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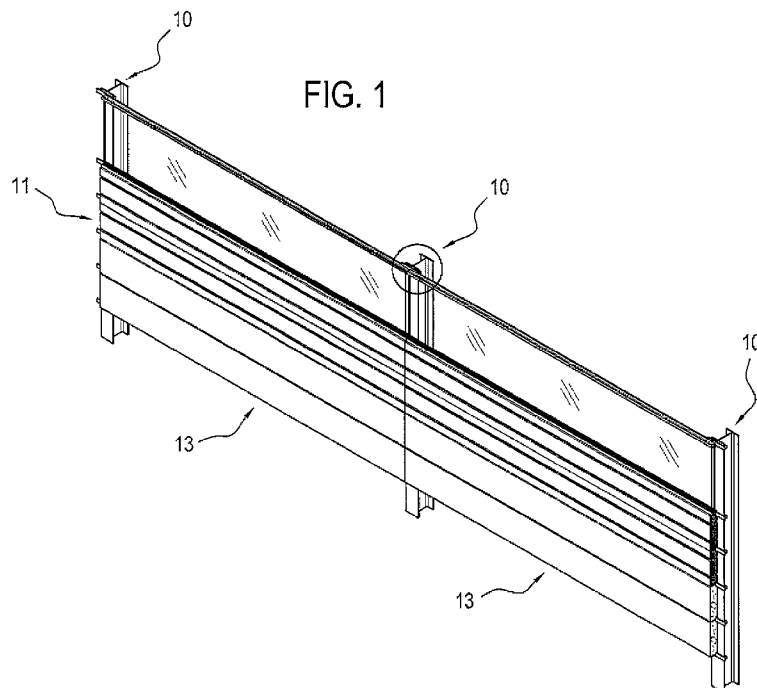
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(57) Abstract: A barrier (11) for infrastructures or constructions, preferably for separating lines of communication, such as railways, roads or highways, from the surrounding environment, comprising longitudinally spaced uprights (10), along the direction of extension of the barrier, which support corresponding panel means (13) of the barrier. The respective upright (10) comprises at least end wing-shaped means and there are means (15) for connecting panel means (13) to the respective upright (10). The connecting means (15) are designed to be inserted into a corresponding seat (17) provided in the means panel (13) and are preferably freely slideable along the upright (10).

DESCRIPTION

BARRIER

Technical field

This invention relates to a barrier, in particular which can be used for infrastructures or constructions and preferably for separating lines of communication, such as railways, roads or motorways, from the surrounding environment.

Background art

There are prior art barriers for separating lines of communication, such as railways, roads or highways, from the surrounding environment, which comprise longitudinally spaced uprights along the direction of extension of the barrier and which support corresponding panels, and wherein the respective upright is normally configured with an I-shaped cross section having corresponding end flanges.

In the prior art barriers, the means for connecting the panels to the respective upright have problems relating to the possibility of making, in an easy fashion, barriers in which the panels superpose the uprights, to allow an advantageous and improved appearance, in particular covering, or concealing, the presence of the supporting uprights of the barrier, at the same time maximising the surface of the panels of the barrier, with obvious advantages in terms of soundproofing and consequent optimising of the acoustic insulation.

Furthermore, the need is felt for barriers with systems for connecting the panels to the respective uprights, which are quick and easy to prepare and, in any case, flexible to use.

Disclosure of the invention

This invention therefore proposes a new solution as an alternative to the solutions known up to now and, more specifically, proposes to overcome

one or more of the above mentioned drawbacks and/or problems and/or to meet one or more of the needs felt in the trade or inferable from the above.

It is accordingly provided a barrier, in particular for infrastructures or constructions, preferably for separating lines of communication, such as railways, roads or the like, from the surrounding environment, the barrier comprising, in particular, longitudinally spaced uprights along the direction of extension of the barrier, which support corresponding panel means; the respective upright comprising corresponding flange means; there are means for connecting the panel means to the respective upright; characterised in that the connecting means are designed to insert in a corresponding seat provided in the panel means.

In this way, it is possible to achieve a fast and easy assembly of the barrier.

Brief description of the drawings

This and other innovative aspects, or specific advantageous features, are set out in the appended claims and its technical features and advantages are apparent from the detailed description which follows of preferred advantageous embodiments of it which must be considered purely as non-limiting examples; the description being made with reference to the accompanying drawings, in which:

- Figure 1 is a perspective view of a portion of a preferred embodiment of the barrier according to this invention;

- Figure 2 is a vertical cross section of the preferred embodiment of the barrier according to this invention;

- Figure 3 is a perspective view of a detail of the preferred embodiment of the barrier according to this invention;

- Figure 4a is a perspective view of a further detail, shown in partial cutaway, of the preferred embodiment of the barrier according to this invention;

- Figure 4B is a vertical cross section relative to the detail of Figure 4A;
- Figure 4C is a horizontal cross section relative to the detail of Figure 4A;
- Figure 5 is a horizontal cross section, similar to that of Figure 4C, showing a second preferred embodiment of the connecting means according to this invention;
- Figure 6 is a horizontal cross section, similar to that of Figure 4C, showing a third preferred embodiment of the connecting means according to this invention;
- Figure 7 is a vertical cross section, similar to that of Figure 4, showing the connection between two panels different to those illustrated in Figure 4B;
- Figure 8 is a vertical cross section, similar to that of Figure 4, showing the connection between concrete panels;
- Figure 9 is a vertical cross section, similar to that of Figure 4, showing the connection between a panel with a metal frame and a concrete panel;
- Figure 10 is a perspective view of a detail relative to a second preferred embodiment of connecting means according to this invention;
- Figure 11 is a horizontal cross section relative to the second preferred embodiment of the connecting means according to this invention;
- Figure 12 is a perspective view of a third preferred of connecting means according to this invention;
- Figure 13 is a vertical cross section of the third preferred embodiment of connecting means according to this invention;
- Figure 14 is a perspective view of a further preferred embodiment of the barrier according to this invention;
- Figure 15 is a perspective view of the upper part of the further preferred embodiment of the barrier according to this invention;
- Figure 16 is a perspective view of a detail of a second version of the further preferred embodiment of the barrier according to this invention;
- Figures 17A, 17B and 17C show, in respective vertical cross sections, a detail of a further preferred embodiment of a barrier, showing in detail the

connecting zone between the uprights and the panels of the barrier;

- Figures 18A, 18B show, respectively, in vertical cross sections and horizontal cross sections, a detail of a fourth preferred embodiment of connecting means, according to this invention;

- 5 - Figures 19A, 19B show, respectively, in vertical cross sections and horizontal cross sections, a detail of a fifth preferred embodiment according to this invention.

Detailed description of preferred embodiments of the invention

- 10 Figures 1 and 2 show a barrier 11 which is designed to delimit, or more specifically, to acoustically separate, routes from the surrounding environment, or more specifically, from the built-up areas which the routes pass through.

As illustrated, the barrier comprises a plurality of elongate structural elements, or uprights, 10, which are longitudinally spaced apart from each other along the line of extension of the barrier, or of the route, such as a railway, a road or a motorway, which the barrier is associated with.

The barrier 11 comprises a plurality of uprights, or elongate structural elements, 10 which support corresponding curtain means, more specifically panel means, which are in the form of corresponding acoustic insulation panels 13 positioned one above the other, the panels extending along, or filling, the longitudinal space between adjacent uprights 10 of the barrier

More specifically, elongate structural elements 10 are used in the barrier, comprising respective end flanges, in particular in the form of opposite first and second end flanges 12, 14, and core means 16 extending perpendicularly from the respective wing-shaped means 12, 14, in particular which extend across and connect the first and second end flanges 12, 14.

- 30 In the first preferred embodiment illustrated, the upright 10 has an I-shaped cross-section, which defines respective end flanges, or front flap,

12 for connecting the panel means 13.

Advantageously, means 15 are provided for connecting panel means 13 to the respective upright 10.

5 The connecting means comprise means for connecting the panel at one end of them and means for connecting, or gripping, the upright at the opposite end and which are connected with each other by intermediate connecting means.

Advantageously, the connecting means 15 are designed to insert into a corresponding seat 17 which is defined in the panel means 13.

10 Advantageously, the connecting means 15 are in the form of means for applying, on the panel means 13, a retaining action in a direction perpendicular to the upright 10, or to the barrier 11.

Further advantageously, the connecting means 15 are in the form of means which extend in front of the respective upright 10, so as to support
15 the panel means 13 in front of the upright 10.

Advantageously, the connecting means 15 are freely positionable, in particular in height, relative to the upright 10.

Further advantageously, the connecting means 15 are freely slidable along the upright 10, in such a way that they can be inserted on the
20 upright and freely positioned, in height, at a respective seat 17 of the panel means 13.

Advantageously, as illustrated, the connecting means 15 engage the flange 12, in particular the front flange 12 of the upright 10.

The connecting means 15 comprise means for gripping the upright 10, in
25 particular the corresponding flange 12 of the upright 10.

Advantageously, the connecting means 15 comprise gripping means in the general form of hook-shaped gripping means 151, 151.

According to a particularly advantageous embodiment, the connecting means 15 have first and second opposite gripping portions or hooks 151,
30 151.

More specifically, the first and second hook-shaped portions 151, 151 are

designed to grip opposite lateral edges of the flange 12 of the corresponding upright 10, to which they connect.

More specifically, the respective hook-shaped portion 151, 151 has an end 152, 152 for rear engagement of the respective flange 12 of the upright 10.

5 In practice, the respective gripping portion 151, 151 has a respective face 151a for rear engagement of the corresponding rear face of the flange 12 of the upright 10 and a lateral face 151b for the lateral edge of the same flange 12 of the upright 10, in front, the respective flange 12 of the upright 10 is engaged by the face 151c of the connecting body 15.

10 As illustrated, the hook-shaped elements 151, 151 are transversely spaced from each other so as to be inserted on the corresponding flange 12 of the upright 10, in particular for this embodiment being inserted on the flange at a respective end and made to slide along it to the desired position.

15 More specifically, the hooks 151, 151 are in the form of a corresponding squat body, in particular with a generally triangular shape, which extends from the portion for connecting to the insertion means, the connecting portion being described below in more detail. The squat body of the hook defines a respective rear gripping tooth 152 for the corresponding flange
20 12 of the upright 10.

In practice, the portions, or teeth, 152, 152 of the respective hook 151 extend towards each other, with a respective short stretch of interference, in a perpendicular direction, with the respective flange 12 of the upright.

According to a second preferred embodiment of the connecting means 15,
25 shown in Figure 5, the first and second hook-shaped portions 251, 251 have a tooth-shaped portion 253, 253, extending perpendicularly, that is, according to the direction of extension of the web 16 of the upright 10, for making an internal seat 254 for receiving a fin 121 perpendicular to the flange 12 of the upright 10, which in this embodiment is "C"-shaped.

30 The tooth-shaped portion 253, 253 defines a corresponding face 251d for engaging the face, in particular transversal, inside the fin 121 and an end

face 251e for laterally engaging with the outside of the main portion of the flange 12 which is "C"-shaped.

The tooth 253 has a free end, or front face, 251f, which faces towards the insertion portion in the panel, that is, the connecting portion, in particular
5 facing and spaced from the edge, or rear face 251g defined by this connecting portion, to define a corresponding slot designed to allow the insertion of a corresponding lateral portion of the front panel 122 of the flange, in particular of the "C"-shaped profile.

In practice, the respective connecting portion defines a corresponding
10 transversal bottom face 251g for the respective seat 254.

This defines means for gripping the end lateral fin 121 of the profile of the flange 12, which are, in particular, in the form of a corresponding seat 254 for inserting the end fin 121.

Preferably, the seat 254 is elongate perpendicularly and extends parallel
15 to the core 16 of the upright, that is to say, to the end fin 121 of the core having the shape of a "C".

The elongate perpendicular seat 254 defines transversal retaining means for the connecting element, in particular for transversal retaining of this to the respective upright, in particular, to the flange 12 of the respective
20 upright.

In practice, the means for gripping the connecting means 15 are designed to grip, according to the first preferred embodiment, a flange 12 shaped in the form of a plate flat, that is, a flange 12 in the shape of a "C", as described for the second embodiment of the connecting means 15
25 described above.

According to a third preferred embodiment of the connecting means 15, they are also designed to grip a corresponding flange 12 with a round shape, in particular tubular.

For that purpose, as may be inferred from Figure 6, opposite hook-shaped
30 portions 351, 351 wrap around a circumferential stretch of the round portion 12 of the upright and have a corresponding curved shape.

In practice, the first and second hook-shaped portions 351, 351 are defined by a tubular body 350 open behind in 351', which surrounds the round body 12 and is integral with the connecting portion of the connecting body 15, which supports the insertion means inside the respective seat of
5 the panel means.

In practice, the tubular element 350 has a rear gap 351', in particular positioned vertically in use and between the respective edges of which there is the core 16 of the upright 10.

Advantageously, the connecting means 15 have a portion, in particular an
10 end portion, 157 for inserting inside the respective seat 17 of the means panel 13.

Preferably, the insertion portion 157 extends vertically, or parallel, to the upright 10, or to the respective flange 12 of the same upright 10.

As illustrated, the insertion portion 157 extends, in particular
15 perpendicularly, from a connecting portion 155 of the body defining the connecting means 15.

In practice, in the first preferred embodiment of the connecting means, the first and second hook-shaped portions 151, 151, the insertion portion 157 and the intermediate connecting portion 155 define a single connecting
20 body, which is preferably made of conveniently metallic material and preferably made of steel.

More specifically, the connecting portion 155 and the gripping portion 151 are made, or defined, by a suitably shaped single portion or plate.

The connecting portion 155 extends transversely, in particular horizontally
25 in use, and is in the form of a corresponding flat plate element from the front end of which extends the insertion portion 157, preferably positioned vertically in use.

From another viewpoint, the connecting means 15 comprise means for connecting to corresponding panel means 13, labelled 157, and
30 connecting means 151, 151, in particular for gripping the corresponding upright 10, that is, the corresponding flange 12 of the upright 10.

It is defined a connecting portion 155 which extends between, and joins, the means 157 for connecting the corresponding panel means 13, that is, the insertion portion 157 in the seat 17 of the panel means 13, and the means 151, 151 for connecting, in particular for gripping, the upright 10.

- 5 As illustrated, as may be inferred from Figure 4B, the insertion portion 157 has a first and a second flange 157a, 157b.

More specifically, as may be inferred from Figure 4B, the insertion portion 157 has a respective flange 157a, which extends upwards from the connecting portion 155.

- 10 Further, the insertion portion 157 has a respective flange 157a, which extends downwards from the connecting portion 155.

Advantageously, the insertion portion 157 is in the form of a respective flat plate, in particular quadrangular in shape, preferably rectangular in shape, which extends transversely, in particular horizontally.

- 15 The result is that the connecting means 15 are substantially in the form of a body which has a cross section with a configuration in the general shape of a "T".

The insertion portion 157 defines a rear face 157p designed to engage with an opposite face of the seat 17 of the panel means 13.

- 20 Moreover, the insertion portion 157 defines a front face 155a designed to engage with an opposite face of the seat 17 of the panel means 13.

As illustrated, advantageously, the seat 17 for connecting to the upright is provided to the rear of the panel means 13.

- 25 As shown in particular in Figure 4B, the seat 17 has an opening 170, in particular as illustrated a rear opening, for the passage of the connecting means 15, especially for the connecting portion 155, into the connecting seat 17.

Advantageously, the connecting means 15 are designed to retain, simultaneously, a first and a second barrier panel 13, 13, in particular a first and a second barrier panel vertically superposed on each other.

- 30 As illustrated, advantageously, the connecting seat comprises a first and a

second respective seat, or half-seat, 171, 172 of panels 13, 13 adjacent to each other, in particular superposed over each other.

Advantageously, the respective connecting seat 171 is provided at the upper end, or upper edge, of the respective panel 13.

- 5 In practice, the seat 171 emerges at the top at the upper edge of the respective panel 13.

Moreover, the respective connecting seat 172 is provided at the lower end, or lower edge, of the respective panel 13.

- 10 In practice, the respective seat 172 emerges at the bottom at the bottom edge of the respective panel 13.

- In practice, the insertion portion 157 has a first engagement flange inside a respective connecting seat 171 of a first panel 13, in particular positioned above, and a second engagement flange inside the connecting seat 172 of a corresponding second panel 13, in particular positioned below.

- 15 In practice, the panels 13, 13, in use, that is to say, in the superposed condition, have the respective seats 171, 172 for the connecting means 15 which are facing each other and define an opening for inserting the connecting means 15 in the respective upright, or for the connecting portion 155 of these.

- 20 In practice, for assembling the barrier it is simply necessary to position a first lower panel 13, inserting on the upright the respective connecting means, or body, 15, in such a way as to insert the insertion portion of these inside the upper seat 171 of the panel already positioned, and then positioning the upper panel 13 in such a way that the seat 172, provided at the lower end of this panel, which is positioned at the top, inserts above, that is, encloses, the insertion portion 157 of the connecting means 15. This is all done in an extremely quick and easy fashion without having to define, in advance, the zones in which the connecting means must be set up and without having to operate inside the flanges of the upright for fixing the panel to the upright.

As may be inferred, the respective seat 17, 171, 172 of the respective panel extends horizontally, that is to say, along the main and longitudinal direction of extension of the panel 13.

In practice, the seat 17, 171, 172 extends preferably for a short horizontal
5 or longitudinal stretch of the respective panel.

Moreover, the respective seat 17, 171, 172 extends vertically, or in height, in particular for a stretch less than the longitudinal or horizontal length of the same seat.

As illustrated, the respective connecting seat 171, 172 has an engaging
10 and retaining rear wall 171p, 172p for the insertion means 157.

Moreover, as may be inferred in particular from Figure 4B, the respective connecting seat 171, 172 has a respective bottom wall 171f, 172f and a respective front wall 171a, 172a, which is opposite the corresponding rear wall 171p, 172p.

15 In practice, the front and rear vertical walls of the respective seat 171, 172 extend perpendicularly to the respective horizontal bottom wall.

In practice, the bottom wall of the upper seat 172 defines, basically, the top wall of the seat 17 formed in its entirety by the half-seats 171, 172.

Advantageously, the connecting means, or body, 15 are designed to
20 retain, simultaneously, a first, a second, a third and a fourth panel 13, in particular in pairs of panels vertically superposed and placed alongside each other, as may be easily inferred from Figures 4B and 4C.

Advantageously, the connecting seat 17 comprises a first and a second pair of respective seats vertically facing each other 171, 172 of vertically
25 superposed panels, the pairs of seats 171, 172 of vertically superposed panels being placed alongside each other.

The insertion portion 157 has respective transversal or horizontal flange portions, which are designed to engage relative connecting seats of panels placed alongside each other, in particular horizontally placed
30 alongside each other.

Advantageously, the respective seat 171, 172 of the respective panel is

open at the top or bottom, that is to say, it emerges at an upper or lower edge of the corresponding panel.

Moreover, the respective seat 171 of the respective panel 172 is also open at the lateral edge of the panel.

- 5 In practice, the seats 171, 172 open, as well as above or below, to the side of the panel, that is to say, they emerge at a side edge, or face, of the corresponding panel.

Advantageously, the respective panel 13 has a rear edge, in particular at the respective upper or lower edge of the panel, the rear edge leading into
10 the respective connecting seat 171, 172 and being withdrawn relative to the edge, in particular at the top or bottom, of the corresponding panel 13 to define, in use, that is to say, with panels superposed, a corresponding opening 170 for passage of the connecting means 15, that is, for the respective connecting portion 155.

- 15 As shown, the above mentioned Figure 4B, the respective panel 13 has a metallic supporting, or outer, structure which can be suitably shaped to define a corresponding seat 171, 172 for receiving the means 15 for connecting to the upright.

More specifically, the metallic structure, preferably made of steel, is
20 designed to support a corresponding transparent panel, that is to say, to encase corresponding noise insulation means or elements.

Obviously, as illustrated in Figure 7, the seats 171, 172 could be provided at the upper and lower zone of identical panels, that is to say, having an outer metallic support structure, which houses inside a corresponding
25 acoustic insulation body.

As illustrated in Figure 8, the connecting seats 171, 172 are also provided with corresponding barrier panels 13, 13 made from corresponding concrete.

In the preferred embodiment, the connecting seats 171, 172 are made
30 directly in the corresponding concrete material and are in the form of corresponding grooves, or recessed cavities, which open onto the upper

and/or lower edge of the corresponding panel, as well as the corresponding lateral edge thereof.

Figure 9 illustrates a situation in which the connecting means 15 connect together panels made, respectively, of concrete and a metallic covering, or supporting, structure, showing the advantageous flexibility of use of the connecting means 15.

Advantageously, according to a second preferred embodiment of the connecting means 15, illustrated in Figures 10 and 11, they comprise first and second distinct parts 15', 15'', the first and second parts of the connecting means being preferably, as illustrated, placed side by side and slightly spaced from each other, that is, they have respective opposite edges 159', 159'' which are slightly spaced from each other, in particular positioned at panels placed alongside each other. Labels 13', 13' in Figure 11 denote the opposite edges of the panels placed horizontally alongside each other.

As illustrated, each part 15', 15'' of the connecting means has a cross section in the general shape of a "T" and is preferably made of suitable metallic material.

In practice, advantageously, the first and second distinct parts 15', 15'' comprise a respective hooked-shaped element, or portion, 151', 151'' which are opposite each other and designed to grip the respective upright, that is to say, the opposite lateral edges of the flange of the corresponding upright.

Also, advantageously, the first and second distinct parts 15', 15'' comprise respective means, or vertical plate, 157', 157'' for inserting in the connecting seat 17 of the panel means 13, the insertion means being connected to the gripping means 151', 151'' by corresponding connecting means, or portion, 155', 155'', substantially similar to that described with regard to the first preferred embodiment of the connecting means 15.

Figures 12 and 13 illustrate a third preferred embodiment of connecting means of corresponding panels 13, 13.

In the third preferred embodiment of the connecting means, the connecting means 451 are made as one with the respective upright of the barrier, and in particular with the respective flange 12 of the upright.

More specifically, the connecting means 451 comprise a plurality of
5 connecting portions 451, which are vertically distributed, in particular, and equispaced from each other, on the respective upright, preferably centrally to the respective flange 12 of the upright.

As illustrated, the connecting portion 451 extends forwards from front face of the flange 12 of the corresponding upright 10, that is to say, it extends
10 in front of the upright 10 and has the general shape of a "L", the front flange of which extends upwards.

As may be inferred from Figure 13, the hook-shaped portion 451 inserts inside a corresponding seat facing downwards, denoted by the numeral 452, of a corresponding lower panel, whilst a fin protruding downwards
15 from an upper panel, which is denoted by the numeral 453, inserts between the rear wall of the seat 452 and the opposite face of the upright, that is, of the flange 12 of the upright 10.

Advantageously, the connecting means 15 are designed to support the panel means 13 front of the respective upright 10.

20 As illustrated, the panel means 13 have respective side edges, which cover at least partly the respective upright 10.

In a further preferred embodiment of the barrier illustrated in Figures 14 and 15, the connecting means 15, which are identical to those of the first preferred embodiment, are used both on the front flange and on the rear
25 flange, respectively 12 and 14 of the upright, in order to retain corresponding panel means which, however, comprise solely of shaped metallic covers, or plates, defining respective seats similar to those of the embodiments of panels described above.

The panel means or rear or front covering elements are labelled 513 in the
30 figures.

More specifically, the seats 517 consist of a respective lower half-seat of

the lower panel or covering and a matching upper half-seat of the upper panel, or covering.

There are also, labelled 514, upper covering means, in the form of a respective flat sheet having respective lateral retaining flanges, which face
5 downwards and are designed to be inserted between the respective seat of the lateral covering element 513 and the element for inserting and retaining the connecting means 15.

According to another version of the further preferred embodiment, as illustrated in Figure 16, it may be inferred that the covering sheet elements
10 513 have only a receiving seat 617 located at the upper part of the respective panel, whilst below the panels there is a corresponding bracket in the shape of a "U", having fins facing downwards, and denoted by the numeral 619, the bracket 619 extending between covering elements, or panels, facing front and rear walls of the barrier.

15 The bracket 619 rests and grips corresponding elements for inserting the connecting means 15 positioned below.

According to a further preferred embodiment of a barrier, illustrated in Figures 17A to 17B, is possible to see how, in particular for the barrier panels made of concrete, the connecting seats 771, 772 of the connecting
20 means are obtained using a corresponding profile 773, preferably metallic, in the general shape of an "L", comprising a first flange 771p, 772p which defines the rear wall of the corresponding seat and a respective second flange 771f, 772f, defining the bottom of the seat and which extends with the respective free end, which is embedded inside the material of the
25 panel, in particular of the concrete. The flange 771f, 772f defines corresponding means for connecting to the panel for the profile of seat 773.

In practice, the seats 771, 772, are at least partly made in the corresponding material, in particular in the concrete, which defines the
30 respective front wall 771a, 772a of the respective seat 771, 772, the seats opening at the upper and/or lower edge of the corresponding panel, as

well as the corresponding lateral edge.

When the seat 772 opens at the upper edge of the upper panel of the stack of panels, forming means of infilling of the barrier, the connecting means, or element, 15 only have the portion, or flange, 157b which is
5 directed downwards from the connecting portion 155 of the connecting means, or element.

Alternately, when the seat 771 opens at the lower edge of the lower panel of the stack of panels, forming means of infilling of the barrier, the connecting means, or element, only have the portion, or flange, 157a
10 which is directed upwards from the connecting portion 155 of the connecting means, or element.

As may be inferred, the connecting means, or element, 15 can therefore comprise a single portion, or flange, for hooking or insertion inside the respective connecting seat of the corresponding panel.

15 Figures 18A and 18B illustrate a fourth preferred embodiment of the connecting means 15 for a barrier, which is substantially similar to the embodiment in Figure 5, being aimed at defining a connection for an upright flange shaped like a "C", which has been modified as illustrated in the embodiment of Figures 10 and 11, that is, in such a way as to have
20 means for connecting the panel to the upright which comprise first and second distinct parts 815', 815", the first and second parts of the connection means being preferably, as illustrated, placed side by side and slightly spaced from each other, that is, having respective opposite edges which are spaced from each other.

25 As illustrated, each part 815', 815" has a cross section in the general shape of a "T" and is preferably made of suitable metallic material.

In practice, advantageously, the first and second distinct parts 815', 815" comprise a respective hooked-shaped element, or portion, 851', 851" which are opposite each other in use and designed to grip the respective
30 upright, that is to say, the opposite edges, or fins, of the C-shaped flange 12 of the upright.

In practice, in a similar fashion to the second preferred embodiment shown in Figure 5, the respective connecting portion 851' and 851" also has a tooth-shaped portion 253, extending perpendicularly, that is, according to the direction of extension of the web 16 of the upright, for making an
5 internal seat 254 for receiving an end fin 121 of the flange 12 of the "C"-shaped upright.

The tooth-shaped portion 253, 253 defines a corresponding face 251d for engaging the face inside the fin 121, whilst an opposite face 251e provides rear engagement for the portion 121 of the flange 12 which is "C"-shaped.
10 The tooth 253 of the respective part 851', 851" has a free end, or front face, 251f, which faces towards the insertion portion in the panel, that is, the connecting portion, in particular facing and spaced from the edge, or rear face 251g defined by this connecting portion, to define a corresponding slot designed to allow the insertion of a corresponding
15 lateral portion of the front panel 122 of the flange, in particular of the "C"-shaped profile.

In practice, the respective connecting portion defines a corresponding transversal bottom face 251g for the respective seat 254.

This defines means for gripping the end lateral fin 121 of the profile of the
20 flange 12, which are, in particular, in the form of a corresponding seat 254 for inserting the end fin 121.

Preferably, the seat 254 is elongate perpendicularly and extends parallel to the core 16 of the upright, that is to say, to the end fin 121 of the core having the shape of a "C".

25 The elongate perpendicular seat 254 defines transversal retaining means for the connecting element, in particular for transversal retaining of this to the respective upright, in particular, to the flange 12 of the respective upright.

In practice, the connecting means 15 can be coupled to the upright in a
30 slidable fashion along the longitudinal direction of the upright.

The connecting means 15 can be coupled to the upright in a slidable

fashion along the front flange of the same upright.

The connecting means 15 can be coupled to the respective panel by inserting a respective connecting portion in a respective seat for receiving the panel.

- 5 Figures 19A and 19B illustrate a fifth preferred embodiment of connecting means 15 for a barrier, which are in the form of connecting means 15 which are adaptable, in particular selectively adaptable, to the respective panels and uprights to be connected, in particular adaptable to various configurations of the same flange 12 of the corresponding upright.
- 10 From another viewpoint, the connecting means 15 for a barrier are equipped with means designed to selectively modify, or adjust, the distance between the means, or portion, for coupling the upright, that is, to the flange 12 of the upright, and the means, or portion, for insertion or coupling to the respective panel.
- 15 More specifically, the connecting means 15 for a barrier are equipped with means designed to modify, or adjust, the perpendicular position, or perpendicular distance, of the means, or portion, for coupling the upright, that is, to the flange 12 of the upright, and the means, or portion, for insertion or coupling to the respective panel.
- 20 More specifically, advantageously, in this fifth preferred embodiment of the barrier, the connecting means 955, between the means for gripping the upright 951 and the means 957 for inserting in the respective connecting seat of the panel 13, comprise a respective rod 955a having respective means 955b, 955c for retaining the respective gripping portion 951, the
- 25 retaining means 955b, 955c being movable and positionable along the rod 955a.
- More specifically, the rod 955 is in the form of a screw, threaded at least at the free end zone, extending perpendicularly to the panel 13 into a corresponding transversal and vertical plate 957, defining the means for
- 30 inserting inside the seat of the corresponding panel, and at the opposite end of the screw there are means 955b, 955c, in particular a nut and lock

nut, which are designed to fix the above-mentioned gripping means 951 of the flange of the upright.

In practice, as may be inferred, the extension screw 955 has a large retaining head 955d inside a corresponding seat of the plate 957 for
5 insertion in the seat of the panel, the plate 957 is extending, as illustrated, preferably, vertically.

The screw 955 supports at its free end corresponding nut and lock nut 955b, 955c designed to retain a transversal portion 951a of the means 951 for connecting the flange of the upright, with the screw 955, which passes
10 through a corresponding hole provided in the connecting portion 951a.

In turn, the means 951 for coupling the upright comprise respective means for gripping the upright, in particular the flange 12 of the upright, which preferably can be, as illustrated, in the form of a corner or "L"-shaped profile, suitable for gripping, in particular, a corresponding fin of a "C"-
15 shaped upright profile, which could, however, also be made in any suitable manner, especially in the form of a simple transversal plate suitable for fastening a corresponding end of a flat flange 12 of an upright having a corresponding "I" shape.

In practice, the corner or L-shaped profile for gripping the upright has a
20 transversal portion 951a and a perpendicular portion 951b, extending from the end of the transversal portion, which are designed to engage the free end of a fin 121 of a flange 12 of the upright.

More specifically, the perpendicular portion 951b extends on the inside of the fin 121 of the flange of the upright.

25 By suitably operating the nut and locknut 955b, 955c, it is possible to conveniently move the gripping means 951 along the rod 955a and suitably lock the flange of the upright 12.

The connecting means, or element, 15 substantially provide slidable joints which do not limit the panels to a predetermined position, but which adapt
30 them to the position that the panels actually have in use.

In practice, means, or element, are obtained which have an extremely

flexible use and which are particularly suitable for allowing the setting up of barriers with particularly advantageous tolerances.

In practice, this avoids the use of fixing devices between panels and uprights of the barrier which must be positioned in a stationary fashion.

- 5 The invention described above is susceptible of industrial application. It would be obvious to one skilled in the art that several changes and modifications can be made to the invention without departing from the spirit and scope of the invention, described in depth above. It is also easy to imagine further embodiments of the invention comprising one or more of
- 10 the features described herein. Moreover, it will be understood that all the details of the invention may be substituted for technically equivalent elements.

CLAIMS

1. A barrier (11), in particular for infrastructures or constructions, preferably for separating lines of communication, such as railways, roads or the like, from the surrounding environment, the barrier comprising
5 longitudinally spaced uprights (10) along the direction of extension of the barrier, which support corresponding panel means (13); the respective upright (10) comprising corresponding flange means; there are means (15) for connecting the panel means (13) to the respective upright (10); characterised in that the connecting means (15) are designed to insert in a
10 corresponding seat (17) provided in the panel means (13).
2. The barrier according to claim 1 or according to the preamble to claim 1, characterised in that the connecting means (15) are in the form of means for applying, on the panel means (13), a retaining action in a direction perpendicular to the upright (10).
- 15 3. The barrier according to any one of the preceding claims or according to the preamble to claim 1, characterised in that the connecting means (15) have means (157) for anchoring the corresponding panel means (13) and corresponding means (151, 151) for anchoring, in particular gripping, to the upright (10).
- 20 4. The barrier according to any one of the preceding claims or according to the preamble to claim 1, characterised in that the connecting means (15) are in the form of means which extend in front of the respective upright (10).
5. The barrier according to any one of the preceding claims or
25 according to the preamble to claim 1, characterised in that the connecting means (15) are freely positionable relative to the upright (10).
6. The barrier according to any one of the preceding claims or according to the preamble to claim 1, characterised in that the connecting means (15) are freely slidable along the upright (10).
- 30 7. The barrier according to any one of the preceding claims or according to the preamble to claim 1, characterised in that the connecting

means (15) engage with the flange (12) of the upright (10).

8. The barrier according to any one of the preceding claims or according to the preamble to claim 1, characterised in that the connecting means (15) have hook-shaped means for gripping the upright (10), in particular the corresponding flange (12) of the same upright (10).

9. The barrier according to claim 8, characterised in that the connecting means (15) have a first and a second opposite hook-shaped gripping portions (151, 151), in particular the first and second opposite hook-shaped portions (151, 151) are designed to grip opposite lateral ends of the flange (12) of the corresponding upright (10).

10. The barrier according to claim 8 or 9, characterised in that the respective hook-shaped portion (151, 151) has a respective end (152, 152) for rear engagement of the respective flange (12) of the upright (10), in particular the respective gripping portion (151, 151) has a respective face (151a) for rear engagement of the corresponding rear face of the flange (12) of the upright (10) and a lateral face (151b) for the lateral edge of the same flange (12) of the upright (10), in front, the respective flange (12) of the upright (10) is engaged by the face (151c) of the body forming the connecting means (15).

11. The barrier according to any one of the preceding claims, characterised in that the means for gripping the connecting means (15) are designed to grip a flange (12) shaped in the form of a flat plate, or in that the means for gripping the connecting means (15) are designed to grip a flange (12) shaped in the form of a "C", or in that the means for gripping the connecting means (15) are designed to grip a flange (12) having a round shape, in particular tubular.

12. The barrier according to any one of the preceding claims, characterised in that the respective first and second hook-shaped portions (251, 251) have a tooth-shaped portion (253, 253), extending perpendicularly, that is, according to the direction of extension of the web (16) of the upright (12) for making an internal seat (254) for receiving a fin

(121) perpendicular to the flange (12) of the upright (10).

13. The barrier according to any one of the preceding claims, characterised in that the first and second hook-shaped portions (351, 351) are formed by a tubular body open at the rear which surrounds the round
5 body (12) of the flange of the upright (10).

14. The barrier according to any one of the preceding claims or according to the preamble to claim 1, characterised in that there is a connecting portion (155) between the means (157) for anchoring the corresponding panel means (13) and the corresponding means (151, 151)
10 for anchoring, in particular gripping, to the upright (10).

15. The barrier according to claim 14, characterised in that the connecting portion (155) extends transversely, in particular horizontally.

16. The barrier according to claim 14 or 15, characterised in that the connecting portion (155) is in the form of a corresponding flat plate.

15 17. The barrier according to any one of the preceding claims or according to the preamble to claim 1, characterised in that the connecting means (15) have a portion, in particular an end portion, (157) for inserting in the respective seat (17) of the panel means (13).

18. The barrier according to claim 17, characterised in that the insertion
20 portion (157) extends vertically or parallel to the upright (10) or to the respective flange (12) of the same upright (10).

19. The barrier according to claim 17 or 18, characterised in that the insertion portion (157) extends, in particular perpendicularly.

20. The barrier according to any one of the preceding claims 17 to 19,
25 characterised in that the insertion portion (157) has a respective engagement flange (157a) extending upwards relative to the connecting portion (155), and/or in that the insertion portion (157) has a respective engagement flange (157b) extending downwards relative to the connecting portion (155).

30 21. The barrier according to any one of the preceding claims 17 to 20, characterised in that the insertion portion (157) is in the form of a flat plate.

22. The barrier according to any one of the preceding claims or according to the preamble to claim 1, characterised in that the connecting seat (17) is provided to the rear of the panel means (13).

23. The barrier according to any one of the preceding claims or
5 according to the preamble to claim 1, characterised in that the seat (17) has an opening (170), in particular a rear opening, for passage of the connecting means (15), in particular of the connecting portion (155), inside the connecting seat.

24. The barrier according to any one of the preceding claims or
10 according to the preamble to claim 1, characterised in that the connecting means or body (15) are designed to retain simultaneously a first and a second panel (13, 13), in particular a first and a second panel vertically superposed and/or a first and a second panel alongside each other.

25. The barrier according to claim 24, characterised in that the
15 connecting seat (17) comprises a first and a second seat facing each other (171, 172) of respective panels adjacent to each other, in particular superposed on each other and/or seats alongside each other of panels alongside each other.

26. The barrier according to claim 24 or 25, characterised in that the
20 insertion portion (157) has a first engagement flange inside a respective connecting seat (171) of an upper panel and a second engagement flange inside the connecting seat (172) of a corresponding lower panel.

27. The barrier according to claim 25 or 26, characterised in that the
25 insertion portion (157) has respective flange portions, which are designed to engage inside respective seats alongside each other for connecting panels alongside each other.

28. The barrier according to any one of the preceding claims or according to the preamble to claim 1, characterised in that the respective connecting seat (171) is provided at the upper end of the respective panel.

30 29. The barrier according to any one of the preceding claims or according to the preamble to claim 1, characterised in that the respective

connecting seat (172) is provided at the lower end of the panel.

30. The barrier according to any one of the preceding claims or according to the preamble to claim 1, characterised in that the respective connecting seat (17, 171, 172) of the panel extends according to the main
5 longitudinal direction of extension of the same panel (13), and/or the respective seat (17, 171, 172) of the panel extends vertically, in particular for a stretch less than the longitudinal length of the same seat.

31. The barrier according to any one of the preceding claims, characterised in that the respective connecting seat (171, 172) has an
10 engaging and retaining rear wall (171p, 172p) for the insertion means (157), and/or a front wall (171a, 172a), and/or a bottom wall (171f, 172f) of the seat.

32. The barrier according to any one of the preceding claims or according to the preamble to claim 1, characterised in that the seat (171,
15 172) of the respective panel is open above or below, and/or is open at the lateral edge of the same panel.

33. The barrier according to any of the preceding claims or according to the preamble to claim 1, characterised in that the respective panel has a rear edge protruding in the respective connecting seat (171, 172), which is
20 recessed relative to the corresponding edge of the respective panel to form, in use, a corresponding passage opening (170) for the connecting means.

34. The barrier according to any one of the preceding claims or according to the preamble to claim 1, characterised in that the panel has a
25 metal supporting or outer structure, which is suitably shaped to define a corresponding seat (171, 172) for connection to the upright, or the respective connecting seat (171, 172) is equipped with a corresponding barrier panel made of concrete, preferably formed by a respective profile, preferably metallic, generally with an "L" shape.

30 35. The barrier according to any one of the preceding claims or according to the preamble to claim 1, characterised in that the connecting

means (15) comprise first and second distinct parts (15', 15'') preferably placed side by side.

36. The barrier according to claim 35, characterised in that the first and second distinct parts (15', 15'') comprise a respective hook-shaped
5 element (151', 151'') for gripping the respective upright.

37. The barrier according to claim 35 or 36, characterised in that the first and second distinct parts (15', 15'') comprise respective means, or vertical plate, (157', 157'') for inserting in the connecting seat (17) of the panel means (13), which is connected to the gripping means, or portion, by
10 corresponding connecting means (155', 155'').

38. The barrier according to any one of the preceding claims or according to the preamble to claim 1, characterised in that the connecting means (451) are made in one piece with the upright, in particular with the respective flange of the upright, in particular the connecting means (451)
15 comprise a plurality of connecting portions (451) vertically distributed, in particular equispaced from each other, on the respective upright; in particular, the respective connecting portion (451) extends in front of the upright, and preferably is L-shaped having a front flange which extends upwards.

39. The barrier according to any one of the preceding claims or according to the preamble to claim 1, characterised in that the connecting means (15) are designed to support the panel means (13) in front of the respective upright (10), with the panel means (13), which preferably have respective lateral edges which cover at least partly the respective upright
25 (10).

40. The barrier according to any of the preceding claims or according to the preamble to claim 1, characterised in that the panel means (513, 513) comprise shaped metal covers defining respective housing means for corresponding connecting means (15).

41. The barrier according to any one of the preceding claims or according to the preamble to claim 1, characterised in that there are upper covering

means (514), in the form of a respective flat sheet having respective lateral retaining fins facing downwards.

42. The barrier according to any one of the preceding claims or according to the preamble to claim 1, characterised in that it comprises connecting
5 means (15) which can be coupled to the upright in a slidable fashion along the front flange of the same upright.

43. The barrier according to any one of the preceding claims or according to the preamble to claim 1, characterised in that it comprises connecting means (15) which are in the form of connecting means (15) which are
10 adaptable, in particular selectively, to the respective panels and uprights to be connected, in particular adaptable to various configurations of the same flange (12) of the corresponding upright.

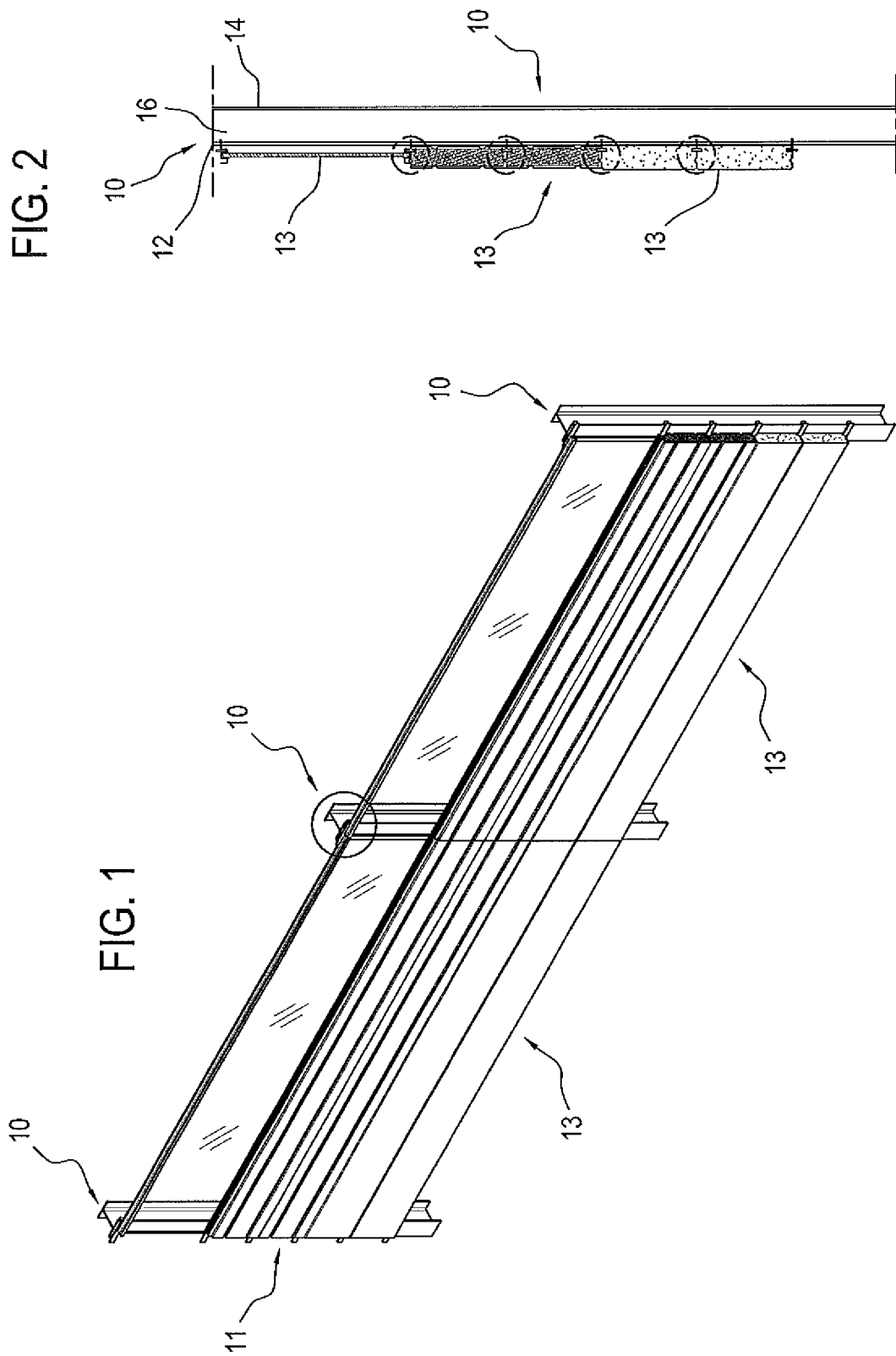
44. The barrier according to any one of the preceding claims or according to the preamble to claim 1, characterised in that it comprises connecting
15 means (15) which are equipped with means designed to modify, or adjust, the distance, in particular perpendicular, between the means, or portion, for coupling the upright, that is, to the flange (12) of the upright, and the means, or portion, for insertion or coupling to the respective panel.

45. The barrier according to any one of the preceding claims or according to the preamble to claim 1, characterised in that it comprises connecting
20 means (955), between the means for gripping the upright (951) and the means (957) for inserting in the respective connecting seat of the panel (13), which comprise a respective elongated rod (955a) and, in particular, having respective means (955b, 955c) for retaining the respective gripping
25 portion (951), the retaining means (955b, 955c) being preferably movable and positionable along the rod (955a).

46. A panel for the barrier (13), characterised in that it is as described in any one of the preceding and corresponding claims.

47. Means, or unit, (15) for connecting the panel means to the respective
30 upright of the barrier and/or panel, characterised in that they are as described in any one of the preceding and corresponding claims 1 to 45.

48. The barrier, means for connecting the panel means to the respective upright, and panel each characterised in that it is according to any of the corresponding preceding claims and/or as described and illustrated herein with reference to the accompanying drawings.



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FIG. 3

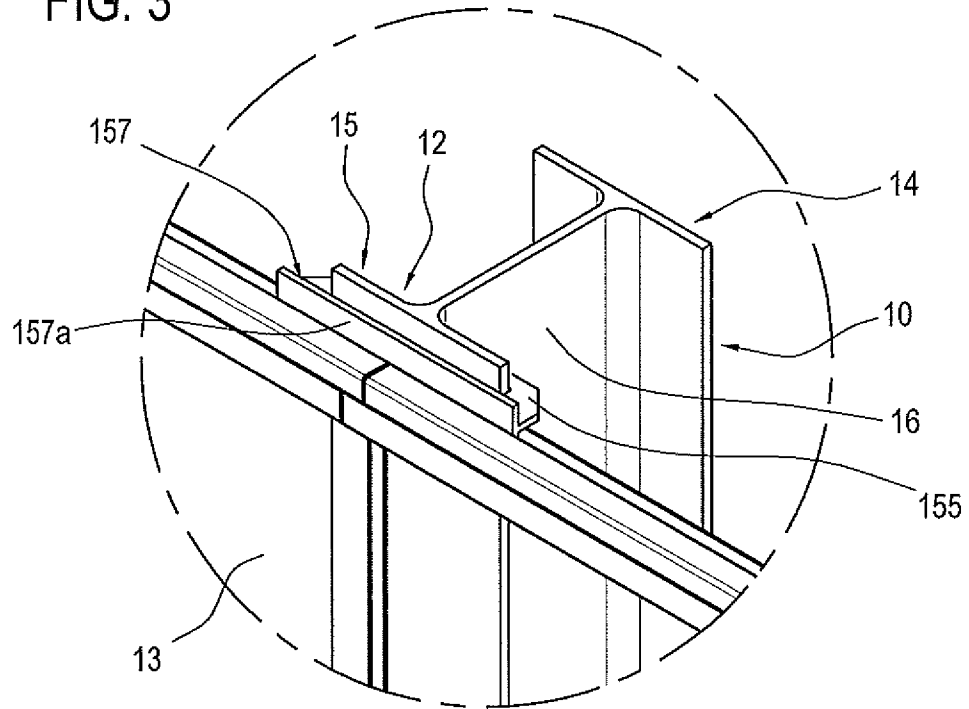
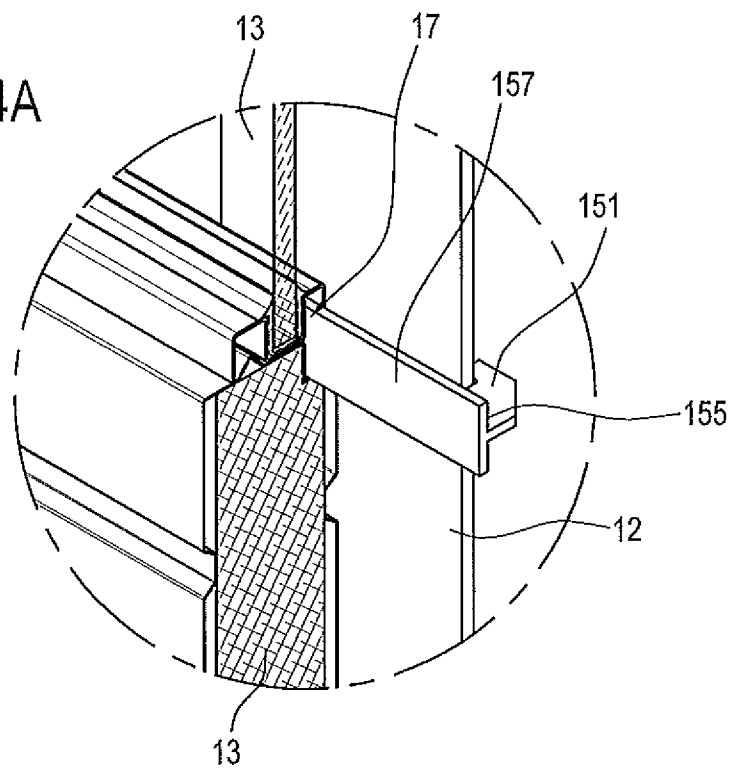


FIG. 4A



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FIG. 4B

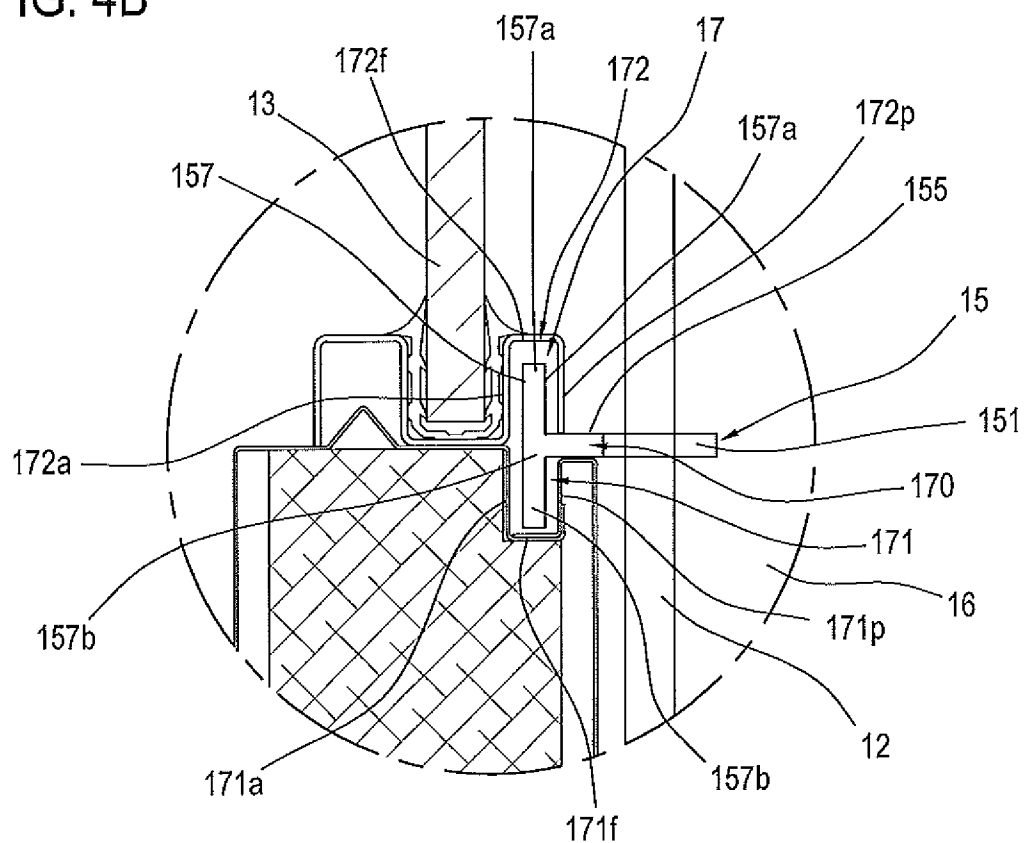
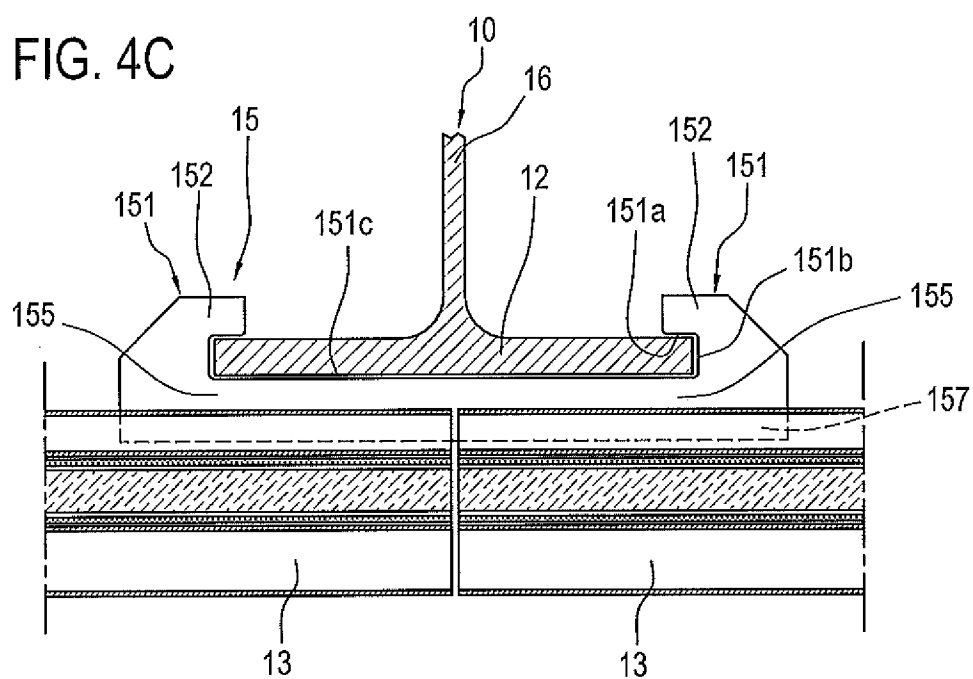


FIG. 4C



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FIG. 5

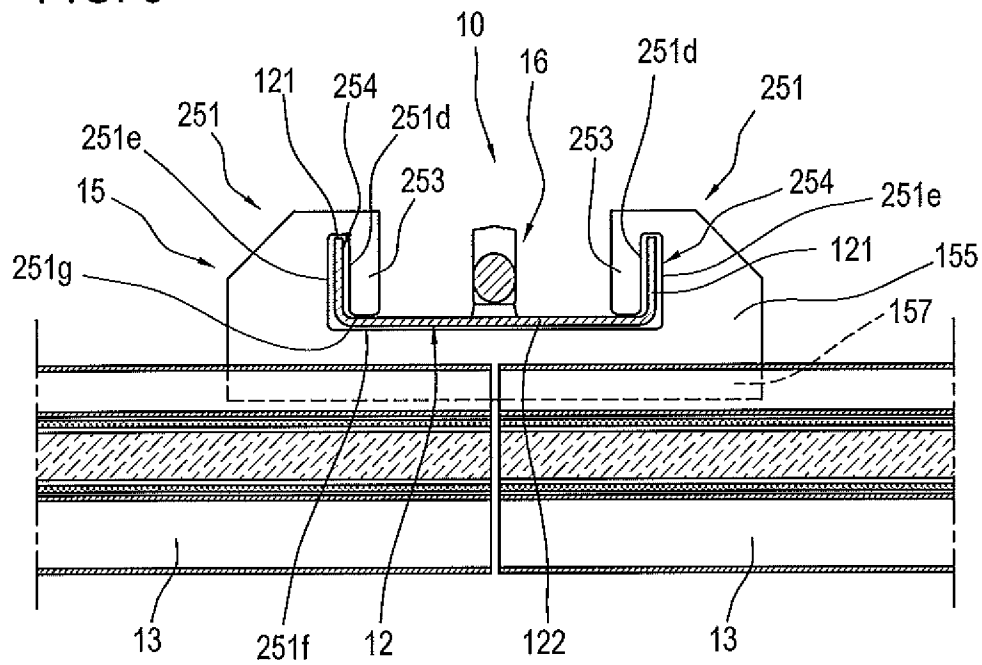
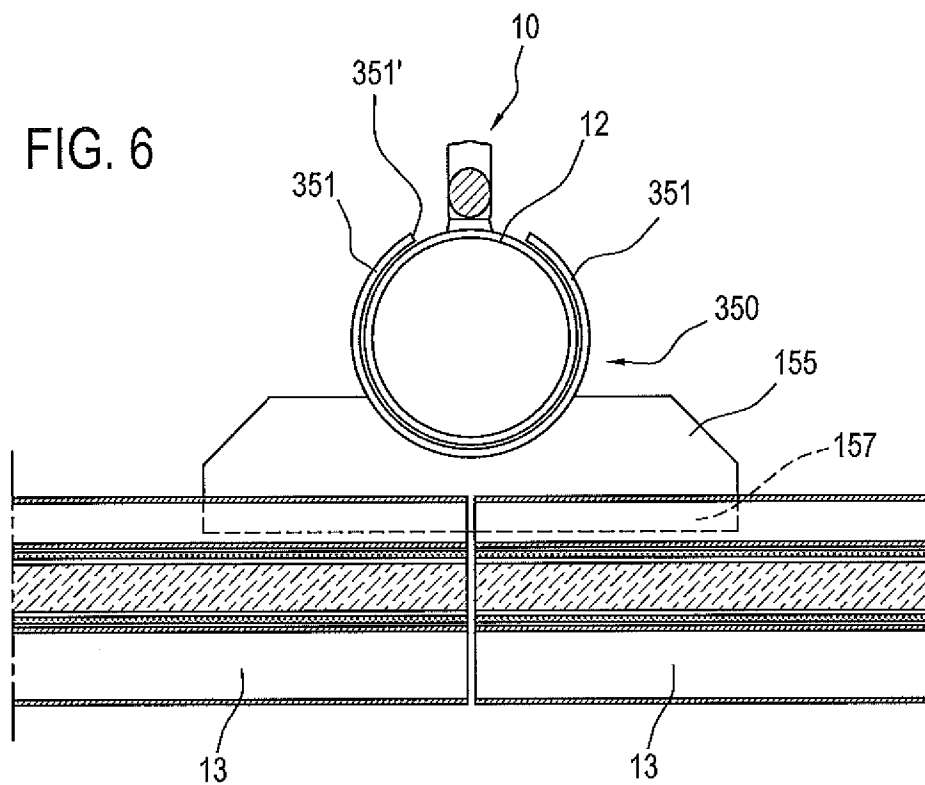


FIG. 6



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FIG. 7

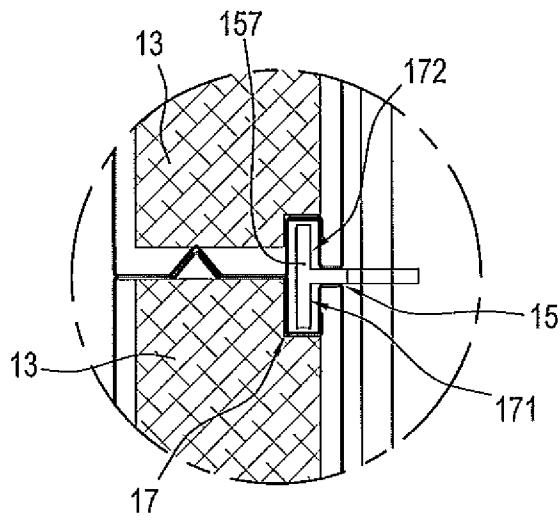


FIG. 8

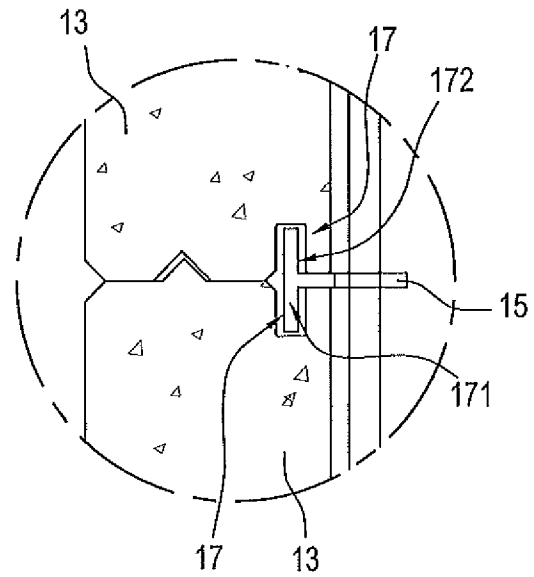
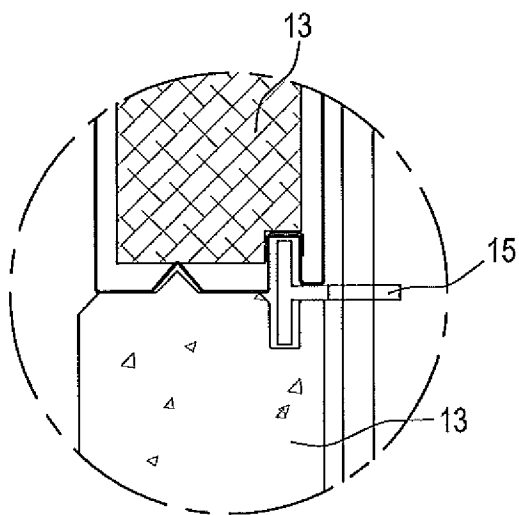


FIG. 9



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FIG. 10

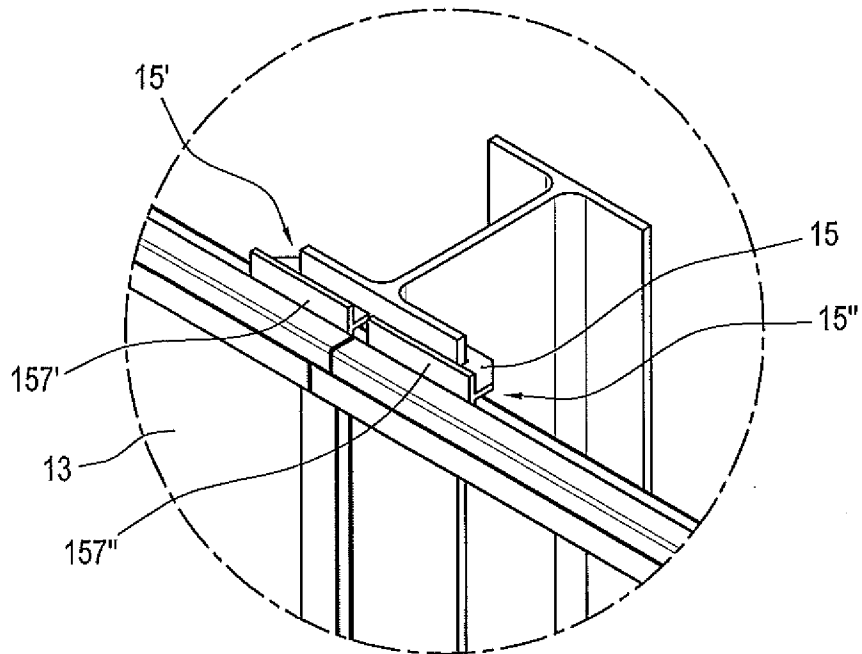


FIG. 11

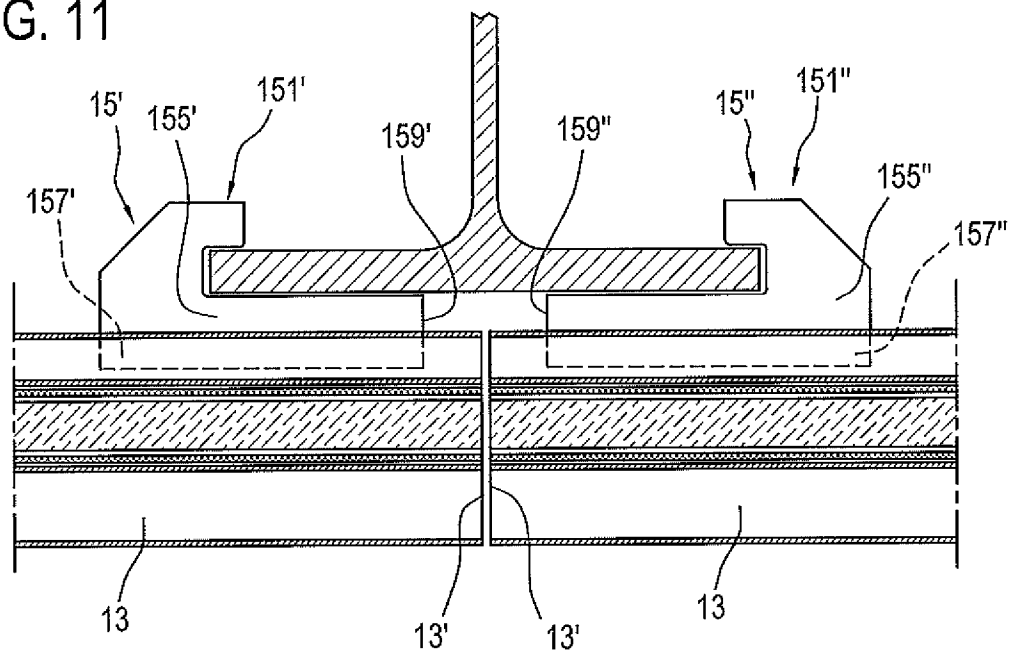


FIG. 13

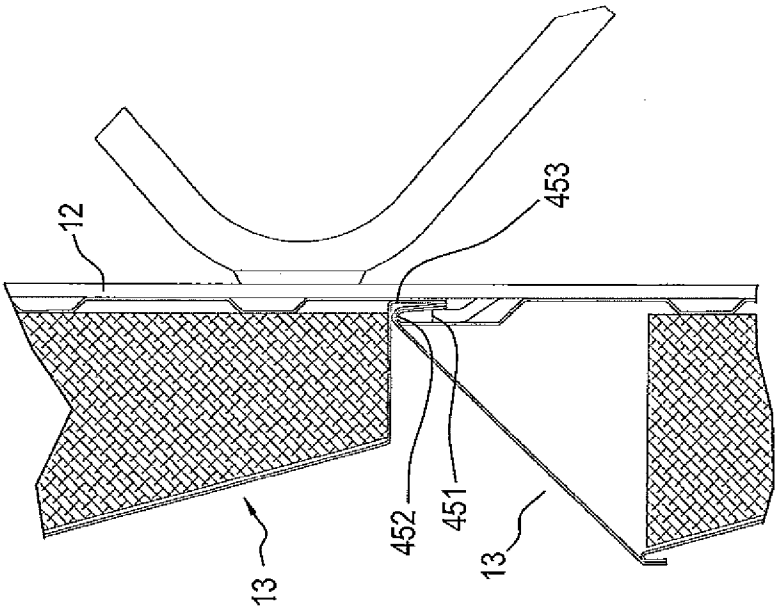
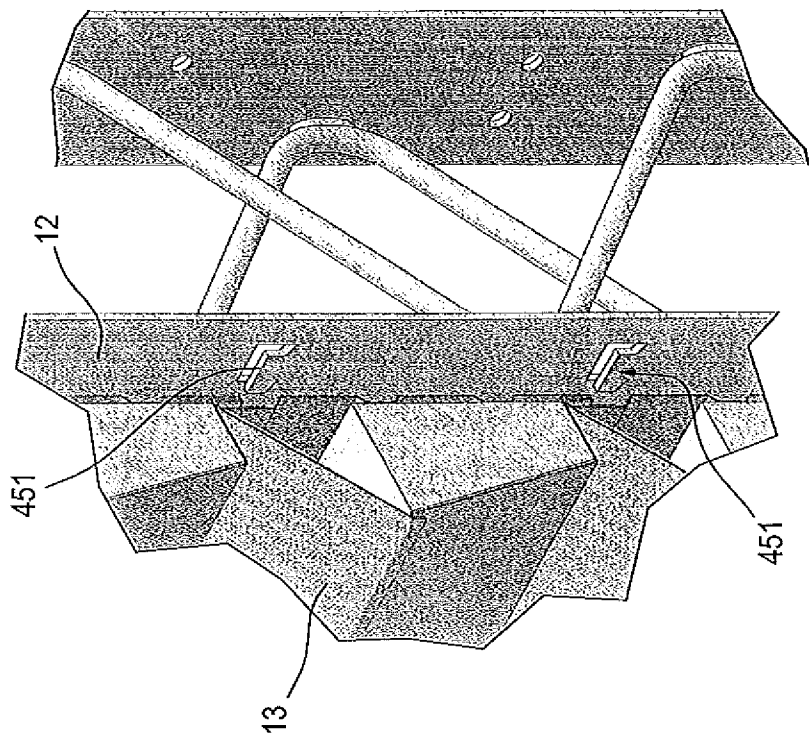
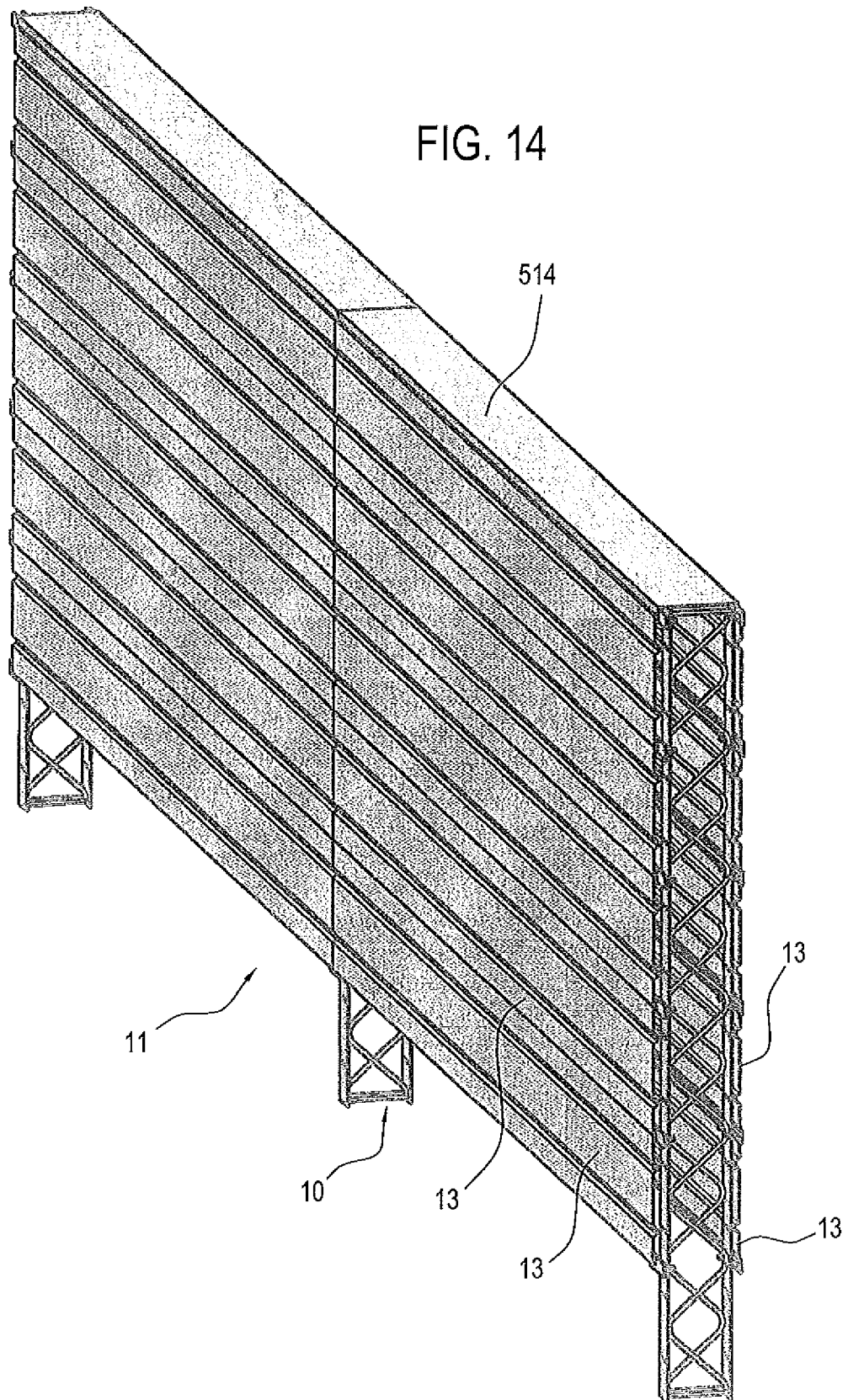


FIG. 12



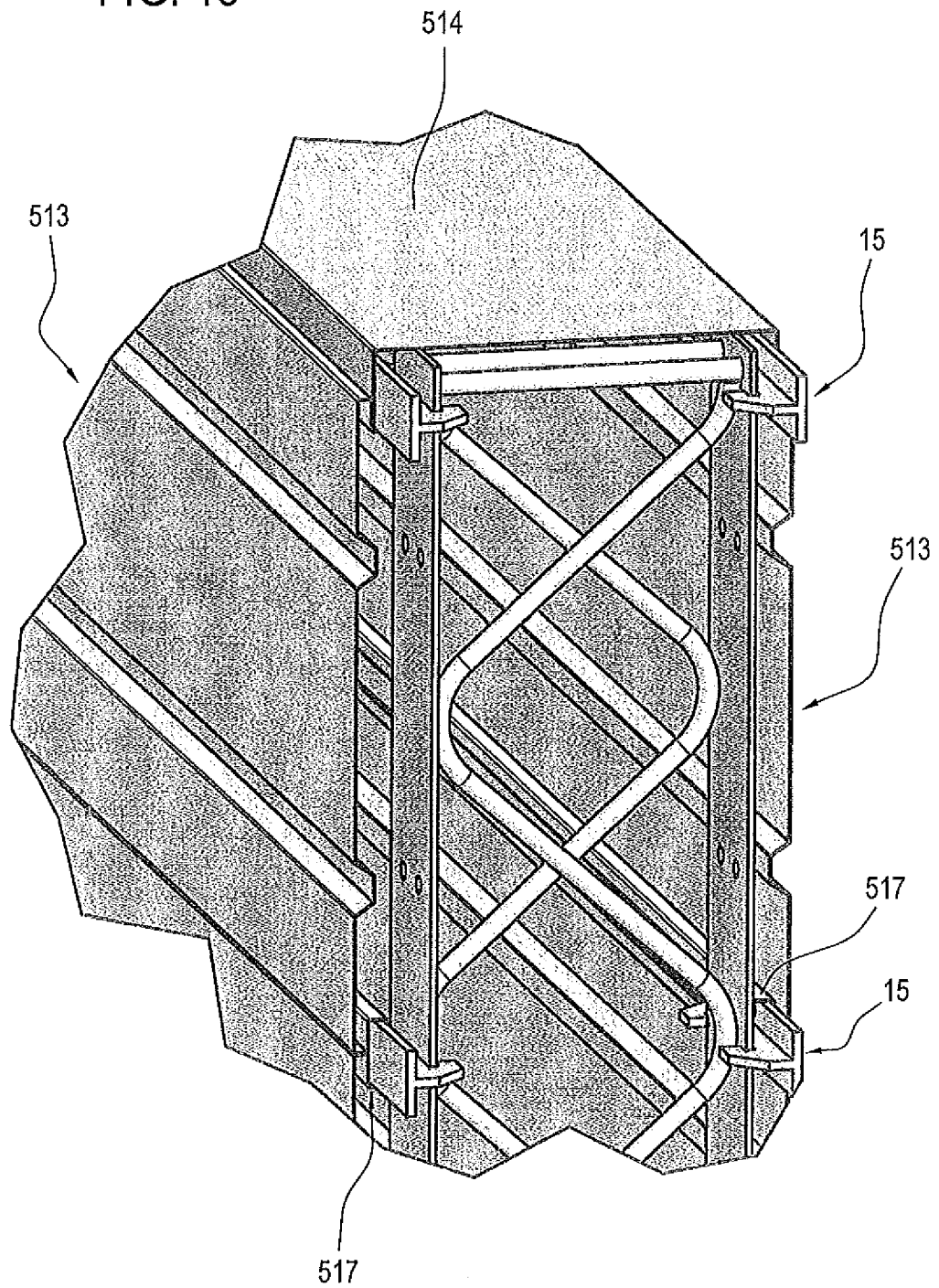
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FIG. 14



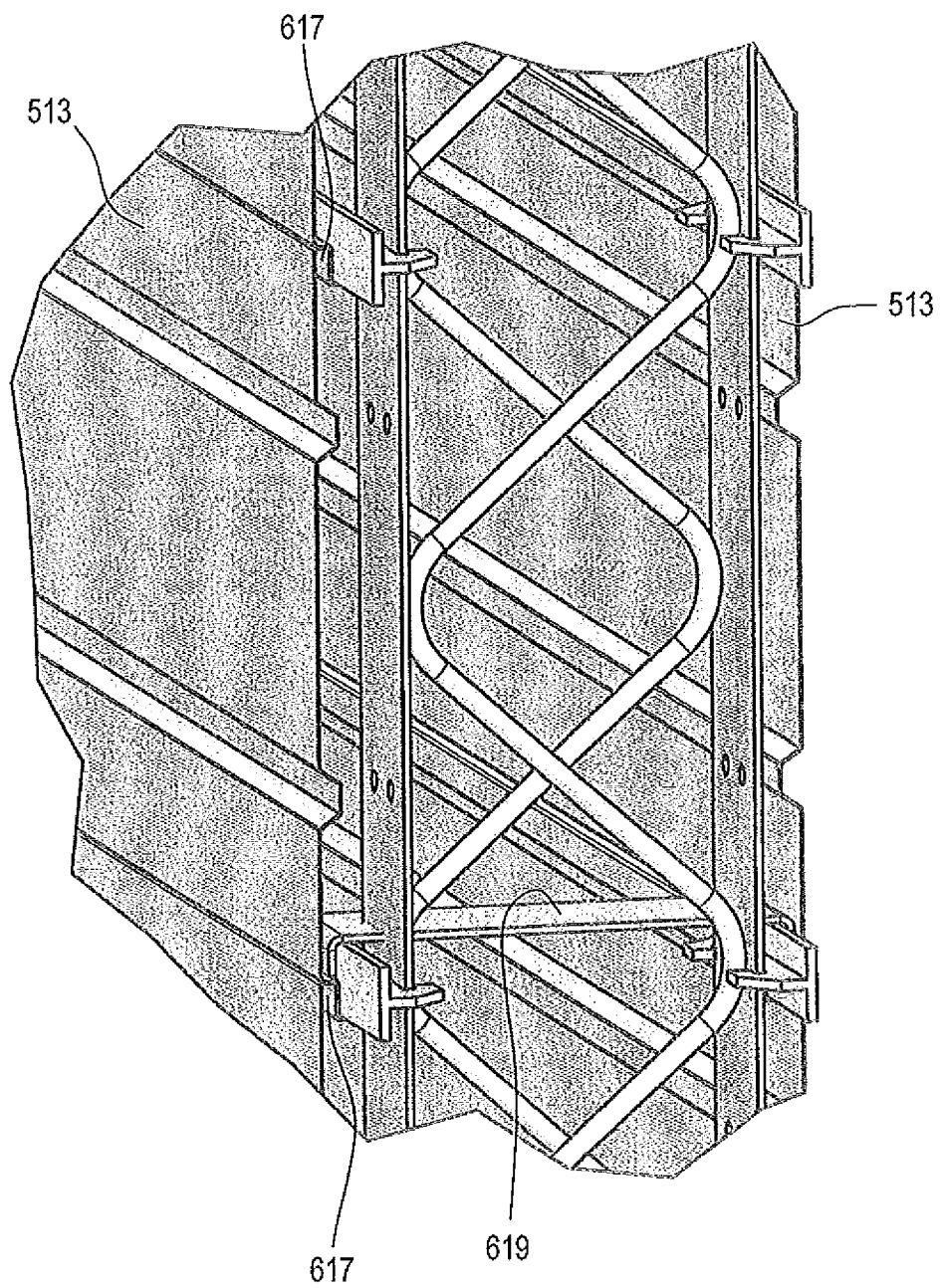
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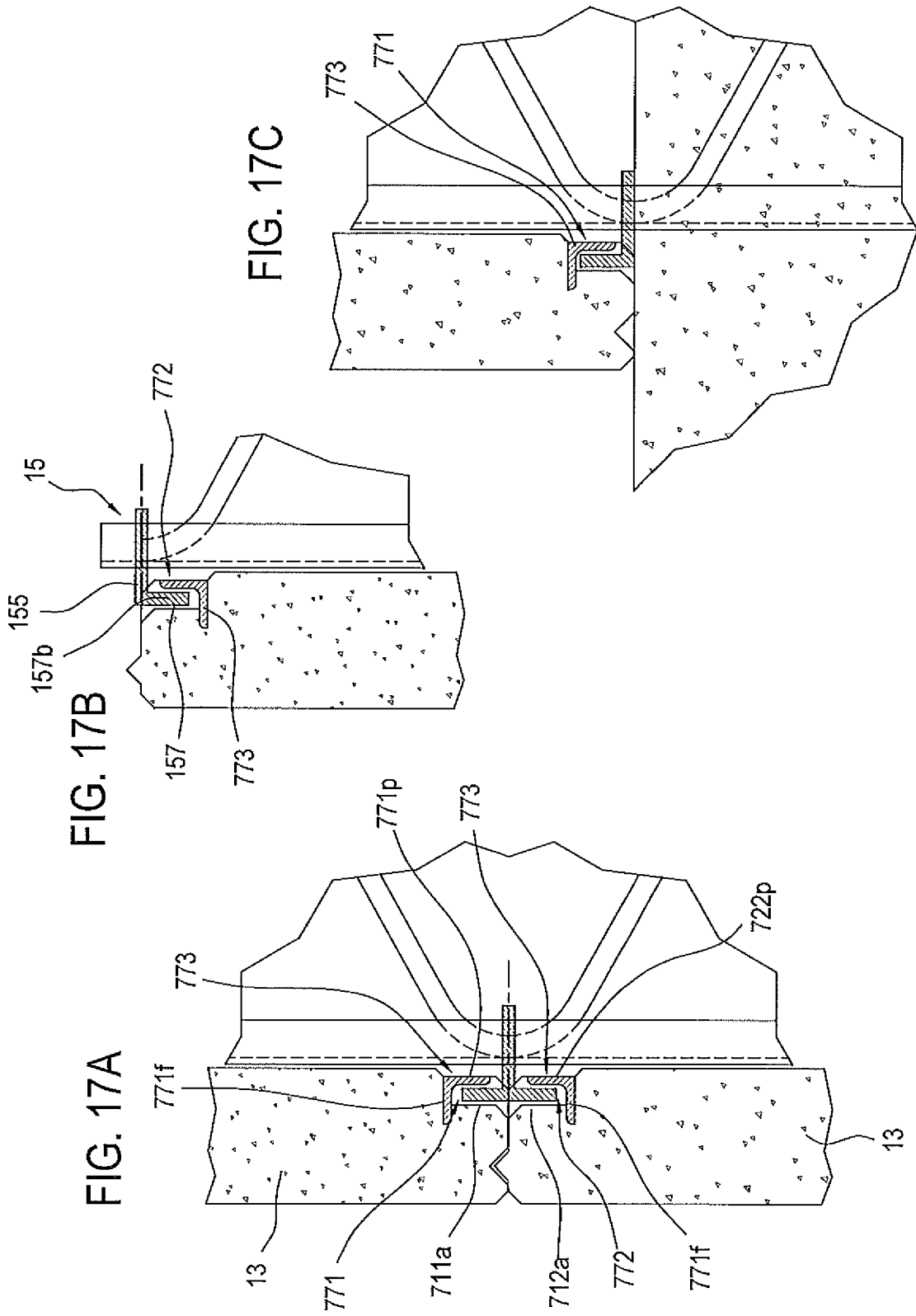
FIG. 15



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FIG. 16





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FIG. 18A

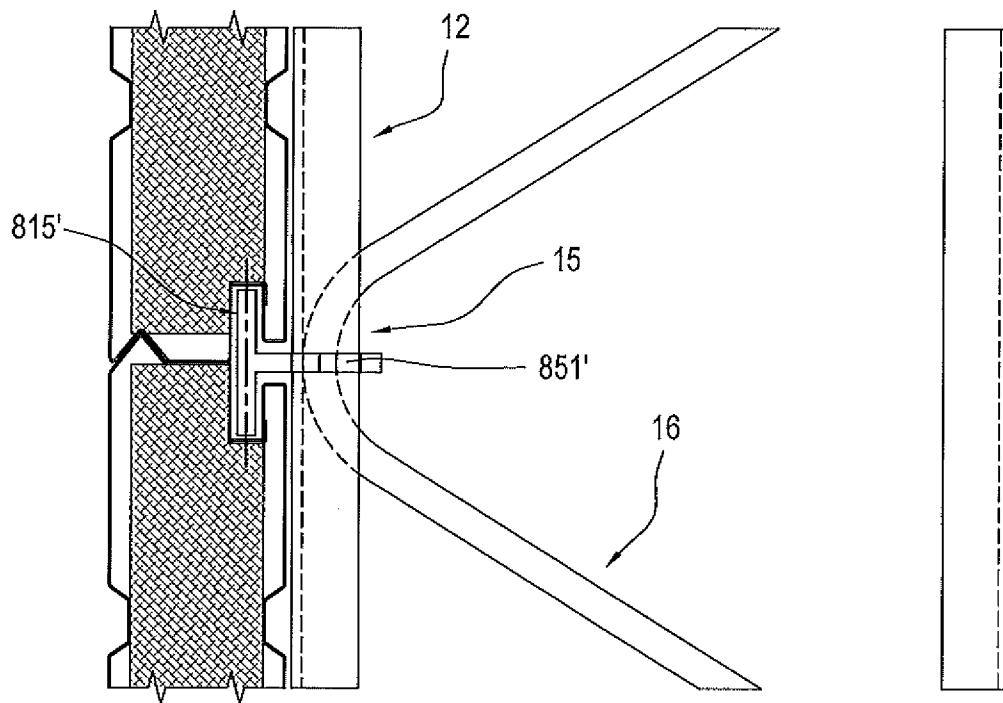
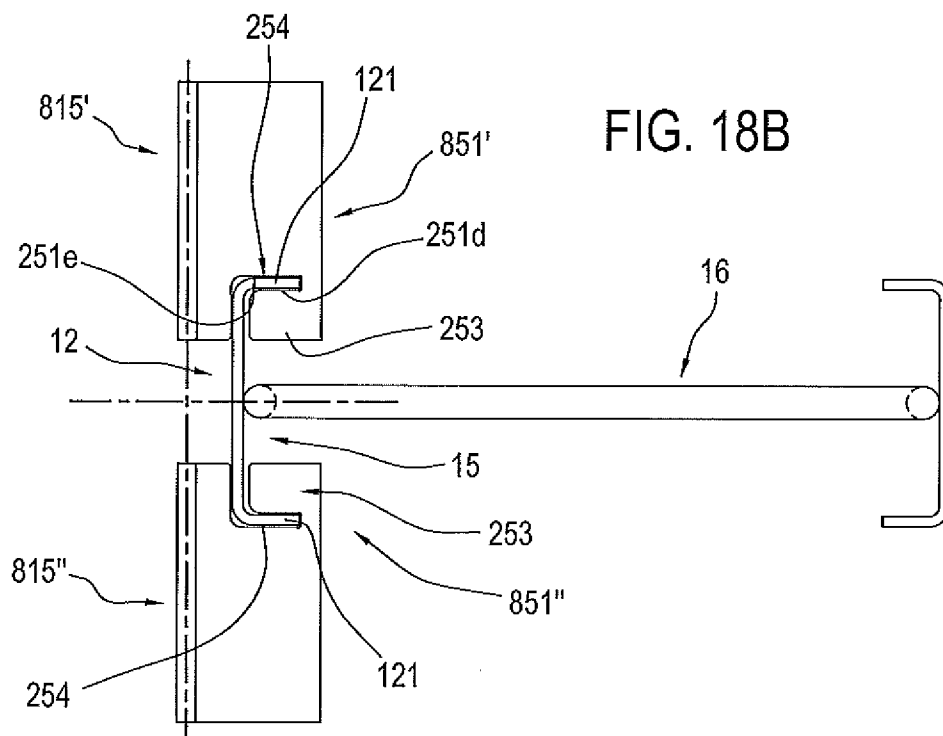


FIG. 18B



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FIG. 19A

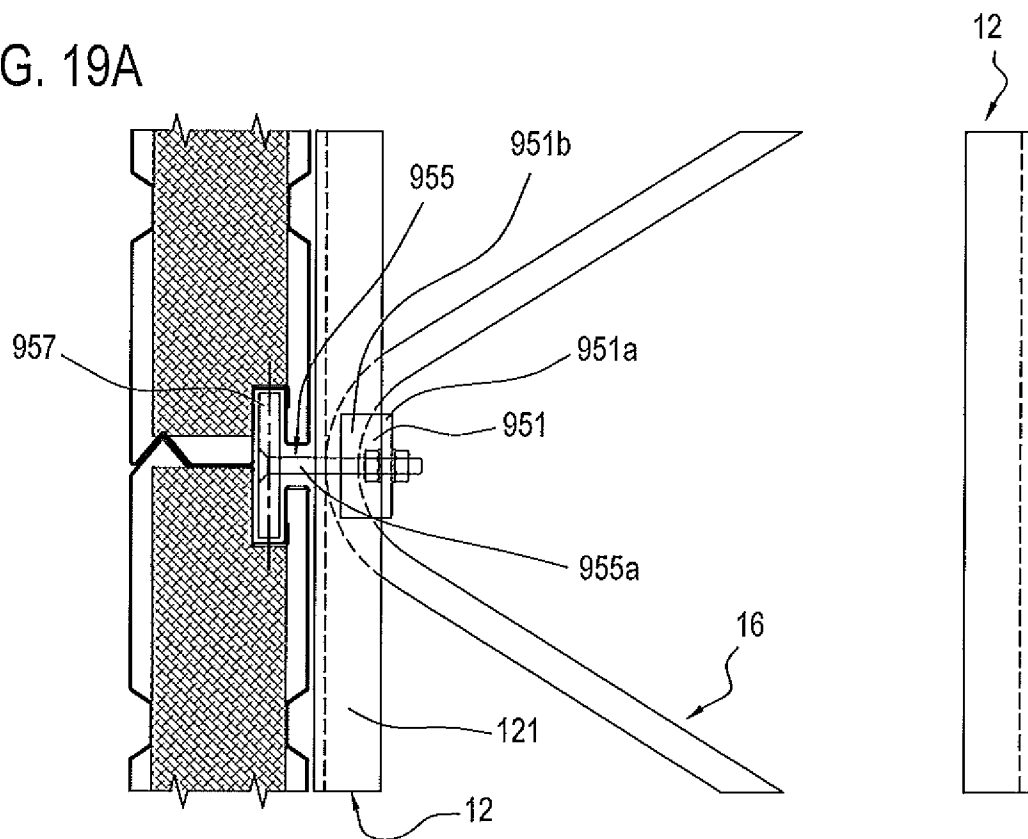
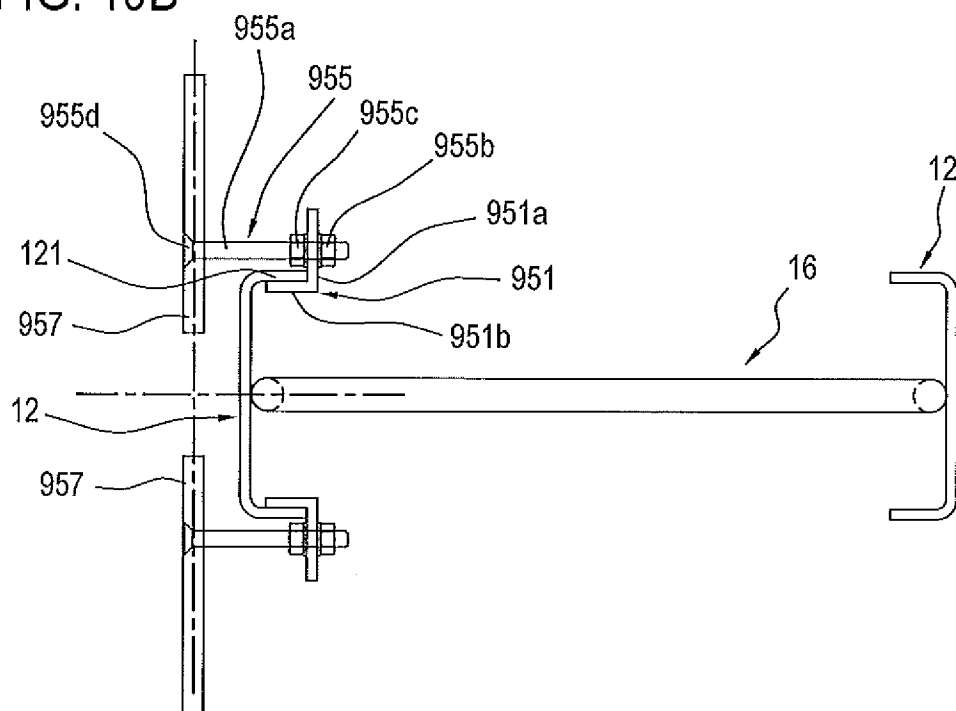


FIG. 19B



INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2014/062726

A. CLASSIFICATION OF SUBJECT MATTER

INV. E01F8/00
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)

E01F

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.
X	JP 2001 279621 A (NIPPON KOKAN LIGHT STEEL KK; UNIPRES CORP; NICHIAS CORP) 10 October 2001 (2001-10-10) paragraphs [0013], [0017], [0022], [0027] - [0032] figures 1-4	1-11, 14-34, 39-42 13
Y	----- JP 2000 225322 A (SUGA YOSHITAKA) 15 August 2000 (2000-08-15) paragraphs [0036] - [0037] figures 8-10	13
X	----- JP S50 147408 U (UNIDENTIFIED) 6 December 1975 (1975-12-06) figures 1-3 ----- -/-	1-11, 43-45

☒ 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

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"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

9 October 2014

Date of mailing of the international search report

17/10/2014

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
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Fax: (+31-70) 340-3016

Authorized officer

Kremsler, Stefan

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2014/062726

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP H05 209406 A (SHOWA DENKO KENZAI KK) 20 August 1993 (1993-08-20) paragraphs [0013], [0034], [0039] figures 12-15 -----	1-11, 35-38

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2014/062726

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.: 48
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 48

Claim 48 does not define any clearly limiting technical features to further characterize the subject matter for which protection is sought. It generally refers to technical features which are disclosed in the attached description and/or figures of the application (PCT GL; 16.27: "omnibus claims"; see paragraph 5.10), without further characterizing them or defining their relationship with the subject matter defined by the previous claims. No definite construction can therefore be established regarding the before mentioned claims and a meaningful search is consequently not possible.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guidelines C-IV, 7.2), should the problems which led to the Article 17(2) declaration be overcome.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2014/062726

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
JP 2001279621	A	10-10-2001	JP 3843389 B2 JP 2001279621 A	08-11-2006 10-10-2001

JP 2000225322	A	15-08-2000	NONE	

JP S50147408	U	06-12-1975	NONE	

JP H05209406	A	20-08-1993	JP 3090791 B2 JP H05209406 A	25-09-2000 20-08-1993
