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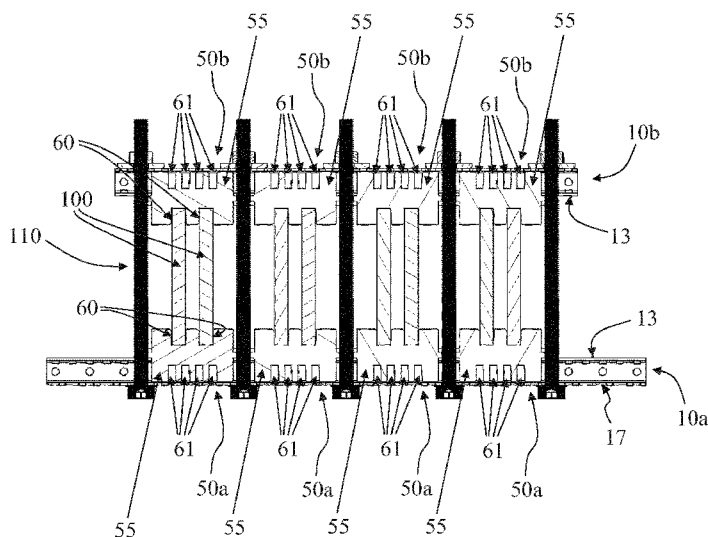


Fig. 9

(57) Abstract: An assembly for mounting conductive bars in a switchboard cabinet, comprising at least one supporting bar having a longitudinal extension along a main axis, and at least one insulating block operatively coupled to the supporting bar. The supporting bar has an internal space accessible through a slot extending longitudinally along the main axis separating a first wall and a second wall of the supporting bar that extend toward each other. The insulating block comprises a central portion with a first face and a second face opposite each other, and a first portion and a second portion protruding from the first face and from the second face, respectively. One or more first grooves and one or more second grooves are defined in the first portion and in the second portion, respectively, to couple to first conductive bars and second conductive bars, respectively. The central portion of the insulating block is mounted on the first and second walls of the supporting bar so as to insert the second portion into the internal space of the supporting bar through the slot.

ASSEMBLY FOR MOUNTING CONDUCTIVE BARS IN A SWITCHBOARD CABINET

DESCRIPTION

The present invention relates to an assembly for mounting conductive bars in a switchboard cabinet.

As is known, switchboard, for example switchboard for electric power distribution or for automation, comprise a cabinet having a frame that defines an internal space to house one or more electric and/or electronic devices of the switchboard; for example, the frame of a low voltage distribution board houses electrical switching devices, such as circuit breakers.

Generally, the rack of the switchboard has a parallelepiped structure defined by a plurality of frame elements operatively connected to one another.

It is also known that the elements installed inside the switchboard cabinet include conductive bars ("busbars") adapted to distribute electric power to the various electrical and/or electronic devices of the switchboard.

The conductive bars can be mounted inside the cabinet through a mounting assembly that comprises supporting bars operatively connected to the frame of the cabinet, and blocks made of insulating material operatively coupled to these supporting bars. The conductive bars are coupled to and supported by insulating blocks, so that any electrodynamic stress, produced by the flow of current in the conductive bars, is discharged onto the structure of the cabinet with the highest resistance through the supporting bars.

According to known embodiments, each of the insulating blocks comprises a single, first, face having a plurality of grooves defined to couple to conductive bars, and a second face, opposite the first face, that can be mounted on a supporting wall of the respective supporting bar.

In practice, the insulating block can only be coupled to a given number and to a given type of conductive bars through the first face. Instead, from the first face there protrude pins that are inserted into respective openings defined through the supporting wall, so as to couple therebetween the insulating block and the respective supporting bar.

At the current state of the art, the use of mounting assemblies of known type has some drawbacks and disadvantages.

In particular, insulating blocks can be subject to movements with respect to their supporting bars, following noteworthy mechanical stresses such as stresses caused by the flow of a short-circuit current through the conductive bars. Above all, transverse movements of the insulating blocks with respect to the longitudinal extension of the respective supporting bars can cause damage to these blocks, to the supporting bars and to the coupling pins.

The object of the present invention is to provide a mounting assembly for conductive bars that enables improvements to be achieved with respect to the state of the art.

This object is achieved by an assembly for mounting conductive bars in a switchboard cabinet, comprising:

- at least one supporting bar having a longitudinal extension along a main axis; and
- at least one insulating block operatively coupled to said at least one supporting bar.

Said at least one supporting bar has an internal space accessible through a slot extending longitudinally along the main axis separating a first wall and a second wall of the supporting bar that extend toward each other.

Said at least one insulating block comprises a central portion having a first face and a second face opposite each other, and a first portion and a second portion protruding from the first face and from the second face, respectively, in which one or more first grooves are defined in the first portion to couple to respective first conductive bars, and in which one or more second grooves are defined in the second portion to couple to respective second conductive bars.

The central portion of the insulating block is mounted on the first and second walls so that the second portion is inserted into the internal space of the supporting bar through the slot.

A further aspect of the present invention is to provide a switchboard cabinet comprising at least one assembly for mounting conductive bars, such as the assembly defined by the appended claims and discussed in the following description.

Another aspect of the present invention is to provide a switchboard comprising a cabinet such as the cabinet defined by the appended claims and discussed in the following description.

Further features and advantages will be more apparent from the description of preferred, although not exclusive, embodiments of an assembly for mounting conductive bars in a switchboard cabinet, illustrated by way of indicative and non-limiting example in the accompanying drawings, wherein:

- Figs. 1 and 2 respectively show a perspective view and a cross-sectional view of a supporting bar suitable to be used in a mounting assembly according to the present invention;
- Figs. 3 and 4 are two perspective views, from different angles, of an insulating block suitable to be used in a mounting assembly according to the present invention;
- Fig. 5 is a side view of the insulating block illustrated in Figs. 3 and 4;
- Fig. 6 is a perspective view of a mounting assembly according to the present invention, coupled to flat conductive bars;
- Fig. 7 is a front view of a portion of the mounting assembly illustrated in Fig. 6;

- Figs 8 and 9 are a side view and related section of the mounting assembly illustrated in Fig. 6;
- Figs. 10 and 11 are perspective views that partly show a mounting assembly according to the present invention, shown in these figures coupled to two different types of shaped conductive bars;
- Fig. 12 illustrates various shaped conductive bars suitable to be coupled to a mounting assembly according to the present invention;
- Fig. 13 illustrates the frame of a switchboard cabinet operatively coupled to two mounting assemblies according to the present invention.

It should be stressed that the same or equivalent elements, both from a structural and functional viewpoint, will be indicated in the following description with the same reference numbers, regardless of the fact that they are being shown in different embodiments.

It must also be stressed that, for the purpose of clarity and concision of the present description, the drawings may not be to scale and certain features introduced in the description may be shown in the accompanying figures in a somewhat schematic manner.

Moreover, when the term “suitable”, “configured” or “shaped” is used in the description referring to any component considered as a whole, or to any part of the component, or to a whole combination of components, or even to each part of a combination of components, it must be understood that this term correspondingly means and comprises both the structure, and/or the configuration and/or the shape and/or the positioning of the related component or part thereof, or of the combination of components or part thereof, to which this term refers.

Finally, when the term transverse or transversely is used in the following description, it indicates a direction not parallel to the element or direction being referred to, and perpendicularity must be considered a specific case of transverse direction.

With reference to the aforesaid figures, the present invention relates to an assembly for mounting conductive bars 100 in a switchboard cabinet, indicated for simplicity hereinafter in the description as “mounting assembly” and indicated as a whole with the reference number 1.

The mounting assembly 1 according to the present invention comprises at least one supporting bar 10 having a longitudinal extension along a main axis represented by a dashed line and indicated by the reference number 150 in Fig. 1 and in Figs. 6, 10 and 11.

This supporting bar 10 has an internal space 11 accessible through a slot 12 extending longitudinally along the main axis 150, separating a first wall 13 and a second wall 14 of the supporting bar 10 that extend toward each other.

Preferably, the first wall 13 and the second wall 14 lie substantially on a same plane, spaced from each other by a distance D defining the transverse extension of the slot 12 with respect to the main axis 150; in particular, an edge 18 of the first wall 13 and an edge 19 of the second wall 14 are facing each other, delimiting the transverse extension of the slot 12.

Preferably, the supporting bar 10 also comprises:

- a third wall 15 and a fourth wall 16 arranged transversely with respect to the first wall 13 and to the second wall 14 and connected to the first wall 13 and second wall 14, respectively, directly or indirectly through a first connection portion 21 and a second connection portion 22; and
- a bottom wall 17 arranged between and transverse with respect to the third wall 15 and to the fourth wall 16, so as to be facing the first and second walls 13, 14 and the slot 12 comprised therebetween.

The bottom wall 17 can be connected to the third wall 15 and to the fourth wall 16 directly or indirectly through a third connection portion 23 and a fourth connection portion 24.

In the embodiment illustrated by way of example in the aforesaid figures, the supporting bar 10 comprises:

- the first wall 13 and the second wall 14 that extend toward each other, lying on a same plane, and which are separated by the slot 12;
- the third wall 15 and the fourth wall 16 parallel to each other and arranged transversely with respect to the first wall 13 and to the fourth wall 14; in particular, the third wall 15 and the fourth wall 16 are connected to the first wall 13 and fourth wall 14, respectively, through a first curved connection portion 21 and a second curved connection portion 22; and
- the bottom wall 17 arranged transversely with respect to the third and fourth walls 15, 16, and which is connected to the third wall 15 and fourth wall 16 through a third curved connection portion 23 and a fourth curved connection portion 24, respectively.

In this way, the supporting bar 10 illustrated in the aforesaid figures is substantially C-shaped, in which the first and second walls 13, 14, the curved connection portions 21 and 22, the third and fourth walls 15, 16, the curved connection portions 23 and 24 and the bottom wall 17 define the internal space 11 accessible through the slot 12.

The mounting assembly 1 according to the present invention also comprises at least one insulating block 50 operatively coupled to said at least one supporting bar 10.

According to the embodiment illustrated by way of example in Figs. 3-5, this insulating block 50 comprises at least:

- a central portion 51 having a first face 52 and a second face 53 opposite each other;
- a first portion 54 protruding from the first face 52, in which one or more grooves 60 are defined in this first portion 54 to couple to respective conductive bars 100; and
- a second portion 55 protruding from the second face 53, in which one or more grooves 61 are defined in this second portion 55 to couple to respective conductive bars 100.

Advantageously, the central portion 51 is suitable to be mounted on the first wall 13 and on the second wall 14 of the supporting bar 10, in practice placing the second face 53 thereof in contact with the first and second walls 13, 14, so as to insert the second portion 55 into the internal space 11 of the supporting bar 10 through the slot 12.

In practice, the second portion 55 of the insulating block 50 has a thickness, indicated by the reference T_2 in the example illustrated in Fig. 4, which can be equal to or less than the distance D between the first and second walls 13, 14 of the supporting bar 10, so as to allow insertion of this second portion 55 into the internal space 11 through the slot 12.

In this case, the first portion 54 is instead facing the outside of the supporting bar 10, so as to be able to couple to respective conductive bars 100 through its grooves 60.

The central portion 51 of the insulating block 50 is also suitable to be mounted on the first wall 13 and on the second wall 14 of the supporting bar 10, in practice placing its first face 52 in contact with the first and second walls 13, 14, so that the first portion 54 is inserted into the internal space 11 of the supporting bar 10 through the slot 12.

In practice, also the thickness of the first portion 54, indicated by the reference T_1 in the example illustrated in Fig. 3, is equal to or less than the distance D between the first and second walls 13, 14 of the supporting bar 10, so as to enable insertion of the first portion 54 into the internal space 11 through the slot 12.

In this case, the second portion 55 is instead facing the outside of the supporting bar 10, so as to be able to couple to respective conductive bars 100 through its grooves 61.

Operatively, the central portion 51 of the insulating block 50 can be mounted on the first and second walls 13 and 14 of the supporting bar 10 according to:

- a first operating position, in which the second portion 55 is inserted into the internal space 11 of the supporting bar 10 through the slot 12, and the first portion 54 is facing the outside of the supporting bar 10 so that the one or more grooves 60 thereof can be coupled to the respective conductive bars 100; or
- a second operating position, in which the first portion 54 is inserted into the internal space 11 of the supporting bar 10 through the slot 12, and the second portion 55 is facing the outside of the supporting bar 10 so that the one or more grooves 61 thereof can be coupled

to the respective conductive bars 100.

Preferably, the number of the grooves 60 of the first portion 54 is different with respect to the number of grooves 61 of the second portion 55 and/or the grooves 60 are of a different size with respect to the grooves 61.

In this way, the number of conductive bars 100 that can be coupled to the grooves 60 and/or the type or sizes of these conductive bars 100 are advantageously different with respect to the number and/or to the type or sizes of the conductive bars 100 that can be coupled to the grooves 61.

In practice, by changing between the first and second operating positions, it is possible to couple a different number and/or a different type of conductive bars 100 to the insulating block 50.

Preferably, the grooves 60 have a different transverse extension with respect to the transverse extension of the grooves 61; for example, in this case the grooves 60 and the grooves 61 can have substantially the same longitudinal extension and the same depth.

Having a different transverse extension between the grooves 60 and the grooves 61 means that the grooves 60 can receive therein coupling portions 101 of the respective conductive bars 100 having a different thickness with respect to the thickness of the coupling portions 101 of the conductive bars 100 that can be inserted into the grooves 61.

Alternatively to or in addition to having different transverse sizes, the grooves 60 can have a different depth with respect to the depth of the grooves 61, so that the conductive bars 100 that can be coupled to the grooves 60 can have a different height with respect to the height of the conductive bars 100 that can be coupled to the grooves 61.

In the embodiment illustrated by way of example in Figs. 3-5, the first portion 54 of the insulating block 50 comprises two grooves 60, and the second portion 55 comprises four grooves 61.

Each of the grooves 60, just as each of the grooves 61, has a longitudinal extension along a direction that is transverse with respect to the main axis 150 of the supporting bar 10 on which the insulating block 50 is mounted.

In this way, when the central portion 51 of the insulating block 50 takes the first operating position, two conductive bars 100 can be coupled to the grooves 60 to extend longitudinally along a main axis thereof (indicated by the reference number 151 in Figs. 6, 10 and 11) that is transverse with respect to the main axis 150 of the supporting bar 10.

Likewise, when the central portion 51 of the insulating block 50 takes the second operating position, four conductive bars 100 can be coupled to the grooves 61 to extend longitudinally

along a main axis thereof that is transverse with respect to the main axis 150 of the supporting bar 10.

The two grooves 60 have a transverse extension of a larger size with respect to the transverse extension of the four grooves 61; in particular, the maximum transverse extension of the grooves 60 and the maximum transverse extension of the grooves 61 are illustrated by way of example and indicated by respective references D_1 and D_2 in Fig. 5.

In this way, the two grooves 60 can receive therein coupling portions 101 of two respective conductive bars 100 and the four grooves 61 can receive therein coupling portions of four respective conductive bars 100, in which the thickness of the coupling portions 101 of the two conductive bars 100 is greater with respect to the thickness of the coupling portions of the four conductive bars 100. For example, the thickness of the coupling portions 101 of the two conductive bars 100 can have a size of 10 mm, and the thickness of the coupling portions of the four conductive bars 100 can have a size of 5 mm.

According to a possible coupling solution between the insulating block 50 and the respective supporting bar 10, the supporting bar 10 comprises along the longitudinal extension thereof a plurality of openings 30, 31 defined spaced from one another. Correspondingly, the insulating block 50 comprises a plurality of protrusions 70, 71 protruding transversely from the second face 53 of the central portion 51; these protrusions 70, 71 are suitable to couple to respective openings 30, 31 of the supporting bar 10, when the central portion 51 is mounted on the first and second walls 13 and 14 according to the first operating position.

The insulating block 50 also comprises a plurality of protrusions 80, 81 protruding transversely from the first face 52 of the central portion 51; these protrusions 80, 81 are suitable to couple to respective openings 30, 31 of the supporting bar 10, when the central portion 51 is mounted on the first and second walls 13 and 14 so as to take the second operating position.

Preferably, the protrusions 70, 71 or the protrusions 80, 81 of the insulating block 50 are interlockingly coupled to the respective openings 30, 31 of the supporting bar 10.

The supporting bar 10 illustrated by way of example in Fig. 1 comprises a row of openings 30 and a row of openings 31 defined opposite each other with respect to the slot 12. In particular, the openings 30 are defined through the first connection portion 21 and sections of the first wall 13 and of the third wall 15 adjacent to the connection portion 21; the openings 31 are defined through the second connection portion 22 and sections of the second wall 14 and of the fourth wall 16 adjacent to the connection portion 22.

Correspondingly, the insulating block 50 illustrated by way of example in Figs. 3-5 comprises

a row of protrusions 70 and a row of protrusions 71 protruding from the second face 53 and opposite each other with respect to the second portion 55.

In particular, the row of protrusions 70 and the row of protrusions 71 are suitable to couple to the row of openings 30 and the row of openings 31 of the supporting bar 10, respectively, when the central portion 51 of the insulating block 10 is mounted on the first and second walls 13, 14 of the supporting bar 10 according to the first operating position.

Likewise, the row of protrusions 80 and the row of protrusions 81 are suitable to couple to the row of openings 30 and the row of openings 31 of the supporting bar 10, respectively, when the central portion 51 of the insulating block 10 is mounted on the first and second walls 13, 14 of the supporting bar 10 so as to take the second operating position.

Moreover, a fin 72 protrudes transversely from the second face 53 connecting the protrusions 70 to one another, a fin 73 protrudes transversely from the second face 53 connecting the protrusions 71 to one another, a fin 82 protrudes transversely from the first face 52 connecting the protrusions 80 to one another and a fin 83 protrudes transversely from the first face 52 connecting the protrusions 81 to one another.

In particular, the fins 73 and 72 are suitable to cover corresponding sections of the first connection portion 21 and of the second connection portion 22 of the supporting bar 10, respectively, when the central portion 51 of the insulating block 10 is mounted on the first and second walls 13, 14 according to the first operating position.

Likewise, the fins 83 and 82 are suitable to cover corresponding sections of the first connection portion 21 and of the second connection portion 22, respectively, when the central portion 51 of the insulating block 10 is mounted on the first and second walls 13, 14 so as to take the second operating position.

Preferably, the central portion 51 of the insulating block 50 comprises at least one recess 90, 91 defined so as to be positioned over the slot 12 of the supporting bar 10, when the central portion 51 is mounted on the first and second walls 13 and 14.

For example, the insulating block 50 illustrated in Figs. 3-5 comprises two recesses 90 and 91 defined through the central portion 51, between the row of protrusions 72, 82 and the row of protrusions 71, 81; in particular, the recesses 90 and 91 are defined opposite each other with respect to the first and second portions 54, 55.

Figs. 6-9 illustrate by way of example a mounting assembly 1 comprising four supporting bars 10a, 10b, 10c, 10d of the type illustrated in Figs. 1-2. In particular, the supporting bar 10a and the supporting bar 10b are arranged parallel to and spaced from each other so that the respective slots 12 are facing each other; likewise, the supporting bar 10c and the supporting

bar 10d are arranged parallel to and spaced from each other so that the respective slots 12 are facing each other.

Four insulating blocks 50a are operatively coupled to the supporting bar 10a, four insulating blocks 50b are operatively coupled to the supporting bar 10b, four insulating blocks 50c are operatively coupled to the supporting bar 10c, and four insulating blocks 50d are operatively coupled to the supporting bar 10d.

Each of the insulating blocks 50a, 50b, 50c, 50d is of the type illustrated in Figs. 3-6 and described above.

In the example illustrated in Figs. 6-9, the central portions 51 of the insulating blocks 50a-50d are mounted on the first and second walls 13 and 14 of the respective supporting bars 10a-10d according to the first operating position, in which the second portions 55 of the insulating blocks 50a-50d are inserted into the internal space 11 of the respective supporting bars 10a-10d through the slots 12 of these bars 10a-10d.

Moreover, the projections 70 and the projections 71 of the insulating blocks 50a-50d are coupled to the openings 30 and 31 of the respective supporting bars 10a-10d.

The first portions 54 of the insulating blocks 50a are facing the supporting bar 10b, the first portions 54 of the insulating blocks 50b are facing the supporting bar 10a, the first portions 54 of the insulating blocks are facing the supporting bar 10d, and the first portions 54 of the insulating blocks 50d are facing the supporting bar 10c.

In particular, the insulating blocks 50a-50d are mounted along the respective supporting bars 10a-10d so that:

- the two grooves 60 defined in the first portion 54 of each insulating block 50a are facing and aligned with the two grooves 60 defined in the first portion 54 of a respective insulating block 50b;
- the two grooves 60 defined in the first portion 54 of each insulating block 50c are facing and aligned with the two grooves 60 defined in the first portion 54 of a respective insulating block 50d.

In this way, two conductive bars 100 can extend longitudinally along the main axis 151 thereof, passing through the mutually aligned grooves 60 of an insulating block 50a and respective insulating block 50b, and the mutually aligned grooves 60 of an insulating block 50c and respective insulating block 50d.

Although in Figs. 6-9 the central portions 51 of the insulating blocks 50a-50d are shown mounted on the first and second walls 13 and 14 of the respective supporting bars 10a-10b according to the first operating position, these central portions 51 can be mounted on the first

and second walls 13 and 14 also so as to take the second operating position.

In this second operating position:

- the first portions 54 of the insulating blocks 50a-50d are inserted into the internal space 11 of the respective supporting bars 10a-10d, through the slots 12 of these bars 10a-10d;
- the four grooves 61 defined in the second portion 55 of each insulating block 50a are facing and aligned with the four grooves 61 defined in the second portion 55 of a respective insulating block 50b;
- the four grooves 61 defined in the second portion 55 of each insulating block 50c are facing and aligned with the four grooves 61 defined in the second portion 55 of a respective insulating block 50d.

In this way, four conductive bars 100 can extend longitudinally along the main axis 151 thereof, passing through the mutually aligned grooves 61 of an insulating block 50a and respective insulating block 50b, and the mutually aligned grooves 61 of an insulating block 50c and respective insulating block 50d.

In the example illustrated in Fig. 6, the conductive bars 100 coupled to the insulating blocks 50a-50d are flat; in particular, each of the grooves 60 is of a transverse size to receive therein a coupling portion 101 of the flat conductive bar 100, coupling portion 101 that corresponds to the thickness of this bar 100.

It must be stressed that also shaped conductive bars 100, i.e. with a shape that is not purely flat, can be coupled to the blocks 50a-50d of the mounting assembly 1.

Preferably, with reference to the embodiments illustrated by way of example in Figs. 10-12, the shaped conductive bars 100 that can be mounted through the mounting assembly 1 comprise at least one C-shaped groove 102 extending along the main axis 151 of the bar 100.

Advantageously, the bottom wall of this groove 102 comprises two substantially rectilinear sections 103, 104 forming therebetween an angle of less than 180° , preferably comprised between 155° and 168° , and more preferably between 165° and 172° . In the shaped bars 100 illustrated by way of example in Figs. 10-12, the angle indicated is of around 170° .

The use of grooves 102 shaped in this way simplifies connection of the conductive bars 100 with other elements, in particular in the case in which this connection takes place through screws, such as hammer screws.

In the case in which the shaped conductive bar 100 comprises two grooves 102 spaced from each other, a cavity 105 can be defined so as to extend at least over a portion of the bar 100 extending between two grooves 102. In this way the material used to manufacture the conductive bars 100 is reduced, without penalizing the current conducting capacity thereof.

According to a first embodiment, the shaped conductive bars 100 that can be mounted through the mounting assembly 1 comprise a single first coupling portion 101a and a single second coupling portion 101b, defined respectively on a first side and a second side of the bar 100 opposite each other.

In particular, these coupling portions 101a, 101b have a thickness of a size to couple to the grooves 60 or to the grooves 61 of the respective insulating blocks 50a-50d.

For example, Fig. 10 illustrates how the first coupling portion 101a of each of the shaped conductive bars 100 is inserted into a groove 60 of the respective insulating block 50a, and how the second coupling portion 101b is inserted into a groove 60 of the respective insulating block 50b.

Fig. 12 illustrates further examples of shaped conductive bars 100 according to the first embodiment. In particular, some of these shaped conductive bars 100 comprise recesses 106 defined in their coupling portions 101a, 101b; in this way, the material to manufacture the conductive bars 100 is further reduced.

In a second embodiment, the shaped conductive bars 100 that can be mounted through the mounting assembly 1 comprise at least two first coupling portions 101a, defined on a first side of the bar 100, and at least two second coupling portions 101b defined on a second side of the bar 100, opposite the first side.

The first coupling portions 101a have a thickness of a size to couple to two grooves 60 or to two grooves 61 of the respective insulating blocks 50a and 50c, while the second coupling portions 101b have a thickness of a size to couple to two grooves 60 or to two grooves 61 of the respective insulating blocks 50b and 50d.

For example, Fig. 11 illustrates how the two first coupling portions 101a of each shaped conductive bar 100 are inserted into two grooves 60 of the respective insulating block 50a, and how the two second coupling portions 101b are inserted into two grooves 60 of the respective insulating block 50b.

Preferably, a plurality of tie rods 110, which can be made, for example, of plastic material, transversely connect the supporting bars 10a and 10b and the supporting bars 10c and 10d to each other.

For example, as illustrated in Figs. 6-9, each of the tie rods 110 passes through the internal space 11 of the supporting bars 10a-10b or 10c-10d, and projects from the bottom walls 17 to couple with fixing means 112.

In particular, each tie rod 110 comprises at least one threaded portion 111 to couple to the respective fixing means 112, which can be nuts 112. By means of the threaded portions 111 it

is thus possible to adjust the distance between the supporting bars 10a and 10b, and between the supporting bars 10c and 10d.

The recesses 90 and 91 of each insulating block 50a-50d are positioned at the slot 12 of the respective supporting bars 10a-10d.

In particular, the recesses 90 and 91 of each insulating block 50a are aligned with the recesses 90 and 91 of the respective insulating block 50b; in this way, the recesses 90 and 91 of the insulating blocks 50a and the recesses 90 and 91 of the insulating blocks 50b allow tie rods 110 to pass through the central portions 51 of these blocks 50a, 50b, to be inserted into the internal space 11 of the supporting bars 10a and 10b through the slots 12.

Likewise, the recesses 90 and 91 of each insulating block 50c are aligned with the recesses 90 and 91 of the respective insulating block 50d; in this way, the recesses 90 and 91 of the insulating blocks 50c and the recesses 90 and 91 of the insulating blocks 50d allow tie rods 110 to pass through the central portions 51 of these blocks 50c, 50d, to be inserted into the internal space 11 of the supporting bars 10c and 10d through the slots 12.

In the example illustrated in Figs. 6-9, the four insulating blocks 50a, the four insulating blocks 50b, the four insulating blocks 50c and the four insulating blocks 50d are mounted along the respective supporting bars 10a-10d side by side with one another, placing the respective central portions 51 in contact.

For simplicity, considering only the insulating blocks 50a, and in particular considering a first insulating block 50a mounted between a second insulating block 50a and a third insulating block 50a, the recess 90 of the first insulating block 50a defines with the recess 91 of the second insulating block 50a a hole for a first tie rod 110 to pass through, and the recess 91 of the first insulating block 50 defines with the recess 90 of the third insulating block 50 a hole for a second tie rod 110 to pass through.

The present invention also relates to a switchboard cabinet comprising at least one mounting assembly 1 according to the present invention.

With reference to Fig. 13, the cabinet comprises a frame 200, preferably parallelepiped, produced by operatively coupling a plurality of frame elements 201 to one another.

In the example illustrated, a first mounting assembly 1 is used to vertically mount four conductive bars 100 in the cabinet, and a second mounting assembly 1 is used to horizontally mount four conductive bars 100.

In particular, a series of supporting bars 10 of the first mounting assembly 1 is fixed to a vertical frame element 201 and to a cross member 202 connected vertically to the frame 200; a series of supporting bars 10 of the second mounting assembly 1 is fixed to a horizontal

frame element 201 and to a cross member 203 connected horizontally to the frame 200.

In practice, it has been seen how the mounting assembly 1 according to the present invention, and the related cabinet and switchboard, fully achieve the intended aims, providing a series of advantages with respect to the prior art.

In particular, insertion of the first portion 54 or of the second portion 55 of the insulating block 50 into the internal space 11 of the respective supporting bar 10, through the slot 12, limits the displacement to which the insulating block 50 may be subjected following noteworthy stresses, such as stresses caused by the flow of a short circuit current in the conductive bars 100.

This insertion above all limits transverse movements of the insulating block 50 with respect to the main axis 150 along which the supporting bar 10 extends, as the first portion 54 or the second portion 55 are inserted into the internal space 11 of the supporting bar 10, between the first wall 13 and the second wall 14.

Limiting the movement of the insulating block 50 means limiting the damage to this block 50, to the supporting bar 10 and to the coupling means between the block 50 and the bar 10, such as the protrusions 70, 71 and 80, 81 of the block 50.

Besides being able to limit unwanted movements of the insulating block 50 with respect to the supporting bar 10, the first portion 54 and the second portion 55 can allow coupling of this insulating block 50 to a different number and/or a different type of conductive bars 100. In fact, as described with reference to the examples illustrated in the figures, the number and/or the size of the grooves 60 is preferably different with respect to the number and/or the size of the grooves 61.

In practice, when the central portion 51 of the insulating block 50 is mounted on the first and second walls 13, 14 of the respective supporting bar 10 according to the first operating position, the second portion 55 inserted into the internal space 11 has the task of limiting any movements of the insulating block 50, while the first portion 54 has the task of coupling to respective first conductive bars 100 through the grooves 60 thereof.

Instead, if one wishes to change the number and/or the type or size of conductive bars 100 coupled to the insulating block 50, the central portion 51 can be mounted on the first and second walls 13, 14 of the supporting bar 10 so as to take the second operating position. In this second operating position the first portion 54 inserted into the internal space 11 has the task of limiting any movement of the block 50, while the second portion 55 has the task of coupling to respective second conductive bars 100 through its grooves 61.

The insulator 1 thus conceived and related cabinet and switchboard are susceptible to

modifications and variations all falling within the object of the inventive concept as defined in particular by the accompanying claims.

In particular, the number and/or the size of the grooves 60 and of the grooves 61 of the insulating block 50 can differ from those illustrated, purely by way of example, in Figs. 3-6.

For example:

- the first portion 54 can comprise a single groove 60 having a transverse extension greater than two grooves 61 defined in the second portion 55; for example, the only groove 60 can be of a transverse size to receive a coupling portion 101 of a respective conductive bar 100 having a thickness of 10 mm, and the two grooves 61 can be sized transversely to receive coupling portions of respective conductive bars 100 having a thickness of 5 mm; or
- the first portion 54 can comprise three grooves 60 having the same transverse extension of four or two grooves 61 defined in the second portion 55; for example, the three grooves 60 and the two or four grooves 61 can be of a transverse size to receive the coupling portions 101 of respective conductive bars 100 with a thickness of 10 mm or with a thickness of 5 mm.

Although the mounting assembly 1 illustrated in Fig. 6 only comprises two pairs of supporting bars 10a-10b and 10c-10d along the longitudinal extension of the conductive bars 100 supported, and although on each of the bars 10a-10d there are mounted four insulating blocks 50a, 50b, 50c, 50d, the number of pairs of supporting bars 10 used and/or the number of insulating blocks 50 mounted thereon can differ from the number illustrated purely by way of example.

In particular, for increasing values of admissible rated short-time withstand current (I_{CW}), the number of pairs of supporting bars 10 is increased, decreasing the distance between the pairs of bars 10. For example, in Fig. 13 the mounting system 1 for the conductive bars 100 arranged vertically comprises eight pairs of supporting bars 10 along the vertical extension of the conductive bars 100, and the mounting system 1 for the conductive bars 100 arranged horizontally comprises four pairs of supporting bars 10 along the horizontal extension of the conductive bars 100.

Moreover, all the parts/components described can be replaced with other technically equivalent parts/components; in practice, the type of materials and the sizes can be any according to requirements and to the state of the art.

CLAIMS

1. An assembly (1) for mounting conductive bars (100) in a switchboard cabinet, comprising:
 - at least one supporting bar (10) having a longitudinal extension along a main axis (150); and
 - at least one insulating block (50) operatively coupled to said at least one supporting bar;characterized in that
 - said at least one supporting bar has an internal space (11) accessible through a slot (12) extending longitudinally along said main axis (150) separating a first wall (13) and a second wall (14) of the supporting bar that extend toward each other;
 - said at least one insulating block comprises a central portion (51) having a first face (52) and a second face (53) opposite each other, and a first portion (54) and a second portion (55) protruding from said first face and said second face, respectively, wherein one or more first grooves (60) are defined in said first portion to couple to respective first conductive bars (100), and wherein one or more second grooves (61) are defined in said second portion to couple to respective second conductive bars (100);said central portion (51) of the insulating block (50) being mounted on said first and second walls (13, 14) so that said second portion (55) is inserted into the internal space (11) of the supporting bar (10) through said slot (12).
2. The assembly (1) according to the claim 1, characterized in that the number of said one or more first grooves (60) differs with respect to the number of said one or more second grooves (61) and/or said one or more first grooves (60) are of a different size with respect to said one or more second grooves (61).
3. Assembly (1) according to claim 1 or claim 2, characterized in that said at least one supporting bar (10) comprises a plurality of openings (30, 31) defined spaced from one another along the longitudinal extension of the supporting bar, and in that said insulating block (50) comprises a plurality of first protrusions (70, 71) that protrude transversely from said second face (53) and are coupled to respective openings (30, 31) of said plurality of openings.
4. The assembly (1) according to claim 3, characterized in that said first protrusions (70, 71) are interlockingly coupled to the respective openings (30, 31).
5. The assembly (1) according to claim 3 or claim 4, characterized in that said plurality of

openings (30, 31) comprises a row of first openings (30) and a row of second openings (31) opposite each other with respect to said slot (12), and in that said plurality of first protrusions (70, 71) comprises a row of first protrusions (70) coupled to respective first openings (30), and a row of first protrusions (71) coupled to respective second openings (31).

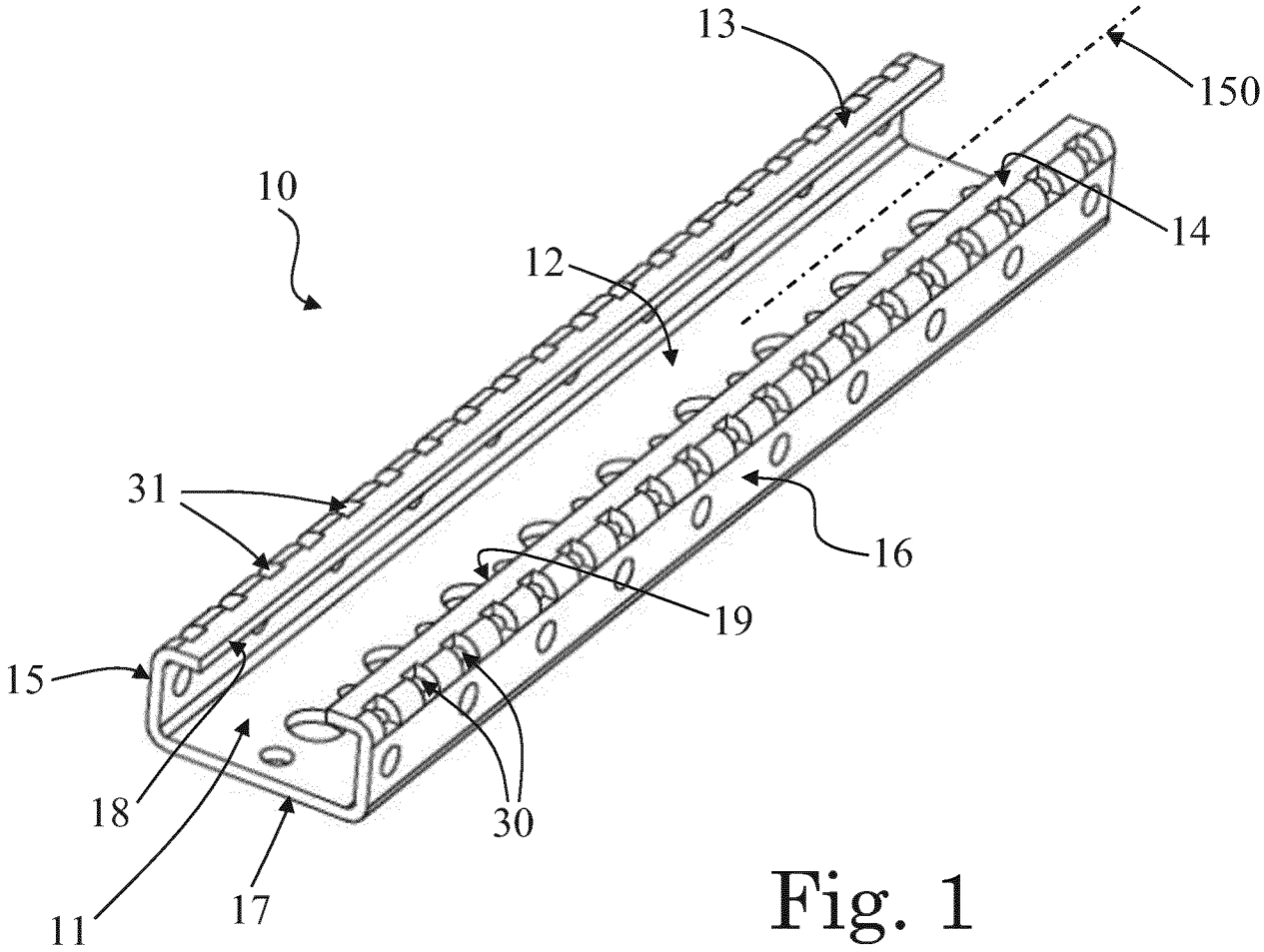
6. The assembly (1) according to claim 5, characterized in that it comprises:
 - a third wall (15) and a fourth wall (16) arrange transversely with respect to the first wall (13) and to the second wall (14), respectively;
 - a first connection portion (21) between said first and third walls (13, 15);
 - a second connection portion (22) between said second and fourth walls (14, 16);said first openings (30) being defined through at least said first connection portion (21) and said second openings (31) being defined through at least said second connection portion (22).
7. The assembly (1) according to one or more of the preceding claims, characterized in that said central portion (51) is suitable to be mounted on said first and second walls (13, 14) so as to insert said first portion (54) into the internal space (11) of the supporting bar (10) through said slot (12).
8. The assembly (1) according to claim 7, characterized in that said at least one insulating block (10) comprises a plurality of second protrusions (80, 81) that protrude transversely from said first face (52) and are suitable to couple to respective openings (30, 31) of said plurality of openings of the supporting bar (10).
9. The assembly (1) according to claim 8, characterized in that said plurality of second protrusions (80, 81) comprises a row of second protrusions (80) suitable to couple to respective first openings (30), and a row of second protrusions (81) suitable to couple to respective second openings (31).
10. The assembly (1) according to one or more of the preceding claims, characterized in that said at least one supporting bar (10) comprises at least a first supporting bar (10a; 10c) and a second supporting bar (10b; 10d) arranged parallel and spaced from each other so that the slots (12) of said first and second supporting bars (10a-10b; 10c-10d) are facing each other, and in that said at least one insulating block (50) comprises at least:
 - a first insulating block (50a; 50c) having the central portion (51) thereof mounted on the first and second walls (13, 14) of the first supporting bar (10a; 10c), so that the second portion (55) of the first insulating block (50a; 50C) is inserted into the internal space (11) of the first supporting bar (10a; 10c) through the slot (12) of said first

supporting bar (10a; 10c); and

- a second insulating block (50b; 50d) having the central portion (51) thereof mounted on the first and second walls (13, 14) of the second supporting bar (10b; 10d), so that the second portion (55) of the second insulating block (50b, 50d) is inserted into the internal space (11) of the second supporting bar (10b; 10d) through the slot (12) of said second supporting bar (10b; 10d);

said one or more first grooves (60) defined in the first portion (54) of the first insulating block (50a; 50c) being facing and aligned with said one or more first grooves (60) defined in the first portion (54) of the second insulating block (50b; 50d).

11. The assembly (1) according to claim 10, characterized in that it comprises at least one tie rod (110) transversely connecting said first and second supporting bars (10a, 10b; 10c, 10d) to each other.
12. The assembly (1) according to claim 11, characterized in that said tie rod (110) comprises at least one threaded portion (111).
13. The assembly according to claim 11 or claim 12, characterized in that:
 - the central portion (51) of the first insulating block (50a; 50c) comprises at least a first recess (90, 91) at the slot (12) of said first supporting bar (10a; 10c); and
 - the central portion (51) of the second insulating block (50b; 50d) comprises at least a second recess (90, 91) at the slot (12) of said second supporting bar (10b; 10d);said first recess and said second recess being suitable to allow a respective tie rod (110) to pass through the central portions (51) of the first insulating block (50a; 50c) and of the second insulating block (50b; 50d).
14. A switchboard cabinet, characterized in that it comprises at least one mounting assembly (1) according to one or more of claims 1-13.
15. A switchboard comprising a cabinet according to claim 14.



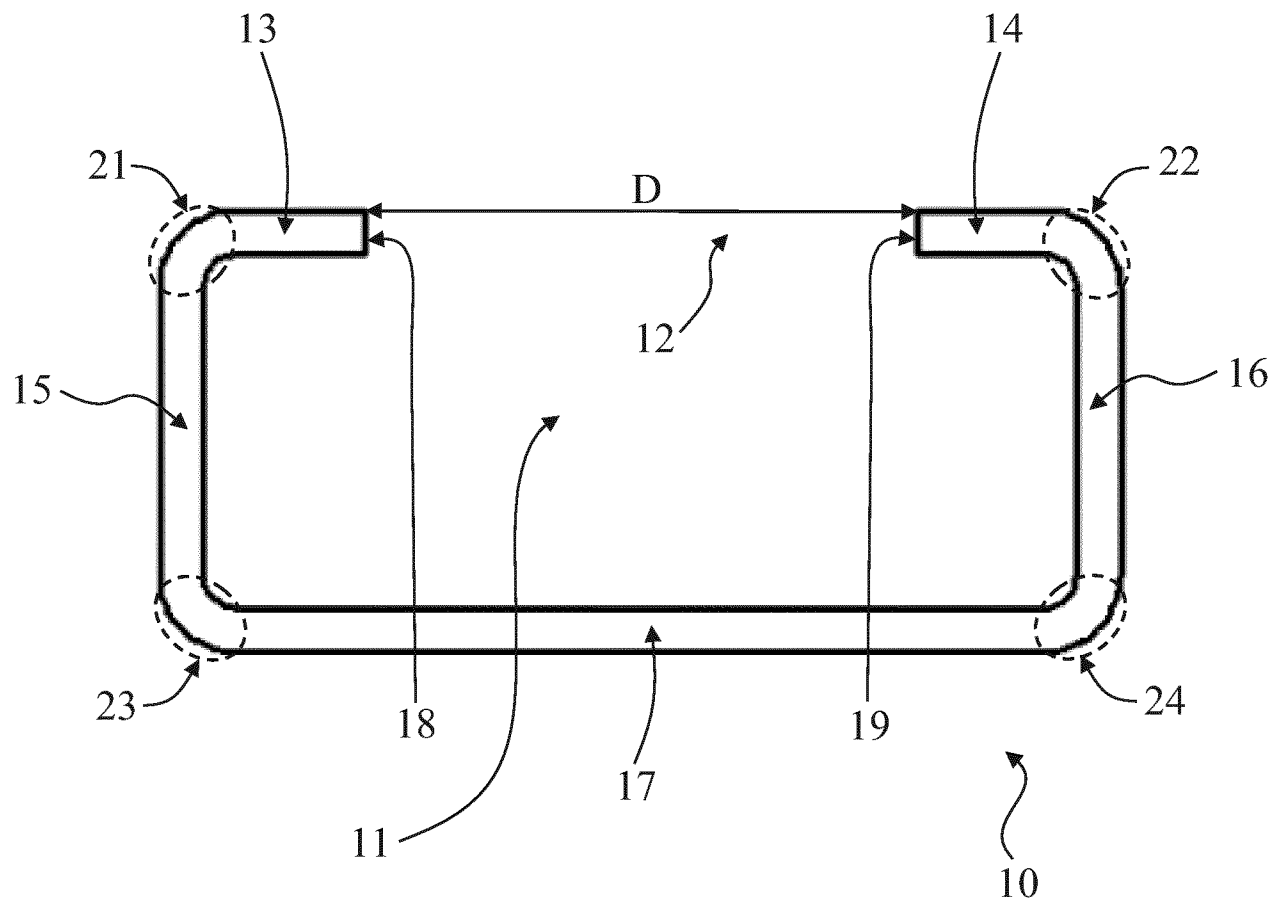


Fig. 2

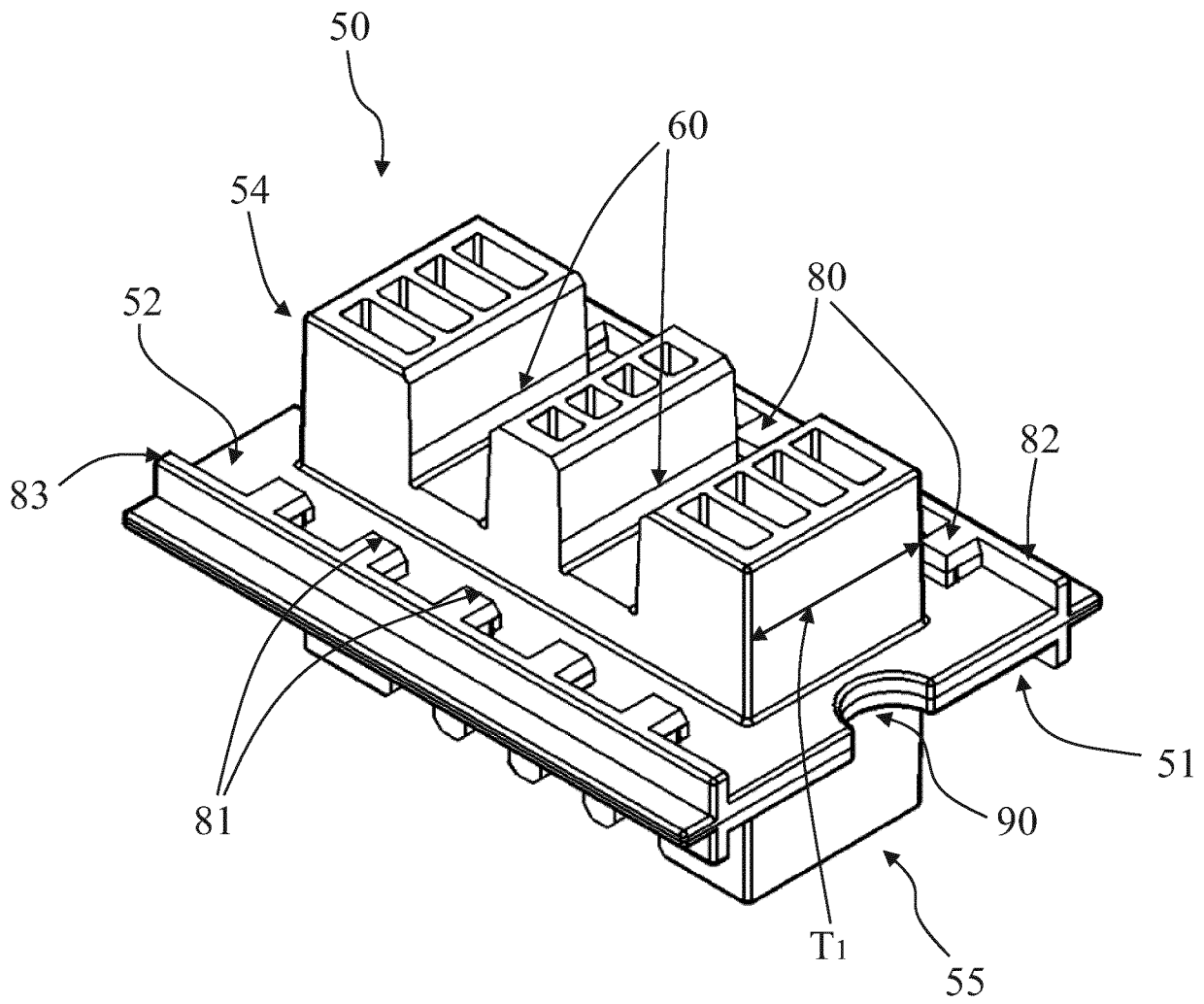


Fig. 3

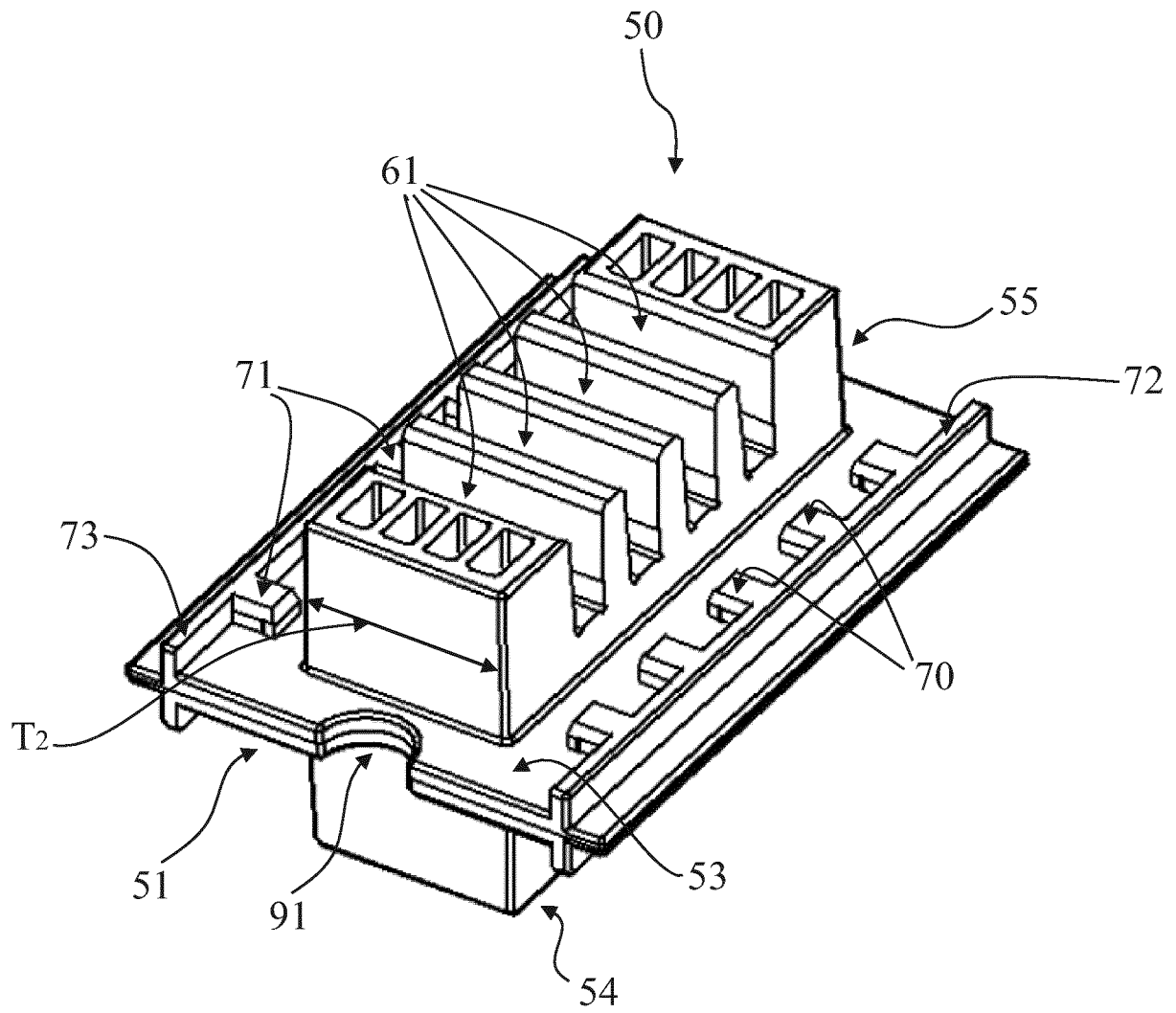


Fig. 4

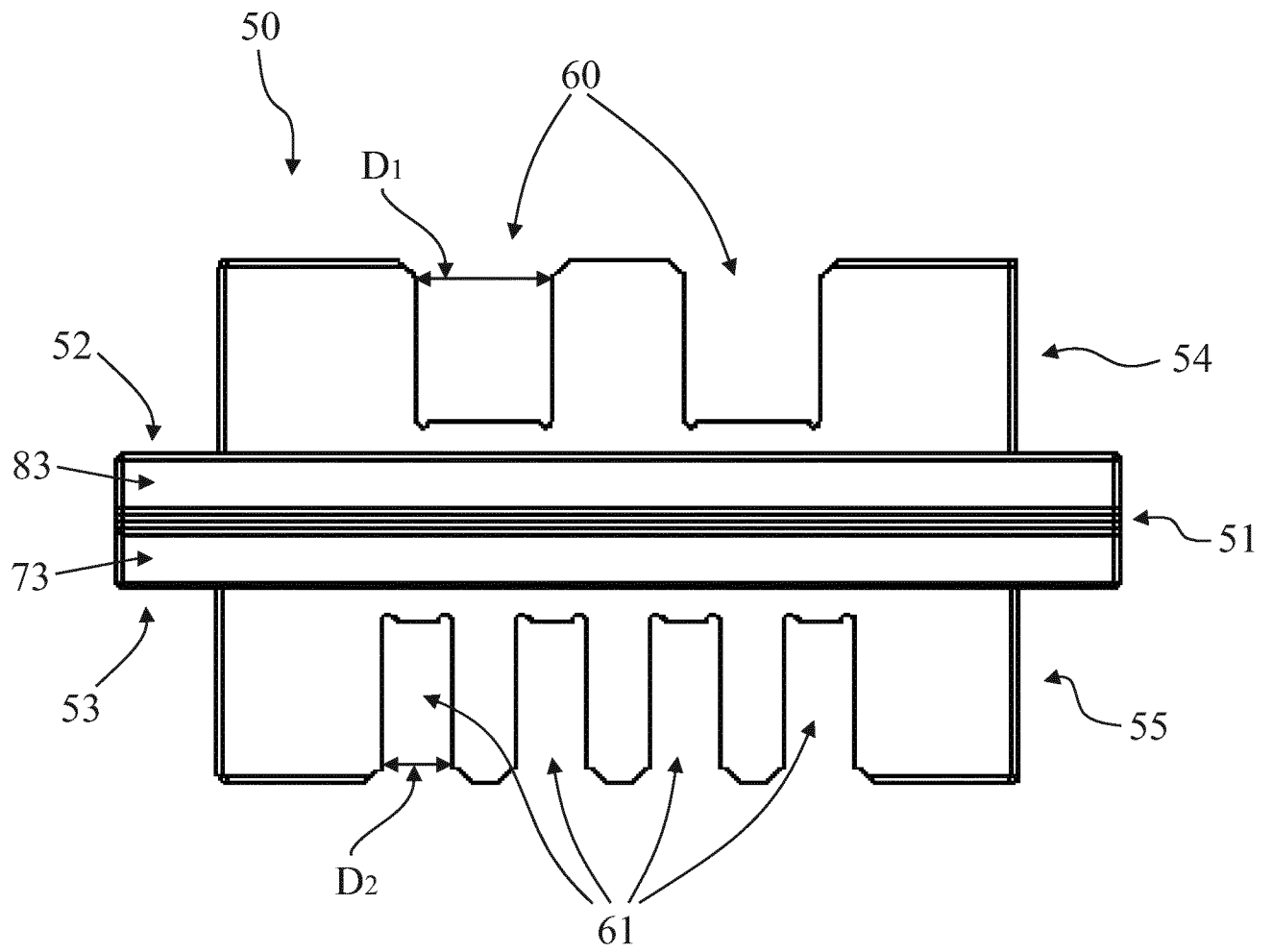
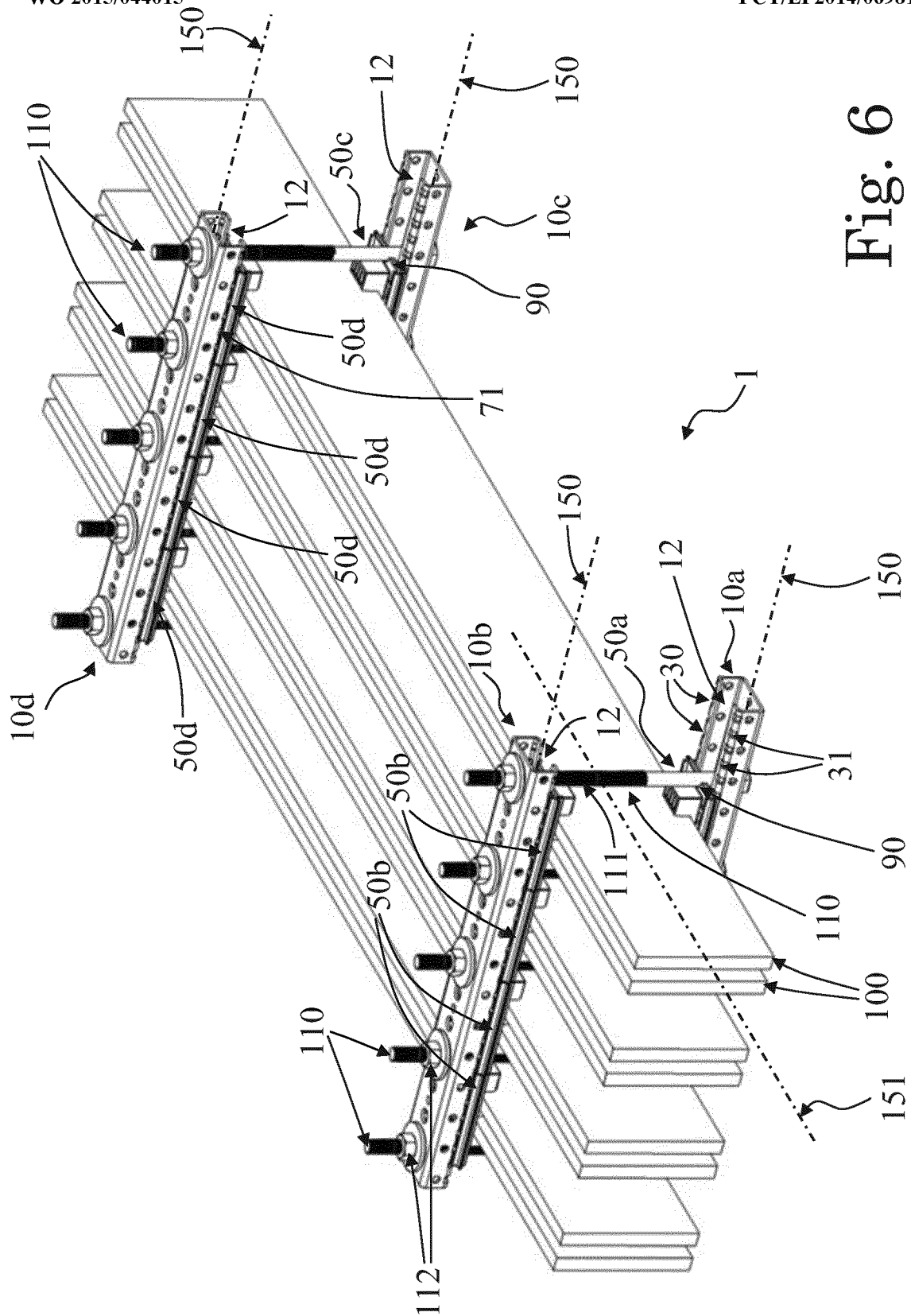


Fig. 5



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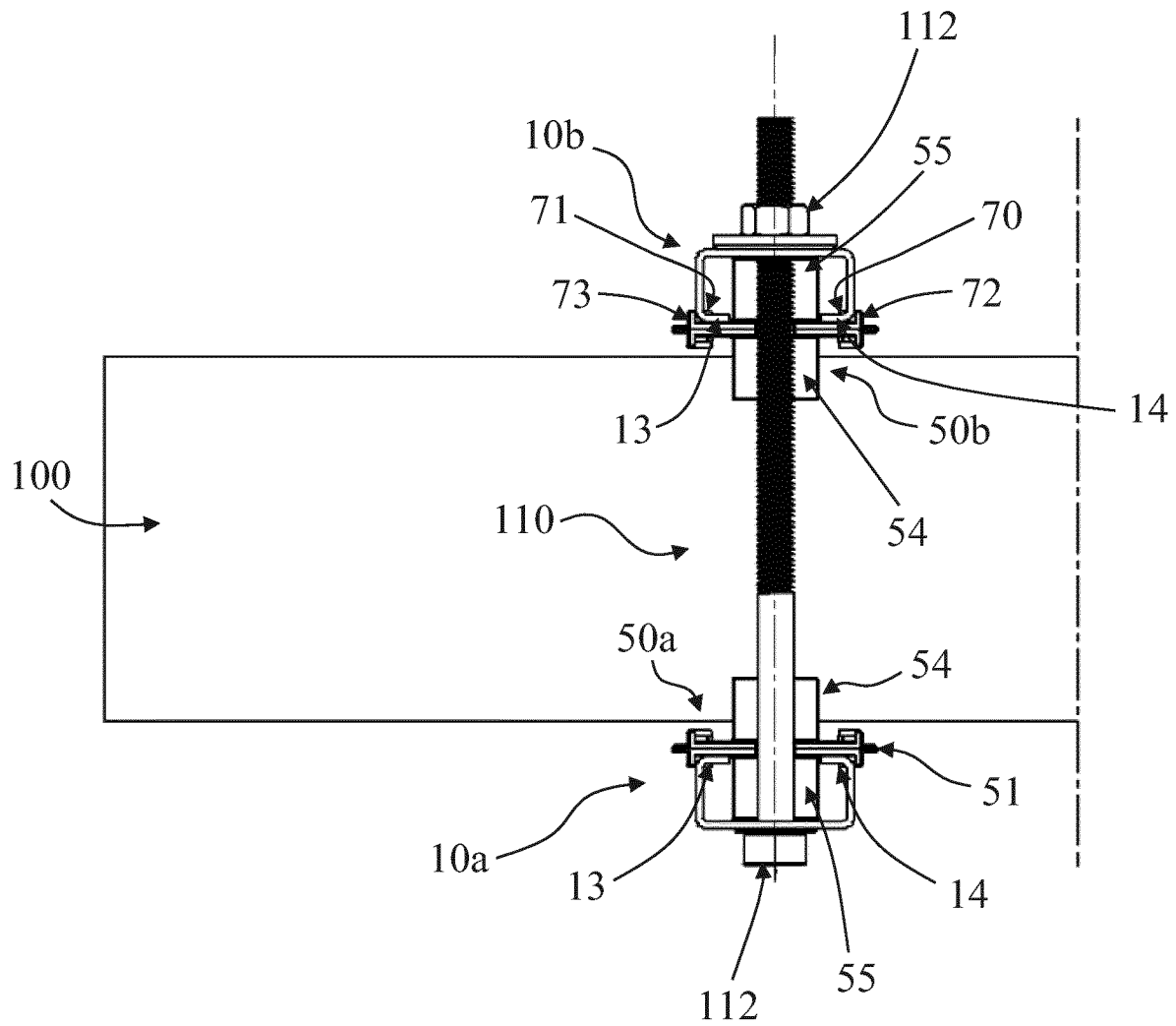


Fig. 7

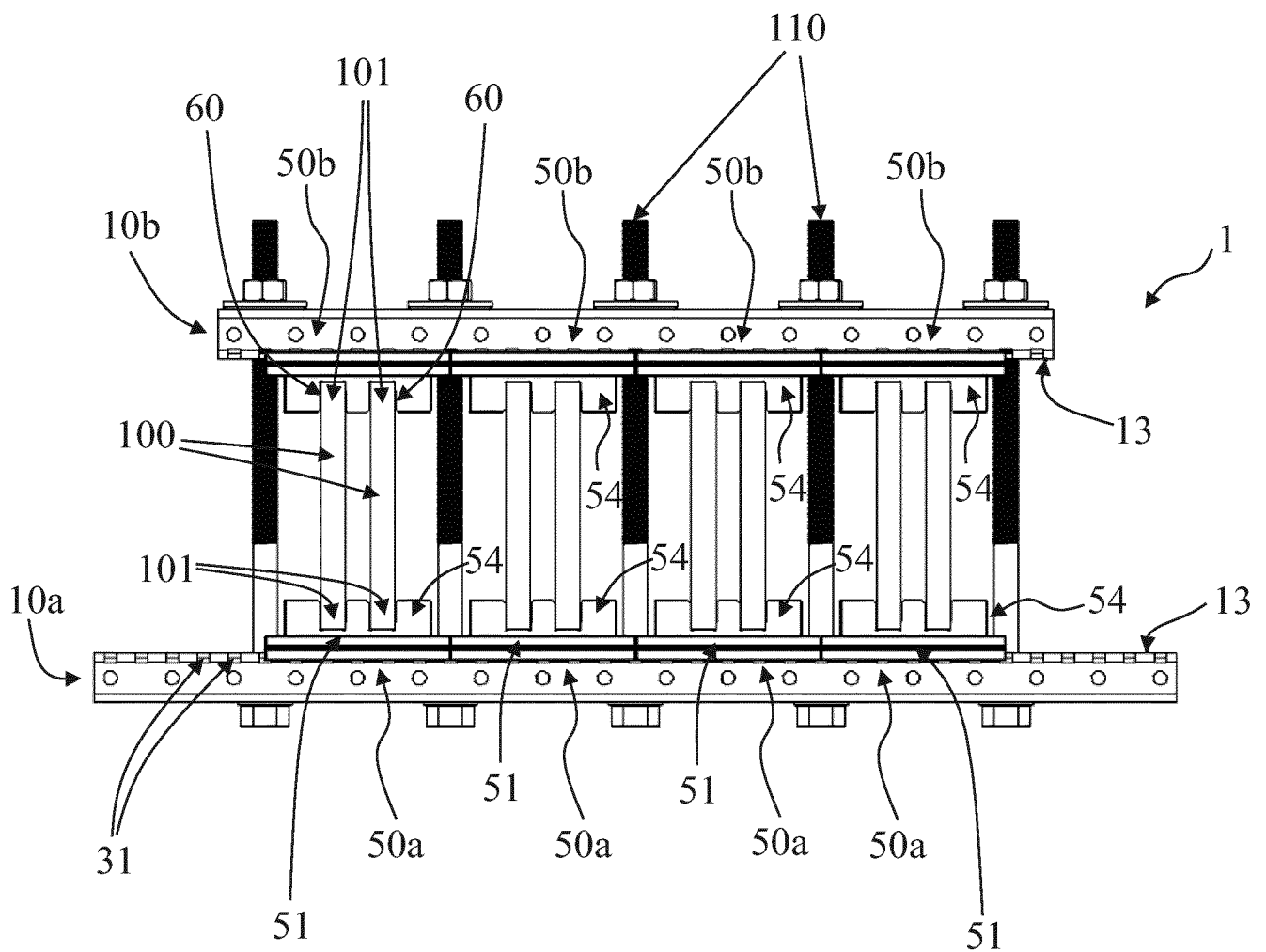


Fig. 8

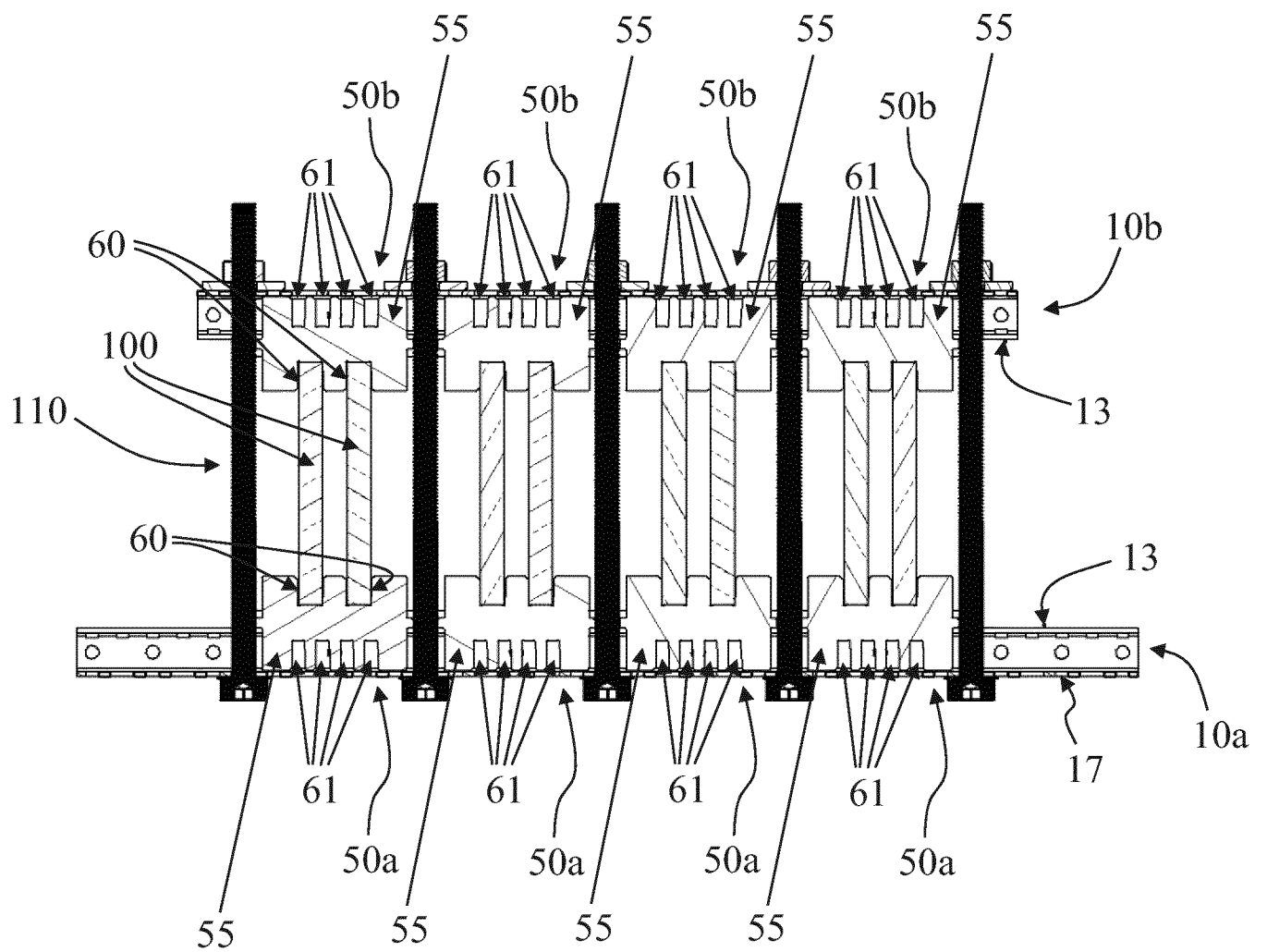


Fig. 9

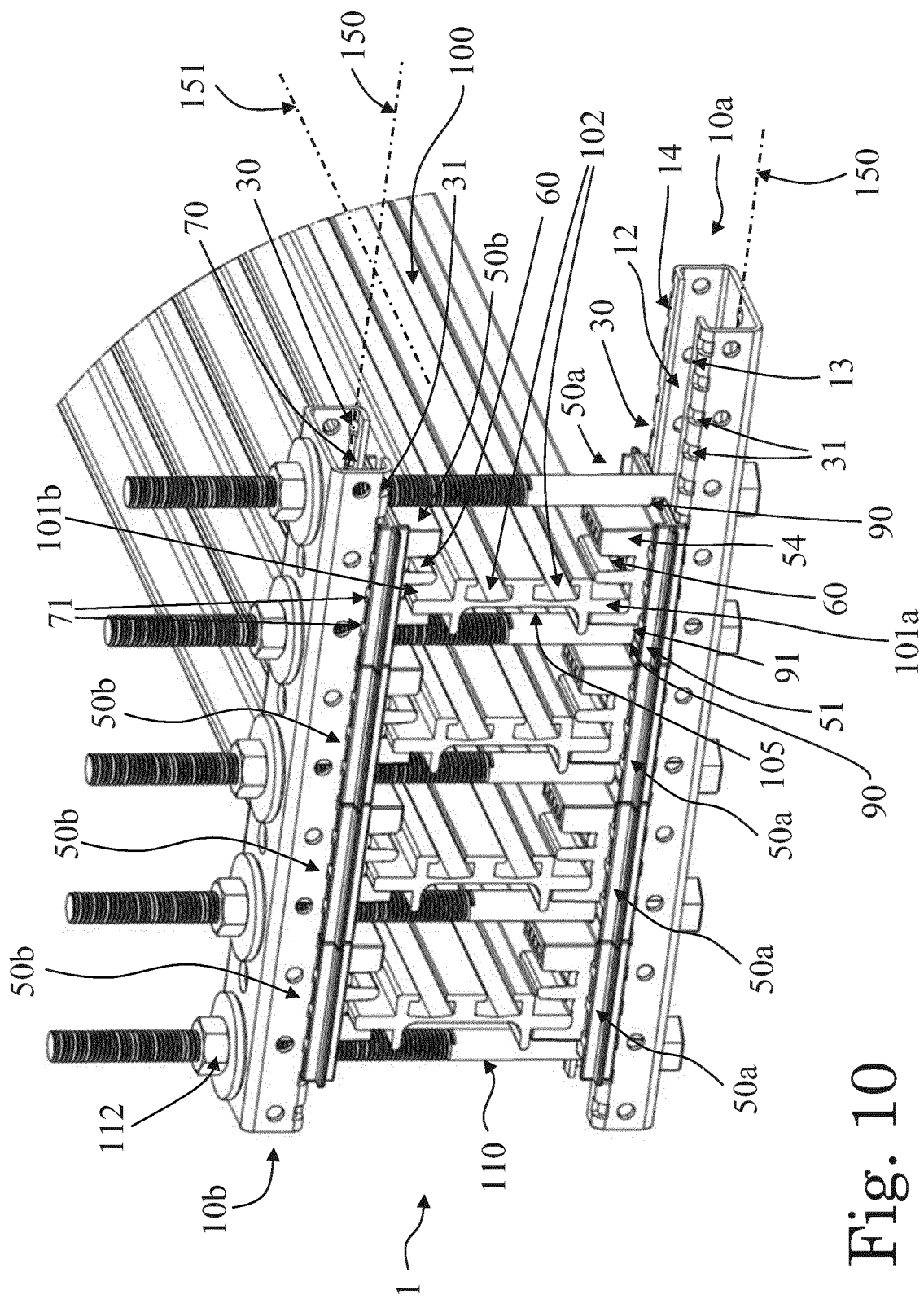


Fig. 10

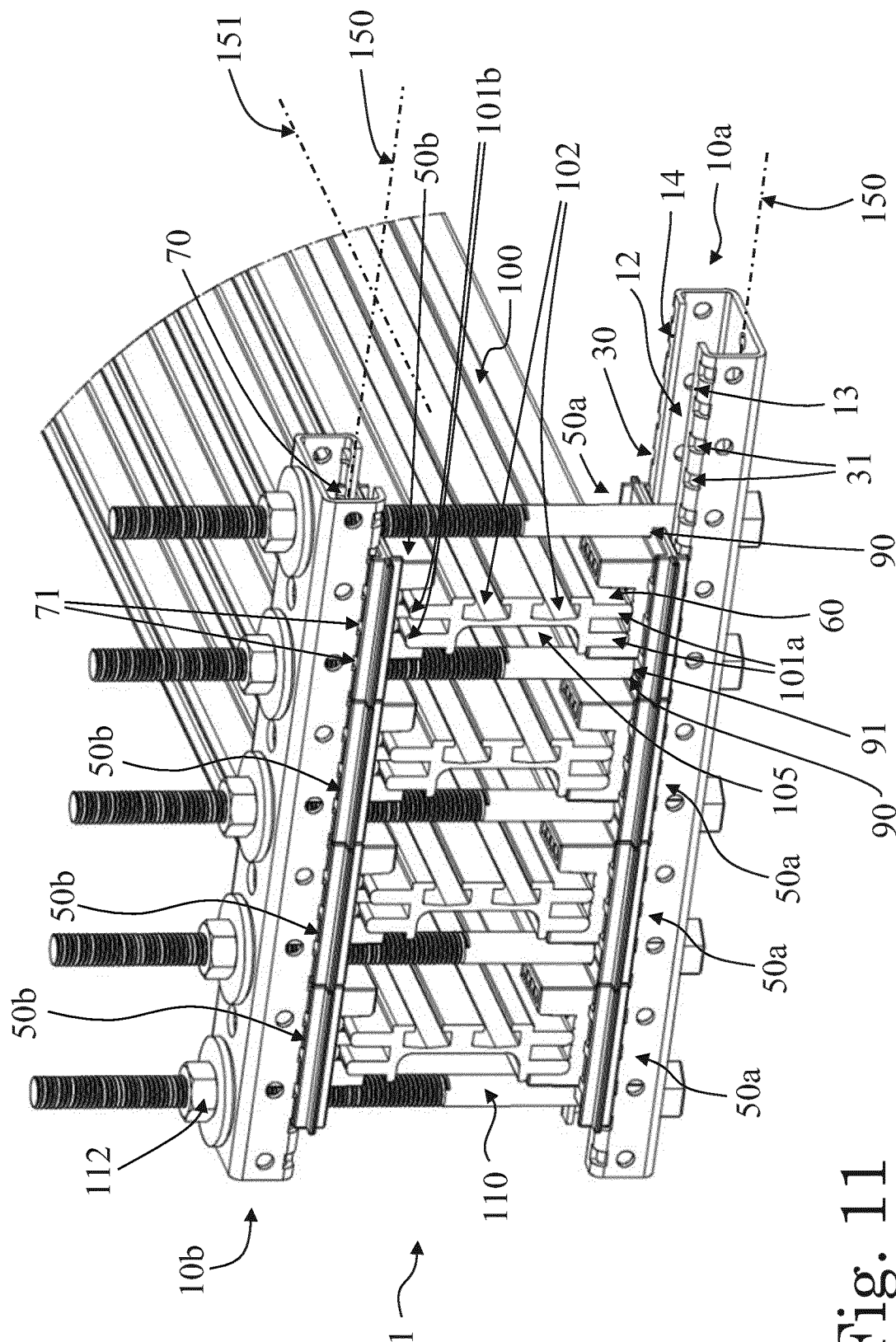


Fig. 11

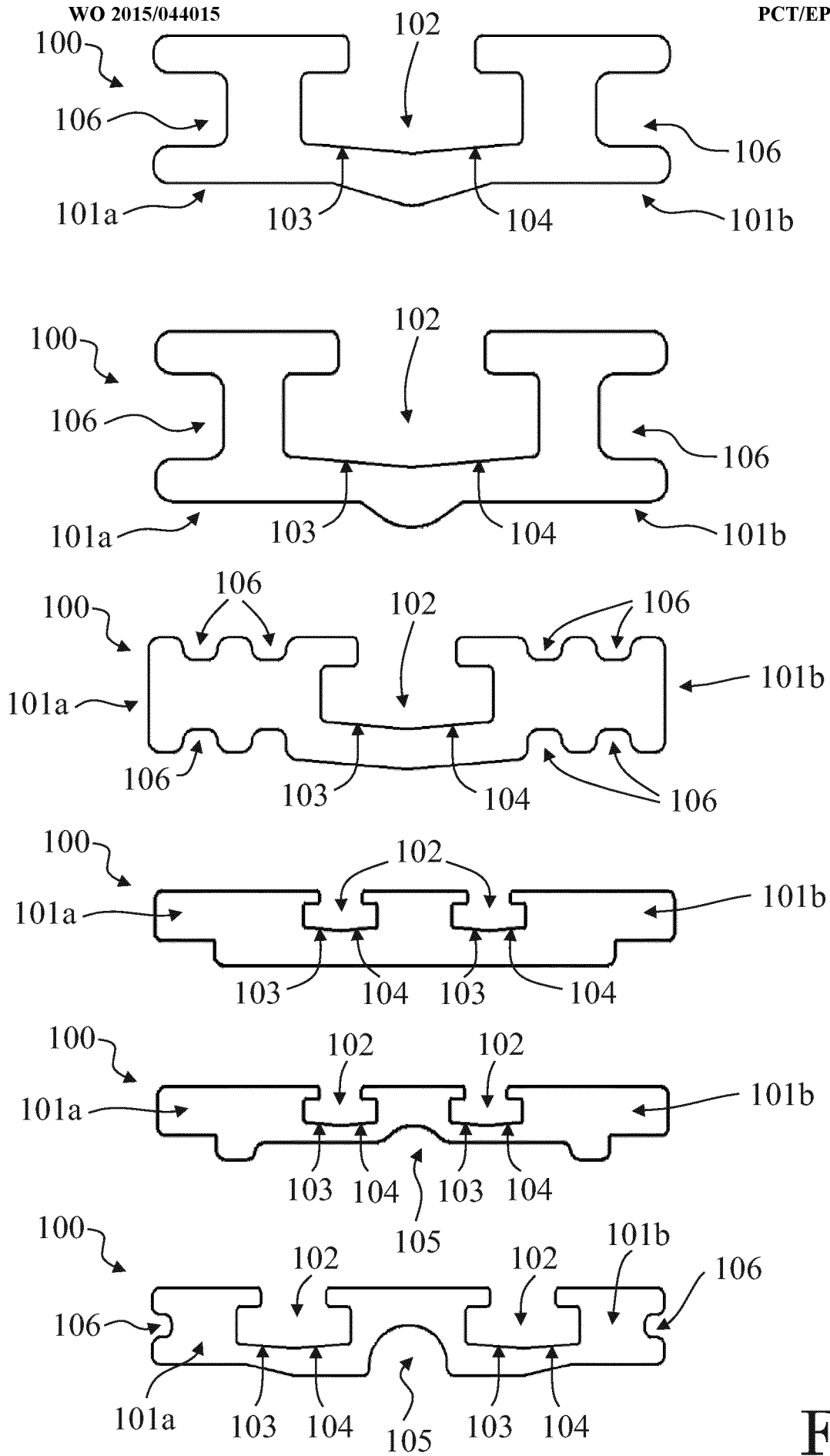


Fig. 12

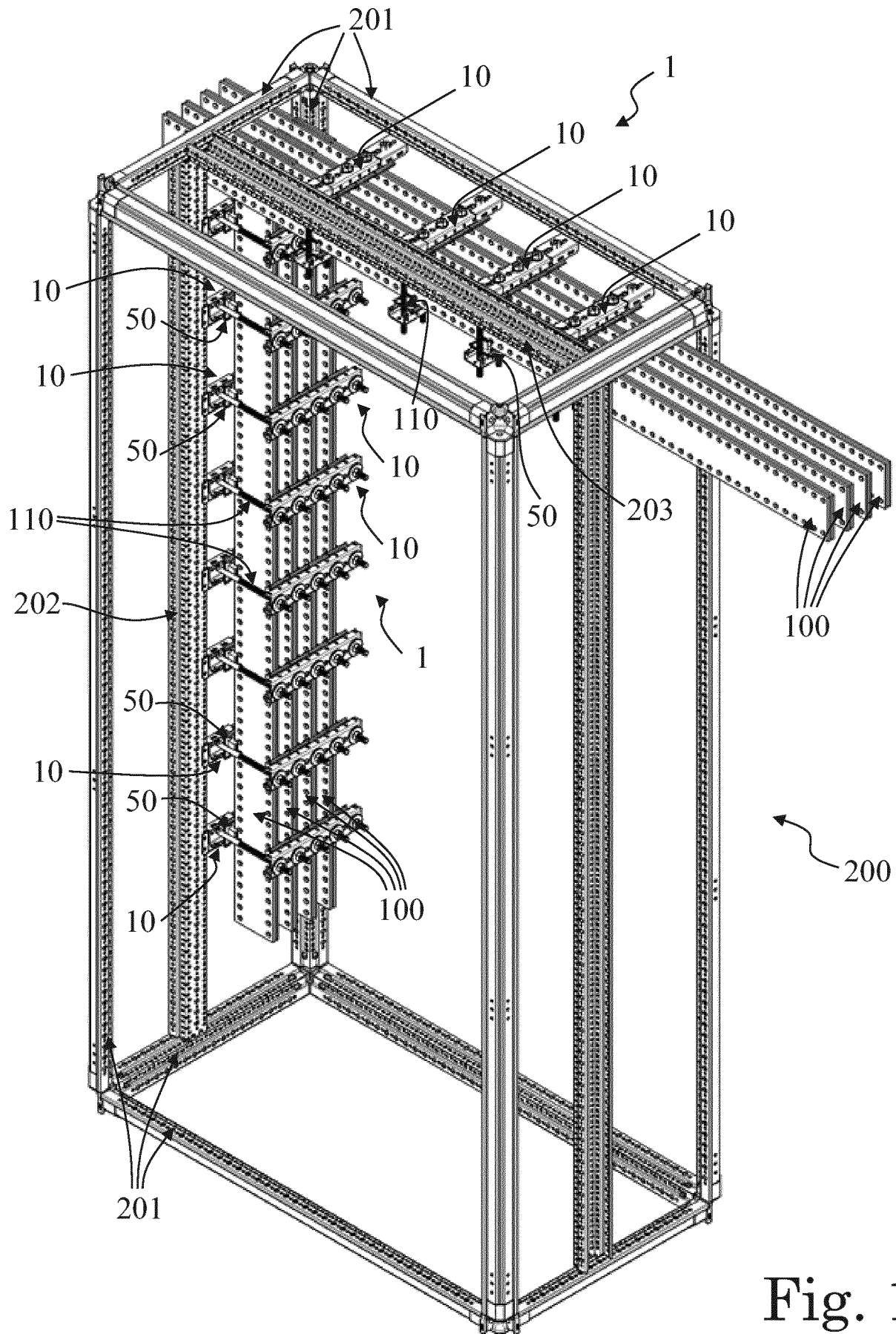


Fig. 13

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2014/069813

A. CLASSIFICATION OF SUBJECT MATTER
INV. H02G5/02
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H02G H02B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR 2 888 998 A1 (SOCOME SA SA [FR] SOCOME SA [FR]) 26 January 2007 (2007-01-26) figures 1,4,5	1
A	----- US 2001/028547 A1 (WAGENER HANS [DE]) 11 October 2001 (2001-10-11) paragraph [0027]; figure 3 -----	1



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

2 December 2014

Date of mailing of the international search report

09/12/2014

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2014/069813

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 2888998	A1	26-01-2007	NONE

US 2001028547	A1	11-10-2001	DE 10001463 A1 26-07-2001
			DK 1117162 T3 23-11-2009
			EP 1117162 A1 18-07-2001
			US 2001028547 A1 11-10-2001
