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(54) **A NOISESCREEN**

LÄRMSCHUTZWAND

DISPOSITIF ANTIBRUIT

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EP 1 032 733 B1

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Description

[0001] The present invention relates to a noisescreeen comprising at least one row of live, essentially vertical tree stems or branches set in a growth medium, and a layer of a soundproofing material disposed on one side of this row.

[0002] It is known to use such noisescreeens for protecting the environment surrounding noise exposed areas, such as heavily trafficked roads, railways, and airports, against noise.

[0003] It is a special advantage of using such vegetative noisescreeens that at least part of the year they are green and consequently more environmentally acceptable than known noisescreeens in the form of hoardings, concrete elements, glass boards, and the like.

[0004] DE 41 26 657 C1 discloses a noisescreeen comprising two parallel rows of live willow stems or branches placed in spaced relationship, the lower ends of which are dug into the ground, and where the space between these rows of willow stems or branches is filled with soil. This construction offers the possibility of composing a multi-story noisescreeen, as the soil fill between the lowermost rows of willow stems or branches can constitute foundation for two corresponding rows of willow stems or willow branches set on top of and partially dug into the soil fill between the two first-mentioned rows. A corresponding noisescreeen construction is disclosed in DK 161 981 B.

[0005] Each row of willow stems or branches is retained together by longitudinal, horizontally extending poles positioned on opposite sides of the row, and wires, strings or the like of leather, rubber or plastic are used for tying together the said poles.

[0006] EP 0 128 245 B1 discloses a method for the preparation of a noisescreeen consisting of two rows of live, planted tree stems or branches between which there is disposed a plate shaped material of e.g. metal or glass fibre reinforced plastic, and where the stems or branches on opposite sides of the plate shaped material are interconnected by means of bolts which have been passed through holes in the plate shaped material.

[0007] Noisescreeens, in which soil is used as soundproofing material, suffer from the disadvantage of being expensive to erect as they must be built on site and call for use of heavy transport equipment.

[0008] On the other hand, the use of noisescreeens of the kind stated in the preamble, where the soundproofing material is plates of metal or plastic, does not always provide a satisfactory noise reduction or absorption.

[0009] It is the object of the present invention to provide a noisescreeen which offers efficient protection against normally occurring noise, such as traffic noise, which can be built from factory producible elements, and which is easily transported to and erected on the site where it is desired to erect a noise shielding.

[0010] This object is achieved by the noisescreeen according to the features of claim 1 of the invention.

[0011] It is known to use mineral fibre batts for both internal and external heat and sound insulation of buildings, and in such cases the mineral fibre batts are normally secured to a solid support, e.g. a wall or ceiling surface.

[0012] The invention is based on the discovery that the comparatively low weight and the rigidity of mineral wool batts together with layers of tree stems or branches and interconnected stiffening elements can be combined to form a transportable noisescreeen element from which efficient noisescreeens can easily be built on the site of use.

[0013] A particularly preferred embodiment of the noisescreeen according to the invention is characterized in that there is layer of adjacent, live tree stems or branches on both sides of the layer of soundproofing material.

[0014] Such an noisescreeen is particularly stable and offers the advantage that, as viewed from either side, it has a beautiful appearance.

[0015] In the following the invention is described in more detail with reference to the said preferred embodiment, but it should be noted that in many cases in which a noisescreeen is to be erected which will only be viewed from one side, e.g. a noisescreeen to be erected at close distance from a stone wall, wall or the like, noisescreeen elements can advantageously be used in which a layer of tree stems or branches has been positioned only on the visible side of the noisescreeen.

[0016] Thus, the mounting on the site of use only requires that two parallel trenches are dug with the same mutual distance as the distance between the two layers of tree stems or branches, that the end of each noisescreeen element which is not filled up with the mineral fibre layer is positioned with the free ends of the tree stems or branches down in the trenches, and that soil or another growth medium is filled up round the said stem or branch ends, and that irrigation is optionally performed.

[0017] As a result of the capability of the live tree stems or branches for rapidly budding and rooting, the two layers of tree stems or branches will quickly start leafing, and the noisescreeen formed will obtain a beautiful green colour and will mingle well with nature. In the autumn, the noisescreeen will, as a consequence of the leaves fading, assume other colours before the leaves, as it may be, completely fall off.

[0018] When the growth is ongoing, it suffices to trim the noisescreeen only once or twice a year in order to keep the foliage dense and to ensure that it retains a desired height and width.

[0019] The mineral fibre batts or mats are preferably constituted by glass wool, slag wool or rockwool, held together by a binder, such as a heat cured binder, e.g. a phenolformaldehyde resin. The density of the mineral fibre batts or mats is preferably between 25 and 450 kg/m³, particularly preferred between 40 and 200 kg/m³.

[0020] The mineral fibre batts or mats may be com-

posed of several layers with different density, e.g. a centre layer with a comparatively low density, and two or more encompassing layers with higher density, and optionally increasing in density with increasing distance from the centre layer.

[0021] The average density for the mineral fibre layer is preferably between 80 and 150 kg/m³, and particularly preferred between 100 and 150 kg/m³.

[0022] The thickness of the mineral fibre layer formed from mineral fibre batt or mat is preferably between 10 and 40 cm. Optimum noise reduction is obtained when the density of the mineral fibre layer, expressed as weight per area unit, is between 15 and 40 kg/m², and particularly preferred between 20 and 25 kg/m².

[0023] In order to make the mineral fibre layer resistant to external impacts, such as thrown-up pebbles and weather conditions, it may be desirable to use batts or mats with hard and durable surface layers. The resistance of the mineral fibre layer to impacts can also be increased by covering it with an optionally fibrous cover material, e.g. glass fibre web, on both sides.

[0024] Normally it is preferred to use a water-repellent mineral fibre layer, but the mineral fibre layer can, if desired, be made water-absorbent by treatment with a surfactant.

[0025] The layer/layers preferably consists/consist of tree stems or branches with a length from 2 to 3 m. If desired, tree stems or branches having a length as short as 1 m or as long as 5 m, may, however, be used.

[0026] Each layer is preferably composed of 50-150 tree stems, more preferably of 70-100 tree stems, and particularly preferred of 80-90 tree stems. Depending on the number and diameter of the tree stems, which diameter is preferably from 1 to 3 cm, the noisecscreen elements are preferably produced with a length between 1 and 4 m, and, for the sake of transportation, particularly preferred with a length of about 2.2 m.

[0027] Stems or branches from willows are preferably used, as such stems or branches have a special capability for rapidly rooting, and do not require special soil. By suitable selection of type of willow, different stem and foliage colours can be obtained, varying between yellow, brown, red or green, and with correspondingly varying autumn colours, which offers the possibility of obtaining noisecscreens with particularly beautiful colour effects.

[0028] The interconnected stiffening elements, which serve to keep the layers of willow stems or branches urged against the opposite sides of the mineral fibre layer, and consequently to ensure the integrity of the noisecscreen element, are preferably constituted by poles with round, semicircular, rectangular or square cross-section. The poles are preferably flat on the side facing the tree stems or branches.

[0029] The stiffening poles, which are preferably positioned at two levels on either side of the noisecscreen element, may consist of untreated or impregnated wood or plastic, or of another, e.g. recycled, material.

[0030] For the formation of noisecscreen elements which are curved as viewed from above, stiffening poles of plastic are preferred, and particularly preferred of PVC.

[0031] The connection between the stiffening elements on opposite sides of the noisecscreen element is preferably obtained by means of bolts, in particular galvanized bolts, with threaded ends, where the bolts have been passed through holes in the stiffening elements and the mineral fibre layer, and where tensioning has been obtained by screwing nuts onto the threaded bolt ends.

[0032] However, also other types of connecting means can be used, e.g. metal wires, for connecting the stiffening elements on the opposite sides of the noisecscreen element.

[0033] In order to protect the live tree stems or branches against damage during the tensioning of the noisecscreen element, a protective material can be interposed between the stiffening elements and the layers of tree stems or branches.

[0034] In cases in which a stiffening means has also been positioned on the inner side of the layer of tree stems or branches, i.e. between the said layer and the mineral fibre layer, a protective material may be disposed on both sides of each layer of tree stems or branches.

[0035] The protective layer is preferably elastic and weather-resistant. An example of a well suited material is polyethylene foam, e.g. a product sold under the trademark Alviolux®.

[0036] In the following an embodiment of the invention is described in more detail with reference to the drawing, in which

Fig. 1 is a vertical section of a preferred embodiment of a noisecscreen according to the invention,

Fig. 2 is an exploded, perspective view of the noisecscreen according to Fig. 1, and

Fig. 3 is a detailed sectional view of the noisecscreen according to Fig. 1.

[0037] The noisecscreen shown in the drawing comprises two rows 1 and 2 of willow stems 3, the lowermost ends 4 of which are set into soil 5. Between the rows of willow stems 3 there is disposed a soundproofing material in the form of two layers 6 and 7 of relatively loose mineral wool (weight about 80 kg/m³) encompassed by two layers 8 and 9 or relatively dense mineral wool (weight about 200 kg/m³).

[0038] The rows 1 and 2 of willow stems 3 are held together by transverse laths 10 and 11 positioned on opposite sides of the noisecscreen and transversely to the longitudinal direction of the willow stems, and by bolts 12 with a bolt head 13 and a nut 14 extending throughout the entire noisecscreen element. The rows 1 and 2 of wil-

low stems are kept at a distance from the layers 8 and 9 of mineral wool by means of transverse wooden fillets 15, and between the laths 10 and 11 and the rows of willow stems 3 there are disposed protective strips 16 of an elastic material. In the same way, corresponding protective strips 17 are disposed between the wooden fillets 15 and the rows of willow stems 3.

Claims

1. A noisescreeen comprising at least one row of live, essentially vertical tree stems or branches set in a growth medium, and a layer of a soundproofing material disposed on one side of this row, wherein said noisescreeen is constituted by at least one noisescreeen element comprising a layer of soundproofing material in the form of at least one mineral fibre batt or mat and a layer of adjacent, live tree stems or branches, wherein the layer of live tree stems or branches at its lowermost end has greater extent than the layer of soundproofing material, and wherein the layer of tree stems or branches and the layer of soundproofing material are kept together by interconnected stiffening elements positioned on opposite sides of the noisescreeen element and extending essentially perpendicularly to the longitudinal direction of the tree stems or branches and along the entire length of the noisescreeen element.
2. A noisescreeen according to claim 1, **characterized in that** there is a layer of adjacent, live tree stems or branches on either side of the layer of soundproofing material.
3. A noisescreeen according to claim 1 or 2, **characterized in that** the mineral fibre batt or mat is constituted by glass wool, slag wool or rockwool held together by a binder.
4. A noisescreeen according to claim 1, 2 or 3, **characterized in that** the mineral fibre batt or mat has a density between 25 and 450 kg/m³, preferably between 40 and 200 kg/m³.
5. A noisescreeen according to claim 4, **characterized in that** the mineral fibre batt or mat has varying density in the direction of thickness.
6. A noisescreeen according to any of the preceding claims, **characterized in that** the thickness of the mineral fibre batt or mat is from 10 to 40 cm.
7. A noisescreeen according to claim 6, **characterized in that** the mineral fibre batt or mat has a surface weight between 15 and 40 kg/m², and preferably between 20 and 25 kg/m².

8. A noisescreeen according to any of the preceding claims, **characterized in that** the tree stems or branches have a thickness from 1 to 3 cm.

9. A noisescreeen according to any of the preceding claims, **characterized in that** the stiffening elements are poles of wood or plastic.

10. A noisescreeen according to any of the preceding claims, **characterized in that** the stiffening elements are interconnected by means of threaded bolts.

11. A noisescreeen according to any of the preceding claims, **characterized in that** a protective material is interposed between the stiffening elements and the tree stems or branches.

Patentansprüche

1. Lärmschutzwand, welche mindestens eine Reihe von im Wesentlichen vertikalen, lebenden Baumstämmen oder -ästen aufweist, die in ein Wachstumsmedium eingesetzt sind, sowie eine Schicht aus schalldämmendem Material, das auf der einen Seite dieser Reihe angeordnet ist, wobei die Lärmschutzwand aus mindestens einem Lärmschutzelement besteht, das eine Schicht aus schalldämmendem Material in Form mindestens einer Mineralfasermatte und eine Schicht aus benachbart angeordneten lebenden Baumstämmen oder -ästen aufweist, und die aus lebenden Baumstämmen oder -ästen bestehende Schicht an ihrem unteren Ende ein größeres Ausmaß hat als die aus schalldämmendem Material bestehende Schicht, wobei die aus Baumstämmen oder -ästen bestehende Schicht und die aus schalldämmendem Material bestehende Schicht durch untereinander verbundene Aussteifungselemente zusammengehalten werden, die auf entgegengesetzten Seiten des Lärmschutzwandelementes angeordnet sind und sich im Wesentlichen senkrecht zur Längsrichtung der Baumstämmen oder -äste und über die gesamte Länge des Lärmschutzwandelementes erstrecken.
2. Lärmschutzwand nach Anspruch 1, **dadurch gekennzeichnet, dass** auf jeder Seite der aus schalldämmendem Material bestehenden Schicht eine Schicht benachbart angeordneter lebender Baumstämmen oder -äste vorhanden ist.
3. Lärmschutzwand nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Mineralfasermatte aus Glaswolle, Schlackenwolle oder Steinwolle besteht, die durch ein Bindemittel zusammengehalten wird.

4. Lärmschutzwand nach Anspruch 1, 2 oder 3, **dadurch gekennzeichnet, dass** die Mineralfasermatte eine Dichte zwischen 25 und 450 kg/m³, vorzugsweise zwischen 40 und 200 kg/m³ aufweist. 5
5. Lärmschutzwand nach Anspruch 4, **dadurch gekennzeichnet, dass**, die Mineralfasermatte in Dickenrichtung veränderliche Dichte aufweist.
6. Lärmschutzwand nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Dicke der Mineralfasermatte zwischen 10 und 40 cm beträgt. 10
7. Lärmschutzwand nach Anspruch 6, **dadurch gekennzeichnet, dass** die Mineralfasermatte ein Flächengewicht zwischen 25 und 40 kg/m², und vorzugsweise zwischen 20 und 25 kg/m² hat. 15
8. Lärmschutzwand nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Baumstämme oder -äste eine Dicke zwischen 1 und 3 cm haben. 20
9. Lärmschutzwand nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Aussteifungselemente Stäbe aus Holz oder Kunststoff sind. 25
10. Lärmschutzwand nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Aussteifungselemente mittels Gewindebolzen untereinander verbunden sind. 30
11. Lärmschutzwand nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** ein Schutzmaterial zwischen die Aussteifungselemente und die Baumstämme oder -äste eingelegt ist. 35

Revendications

1. Ecran anti-bruit comprenant au moins une rangée de tiges ou branches d'arbre sur pied essentiellement verticales installées dans un moyen d'accroissement, et une couche de matériau insonorisant disposée sur un côté de cette rangée, dans lequel ledit écran anti-bruit est composé d'au moins un élément formant écran anti-bruit comprenant une couche de matériau insonorisant sous la forme d'au moins une natte ou un mat en fibre minérale, et une couche adjacente de tiges ou branches d'arbres sur pied, dans lequel la couche de branches ou de tiges d'arbre sur pied au niveau de son extrémité la plus basse présente une plus grande étendue que la couche de matériau insonorisant, et dans lequel la couche de tiges ou de branches d'arbre et la couche de matériau insonorisant sont conservées ensem- 45

ble par des éléments solidifiant interconnectés positionnés sur les côtés opposés de l'élément formant écran anti-bruit et s'étendant essentiellement perpendiculairement à la direction longitudinale des tiges ou des branches d'arbre et le long de la longueur totale de l'élément formant écran anti-bruit.

2. Ecran anti-bruit selon la revendication 1, **caractérisé en ce qu'il** existe une couche adjacente de tiges ou de branches d'arbre sur pied de chaque côté de la couche de matériau insonorisant.
3. Ecran anti-bruit selon la revendication 1 ou 2, **caractérisé en ce que** la natte ou le mat en fibre minérale est composé de laine de verre, de laine minérale ou de laine de roche maintenue ensemble par un liant.
4. Ecran anti-bruit selon la revendication 1, 2 ou 3, **caractérisé en ce que** la natte ou le mat en fibre minérale présente une densité entre 25 et 450 kg/m³, de préférence entre 40 et 200 kg/m³.
5. Ecran anti-bruit selon la revendication 4, **caractérisé en ce que** la natte ou le mat en fibre minérale présente une densité variable dans la direction de l'épaisseur.
6. Ecran anti-bruit selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'épaisseur de la natte ou du mat en fibre minérale est comprise entre 10 et 40 cm.
7. Ecran anti-bruit selon la revendication 6, **caractérisé en ce que** la natte ou le mat en fibre minérale présente un poids de surface entre 15 et 40 kg/m², et de préférence entre 20 et 25 kg/m².
8. Ecran anti-bruit selon l'une quelconque des revendications précédentes, **caractérisé en ce que** les tiges ou les branches d'arbre présentent une épaisseur comprise entre 1 et 3 cm. 40
9. Ecran anti-bruit selon l'une quelconque des revendications précédentes, **caractérisé en ce que** les éléments solidifiant sont des poteaux en bois ou en plastique.
10. Ecran anti-bruit selon l'une quelconque des revendications précédentes, **caractérisé en ce que** les éléments solidifiant sont interconnectés au moyen de boulons filetés. 50
11. Ecran anti-bruit selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'un** matériau protecteur est interposé entre les éléments solidifiant et les tiges ou les branches d'arbre. 55

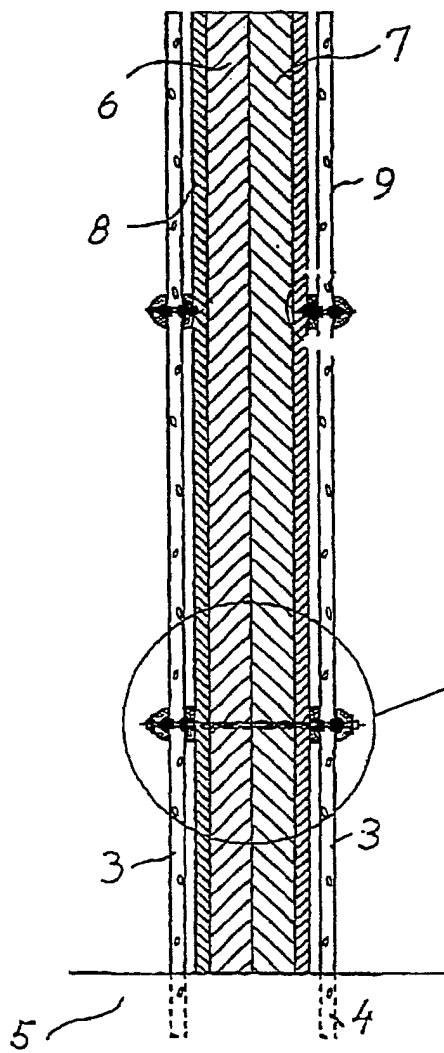


FIG. 1

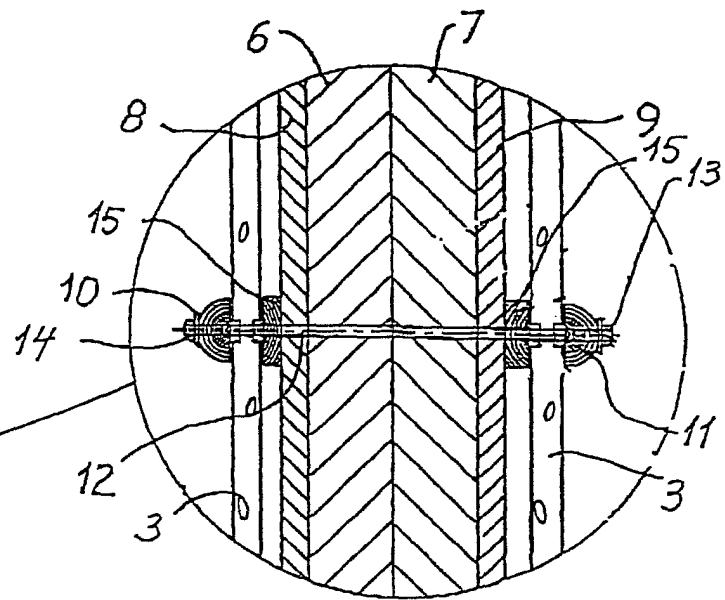


FIG. 3

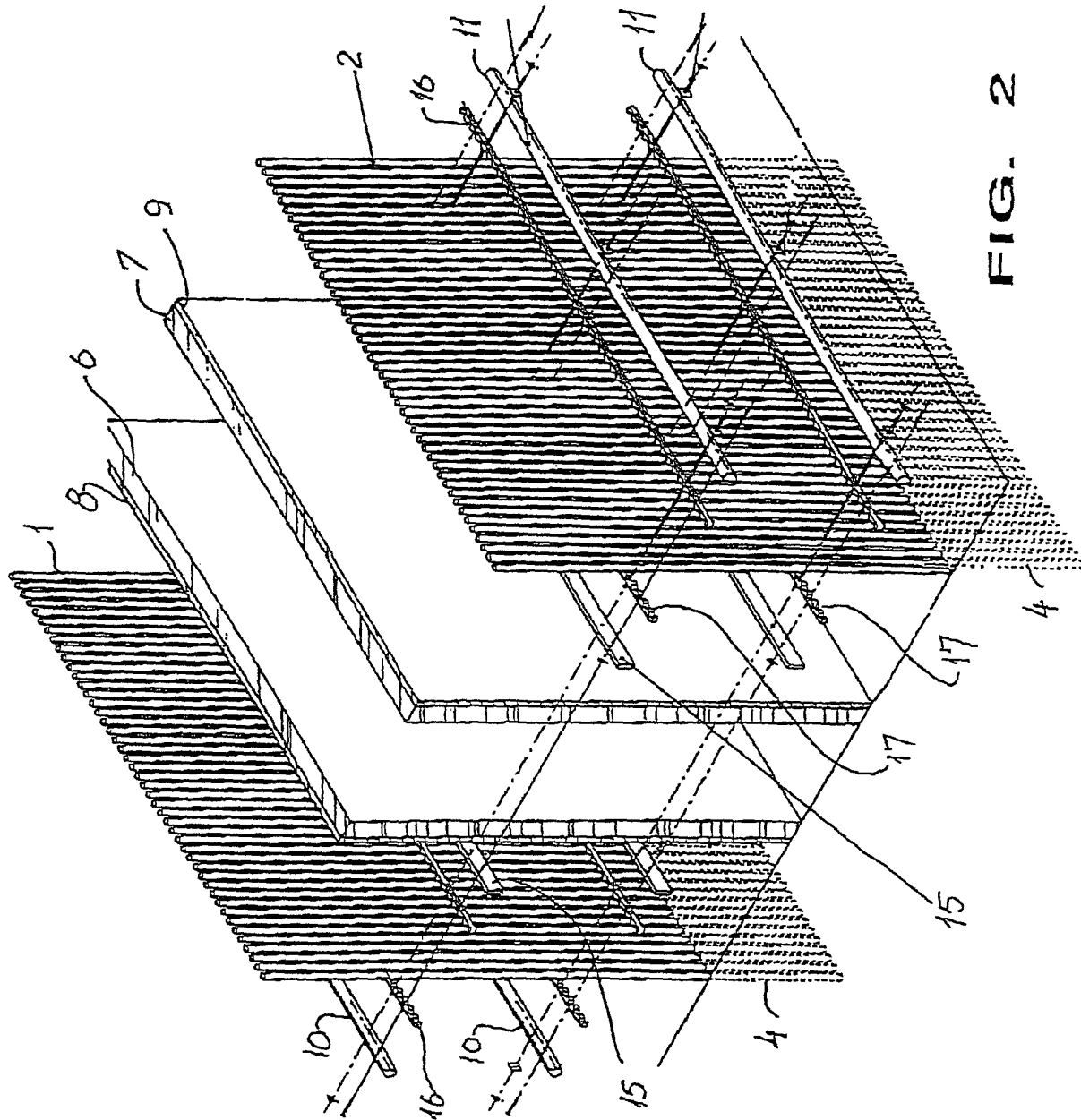


FIG. 2