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(54) Terminal block arrangement

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Description

[0001] The invention relates to a terminal block arrangement, which has an elongated mounting strip with two rectangular broad long-edged front plates, equipped with parts formed at its opposing narrow short-edged side plates for coupling it to support parts of a support structure, said terminal block arrangement having modules that can be fitted to the mounting strip next to one another in a row, said modules having an insulated housing, whereby each housing and the mounting strip have mutual connection devices for the purpose of plugging the modules to the mounting strip, transversely with respect to the longitudinal direction of the mounting strip (2), 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.

[0003] The object of the present invention is to create a simplified type of terminal block arrangement where a stable positioning and fixation of the terminal modules to the mounting strip is achievable with simple handling of the devices

[0004] According to the invention, the above object is achieved by a terminal block arrangement with the features as pointed out in claim 1. According to the invention, each housing has a mounting wall and at least one receiving slot in the mounting wall, and the mounting strip has a number of connection bars projecting from one of its two rectangular broad long-edged front plates and oriented transversely with respect to the longitudinal direction of the mounting strip, whereby the receiving slot and the connection bars are forming the mutual connection devices, whereby the connection bar has a T-shaped cross-section, with a first plate-like limb arising from one of the two rectangular broad long-edged front plates, and with a second plate-like limb formed at the free end of and perpendicular to the first limb. The T-shaped cross-section of the connection bar in cooperation with the receiving slot renders possible an easy way of stable positioning and fixing of the module housing to the mounting strip. The connection bars all being oriented in parallel and transversely with respect to the longitudinal direction of the mounting strip, they can in an advantageous way be arranged by being spaced apart in equal distances, forming a kind of raster. The housing of the module, if it has a larger size, may advantageously have a number of receiving slots, all of said receiving slots being arranged in a mutually spaced manner, spaced apart in the same equal distances as the connection bars, so that the raster of the receiving slots in the module housing fits to the raster of the connection bars at the mounting strip. Thus, the design according to the invention allows for an exact positioning of the module housings, in a rastered, grid-like spacing along the longitudinal extension of the mounting strip.

[0005] Advantageous embodiments are described in the characteristic features of the dependent claims.

[0006] According to an advantageous aspect of the invention, the mounting wall of the housing has an insertion edge and the receiving slot has an insertion opening at the insertion edge, said receiving slot extending from the insertion edge upwards towards a second edge of the housing located opposite the insertion edge, and the connection bar and the receiving slot are adapted for a gliding cooperation when the connection bar is inserted into the receiving slot at the insertion opening. The insertion opening may be a little wider than the receiving slot, facilitating the insertion of the module housing to the connection bars.

[0007] According to an advantageous aspect of the invention, the width of the receiving slot is adapted to the width of the second plate-like limb, and there are two rod-like lugs projecting from the mounting wall into the receiving slot, the thickness of the lugs are corresponding to the distance of the second plate-like limb from the broad long-edged front plate, leaving between their opposed free edges a free distance corresponding to the thickness of the first limb. The two rod-like lugs thus reduce the effective cross-section of the receiving slot when looking at it perpendicularly to the mounting wall of the housing. The two rod-like lugs do not reach completely down to the insertion edge, but they end in a short distance above the insertion edge. Thus in the remaining section of the receiving slot down to the insertion edge the effective cross-section of the receiving slot appears to be larger than in the rest of the slot, when looking at it perpendicularly to the mounting wall of the housing. The portion with the larger effective cross section thus forms the insertion opening mentioned above.

[0008] According to an advantageous aspect of the invention, the connection bar has an insertion end and a distal end opposite the insertion end, and the width of the cross-sectional contour of the connection bar at the distal end is larger than the width of the cross-sectional contour of the receiving slot at the insertion opening. The advantageous effect of this embodiment is that an insertion of the module at the distal end of the connection bar is prohibited and thus a false insertion of the module is impeded. For increasing the width of the cross-sectional contour of the connection bar at the distal end there are numerous ways. One can increase the dimension of the cross-section of the first plate, or of the second plate, or of both. The increase of the width of the cross-sectional contour needs not be large. In essence, it would be sufficient to increase to a small extent, only to such an extent that the distal end of the connection bar still can be

inserted into the insertion opening mentioned above, but does not easily fit into the remaining portion of the receiving slot, or can only be pressed into it by applying a substantial force. So the operator would easily recognize the difference between insertion on the correct side of the connection bar, where insertion is smooth and an easy gliding of the receiving slot on the connection bar is felt, and insertion on the wrong side, where insertion is not smoothly possible.

[0009] According to an advantageous aspect of the invention, the mutual adaptation of at least one of a connection bar and its corresponding receiving slot is designed for a connection with force transmission by friction. The force transmission by friction would occur after insertion of the receiving slot on the connection bar and moving the housing some way along the connection bar downwards, so that in the first part of the insertion path there is a smooth gliding, and towards the end the force transmission by friction gets into effect. The advantage is that due to the force transmission by friction there is a stable fixation of the module housing to the mounting strip achievable without any further fixation means such as hooks or the like, which also can easily be released just by pushing the module housing back again. If a module housing has more than one receiving slots, as described above arranged in a spaced manner, it may be sufficient that only the mutual adaptation of one of the connection bars and one of the receiving slot is designed for a connection with force transmission by friction.

[0010] According to an advantageous aspect of the invention, there is a distance-reducing means applied to the free edge of at least one of the rod-like lugs. Thus the force transmission by friction is achieved by means of at least partially decreasing the distance between the opposed free edges of a pair of rod-like lugs facing each other. If a module housing has more than one receiving slots, as described above arranged in a spaced manner, it may be sufficient that distance-reducing means are applied to the free edge of only one of the rod-like lugs, so that only one of several receiving slots in the mounting wall of the module housing has a reduced cross-section to achieve a force transmission by friction. The creation of a force transmission by friction thus achieved by reducing the cross section of the receiving slot of the housing has the advantage that the mounting strip and the connection bars need not be modified.

[0011] According to an advantageous aspect of the invention, the distance-reducing means is a lug or a bump formed to at least one of the opposed free edges of a pair of two rod-like lugs facing each other. Again, if a module housing has more than one receiving slots, as described above arranged in a spaced manner, it may be sufficient that a lug or a bump is formed to only one of the opposed free edges of a pair of two rod-like lugs facing each other so that only one of several receiving slots in the mounting wall of the module housing has a reduced cross-section to achieve a force transmission by friction.

[0012] According to an advantageous aspect of the invention, there is a contour-widening means applied to the cross-sectional contour of the connection bar. Thus the force transmission by friction is achieved by at least partially increasing the cross-sectional contour of the connection bar. The creation of a force transmission by friction thus achieved by increasing the cross section of the connection bar has the advantage that the housing and the receiving slots therein need not be modified.

[0013] According to an advantageous aspect of the invention, the contour-widening means is a thickness-increasing means at least partially increasing the thickness of the second plate-like limb, so that the force transmission by friction is achieved by at least partially increasing the thickness of the second plate-like limb.

[0014] According to an advantageous aspect of the invention, there is at least one frontal expansion means applied to at least one of the broad long-edged front plate of the mounting strip or the mounting wall of the housing. Thus the force transmission by friction is achieved by a jamming effect when the module is plugged to the mounting strip.

[0015] According to an advantageous aspect of the invention, the frontal expansion means is a bump protruding from the broad long-edged front plate of the mounting strip.

[0016] According to an advantageous aspect of the invention, the frontal expansion means is a bump protruding from the mounting wall of the housing. The advantage of this embodiment is that it may be sufficient to foresee only one bump on the mounting wall of the housing and leave the mounting strip un-modified, which makes the necessary modification very easy.

[0017] According to an advantageous aspect of the invention, a resilient fixation arm which biases into a retaining position is formed in the mounting wall of the module housing by slot-like recesses, that the fixation arm has a latching member protruding out of the mounting wall, which is adapted for a resiliently latching engagement with a corresponding recess formed in the broad long-edged front plate of the mounting strip, that the latching member can be released by pressing the fixation arm towards the inside of the housing. This is an alternative and/or an additional means for fixing the module housing to the mounting strip.

[0018] According to an advantageous aspect of the invention, the free end of the resilient fixation arm has a pushing member at its end for pushing the end portion of the resilient fixation arm towards the inside of the housing for releasing the latching engagement.

[0019] According to an advantageous aspect of the invention, there is at least one spacer formed at the mounting wall of the housing positioned near the latching member, for limiting the displacement of the resilient arm when pressing the mounting wall of the housing against a flat surface.

[0020] The invention will be described in greater detail by description of an embodiment with reference to the accom-

panying drawings, wherein

- Fig. 1 shows an embodiment of a distribution unit with a terminal block arrangement according to the invention,
- Fig. 2 shows a module oriented towards a mounting strip in a terminal block arrangement according to the invention,
- Fig. 3a shows a module oriented towards a mounting strip in a terminal block arrangement according to a second embodiment of the invention,
- Fig. 3b shows a schematic drawing of a side view and a view perpendicular to the mounting wall of a module according to the embodiment shown in figure 3a,
- Fig. 4 shows a sectional view of the terminal block arrangement according to the embodiment of figure 3a, the module being fixed to the mounting strip,
- Fig. 5 shows a sectional topside view of the terminal block arrangement according to fig. 4,
- Fig. 6 shows an enlarged detail view of the mounting interface between a module fixed to a mounting strip according to the embodiment shown in figure 3a,
- Fig. 7a shows a schematic cross-sectional view of a housing mounted to a mounting strip in a terminal block arrangement according to the invention,
- Fig. 7b shows a schematic cross-sectional view of a housing and a mounting strip in a terminal block arrangement according to the invention, prior to assembly of both together, with a height-increasing means increasing the height of the second plate-like limb of one of the connection bars,
- Fig. 7c shows a schematic cross-sectional view of a housing and a mounting strip in a terminal block arrangement according to the invention, prior to assembly of both together, with three embodiments of distance-reducing means applied to the free edge of at least one of the rod-like lugs bordering the receiving slot,
- Fig. 7d shows a schematic cross-sectional view of a housing and a mounting strip in a terminal block arrangement according to the invention, prior to assembly of both together, with two embodiments of frontal expansion means applied to the broad long-edged front plate of the mounting strip or the mounting wall of the housing.

[0021] Referring to figures 1 to 7, 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.

[0022] The distribution unit 1 is further comprising a terminal block arrangement 100, in particular for connecting protective earth conductors and neutral conductors (PE/N terminal). The terminal block arrangement 100 is located at the topside edge of the mounting plate 7. It could as well be located at the bottom-side edge, opposite of the top-side edge, or there could be terminal block arrangements both at the top-side edge and the bottom-side edge. The terminal block arrangement 100 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.

[0023] The terminal block arrangement 100 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.

[0024] 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.

[0025] 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 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 biases into a retaining position.

[0026] 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 of the broad long-edged plates 11, 12 and the narrow edges of the narrow short-edged plates 13, 14 define two narrow long-edged side sections 17, 18.

[0027] 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 2 into the slot 21 when plugging the module housing 4 to the mounting strip 2.

[0028] Each housing 4 has a mounting wall 45 and at least one receiving slot 21 in the mounting side 45. The mounting wall 45 has an insertion edge 42 and the receiving slot 21 has an insertion opening 43 at the insertion edge 42, extending from the insertion edge 42 upwards towards a second edge 44 of the housing 4 located opposite the insertion edge 42. The receiving slot 21 extends about half the way up from the insertion edge 42 to the second edge. The insertion opening 43 is a little wider than the receiving slot 21, facilitating the pushing of the module housing 4 to the connection bars.

[0029] Inside the housing 4 and attached to the housing 4 there are all the parts that a housing for a modular terminal clamp requires, such as cable insertion means and channels, clamping spring with clamping spring holding means, terminal screw clamps with screw accession opening in the housing 4 and so on. All these components are not described in detail here, although they can be seen in the figures and the person skilled in the art will recognise them in the figures.

[0030] The mounting strip 2 has a number of connection bars 20 projecting from one of its two rectangular broad long-edged front plates 11 and oriented transversely with respect to the longitudinal direction of the mounting strip 2. So the receiving slot 21 and the connection bars 20 are forming the mutual connection devices. The connection bar 20 has a T-shaped cross-section, with a first plate-like limb 40 arising from the broad long-edged front plate 11, and with a second plate-like limb 41 formed at the free end of and perpendicular to the first limb 40.

[0031] The connection bars 20 are all oriented in parallel and transversely with respect to the longitudinal direction of the mounting strip 2. They are arranged by being spaced apart in equal distances, forming a kind of raster. In figure 1 one sees a raster of 16 connection bars 20, in figure 2 and 3a one sees a detail with 6 resp. 7 of these connection bars 20. The housing of the module 3 has four receiving slots 21, all of said receiving slots 21 being arranged in a mutually spaced manner, spaced apart in the same equal distances as the connection bars 20. So the raster of the receiving slots 21 in the housing 4 of module 3 fits to the raster of the connection bars 20 at the mounting strip 2. This design allows for an exact positioning of the housings 4 of module 3, in a rastered, grid-like spacing along the longitudinal extension of the mounting strip 2.

[0032] The connection bar 20 and the receiving slot 21 are adapted for a gliding cooperation when the connection bar 20 is inserted into the receiving slot 21 at the insertion opening 43.

[0033] In the schemes of figures 7a, to 7d it can be seen that the width w of the receiving slot 21 is adapted to the width w' of the second plate-like limb 41, which means that the second plate-like limb 41 is guided within the receiving slot 21, it can easily glide within the receiving slot 21. There are two rod-like lugs 46, 47 projecting from the mounting wall 45 into the receiving slot 21. The thickness t of the lugs 46, 47 are corresponding to the distance of the second plate-like limb 41 from the broad long-edged front plate 11, leaving between their opposed free edges a free distance d corresponding to the thickness t' of the first limb 40. In other words, the interior of the receiving slot 21 forms a kind of negative T-shape, which matches the T-shape of the connection bar 20 in the sense of an adaption for a gliding coupling when the connection bars 20 are inserted into the receiving slots 21.

[0034] The two rod-like lugs 46, 47 do not reach completely down to the insertion edge 42, but they end in a short distance above the insertion edge 42. Thus in the remaining section of the receiving slot 21 down to the insertion edge

42 the effective cross-section of the receiving slot 21 appears to be larger than in the rest of the slot 21, when looking at it perpendicularly to the mounting wall of the housing, see figure 3b. The portion with the larger effective cross section thus forms the insertion opening 43 mentioned above.

[0035] The connection bar 20 has an insertion end 48 and a distal end opposite the insertion end 48, see figures 2 and 3a. The reference sign 48 is shown only once in the figures, but it is understood that the other connection bars can easily be identified in the figures, as their structure is the same as that marked with a reference sign, and for purposes of clarity of drawing only one out of a number of identical multiple structures was marked with a reference number.

[0036] The width of the cross-sectional contour of the connection bar 20 at the insertion end is matched with cross-sectional contour of the receiving slot 21 for easy insertion, but the cross-sectional contour of the connection bar 20 at the distal end is larger than the width of the cross-sectional contour of the receiving slot 21 at the insertion opening 43, so that an insertion of the module 3 at the distal end of the connection bar 20 is prohibited and thus a false insertion of the module 3 is impeded. The described widening of the contour is not shown in the figures, but it can easily be understood.

[0037] For increasing the width of the cross-sectional contour of the connection bar 20 at the distal end there are numerous ways. One can increase the dimension of the cross-section of the first plate-like limb 40, or of the second plate-like limb 41, or of both. The increase of the width of the cross-sectional contour needs not be large. In essence, it would be sufficient to increase to a small extent, only to such an extent that the distal end of the connection bar 20 still can be inserted into the insertion opening 43 mentioned above, but does not easily fit into the remaining portion of the receiving slot 21, or can only be pressed into it by applying a substantial force. So the operator would easily recognize the difference between insertion on the correct side of the connection bar, where insertion is smooth and an easy gliding of the receiving slot on the connection bar is felt, and insertion on the wrong side, where insertion is not smoothly possible.

[0038] Looking now to figures 7a to 7d, it is explained how the mutual adaptation of at least one of a connection bars 20 and its corresponding receiving slot 21 is designed for a connection with force transmission by friction.

[0039] In the three embodiments shown in figure 7c (right, middle, left part of the figure, separated by the zig-zag line to indicate three possible embodiments), there is a distance-reducing means 49, 50 applied to the free edge of at least one of the rod-like lugs 46, 47, so that the distance between the free ends of the lugs is reduced to a smaller distance d' and so the force transmission by friction is achieved by means of at least partially decreasing the distance between the opposed free edges of a pair of rod-like lugs 46, 47 facing each other from d to d' .

[0040] On the part shown on the left hand side of figure 7c, the distance-reducing means 49 is a lug 49 formed to both opposed free edges of a pair of two rod-like lugs 46, 47 facing each other. On the part shown on the right-hand side of figure 7c, the distance-reducing means 49 is a lug 49 formed to only one of the free edges of a pair of two rod-like lugs 46, 47 facing each other.

[0041] On the part shown in the central part of figure 7c, the distance-reducing means 50 are two bumps 50 formed to both free edges of a pair of two rod-like lugs 46, 47 facing each other.

[0042] In the embodiment shown in figure 7b, there is a contour-widening means applied to the cross-sectional contour of the connection bar 20' shown in the central part of figure 7b, so that the force transmission by friction is achieved by at least partially increasing the cross-sectional contour of the connection bar 20'. The contour-widening means is a thickness-increasing means 60, for example an additional thickening, at least partially increasing the thickness h' of the second plate-like limb 41', making it larger than the thickness h of the unchanged second plate-like limb 40 of the other two connection bars 20, so that the force transmission by friction is achieved by at least partially increasing the thickness h' of the second plate-like limb 41'.

[0043] In the two embodiments shown in figure 7d (right, and left part of the figure, separated by the zig-zag line to indicate two possible embodiments), there is at least one frontal expansion means 51, 51' applied to at least one of the broad long-edged front plate 11 of the mounting strip 2 or the mounting wall 45 of the housing 4. The force transmission by friction is achieved by a jamming effect when the module 3 is plugged to the mounting strip 2. On the left hand side of figure 7d it is shown that the frontal expansion means is a bump 51 protruding from the broad long-edged front plate 11 of the mounting strip 2. On the right hand side of figure 7d it is shown that the frontal expansion means is a bump 51' protruding from the mounting wall 45 of the housing 4.

[0044] Figures 3a and 3b show an embodiment where there is an alternative or additional means for fixing the housing 4 of module 3 to the mounting strip 2. There is a resilient fixation arm 52, which biases into a retaining position. The resilient fixation arm is formed in the mounting wall 45 of the module housing 4 by slot-like recesses 53, 54, 55. The fixation arm has a latching member 56, here in the form of a latching nose, protruding out of the mounting wall 45. In the broad long-edged front plate 11 of the mounting strip 2 there are recesses 57 formed, one of these is indicated in figure 4. The recesses are rastered with the same raster as the connection bars 20 and the receiving slots 21, whereby each of the recesses 57 is located between two neighbouring connection bars 21, as also each resilient fixation arm 52 is located between two neighbouring insertion slots 21. It is not required to have as many resilient fixation arms as recesses. It may be sufficient for small housings to have as little as one resilient fixation arm. In the embodiment of figure 3a there are only two resilient fixation arms, one to the left, one to the right, none in the centre. Each resilient fixation arm 52 is adapted for a resiliently latching engagement with a corresponding recess 57.

[0045] The free end of the resilient fixation arm 52 has a pushing member 58 at its end for pushing the end portion of the resilient fixation arm 52 towards the inside of the housing 4. The latching member 56 can be released by pushing on the pushing member 58 and so pressing the fixation arm 52 towards the inside of the housing 4 for releasing the latching engagement. Positioned near the latching member 56, there is at least one spacer 59 formed at the mounting wall 45 of the housing 4. The effect of the spacer is to limit the displacement of the resilient arm when pressing the mounting wall 45 of the housing 4 against a flat surface.

[0046] As can be seen in figure 6, the pushing member 58 exceeds the upper surface of the mounting strip 2 when the module is fixed to the mounting strip. So the pushing member 58 is accessible for a manual pushing operation, by finger or by a tool, even when the housing 4 is fixed to the mounting strip. So it is possible to release an individual housing out of a combination of housings arranged in a row and fixed to a mounting strip, even from within the combination.

List of reference signs

		50	distance-reducing means for lug 46, 47
	1		distribution unit
15	2	51	frontal expansion means
	3	51'	frontal expansion means
	4	52	resilient fixation arm
	5	53	slot-like recess
20	6	54	slot-like recess
	7	55	slot-like recess
	8	56	locking member
	9	57	recess
	11	58	pushing member
25	12	59	spacer
	13	60	thickness-increasing means
	14	100	terminal block arrangement
	20	w	width of slot 21
30	21	w'	width of second limb 41
	32	t	thickness of lugs 46, 47
	33	t'	thickness of first limb 40
	34	h	thickness of second plate-like limb 41
35	40		
	41	d	free distance between free ends of lugs 46, 47
	42		
	43	d'	reduced free distance between
	44		free ends of lugs 46, 47
40	45		
	46		
	47		
	48		
45	49		

Claims

1. Terminal block arrangement (100), which has an elongated mounting strip (2) with two rectangular broad long-edged front plates (11, 12), equipped with parts (8, 9) formed at its opposing narrow short-edged side plates (13, 14) for coupling it to support parts (5, 6) of a support structure (7), said terminal block arrangement (100) having modules (3) that can be fitted to the mounting strip (2) next to one another in a row, said modules (3) having an insulated housing (4), whereby each housing (3) and the mounting strip (2) have mutual connection devices (21, 20) 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 each housing (4) has a mounting wall (45) and at least one receiving slot (21) in the mounting side (45), and that the mounting strip (2) has a number of connection bars (20) projecting from one of its two

rectangular broad long-edged front plates (11) and oriented transversely with respect to the longitudinal direction of the mounting strip (2), whereby the receiving slot (21) and the connection bars (20) are forming the mutual connection devices, whereby the connection bar (20) has a T-shaped cross-section, with a first plate-like limb (40) arising from one of the two rectangular broad long-edged front plates (11), and with a second plate-like limb (41) formed at the free end of and perpendicular to the first limb (40).

2. Terminal block arrangement (100) according to claim 1, **characterised in that** the mounting wall (45) has an insertion edge (42) and that the receiving slot (21) has an insertion opening (43) at the insertion edge (42), extending from the insertion edge (42) upwards towards a second edge (44) of the housing (4) located opposite the insertion edge (43), and that the connection bar (20) and the receiving slot (21) are adapted for a gliding cooperation when the connection bar (20) is inserted into the receiving slot (21) at the insertion opening (43).
3. Terminal block arrangement (100) according to claim 2, **characterised in that** the width(w) of the receiving slot (21) is adapted to the width (w') of the second plate-like limb (41), and that there are two rod-like lugs (46, 47) projecting from the mounting wall (45) into the receiving slot (21), the thickness (t) of the lugs (46, 47) corresponding to the distance of the second plate-like limb (41) from the broad long-edged front plate (11), leaving between their opposed free edges a free distance (d) corresponding to the thickness (t') of the first limb (40).
4. Terminal block arrangement (100) according to claim 3, **characterised in that** the connection bar (20) has an insertion end (48) and a distal end opposite the insertion end (48), and that the width of the cross-sectional contour of the connection bar (20) at the distal end is larger than the width of the cross-sectional contour of the receiving slot (21) at the insertion opening (43), so that an insertion of the module (3) at the distal end of the connection bar (20) is prohibited and thus a false insertion of the module (3) is impeded.
5. Terminal block arrangement (100) according to claim 3, **characterised in that** the mutual adaptation of at least one of a connection bar (20) and its corresponding receiving slot (21) is designed for a connection with force transmission by friction.
6. Terminal block arrangement (100) according to claim 5, **characterised in that** there is a distance-reducing means (49, 50) applied to the free edge of at least one of the rod-like lugs (46, 47), so that the force transmission by friction is achieved by means of at least partially decreasing the distance (d) between the opposed free edges of a pair of rod-like lugs (46, 47) facing each other.
7. Terminal block arrangement (100) according to claim 6, **characterised in that** the distance-reducing means (49, 50) is a lug (49) or a bump (50) formed to at least one of the opposed free edges of a pair of two rod-like lugs (46, 47) facing each other.
8. Terminal block arrangement (100) according to claim 5, **characterised in that** there is a contour-widening means applied to the cross-sectional contour of the connection bar (20), so that the force transmission by friction is achieved by at least partially increasing the cross-sectional contour of the connection bar (20).
9. Terminal block arrangement (100) according to claim 8, **characterised in that** the contour-widening means is a thickness-increasing means (60) at least partially increasing the thickness (h) of the second plate-like limb (41), so that the force transmission by friction is achieved by at least partially increasing the thickness (h) of the second plate-like limb (41).
10. Terminal block arrangement (100) according to claim 5, **characterised in that** there is at least one frontal expansion means (51, 51') applied to at least one of the broad long-edged front plate (11) of the mounting strip (2) or the mounting wall (45) of the housing (4), so that the force transmission by friction is achieved by a jamming effect when the module (3) is plugged to the mounting strip (2).
11. Terminal block arrangement (100) according to claim 10, **characterised in that** the frontal expansion means is a bump (51) protruding from the broad long-edged front plate (11) of the mounting strip (2).
12. Terminal block arrangement (100) according to claim 10, **characterised in that** the frontal expansion means is a bump (51') protruding from the mounting wall (45) of the housing (4).
13. Terminal block arrangement (100) according to any of the preceding claims, **characterised in that** a resilient fixation

arm (52) which biases into a retaining position is formed in the mounting wall (45) of the module housing (4) by slot-like recesses (53, 54, 55), that the fixation arm has a latching member (56) protruding out of the mounting wall (45), which is adapted for a resiliently latching engagement with a corresponding recess (57) formed in the broad long-edged front plate (11) of the mounting strip (2), that the latching member (56) can be released by pressing the fixation arm (52) towards the inside of the housing (4).

14. Terminal block arrangement (100) according to claim 13, **characterised in that** the free end of the resilient fixation arm (52) has a pushing member (58) at its end for pushing the end portion of the resilient fixation arm (52) towards the inside of the housing (4) for releasing the latching engagement.

15. Terminal block arrangement (100) according to claim 14, **characterised in that**, positioned near the latching member (56), there is at least one spacer (59) formed at the mounting wall (45) of the housing (4) for limiting the displacement of the resilient arm when pressing the mounting wall (45) of the housing (4) against a flat surface.

Patentansprüche

1. Verbindungsblockanordnung (100), die einen länglichen Montagestreifen (2) mit zwei rechteckigen, breiten, langkantigen Stirnplatten (11, 12) aufweist, der mit Teilen (8, 9) ausgestattet ist, die an dessen entgegengesetzten schmalen kurzkantigen Seitenplatten (13, 14) ausgebildet sind, um ihn mit Trägerteilen (5, 6) einer Trägerstruktur (7) zu koppeln, wobei die Verbindungsblockanordnung (100) Module (3) aufweist, die in einer Reihe nebeneinander auf dem Montagestreifen (2) eingesetzt werden können, wobei die Module (3) ein isoliertes Gehäuse (4) aufweisen, wobei jedes Gehäuse (3) und der Montagestreifen (2) gemeinsame Verbindungsvorrichtungen (21, 20) aufweisen, um die Module (3) in Bezug zur Längsrichtung des Montagestreifens (2) quer in den Montagestreifen (2) zu stecken, **dadurch gekennzeichnet, dass** jedes Gehäuse (4) eine Montagewand (45) und mindestens einen Aufnahmeschlitz (21) in der Montageseite (45) aufweist und dass der Montagestreifen (2) eine Anzahl Verbindungsstege (20) aufweist, die von einer seiner zwei rechteckigen, breiten, langkantigen Stirnplatten (11) vorstehen und in Bezug zur Längsrichtung des Montagestreifens (2) quer ausgerichtet sind, wobei der Aufnahmeschlitz (21) und die Verbindungsstege (20) die gemeinsamen Verbindungsvorrichtungen ausbilden, wobei der Verbindungssteg (20) einen T-förmigen Querschnitt mit einem ersten plattenförmigen Schenkel (40), der sich von einer der zwei rechteckigen, breiten, langkantigen Stirnplatten (11) erhebt, und einem zweiten plattenförmigen Schenkel (41), der am freien Ende des und senkrecht zum ersten Schenkel (40) ausgebildet ist, aufweist.

2. Verbindungsblockanordnung (100) nach Anspruch 1, **dadurch gekennzeichnet, dass** die Montagewand (45) eine Einsetzkante (42) aufweist, und dass der Aufnahmeschlitz (21) eine Einsetzöffnung (43) an der Einsetzkante (42) aufweist, die sich von der Einsetzkante (42) zu einer zweiten Kante (44) des Gehäuses (4), die der Einsetzkante (43) entgegengesetzt angeordnet ist, nach oben erstreckt, und dass der Verbindungssteg (20) und der Aufnahmeschlitz (21) dazu eingerichtet sind, verschiebbar zusammenzuwirken, wenn der Verbindungssteg (20) in den Aufnahmeschlitz (21) an der Einsetzöffnung (43) eingesetzt wird.

3. Verbindungsblockanordnung (100) nach Anspruch 2, **dadurch gekennzeichnet, dass** die Breite (w) des Aufnahmeschlitzes (21) an die Breite (w') des zweiten plattenförmigen Gelenks (41) angepasst ist, und dass es zwei stegförmige Laschen (46, 47) gibt, die von der Montagewand (45) in den Aufnahmeschlitz (21) vorstehen, wobei die Stärke (t) der Laschen (46, 47) dem Abstand des zweiten plattenförmigen Schenkels (41) von der breiten, langkantigen Stirnplatte (11) entspricht, wobei zwischen deren entgegengesetzten freien Kanten ein freier Abstand (d) gelassen wird, der der Stärke (t') des ersten Schenkels (40) entspricht.

4. Verbindungsblockanordnung (100) nach Anspruch 3, **dadurch gekennzeichnet, dass** der Verbindungssteg (20) ein Einsetzende (48) und ein dem Einsetzende (48) entgegengesetztes distales Ende aufweist, und dass die Breite der Querschnittskontur des Verbindungsstegs (20) am distalen Ende größer als die Breite der Querschnittskontur des Aufnahmeschlitzes (21) an der Einsetzöffnung (43) ist, sodass das Einsetzen des Moduls (3) am distalen Ende des Verbindungsstegs (20) nicht zulässig ist und somit das falsche Einsetzen des Moduls (3) verhindert wird.

5. Verbindungsblockanordnung (100) nach Anspruch 3, **dadurch gekennzeichnet, dass** die gemeinsame Anpassung des mindestens einen Verbindungsstegs (20) und des zugehörigen Aufnahmeschlitzes (21) für eine Verbindung mit einer Kraftübertragung durch Reibung ausgestaltet ist.

6. Verbindungsblockanordnung (100) nach Anspruch 5, **dadurch gekennzeichnet, dass** es eine Abstandsverringere-

rungseinrichtung (49, 50) gibt, die auf die freie Kante mindestens einer der stabförmigen Laschen (46, 47) angewendet wird, sodass die Kraftübertragung durch Reibung mittels mindestens teilweise Verringern des Abstands (d) zwischen entgegengesetzten freien Kanten eines Paares einander zugewandter stabförmiger Laschen (46, 47) erreicht wird.

7. Verbindungsblockanordnung (100) nach Anspruch 6, **dadurch gekennzeichnet, dass** die Abstandsverringereinrichtung (49, 50) eine Lasche (49) oder eine Erhebung (50) ist, die an mindestens einer der entgegengesetzten freien Kanten eines Paares zweier einander zugewandter stabförmiger Laschen (46, 47) ausgebildet ist.
8. Verbindungsblockanordnung (100) nach Anspruch 5, **dadurch gekennzeichnet, dass** es eine Konturverbreiterungseinrichtung gibt, die auf die Querschnittskontur des Verbindungsstegs (20) angewendet wird, sodass die Kraftübertragung durch Reibung durch zumindest teilweise Vergrößern der Querschnittskontur des Verbindungsstegs (20) erreicht wird.
9. Verbindungsblockanordnung (100) nach Anspruch 8, **dadurch gekennzeichnet, dass** die Konturverbreiterungseinrichtung eine Stärkevergrößerungseinrichtung (60) ist, die zumindest teilweise die Stärke (h) des zweiten plattenförmigen Schenkels (41) vergrößert, sodass die Kraftübertragung durch Reibung durch zumindest teilweise Vergrößern der Stärke (h) des zweiten plattenförmigen Schenkels (41) erreicht wird.
10. Verbindungsblockanordnung (100) nach Anspruch 5, **dadurch gekennzeichnet, dass** es mindestens eine Stirnseitenausdehnungseinrichtung (51, 51') gibt, die auf die mindestens eine breite, langkantige Stirnplatte (11) des Montagestreifens (2) oder die Montagewand (45) des Gehäuses (4) angewendet wird, sodass die Kraftübertragung durch Reibung mittels eines Stauungseffekts erreicht wird, wenn das Modul (3) in den Montagestreifen (2) gesteckt wird.
11. Verbindungsblockanordnung (100) nach Anspruch 10, **dadurch gekennzeichnet, dass** die Stirnseitenausdehnungseinrichtung eine Erhebung (51) ist, die von der breiten, langkantigen Stirnplatte (11) des Montagestreifens (2) vorsteht.
12. Verbindungsblockanordnung (100) nach Anspruch 10, **dadurch gekennzeichnet, dass** die Stirnseitenausdehnungseinrichtung eine Erhebung (51') ist, die von der Montagewand (45) des Gehäuses (4) vorsteht.
13. Verbindungsblockanordnung (100) nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** ein elastischer Fixierungsarm (52), der in eine Haltestellung vorgespannt ist, in der Montagewand (45) des Modulgehäuses (4) durch schlitzförmige Aussparungen (53, 54, 55) ausgebildet ist, dass der Fixierungsarm ein Riegeelement (56) aufweist, das aus der Montagewand (45) heraus vorsteht, das für einen elastischen Verriegelungseingriff mit einer zugehörigen Aussparung (57), die in der breiten, langkantigen Stirnplatte (11) des Montagestreifens (2) ausgebildet ist, eingerichtet ist, dass das Riegeelement (56) durch Drücken des Fixierungsarms (52) zur Innenseite des Gehäuses (4) gelöst werden kann.
14. Verbindungsblockanordnung (100) nach Anspruch 13, **dadurch gekennzeichnet, dass** das freie Ende des elastischen Fixierungsarms (52) ein Schiebeelement (58) an seinem Ende aufweist, um den Endabschnitt des elastischen Fixierungsarms (52) zur Innenseite des Gehäuses (4) zu schieben, um den Verriegelungseingriff zu lösen.
15. Verbindungsblockanordnung (100) nach Anspruch 14, **dadurch gekennzeichnet, dass** in der Nähe des Riegelements (56) mindestens ein Abstandhalter (59), der an der Montagewand (45) des Gehäuses (4) ausgebildet ist, angeordnet ist, um die Verschiebung des elastischen Arms einzuschränken, wenn die Montagewand (45) des Gehäuses (4) gegen eine glatte Oberfläche gedrückt wird.

Revendications

1. Agencement de bloc de jonction (100), qui comprend une barrette de montage (2) comportant deux plaques avant longues et larges rectangulaires (11, 12) équipées de parties (8, 9) formées sur ses plaques latérales courtes et étroites opposées (13, 14) pour le coupler à des parties de support (5, 6) d'une structure de support (7), ledit agencement de bloc de jonction (100) comportant des modules (3) qui peuvent être fixés sur la barrette de montage (2) proches les uns des autres en ligne, lesdits modules (3) ayant un boîtier isolé (4), dans lequel chaque boîtier (3) et la barrette de montage (2) ont des dispositifs de connexion mutuelle (21, 20) dans le but de brancher les

modules (3) sur la barrette de montage (2) transversalement par rapport à la direction longitudinale de la barrette de montage (2),

caractérisé en ce que chaque boîtier (4) comporte une paroi de montage (45) et au moins une fente de réception (21) sur le côté de montage (45), et **en ce que** la barrette de montage (2) a un certain nombre de barres de connexion (20) se projetant depuis l'une de ses deux plaques avant longues et larges rectangulaires (11) et orientées transversalement par rapport à la direction longitudinale de la barrette de montage (2), dans lequel la fente de réception (21) et les barres de connexion (20) forment les dispositifs de connexion mutuelle, dans lequel la barre de connexion (20) présente une section transversale en forme de T, avec une première branche similaire à une plaque (40) relevée à partir de l'une des deux plaques avant longues et larges rectangulaires (11), et une seconde branche similaire à une plaque (41) formée à l'extrémité libre de la première branche (40) et perpendiculaire à celle-ci.

2. Agencement de bloc de jonction (100) selon la revendication 1, **caractérisé en ce que** la paroi de montage (45) comporte un bord d'insertion (42) et **en ce que** la fente de réception (21) comporte une ouverture d'insertion (43) sur le bord d'insertion (42), s'étendant depuis le bord d'insertion (42) vers le haut en direction d'un second bord (44) du boîtier (4) situé à l'opposé du bord d'insertion (43), et **en ce que** la barre de connexion (20) et la fente de réception (21) sont conçues pour une coopération coulissante lorsque la barre de connexion (20) est insérée dans la fente de réception (21) dans l'ouverture d'insertion (43).

3. Agencement de bloc de jonction (100) selon la revendication 2, **caractérisé en ce que** la largeur (w) de la fente de réception (21) est adaptée à la largeur (w') de la seconde branche similaire à une plaque (41), et **en ce que** deux pattes similaires à des tiges (46, 47) se projettent depuis la paroi de montage (45) dans la fente de réception (21), l'épaisseur (t) des pattes (46, 47) correspondant à la distance de la seconde branche similaire à une plaque (41) depuis la plaque avant longue et large (11), laissant entre leurs bords libres opposés une distance libre (d) correspondant à l'épaisseur (t') de la première branche (40).

4. Agencement de bloc de jonction (100) selon la revendication 3, **caractérisé en ce que** la barre de connexion (20) comporte une extrémité d'insertion (48) et une extrémité distale opposée à l'extrémité d'insertion (48), et **en ce que** la largeur du contour transversal de la barre de connexion (20) à l'extrémité distale est supérieure à la largeur du contour transversal de la fente de réception (21) à l'ouverture d'insertion (43), de façon à empêcher une insertion du module (3) à l'extrémité distale de la barre de connexion (20) et donc à interdire une mauvaise insertion du module (3).

5. Agencement de bloc de jonction (100) selon la revendication 3, **caractérisé en ce que** l'adaptation mutuelle d'au moins l'une d'une barre de connexion (20) et de sa fente de réception correspondante (21) est conçue pour une connexion avec une transmission de force par frottement.

6. Agencement de bloc de jonction (100) selon la revendication 5, **caractérisé en ce qu'un** moyen de réduction de distance (49, 50) est appliqué sur le bord libre d'au moins l'une des pattes similaires à des tiges (46, 47) de sorte que la force de transmission par frottement soit obtenue au moyen de la réduction au moins partielle de la distance (d) entre les bords libres opposés d'une paire de pattes similaires à des tiges (46, 47) en face l'une de l'autre.

7. Agencement de bloc de jonction (100) selon la revendication 6, **caractérisé en ce que** le moyen de réduction de distance (49, 50) est une patte (49) ou une bosse (50) formée sur au moins l'un des bords libres opposés d'une paire de deux pattes similaires à des tiges (46, 47) en face l'une de l'autre.

8. Agencement de bloc de jonction (100) selon la revendication 5, **caractérisé en ce qu'un** moyen d'élargissement de contour est appliqué sur le contour transversal de la barre de connexion (20), de sorte que la force de transmission par frottement soit obtenue par l'augmentation au moins partielle du contour transversal de la barre de connexion (20).

9. Agencement de bloc de jonction (100) selon la revendication 8, **caractérisé en ce que** le moyen d'élargissement de contour est un moyen d'augmentation de l'épaisseur (60) augmentant au moins partiellement l'épaisseur (h) de la seconde branche similaire à une plaque (41), de sorte que la force de transmission par frottement soit obtenue par l'augmentation au moins partielle de l'épaisseur (h) de la seconde branche similaire à une plaque (41).

10. Agencement de bloc de jonction (100) selon la revendication 5, **caractérisé en ce qu'un** moyen d'expansion frontale (51, 51') est appliqué sur au moins l'une des plaques avant longues et larges (11) de la barrette de montage (2) ou de la paroi de montage (45) du boîtier (4), de sorte que la force de transmission par frottement soit obtenue par un effet de blocage lorsque le module (3) est branché sur la barrette de montage (2).

11. Agencement de bloc de jonction (100) selon la revendication 10, **caractérisé en ce que** le moyen d'expansion frontale est une bosse (51') faisant saillie depuis la plaque avant longue et large (11) de la barrette de montage (2).

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12. Agencement de bloc de jonction (100) selon la revendication 10, **caractérisé en ce que** le moyen d'expansion frontale est une bosse (51') faisant saillie depuis la paroi de montage (45) du boîtier (4).

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13. Agencement de bloc de jonction (100) selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'un** bras de fixation élastique (52) qui se polarise dans une position de retenue est formé dans la paroi de montage (45) du logement (4) de module par des évidements similaires à des fentes (53, 54, 55), **en ce que** le bras de fixation comporte un organe de verrouillage (56) faisant saillie hors de la paroi de montage (45), qui est conçu pour une prise de verrouillage élastique avec un évidement correspondant (57) formé dans la plaque longue et large (11) de la barrette de montage (2), **en ce que** l'organe de verrouillage (56) peut être dégagé par pression du bras de fixation (52) en direction de l'intérieur du boîtier (4) .

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14. Agencement de bloc de jonction (100) selon la revendication 13, **caractérisé en ce que** l'extrémité libre du bras de fixation (52) comporte un organe de poussée (58) à son extrémité pour pousser la partie d'extrémité du bras de fixation élastique (52) en direction de l'intérieur du boîtier (4) pour dégager la prise de verrouillage.

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15. Agencement de bloc de jonction (100) selon la revendication 14, **caractérisé en ce que**, positionné près de l'organe de verrouillage (56), se trouve au moins une entretoise (59) formée sur la paroi de montage (45) du boîtier (4) pour limiter le déplacement du bras élastique lors de la pression de la paroi de montage (45) du boîtier (4) contre une surface plate.

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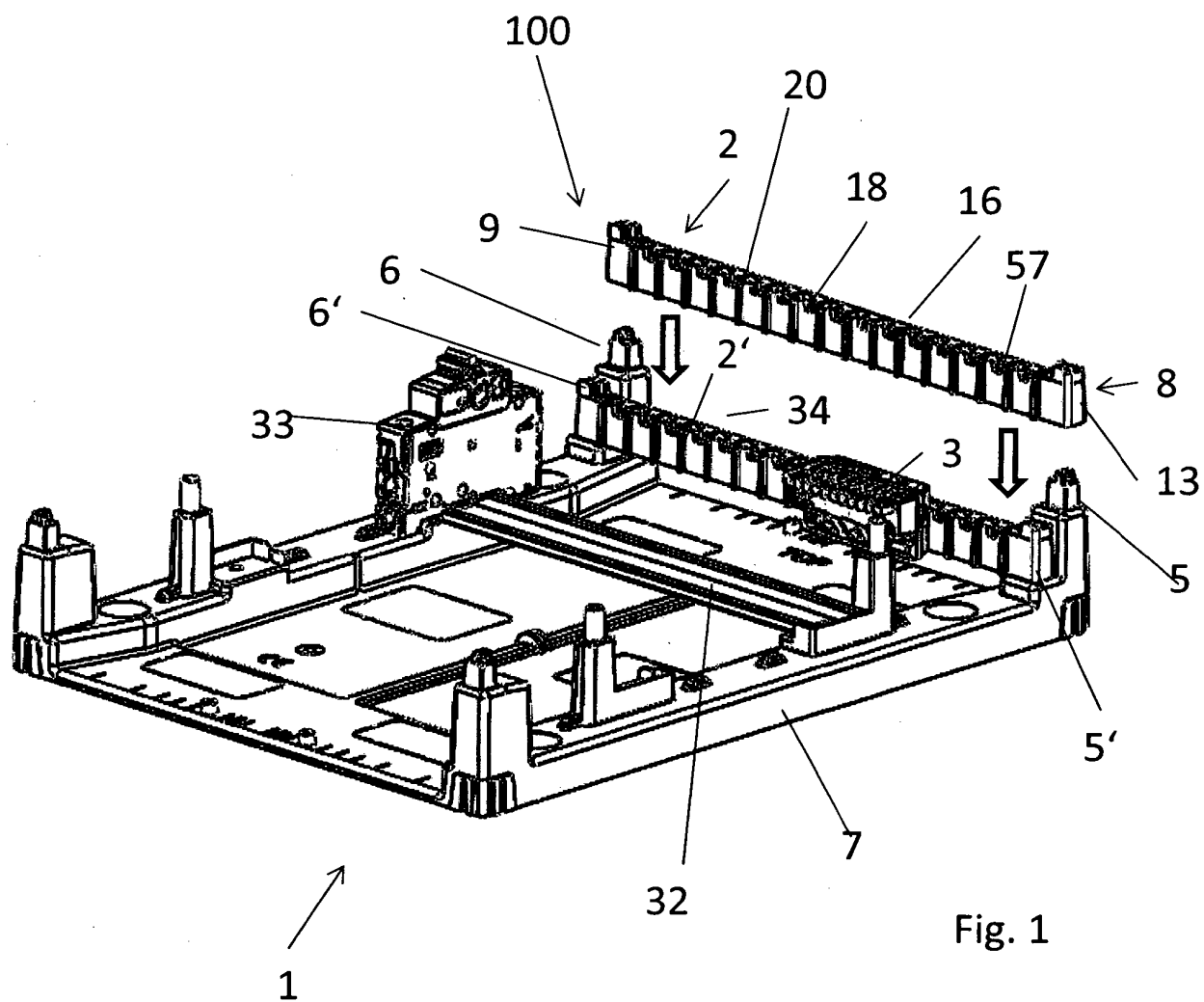
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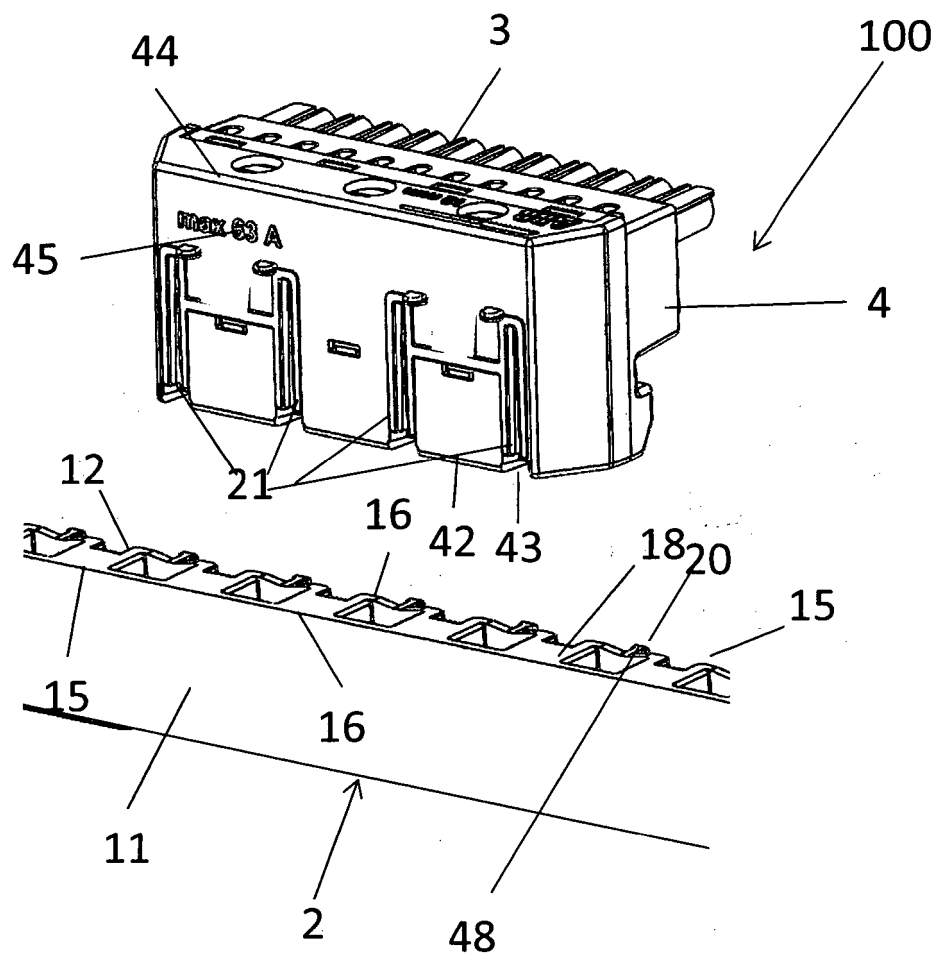
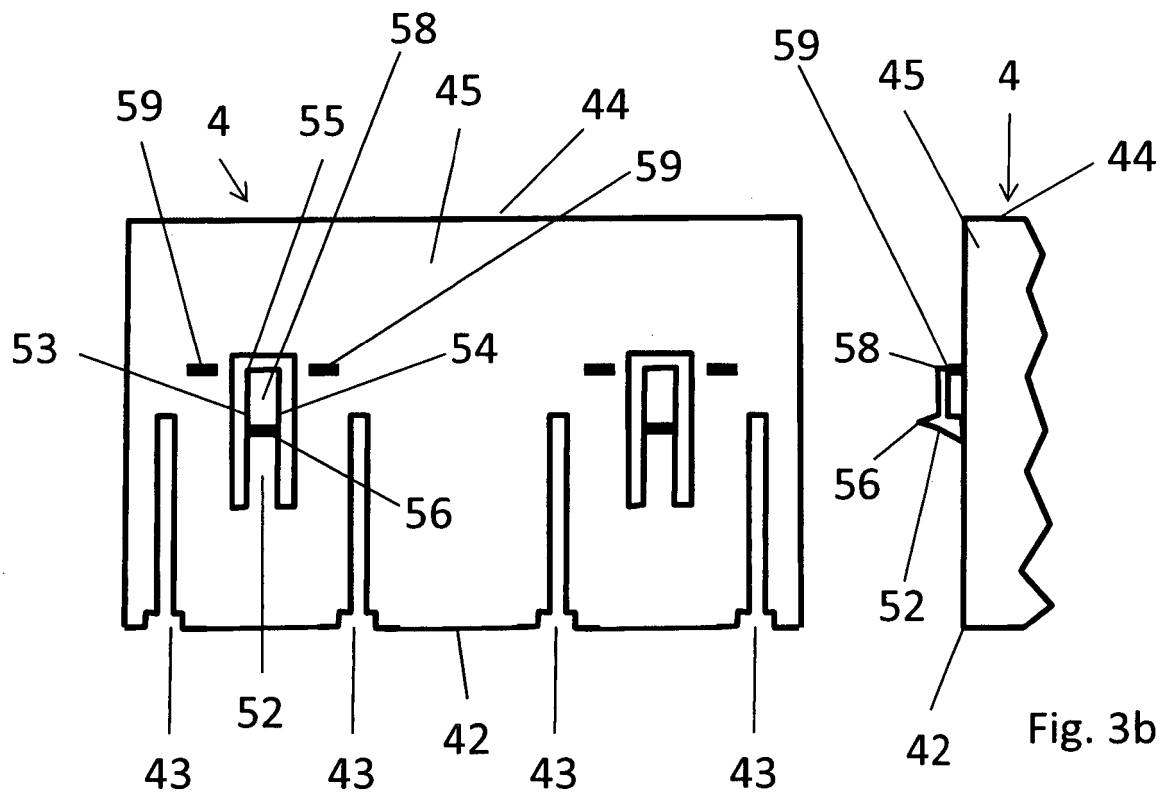
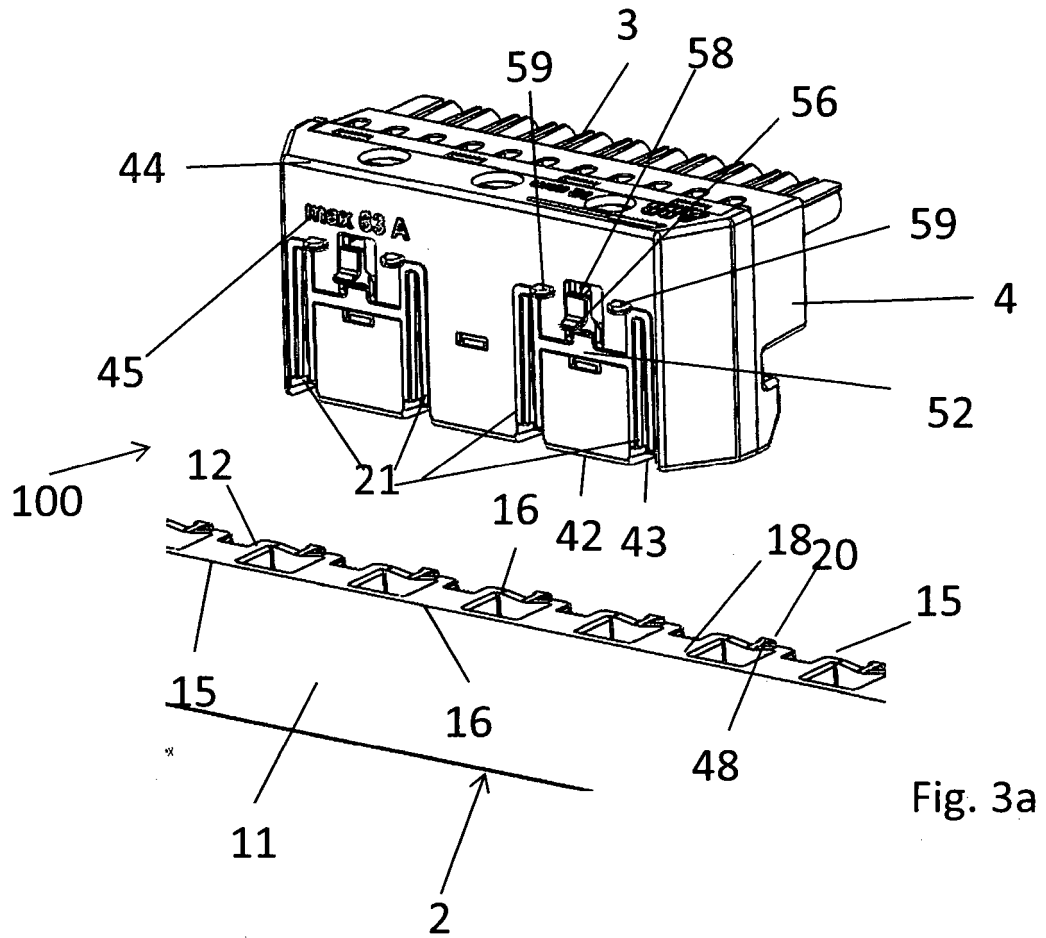


Fig. 2



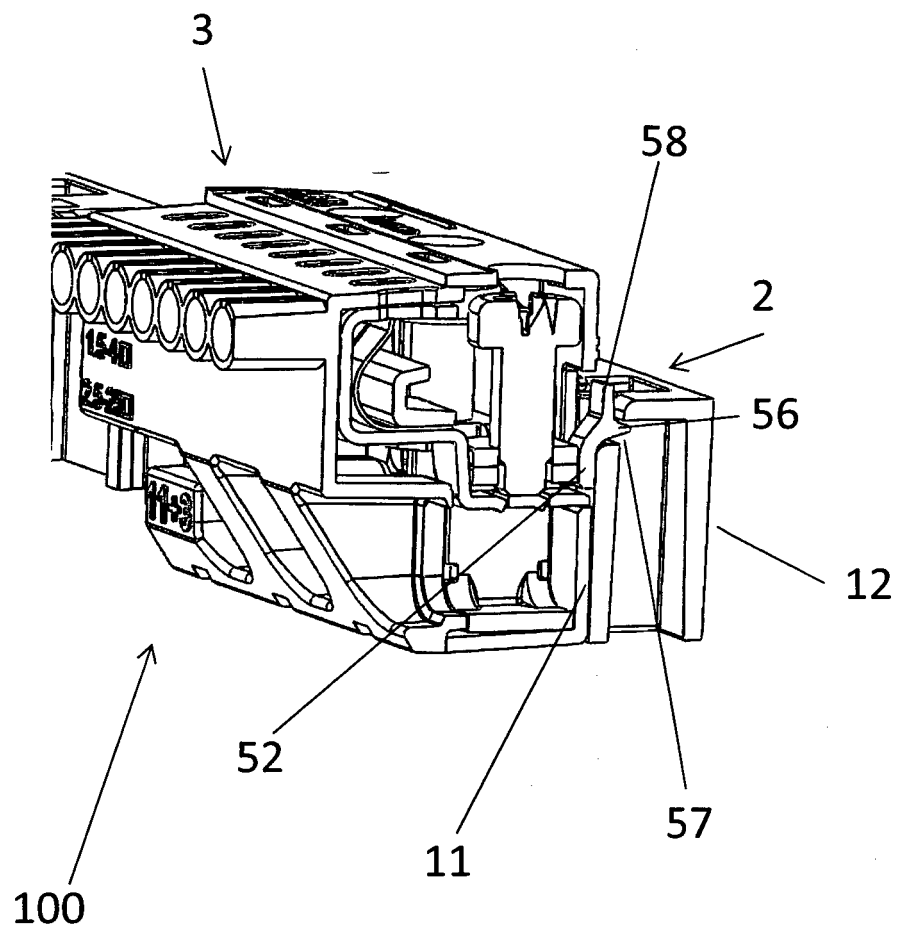


Fig. 4

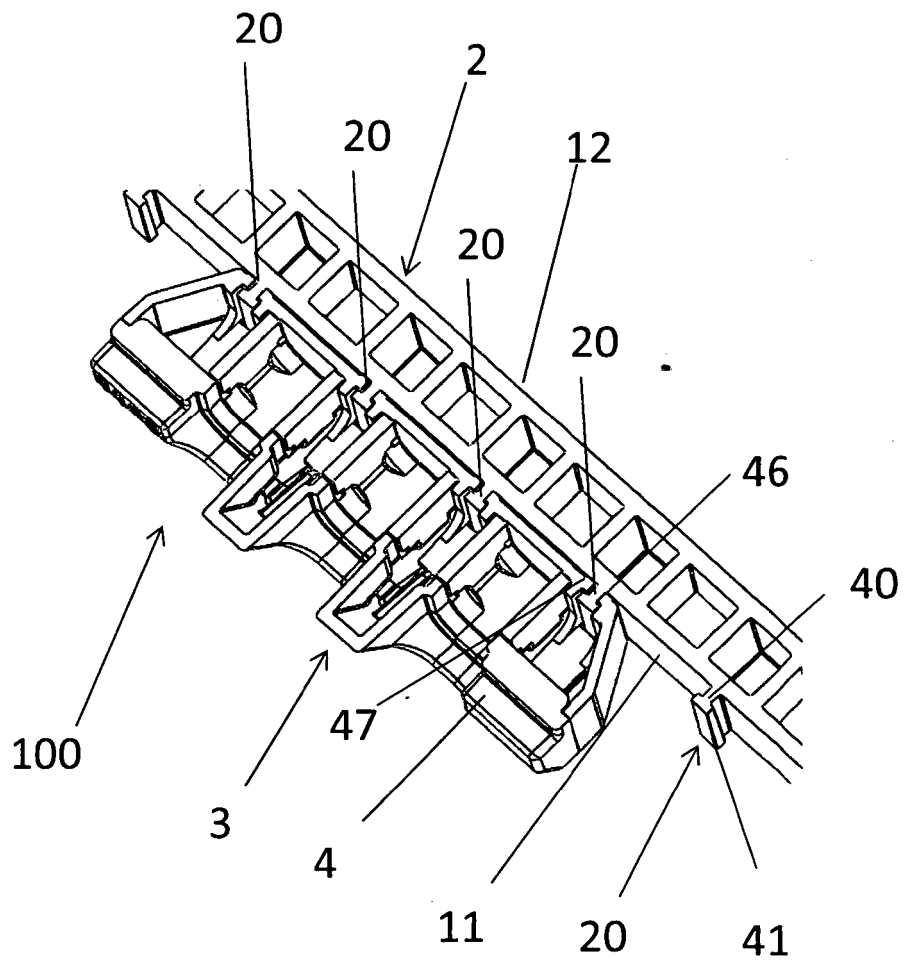


Fig. 5

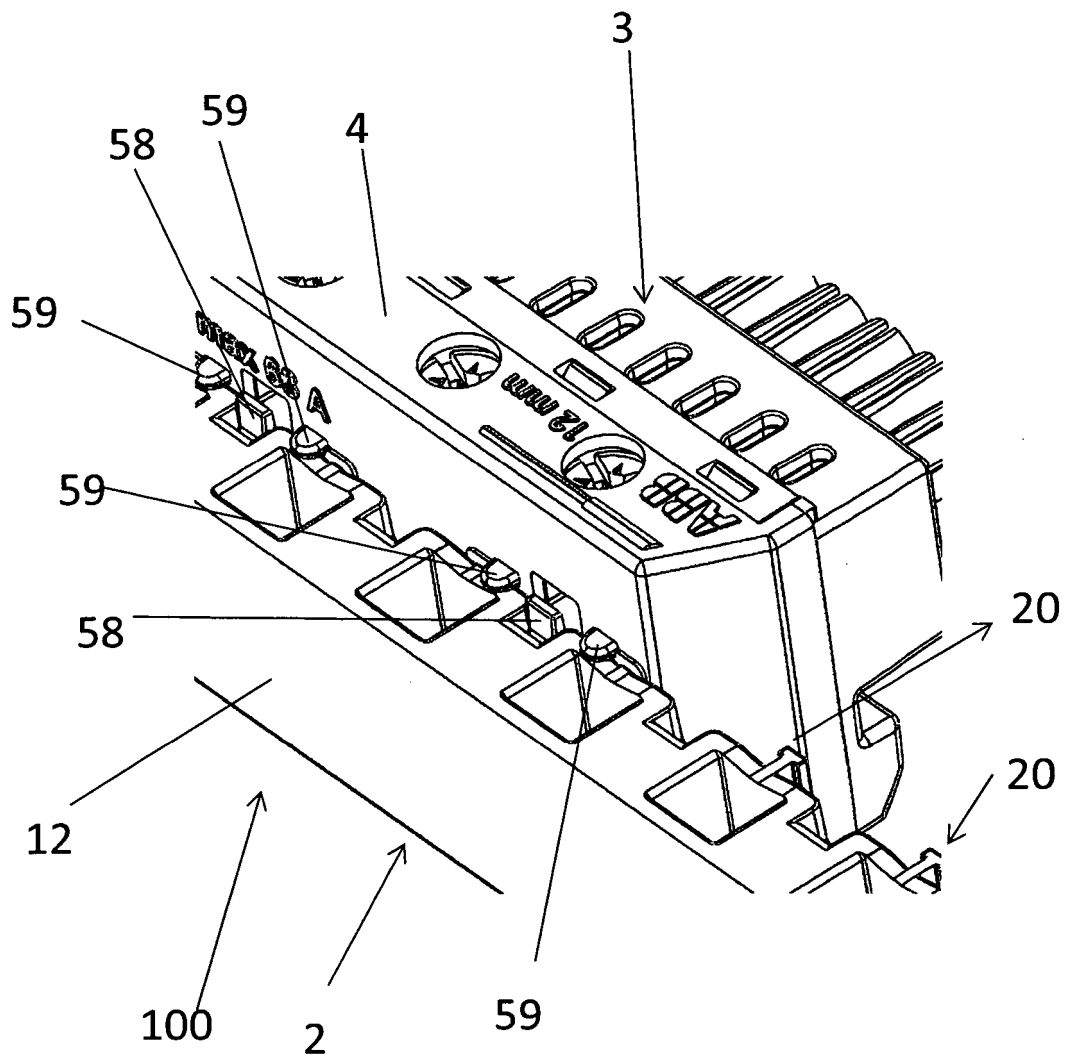
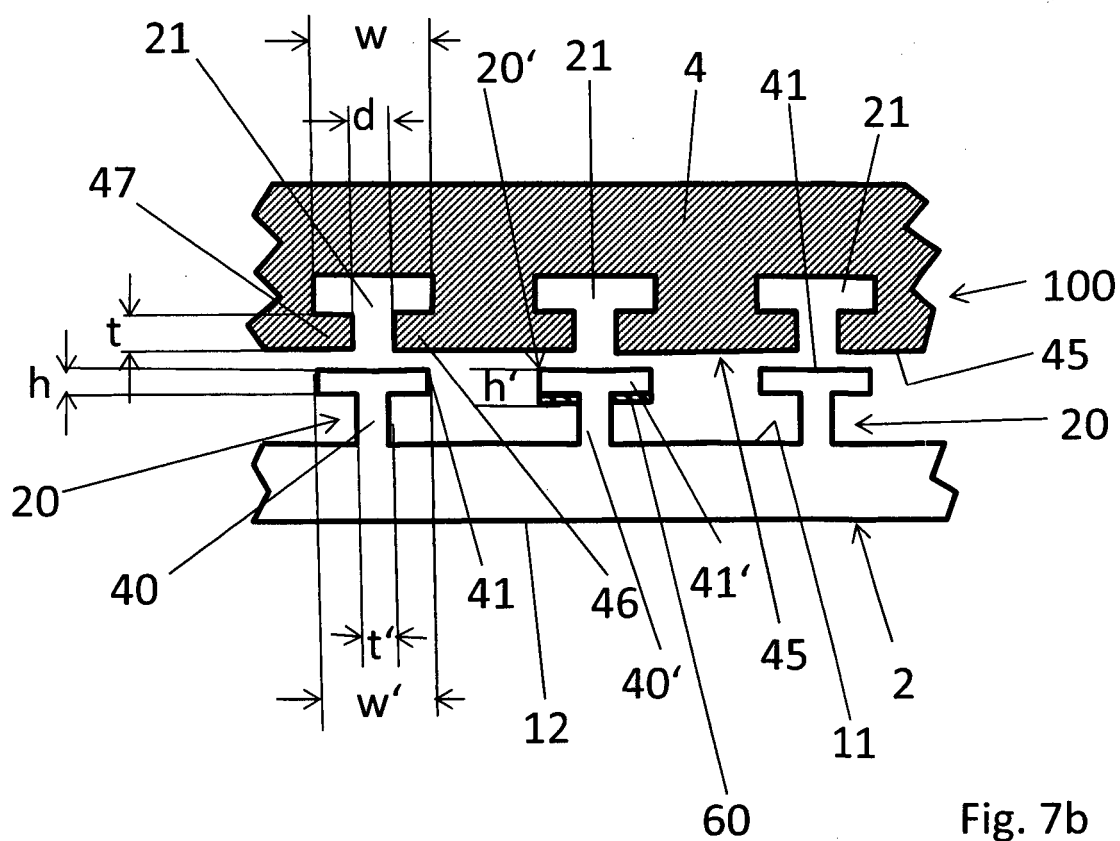
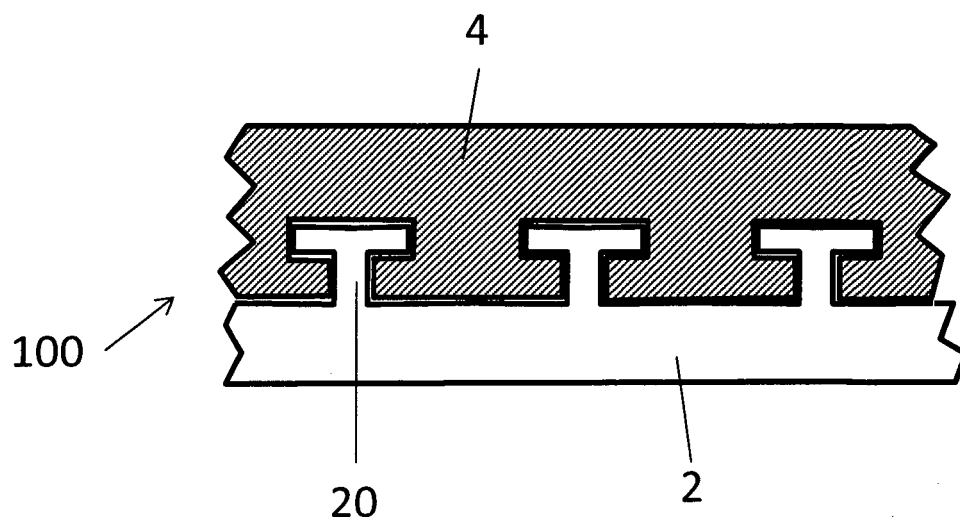
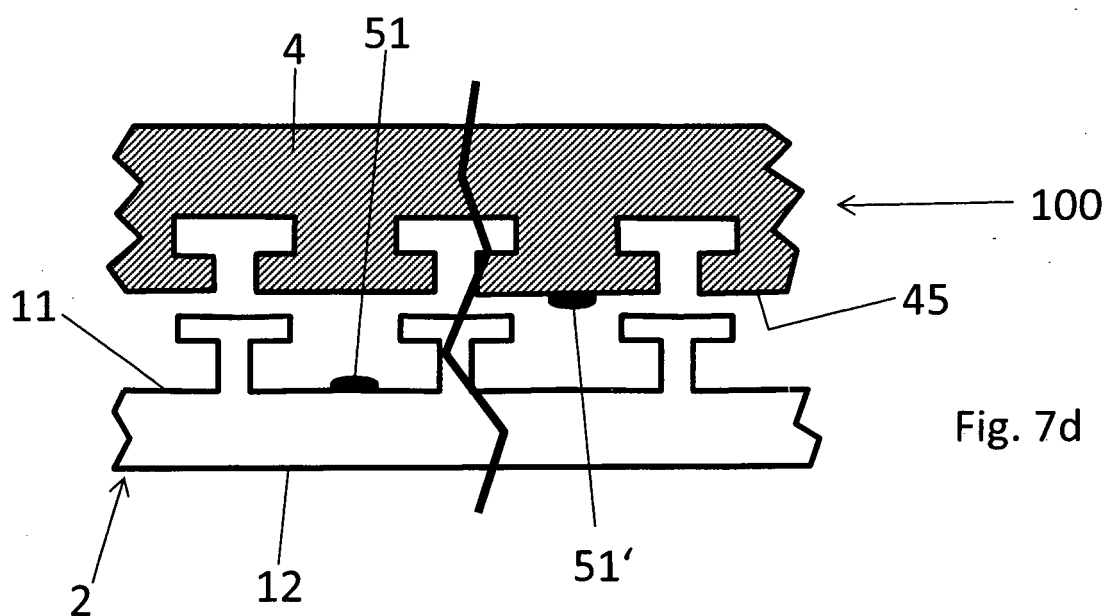
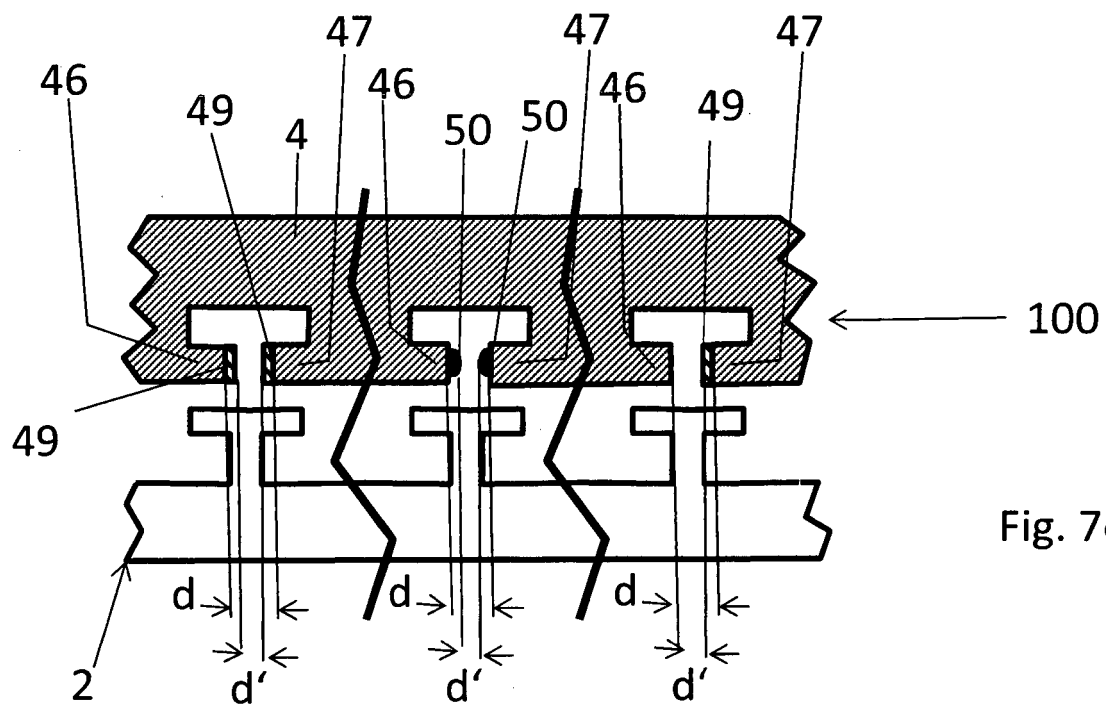


Fig. 6





REFERENCES CITED IN THE DESCRIPTION

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