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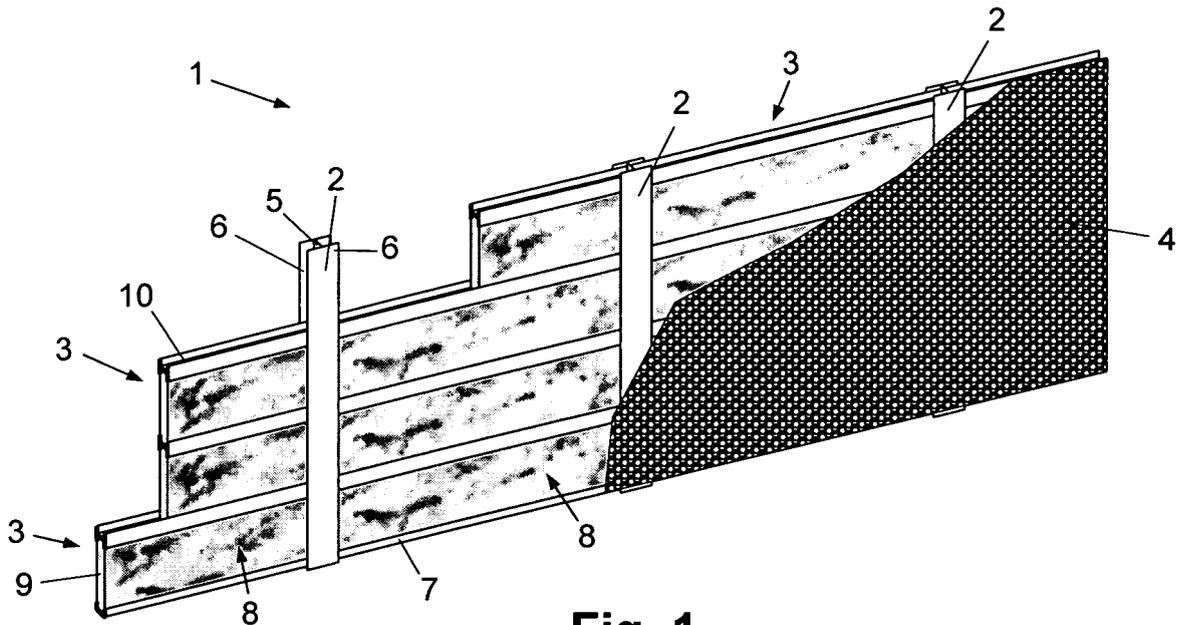
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(54) **A noise absorbing element and a noise screen with such elements**

(57) A noise absorbing element (3) for a noise screen (1) comprising a plurality of such elements (3) arranged in an edge-to-edge relationship. The element (3) has a main surface (8) that in its use position is substantially vertical. The element (3) comprises a pliable noise absorbing core material (9) and has as a whole rigidity and

strength to withstand normal wind load provided transversely to the main surface (8) of the element (3). The pliable noise absorbing core material (9) constitutes an essential structural part of the noise absorbing element (3). A noise screen (1) comprising a plurality of such noise absorbing elements (3) are also described.



**Fig. 1**

## Description

**[0001]** The invention relates to a noise absorbing element for a noise screen comprising a plurality of such elements arranged in an edge-to-edge relationship. The noise absorbing element has a main surface that in its use position is substantially vertical, it comprises a pliable noise absorbing core material, and it has as a whole rigidity and strength to withstand normal wind load provided transversely to the main surface of the element

**[0002]** The invention also relates to a noise screen provided with a plurality of such noise absorbing elements.

**[0003]** Noise screens or noise barriers for absorbing and/or reducing noise from road traffic, trains, industrial noise, etc. are known in various shapes and structural forms. Noise screens can be divided into two main classes: noise screens that are built from scratch on the site and noise screens that comprise noise reducing/absorbing elements that are prefabricated and mounted on the site. Noise screen may comprise rigid or pliable noise absorbing core material. Examples of rigid noise absorbing material are corrugated concrete, lightweight concrete and wood. Examples of pliable noise absorbing core material are mineral wool and rubber. The present invention relates only to noise screens comprising a pliable noise absorbing core material which typically is better noise absorbing and/or reducing than rigid noise absorbing materials.

**[0004]** A noise screen in the first class of noise screens is typically made by erecting outer walls and arranging a noise reducing/absorbing core material between the outer walls. The noise reducing/absorbing material may be soil, mineral wool (loose or in the shape of blocks), gravel, recycled waste material, etc. The outer walls of the erected noise screen must be able to withhold the core material, which of course set up limitations in relation to which materials can be used as outer walls. The visual appearance of the noise screen is therefore also limited unless a supplementary covering is provided. EP-A1-393 735 shows a noise screen of this type.

**[0005]** The second class of noise screens are typically built by mounting vertical beams (for instance H-beams) and arranging prefabricated noise absorbing elements between the vertical beams. The prefabricated elements may have a height corresponding to the finished noise screen or more elements may be stacked on top of each other in order to reach the desired height. The elements are connected to the vertical beams in a suitable manner.

**[0006]** In one type of noise screens in this class the noise absorbing elements are pliable or non-rigid and are covered on at least one side by a plate or the like that prevents e.g. wind loads in destroying the noise absorbing elements. EP-A2-385 087 and EP-A1-1 032 733 show noise screens of this type. In stead of covering the non-rigid noise absorbing elements, horizontal beams may be provided for restricting deflection of the noise reducing/absorbing elements. EP-A2-1 120 496 shows an example of this.

**[0007]** In another type of noise screens in this class the noise absorbing elements are not covered, and an important aspect of this type of noise screens is that the noise absorbing elements must have sufficient rigidity and strength to withstand physical loads, such as wind loads transversely to the length of the element, since no further structural elements are normally provided. In this kind of noise screens the visual appearance of the noise absorbing elements is important, since the visual appearance of the noise screen as a whole is given by the appearance of the noise absorbing elements. Therefore, the elements or cassettes are provided with an outer casing that provides structural strength and rigidity to the elements as well as provides the desired final visual appearance. The pliable noise absorbing core material is arranged inside the casing, which in most cases is partly open at least to the side that faces the source of noise. WO 98/58127 shows a noise screen of this type. In order to provide a green appearance of the noise screen, there may be provided means for growing plants on the surface of the noise screen.

**[0008]** The present invention relates to the last described type of noise screens, i.e. noise screens made by mounting prefabricated noise absorbing elements adjacent each other, which elements comprise a pliable noise absorbing material and which elements must be sufficiently strong to be able to withstand normal wind load. In accordance with a norm this may be define as a max. deflection of 50 mm under a load of 1.56 kN/m<sup>2</sup>. The known elements for this kind of noise screens are quite complex and comprise an outer structural casing made of e.g. metal plates or metal nets and a pliable noise absorbing material arranged inside the casing. This structure of the elements makes them expensive due to the large amount of materials used for the structural and visually appealing casing and the time and labour required for its manufacturing. As mentioned above, the visual appearance of the whole noise screen is determined by the visual appearance of the noise absorbing elements. If it is desired to change the visual appearance it is necessary to produce new noise absorbing elements or to mount a covering that conceals at least partly the noise absorbing elements. This will further increase the costs of the noise screen.

**[0009]** It is therefore an object of the present invention to provide a noise absorbing element for a noise screen comprising a pliable noise absorbing material, which element is structurally more simple than the known elements and thereby less expensive, but still able to fulfil the requirement of structural rigidity and strength. Another object is to provide a noise screen in which the outer appearance can be varied within more wide limits than the present noise screens.

**[0010]** This object is achieved by arranging the noise absorbing element mentioned in the opening paragraph in such manner that the pliable noise absorbing core material constitutes an essential structural part of the noise absorbing element.

**[0011]** Hereby is achieved that the amount of other material can be substantially reduced. In the prior art noise absorbing elements the pliable core material is arranged as a sort of "fitter" in the structural casing of the element without providing any, or only minor, structural strength to the element. Contrary to this, in the present invention the structural integrity of the noise absorbing element is highly dependent on the pliable core material.

**[0012]** In a preferred embodiment the noise absorbing element comprises at least one structural beam extending from one end of the element to the other. This structural beam provides strength to the noise absorbing element, such that the element, which mainly consists of the pliable noise absorbing core material, as a whole is able to withstand wind load transversely to the main surface of the noise absorbing element.

**[0013]** In a first embodiment the at least one structural beam is an H-beam made of metal, such as steel or aluminium, and it has its body part firmly connected to the pliable noise absorbing core material. Due to its cross-section, which provides a large moment of inertia, an H-beam has a big resistance against bending. Thus, it is suitable for providing strength and rigidity to the noise absorbing element.

**[0014]** When using an H-beam it has shown sufficient that the noise absorbing element comprises only one H-beam arranged at a longer edge of the noise absorbing element. The opposite longer edge, which is not provided with any strengthening element, can be supported by a corresponding H-beam provided on the adjacent noise absorbing element.

**[0015]** In another embodiment the at least one beam is C-shaped in cross-section with the ends of the C extending into the pliable noise absorbing core material. A C-shaped beam also has a large moment of inertia, and hence it provides strength and rigidity to the noise absorbing element.

**[0016]** In yet another embodiment the at least one structural beam is made of hardened noise absorbing core material. In this embodiment the whole noise absorbing element is made of the noise absorbing core material, which might reduce the manufacturing costs.

**[0017]** It is mentioned above that the noise absorbing element may comprise only one structural beam (H-beam). However, if required in order to obtain sufficient structural strength and rigidity the element may comprise two structural beams arranged at two longer edges of the element.

**[0018]** In a preferred embodiment the pliable noise absorbing core material is mineral wool, such as stone wool, glass wool or the like. Mineral wool, and in particular stone wool, has shown excellent noise absorbing and/or reducing properties.

**[0019]** The density of the mineral wool should be between 100 and 200 kg/m<sup>3</sup>, preferably between 120 and 180 kg/m<sup>3</sup>, more preferably between 130 and 150 kg/m<sup>3</sup>, most preferably approximately 140 kg/m<sup>3</sup>. At these densities the noise absorbing and/or reducing properties

have shown to fulfil most requirements of noise absorbing/reducing.

**[0020]** It is preferred to make the pliable noise absorbing core material of stone wool, and in order to ensure sufficient integrity of the noise absorbing core material it has a binder content of between 2 and 10 weight-%, preferably between 3 and 8 weight-%, more preferably between 4 and 6 weight-%.

**[0021]** In order to maximise noise absorbing the pliable noise absorbing core material is substantially fully exposed on at least one side of the element.

**[0022]** The pliable noise absorbing core material may, however, be covered by a protective layer at least on the main surfaces of the noise absorbing element. The protective layer protects the pliable noise absorbing core material from being damaged by flying stones, birds and other animals. The protective layer is preferably a small-meshed PE net.

**[0023]** In order to increase the noise reducing properties of the noise absorbing element it may comprise at least one noise reducing plate member extending between the two longer edges of the element. It is well known that such a plate member increases the noise reduction substantially.

**[0024]** If the source of noise is located on one side of the noise screen only, the noise reducing plate member need only to be arranged at one side of the noise absorbing element, namely on the side that does not face the source of noise.

**[0025]** However, if the noise screen is to absorb/reduce noise from both sides it is preferred to arrange the pliable noise absorbing core material on both sides of the noise reducing plate member.

**[0026]** The noise reducing plate member may be connected to the at least one structural beam of the element. Thereby the structural integrity of the noise absorbing element can be increased.

**[0027]** The noise absorbing element is preferably rectangular having a length between 2m and 6m, preferably between 3m and 5m; a width between 0.2m and 1.5m, preferably between 0.4m and 0.8m; and a thickness between 5 and 50 cm, preferably between 10 and 25 cm. With these dimensions each noise absorbing element can be handled without heavy equipment which reduces the mounting costs.

**[0028]** The invention also relates to a noise screen comprising a plurality of noise absorbing elements as described above. The noise screen comprises a plurality of vertical or horizontal beams with the noise absorbing elements arranged between the beams and connected thereto, the main surfaces of the noise absorbing elements being substantially vertical.

**[0029]** Since the noise absorbing elements are made as simple as possible the visual appearance thereof has not been in focus. Thus, it is often desired to provide an outer decorative covering on at least one side of the noise screen.

**[0030]** The outer decorative covering is preferably in-

terconnected with structural parts of the noise absorbing elements, such that the integrity of the noise screen as a whole is increased.

**[0031]** The outer decorative covering may be made from metal, wood, plastics, textile or any combination thereof.

**[0032]** In a preferred embodiment the noise screen comprises a plurality of vertical H beams with the ends of the noise absorbing elements being arranged between the flanges of the H beams. This provides a simple structure that can be easily mounted on the site of the noise screen.

**[0033]** The invention will be described in the following with reference to the drawings in which

Figure 1 shows a noise screen according to the invention;

Figure 2 shows a first embodiment of noise absorbing element according to the invention;

Figure 3 shows a second embodiment of a noise absorbing element according to the invention; and

Figure 4 shows a third embodiment of a noise absorbing element according to the invention.

**[0034]** Figure 1 shows a noise screen 1 made in accordance with one aspect of the invention. The noise screen 1 comprises a plurality of vertical beams 2 that defines sections for noise absorbing elements 3 mounted between the vertical beams 2. In the shown embodiment each section comprises four noise absorbing elements 3 stacked on top of each other. The number of noise absorbing elements 3 may of course be varied in dependency of the desired height of the noise screen 1 as well as the height of each noise absorbing element 3. Figure 1 also shows a decorative covering 4 in the form of a perforated plate provided on one side of the noise screen 1. For illustrative reasons one of the noise absorbing elements 3 and the decorative covering 4 have been partly cut away.

**[0035]** The noise screen 1 is erected by first mounting the vertical beams 2 in the ground in a safe manner. This may be done either by forcing one end of the vertical beams 2 into the ground, embedding one end of the vertical beams 2 in concrete or by firmly securing one end of the vertical beams 2 to a concrete block that has been dug into the ground. This detail is not a part of the present invention and will not be described any further. A person skilled in the art can easily specify the best way to mount the vertical beams 2 for a given noise screen 1.

**[0036]** In the embodiment shown in Figure 1 the vertical beams 2 are so-called H-beams, i.e. beams 2 having an H-shaped cross-section comprising a body part 5 and two flanges 6. The noise absorbing elements 3 are mounted between the vertical beams 2 by positioning the ends of the noise absorbing elements 3 between the

flanges 6 of each vertical beam 2. The ends of the noise absorbing elements 3 are preferably secured to at least one of the flanges 6 of each vertical beam 2. Below the lowest noise absorbing element 3 in each section a "ground element" 7 may be mounted in order to ensure a straight lower surface for the lowermost noise absorbing element 3. The ground element 7 may be concrete cast on the site, or it can be a beam of concrete or steel mounted between the vertical beams 2 before the lowermost noise absorbing element 3 is mounted.

**[0037]** In accordance with the invention, each noise absorbing element 3 has sufficient strength and rigidity to withstand normal wind load transversely to the main surface 8 thereof. This means that in the simplest form the noise wall 1 consists only of the vertical beams 2 and noise absorbing elements 3 - plus any relevant fittings for securing the vertical beams 2 to the ground and the noise absorbing elements 3 to the vertical beams. It is essential to the invention that no further structural parts need to be included in order to ensure a firm and stable noise screen 1. The decorative covering 4 shown as a perforated plate in Figure 1 serves primarily a decorative purpose and no structural performances of the noise screen 1 is based on it being present.

**[0038]** The pliable noise absorbing core material 9 has as the basic function to absorb noise as it is known from prior art noise absorbing elements where the pliable noise absorbing core material is arranged within an outer casing that provides structural strength to the noise absorbing element. However, in the present invention the pliable noise absorbing core material 9 has an additional function, namely to be an essential structural part of the noise absorbing element 3, such that no outer casing is needed.

**[0039]** In a preferred embodiment the pliable noise absorbing core material 9 consists of mineral wool, preferably stone wool. This material has excellent noise absorbing properties and by using a density of the stone wool of about 140 kg/m<sup>3</sup> the noise absorbing and even noise reducing properties are very good. In fact, by having this density it is in many applications possible to make the noise absorbing element 3 as thin as 120 mm and still fulfil the requirement of noise absorbing and reducing. In case higher noise absorbing and/or reducing is required the thickness of the noise absorbing element 3 can be increased and/or a plate element may be included (see below).

**[0040]** A noise absorbing element 3 made primarily of stone wool can be made with sufficient rigidity and strength if the span between to vertical beams 2 is not too large. However, often the span between to vertical beams 2 will be 3 to 4 metres or even up to 6 metres. If this is the case it is necessary to strengthen the noise absorbing element 3 against deflection due to wind load transversely to the main surface 8 of the noise absorbing element 3. In a preferred embodiment this is done by incorporating at least one structural beam 10 that extends from one end of the noise absorbing element 3 to the

other. The structural beam 10 must have a big resistance against deflection in a direction transversely to the main surface 8 of the noise absorbing element 3. This is accomplished by ensuring that it has a certain extent in the transverse direction and at the same time ensuring that it is firmly connected to the noise absorbing core material 10 such that twisting of the structural beam 10 is prohibited.

**[0041]** In a first embodiment shown in Figure 2 only one structural beam 10 is arranged at each noise absorbing element 3. In this embodiment the structural beam 10 consists of an H-beam that is arranged at one of the longer edges 11 of the noise absorbing element 3 and is firmly secured to the pliable noise absorbing core material 9. This may be ensured by gluing the body part 12 of the H-beam to the pliable noise absorbing core material 9 or by any other suitable means. The outer flanges 13 of the H-beam may extend into the noise absorbing core material 9 or they may be positioned externally of the pliable noise absorbing core material 9 as shown. In the latter case stacking of noise absorbing elements 3 between the vertical beams 2 is made easier, since the opposite longer edge 11 of the adjacent noise absorbing element 3 simply has to be arranged between the flanges 13 of the H-beam of the already mounted noise absorbing element 3. The interconnection between the H-beam of one noise absorbing element 3 and the free edge 11 of the adjacent noise absorbing element 3 increases the integrity of the noise screen as a whole.

**[0042]** In a second embodiment the structural strength against deflection transversely to the main surface 8 of the noise absorbing element 3 is achieved by arranging a structural beam 20 at each of the longer edges 11 of the noise absorbing element 3. This is shown in Figure 3 that shows a noise absorbing element 3, wherein the pliable noise absorbing core material 9 constitutes an essential structural part of the noise absorbing element 3 supported by the two structural beams 20. Each of the structural beams 20 is C-shaped with the ends of the C extending into the pliable noise absorbing core material 9 to ensure a firm connection between the structural beams 20 and the pliable noise absorbing core material 9. Glue may be applied between the structural beams 20 and the pliable noise absorbing core material 9. In this embodiment one of structural beams 20 is provided with an outwardly protruding tongue 21 which is complementary with a groove 22 provided in the other structural beam 20. Thereby a good connection between stacked noise absorbing elements 3 is ensured.

**[0043]** In the embodiment shown in Figure 3 a noise reducing plate member 23 is provided on the side facing away from the source of noise. The plate member 23 may be made of any suitable material such as steel, aluminium, plywood, etc. The plate member 23 may be secured to the pliable noise absorbing core material 9 as shown and/or to the structural beams 20.

**[0044]** In either of the embodiments shown in Figure 2 and 3 the structural beams 10,20 may be made of any

suitable material, such as steel or aluminium. Plastics or a fibre reinforced material could also be an option. They may be standard beams, or they may be tailor-made for the specific purpose. Specifically, they may be extruded aluminium profiles, whereby it is possible to incorporate various flanges or even cavities when seen in cross-section.

**[0045]** Figure 4 shows yet another embodiment of a noise absorbing element 3 according to the invention. In this embodiment the noise absorbing element 3 is provided with structural beams 30 that are made of the same material as the pliable noise absorbing core material 9 in a compressed or hardened form. If the pliable noise absorbing core material 9 is stone wool the structural beams 30 are made by compressing the stone wool to a very high density, such as 300-500 kg/m<sup>3</sup>. Three structural beams 30 are provided in the embodiment shown, but the number may of course be adjusted in accordance with the strength requirements.

**[0046]** As mentioned above the decorative outer covering 4 shown in Figure 1 serves primarily a decorative purpose and no structural properties are based on it being present. This also means that the noise screen 1 may be erected without any decorative covering 4 if desired. Moreover, since mounting of a decorative covering 4 is optional it is possible to choose almost any kind of covering. Thus, it may be desirable to omit any decorative covering 4 towards the source of noise, which might be a traffic road, whereas the opposite side, which might be facing a dwelling area, is provided with a decorative covering 4. However, in most cases it will be desirable to have a decorative covering 4 on each side of the noise screen 1.

**[0047]** If a decorative covering 4 is mounted it may be connected to the vertical beams 2 in any suitable manner, e.g. by screws. It may also be connected to the structural beams 10,20,30 of the noise absorbing elements 3 between the vertical beams 2 in order to ensure integrity between the noise absorbing elements 3 and the decorative covering 4. This interconnection between the noise absorbing elements 3 and the decorative covering 4 will in many instances also provide further strength and rigidity to the noise screen 1 as a whole. It is important, however, that the stability and strength of the noise screen 1 is not dependent on the presence of the decorative covering 4.

**[0048]** If a decorative covering 4 is provided on the side facing the source of noise it preferably has a perforating degree of at least 35%, i.e. at least 35% of the pliable noise absorbing core material 9 is exposed to noise. The decorative covering 4 may be made of any suitable material. Examples are perforated wooden boards, perforated aluminium or galvanized steel plates, boards of compressed stone wool, nets of steel rods, woven willow branches, etc.

**[0049]** If no decorative covering 4 is provided it may be desirable to arrange a protective layer on the main surface of each noise absorbing element 3. Examples of

protective layers are a thin layer of non-woven glass fibres, a small-meshed PE-net 24 (see Figure 3), etc.

[0050] The invention has been described with reference to three different embodiments of a noise absorbing element comprising mineral wool as the pliable noise absorbing core material. The invention is of course not restricted to these specific embodiments. Thus, the invention relates to any noise absorbing elements and noise screens that comprise a pliable noise absorbing core material that constitutes an essential structural part of the noise absorbing element.

### Claims

1. A noise absorbing element (3) for a noise screen (1) comprising a plurality of such elements (3) arranged in an edge-to-edge relationship, said element (3) having a main surface (8) that in its use position is substantially vertical, said element (3) comprising a pliable noise absorbing core material (9), and said element (3) having as a whole rigidity and strength to withstand normal wind load provided transversely to the main surface (8) of the element (3), **characterized in that** the pliable noise absorbing core material (9) constitutes an essential structural part of the noise absorbing element (3).
2. A noise absorbing element according to claim 1, **characterized in that** the element (3) comprises at least one structural beam (10;20;30) extending from one end of the element (3) to the other.
3. A noise absorbing element according to claim 2, **characterized in that** the at least one structural beam (10) is an H-beam made of metal, such as steel or aluminium, and has its body part (12) firmly connected to the pliable noise absorbing core material (9).
4. A noise absorbing element according to claim 3, **characterized in that** the element (3) comprises only one H-beam arranged at a longer edge (11) of the noise absorbing element (3).
5. A noise absorbing element according to claim 2, **characterized in that** the at least one beam (20) is C-shaped in cross-section with the ends of the C extending into the pliable noise absorbing core material (9).
6. A noise absorbing element according to claim 2, **characterized in that** the at least one structural beam (30) is made of hardened noise absorbing core material (9).
7. A noise absorbing element according to claim 2, 5 or 6, **characterized in that** the element (3) comprises two structural beams (20) arranged at two longer edges of the element (11).
8. A noise absorbing element according to any one of claims 1-7, **characterized in that** the pliable noise absorbing core material (9) is mineral wool, such as stone wool, glass wool or the like.
9. A noise absorbing element according to claim 8, **characterized in that** the density of the mineral wool is between 100 and 200 kg/m<sup>3</sup>, preferably between 120 and 180 kg/m<sup>3</sup>, more preferably between 130 and 150 kg/m<sup>3</sup>, most preferably approximately 140 kg/m<sup>3</sup>.
10. A noise absorbing element according to claim 8 or 9, **characterized in that** the pliable noise absorbing core material (9) is stone wool and has a binder content of between 2 and 10 weight-%, preferably between 3 and 8 weight-%, more preferably between 4 and 6 weight-%.
11. A noise absorbing element according to any one of claims 1-10, **characterized in that** the pliable noise absorbing core material (9) is substantially fully exposed on at least one side of the element (3).
12. A noise absorbing element according to any one of claims 1-11, **characterized in that** the pliable noise absorbing core material (9) is covered by a protective layer at least on the main surfaces of the noise absorbing element (3).
13. A noise absorbing element according to claim 12, **characterized in that** the protective layer is a small-meshed PE net (24).
14. A noise absorbing element according to any one of claims 1-13, **characterized in that** the element (3) comprises at least one noise reducing plate member (23) extending between the two longer edges (11) of the element (3).
15. A noise absorbing element according to claim 14, **characterized in that** the noise reducing plate member (23) is arranged at one side of the element (3).
16. A noise absorbing element according to claim 14, **characterized in that** the pliable noise absorbing core material (9) is arranged on both sides of the noise reducing plate member (23).
17. A noise absorbing element according to any one of claims 14-16, **characterized in that** the noise reducing plate member (23) is connected to the at least one structural beam (20) of the element (3).

18. A noise absorbing element according to any one of claims 1-17, **characterized in that** the element (3) is rectangular having:
- a length between 2m and 6m, preferably between 3m and 5m, 5
  - a width between 0.2m and 1.5m, preferably between 0.4m and 0.8m, and
  - a thickness between 5 and 50 cm, preferably between 10 and 25 cm. 10
19. A noise screen (1) comprising a plurality of noise absorbing elements (3) according to any one of claims 1-18, which noise screen (1) comprises a plurality of vertical or horizontal beams (2) with the noise absorbing elements (3) arranged between the beams (2) and connected thereto, the main surfaces (8) of the noise absorbing elements (3) being substantially vertical. 15  
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20. A noise screen according to claim 19, **characterized in that** an outer decorative covering (4) is provided on at least one side of the noise screen (1).
21. A noise screen according to claim 20, **characterized in that** the outer decorative covering (4) is interconnected with structural parts of the noise absorbing elements (3). 25
22. A noise screen according to claim 20 or 21, **characterized in that** the outer decorative covering (4) is made from metal, wood, plastics, textile or any combination thereof. 30
23. A noise screen according to any one of claims 19-22, **characterized in that** the noise screen (1) comprises a plurality of vertical H-beams (2) with the ends of the noise absorbing elements (3) being arranged between the flanges (6) of the H-beams (2). 35  
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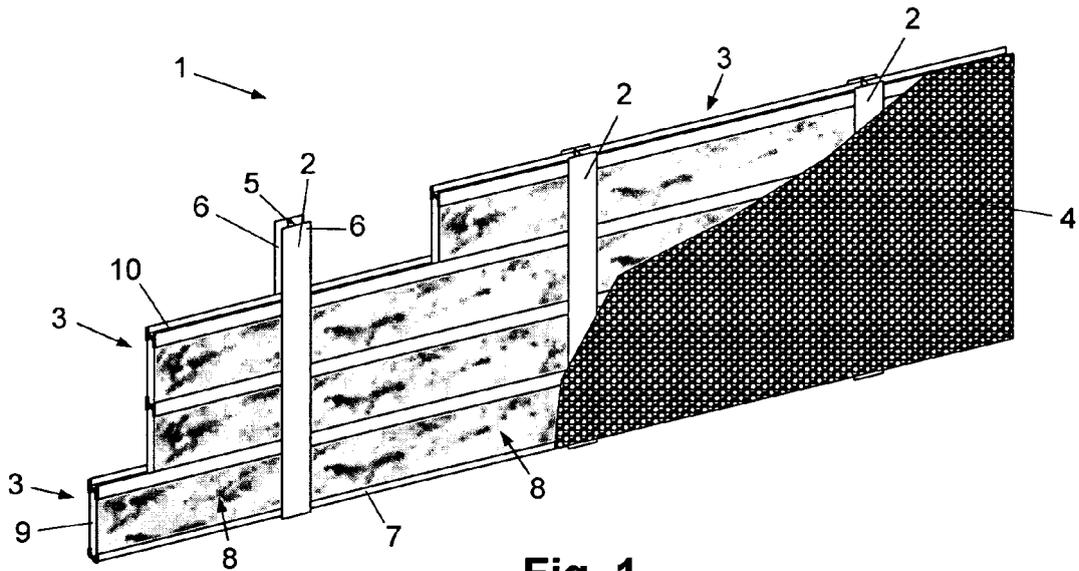


Fig. 1

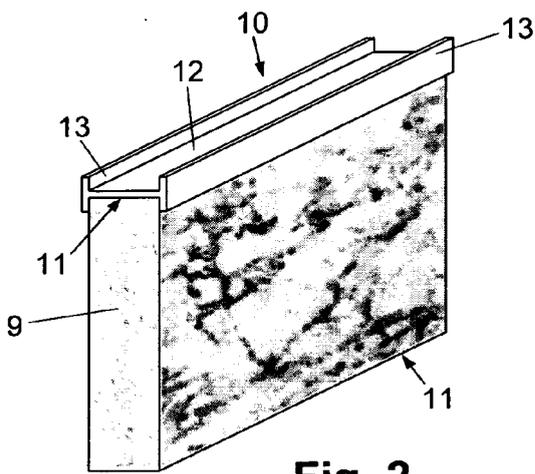


Fig. 2

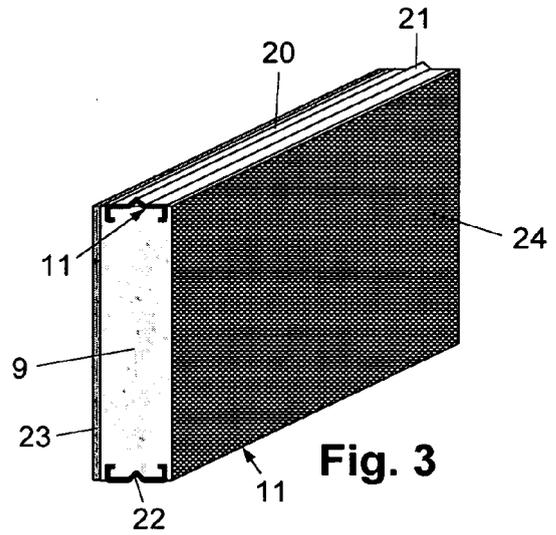


Fig. 3

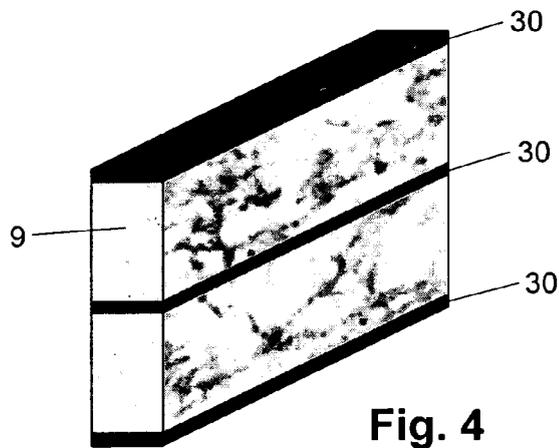


Fig. 4



| DOCUMENTS CONSIDERED TO BE RELEVANT  |  |   |  |
|--|--|---|--|
| Category   | Citation of document with indication, where appropriate, of relevant passages  | Relevant to claim   | CLASSIFICATION OF THE APPLICATION (IPC)    |
| X  | EP 1 479 825 A (LOHARENS ING.-BAU GMBH)<br>24 November 2004 (2004-11-24)<br>* paragraph [0007] - paragraph [0020];<br>claims 3,12; figure 1 *  | 1-19  | E01F8/00                                   |
| X  | PATENT ABSTRACTS OF JAPAN<br>vol. 2002, no. 08,<br>5 August 2002 (2002-08-05)<br>& JP 2002 123259 A (NIPPON SHEET GLASS<br>ENVIRONMENT AMENITY CO LTD),<br>26 April 2002 (2002-04-26)<br>* abstract *      | 1,2,<br>6-15,17,<br>18  | TECHNICAL FIELDS<br>SEARCHED (IPC)<br>E01F |
| X  | PATENT ABSTRACTS OF JAPAN<br>vol. 2000, no. 01,<br>31 January 2000 (2000-01-31)<br>& JP 11 293633 A (KAM:KK),<br>26 October 1999 (1999-10-26)<br>* abstract *  | 1-5,<br>7-11,<br>18-23  |  |
| X  | PATENT ABSTRACTS OF JAPAN<br>vol. 2000, no. 05,<br>14 September 2000 (2000-09-14)<br>& JP 2000 045414 A (NITTO BOSEKI CO LTD;<br>DAIDO STEEL SHEET CORP),<br>15 February 2000 (2000-02-15)<br>* abstract * | 1,2,<br>5-10,12,<br>14-18   |  |
| X  | EP 1 455 018 A (MAAS GMBH)<br>8 September 2004 (2004-09-08)<br><br>* figures 3,4 *   | 1,2,<br>6-10,12,<br>14,16,<br>18,19,23  |  |
| The present search report has been drawn up for all claims   |  |   |  |
| 4  | Place of search<br>The Hague   | Date of completion of the search<br>31 January 2006   | Examiner<br>Severens, G                    |
| CATEGORY OF CITED DOCUMENTS<br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document |  | T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>.....<br>& : member of the same patent family, corresponding document |  |

EPO FORM 1503 03.82 (P04C01)



| DOCUMENTS CONSIDERED TO BE RELEVANT   |  |   |   |
|---|--|---|---|
| Category  | Citation of document with indication, where appropriate, of relevant passages  | Relevant to claim   | CLASSIFICATION OF THE APPLICATION (IPC) |
| X   | FR 2 785 922 A (EUROCOUSTIC)<br>19 May 2000 (2000-05-19)<br><br>* page 4, line 26 - page 5, line 8 *<br>* page 6, lines 6-8 *<br>* figure *<br><br>-----               | 1,2,<br>8-10,<br>12-15,<br>19-23  |   |
| A   | EP 0 347 966 A (KAAI BEHEERMIJ OP BV;<br>BEHEERMAATSCHAPPIJ OP DE KAAI B.V)<br>27 December 1989 (1989-12-27)<br>* column 2, line 28 - line 30; figure 1 *<br><br>----- | 21,22   |   |
|   |  |   | TECHNICAL FIELDS SEARCHED (IPC)         |
|   |  |   |   |
| The present search report has been drawn up for all claims  |  |   |   |
| Place of search<br><b>The Hague</b>   |  | Date of completion of the search<br><b>31 January 2006</b>  | Examiner<br><b>Severens, G</b>          |
| <b>CATEGORY OF CITED DOCUMENTS</b><br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document |  | T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>.....<br>& : member of the same patent family, corresponding document |   |

4  
EPO FORM 1503 03.02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 05 38 8081

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

31-01-2006

| Patent document cited in search report |   | Publication date | Patent family member(s) | Publication date |
|--|---|------------------|-------------------------|------------------|
| EP 1479825                             | A | 24-11-2004       | NONE                    |                  |
| -----                                  |   |                  |                         |                  |
| JP 2002123259                          | A | 26-04-2002       | NONE                    |                  |
| -----                                  |   |                  |                         |                  |
| JP 11293633                            | A | 26-10-1999       | NONE                    |                  |
| -----                                  |   |                  |                         |                  |
| JP 2000045414                          | A | 15-02-2000       | NONE                    |                  |
| -----                                  |   |                  |                         |                  |
| EP 1455018                             | A | 08-09-2004       | DE 10310202 A1          | 16-09-2004       |
| -----                                  |   |                  |                         |                  |
| FR 2785922                             | A | 19-05-2000       | NONE                    |                  |
| -----                                  |   |                  |                         |                  |
| EP 0347966                             | A | 27-12-1989       | DE 68902104 D1          | 20-08-1992       |
|  |   |                  | DE 68902104 T2          | 14-01-1993       |
|  |   |                  | NL 8801579 A            | 16-01-1990       |
| -----                                  |   |                  |                         |                  |

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- EP 393735 A1 [0004]
- EP 385087 A2 [0006]
- EP 1032733 A1 [0006]
- EP 1120496 A2 [0006]
- WO 9858127 A [0007]