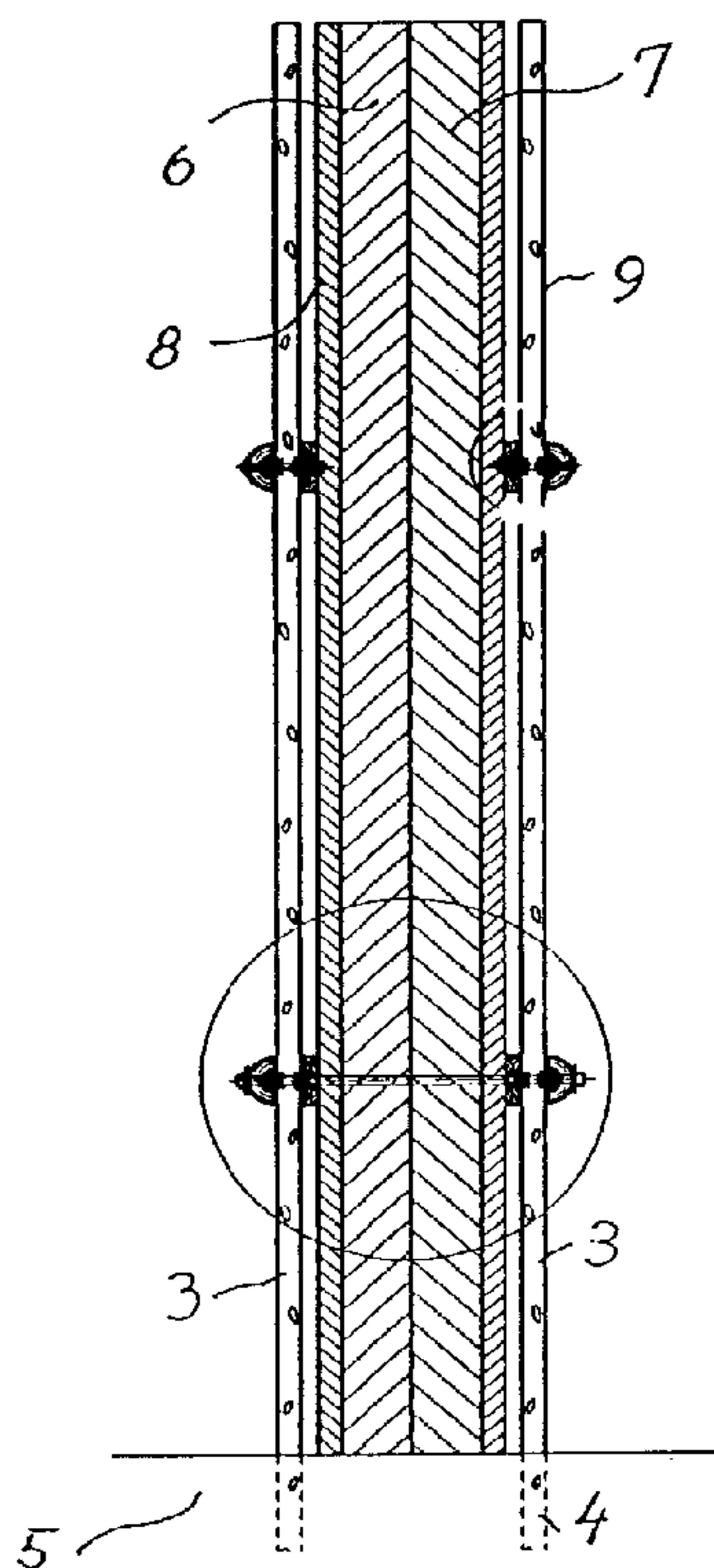




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(54) **DISPOSITIF ANTIBRUIT**
(54) **A NOISESCREEN**



(57) L'invention se rapporte à un dispositif antibruit comportant deux rangées (1, 2) de tiges d'arbres ou de branches (3) vivantes disposées principalement verticalement dans un milieu de culture, et une couche de matière d'insonorisation intercalée entre lesdites rangées (1, 2). Ce dispositif antibruit est composé d'un ou de plusieurs éléments antibruit comportant deux couches de tiges d'arbres ou de branches (3) vivantes et une couche de type matelas ou mat de fibres minérales (6, 7, 8, 9) positionnée entre les couches de tiges ou de branches. Ces couches (1, 2) constituées de tiges d'arbres ou de branches (3) vivantes présentent, au niveau de leurs

(57) A noisescreeen comprising two rows (1, 2) of live, essentially vertical tree stems or branches (3) set in a growth medium, and a layer of a soundproofing material disposed between the rows (1, 2), and being composed of one or more noisescreeen elements comprising two layers of live tree stems or branches (3) and a layer of mineral fibre batt or mat (6, 7, 8, 9) positioned between these layers, where the layers (1, 2) of live tree stems or branches at their lowermost ends (4) have greater extent than the layer of soundproofing material, where the layers (1, 2) of tree stems or branches by the layer of soundproofing material are kept together by means of



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extrémités inférieures (4), une épaisseur supérieure à la couche de matière d'insonorisation et elles sont maintenues ensemble par ladite couche de matière d'insonorisation au moyen de lattes interconnectées (10) positionnées sur des côtés opposés de l'élément et disposées principalement perpendiculairement à la direction longitudinale des tiges d'arbres ou des branches (3) et sur toute la longueur de l'élément antibruit.

interconnected laths (10) positioned on opposite sides of the element and extending essentially perpendicularly to the longitudinal direction of the tree stems or branches (3) and along the entire length of the noisescreeen element.

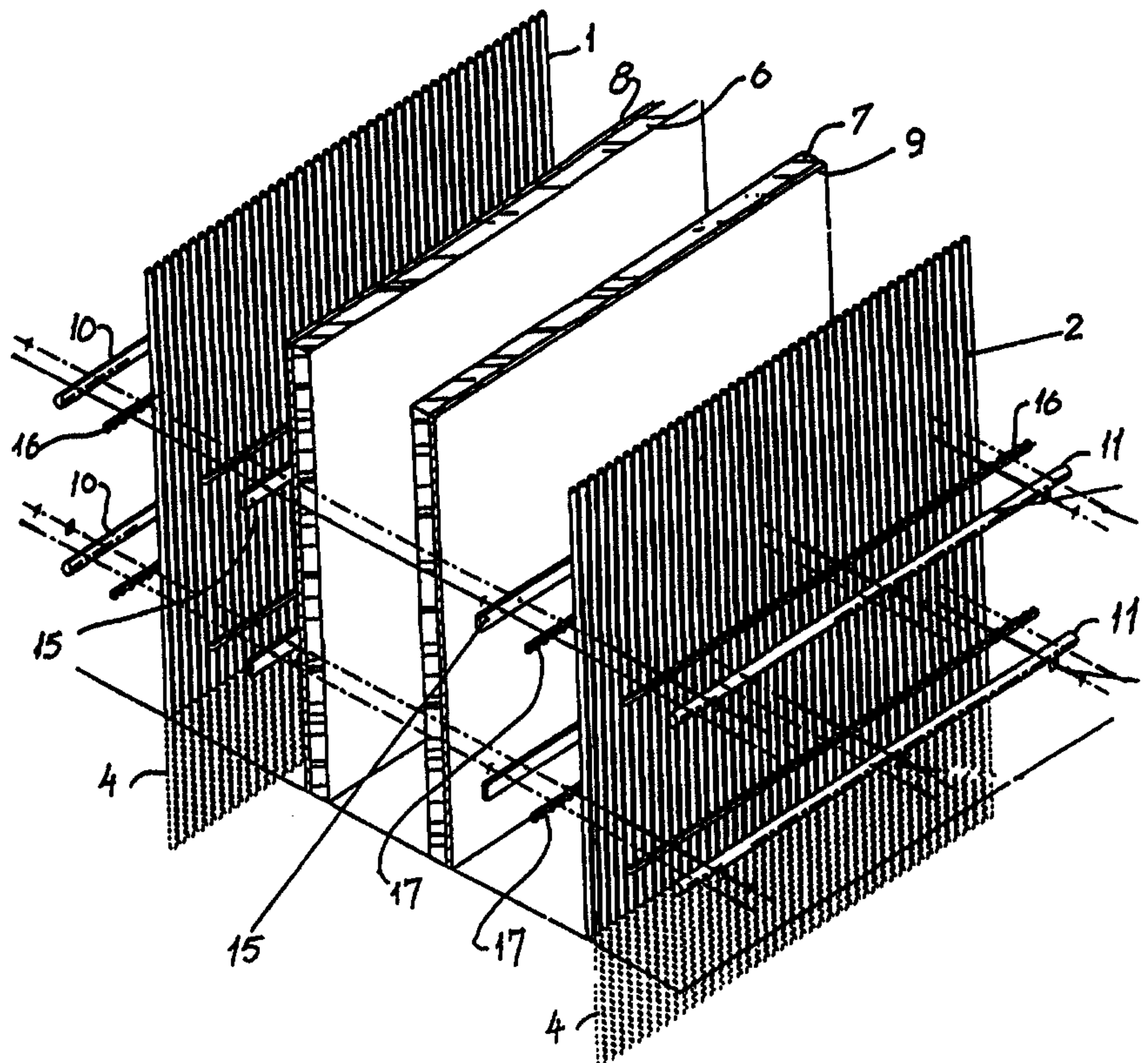
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(21) International Application Number: PCT/DK98/00466 (22) International Filing Date: 27 October 1998 (27.10.98) (30) Priority Data: 1226/97 28 October 1997 (28.10.97) DK (71) Applicant (for all designated States except US): ROCK-WOOL INTERNATIONAL A/S [DK/DK]; Hovedgaden 584, DK-2640 Hedehusene (DK). (72) Inventors; and (75) Inventors/Applicants (for US only): RASK, Steen, Erik [DK/DK]; Baunegårdsvej 7a, DK-2820 Gentofte (DK). FALK, Johannes [DK/DK]; Hvidstedvej 75, DK-9830 Taars (DK). (74) Agent: HOFMAN-BANG & BOUTARD, LEHMANN & REE A/S; Hans Bekkevolds Allé 7, DK-2900 Hellerup (DK).		(81) Designated States: AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, FI (Utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>In English translation (filed in Danish).</i>

(54) Title: A NOISESCREEN**(57) Abstract**

A noisescreeen comprising two rows (1, 2) of live, essentially vertical tree stems or branches (3) set in a growth medium, and a layer of a soundproofing material disposed between the rows (1, 2), and being composed of one or more noisescreeen elements comprising two layers of live tree stems or branches (3) and a layer of mineral fibre batt or mat (6, 7, 8, 9) positioned between these layers, where the layers (1, 2) of live tree stems or branches at their lowermost ends (4) have greater extent than the layer of soundproofing material, where the layers (1, 2) of tree stems or branches by the layer of soundproofing material are kept together by means of interconnected laths (10) positioned on opposite sides of the element and extending essentially perpendicularly to the longitudinal direction of the tree stems or branches (3) and along the entire length of the noisescreeen element.



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Noisescreen

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

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

10 It is a special advantage of using such vegetative noise-screens that at least part of the year they are green and consequently more environmentally acceptable than known noisescreens in the form of hoardings, concrete elements, glass boards, and the like.

15 DE 41 26 657 C1 discloses a noisescreen 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
20 construction offers the possibility of composing a multi-story noisescreen, 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
25 soil fill between the two first-mentioned rows. A corresponding noisescreen construction is disclosed in DK 161 981 B.

Each row of willow stems or branches is retained together by longitudinal, horizontally extending poles positioned
30 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.

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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 of 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.

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.

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.

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.

This object is achieved by the noisescreeen according to the invention, which noisescreeen is characterized in that it 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, a layer of adjacent, live tree stems or branches, that the layer of live tree stems or branches at its lowermost end has greater extent than the layer of soundproofing material, and that the layer of tree stems or branches and the layer of soundproofing material are kept together by interconnected stiffening elements positioned on opposite

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sides of the element and extending essentially perpendicularly to the longitudinal direction of the tree stems or branches and along the entire length of the noisescreeen element.

- 5 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.
- 10 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
- 15 efficient noisescreeens can easily be built on the site of use.

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

20 sides of the layer of soundproofing material.

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

- In the following the invention is described in more detail with reference to the said preferred embodiment,
- 25 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
- 30 tree stems or branches has been positioned only on the visible side of the noisescreeen.

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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 noisescree
5 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.

10 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 noisescree formed will obtain a beautiful green colour and will mingle well with nature. In the autumn,
15 the noisescree will, as a consequence of the leaves fading, assume other colours before the leaves, as it may be, completely fall off.

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

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
25 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.

The mineral fibre batts or mats may be composed of several layers with different density, e.g. a centre
30 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.

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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.

5 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.

10 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
15 covering it with an optionally fibrous cover material, e.g. glass fibre web, on both sides.

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.

20 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.

Each layer is preferably composed of 50-150 tree stems,
25 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 noisescree elements are preferably produced with a length between 1 and 4 m, and, for
30 the sake of transportation, particularly preferred with a length of about 2.2 m.

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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 noisescreens with particularly beautiful colour effects.

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 noisescreen 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.

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

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

The connection between the stiffening elements on opposite sides of the noisescreen 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.

However, also other types of connecting means can be used, e.g. metal wires, for connecting the stiffening

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elements on the opposite sides of the noisescree
element.

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

In cases in which a stiffening means has also been
positioned on the inner side of the layer of tree stems
10 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.

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

In the following 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
20 a noisescree according to the invention,

Fig. 2 is an exploded, perspective view of the noise-
screen according to Fig. 1, and

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

25 The noisescree 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
30 (weight about 80 kg/m³) encompassed by two layers 8 and 9

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or relatively dense mineral wool (weight about 200 kg/m³).

The rows 1 and 2 of willow stems 3 are held together by transverse laths 10 and 11 positioned on opposite sides of the noisescreeen 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 noisescreeen element. The rows 1 and 2 of willow 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.

C l a i m s :

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
5 disposed on one side of this row, c h a r a c t e r -
i z e d in that it 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, a layer of adjacent, live tree stems or branches,
10 that the layer of live tree stems or branches at its
lowermost end has greater extent than the layer of sound-
proofing material, and that the layer of tree stems or
branches and the layer of soundproofing material are kept
together by interconnected stiffening elements positioned
15 on opposite sides of the 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, c h a r a c -
20 t e r i z e d 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, c h a r -
a c t e r i z e d in that the mineral fibre batt or mat
25 is constituted by glass wool, slag wool or rockwool held
together by a binder.
4. A noisescreeen according to claim 1, 2 or 3, c h a r -
a c t e r i z e d in that the mineral fibre batt or mat
has a density between 25 and 450 kg/m³, preferably
30 between 40 and 200 kg/m³.

5. A noisescreeen according to claim 4, c h a r a c -
t e r i z e d 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
5 claims, c h a r a c t e r i z e d in that the thickness
of the mineral fibre batt or mat is from 10 to 40 cm.
7. A noisescreeen according to claim 6, c h a r a c -
t e r i z e d in that the mineral fibre batt or mat has
a surface weight between 15 and 40 kg/m², and preferably
10 between 20 and 25 kg/m².
8. A noisescreeen according to any of the preceding
claims, c h a r a c t e r i z e d in that the tree stems
or branches have a thickness from 1 to 3 cm.
9. A noisescreeen according to any of the preceding
15 claims, c h a r a c t e r i z e d in that the stiffening
elements are poles of wood or plastic.
10. A noisescreeen according to any of the preceding
claims, c h a r a c t e r i z e d in that the stiffening
elements are interconnected by means of threaded bolts.
- 20 11. A noisescreeen according to any of the preceding
claims, c h a r a c t e r i z e d in that a protective
material is interposed between the stiffening elements
and the tree stems or branches.

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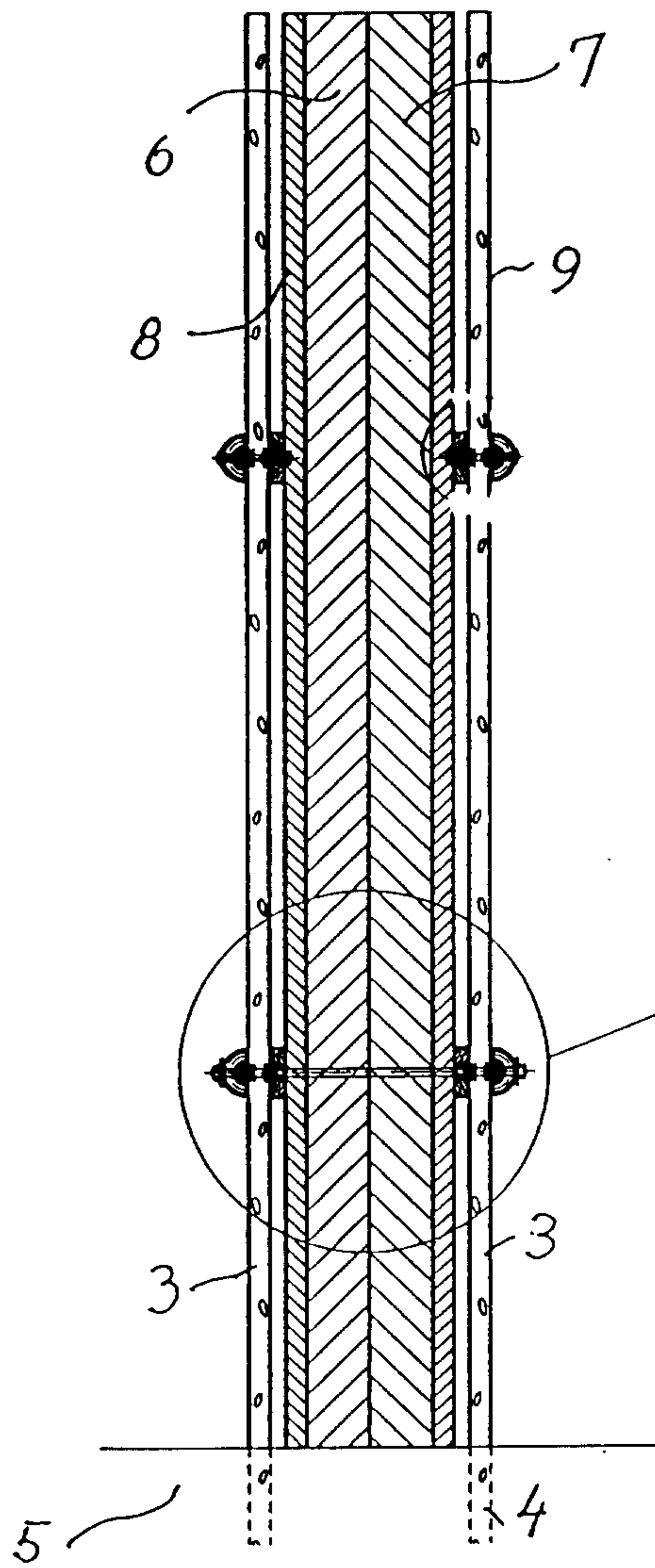


FIG. 1

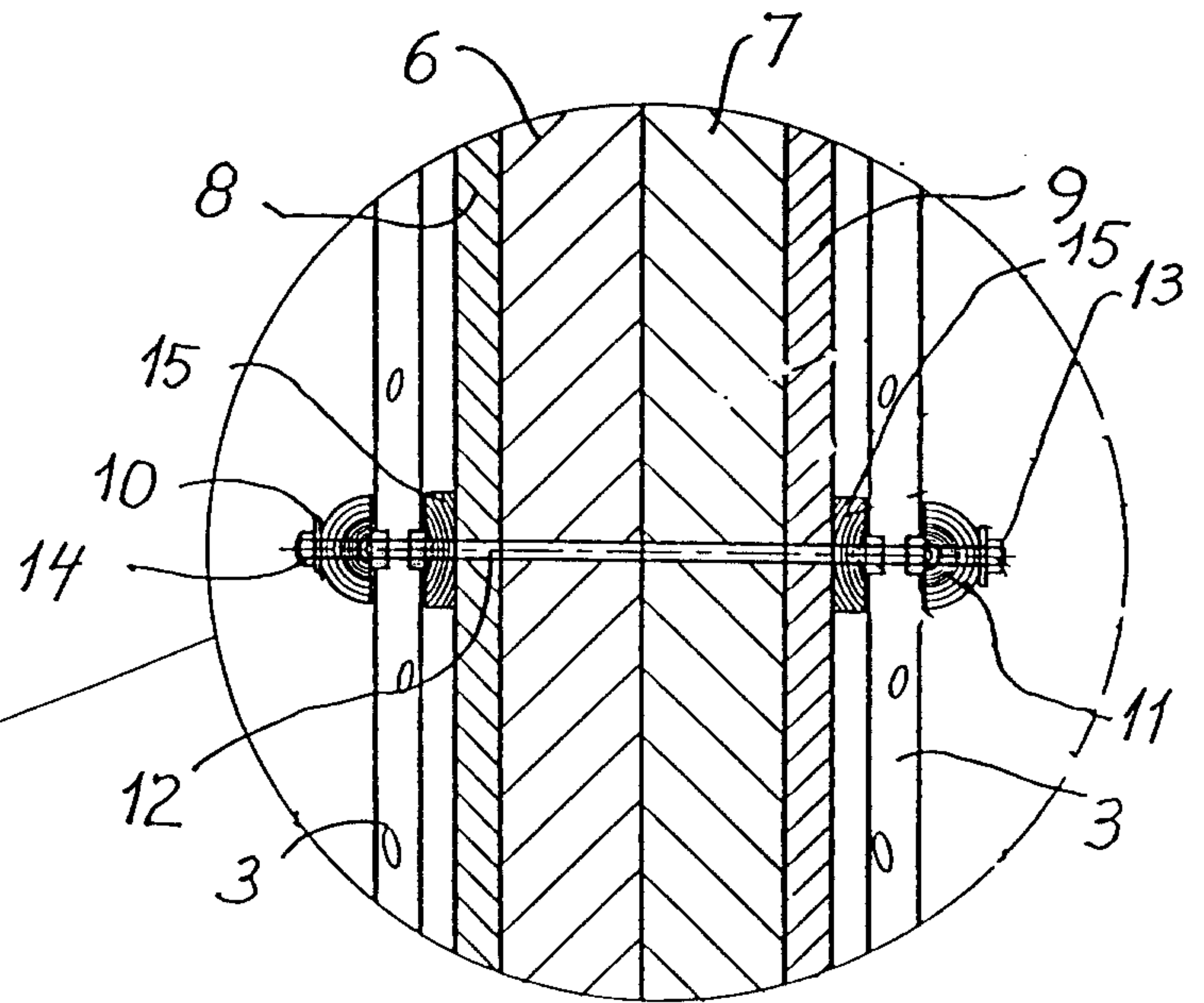


FIG. 3

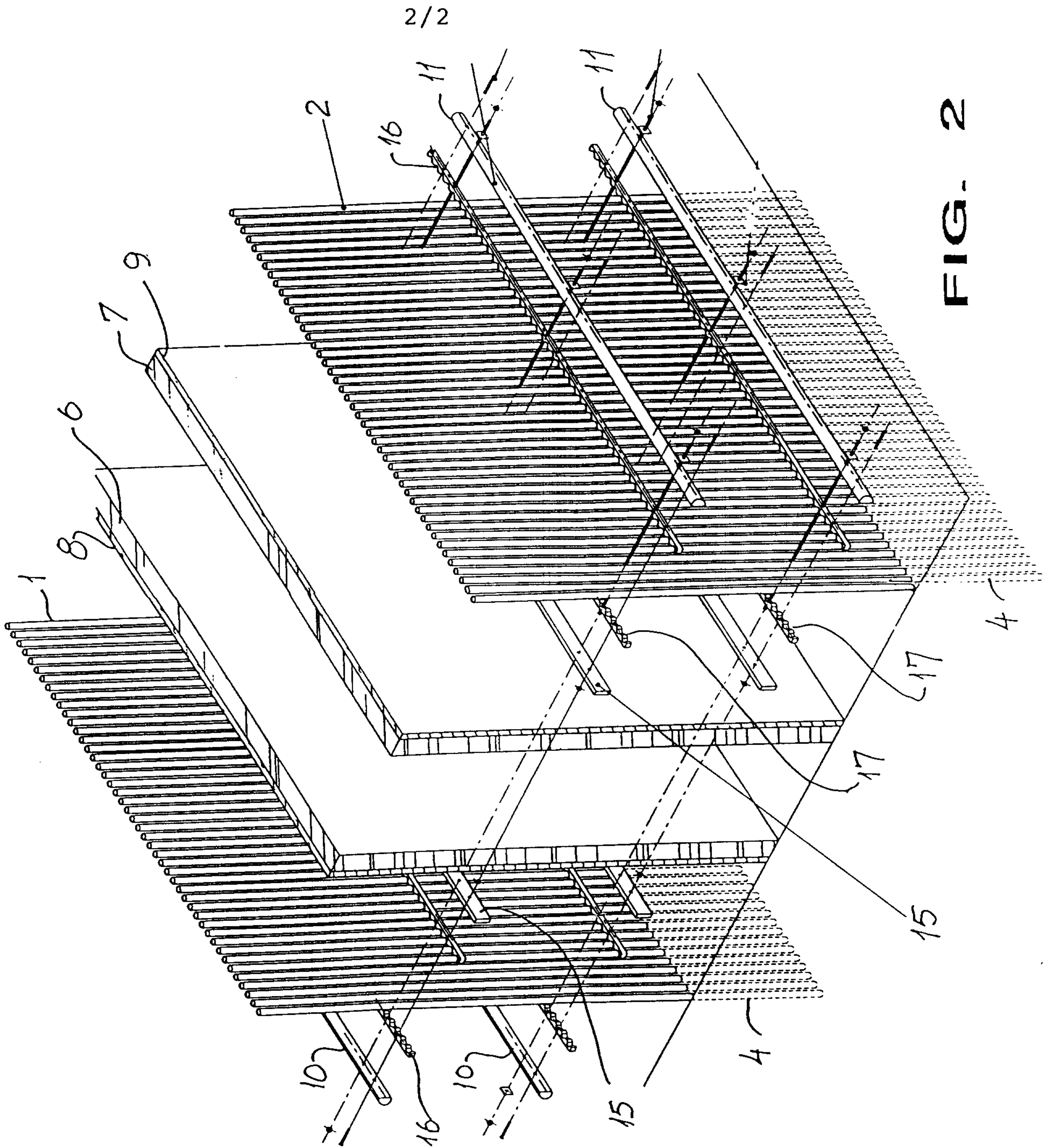


FIG. 2