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(54) **Georgian style insulating grid**

(57) A Georgian style insulating grid, comprising horizontal profiles (10) and vertical profiles (20) connected to one another to make any type of divider elements inside insulating glass units, each of said profiles (10, 20) comprising an elongated body (5) made in plastic material or the like, and at least one metal insert (6), which extends for at least one portion of the length of said elongated body (5), at least partially embedded in said elongated body (5), said elongated body (5) having a substantially tubular cross-section and defining at least one inner cavity (8), said grid (1) moreover comprising means (30) for connecting at least two opposite profiles (10, 20) to one another. The metal insert (6) of at least one of said profiles (10, 20) passes through said inner cavity (8) and has its ends (9) embedded in said elongated body (5), so as to define at least one seat (40;40,41) for inserting said reciprocal connection means (30).

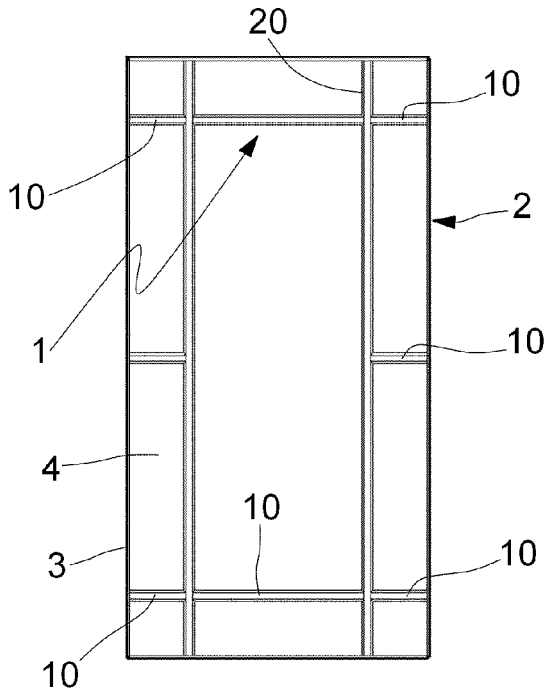

FIG. 1

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Description

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention concerns a Georgian style insulating grid.

PRIOR ART

[0002] As it is known, insulating glass units, also called double-glazed units, are made up of two or more panes of flat glass that are joined to one another, at the perimeter, by a spacer frame, made in metal polymer material, or mixed, and separated by one layer of air or gas, for example argon, krypton, xenon.

[0003] The spacer frame is shaped so that hygroscopic salts, that prevent condensation from appearing in the volume comprised between the panes of glass, can be housed inside it.

[0004] Normally, sealing elements are applied both between the spacer frame and the panes of glass, and outside the panes themselves at their peripheral edge.

[0005] Some insulating glass units that are common on the market are made in the so-called Georgian style, i.e. they are provided with profiles that are manufactured and assembled so as to create grids that have architectural patterns inside the insulating glass units.

[0006] In other words, through the aforementioned grids, some divider elements with a great range of designs are made inside the glass units.

[0007] The assembly system for making grids in Georgian style foresees the use of profiles and accessories.

[0008] The most common assembly - at 90° -, foresees making one or more vertical elements - uprights - and horizontal elements - cross members - which rise above the latter.

[0009] One example of an assembly between horizontal and vertical profiles according to the state of the art is illustrated in figure 5.

[0010] With reference to such a figure 5, it can be observed that the juxtaposition of the elements is ensured by the milling of the horizontal elements A and their fixing to the vertical elements B through assembly sets made up of a plastic accessory C and a metal insert D. Once the grid has been created through the aforementioned assembly sets, it is normally fixed to the frame of the spacer elements through attachment with clips.

[0011] In particular, the fixing is ensured thanks to plastic end pieces that are inserted in the end part of the profile.

[0012] It should be noted that the aforementioned profiles that constitute the grids do not have a load-bearing function, but only a decorative one, in other words they do not support the weight of the panes of glass. Moreover, the direct contact between the Georgian style profiles that make the grids, and consequently the divider elements, and the surface of the panes of glass must be absolutely avoided.

[0013] Indeed, currently almost all of the glass used, for energy saving reasons, is covered, without solution of continuity, with a film of the magnetronic type, or rather of the low emissivity or selective type. Such a film is notoriously quite delicate and can thus be easily scratched or removed through simple contact. Therefore, the possible direct contact of the profiles in Georgian style with the surface of the glass could damage the covering film, thus jeopardising the appearance or even the functionality of the insulating glass unit.

[0014] Currently there are Georgian style profiles for insulating glass units that are made in aluminium or plastic.

[0015] The profiles made in aluminium are the most common, they can have different thicknesses - generally less than 1 mm - and different shapes, and can be assembled through different systems, for example riding over one another, interlocking, with plastic crosses, etcetera. Profiles in aluminium are the ones that are used the most thanks to their better mechanical characteristics and better appearance. Their machining is simple and can be typically carried out with metal cutting machines; moreover, they are also resistant to the high temperatures that are generated inside the insulating glass units for a sort of greenhouse effect.

[0016] Current profiles use a series of accessories, in general made from plastic, but also from metal material, so as to allow - 90° junctions, "T" junctions, "L" junctions, etc. - and the fixing to the frame.

[0017] In addition to the greater investment cost, the assembly of the profiles for making decorative grids foresees a long series of mainly manual operations.

[0018] The weak point of the profiles made in aluminium, moreover, is made up of the fact that aluminium is a known heat conductor, and the presence of profiles, variously assembled, inside the insulating glass unit increases the overall heat transmission rate, thus degrading the performance of the glass unit in terms of thermal insulation.

[0019] The profiles made, on the other hand, in plastic material - for example PVC - are characterised by optimal thermal properties, but the same cannot be said for its mechanical properties.

[0020] Despite not having particular problems during assembly, the profiles in plastic material, once installed in the insulating glass units, can have problems of resistance to the high temperature that is generated inside the insulating glass unit.

[0021] Indeed the profiles in plastic, when subject to high temperatures, tend to soften, becoming deformed.

[0022] Such a deformation, in addition to obviously jeopardising the appearance of the product, can bring the profiles into contact with the pane of glass, which, as explained previously, should be absolutely avoided.

[0023] One solution to this problem can be made up of the use of plastic materials with higher mechanical strength, which do not therefore deform at high temperatures: these materials, however, have great limitations

in terms of their colours.

[0024] In other words, they cannot be pigmented as desired, and therefore their use is very limited, and in any case not suitable for the requirements of the market.

PURPOSES OF THE INVENTION

[0025] The technical task of the present invention is therefore that of improving the state of the art in the field of Georgian style insulating grids.

[0026] In such a technical task, one purpose of the present invention is to devise a Georgian style insulating grid which has suitable characteristics both in terms of the thermal resistance and in terms of the heat transmission rate.

[0027] Again another purpose of the present invention is that of eliminating the majority of plastic accessories necessary for assembling the grid, and reducing the operations necessary for assembling the current system. Yet another purpose of the present invention is that of making a Georgian style insulating grid that joins the characteristics mentioned above with a high versatility in terms of the appearance that can be obtained.

[0028] Such a task and such purposes are all achieved by the profile in Georgian style for insulating glass units according to the attached claim 1.

[0029] The dependent claims refer to preferred and advantageous embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS.

[0030] These and further advantages shall become clearer by any man skilled in the art from the following description and from the attached drawings, given as a non limiting example, in which:

figure 1 is a front view of an insulating glass unit comprising a grid according to the invention;

figure 2 is a front view of another insulating glass unit comprising a grid according to the invention, in another embodiment;

figure 3 is a front view of yet another insulating glass unit comprising a grid according to the invention in yet another embodiment;

figure 4 is a detail of an area for connecting horizontal and vertical profiles of a grid according to the invention;

figure 5 is a detail of an area for connecting horizontal and vertical profiles of a grid in a solution belonging to the state of the art;

figure 6 is a cross-section of a profile of the grid according to the present invention;

figure 7 is a cross-section of another embodiment of a profile of the grid according to the present invention;

figure 8 is a cross-section view of yet another embodiment of a profile of the grid according to the present invention;

figure 9 is a cross-section view of a further embodiment of a profile of the grid according to the present invention;

figure 10 is a cross-section view of another embodiment of a profile of the grid according to the invention;

figure 11 is a cross-section view of another embodiment of a profile of the grid according to the invention.

EMBODIMENTS OF THE INVENTION.

[0031] With reference to figures 1-4, reference numeral 1 wholly indicates a Georgian style insulating grid according to the invention.

[0032] The grid 1 according to the present invention can be used to make any type of divider elements inside insulating glass units, without any limitation.

[0033] In particular figures 1-3 illustrate, purely as an example, insulating glass units 2 with divider elements in Georgian style that can be made with the grid 1 according to the present invention.

[0034] In particular, the insulating glass units 2 each comprise, in a per se known manner, a peripheral spacer frame 3 to which, with suitable sealing means, two opposite panes of glass 4 are connected.

[0035] The panes of glass 4 insulate, between them, in a per se known manner, a laminar volume inside which air or a gas such as argon, krypton, xenon, or other gases suitable for the present application are contained.

[0036] A plurality of profiles 10, 20 having different length and/or cross-sections, variously combined and/or intersected with one another so as to obtain divider elements with different visual effects are in turn connected to the spacer frame 3.

[0037] In particular, the profiles 10, 20 comprise horizontal profiles 10 and vertical profiles 20.

[0038] The horizontal profiles 10 and the vertical profiles 20 are connected to one another at intersecting areas. Each horizontal profile 10 or each vertical profile 20 comprises an elongated body 5.

[0039] Figure 6 represents, without distinction, a horizontal profile 10 or a vertical profile 20 of the grid 1.

[0040] The elongated body 5 is made in plastic material or the like, as shall be described in greater detail in the rest of the description.

[0041] According to one aspect of the present invention, at least one of the profiles 10, 20 of the grid 1 comprises moreover at least one metal insert 6.

[0042] The metal insert 6 extends for at least one portion of the length of the elongated body 5.

[0043] The metal insert 6 can also extend for the entire length of the elongated body 5 and can be preformed.

[0044] The metal insert 6 is at least partially embedded in the elongated body 5, as shall become clearer in the rest of the description.

[0045] More in detail, the elongated body 5 can be made for example in PVC.

[0046] Alternatively, the elongated body 5 can be made in polypropylene, or the like, or in a mixture of PVC and polypropylene, or in any other plastic material that is suitable for the present application.

[0047] The use of a similar plastic material makes it possible to considerably limit the heat transmission rate of the grid 1, as required by the current requirements of the market.

[0048] The elongated body 5 can have any shape cross-section, in relation to the specific requirements of use.

[0049] Purely as an example, in the embodiment of figure 6 the elongated body 5 has a substantially rectangular cross-section with rounded corners, and with slightly tapered end portions 7.

[0050] The cross-section of the elongated body 5, moreover, is substantially tubular, and defines at least one inner cavity 8.

[0051] The inner cavity 8 can be a complete through cavity or even discontinuous along the elongated body 5.

[0052] The inner cavity 8 normally makes it possible, in the grids of the known type, to insert joining accessories so as to create the desired divider elements inside the insulating glass unit 2, according to the specific manufacturing requirements, for example like in figures 1, 2, 3.

[0053] The inner cavity 8 has for example a rectangular cross-section, but it could have a cross-section with any other shape suitable for the application.

[0054] Moreover, it could be foreseen for there to be many inner cavities 8 in the same elongated body 5.

[0055] According to another aspect of the present invention, the metal insert 6 has a substantially laminar cross-section, i.e. narrow and elongated rectangle and it can be preformed (open or closed profile).

[0056] This solution makes it possible to limit the use of metal material, and therefore the weight of the profile 10, 20, despite giving the latter a suitable mechanical strength.

[0057] In other embodiments, the metal insert 6 could have a cross-section with another shape: for example, the section of the metal insert 6 could be curved, or it could have variable thickness, and so on.

[0058] As illustrated in figure 6, the metal insert 6 is arranged parallel to the long side of the cross-section of the elongated body 5, along the longitudinal axis of symmetry of the section itself.

[0059] Moreover, the metal insert 6 passes through the inner cavity 8 of the elongated body 5, and has the ends 9 that are embedded in the elongated body 5 itself, for corresponding portions with suitable length.

[0060] In this way seats 40 are defined comprised between the inner walls of the cavity 8 and the metal insert 6.

[0061] Of course the arrangement of the metal insert 6 could also be different, for example it could be arranged parallel to the short side of the cross-section of the elongated body 5.

[0062] The metal insert 6 is made in a material selected from aluminium, iron, stainless steel, or the like, or in any case from any other metal material suitable for the present application.

[0063] As mentioned, the metal insert 6, suitably sized, contributes towards increasing the mechanical strength of the profile 10, 20 with respect to the strength of just the plastic material with which the elongated body 5 is made.

[0064] In such a way, the profile 10, 20 can also become load-bearing, and especially, it absolutely does not become deformed even if it is subjected to the high temperatures that are generated inside the insulating glass unit 2.

[0065] This means that the aesthetic characteristics of the insulating glass unit 2 are not jeopardised, and furthermore there is not the risk of the profile 10, 20, becoming deformed, coming into direct contact with one of the panes of glass 4, thus damaging the low-emissivity covering film possibly present.

[0066] Moreover since the metal insert 6 is embedded in the elongated body 5, it does not affect the thermal transmission of the entire profile 10, 20, which is thus that typical of the profiles made in plastic material.

[0067] It should be moreover noted that the profile 10, 20 has the elongated body 5 made in material that is easy to colour as desired, i.e. in a way such as to satisfy any productive and aesthetic requirement.

[0068] The grid 1 according to the invention comprises means 30 for connecting two opposite horizontal or vertical profiles 10, 20 to one another.

[0069] Said reciprocal connection means 30 are made up of at least one pin 30 for fixing opposite horizontal profiles 10 and vertical profiles 20 to one another at the intersection areas of the grid 1.

[0070] According to one important aspect of the present invention, the pin 30 - see the detail of figure 4 - is inserted, with its ends, inside the seats 40 of the cavity 8 of two opposite horizontal or vertical profiles, 10 20, thanks to a suitable assembly interference that prevents the accidental disengagement.

[0071] The pin 30 can have for example a circular cross-section, but it could also have another shape.

[0072] The pin 30 can be made up of a smooth pin; alternatively, it can be made up of a threaded pin for a more stable coupling with the surfaces with which it comes into contact.

[0073] In particular, each end of the pin 30 engages, with suitable interference, in a seat 40 defined between the inner wall of the cavity 8 and the metal insert 6, that thus acts as an element that ensures the stable connection between the horizontal or vertical profiles 10 or 20.

[0074] Indeed, the presence of the metal insert 6, in addition to ensuring the advantages already mentioned previously, also gives stability to the coupling between horizontal and vertical profiles 10 and 20 since it is possible to eliminate the possible negative effects due to softening of the plastic material at high temperatures, which could lead to the accidental loosening of the cou-

pling itself.

[0075] The simple connection of the profiles 10, 20 through the pin 30 advantageously makes it possible to eliminate the necessity of using plastic accessories like those illustrated in figure 5: in such a way also the assembly operations are substantially simplified. Another important feature of the present invention is the presence of an element in plastic material near to the insert 6, in particular at the outermost end of the horizontal or vertical profile 10, 20.

[0076] Such an element in plastic material can be made up for example by an appendage that is fixed, at its bottom, to the insert 6.

[0077] Such an element in plastic material foreseen near to the insert 6 makes it possible to eliminate the plastic accessories, named connectors, used for the attachment through clips of the grid 1 on the frame of the insulating glass unit 2.

[0078] In such a way, it is possible to use clips directly on the profile 10, 20 without using further accessories. Another embodiment of the grid 1 according to the present invention is illustrated in figure 7, which indeed represents the cross-section of one of the profiles 10, 20 of the grid 1 itself.

[0079] In this embodiment, the elongated body 5 of each profile 10, 20 is completely identical to that of the embodiment of figure 6.

[0080] At least one of the profiles 10, 20 however, is different due to the fact that it comprises two metal inserts 6, arranged parallel to one another.

[0081] The two metal inserts 6, which are for example identical to one another - but they could also be different from one another - are arranged parallel to the long side of the cross-section of the elongated body 5.

[0082] The two metal inserts 6 can be arranged symmetrically with respect to the longitudinal axis of the section of the elongated body 5, but they could also have a different arrangement.

[0083] The two metal inserts 6, in the present embodiment, can be for example made with cross-sections having a shorter length than that of the embodiment of figure 6, in any case being capable of offering a suitably strong section.

[0084] This embodiment offers the two opposite profiles 10, 20 a greater possibility of connecting to one another through the pin 30, with respect to the previous embodiment, since many seats 40, 41 are foreseen.

[0085] In other words, it is possible to engage the pin 30 in the seat 40 defined between the inner wall of the cavity 8 and the insert 6, like in the previous embodiment, or in the seat 41 foreseen between the two inserts 6 themselves.

[0086] Consequently, the present embodiment makes it possible to use many parallel pins 30, for example two or three, for a more stable connection.

[0087] Yet another embodiment of the grid 1 according to the present invention is illustrated in figure 8.

[0088] In this embodiment, the elongated body 5 of each profile 10, 20 is completely identical to that of the embodiments of figures 6,7.

[0089] At least one of the profiles 10, 20 is different however due to the fact that the metal insert 6 has a complex cross-section.

[0090] More in detail, the cross-section of the metal insert 6 is made up of two intersecting laminar elements, having at least the ends 9 that are embedded in the elongated body 5.

[0091] Of course the cross-section of the metal insert 6 could be made up of many variously intersecting laminar elements, having at least the ends 9 embedded in the elongated body 5.

[0092] This solution makes it possible to further increase the mechanical strength of the profile 10, 20, in particular the bending resistance according to the longitudinal section of the cross-section of the elongated body 5, without excessively increasing the weight of the profile 10, 20 itself.

[0093] Moreover, also this embodiment makes it possible to obtain greater reciprocal connection possibilities between two opposite profiles 10, 20, since the cavity 8 is divided for example into four seats 40, in each of which it is possible to insert the end of a pin 30 with the due interference.

[0094] Another embodiment of the grid 1 according to the invention is illustrated in figure 9.

[0095] Also in this case, figure 9 illustrates the cross-section of one of the horizontal or vertical profiles 10, 20 of the grid 1.

[0096] In this embodiment, the horizontal or vertical profile 10, 20 comprises an elongated body 5 defining two inner cavities 8 with identical dimensions.

[0097] It is moreover foreseen for there to be a metal insert 6 that passes through the two cavities 8 and that has its ends 9 embedded in the elongated body 5.

[0098] The elongated body 5 comprises an element in plastic material 11 that can be fixed through attachment with clips to the frame of the insulating glass unit 2.

[0099] Such an element in plastic material 11 is made up in particular by a central ribbing 11 that is foreseen inside the cavity 8 and passed through by the metal insert 6.

[0100] Four seats 40 - two for each of the cavities 8 - , in which the ends of the pin 30 can engage, are thus defined by such central ribbing 11.

[0101] The pin 30 thus engages in one of the seats 40 defined between the inner wall of one of the cavities 8 and the metal insert 6.

[0102] Of course, as already clarified, the reciprocal connection between two horizontal or vertical profiles 10, 20 can be obtained also through many pins 30 inserted in different cavities 8.

[0103] Moreover, as mentioned, in the present embodiment, the central ribbing 11 acts as an element for connecting the frame of the insulating glass unit 2 through attachment with clips.

[0104] Indeed, the central ribbing 11 can be directly

attached with clips to the frame of the insulating glass unit 2 without the necessity of having to use special connectors like what occurs in known types of grids. One further embodiment of the grid 1 according to the present invention is illustrated in figure 10.

[0105] In this embodiment, the shape of the elongated body 5 of the horizontal or vertical profile 10, 20 is identical to that of the previous embodiment.

[0106] Two parallel inserts 6 are however foreseen, with the respective ends 9 embedded in the elongated body 5, and passing through the central ribbing 11.

[0107] Compared to the previous one, this embodiment has greater mechanical strength characteristics - thanks to the presence of two metal inserts 6 - and it moreover makes it possible to have further possibilities for the insertion of the ends of one or more connection pins 30.

[0108] In other words, the pin 30 can be inserted, with the due interference, in one of the seats 40 defined between the inner wall of one of the cavities 8 and one of the metal inserts 6, or in one of the seats 41 defined between the two metal inserts 6 themselves.

[0109] Yet another embodiment of the grid 1 according to the present invention is represented in figure 11.

[0110] In this embodiment, the elongated body 5 of the horizontal or vertical profile 10, 20 comprises two identical cavities 8 that are arranged, however, along the longer dimension of the cross-section of the elongated body 5 itself.

[0111] Also in this embodiment, it is foreseen for there to be two metal inserts 6 that pass through the cavities 8 and that have the respective ends 9 embedded in the elongated body 5.

[0112] Also in this embodiment it is foreseen for there to be a central ribbing 11 between the two cavities 8.

[0113] The central ribbing 11 is passed through by the two metal inserts 6.

[0114] This embodiment can be particularly indicated in situations in which there are smaller requirements of mechanical strength of the horizontal or vertical profile 10, 20.

[0115] Indeed, the metal inserts 6 have smaller dimensions, just like the cavities 8.

[0116] Consequently also the connection pin 30 has smaller dimensions in section.

[0117] This leads to a lighter solution with greater thermal insulation characteristics due to the greater amount of plastic material with respect to metal material.

[0118] It has thus been seen how the invention achieves the proposed purposes.

[0119] The present invention has been described according to preferred embodiments, but equivalent embodiments can be conceived without for this reason departing from the scope of protection offered by the following claims.

Claims

1. A Georgian style insulating grid, comprising horizontal profiles (10) and vertical profiles (20) connected to one another to make any type of divider elements inside insulating glass units, each of said profiles (10,20) comprising an elongated body (5) made in plastic material or the like, and at least one metal insert (6), which extends for at least one portion of the length of said elongated body (5), at least partially embedded in said elongated body (5), said elongated body (5) having a substantially tubular cross-section and defining at least one inner cavity (8), said grid (1) moreover comprising means for connecting (30) at least two opposite profiles (10,20) to one another, **characterised in that** said metal insert (6) of at least one of said profiles (10, 20) passes through said inner cavity (8) and has its ends (9) embedded in said elongated body (5), so as to define at least one seat (40;40,41) for inserting said reciprocal connection means (30).

2. Grid according to claim 1, wherein said reciprocal connection means (30) comprise at least one pin with at least one end that can be inserted in said seat (40; 40, 41) .

3. Grid according to claim 1 or 2, wherein said metal insert (6) has a substantially laminar cross-section.

4. Grid according to one of the previous claims, wherein said seat (40) is defined between the wall of said inner cavity (8) and said metal insert (6).

5. Grid according to one of the previous claims, comprising at least two metal inserts (6) arranged parallel to one another.

6. Grid according to the previous claim, wherein said seat (41) is defined between said two metal inserts (6).

7. Grid according to any one of claims 2-6, wherein said pin (30) is inserted inside said seat (40;40,41) with a certain assembly interference.

8. Grid according to any one of claims 1-4, wherein said metal insert (6) has a complex cross-section, made up of many intersecting laminar elements, having at least their ends (9) embedded in said elongated body (5).

9. Grid according to any one of the previous claims, wherein said elongated body (5) comprises an element in plastic material (11) foreseen near to said metal insert (6) that can be fixed by attachment with clips of an insulating glass unit (2) to the support frame.

10. Grid according to the previous claim, wherein said element in plastic material (11) is made up of a central ribbing foreseen inside said cavity (8).

11. Grid according to the previous claim, wherein said element in plastic material (11) divides said inner cavity (8) in at least four seats (40;40,41) in which said reciprocal connection means (30) can be inserted.

12. Grid according to any one of the previous claims, wherein said elongated body (5) is made in PVC type material or the like.

13. Grid according to any one of the previous claims, wherein said metal insert (6) is made in a material selected from aluminium, iron, stainless steel or the like.

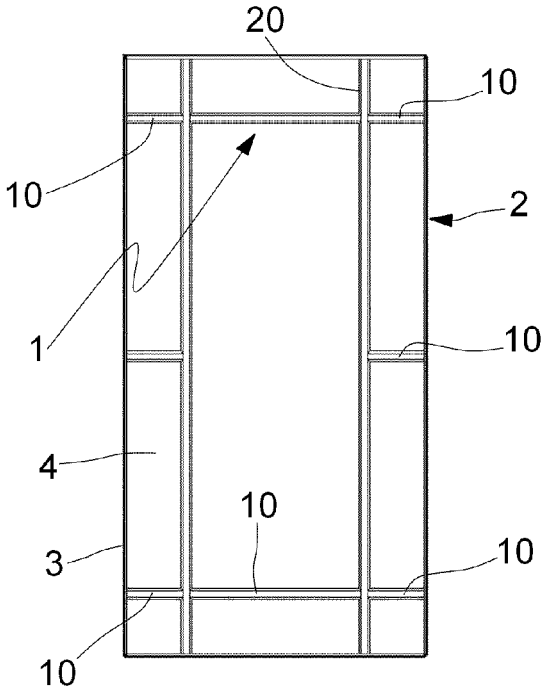

FIG. 1

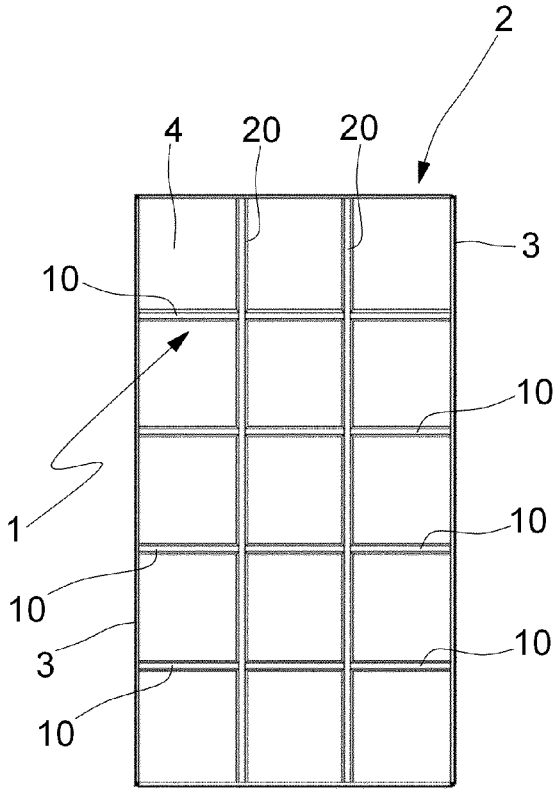

FIG. 2

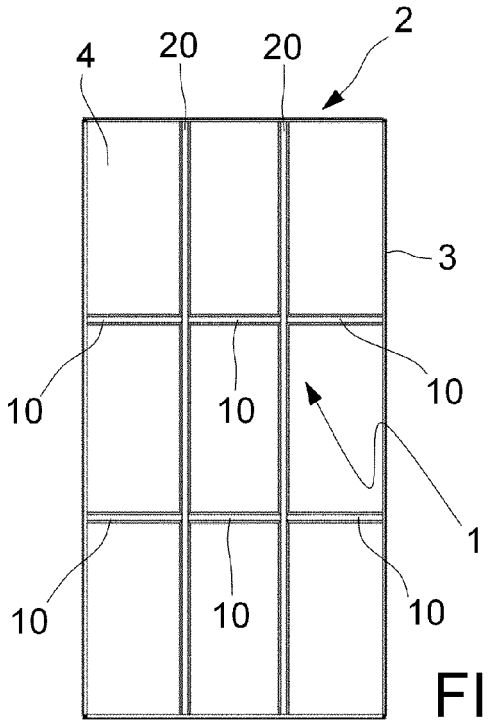

FIG. 3

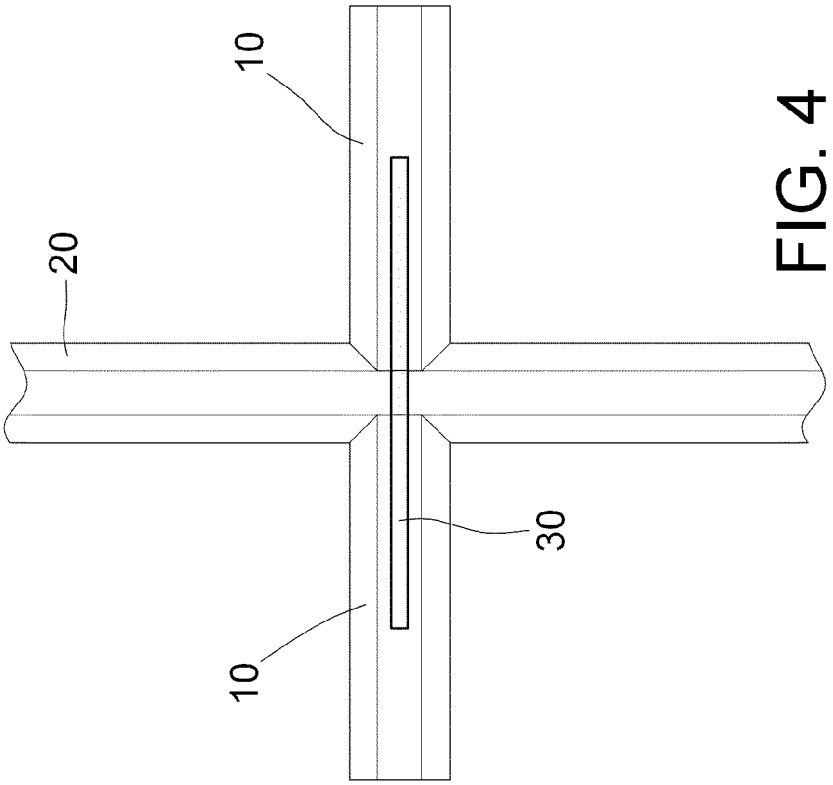

FIG. 4

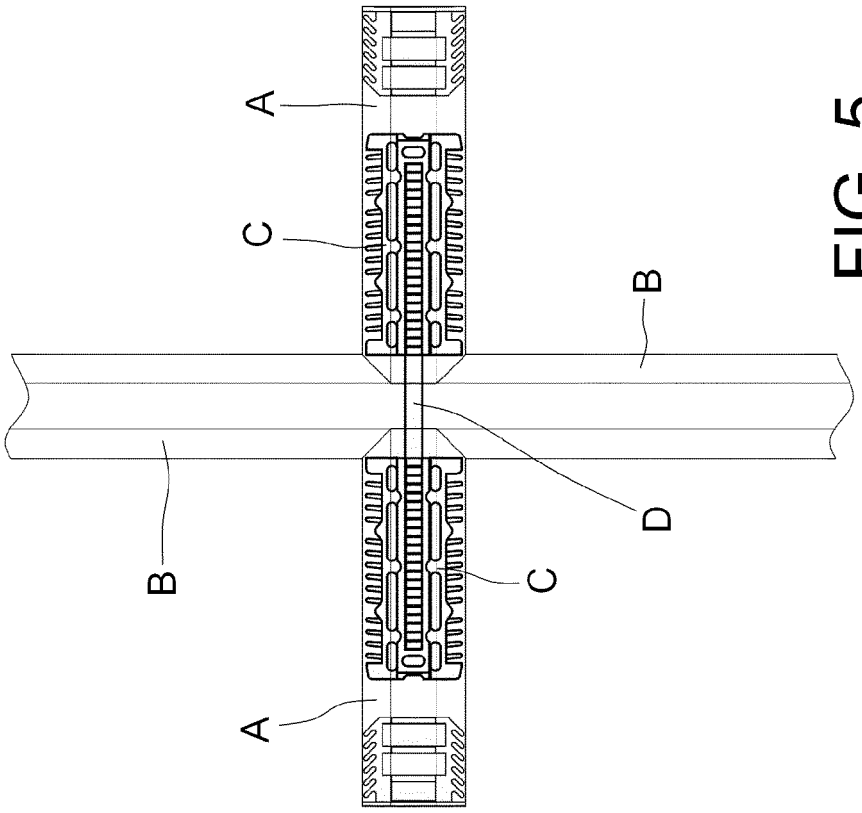

FIG. 5
(PRIOR ART)

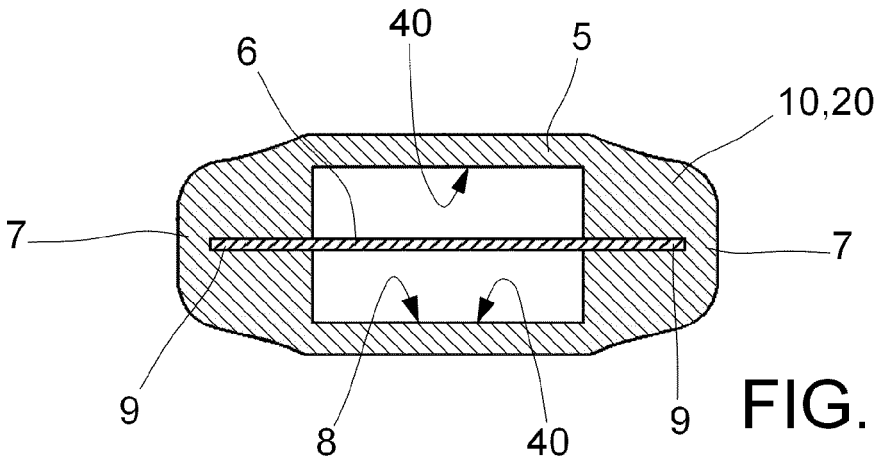

FIG. 6

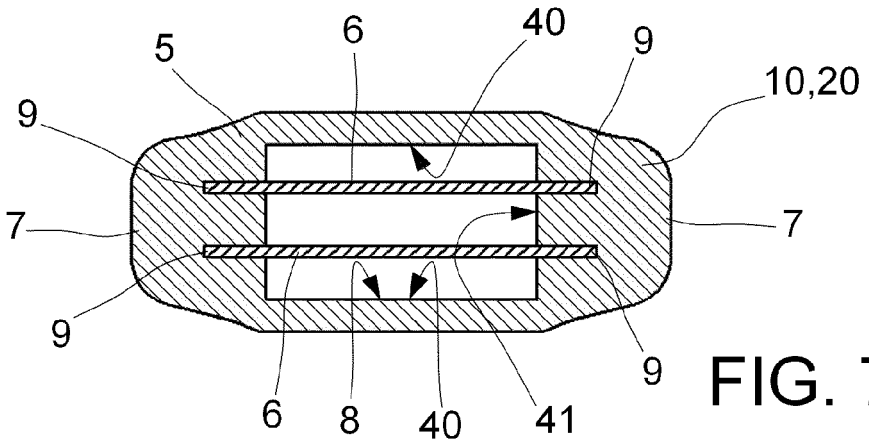

FIG. 7

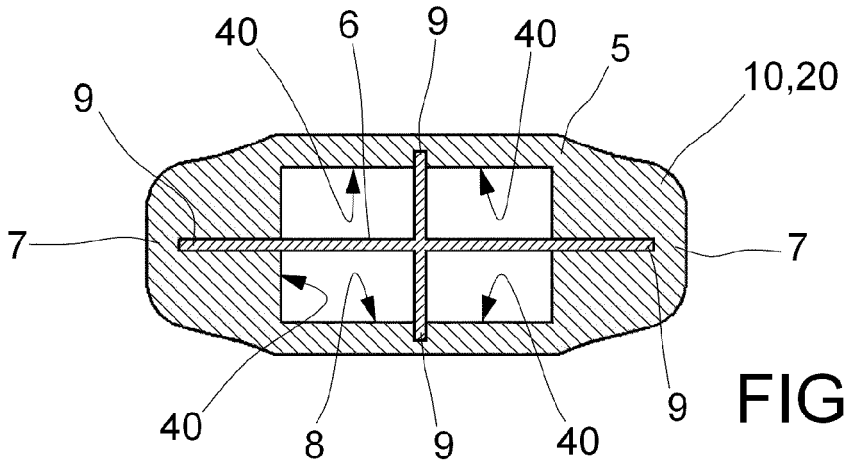

FIG. 8

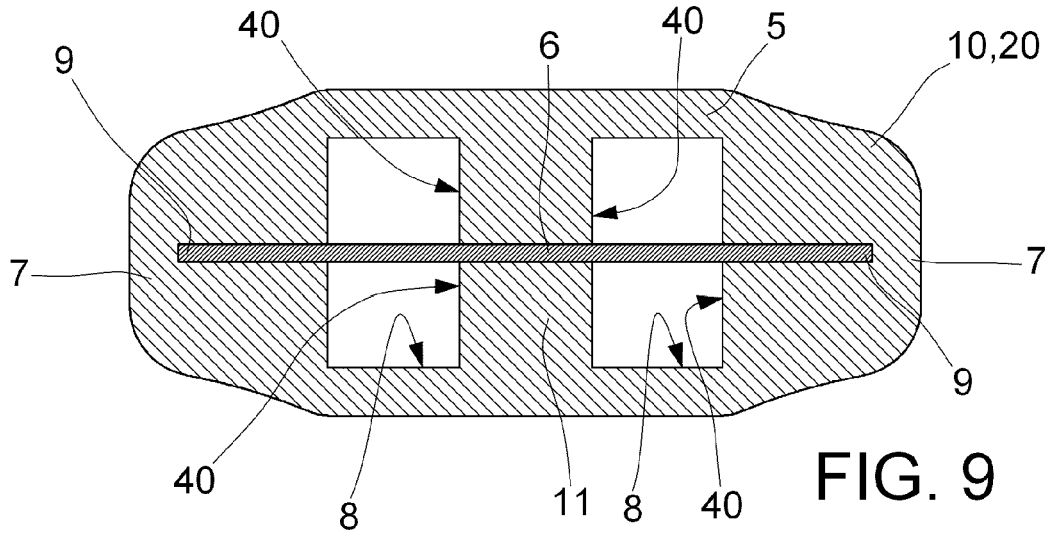

FIG. 9

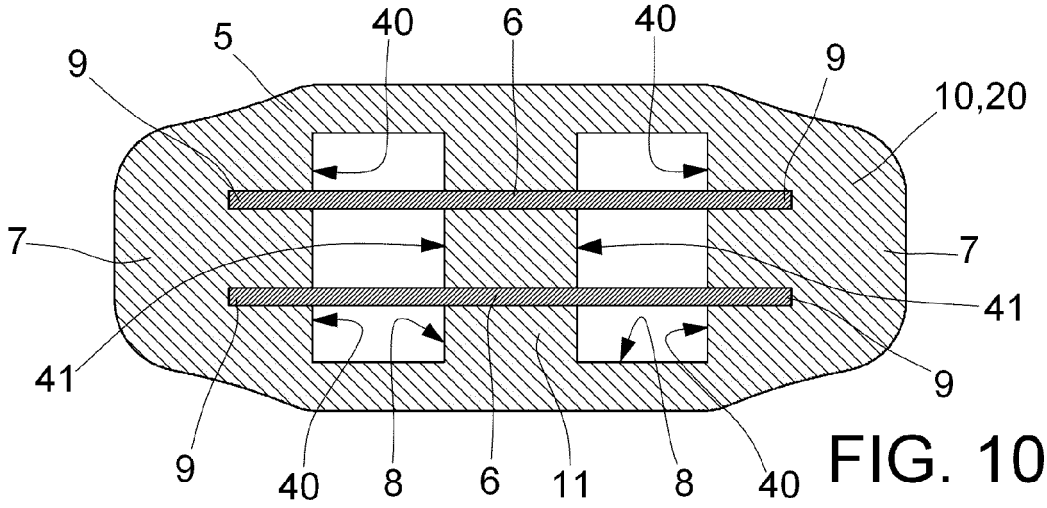

FIG. 10

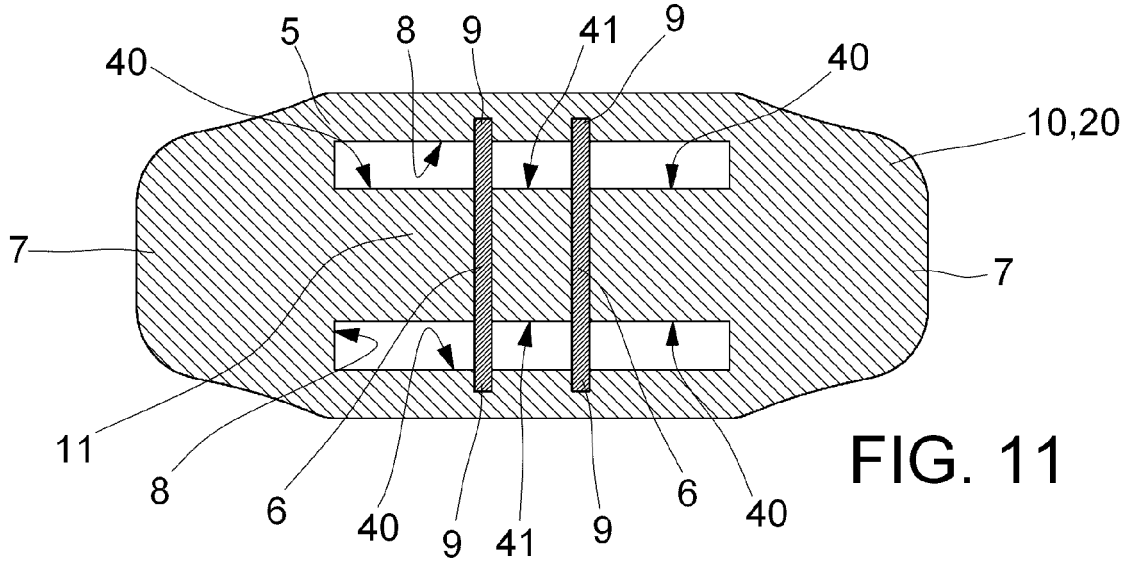

FIG. 11

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EUROPEAN SEARCH REPORT

Application Number
EP 13 16 6714

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS SEARCHED (IPC)

E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	22 August 2013	Cobusneanu, D

CATEGORY OF CITED DOCUMENTS

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22-08-2013

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