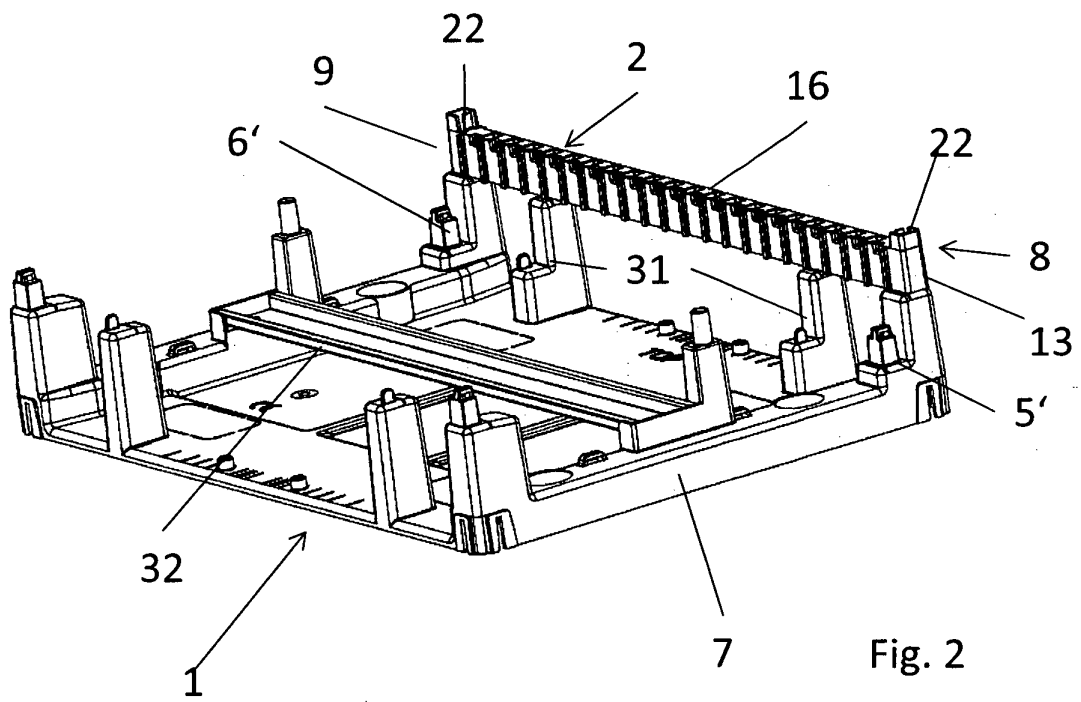
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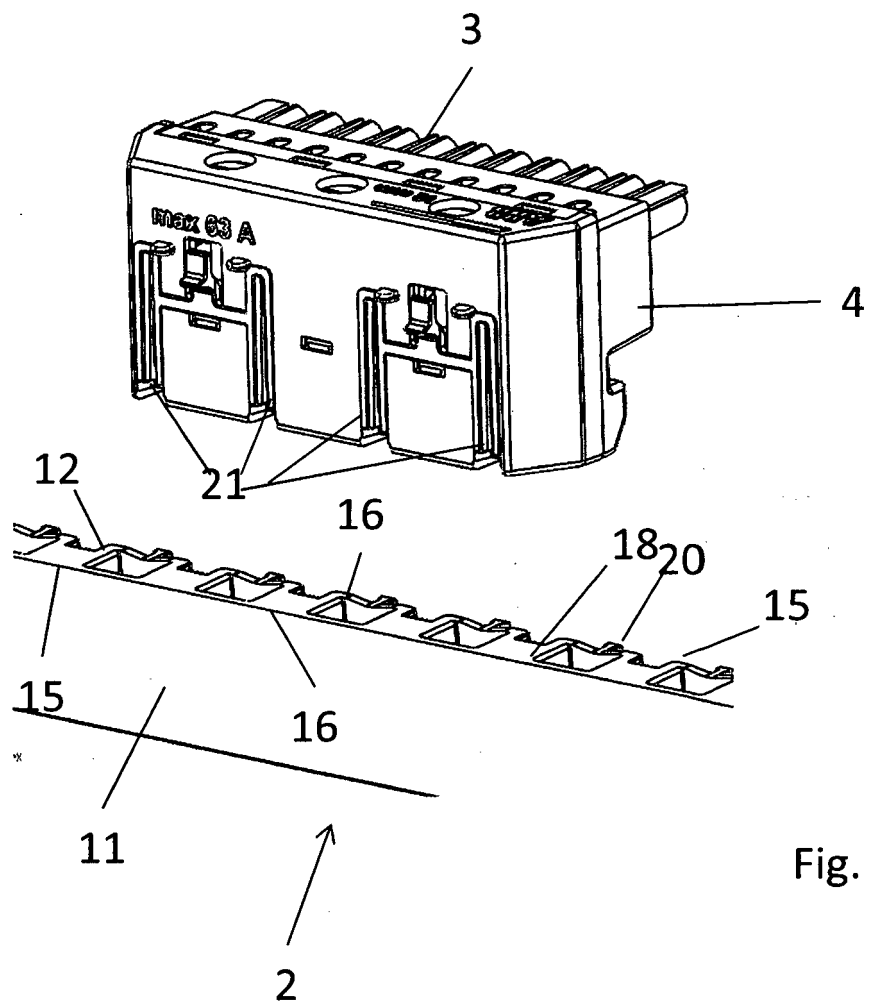
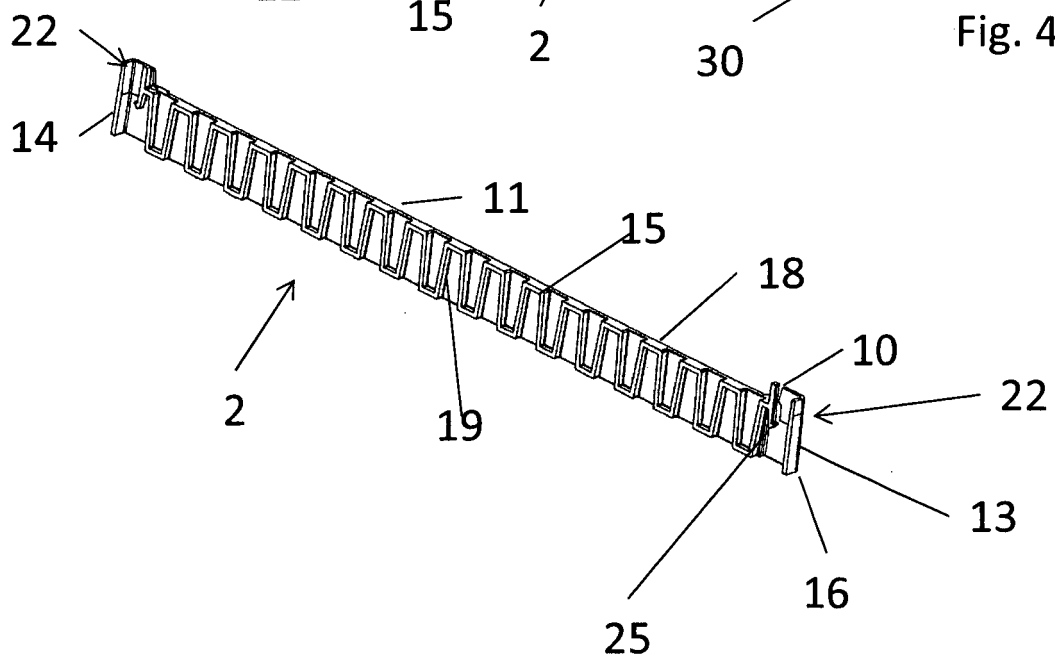
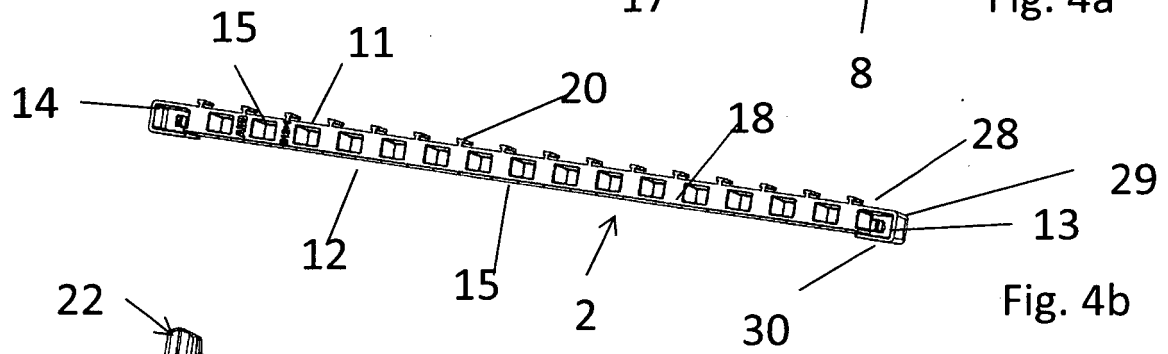
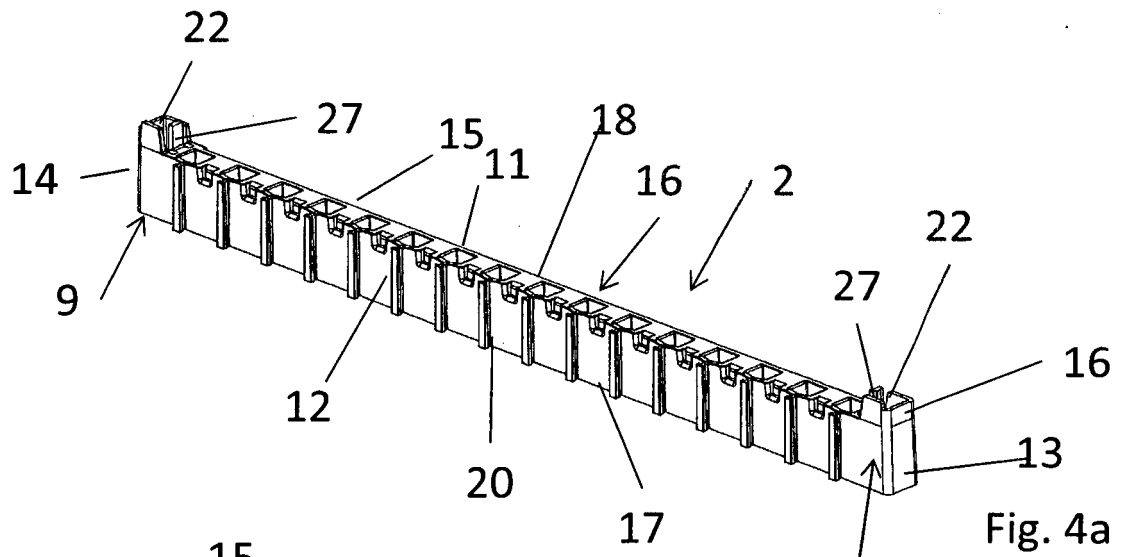


Fig. 3



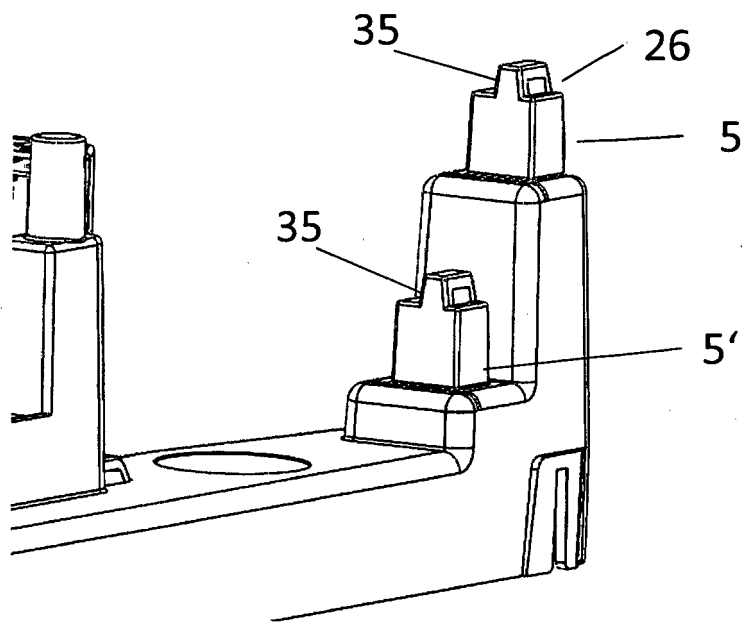


Fig. 5

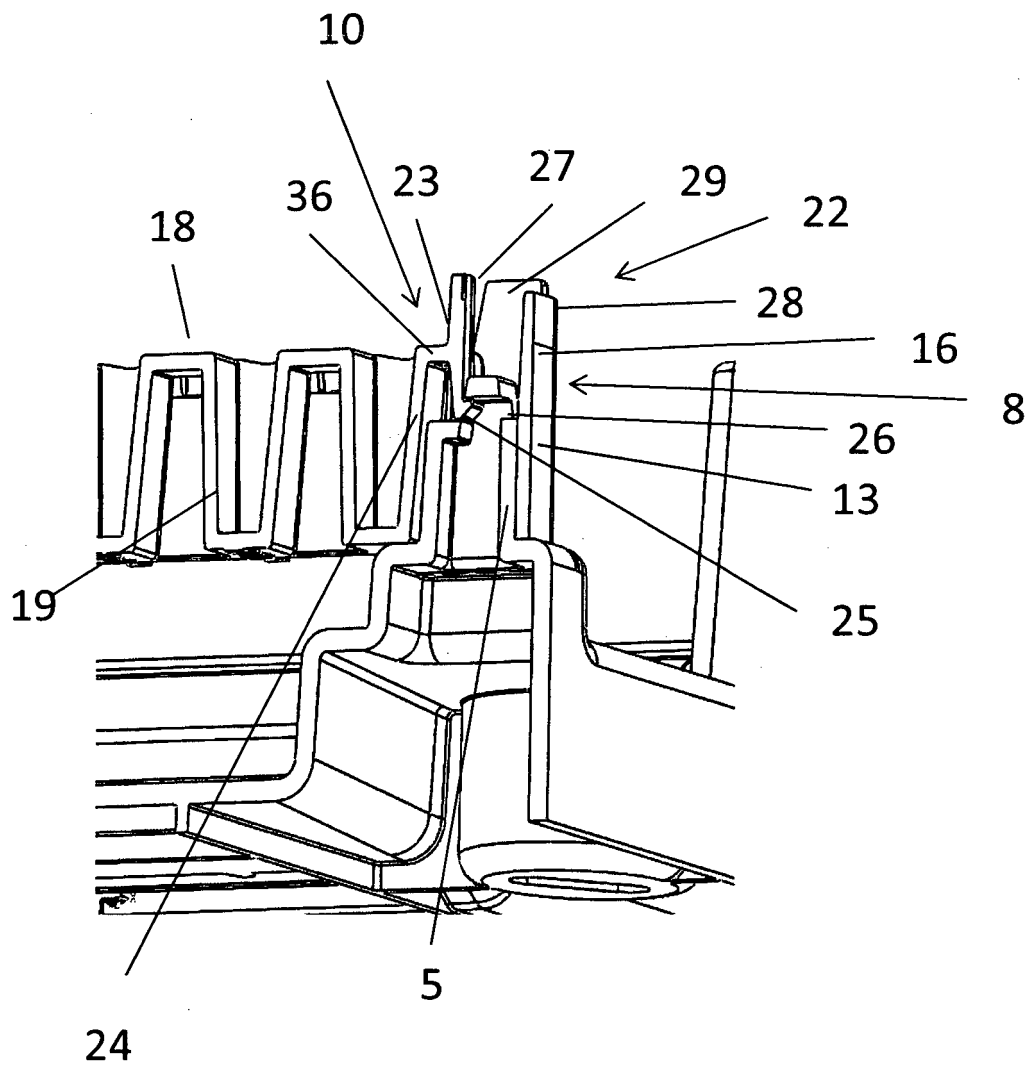


Fig. 6

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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