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(54) **ANTI-SEISMIC, INSULATING CONSTRUCTION ELEMENT**

(57) The invention describes an anti-seismic, insulating construction element, designed for constructing building partitions, comprising a plurality of rods (15a, 15b) made of a rigid material and substantially embedded in a matrix (10) made of a flexible material, wherein a first set of rods (15a) is housed inside the matrix (10) in

a vertical direction, a second set of rods (15b) is housed inside the matrix in a horizontal direction, none of the rods of the first set (15a) is rigidly joined to any rod of the second set (15b), and the rods (15a, 15b) of one of the two sets, first (15a) or second (15b), do not extend continuously along the length of the matrix (10).

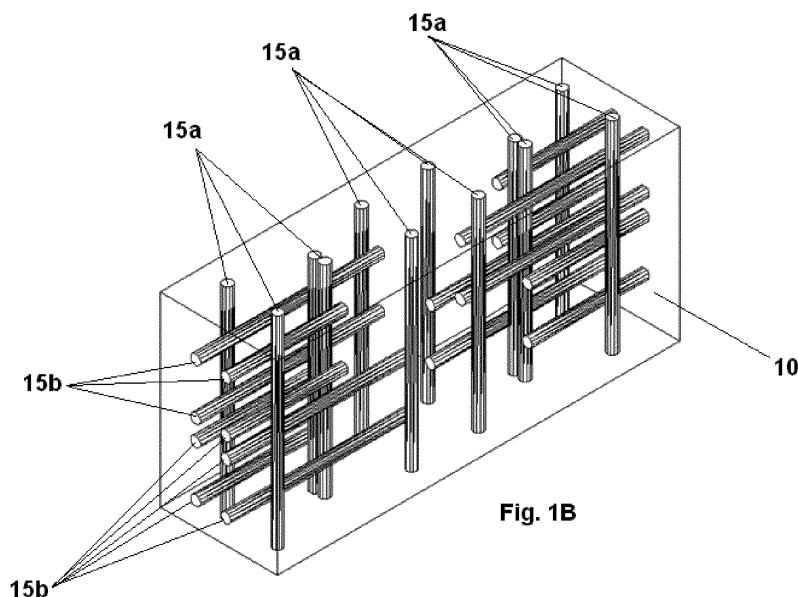


Fig. 1B

Description

OBJECT OF THE INVENTION

[0001] The present invention belongs to the technical field of construction, and more specifically to the seismic insulation of buildings.

[0002] Its object consists of providing an element designed for constructing partitions of a building (i.e. enclosures, walls and/or partitions), specifically designed to seismically insulate said partition from the resistant structure of the building, i.e. that part of the building design to withstand loads.

BACKGROUND OF THE INVENTION

[0003] Buildings, especially those built in areas close to the limits of a tectonic plate or in areas where there is an important presence of volcanoes, can be affected by a seismic event. In the most serious cases, said events may seriously damage the building and even completely destroy it.

[0004] Therefore, within the construction sector, a multitude of anti-seismic construction elements have been developed; i.e. elements that are incorporated in a building with the aim of minimizing the adverse effects of a seismic event, should this occur. For the purposes of the present description, a seismic event is not exclusively limited to earthquakes or earth tremors but can also be understood to refer to any phenomenon of mechanical type or dynamic action that may cause damage to the resistant structure and/or to the partitions of a building. Thus, the term "seismic event" equally comprises any catastrophe or external action that supposes, in short, movements of the building that may affect the structural integrity thereof, such as explosions, tornadoes, floods, etc.

[0005] In most cases, said anti-seismic construction elements known at present are bricks or blocks intended for the construction of partitions which do not produce seismic insulation but instead increase the resistance of said partitions, either because they give greater interlocking between the component pieces or because they are provided with inner strengthening cables or bars which are joined together and anchored to the resistant structure of the building, and may even be pre-stressed.

[0006] Thus, for example, document IT1201302 discloses a modular element formed by a chipboard block which incorporates a metal mesh composed of vertical and horizontal bars rigidly joined together. The metal mesh of each chipboard block is joined to the metal mesh of the adjacent blocks by special threaded pieces so that it forms a continuous and rigid metal structure which is joined to the resistant structure of the building, not requiring joining mortar between the blocks. It is important to indicate the fact that as the vertical bars are rigidly joined to the horizontal bars, it is not possible for there to be relative movement of some bars with others.

[0007] Furthermore, it is known that the partitions have a considerable influence in the dynamic response of buildings. In this way, the use of anti-seismic elements according to the prior art in partition construction increases the resistance of said partitions, providing a considerable rigidity to the building structure which affects its behaviour in the event of seismic event, and said partitions may even cause serious damages and collapses of buildings, as numerous studies and scientific bibliography reveal, e.g. in: [El-Dakhkhni W. W., Elgaaly, F. M., Hamid, A.A, 'Three-Strut Model for Concrete Masonry-Infilled Steel Frames'. Journal of Structural Engineering, 129, 2, 2003], [Braga F., Manfredi V., Masi A., Salvatori A., Vona M. 'Performance of non-structural elements in RC buildings during the L'Aquila, 2009 earthquake'. Bulletin of Earthquake Engineering, 9, 307-24, 2010], [Uva G., Porco F., Fiore A. 'Appraisal of masonry infill walls effect in the seismic response of RC framed buildings: A case study'. Engineering Structures 34, 514-526, 2012].

[0008] Despite this, the contribution of said partitions is not usually taken into consideration in the theoretical structural and/or seismic calculations performed during the construction project phase of a building, since they are not considered resistant elements, in addition to the fact that they may exist or not, depending on the requirements at any given time. For this reason, the real dynamic behaviour of a building, especially in a seismic event, does not usually coincide with that predicted by the theoretical calculations. This difference is even greater in buildings where the partitions incorporate anti-seismic elements according to the prior art such as those indicated above, since said anti-seismic elements contribute to increasing the resistance of the partitions and change the overall rigidity of the building.

[0009] A way of significantly reducing the discrepancy between theory and practice described above in the event of a dynamic action such as an earthquake, would be to significantly insulate the building partitions from the resistant structure of said building.

[0010] Indeed, modern seismic legislation establishes, in its majority, that if an element (such as, for example, the partitions) affects the dynamic behaviour of a building, said element, should either be taken into consideration in the calculations or be seismically insulated. However, an attempt to seismically insulate the resistant structure of a building from the partitions may easily lead to loss of resistance against the actions in the plane perpendicular to said partitions.

[0011] The bricks or blocks of the prior art mentioned above only increase partition resistance, modifying the overall rigidity of the building but are not effective for seismically insulating said partitions from the corresponding resistant structures of the building, so that in the sector there is the need to provide elements specifically to satisfactorily achieve said insulation.

DESCRIPTION OF THE INVENTION

[0012] In order to tackle the problems and disadvantages of the prior art indicated above, the invention provides an anti-seismic, insulating construction element, designed for constructing building partitions comprising:

- a plurality of rods made of a rigid material; and
- a matrix made of a flexible material, provided with an upper wall, a lower wall and side walls,

wherein the plurality of rods is substantially embedded in the matrix made of a flexible material so that:

- a first set of rods is disposed in a vertical direction;
- a second set of rods is disposed in a horizontal direction,
- none of the rods of the second set of rods is rigidly joined to none of the rods of the first set of rods.
- the rods of one of the two sets, first or second, do not extend continuously along the length of the matrix.

[0013] The anti-seismic, insulating construction element according to the invention is designed to preferably be disposed in contact with the pillars and the beams or floors of a building, to absorb its movements should a seismic event occur and not transmit it to the partitions.

[0014] In a first embodiment of the invention, the rods of the second set do not extend continuously along the horizontal direction of the matrix. The anti-seismic, insulating construction elements, according to this embodiment particular of the invention, are preferably disposed in contact with the structure's pillars to mainly absorb horizontal movements should a seismic event occur.

[0015] In the present description, it should be understood that "a vertical direction" is that perpendicular to the surface of the ground on which a building partition rests, built from the anti-seismic, insulating construction elements of the invention, whilst "a horizontal direction" is that parallel to the surface of said ground. It should also be understood that a "rigid joint" of two pieces is that which prevents the relative movement of said pieces with respect to another and that a "rod" is a part with a long and thin form.

[0016] The rigid rods of an anti-seismic, insulating construction element according to the invention are designed to withstand the vertical stresses generated by the action of gravity and, in the case of an anti-seismic, insulating element according to the first embodiment of the invention, the horizontal stresses produced by a seismic event. Therefore, they must be made of a rigid and resistant material, for example a steel or a plastic with an elastic modulus in the range of 2 to 250 GPa and an elastic limit in the range of 5 to 1000 MPa. Furthermore, its disposal within the matrix is such that it allows resisting with rigidity the gravitational and horizontal forces perpendicular to the plane of the partition, but not the forces arising from

movements in the plane of the partition. The matrices of said anti-seismic, insulating construction elements according to the invention must instead be made of a flexible material, for example with an elastic modulus between 1 and 1000 MPa, to thus enable absorbing the movements produced in the plane of the partition without introducing additional rigidity, and avoiding the dynamic interaction between the building partition and structure. Furthermore, the dimensions of said matrices are substantially equal to the total size of the anti-seismic, insulating construction element.

[0017] Thus, an anti-seismic, insulating construction element according to the invention has a different behaviour according to the three directions of the space. For example, in the case of an anti-seismic, insulating element according to the first embodiment of the invention, said anti-seismic, insulating element is capable of withstanding vertical forces and forces perpendicular to the plane of the partition thanks to the plurality of rods and to its special disposal, and capable of absorbing the horizontal movements produced in the plane of the partition thanks to the flexible matrix and to the horizontal movement in the plane of the partition allowed for the horizontal bars not extending continuously throughout the length of the matrix.

[0018] In this way, a partition built with the anti-seismic, insulating construction elements according to the first embodiment of the invention which mainly intend to absorb horizontal movements produced by a seismic event according to the invention is sufficiently rigid and resistant in two directions to withstand, thanks to the plurality of rods, the compression and or shear stresses due to the gravitational loads of the building and loads perpendicular to the plane of the partition and, simultaneously, sufficiently flexible in the third direction (i.e. horizontal) to absorb the movements imposed by the building structure on the partition in its plane during a seismic event without introducing an appreciable rigidity in the plane of said partition, so that it has the advantage of favouring the seismic insulation of the partition with respect to the resistant structure of the building. As commented, the flexibility throughout this direction allows that said partitions substantially absorb the movements induced by a seismic event in the building, as the horizontal rods can penetrate each anti-seismic, insulating element in the matrix that contains it without colliding with other rods, whilst the plurality of rods and their particular disposal allow resistance against loads perpendicular to the plane of the partition. Likewise, it is achieved that said partitions are seismically insulated from the resistant structure of the building on substantially interrupting the diagonal compression struts, flattening and/or sliding which are typically formed with a seismic event, and the fractures in the form of a cross associated to said compression struts are significantly eliminated.

[0019] In a second embodiment of the invention, the rods of the first set do not extend continuously along the vertical direction of the matrix. The anti-seismic, insulat-

ing construction elements, according to this particular embodiment of the invention, are preferably disposed in contact with the floor or the beams of a building to mainly absorb the vertical movements that may occur.

[0020] In this case, the anti-seismic, insulating elements according to this second embodiment of the invention intend to mainly absorb vertical movements, and their behaviour is equivalent to that described for the case of absorption of horizontal movements (first embodiment of the invention), the rods then being disposed in vertical direction (i.e. that of the first set of rods) not continuous along the length of the matrix, and continuous in the horizontal direction, thus changing its spatial orientation 90° with respect to the case of absorption of horizontal movements (first embodiment of the invention) and adapting its measures with respect to the sets of rods described for the previous case.

[0021] As previously stated, the real dynamic behaviour of a building whose partitions are formed by anti-seismic, insulating construction elements according to the invention, shall be closer to that predicted by the theoretical calculations than of that of a building built without said elements.

[0022] Obviously, the anti-seismic, insulating construction elements according to the present invention can also be used in a building, whether it is built in a seismic area or not, to absorb the movements of the structure with respect to the partition caused by other phenomenon which are not earthquakes and do not necessarily cause serious damage to the structure. Thus, the partitions built with elements according to the invention may be adapted to the movements of the supports and floors of the building and have good behaviour against unforeseen fissuring induced by stresses due to thermal effects, climate, wind, machinery vibration, effects of day and night alteration, retraction of the concrete of the resistant structure of the building after its construction, etc.

[0023] The anti-seismic, insulating construction elements according to the invention may be used both for integrally building a partition, and exclusively in areas of joining of a partition with the resistant structure of the building to absorb the relative movements between both and hinder the formation of compressions struts thanks to its flexibility in one direction. Therefore, the anti-seismic, insulating construction elements according to the invention can be disposed in rows above one another.

[0024] The anti-seismic, insulating construction element according to the invention is preferably modular. Modular means that two or more anti-seismic, insulating elements can be joined together to form a partition or a portion of said partition. Furthermore, it may have dimensions similar to those of the bricks or blocks typically used in construction of a building, so that to build a partition with anti-seismic, insulating construction elements according to the invention it is possible to use the typical construction technique, with the advantage that it is not necessary to use additional pieces.

[0025] The number of rods made of rigid material com-

prising an anti-seismic, insulating construction element according to the invention is, at least, that which provides the same resistance to compression required and it will be obvious for a person skilled in the art in light of the applicable legislation and of the dimensions that said anti-seismic, insulating element should have.

[0026] Said rods may be optionally provided with an anti-corrosion treatment and/or may have a circular cross-section. Likewise, the rods of the first set (i.e. the vertical rods) are preferably continuous throughout the thickness of the matrix in anti-seismic, insulating elements disposed to absorb horizontal movements (first embodiment of the invention), and preferably continuous in the horizontal direction when the anti-seismic, insulating element is disposed to absorb vertical movements (second embodiment of the invention).

[0027] In an embodiment of the invention provided to absorb horizontal movements at least two of the rods of the second set (i.e. two horizontal rods) are disposed opposite one another, also existing a space between both, designed that said rods do not come into contact with one another if a seismic event occurs.

[0028] According to a preferred embodiment of the invention, at least one part of the plurality of rods protrudes slightly from the upper wall, lower wall and/or the side walls of the anti-seismic, insulating construction element, with the protruding portions of said rods being intended to be embedded in the joints typically made between the construction elements forming a partition. This improves the joining of the anti-seismic, insulating element provided of said rods to the adjacent anti-seismic, insulating elements which form the partition and/or to other bricks, blocks or conventional construction elements and/or to the resistant structure of the building, therefore, increasing the interlocking between the elements. In an even more preferred embodiment of the invention, the rods protrude a distance substantially equal to half of the thickness of the joint necessary to join to anti-seismic, insulating elements of adjacent construction. Said joint is normally filled with a material capable of setting, such as mortar.

[0029] In an even more preferred embodiment of the invention part of the plurality of rods slightly protrudes, e.g. in the order of 0.1 to 2 cm, from the upper wall, lower wall and/or the side walls of the anti-seismic, insulating construction element. Preferably, the distance that the rods protrude is substantially equal to half of the thickness of the joint, and the matrix is also provided with notches in those areas of its walls where through the rods protrude with a depth substantially equal to the thickness of the joint. Said notches optionally have a circular, rectangular or square section, and their object is to penetrate the mortar of the joint in the notches and improve the interlocking.

[0030] Furthermore, the protruding portion of the rods contributes to resisting the compression stresses on the construction element and increases the resistance to actions perpendicular to the plane of the partition as said

portions are embedded in the set material of the joint.

[0031] According to another preferred embodiment of the invention disposed to absorb horizontal movements, the disposal of the plurality of rods is such that it allows continuity of the vertical rods between one anti-seismic, insulating element of the invention and another disposed in a top row. In this way, the compression each vertical rod receives during a seismic event shall be directly transmitted to the rod of the lower anti-seismic, insulating element until reaching the resistant structure of the building.

[0032] Furthermore, in another preferred embodiment of the invention the matrix is made of a polymer, for example and preferably polyurethane, rubber, recycled rubber or foam rubber. This last material has lower density, so that its use is preferred to minimise the weight of the anti-seismic, insulating element. Likewise, the matrix may be optionally provided with cavities or lightening elements made from a lighter additional material than the flexible material used in the remaining parts of the matrix. Said lightening elements may be made, for example, from expanded polyurethane with a density in the range of 20 to 40 kg/m³. Alternatively, the lightening elements may be air bubbles introduced or not by means of an aerating element. Likewise, the material from which the matrix is formed, in addition to elastic, may be thermal, acoustically insulating and/or be provided with a treatment (e.g. add chlorine in the composition) which improves its properties of reaction and resistance to fire, and/or has a surface coating of another material (e.g. plaster) which improves its properties of reaction and resistance to fire.

[0033] According to a preferred embodiment of the invention, the disposal of the plurality of rods within the anti-seismic, insulating element of the invention disposed to absorb horizontal movements, is such that it leaves a space so that the element can be cut through the central area parallel to the side walls, only traversing the material of the matrix and/or lightening element, obtaining two approximately equal pieces. Likewise, the matrix material, in addition to being flexible, is preferably such that it can be cut with basic tools (of those typically used in building construction, so that in an anti-seismic, insulating construction element according to the invention, it is possible to make shears, pass installations and build a partition with the usual construction technique in the areas close to the building structure.

[0034] On the other hand, the matrix may be optionally provided, on the outer surface of at least one of its walls, with notches intended to indicate the areas wherethrough the element can be cut parallel to the side walls, so that only material of the matrix and/or lightening element are traversed.

[0035] In another preferred embodiment of the invention, the matrix is provided, on the outer surface of at least one of its walls, with small projections and/or grooves that define a stamp or "drawing", intended to improve the interlocking/friction with the joint filling ma-

terial, which may be, for example, mortar.

[0036] Likewise, in another preferred embodiment of the invention, the disposal of the plurality of rods results from the repetition, as many times are necessary and optionally with change of spatial orientation, of a basic pattern of placement of rods.

[0037] In another preferred embodiment of the invention disposed to absorb horizontal movements the rods of the second set (i.e. the horizontal rods) are very close, e.g. a few mm from, or brushing against the rods of the first set (i.e. the vertical rods), but without there being a rigid joint.

[0038] In this way, the horizontal bars may continue moving in the horizontal direction of the plane of the partition with respect to the vertical ones, at the same time as favouring the propping up against them, which gives the advantage of preventing movement in the direction perpendicular to the plane of the partition. This propping up of the horizontal rods against the vertical rods is favoured by means of the particular disposal of the vertical rods on both sides of the horizontal rods and at a little distance.

[0039] In another even more preferred embodiment, -at least one- pair of rods of the first set of rods (vertical) is disposed on both sides of -at least one- rod of the second set (horizontal) and sufficiently close to it, to allow the propping up of said -at least one- rod of the second set (horizontal) against -at least one- pair of rods of the first set of rods.

[0040] Similarly, in another preferred embodiment of the invention provided to absorb vertical movements, the vertical rods are very close, e.g. a few mm from, or brushing against the horizontal rods, but without there being a rigid joint. In this way, the vertical bars may continue moving in the vertical direction of the plane of the partition with respect to the horizontal ones, at the same time as it favours the propping up against them, which gives the advantage of preventing movement in the direction perpendicular to the plane of the partition.

[0041] In another even more preferred embodiment, -at least one- pair of rods of the second set of rods (horizontal) is disposed on both sides of -at least one- rod of the first set (vertical) and sufficiently close to it, to allow the propping up of said -at least one- rod of the first set (vertical) against -at least one- pair of rods of the second set of rods.

BRIEF DESCRIPTION OF THE FIGURES

[0042]

Figure 1A is a schematic perspective view of an example of anti-seismic, insulating construction element according to the present invention;

Figure 1B is a schematic perspective view of the interior of the anti-seismic, insulating construction element of figure 1A which aims to mainly absorb hor-

izontal movements;

Figures 1C and 1D are, respectively, a top view and a sectional view according to a vertical plane, of the anti-seismic, insulating construction element of figures 1A and 1B;

Figure 2A is a schematic perspective view of a second example of anti-seismic, insulating construction element according to the present invention,

Figures 2B and 2C are, respectively, a schematic perspective view of the interior and a top view of the anti-seismic, insulating construction element of figure 2A which aims to mainly absorb horizontal movements;

Figures 3A and 3B are, respectively, a perspective view and a sectional view according to a vertical plane, of anti-seismic, insulating construction elements according to the invention disposed in two rows;

Figure 4A and figure 4B are sectional views according to a vertical plane of two embodiments of the invention which aims to mainly absorb horizontal movements wherein two possible disposals of the rods are shown;

Figure 5A is a schematic perspective view of the interior of a third example of anti-seismic, insulating construction element according to the present invention;

Figures 5B and 5C are, respectively, a top view (of the interior) and a sectional view according to a vertical plane, of the anti-seismic, insulating construction element of figure 5A; and

Figure 6 is a sectional view according to a vertical plane, of the matrix of anti-seismic, insulating construction element according to the embodiment of the present invention which is schematically shown in figure 2A.

Figure 7A is a schematic perspective view of an example of anti-seismic, insulating construction element according to the present invention with prismatic notches;

Figure 7B is a schematic perspective view of the interior of the anti-seismic, insulating construction element of figure 7A which aims to mainly absorb vertical movements;

Figures 7C and 7D are sectional views according to a vertical plane of the anti-seismic, insulating construction element of figures 7A and 7B which aims

to mainly absorb vertical movements.

PREFERRED EMBODIMENT OF THE INVENTION

[0043] Below, various specific examples are described of the invention making reference to attached figures. In said figures, the components with identical or similar functions have been given the same reference number.

[0044] Figures 1A, 1B, 1C and 1D show a first embodiment of an anti-seismic, insulating construction element according to the invention comprising a matrix 10 with an upper wall 10a, a lower wall 10b and side walls 10c. Housed in the interior of said matrix 10 and joined to at least one of the walls 10a, 10b, 10c, are disposed vertical rods 15a, and horizontal rods 15b, which protrude slightly through at least one of the walls 10a, 10b, 10c.

[0045] In this example of embodiment of anti-seismic, insulating construction element according to the invention, the horizontal rods 15b are disposed in two groups opposite one another, with a space 30 between both, designed so that said rods 15b do not come into contact with one another if a seismic event occurs. In figure 1C, it is possible to observe the basic pattern 50 of placement of rods 15a, 15b (enclosed by a broken line) which is repeated four times to give the specific disposal of the plurality of rods 15a, 15b shown in this example.

[0046] Figure 2A shows a second embodiment of an anti-seismic, insulating construction element according to the invention, wherein the matrix 10 is provided with notches 20, of cylindrical section, in those areas wherein the rods 15a, 15b, protrude whilst figure 2B shows a schematic perspective view of the interior of the anti-seismic, insulating construction element of figure 2A with a new basic pattern 50 of placement of rods 15a, 15b, shown in figure 2C. Said basic pattern 50 of placement of rods 15a, 15b is different from that of the previous embodiment, shown in figures 1A, 1B, 1C and 1D.

[0047] Figures 3A and 3B schematically show the joining process of anti-seismic, insulating construction elements according to the invention in two rows. In figure 3B, it can be observed how according to a preferred embodiment of the invention, whenever possible, the vertical rods 15a of an anti-seismic, insulating element are aligned with the vertical rods 15a of the other anti-seismic, insulating element situated in the top row.

[0048] Figures 4A and 4B show two sectional views according to a vertical plane with two different rod disposals for two embodiments of anti-seismic, insulating construction elements according to the invention, in which a set of rods in the left half is repeated in the right half varying its orientation, so that the space 30 is sufficient to allow the movement of the horizontal rods inserted in the matrix, and it has the necessary propping with the vertical rods, as described above.

[0049] Figures 5A, 5B and 5C show another embodiment of an anti-seismic, insulating construction element according to the invention, which is provided with lightening elements 40.

[0050] Figure 6 shows a cut (according to a vertical plane) of the matrix 10 of an anti-seismic, insulating construction element according to the invention, wherein it is possible to observe the notches 20.

[0051] Figures 7A, 7B, 7C and 7D show another embodiment of an anti-seismic, insulating construction element according to the invention wherein the rods 15b of the first set do not extend continuously along the vertical direction of the matrix 10. In this embodiment of the invention, the matrix 10 is provided with notches 20 of square section.

[0052] Although the invention has only been described in relation to the embodiments mentioned in the present, it must be understood that other possible combinations, variations and improvements shall also be included within the scope of the invention, which is not exclusively defined by the attached claims.

Claims

1. Anti-seismic, insulating construction element, designed for constructing building partitions, comprising:

- a plurality of rods (15a, 15b) made of a rigid material; and
- a matrix (10) made of a flexible material provided with an upper wall (10a), a lower wall (10b) and side walls (10c),

characterized in that the plurality of rods (15a, 15b) is substantially embedded in the matrix (10) made of a flexible material so that:

- a first set of rods (15a) is disposed in a vertical direction;
- a second set of rods (15b) is disposed in a horizontal direction,
- none of the rods (15b) of the second set of rods (15b) is joined to none of the rods (15a) of the first set of rods (15a),
- the rods (15a;15b) of one of the two sets, first (15a) or second (15b), do not extend continuously along the length of the matrix (10).

2. Element according to claim 1, wherein the rods of the second set (15b) do not extend continuously along the horizontal direction of the matrix (10).

3. Element according to claim 1, wherein the rods of the first set (15a) do not extend continuously along the vertical direction of the matrix (10).

4. Element according to any of the preceding claims, wherein it is of modular type.

5. Element according to any of the preceding claims,

wherein at least one part of the plurality of rods (15a, 15b) protrudes from the upper wall (10a), lower wall (10b) and/or the side walls (10c).

6. Element according to claim 5, wherein the rods (15a, 15b) protrude a distance substantially equal to half of the thickness of the joint necessary to join to anti-seismic, insulating elements of adjacent construction.

7. Element according to any of claims 5 or 6, wherein the matrix (10) is provided with notches (20) in those areas of its walls wherethrough the rods (15a, 15b) protrude.

8. Element according to claim 7, wherein the notches (20) have a circular, rectangular or square section.

9. Element according to any of the preceding claims, wherein at least two of the rods (15b) of the second set are disposed opposite one another, also existing a space (30) between both, designed that said rods (15b) do not come into contact with one another if a seismic event occurs.

10. Element according to any of the preceding claims, wherein the rods (15b) of the second set are very close or brushing against the rods (15a) of the first set.

11. Element according to any of the preceding claims, wherein the rods (15a, 15b) are provided with an anti-corrosion treatment.

12. Element according to any of the preceding claims, wherein the rods (15a, 15b) have a circular cross-section.

13. Element according to any of the preceding claims, wherein the disposal of the plurality of rods (15a, 15b) is such that it allows continuity of the vertical rods (15a) between one anti-seismic, insulating element of the invention and another disposed in a top row.

14. Element according to any of the preceding claims, wherein the matrix (10) is made of a polymer, preferably polyurethane, rubber, recycled rubber or foam rubber.

15. Element according to any of the preceding claims, wherein the matrix (10) is provided with lightening elements (40) made from a lighter additional material than the flexible material used in the remaining parts of the matrix (10).

16. Element according to claim 15, wherein the lightening elements (40) are air bubbles and/or are made

from expanded polyurethane with a density in the range of 20 to 40 kg/m³.

17. Element according to any of the preceding claims,
wherein the matrix (10) is provided, on the outer sur- 5
face of at least one of its walls, with projections and/or
grooves that define a stamp or drawing.

18. Element according to any of the preceding claims,
wherein the disposal of the plurality of rods (15a, 10
15b) results from the repetition, optionally with
change of spatial orientation, of a basic pattern (50)
of placement of rods (15a, 15b).

19. Element according to any of the preceding claims, 15
wherein -at least one- pair of rods of the first set of
rods (15a) is disposed on both sides of -at least one-
rod of the second set (15b) and sufficiently close to
it, to allow the propping up of said -at least one- rod
of the second set (15b), against said -at least one- 20
pair of rods of the first set of rods (15a).

20. Element according to any of the preceding claims,
wherein at least one- pair of rods of the second set
of rods (15b) is disposed on both sides of -at least 25
one- rod of the first set (15a) and sufficiently close
to it, to allow the propping up of said -at least one-
rod of the first set (15a) against -at least one- pair of
rods of the second set of rods (15b). 30

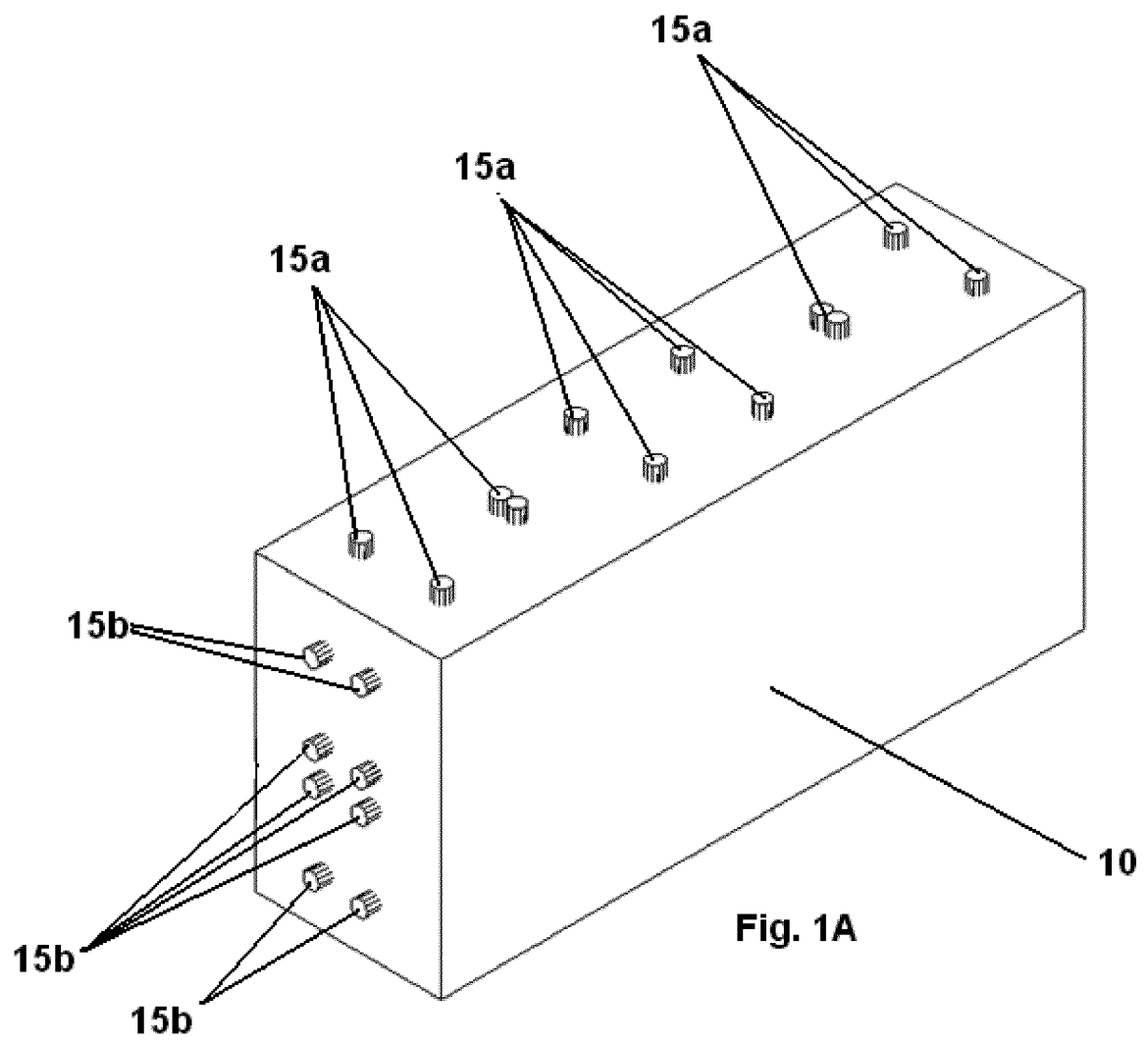
21. Element according to any of the preceding claims,
wherein the matrix is thermally insulating, acousti-
cally insulating and/or is provided with a treatment
that improves its properties of reaction and resist- 35
ance to fire, and/or has a surface coating of another
material that improves its properties of reaction and
resistance to fire.

22. Building partition, **characterized in that** it is totally
or partially built with the anti-seismic, insulating con- 40
struction elements of any of the preceding claims.

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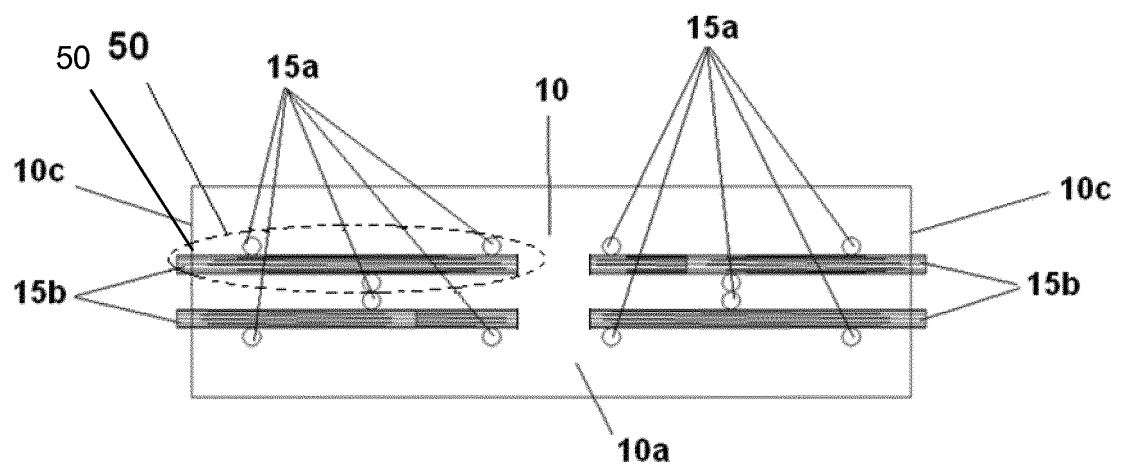
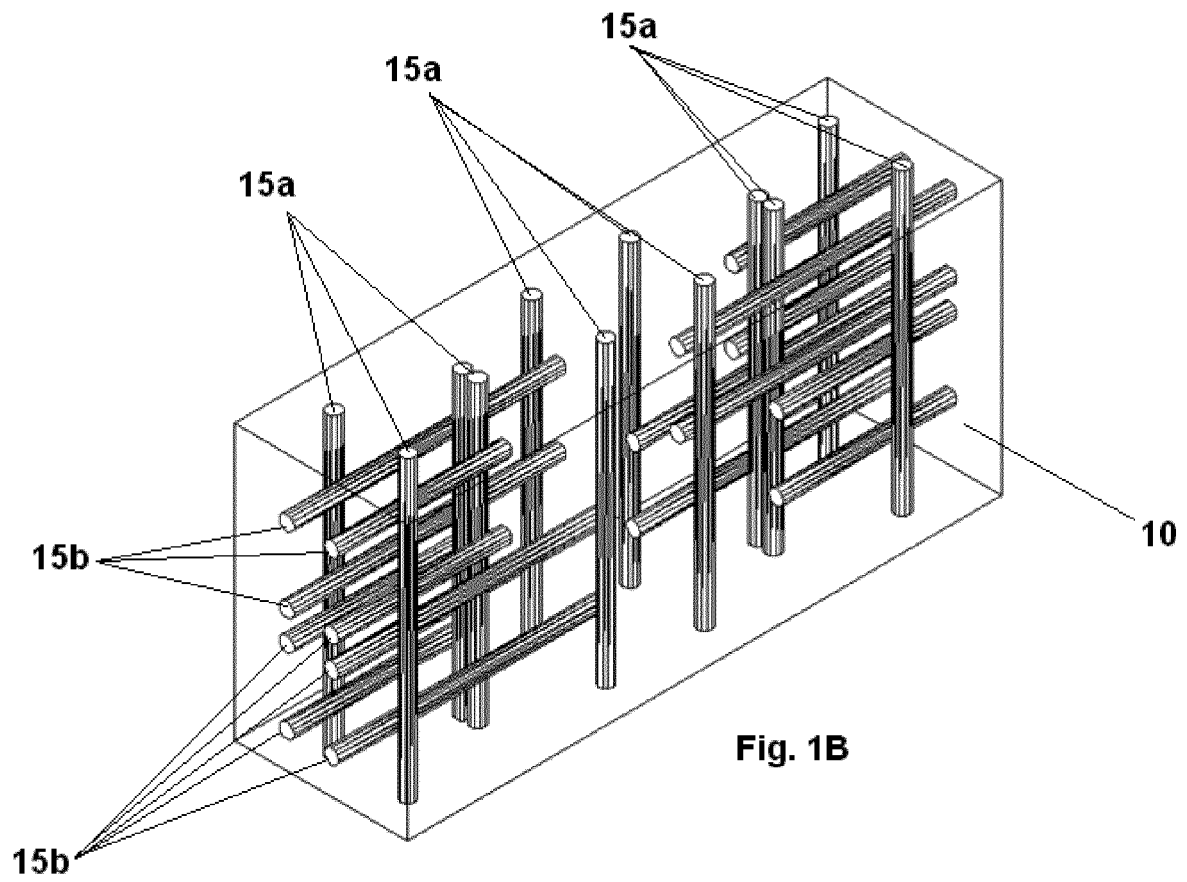
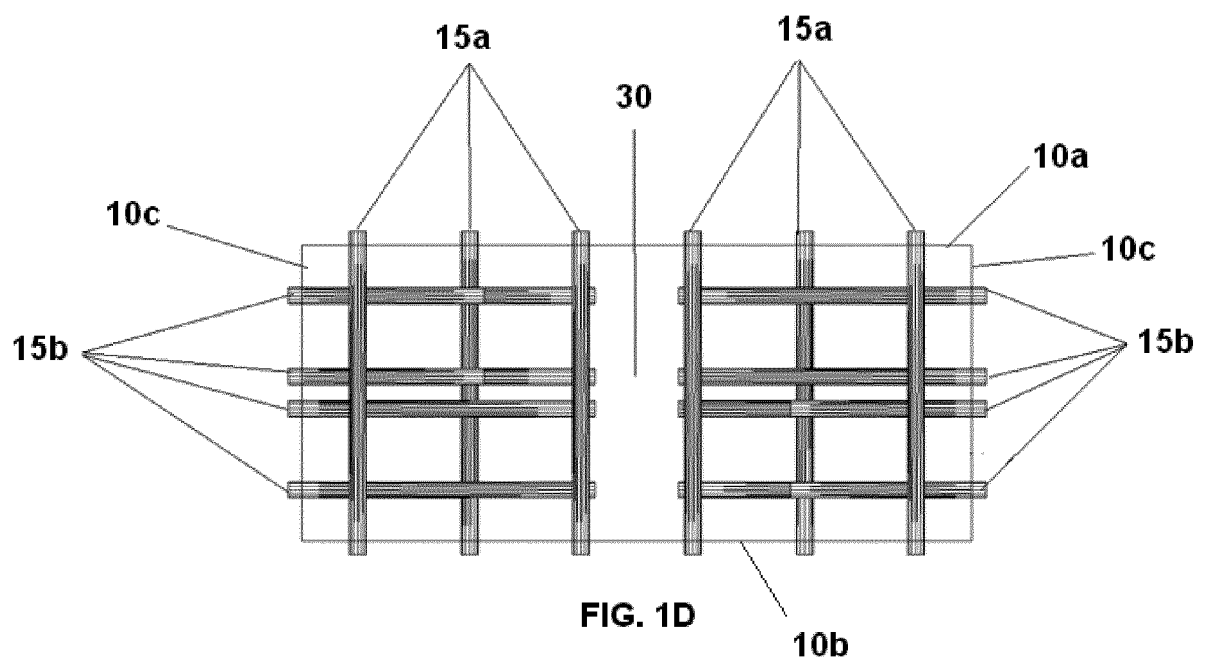


FIG. 1C



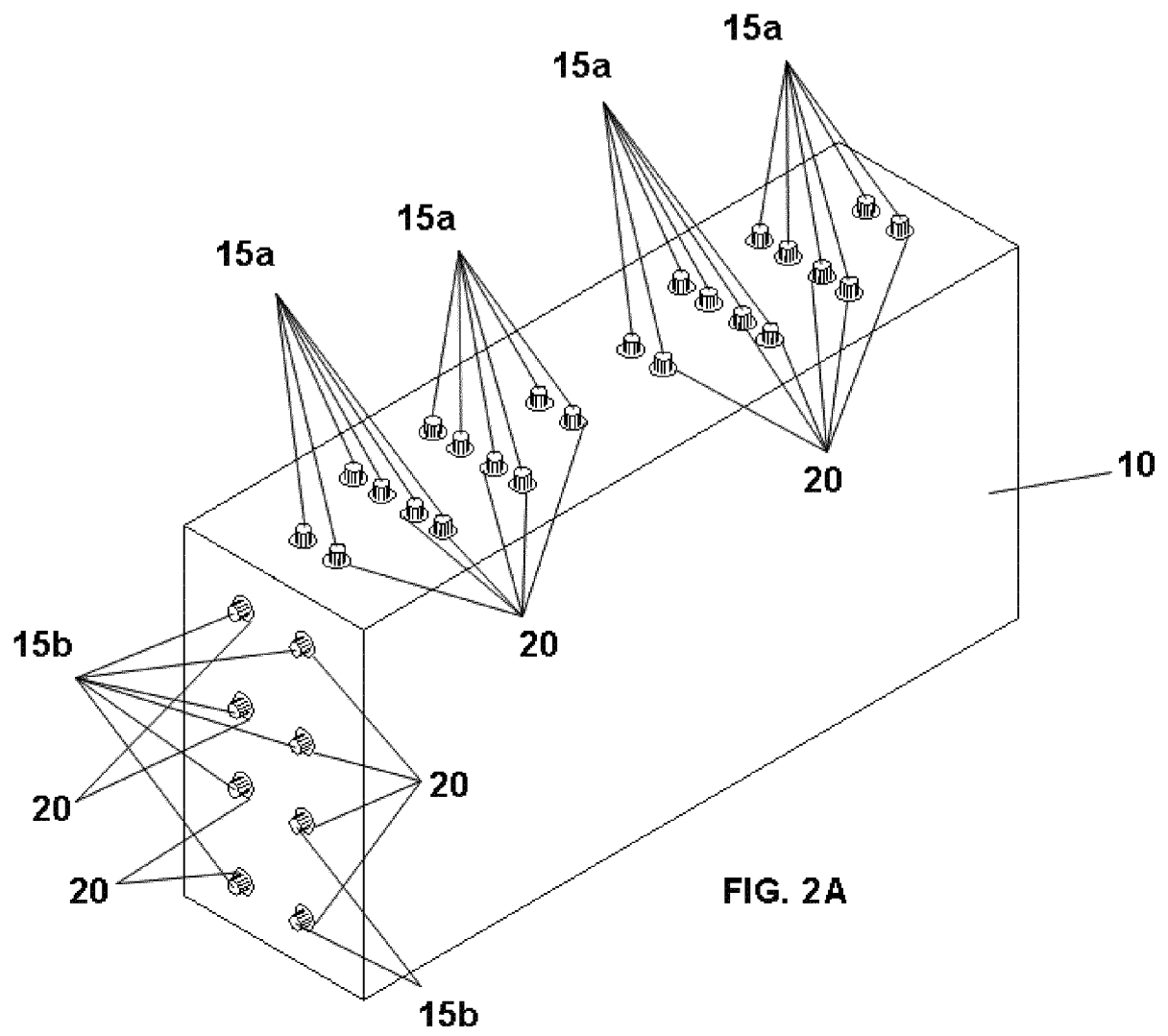
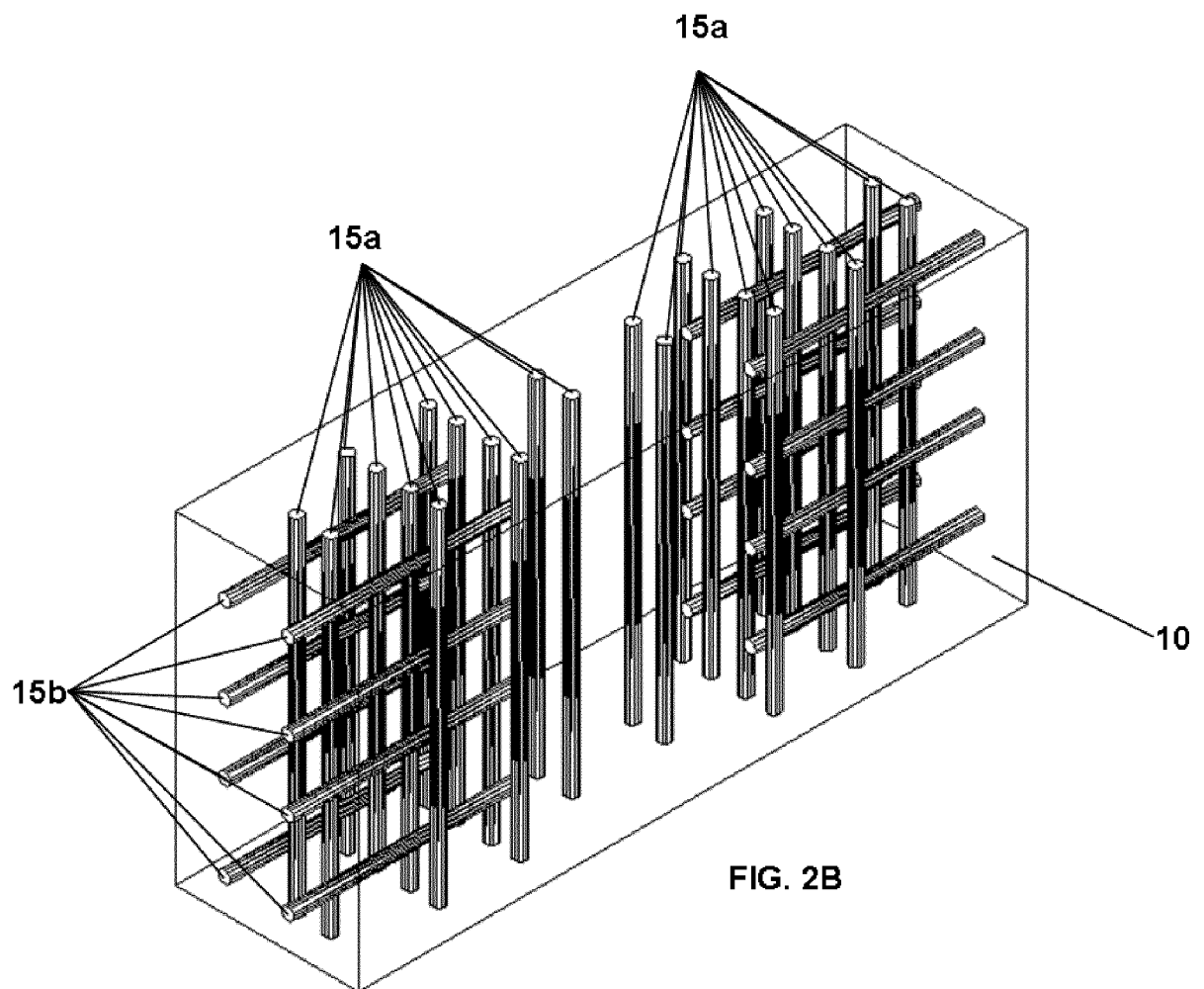


FIG. 2A



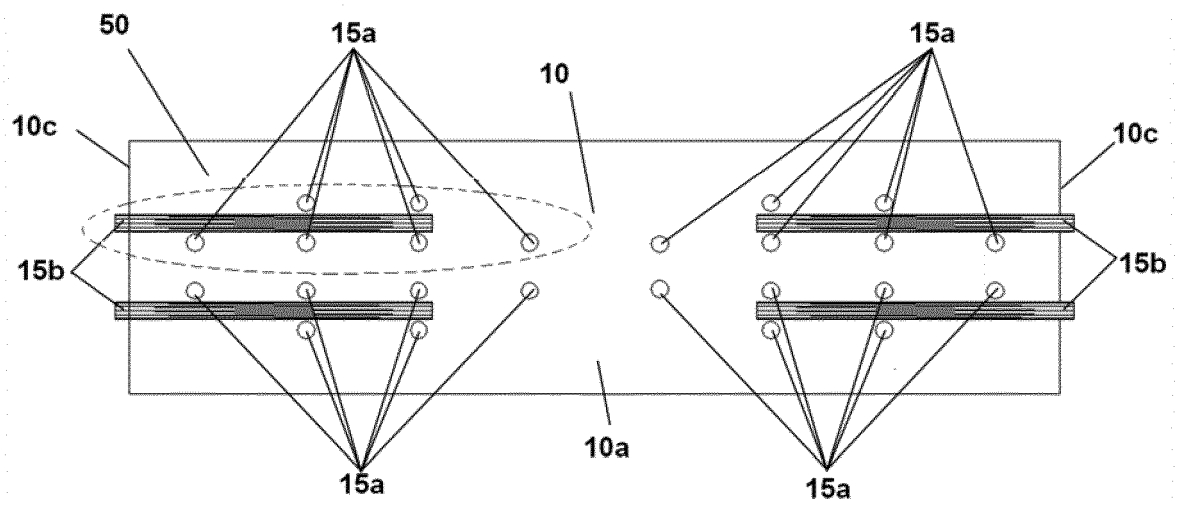
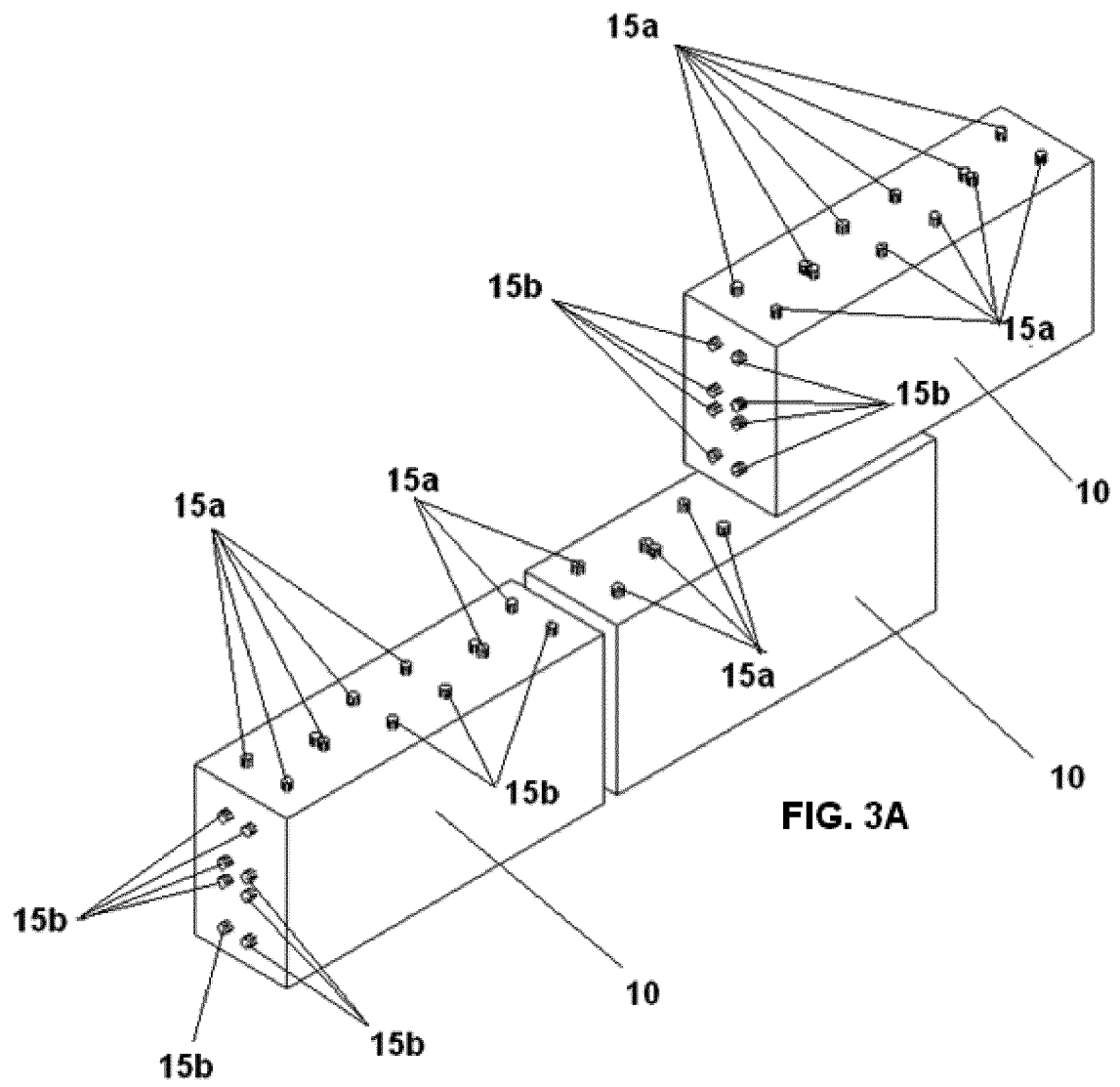
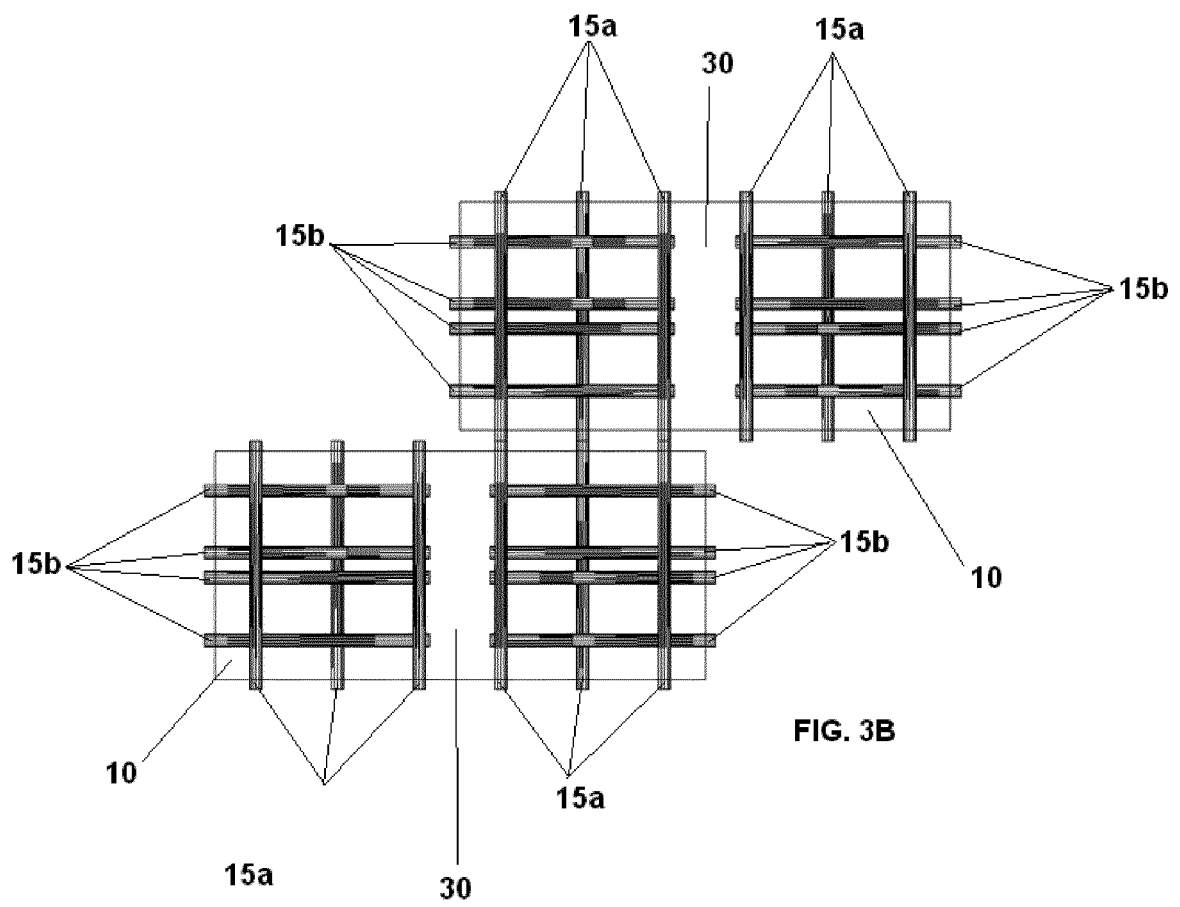


FIG. 2C





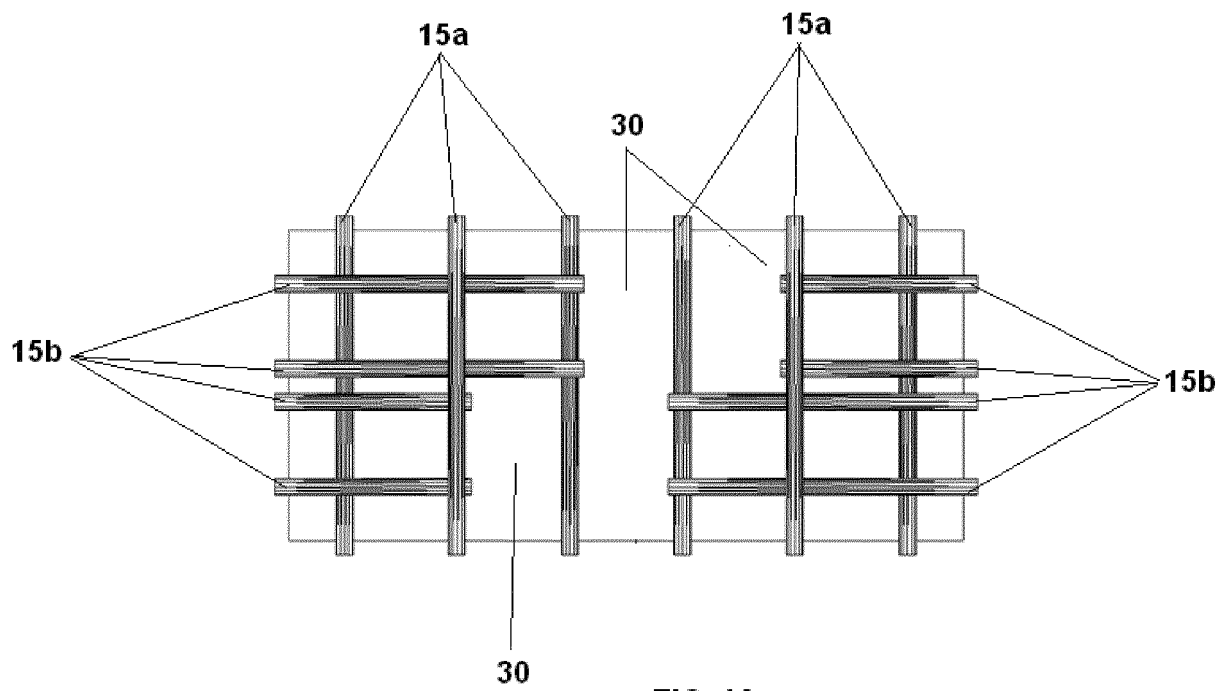


FIG. 4A

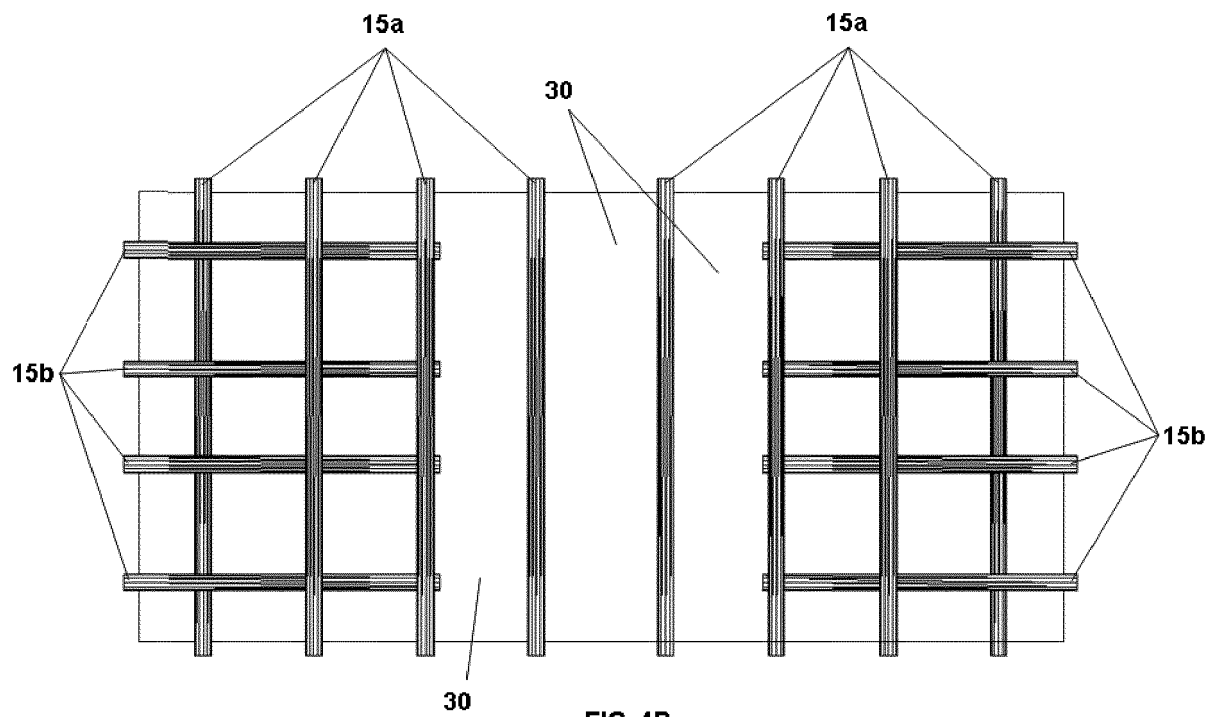
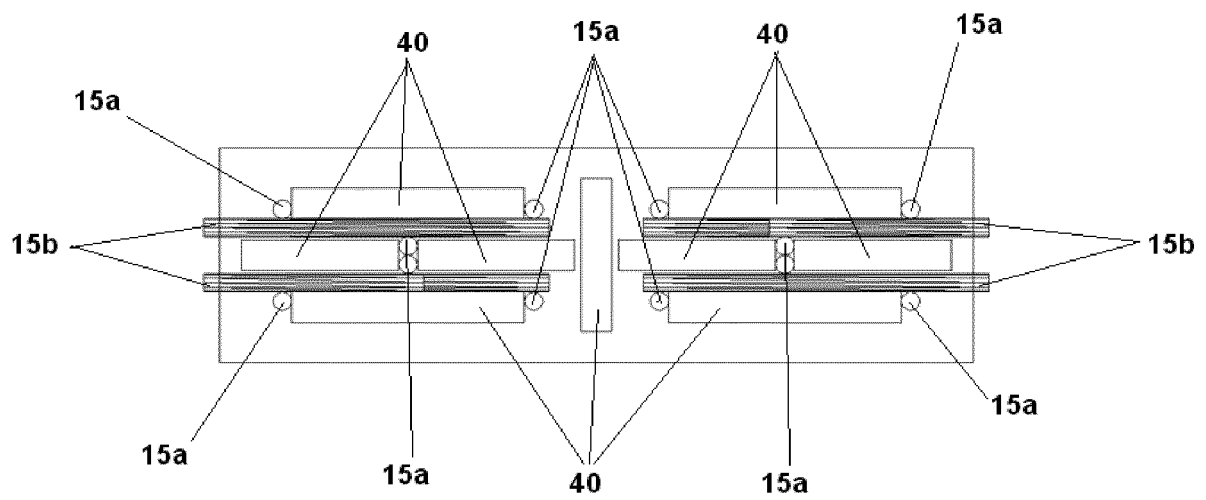
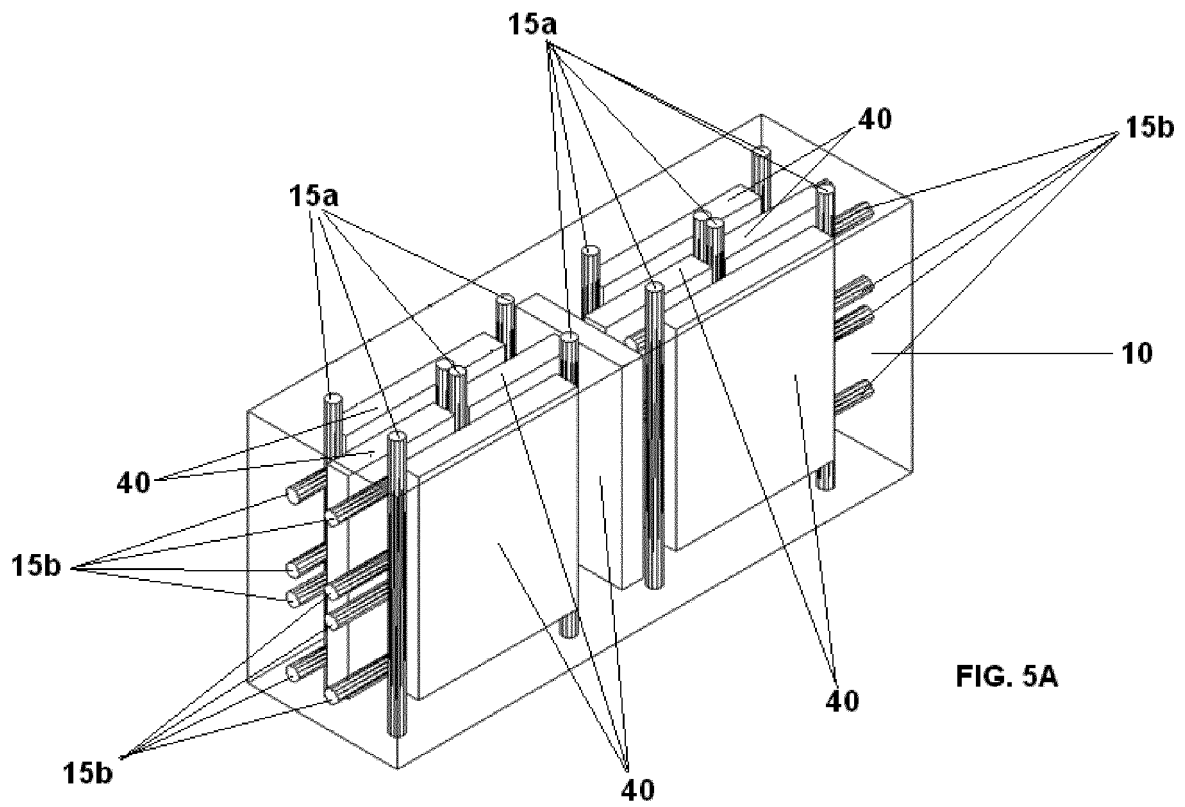


FIG. 4B



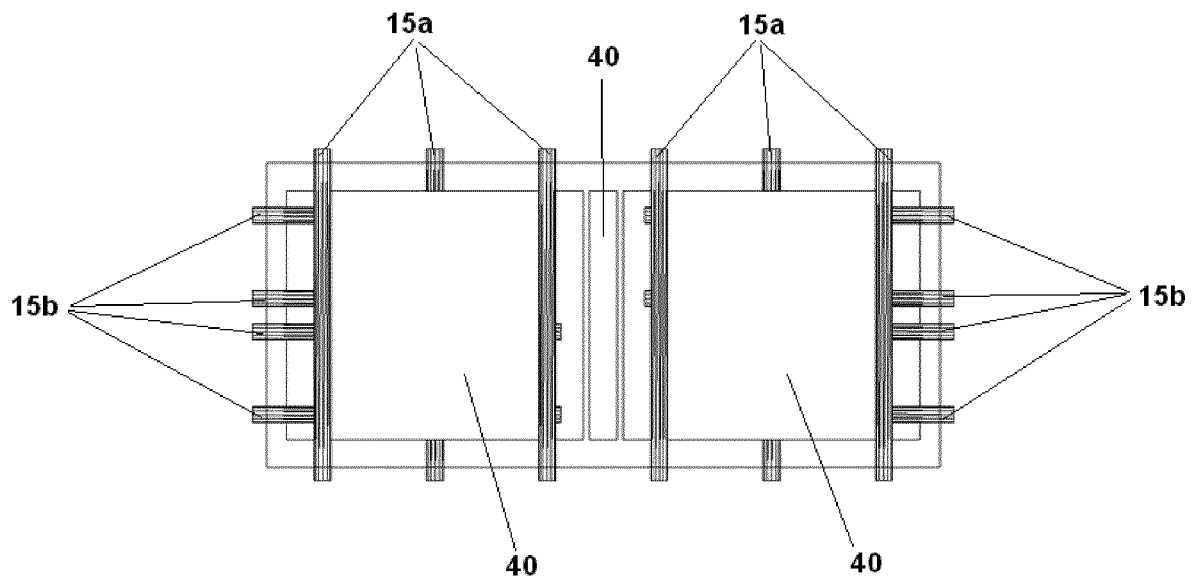


FIG. 5C

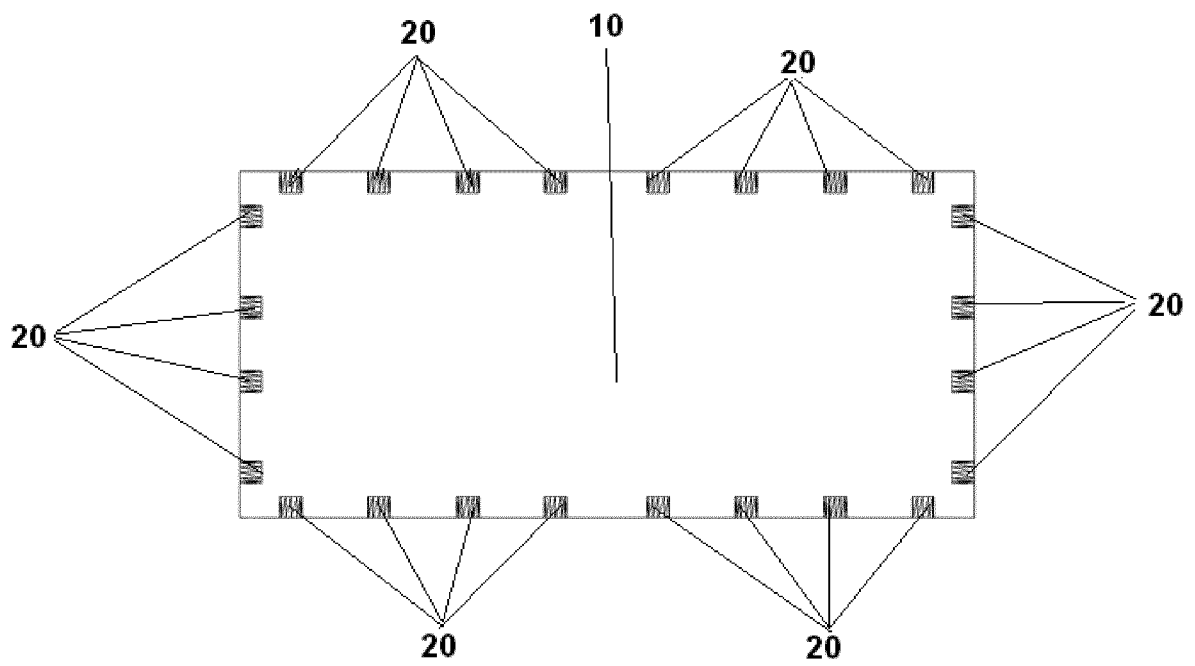
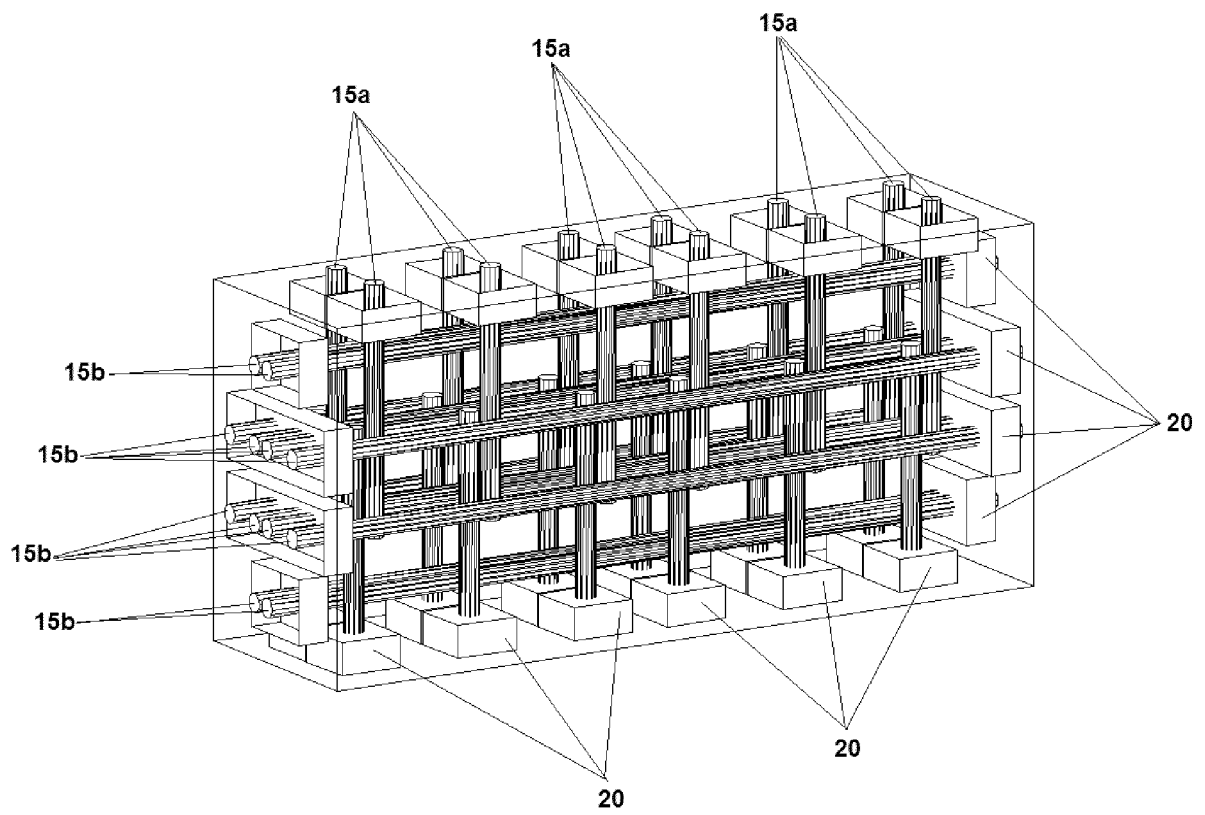
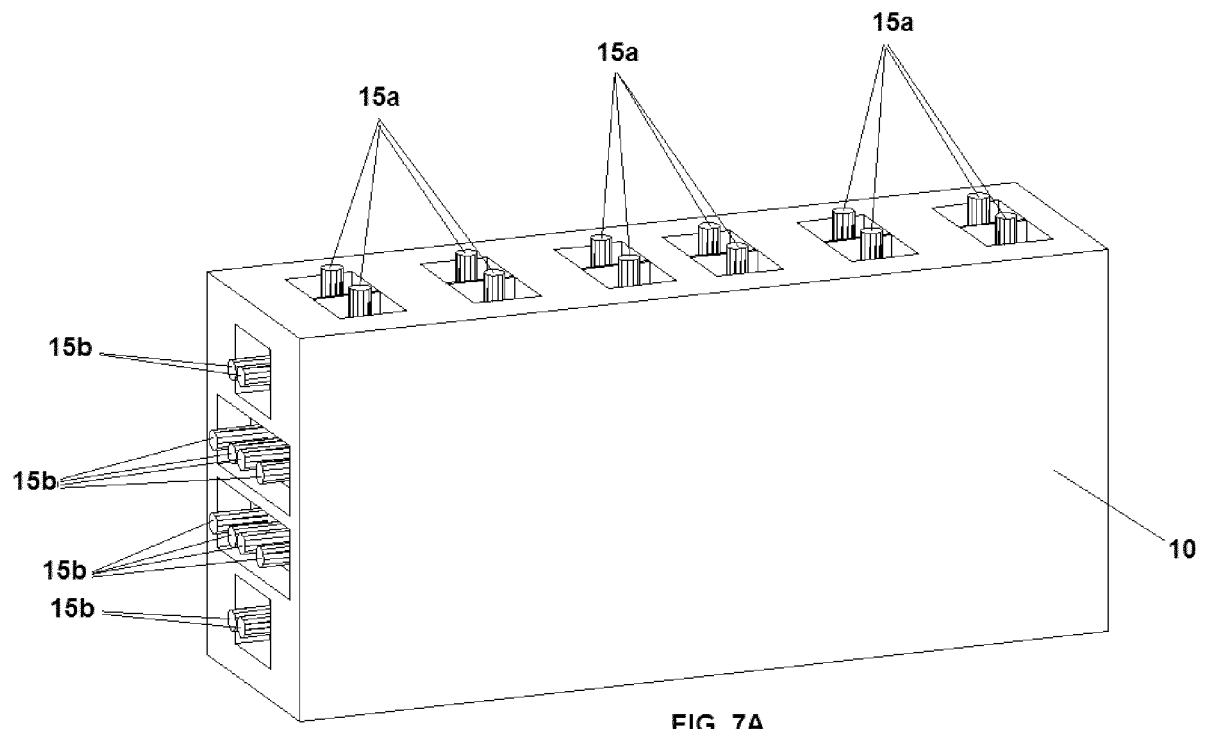


FIG. 6



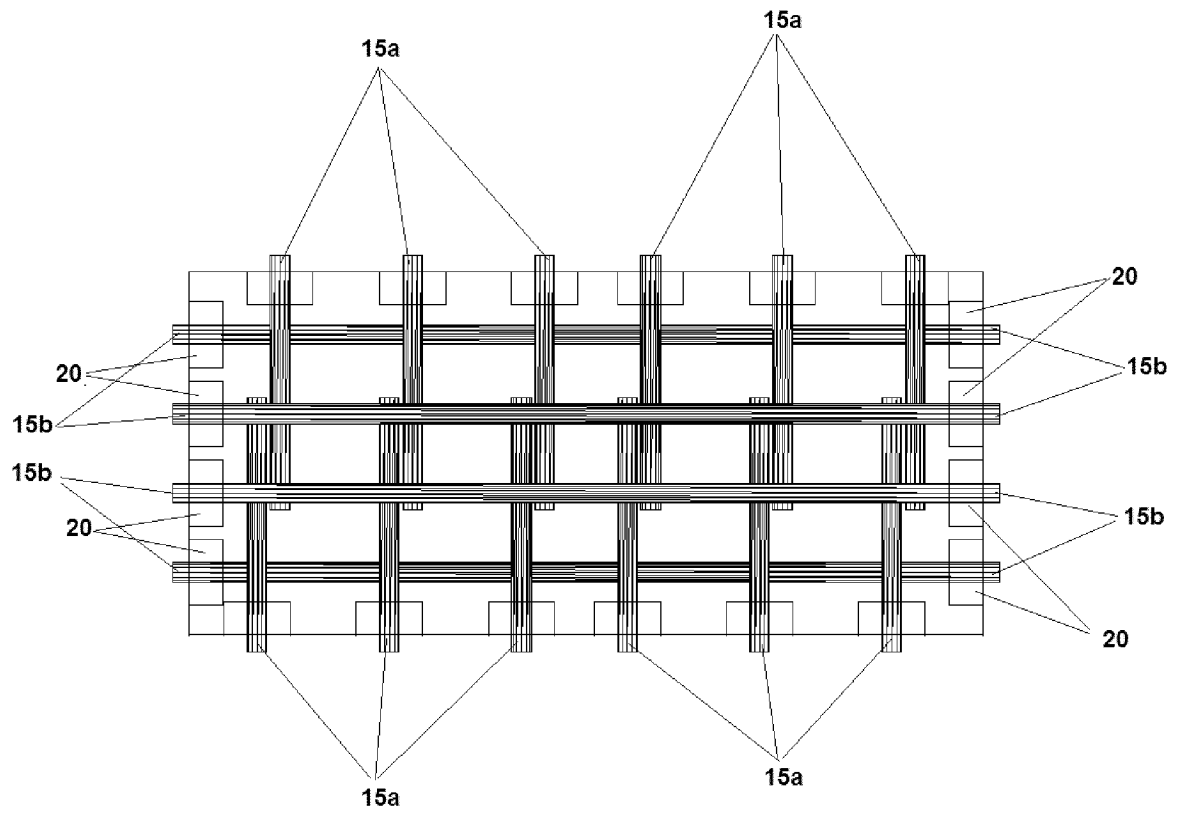


FIG. 7C

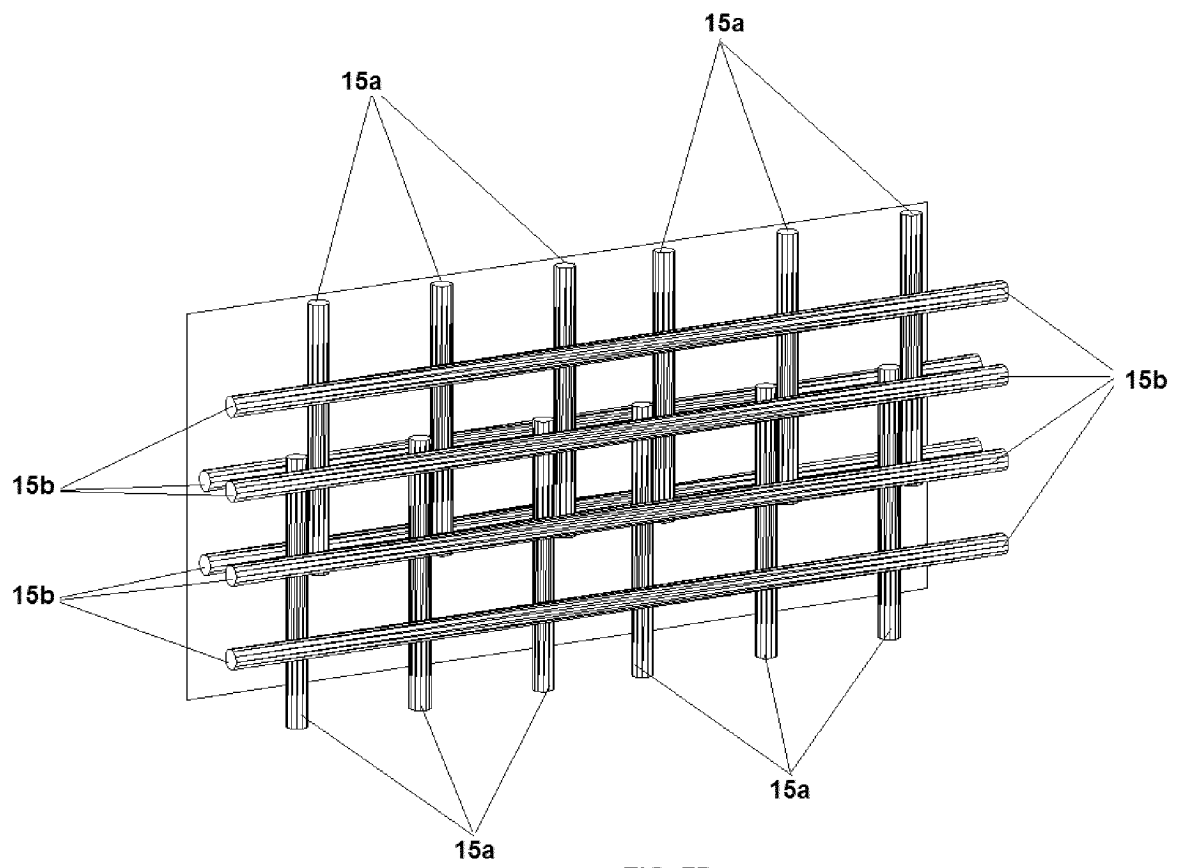


FIG. 7D

INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES2015/070215

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

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)

E04B, E04C, E04H

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)

EPODOC, INVENES

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2008245005 A1 (FENNELL HARRY C) 09/10/2008, paragraphs[0015 - 0026, 0046 - 0054]; figures 1 - 6.	1, 4-8, 10-16, 18, 21, 22
A	IT 1201302 B (VERNISCOT DI LANZA GIOVANNINO) 27/01/1989, page 5, line 1 - page 6, line 7; page 9, line 10 - page 10, line 3; figures 1 - 3.	1, 4-6, 12, 13, 17, 21, 22
A	GB 190904157 A (HOMAN ERNEST) 22/07/1909, page 1, lines 3 - 24; page 3, line 53 - page 4, line 22; figures 6, 7, 13 - 16.	1, 4-6, 10, 13, 21, 22
A	WO 2004035956 A1 (LEE SEUNG WOOK) 29/04/2004, page 2, line 6 - page 3, line 6; page 12, line 16 - page 14, line 8; figure 18.	1, 4, 12-14, 17, 21, 22

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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"P" document published prior to the international filing date but later than the priority date claimed	"&" document member of the same patent family

Date of the actual completion of the international search
26/06/2015Date of mailing of the international search report
(30/06/2015)

Name and mailing address of the ISA/

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Telephone No. 91 3495437

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES2015/070215

C (continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of documents, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	ES 2382847 A1 (UNIV MIGUEL HERNANDEZ DE ELCHE) 14/06/2012, column 2, lines 11 - 38; column 3, line 5 - column 4, line 1; figures 3 - 5.	1, 4, 10, 12, 13, 21, 22
A	US 5992119 A (ROKHLIN ZINOVIIY) 30/11/1999, column 1, lines 20 - 35; column 1, line 66 - column 2, line 27; figures.	1, 4, 12-14, 21, 22

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES2015/070215

Information on patent family members

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ES2382847 A1	14.06.2012	NONE	
US5992119 A	30.11.1999	NONE	

Form PCT/ISA/210 (patent family annex) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES2015/070215

CLASSIFICATION OF SUBJECT MATTER

E04B2/06 (2006.01)

E04B1/98 (2006.01)

E04C1/39 (2006.01)

E04H9/02 (2006.01)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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