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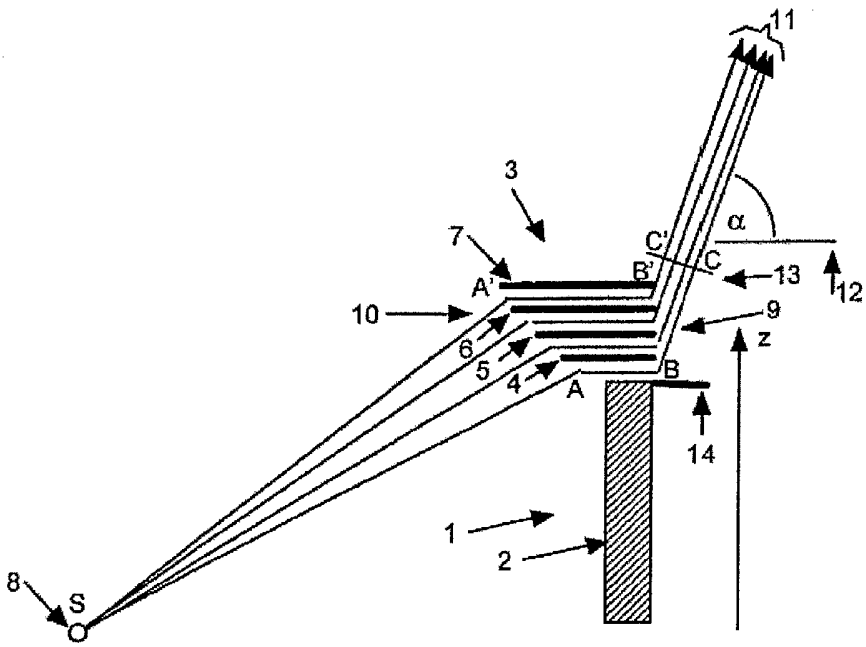
(54) Title: BAFFLE BOARD



(57) Abstract: The invention relates; to a baffle board (1) for a sound source, comprising a standing wall (2) with a lamellar array (3) placed on the wall, wherein the lamellae (4, 5, 6, 7) are oriented horizontally and wherein the lamellar array is permeable to light, air and sound.

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Baffle board

The invention relates to a baffle board for a sound source comprising a standing wall.

In practice, baffle boards are used for the protection against disturbing noise of the kind occurring near, for example, motorways. Such baffle boards exist in various forms of screens disposed vertically or at an angle and may or may not be permeable.

In order to also effectively protect taller buildings behind the baffle board against disturbing noise, the baffle boards to be erected must also be tall. In practice there is a limit to the height of baffle boards because in order to render them sufficiently wind resistant they require a heavy foundation. Thus apart from a practical limit regarding the required height of the baffle boards, the aspect of unsightliness attached to tall baffle boards plays a role as well.

From EP-A-0 798 426 a baffle board is known for a noise source, comprising a standing wall as well as a lamellar array provided on the wall, wherein the lamellae are oriented horizontally. With this known baffle board, the lamellar array is embodied such that a wall portion is provided in the extended direction of the standing wall, possessing sound-insulating properties.

From US-A-4,436,179 a baffle board for a sound source is known, comprising a standing wall and a lamellar array placed on the wall, wherein the lamellae are oriented vertically and wherein the lamellar array is permeable to sound.

From US-A-4,069,768 a baffle board for a sound source is known comprising a lamellar array, which is placed obliquely in relation to the horizon and which lamellar array is permeable to sound.

The object of the invention is to provide a baffle board that has a limited height, while nevertheless effectively reducing the sound behind the baffle board. A further object of the baffle board according to the invention is to

achieve an intended degree of sound reduction behind the baffle board with a construction that is less heavy than that of prior art baffle boards.

To this end the baffle board according to the invention is characterized by one or several of the appended claims.

In a first aspect of the invention, the baffle board is embodied with a standing wall, on which wall a lamellar array is provided whose lamellae extend horizontally and wherein the lamellar array allows light, air and sound to pass through. Such a lamellar array is wind-permeable, thus allowing the foundation of the baffle board to be constructed less heavily. Even more importantly, the lamellar array effectively reduces the sound behind the baffle board because the lamellar array is permeable to sound.

To this end the baffle board according to the invention is preferably realised such that the lamellae of the lamellar array extend from the wall substantially to a side where the sound source is located. Surprisingly, such an embodiment was shown to be capable of effectively reducing the sound by at least approximately 6 decibels at relevant heights behind the baffle board.

With a view to a more symmetrical distribution of the load of the wall on which the lamellar array is provided, the lamellar array is advantageously embodied such that viewed at right angles to the wall, the lamellae extend both towards the side of the sound source and away from the side of the sound source.

In a further aspect, it serves the effectiveness of the baffle board according to the invention if, viewed at right angles to the wall, the width of the respective lamella also increases with each higher placed lamella. The result is that with increasing height, sound from a sound source located at a low level and passing through the lamellar array will experience a prolonged travelling time at the exit side of the lamellar array facing away from the sound source. The resulting interference at the exit side of the lamellar array is such that the original direction of the sound is deflected

upwards, which improves the protective effect of the baffle board.

More specifically, the baffle board according to the invention may be optimised by embodying the same such that each lamella has a predetermined width, so that each lamella of the lamellar array delimits an end portion of a sound path in the lamellar array that exits at the exit side of the lamellar array facing away from the sound source, which end portion links up with a begin portion of said sound path running from the sound source to the entry side of the lamellar array facing the sound source, and that the sum of the distances of the begin portion and the end portion of each sound path that passes at least partly through the lamellar array, increases with the increasing height at which the lamellae delimiting the said sound path are placed.

In still another aspect of the invention, the baffle board is characterized in that the length of the sound paths is predetermined according to a predetermined preferred direction into which the lamellar array directs the sound coming from the sound source. Surprisingly, the effectiveness of the baffle board with a view to the direction in which the sound reduction takes place is not so much determined by the orientation of the lamellae but rather by the width of the lamellae, which is related to the intended length of the sound paths.

For example, if the lamellae are arrayed horizontally, it was shown to be advantageous to let the length of the separate sound paths depend on the relation

$L = K + z \cdot \sin \alpha$;

wherein z = the height of the lamella

K = a constant

α = the angle of the preferred direction

wherein the lamellar array directs the sound in relation to the horizontal

L = the length of the sound path partly delimited by the lamella and running between a sound source and the exit side of the lamellar array.

In all the embodiments of the baffle board according to the invention it is desirable for the mutual distance between adjacent lamellae of the lamellar array to be less than half the wavelength of the highest audio frequency to be influenced; this corresponds to the shortest relevant wavelength. This achieves that the sound propagating between the lamellae has a flat wave front without transverse modes influencing the propagation path of the sound. This further avoids interferences at the exit side of the lamellar array, which would result in the occurrence of more than just the desired propagation path, and which would negatively influence the sound-reducing effect.

Although it generally suffices to embody the baffle board according to the invention with lamellae that extend solely from the wall towards the sound source, on occasion it is advantageous to also provide a lamella positioned directly above the wall and that extends from the wall to a side facing away from the sound source. This may avoid the scattering of sound to objects situated at a low level behind the baffle board.

A further advantage gained with the baffle board according to the invention is that because the lamellar array is provided on the wall of the baffle board, the possible wind gradient at the top of the wall is diminished, which prevents the sound to be reduced from being deflected towards the ground.

Hereinafter the baffle board according to the invention will be further elucidated by way of an exemplary embodiment, which does not limit the appended claims.

In the appended drawing of the exemplary embodiment, a single figure schematically shows the baffle board according to the invention.

In the figure, reference numeral 1 indicates the baffle board. The baffle board 1 comprises a standing wall 2 and mounted on the wall 2 a lamellar array 3.

The figure shows that the lamellae 4, 5, 6, 7 of the lamellar array 3 substantially extend from the wall 2 towards a side where the sound source 8 is located. The lamellae may

possibly also extend towards the side facing away from the sound source 8. This is not shown in the figure but is quite clear.

Viewed at right angles to the wall 2, the higher each lamella 4, 5, 6, 7 of the lamellar array 3 is positioned, the greater is the width of each respective lamella 4, 5, 6, 7.

The width of each lamella 4, 5, 6, 7 is preferably predetermined on the basis that each lamella 4, 5, 6, 7 of the lamellar array 3 delimits an end portion of a sound path in the lamellar array 3, which exits at the exit side 9 of the lamellar array 3 facing away from the sound source 8, which end portion links up with a begin portion of said sound path running from the sound source 8 to the entry side 10 of the lamellar array 3 facing the sound source. For each sound path which in this manner passes at least partly through the lamellar array 3, the sum of the distances of the begin portion and the end portion increases with the increasing height at which the lamellae delimiting said sound path are placed. This achieves that the wave front 13 (line C-C') is directed upward, which means per definition that the distance from the sound source 8 to the wave front 13 is the same for each sound path through the lamellar array 3. This is schematically shown in the figure. The illustration depicts a sound path whose end portion travels through the lamellae 6 and 7 and that is indicated as section A'-B'. This end portion links up with section B'-C' that continues to the wave front 13. The begin portion of this sound path running between the sound source 8 and the entry side 10 of the lamellar array 3 is indicated as section S-A'. For example, the length of the sound path whose end portion A-B is delimited by lamella 4 of the lamellar array 3, is the same from the sound source 8 to the position of the wave front 13; in other words, the length of section S-A-B-C is the same as the length of section S-A'-B'-C'. One thing and another is realised by suitably choosing the width of the different lamellae 4, 5, 6 and 7.

The arrows 11 in the figure further schematically symbolise that by means of the device it is possible to real-

ise a predetermined preferred direction in which the lamellar array 4, 5, 6, 7 sends the sound originating from the sound source 8. The length of the sound paths up to the exit side 9 of the lamellar array 3 as defined in the foregoing is determined subject to the desired preferred direction 11. In the illustrated case where the lamellae 4, 5, 6, 7 extend substantially horizontally, the length of the different sound paths depends on the relation $L = K + z \cdot \sin \alpha$, wherein z is the height of the lamella 4, 5, 6 or 7 and K is a constant, α is the angle of the preferred direction 11 into which the lamellar array 3 directs the sound in relation to a horizontal 12, and L is the length of the respective sound path partly delimited by the lamella 4, 5, 6 or 7 and which runs between the sound source 8 and the exit side of the lamellar array 3.

It is further desirable for the mutual distance between the adjacent lamellae 4, 5, 6, 7 of the lamellar array 3 to be less than half the wavelength of the highest sound frequency to be influenced, or tantamount to that, to be less than half the shortest wavelength still to be influenced.

Finally, it is worth noting that it is preferred for a lowest lamella 14 to be provided directly on top of the wall 2, which extends from the wall 2 to the side facing away from the sound source 8.

CLAIMS

1. A baffle board (1) for a sound source, comprising a standing wall (2), with a lamellar array (3) placed on the wall (2), wherein the lamellae (4, 5, 6, 7) are oriented horizontally and wherein the lamellar array (3) is permeable to light, air and sound.

2. A baffle board (1) according to claim 1, **characterised** in that the lamellae (4, 5, 6, 7) of the lamellar array (3) extend from the wall (2) substantially to a side where the sound source (8) is located.

3. A baffle board (1) according to claim 1 or 2, **characterised** in that viewed at right angles to the wall (2), with each higher placed lamella (4, 5, 6, 7), the width of the respective lamella also increases.

4. A baffle board (1) according to one of the claims 1-3, **characterised** in that viewed at right angles to the wall (2), the lamellae (4, 5, 6, 7) extend both towards the side of the sound source and away from the side of the sound source.

5. A baffle board (1) according to one of the claims 1-3, **characterised** in that each lamella (4, 5, 6, 7) has a predetermined width so that each lamella (4, 5, 6, 7) of the lamellar array (3) delimits an end portion of a sound path in the lamellar array (3) that exits at the exit side (9) of the lamellar array (3) facing away from the sound source (8), which end portion links up with a begin portion of said sound path running from the sound source (8) to the entry side (10) of the lamellar array (3) facing the sound source, and that the sum of the distances of the begin portion and the end portion of each sound path that passes at least partly through the lamellar array (3) increases with the increasing height at which the lamellae delimiting the said sound path are placed.

6. A baffle board (1) according to one of the claims 1-5, **characterised** in that the length of the sound paths is predetermined subject to a predetermined preferred direction

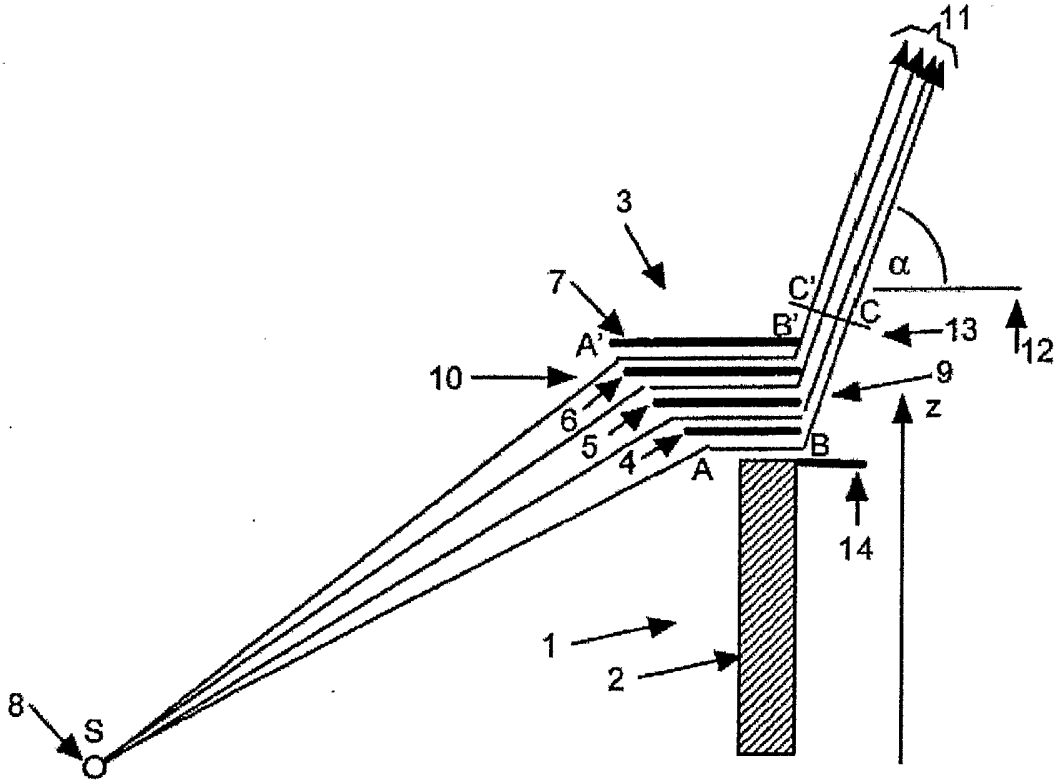
into which the lamellar array (3) directs the sound coming from the sound source.

7. A baffle board (1) according to claim 5 and 6, **characterised** in that the lamellae (4, 5, 6, 7) are arrayed substantially horizontally and in that the length of the separate sound paths depends on the relation $L = K + z \cdot \sin \alpha$;

wherein z = the height of the lamella (4, 5, 6, 7)
K = a constant
α = the angle of the preferred direction (11) wherein the lamellar array (3) directs the sound in relation to the horizontal (12)
L = the length of the sound path partly delimited by the lamella (4, 5, 6, 7) and which runs between a sound source (8) and the exit side (9) of the lamellar array (3).

8. A baffle board (1) according to one of the preceding claims, **characterised** in that the mutual distance between adjacent lamellae (4, 5, 6, 7) of the lamellar array (3) is less than half the wavelength of the highest audio frequency to be influenced.

9. A baffle board (1) according to one of the preceding claims, **characterised** in that a lamella (14) is provided positioned directly above the wall (2) and extending from the wall (2) to a side facing away from the sound source (8).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INTERNATIONAL SEARCH REPORT

International application No
PCT/NL2006/000222

A. CLASSIFICATION OF SUBJECT MATTER
INV. E01F8/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
E01F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Y		9
X	EP 0 798 426 A (MITSUBISHI DENKI KABUSHIKI KAISHA) 1 October 1997 (1997-10-01)	1-8
Y	column 6, line 42 - line 56 column 7, line 26 - line 35 column 8, line 18 - line 28; figures 4,6,9	9
X	US 4 436 179 A (YAMAMOTO ET AL) 13 March 1984 (1984-03-13) column 2, line 37 - column 3, line 5; figure 6	1,2

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
18 July 2006	25/07/2006

Name and mailing address of the ISA/	Authorized officer
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INTERNATIONAL SEARCH REPORT

International application No
PCT/NL2006/000222

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 069 768 A (MATSUMOTO ET AL) 24 January 1978 (1978-01-24) figures 13-16	1,2
Y	EP 0 765 968 A (BRIDGESTONE CORPORATION) 2 April 1997 (1997-04-02) page 3, line 37 - line 46; figure 1	9

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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