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(54) Upright for acoustic barriers and related acoustic barrier

(57) An upright for acoustic barriers comprising a main body (2) having a prevalent direction of development (A), a first array (11) of fins (11a) comprising at least three fins (11a) protruding from a first lateral surface (3) of the main body (2) along substantially parallel directions and with concurrent orientation. The upright further comprises a second array (12) of fins (12a) comprising at least three fins (12a) protruding from a second lateral surface (4) of the main body (2) along substantially parallel directions with concurrent orientation. Each array (11, 12) of fins (11a, 12a) defines at least two substantially parallel channels (13) for housing sound-absorbing panels (14).

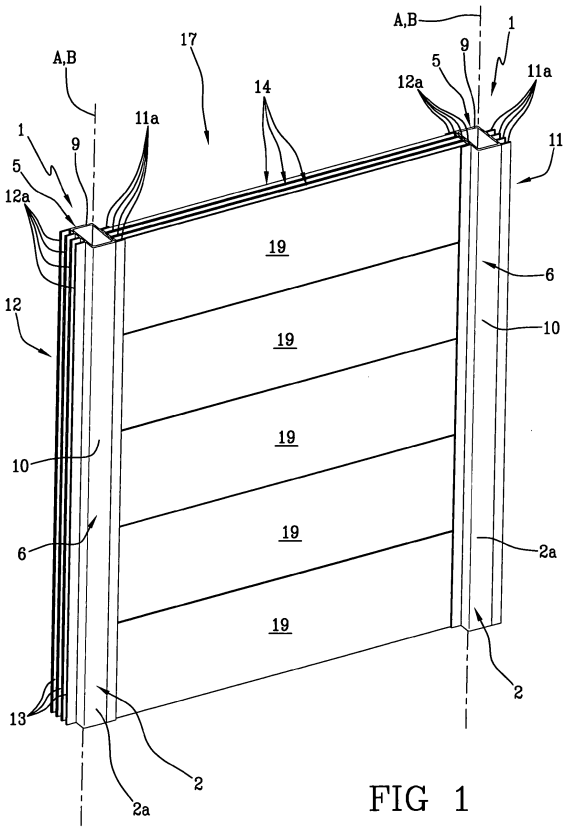

FIG 1

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Description

[0001] The present invention relates to an upright for acoustic barriers, the use thereof and the corresponding acoustic barrier.

[0002] In particular, the present invention finds application in the field of construction, with the purpose of acoustically isolating an environment from the noise caused by road, rail, or other kinds of traffic originating from an adjacent or proximate environment.

[0003] Known acoustic barriers may be "panel" type, otherwise known as artificial, or "embankment" type, otherwise known as natural.

[0004] Since the present invention belongs to the "panel" or artificial type, currently existing artificial barriers shall be described below.

[0005] All known artificial barriers entail the presence of sound-absorbing panels supported by a support structure.

[0006] Typically, the support structure is defined by two uprights constituted by IPE or HEB beams, whose conformation favours the insertion of the panels and the sound construction of the barrier.

[0007] IPE (or HBE) beams are the typical beams having I-shaped (or H-shaped) cross section, which define to channels into which the panels are inserted by sliding from the top downwards.

[0008] In use, the beams are anchored to the ground, using a log bolt or other system, so that they are aligned and that each channel of a beam faces the respective channel of the next beam.

[0009] In this way, the two channels serve as a track for the panels, which are introduced from the top and made to slide downwards for such a number as to reach the desired height.

[0010] Prior art panels may be of different types, and they generally comprise a plurality of superposed layers of materials with different sound-absorbing characteristics.

[0011] In detail, panels may comprise layers of perforated plate, mineral wool, concrete, polycarbonate, wood or other materials.

[0012] It should be noted that panels of the same type have noise-proofing properties that change with thickness, and in particular with the number of sound-absorbing layers in use.

[0013] The conformation of the aforesaid uprights entails the use of the aforementioned multi-layer panels, generally prefabricated, obtained by placing different materials side by side until reaching the thickness required by the size of the channel.

[0014] More specifically, the channel is dimensioned in accordance with the environmental factors relating to the entire area of utilisation and consequently all uprights used in the same area are of the same type.

[0015] Disadvantageously, this does not allow to differentiate on site the acoustic performance of the barrier in the individual installation sectors, unless one has a priori knowledge of its exact sound characteristics, because the uprights allow only to position panels with predetermined thickness.

[0016] Moreover, said uprights entail the use of high-weight panels requiring appropriate machinery for lifting and mounting.

[0017] In view of the conformation of the uprights, panels must have such thickness as to fill the entire sliding channel.

[0018] Alternatively, for polycarbonate panels the empty thickness is filled by an appropriate spacer, e.g. a second C-shaped steel section bar.

[0019] Additionally, in the winter, prior art barriers are subject to the freezing of the humidity and of the frost present on the surfaces, resulting in a considerable loss of efficiency of the barriers.

[0020] Lastly, in spite of the superposition of different types of sound-absorbing material, prior art barriers are not able to absorb the most frequent wavelengths in road traffic.

[0021] In this context, the technical task of the present invention is to propose an upright for acoustic barriers and an acoustic barrier that overcome the aforementioned drawbacks of the prior art.

[0022] In particular, an object of the present invention is to make available an upright for acoustic barriers that enables to optimize acoustic absorption and isolation in its different sectors of installation, even without having a priori knowledge of their exact sound characteristics.

[0023] Moreover, an additional object of the present invention is to propose an acoustic barrier that is easy to mount and has high performance, i.e. it is able to remain efficient even in winter and to adapt to areas with varied sound characteristics.

[0024] The technical task set out above and the objects specified are substantially achieved by an upright for acoustic barriers and by an acoustic barrier, comprising the technical characteristics exposed in one or more of the appended claims.

[0025] Further characteristics and advantages of the present invention shall become more readily apparent from the indicative, and therefore not limiting, description of a preferred but not exclusive embodiment of an upright for acoustic barriers and by the related acoustic barrier, as illustrated in the accompanying drawings in which:

- figure 1 is a perspective view of an acoustic barrier according to the present invention in a complete configuration;
- figure 2 is a perspective view of an acoustic barrier according to the present invention in a mounting configuration;
- figure 3 shows a plan view of an upright for acoustic barrier in accordance with the present invention;
- figure 4 is a plan view of an acoustic barrier according to the present invention; With reference to the accompanying figures, the reference number 1 indicates an upright for acoustic barriers according to

the present invention.

[0026] The upright 1 comprises a main body 2 having a prevalent direction of development "A".

[0027] In other words, the main body 2 is a substantially longitudinal body which in use is meant to protrude from the ground.

[0028] Moreover, the upright 1 comprises an anchoring body fastened to the main body 2, preferably at a lower portion 2a of the main body 2.

[0029] In use, the anchoring body is anchored to the ground, using a log bolt or another system, or to another upright 1 to enable the main body 2 to maintain an erect position and support the acoustic barrier.

[0030] The main body 2 comprises a first 3 and a second lateral surface 4.

[0031] In a preferred, illustrated embodiment, said first 3 and second lateral surface 4 are substantially opposite.

[0032] In the illustrated embodiment, the first 3 and the second lateral surface 3 are connected to each other by a third lateral surface 5.

[0033] In particular, the third lateral surface 5 connects the first one 3 to the second lateral surface 4 at respective ends 3a, 4a thereof.

[0034] The main body 2 also comprises a fourth lateral surface 6 that connects the first lateral surface 3 to the second lateral surface 4.

[0035] In particular, the fourth lateral surface 6 connects the first lateral surface 3 to the second lateral surface 4 at additional ends 3b, 4b thereof, opposite to the aforesaid ends 3a, 4a.

[0036] Preferably, each of the lateral surfaces 3, 4, 5, 6 is defined by substantially planar wall 7, 8, 9,10.

[0037] In particular, the main body 2 presents a polygonal closed and hollow cross section, combining excellent torsional strength and a limited mass of the upright 1.

[0038] It should be noted that the term "cross section" means a section perpendicular to the prevalent direction of development "A" of the main body 2.

[0039] The first lateral surface 3 presents a first array 11 of fins 11 a that develop away from the first lateral surface 3 along substantially parallel directions and with concurrent orientation.

[0040] Similarly, the second lateral surface 4 presents a second array 12 of fins 12a that develop away from the second lateral surface 4 along substantially parallel directions and with concurrent orientation.

[0041] In particular, the first 11 and the second array 12 present each at least three fins 11a, 12a, substantially equidistant from each other, in such a way as to define at least two mutually parallel channels 13 for receiving sound absorbing panels 14.

[0042] In the preferred embodiment, the first 11 and the second array 12 present four fins 11a, 12a in such a way as to define three channels 13, allowing to increase the number of panels 14 that can be inserted and consequently a greater number of combination between them.

[0043] Moreover, each fin 11a, 12a develops longitudinally throughout the longitudinal extension of the main body 2.

[0044] Advantageously, this enables to obtain channels 13 for receiving the sound-absorbing panels 14 that guide each panel 14 from an upper position of insertion to a final position, lower than the position of insertion.

[0045] In the illustrated embodiment, the first 3 and the second lateral surface 4 present a first portion 3c, 4c and a second portion 3d, 4d adjacent to the first portion 3c, 4c. In particular, the first portion 3c of the first lateral surface 3 is occupied by the first array 11 of fins 11 a, whilst the second portion 3d of the first lateral surface 3 is free of the fins 11 a.

[0046] Similarly, the first portion 4c of the second lateral surface 4 is occupied by the second array 12 of fins 12a, whilst the second portion 4d of the second lateral surface 4 is free of the fins 12a.

[0047] As stated, in the preferred embodiment, the first lateral surface 3 is opposite to the second lateral surface 4.

[0048] In particular, the first portion 3c of the first lateral surface 3 is at least partly opposite to the second portion 4d of the second lateral surface 4.

[0049] Similarly, the second portion 3d of the first lateral surface 3 is at least in part opposite to the first portion 4c of the second lateral surface 4.

[0050] More specifically, each fin 11a of the first array 11 is positioned symmetrically relative to a corresponding fin 12a of the second array 12 relative to a central longitudinal axis "B" of the main body.

[0051] Said central longitudinal axis "B" develops along the prevalent direction of development "A" of the main body and, more specifically, it defines the centre "C" from which the alignment of two successive uprights is measured.

[0052] Moreover, the fins 11a of the first array 11 are substantially parallel to the fins 12a of the second array 12.

[0053] More specifically, both the fins 11a of the first array 11 and the fins 12a of the second array 12 are inclined by an angle "W" relative to a transverse axis of orientation "D" of the main body 2.

[0054] The terms "transverse axis of orientation D" means an axis that is substantially perpendicular to the prevalent direction of development "A" of the main body 2 and that intercepts two opposite and aligned points lying on the first 3 and on the second lateral surface 4.

[0055] Advantageously, as shall become more readily apparent below, this enables to obtain the mounting of sound-absorbing panels 14 that are inclined relative to a direction of alignment of the uprights 1.

[0056] Preferably, the angle of inclination "W" is between 0.5 and 10 degrees.

[0057] Still more preferably, the angle of inclination "W" of the fins 11a, 12a is between 1.5 and 2.5 degrees.

[0058] In the preferred embodiment, moreover, each fin presents at least one longitudinal notch 16 that defines

a housing seat of a gasket.

[0059] Preferably, the uprights 1 of the present invention are made of aluminium to reduce their weight and facilitate its transportability.

[0060] The present invention further relates to an acoustic barrier 17 constructed through the use of a plurality of uprights 1.

[0061] In particular, the acoustic barrier 17 comprises at least two uprights 1 aligned in such a way that each channel 13 defined by the first array 11 of fins 11 a of an upright 1 faces a respective channel 13 defined by the second array 12 of fins 12a of the next upright 1.

[0062] Moreover, the acoustic barrier 17 comprises at least one panelling 14 made of sound-absorbing material inserted between a channel 13 of an upright and the respective channel 13 of the next upright.

[0063] Moreover, an operator can insert a panelling 14 for each pair of mutually facing channels 13 of two successive uprights 1 obtaining a series of multiple parallel panellings between an upright 1 and the next one.

[0064] Since the number of channels 13 is equal to the number of fins 11 a, 12a minus one, the number of panellings 14 that can be inserted by the operator between two successive uprights 1 is between one and the number of fins 11 a, 12a of a same array 11,12 minus one.

[0065] In the illustrated embodiment, there are three channels 13 and consequently the operator can decide to use a number of panellings 14 between one and three, depending on the acoustic properties of the installation sector.

[0066] Moreover, given the arrangement of the first 11 and of the second array 12 it is possible to align the uprights 1 in such a way that the panellings 14 are inclined relative to a direction of alignment "E" between two successive uprights 1.

[0067] In particular, said direction of alignment "E" is the line joining the two centres "C" of the two successive uprights 1.

[0068] More specifically, the panellings 14 are inclined by an angle "X" between 0.5 and 10 degrees.

[0069] More specifically, the panellings 14 are inclined by an angle "X" between 1.5 and 2.5 degrees.

[0070] Advantageously, this enables to better disperse the sound waves reflected by the acoustic barrier 17.

[0071] Preferably, moreover, the direction of alignment "E" coincides with the transverse axis of orientation "D" of the upright.

[0072] Note, moreover, that the thickness of the fins 11 a, 12a between two parallel panellings 14 defines an air gap 18 between a panelling 14 and the other, preventing their contact.

[0073] Advantageously, the thickness of the air gap 18 is closely linked with the absorption of the sound wavelengths in the area of use.

[0074] In other words, varying the thickness of the tabs 11a, 11 b, it is possible to control the thickness of the air gap 18 to optimize the absorption of the most frequent sound wavelengths in the area of use.

[0075] Advantageously, moreover, the presence in the air gap 18 allows to prevent the surfaces of the panellings 14 from freezing during the winter and the consequent occlusion of their porosity, which entails a substantial loss of efficiency of the acoustic barrier 17.

[0076] By way of example, some examples of sound-absorbing panellings 14 used in acoustic barriers according to the present invention are mentioned below.

[0077] The panellings 14 used are mainly made of Celenit®, a material composed by mineralised wood fibres and cement serving as binder, coupled with other high-density materials to optimize acoustic characteristics.

[0078] The materials with which Celenit® can be coupled are, for example, Fermacell® and Acquapanel®, depending on the applications and on the desired acoustic characteristics.

[0079] Moreover, since the upright 1 is able to receive multiple panellings 14 set side by side, the operator can use all these types of panel in combination to adapt the barriers to the sound characteristics of the area of use.

[0080] Preferably, the panellings 14 are divided into multiple panels 19 made of sound absorbing material aligned in the channels 13 of the upright 1 in such a number as to occlude the gap that is created between one upright 1 and the next one. Advantageously, this allows to use panellings 14 divided into lighter, more easily handled panels 19.

[0081] In particular, said panels 19 are substantially planar and they have two dimensions of prevalent development.

[0082] A first dimension of prevalent development corresponds to the width of the panelling 14, i.e. to the distance between an upright 1 and the next one.

[0083] A second dimension of prevalent development is variable according to the type of panel 19.

[0084] In other words, the second dimension of prevalent development is linked to the weight of the panel 19 and to the length of the upright 1.

[0085] On the panels 19, at the longer sides, reinforcements are mounted to increase their flexural strength.

[0086] In particular, said reinforcements are mounted using through holes or the like.

[0087] In use, in order to lock each panelling 14 in the respective channel 13, locking elements 20 are used which are fastened to an upper portion of both uprights 1. More specifically, said locking elements 20 are brackets 20a that are positioned between one upright and the next one, above the last panel 19 of the panelling 14, to prevent the protrusion of said panel 14 from the appropriate channel 13. Preferably, said brackets 20a have semi-cylindrical shape with length equal to the distance between the centres "C" of two successive uprights 1.

[0088] The invention achieves the proposed objects and it provides important advantages. The presence of fins that define multiple channels for receiving the panellings allows to differentiate the sound-absorbing properties of the barriers according to the installation sectors by changing the number of panellings used or by chang-

ing their order.

[0089] In the prior art, this was impossible, unless one had a priori knowledge of the characteristics of the various sectors of the area of use, which is generally difficult between specific, expensive studies would be necessary, which would definitely be economical for the builder.

[0090] Moreover, the presence of the fins allows to maintain the various panellings distanced from each other from an air gap, fundamental for sound absorption and for preventing the degradation of the efficiency of the acoustic barrier during the winter months.

[0091] In particular, studying the thickness of the fins according to the area of utilization it is possible to obtain an air gap that allows the absorption of the most frequent sound waves in the area.

[0092] Additionally, the presence of multiple channels allows, for equal necessary sound-absorbing properties, a greater ease of handling of the panellings because, in the present invention, weight is subdivided into multiple parallel panellings and, unlike in the prior art, it is not concentrated in a single element.

[0093] Moreover, the inclination of the panellings allows to obtain a better dispersion of the sound waves reflected by the barrier, and consequently it favours the optimisation of their performance.

Claims

1. Upright for acoustic barriers comprising a main body (2) having a prevalent direction of development (A); **characterised in that** it comprises a first array (11) of fins (11a) comprising at least three fins (11a) protruding from a first lateral surface (3) of the main body (2) along substantially parallel directions with the same orientation; said upright further comprising a second array (12) of fins (12a) comprising at least three fins (12a) protruding from a second lateral surface (4) of the main body (2) along substantially parallel directions with concurrent orientation; each array (11, 12) of fins (11a, 12a) defining at least two substantially parallel channels (13) for housing sound-absorbing panels (19).

2. Upright as claimed in claim 1, **characterised in that** said first (3) and second lateral surface (4) comprise a first portion (3d, 4d), occupied by the respective array (11, 12) of fins (11a, 12a), and a second portion (3e, 4e), adjacent to the first portion (3d, 4d), free of the fins (11a, 12a).

3. Upright as claimed in claim 2, **characterised in that** the first portion (3d) of the first lateral surface (3)is at least partly opposite to the second portion (4e) of the second lateral surface (4).

4. Upright as claimed in claim 3, **characterised in that** the main body (2) comprises a third lateral surface (5) connecting the first (3) and the second lateral surface (4); said first portion (3d) of the first lateral surface (3) being proximal to the third lateral surface (5) and said first portion (4d) of the second lateral surface (4) being distal from said third lateral surface (5).

5. Upright as claimed in claim 3 or 4, **characterised in that** the fins (11a) of the first array (11) are parallel to the fins (12a) of the second array (12).

6. Upright as claimed in claim 5, **characterised in that** each of said fins (11a, 12a) is inclined by an angle (W) relative to a transverse axis of orientation ("D") of the main body (2).

7. Upright as claimed in claim 5, **characterised in that** each fin (11a, 12a) is inclined relative to a transverse axis of orientation ("D") of the main body (2) by an angle (W) of between 0.5 and 10 degrees.

8. Upright as claimed in any of the claims 4 to 7, **characterised in that** the main body (2) comprises a fourth lateral surface (6) connecting the first (3) and the second lateral surface (4); said fourth lateral surface (6) being proximal to the first portion (4d) of the second lateral surface (4); said lateral surfaces (3, 4, 5, 6) defining a polygonal hollow transverse section of the main body (2)

9. Upright as claimed in any of the previous claims, **characterised in that** each fin (11 a, 12a) presents at least one longitudinal notch (15) to define a seat (16) for housing a gasket.

10. Upright as claimed in any of the previous claims, **characterised in that** each array (11, 12) of fins (11a, 12a) comprises at least four fins (11a, 12a).

11. Acoustic barrier comprising:

    - at least two uprights as claimed in any of the claims 1 to 10; said uprights being aligned in such a way that each channel (13) defined by the first array (11) of fins (11a) of an upright faces a respective channel (13) defined by the second array (12) of fins (12a) of the next upright;
    - at least one panel (14) made of sound—absorbing material inserted between a channel (13) of an upright and the respective channel (13) of the next upright.

12. Acoustic barrier as claimed in claim 11, **characterised in that** each panel (14) is inclined by an angle (X) relative to a direction of alignment (E) of subsequent uprights.

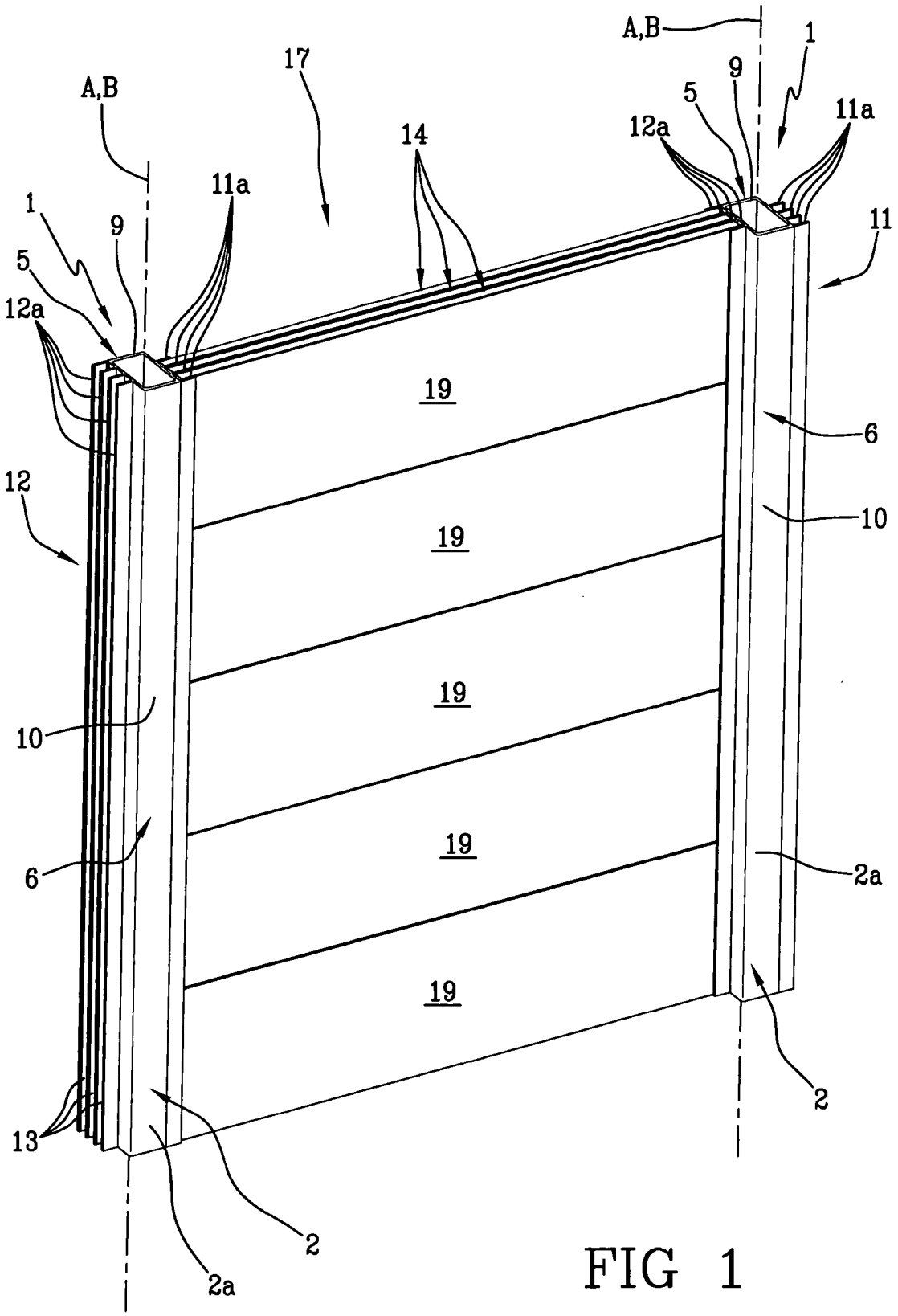
13. Acoustic barrier as claimed in claim 11, **character-**

ised in that each panel (14) is inclined relative to a direction of alignment (E) of subsequent uprights by an angle (X) of between 0.5 and 10 degrees.

14. Acoustic barrier as claimed in any of the claims 11 to 13, **characterised in that** the thickness of each fin (11a , 12a) of an upright included between two panels (14) defines an air interstice between said panels (14).

15. Acoustic barrier as claimed in any of the claims 11 to 14, **characterised in that** the number of panels (14) is selectively variable between one and the number of fins (11a, 12a) of a same array (11, 12) minus one.

16. Use of a plurality of uprights as claimed in any of the claims 1 to 10 for the erection of an acoustic barrier.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14
A,B
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9
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12a
11a
11a
1
9
5
12a
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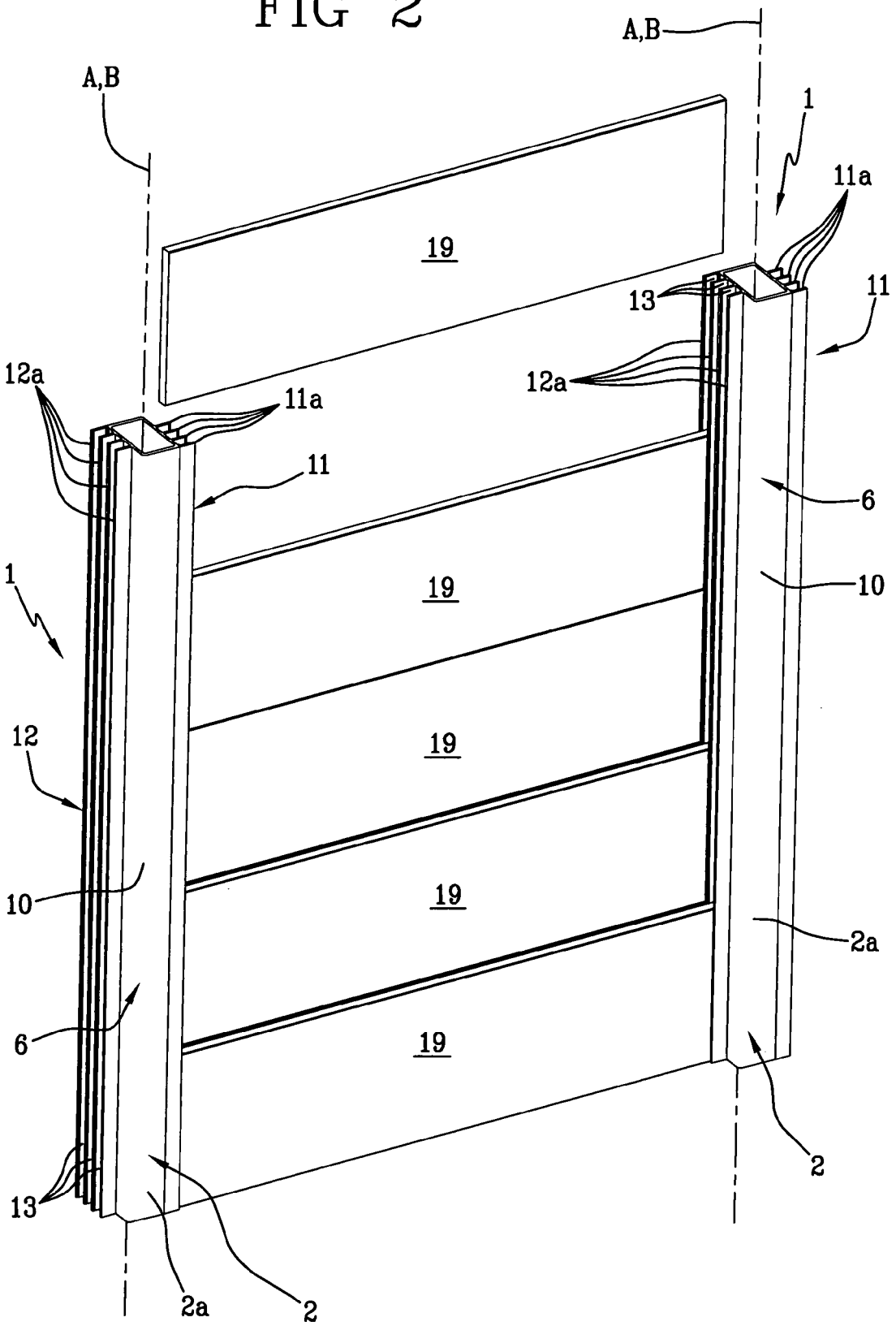
13
2
2a
2

FIG 1

FIG 2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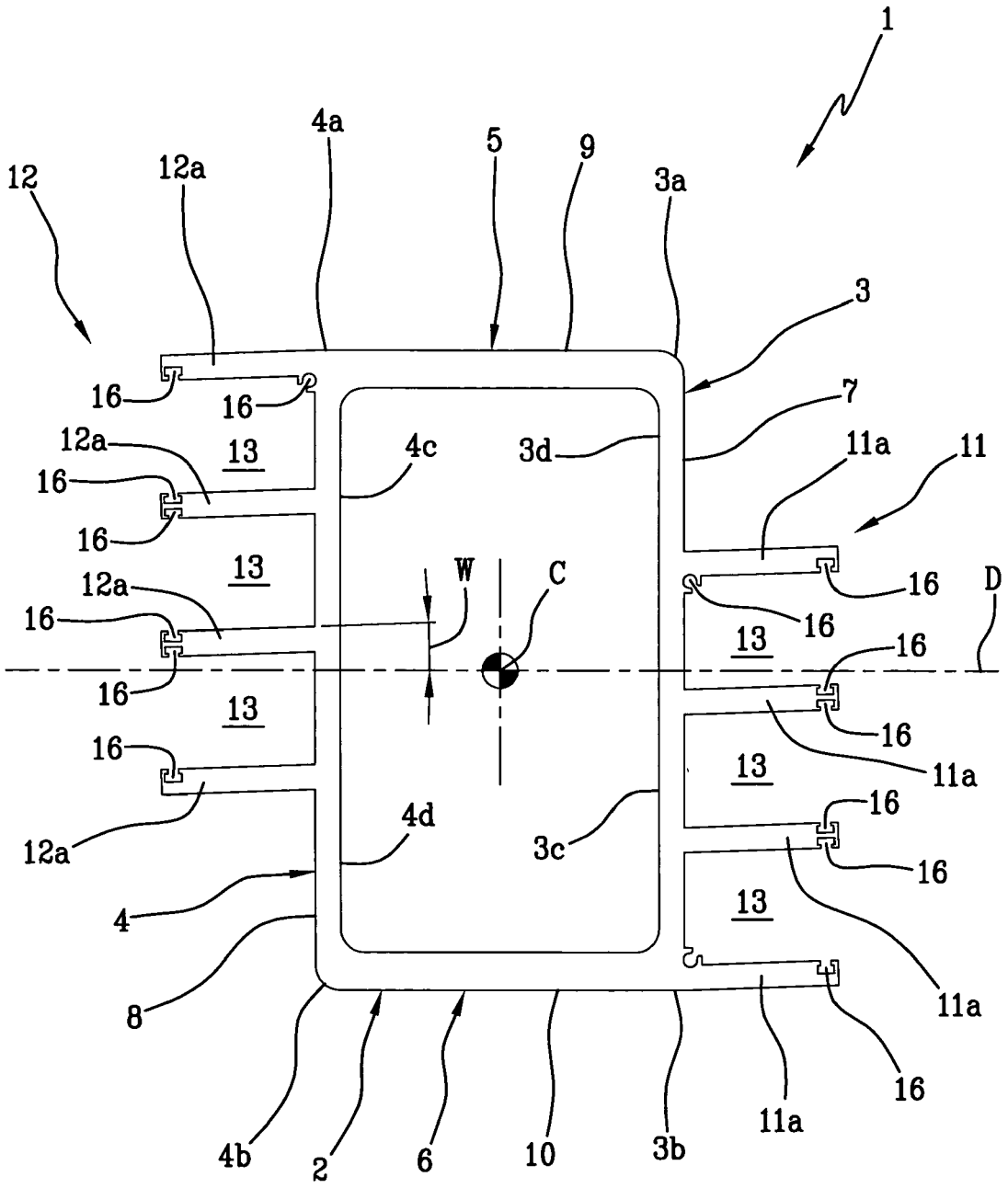
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16
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D
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12a
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16

FIG 3

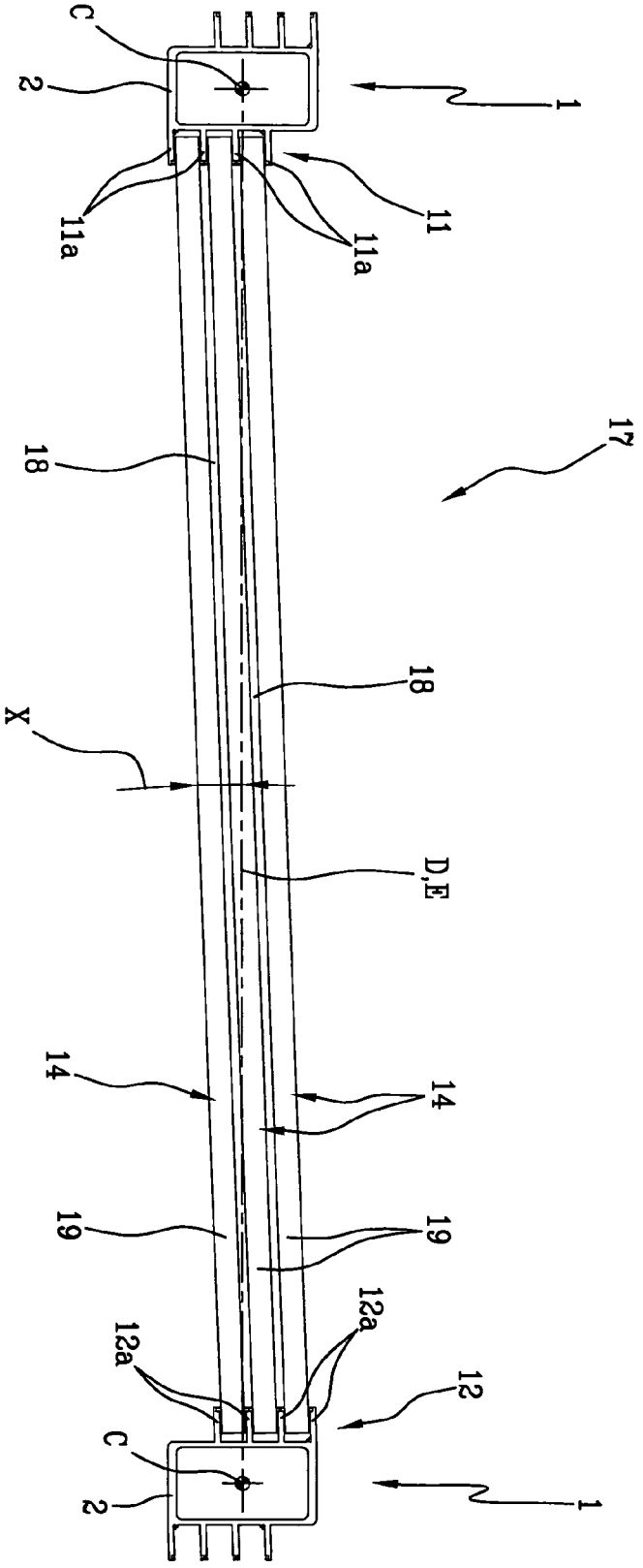

FIG 4