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(54) **Fence able to be made in situ, and method for making it**

(57) A fence able to be made *in situ* comprising a flexible containment body (2) bearing a plurality of stiffening elements (4) mechanically associated at regular distances. The containment body is deformable between a transportation configuration (A), in which it is compacted through folds, and a configuration of application (B), in which it is opened out along the direction of longitudinal extension with the stiffening elements that support it arranging a base portion resting on the ground. A plurality of support posts (10) for a mesh (11) can be inserted in seats (9) formed in the stiffening elements.

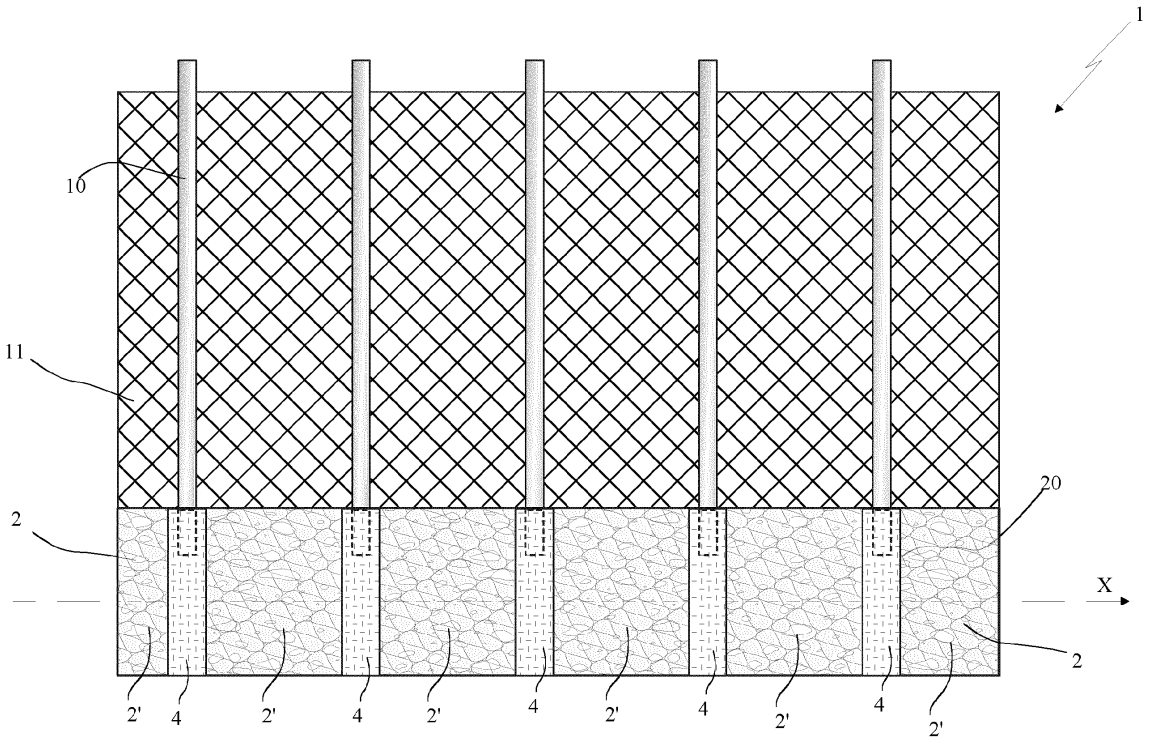

Fig. 1

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Description

Field of application

[0001] The present invention concerns a fence able to be made *in situ,* and a method for making it, according to the preamble of the respective independent claims.

[0002] The fence according to the invention is intended to advantageously be used to fence off areas, in particular with great dimensions, like for example, airports, customs areas, construction sites, forests, roads etc., or else to separate different areas by being placed between them.

[0003] The fence object of the present invention thus fits in the field of road or building constructions, or else in the field of the industry of prefabricated structures.

State of the art

[0004] Fences able to be made *in situ* are known on the market, comprising hollow tubular posts, which are transported to the area to be fenced off, to be inserted one after the other at substantially regular distances inside holes made in the ground.

[0005] The posts are thus filled with cement conglomerates and are then connected to one another with mesh or cables.

[0006] One example of such a known type of fence is described in patent US 5580489, and foresees making each post of the fence with two half-shells which are closed by connecting one first longitudinal edge thereof through hinges and by fixing the other longitudinal edge through hooking means. Once they are closed, the two half-shells defines a tubular cavity intended to receive the cement conglomerate, which penetrates inside the hole of the ground making the supporting base of the post.

[0007] The two shells are obtained from shaped metal sheet that substantially carries out the function of shuttering for making cement posts.

[0008] The fences of the type described above although they are faster and easier to make with respect to those obtained with completely prefabricated cement posts, have proven in practice to still have drawbacks.

[0009] First of all, they require the shuttering for forming the posts to be built *in situ* as well as making the holes to which the shutterings are moved to *in situ.* Such operations require considerable labour and take a rather long time to make the fence.

[0010] A further drawback of the aforementioned known type of fence lies in the fact that the posts made from cement do not form a sufficiently resistant barrier and it can consequently be easily violated by breaking or cutting the mesh between two adjacent posts.

[0011] Fences consisting of safety barriers are also known usually used in road works for the separation of two lanes. These have the main task of preventing vehicles travelling in opposite directions from coming out from their own lane invading that in the opposite direction with the risk of causing particularly serious accidents.

[0012] Such barriers are usually obtained with blocks of reinforced concrete that are prefabricated in house and are then transported *in situ* where they are positioned side by side for making the desired protection fence or barrier.

[0013] The main drawback of this fence lies in the need of transporting very heavy and bulky manufactured products therefore having high transport, and installation costs, in particular for moving the single cement barriers with forklifts.

[0014] In order to overcome the drawbacks of such fences obtained with barriers in cement from patent EP 373279 or rather patent FR 2585047 in the field of roadworks it is known to make fences made up of safety barriers by providing hollow containment bodies made from rigid material, like for example plastic, which are transported *in situ,* set alongside one another along the division line which is desired to be made between the lanes, and then filled there with cement agglomerate.

[0015] Such known barriers, in any case, have the drawback of being particularly bulky during transportation and of requiring a rather long time to form the row of containment bodies to be filled with the concrete.

Presentation of the invention

[0016] In this situation, the problem forming the basis of the present invention is to eliminate the aforementioned drawbacks of the prior art, by providing a fence that is able to be made *in situ,* which is cost-effective to make.

[0017] Another purpose of the present finding is that of providing a fence that is able to be made *in situ,* which is easy to transport.

[0018] Another purpose of the present finding is that of providing a fence that can be made *in situ,* which has limited bulk.

[0019] Another purpose of the present finding is that of providing a method for making a fence that is able to be made *in situ,* which is simple and fast to carry out.

[0020] Another purpose of the present finding is that of providing a method for making a fence that is able to be made *in situ,* which is cost-effective to carry out.

[0021] Another purpose of the present finding is that of providing a method for making a fence that is able to be made *in situ,* which makes it possible to install the fence in a versatile manner on different terrains, be it on flat ground, on steep slopes or on ground with varying slopes.

[0022] These purposes and yet others, are all achieved with a fence that is able to be made *in situ,* and with a method for making it, object of the present invention, as indicated in the attached claims.

Brief description of the drawings

[0023] The technical characteristics of the finding, ac-

cording to the aforementioned purposes, can be clearly seen in the content of the claims below and the advantages thereof shall become clearer from the following detailed description, given with reference to the attached drawings, which represent one embodiment purely as an example and not for limiting purposes, in which:

- fig. 1 shows a side view of a portion of fence obj ect of the present invention;
- fig. 2 shows a front view of the fence of figure 1;
- fig. 3 shows a top view of the fence of figure 1, with the containment body in the transportation configuration;
- fig. 4 shows a top view of the fence of figure 1 with the containment body in the configuration of application;
- fig. 5 shows a perspective view of a portion of the fence of the previous figures.

Detailed description of a preferred embodiment

[0024] With reference to the attached drawings a fence that is able to be made *in situ,* object of the present invention is wholly indicated with reference numeral 1.

[0025] The fence 1, according to the present invention, is intended to advantageously be used to fence off areas, in particular with great dimensions, or rather to be placed between different areas.

[0026] The fence 1 comprises a flexible containment body 2, which extends along a direction of longitudinal extension X, for example for a length of some metres and advantageously comprised in the range of 3 - 5 metres.

[0027] Such a flexible containment body 2 is provided with a base portion 3, which is intended to rest on the ground along the line of the fence be made.

[0028] A plurality of stiffening elements 4 are mechanically associated to the containment body 2 and are advantageously arranged at regular distances with constant pitch along the aforementioned direction of longitudinal extension X and are suitable for supporting the containment body 2 with its base portion 3 resting on the ground.

[0029] The flexible containment body 2 is preferably made from a fabric and in particular from geotextile, suitable for forming a kind of very long sack.

[0030] Advantageously, the geotextile can be obtained with warp and weft filaments of high-density polyethylene, or rather with a high-tenacity polyester or rather again with strips of high tenacity polypropylene. The term geotextile however, can also include non-textile material, mechanically needled and thermo-calendered.

[0031] The stiffening elements 4 form the reinforcements that are suitable for mechanically stiffening the flexible containment body 2 so as to allow the latter to contain inside it a mass of cement material withstanding the mechanical stresses and without bulging in an undesired manner, as shall be described in detail in the rest of the description.

[0032] In accordance with one preferred solution of the present invention, the stiffening elements 4 are obtained in the form of ribs, preferably made from plastic inserted inside a plurality of peripheral pockets advantageously formed at thickened annular portions of the containment body 2. Such pockets are advantageously formed for example through fabric bands or more in general through preferably flexible elements, which are fixed (preferably through seams) on the inner surface of the containment body 2. The pockets otherwise can be obtained by sewing folds or overlapping edges of the end portions of separate portions of the containment body 2 while joining them together one after the other.

[0033] The aforementioned ribs 4 extend at least partially transversally with respect to the direction of longitudinal extension X of the containment body 2.

[0034] Advantageously, such ribs 4 extend as a closed loop in planes that are transversal to the direction of longitudinal extension X of the containment body 2 and are shaped to make a communication between adjacent portions 2' of the containment body 2 so as to make it possible to fill the entire containment body with the cement material.

[0035] In accordance with one preferred embodiment of the present invention, such ribs 4 are provided in the centre with a passage opening 7, which places two adjacent portions 2' of the containment body 2 in communication with one another. In accordance with the embodiment illustrated in the attached figures, the stiffening annular element has a T-shaped generatrix section with the leg 4' defining the passage opening 7.

[0036] The containment body 2 can be made as a single body or it can be made in separate portions 2' that are then fixed to one another in succession at the ends through sewing so as to make a single elongated containment body 2. Preferably, the stiffening elements 4 delimit the separate portions 2' of the containment body 2, which define the separate containment chambers, placed in communication with one another from the passage opening 7 formed in the stiffening elements 4.

[0037] The containment body 2 thus made is thus deformable between a transportation configuration A, in which it is compacted through folds 6 along its direction of longitudinal extension X, and a configuration of application B, in which it is opened out along the direction of longitudinal extension X with the stiffening elements 4 that support it arranging the base portion 3 resting on the ground.

[0038] The stiffening elements 4, advantageously each project from the pockets with cup-shaped portions 8 facing upwards, which define housing seats 9 for a plurality of support posts 10 of a mesh 11.

[0039] Preferably, the stiffening elements 4 are in a number that is greater than that of the posts 10 and for this purpose the cup-shaped portions 8 can be closed with lids where there is not the insertion of a post 10. Otherwise, it is possible to foresee stiffening element 4 without cup-shaped portions 8 alternating - with a fre-

quency to be defined as a function of the characteristics of the fence that is desired to be made (height, resistance etc.) - with stiffening elements 4 that are equipped with cup-shaped portions 8 for supporting the posts 10.

[0040] The containment body 2 is moreover advantageously provided with portions projecting outwards 12, preferably in the form of eyelets, formed at the base portion 3, which can undergo mechanical engagement with stakes that are suitable for holding the containment body 2 in the ground in the application position B before filling it with cement material 20.

[0041] The containment body 2 is for this purpose provided with at least one hole 13 for accessing its inner volume intended to convey the cement material 20 to transform the flexible containment body 2 into a rigid body for supporting the mesh 11.

[0042] The flexible containment body 2 is advantageously obtained from a breathable material, indeed like geo-textile previously mentioned, so as to promote the rapid drying of the casting of cement material (preferably concrete obtained with a cement and mixtures of aggregates such as sand and gravel) which has been introduced inside the containment body 2 through the aforementioned hole 13 and that has distributed along the containment body 2 itself thanks to the through openings 7.

[0043] The access hole 13 is for example obtained with a check valve 14 arranged at the bottom of a cup-shaped portion of a stiffening element 4, and preferably at an end portion 2' of the flexible containment body 2.

[0044] In such a way, the containment body 2 can be filled with cement material 20, for example concrete, from one end thereof. Of course holes 13 can be foreseen at each stiffening element, or else, at further dedicated bushings that are attached to the flexible containment body 2.

[0045] In the case in which the containment body 2 is made from breathable material, there is no need for a vent hole to be made to allow the air to come out while casting the cement inside the containment body 2 itself.

[0046] In the step of application of the fence 1, many containment bodies 2 are advantageously set alongside one another along the line of the fence to be made.

[0047] Also a method for making a fence *in situ* forms the object of the present invention, which in particular can use the fence 1 described above of which, the reference numerals and nomenclature are kept for the sake of simplicity.

[0048] The method initially foresees a step of providing or rather making a sufficient number of flexible containment bodies 2 to fence off the desired area or rather to make the fence 1 of the desired length.

[0049] Once the flexible containment bodies 2 have been loaded in the compact transportation configuration A onto a means of transport (for example a small truck is sufficient), they are then taken near to the area to be fenced off.

[0050] Then an opening out step is carried out, in which each containment body 2, arranged in the transportation configuration A, is opened out moving it into the application configuration B, in which it is indeed opened with its longitudinal direction X which is arranged along the line of the fence 1 to be made. In such an application configuration B, the stiffening elements 4 are advantageously distributed at regular distances along the longitudinal development of the containment body 2.

[0051] Every containment body 2 is arranged in succession until the perimeter of the area to be fenced off is made, or rather, until the division line between two areas to be separated is made.

[0052] During the aforementioned opening out step, the stiffening elements 4 support the containment body 2 arranging the base portion 3 resting on the ground.

[0053] Advantageously, the aforementioned opening out step of the containment bodies 2 on the ground takes place with an accordion-like extension operation.

[0054] Once it has been opened out, each containment body preferably undergoes an attaching step in which it is blocked in position on the ground through stakes, which are engaged with the projecting portions 12 of the containment 2 arranged at the base portion 3.

[0055] A filling step is thus made, in which the inner volume of each containment body 2 receives a flow of cement material from the mouth of a concrete mixer with autoclave, through at least one through hole 13 formed in the containment body 2 itself (and advantageously foreseen at the bottom of a cup-shaped portion 8 of a stiffening element 4).

[0056] Once a solidification step of the cement material has finished and a rigid support body has formed, it is foreseen for there to be an engagement step of a plurality of posts 10 that support a mesh 11 with the housing seats 9.

[0057] During the filling step the air contained in the inner volume of the containment body 2 is replaced by the cement material 20 and comes out passing through the fabric made from breathable material of the containment body 2.

[0058] The fabric of the containment body allows the water in excess to come out and the cement 20 to dry.

[0059] Thanks to the present invention, it is possible to make a fence in a very short time even on steep uneven ground, since it is possible to easily get there with the flexible containment body in the compact transportation configuration A and then easily open it out, for example along a slope, in the application configuration B.

[0060] The fence object of the present invention as described above advantageously makes it possible to be installed in inaccessible areas without using a crane or similar apparatuses and more in general it can be adapted to be easily installed on surfaces that are in any case irregular.

[0061] The finding thus conceived therefore reaches the aforementioned purposes.

[0062] Of course, it can take up, in its practical embodiment also forms and configurations that are different from those illustrated above without for this reason de-

parting from the present scope of protection.

[0063] Moreover, all the details can be replaced by technically equivalent elements and the dimensions, the shapes and materials used can be any according to the requirements.

Claims

1. Fence able to be made *in situ,* **characterised in that** it comprises:

- at least one flexible containment body extending along a direction of longitudinal extension, equipped with at least one base portion intended to rest on the ground;
- a plurality of stiffening elements mechanically associated at regular distances with said containment body, at least some of which are provided with a housing seat;
- said containment body being deformable between a transportation configuration, in which it is compacted through folds along said direction of longitudinal extension, and a configuration of application, in which it is opened out along said direction of longitudinal extension with said stiffening elements that support it arranging said base portion resting on the ground, and
- a plurality of posts, each of which is inserted in a seat of said stiffening elements with said containment body arranged in said configuration of application;
- a mesh supported by said posts.

2. Fence able to be made *in situ* according to claim 1, **characterised in that** said stiffening elements are obtained with ribs extending at least partially transversally with respect to the direction of longitudinal extension of said containment body.

3. Fence able to be made *in situ* according to claim 1, **characterised in that** said containment body is provided with a plurality of peripheral pockets, in which said stiffening elements are inserted.

4. Fence able to be made *in situ* according to claim 2, **characterised in that** at least one part of said ribs extends annularly transversally with respect to the direction of longitudinal extension of said containment body and are shaped, in particular through an opening, to make a communication between adjacent portions of the containment body.

5. Fence able to be made *in situ* according to any one of the previous claims, **characterised in that** said containment bodies are able to be moved between said configuration of application and said transportation configuration through their deformation like an accordion.

6. Fence able to be made *in situ* according to any one of the previous claims, **characterised in that** said containment body is provided with a hole, in particular formed at one said seat, intended to convey cement material to fill the inner volume of said containment body.

7. Fence able to be made *in situ* according to any one of the previous claims, **characterised in that** said containment body is provided with projecting portions formed at the base portion to stop said containment body in application position through ropes, stakes or similar.

8. Fence able to be made *in situ* according to any one of the previous claims, **characterised in that** said containment body is made from breathable material, in particular geotextile.

9. Method for making a fence *in situ,* **characterised in that** it comprises:

- a step of providing at least one flexible containment body having a direction of longitudinal extension and a plurality of stiffening elements mechanically associated at regular distances with said containment body, and provided with housing seats;
- an opening out step, in which said containment body organised in a transportation configuration, in which it is compacted along said direction of longitudinal extension, is moved into a configuration of application, in which it extends in said direction of longitudinal extension along the line of the fence to be made, with said stiffening elements that support it arranging said base portion resting on the ground;
- a filling step, in which the inner volume of said containment body receives a flow of cement material through at least one passage opening of said containment body, in particular formed at a said stiffening elements;
- a solidification step of said cement material with the formation of a rigid support body;
- an engagement step of a plurality of support posts of a mesh in said housing seats.

10. Method for making a fence *in situ* according to claim 9, **characterised in that** the opening out of said containment bodies on the ground takes place with accordion-type extension.

11. Method for making a fence *in situ* according to claim 9, **characterised in that** during said filling step the air contained in the inner volume of said containment body is replaced by said cement material and comes

out passing through said containment body, which is made from a breathable material.

12. Method for making a fence *in situ* according to claim 9, **characterised in that** it comprises at least one step of attaching said containment body to the ground after said opening out step through stakes for engaging with projecting portions of said containment body arranged at said base portion.

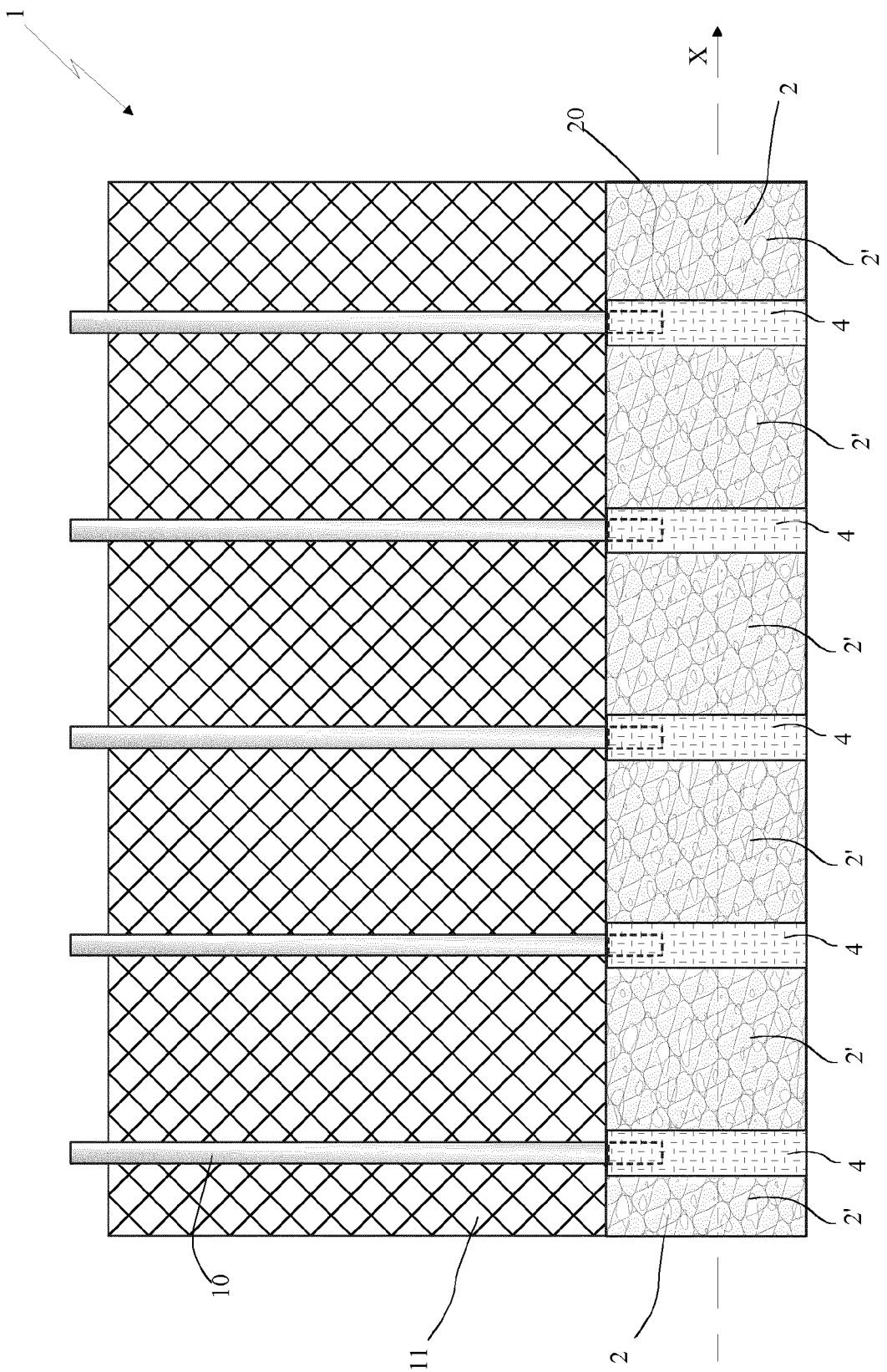

Fig. 1

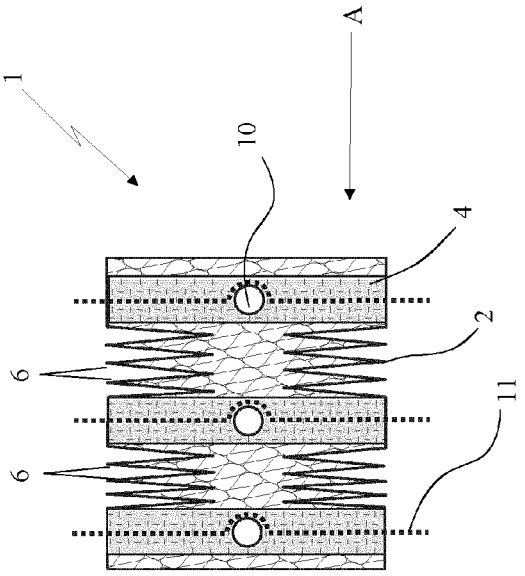

Fig. 3

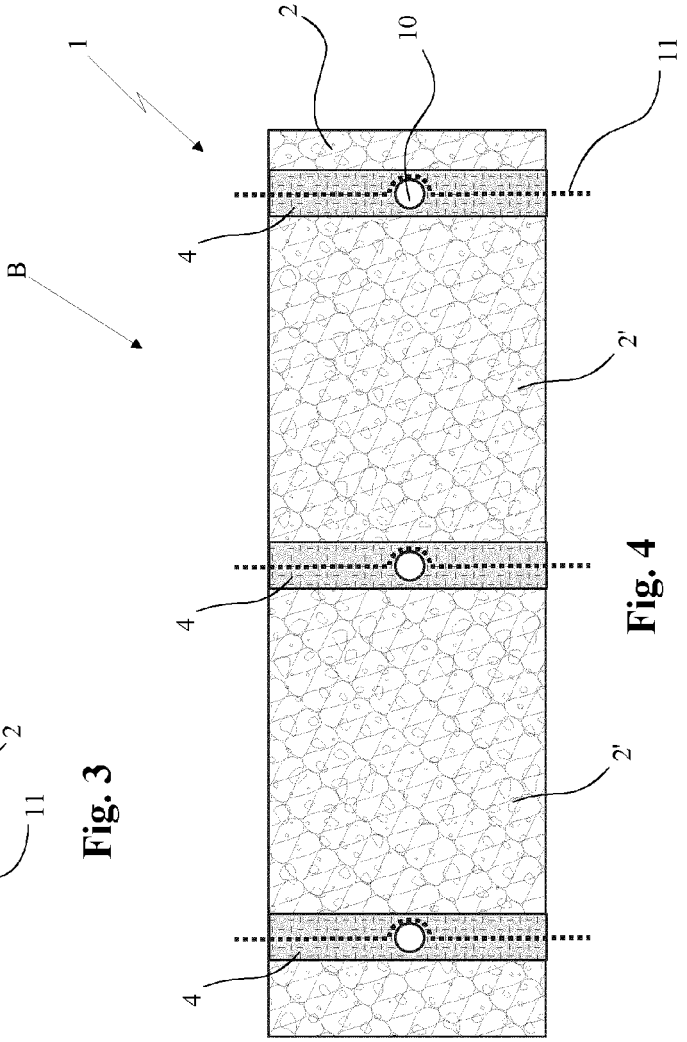

Fig. 4

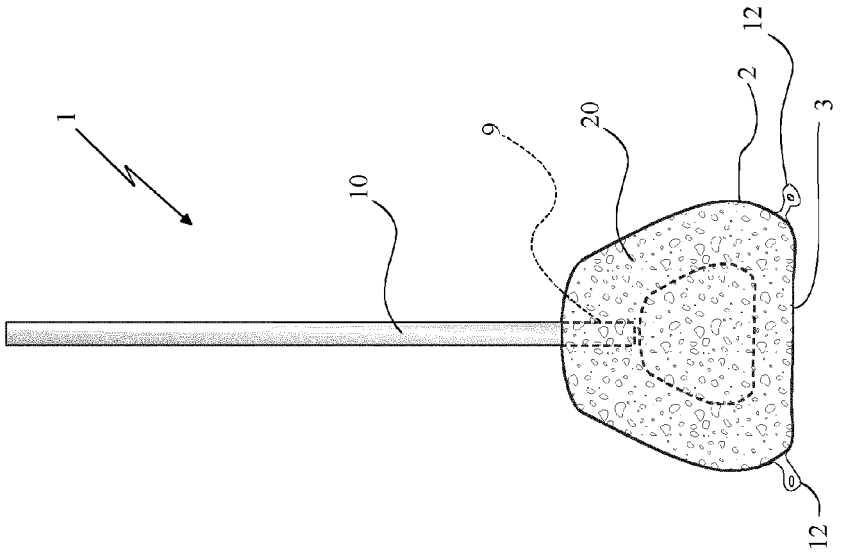

Fig. 2

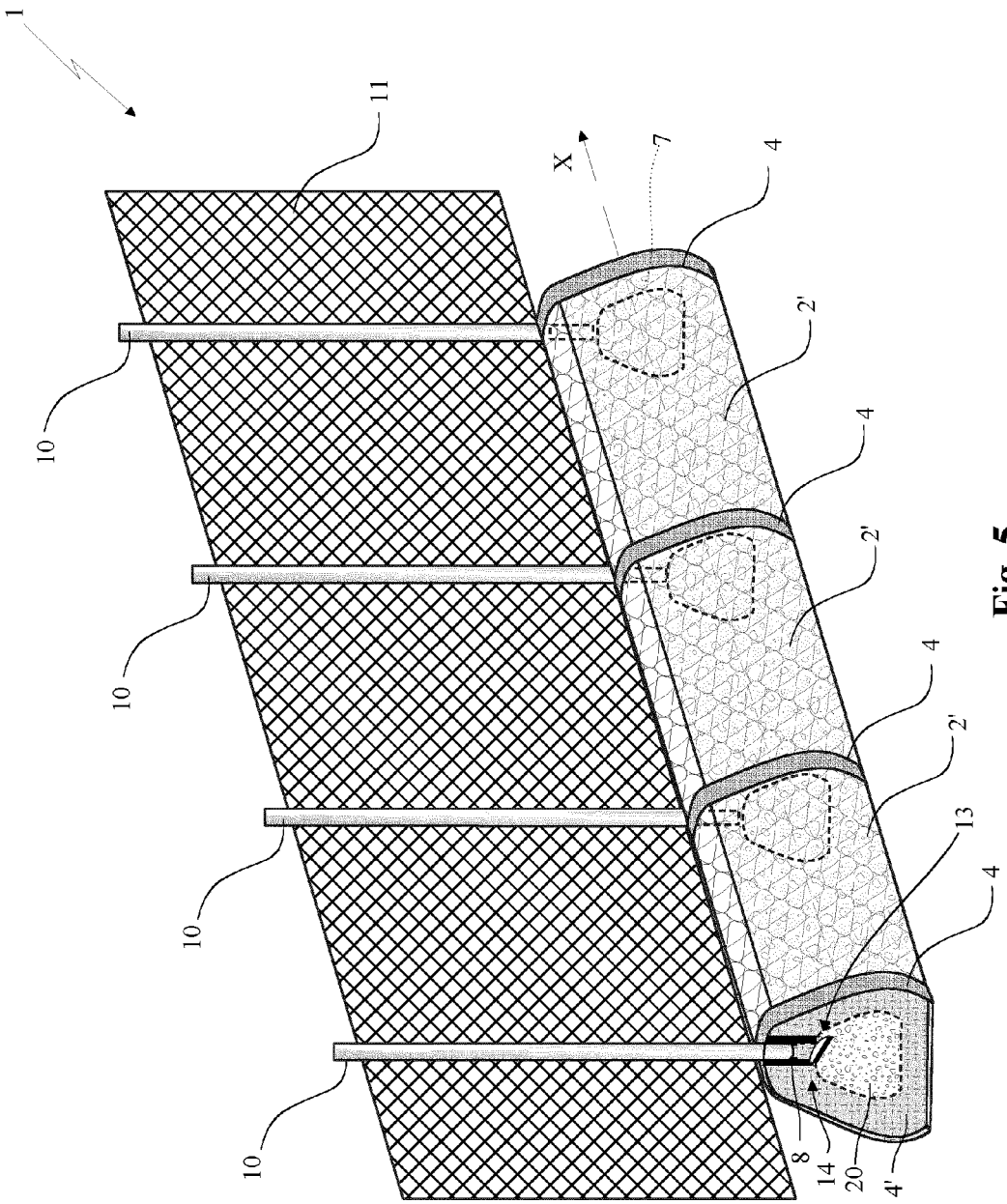

Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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- EP 373279 A **[0014]**
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