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(54) **Panel for soundproof walls**

(57) Panel designed to be installed by the side of roads, viaducts and the like, which said panel comprises a layer (4) of reinforced concrete with a covering (5) con-

sisting of a layer of concrete made of light material, in particular pumice, shaped on the surface so as to form a plurality of rhomboidal figures (6) inside one another.

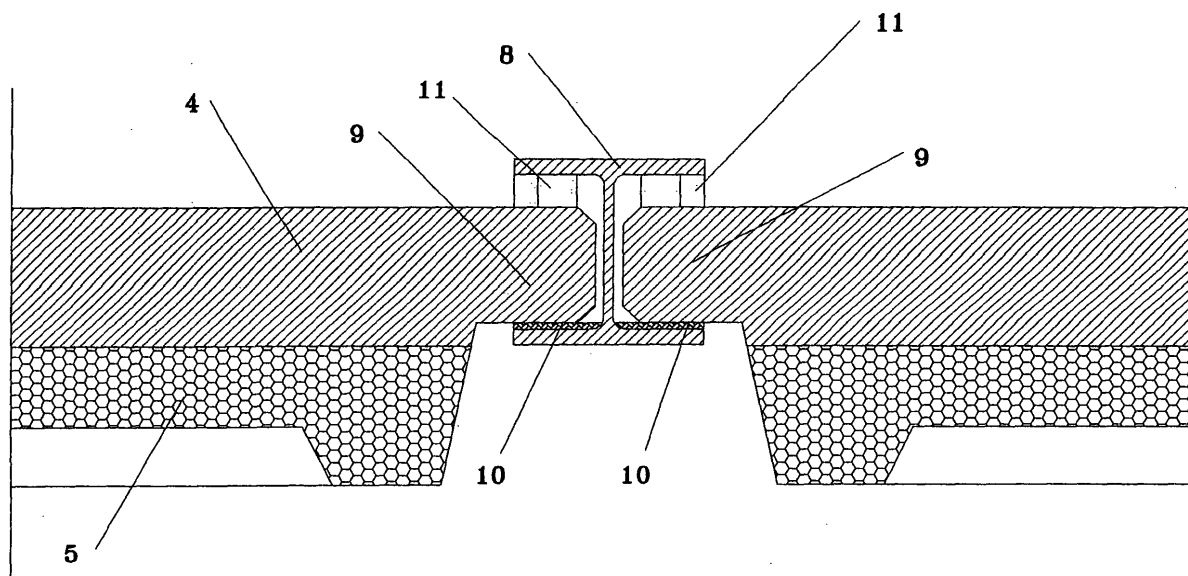


Fig. 6

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Description

[0001] This invention relates to a panel designed to be used to manufacture soundproof walls and barriers such as the type installed by the side of roads, viaducts and the like, which said panel comprises a layer of reinforced concrete with a covering consisting of a layer of concrete made of light material, in particular pumice, shaped on the surface so as to form a plurality of rhomboidal figures inside one another.

[0002] This solution increases the ability of the panels to limit the passage and spread of noise, and the resulting product is easy to work, and simple and cheap to make.

[0003] The configuration of the surface maximises the acoustic performance of the panel, enhancing the intrinsic properties of the material used to make the mix.

[0004] In order to protect conurbations crossed by roads, railways and the like from noise, soundproofing barriers consisting of a plurality of panels positioned at the sides of the road or railway are used to limit the noise produced by vehicles by absorbing it or reflecting it towards the road.

[0005] As a result of a well-known physical principle, in the case of aircraft noise the greater the mass of the barrier used to prevent the passage of noise, the more efficient the soundproofing will be.

[0006] However, this characteristic conflicts with the need to make products which are lightweight, thin, attractive and of limited cost.

[0007] The use of simple, thick concrete panels is therefore often unsuitable.

[0008] Panels are also known in which the surface facing the noise source features irregular patterns, so that the noise reflected by those panels is attenuated to some extent.

[0009] These panels are made with a concrete mix in which the aggregates consist of light material such as expanded clay or similar materials.

[0010] The industry is constantly seeking new materials and solutions that improve the performance of these panels which, however effective they may be, could be further perfected.

[0011] The present invention, which was developed against this background, relates to a panel for the manufacture of soundproof barriers that comprises a first supporting layer made of concrete, bonded to a covering layer of suitable thickness made of a soundproofing material, in particular a monogranular pumice-based mix, generally having a particle size of between 5 and 15 mm.

[0012] This panel surface is worked to produce patterns constituted by a series of diamond shapes inside one another and a series of parallel ridges outside the said diamond shapes, which said patterns cover the entire panel surface.

[0013] Various laboratory tests and experiments conducted by the applicant have demonstrated that this panel presents better sound-absorption characteristics

than the panels currently known.

[0014] This invention will now be described in detail, by way of example but not of limitation, by reference to the annexed figures in which:

- figure 1 is a view showing a section of soundproofing barrier made with the panels in accordance with the invention;
- figure 2 shows two adjacent panels;
- figure 3 is a view of a panel in accordance with the invention;
- figures 4 and 5 are cross-sections along lines A-A and B-B of the panel shown in figure 3 respectively;
- figure 6 is the horizontal section of a pair of adjacent panels showing the joint between them.

[0015] As shown in figure 1, a soundproofing barrier indicated as 1 is formed by a plurality of panels 2 arranged side by side and joined by metal structural sections 3 or the like.

[0016] These panels (see figure 6) consist of a supporting layer 4 made of reinforced concrete on which a second layer 5 made of lightweight concrete, in particular pumice-based concrete, is laid.

[0017] In addition to acting as the support for layer 5, layer 4 also exerts an efficient soundproofing effect.

[0018] The noise not absorbed by layer 4 is in any event attenuated and absorbed by pumice layer 5.

[0019] In accordance with one characteristic of the invention, the said layer 5 is shaped with a plurality of ridges or grooves that form a pattern, shown in detail in figure 3.

[0020] In particular, on surface 5 the panel presents a pattern consisting of a plurality of diamond shapes 6 arranged inside one another. Pattern 6 is formed by ridges, the outer ones of which join other ridges 7 that run parallel to the long sides of the panel.

[0021] Laboratory tests conducted by the applicant demonstrate that the best results are obtained with panels having a load-bearing layer some 12 centimetres thick joined to a layer of equal thickness made of light concrete presenting a pattern of grooves, the said light concrete being made from a mix containing light aggregates with high open porosity and a mainly "coarse" particle size (excluding fines), in particular a monogranular pumice mix having a particle size of between 5 and 15 millimetres, with the addition of fluidifier and possibly dyes.

[0022] In order to install the panels used to construct the soundproof barrier, a suitable foundation is first made with uprights to support the panels, after which the panels are inserted side by side along the said uprights.

[0023] In particular, as shown in figure 6, the said uprights consist of H-shaped structural sections 8, between the arms of which the terminal edges of the load-bearing concrete layer of the panel are inserted.

[0024] A layer of elastic filling material 10, in particular

neoprene, will be advantageously inserted between the arms of structural section 8 and the edge of the panel inserted into the structural sections, and a layer of sealant 11, preferably a silicone sealant, on the opposite side.

[0025] The acoustic properties of a barrier made with the panels in accordance with the invention have been tested in the laboratory.

[0026] A specimen consisting of a portion of soundproofing barrier measuring 345 by 285 centimetres, installed on the floor, was tested to evaluate the sound absorption.

[0027] The tests were conducted in accordance with the requirements of standards EN1793-1:1997 and EN1793-3:1997.

[0028] The results are set out in table A, which shows the trend of the sound absorption coefficient for thirds of an octave.

[0029] The same specimen, installed vertically on the floor, was used for the test of soundproofing power, which was conducted in accordance with the procedures laid down in standards EN1793-2:1997 and EN1793-3:1997.

[0030] The test environment consisted of two chambers, one of which contained the noise source, the said chambers being separated by the test panel.

[0031] The sound pressure level at various frequencies in the interval between 100 Hz and 5000 Hz was recorded in both chambers, and the soundproofing power was then calculated.

[0032] The results are set out in the annexed Table B.

[0033] The test results confirm that the panel in accordance with the invention possesses noise protection properties superior to those of the panels currently known.

[0034] Another advantageous feature is the modular vertical and horizontal flexibility of the panels in accordance with the invention which, associated with the possibility of combining the groove patterns in various ways, solves a number of design and appearance problems.

[0035] An expert in the field could also devise various modifications and variations, all of which should be deemed to fall within the scope of this invention.

load-bearing layer of concrete.

3. Panel for the manufacture of soundproofing barriers as claimed in claim 2, in which the mix is made from light aggregates with high open porosity and a mainly "coarse" particle size (excluding fines).
4. Panel for the manufacture of soundproofing barriers as claimed in claim 2, in which the pumice used in the mix has a particle size of between 5 and 15 millimetres.
5. Panel for the manufacture of soundproofing barriers as claimed in each of the preceding claims, **characterised in that** the outermost sides of the diamond shapes in the pattern are extended towards the outside in a direction parallel to one side of the panel.
6. Panel for the manufacture of soundproofing barriers in accordance with the preceding claims, **characterised in that** it includes a layer of concrete bonded to a layer of lightweight pumice-based concrete covering, the surface of which said covering layer presents a pattern of diamond shapes arranged inside one another.

Claims

1. Panel for the manufacture of soundproofing barriers, **characterised in that** it comprises at least one surface made of light concrete, which said surface presents a pattern of diamond shapes arranged inside one another.
2. Panel for the manufacture of soundproofing barriers as claimed in claim 1, **characterised in that** the said lightweight concrete surface is made from a mix based on pumice or light aggregates with high open porosity, which forms a covering applied to a

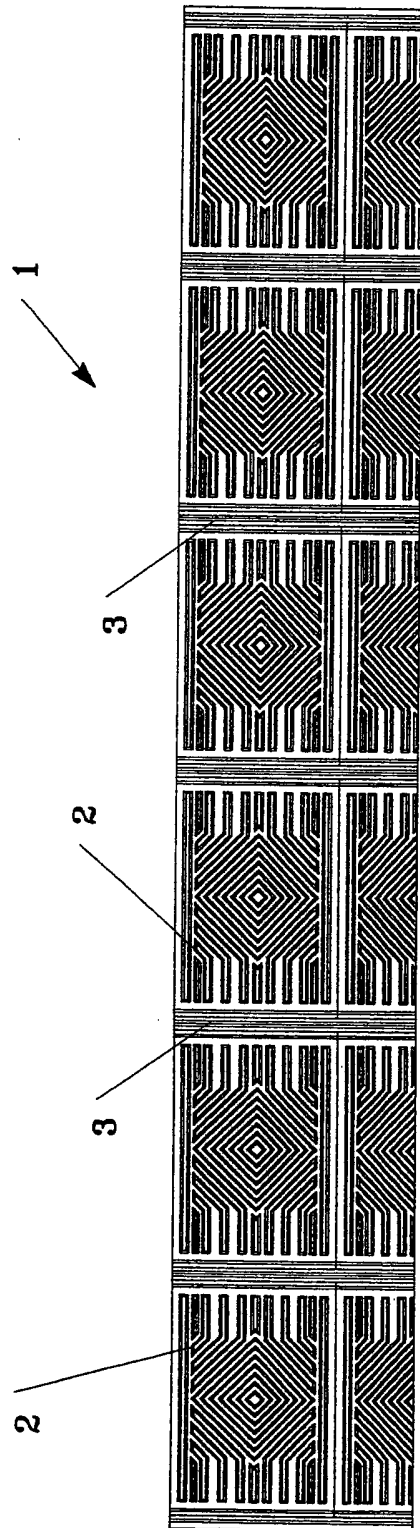


Fig. 1

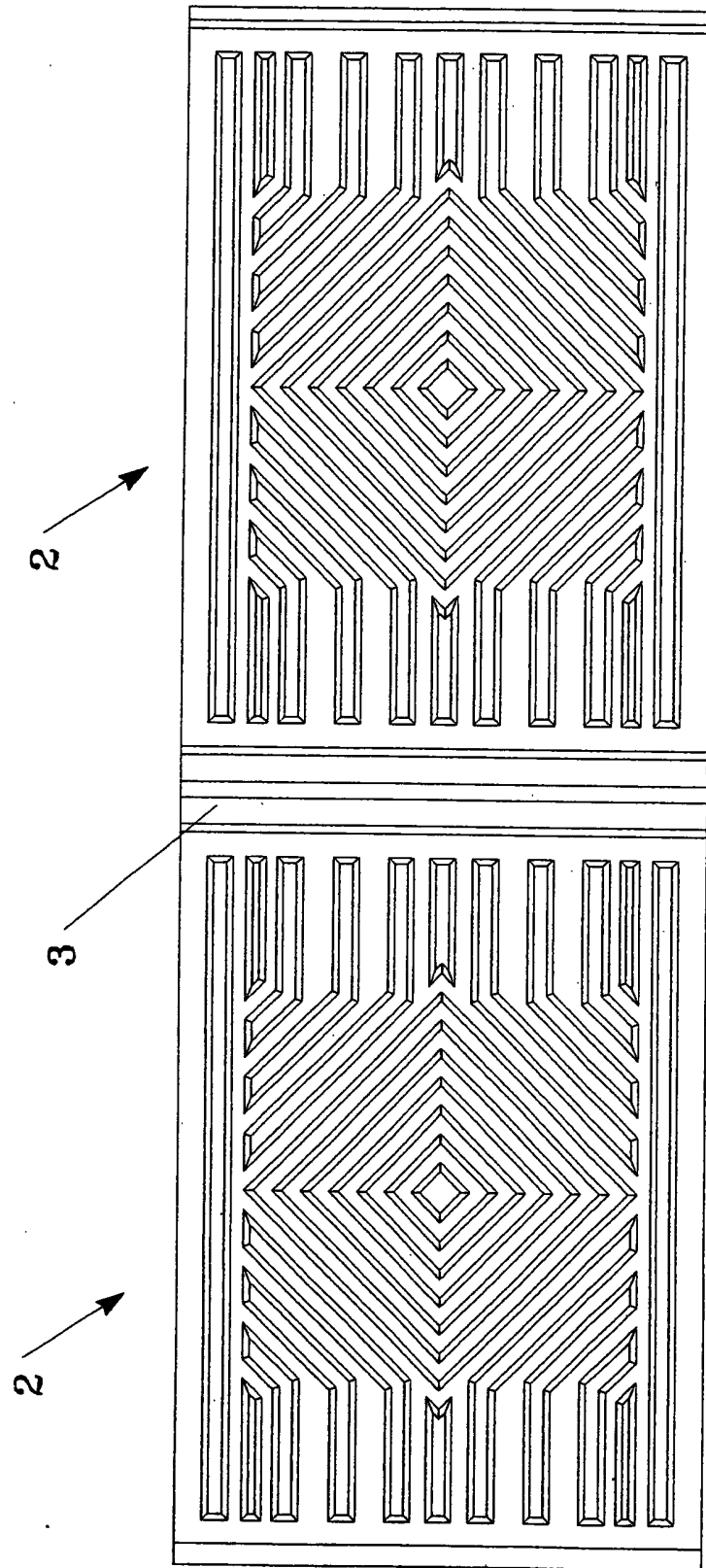
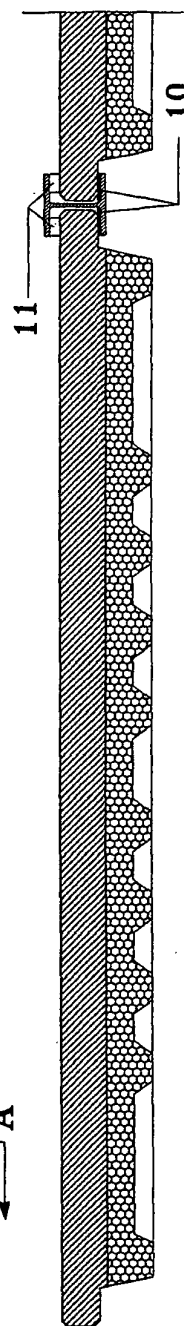
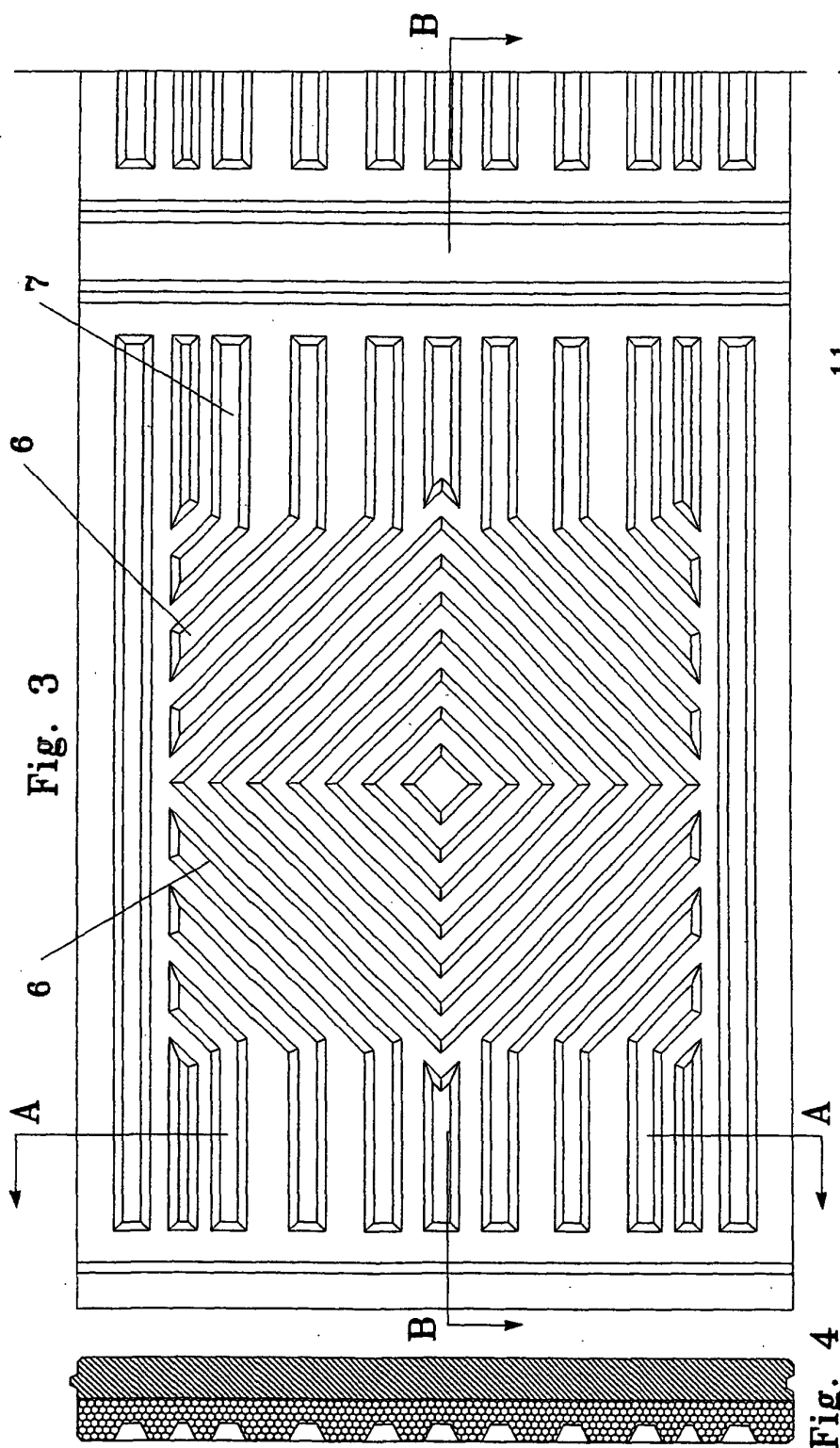


Fig. 2



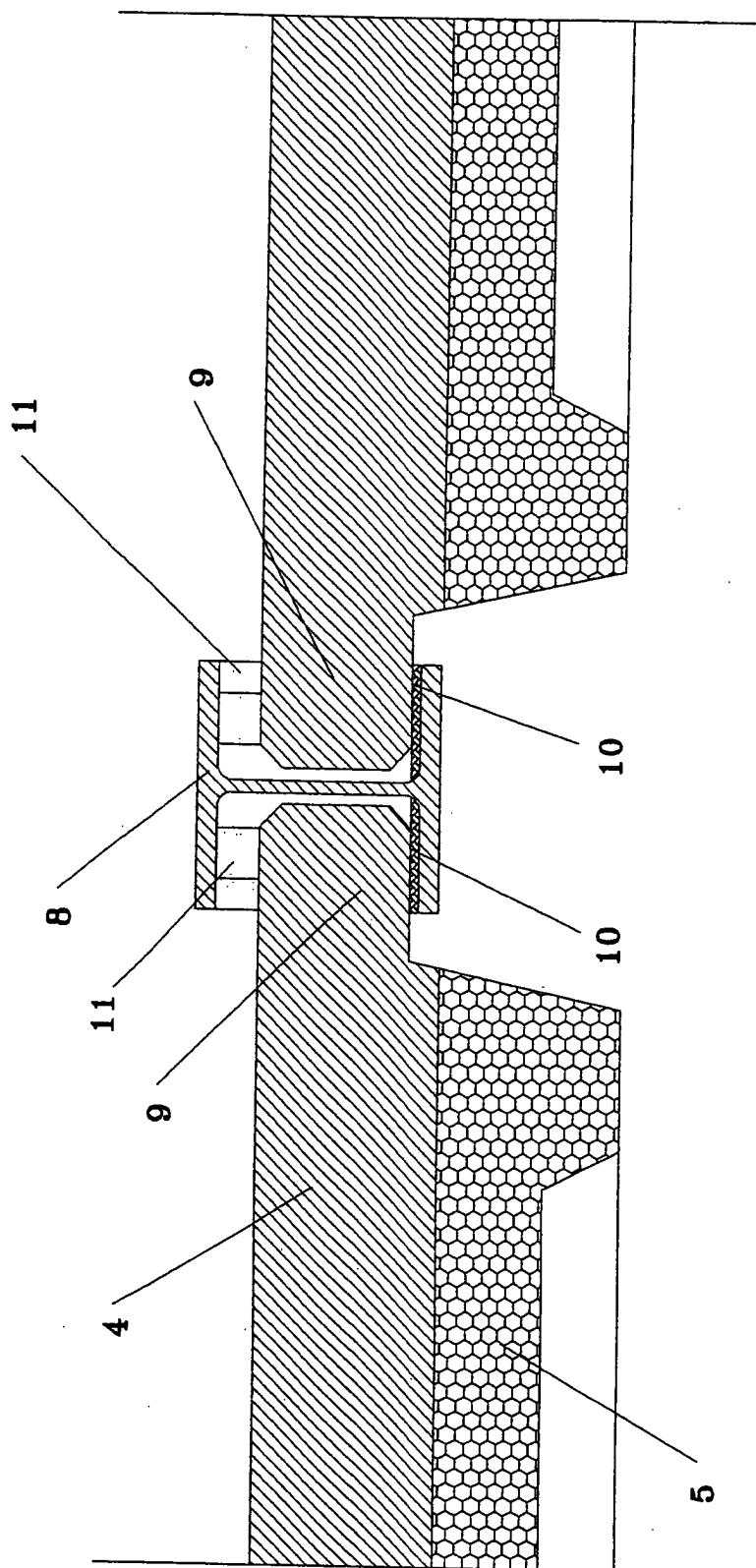
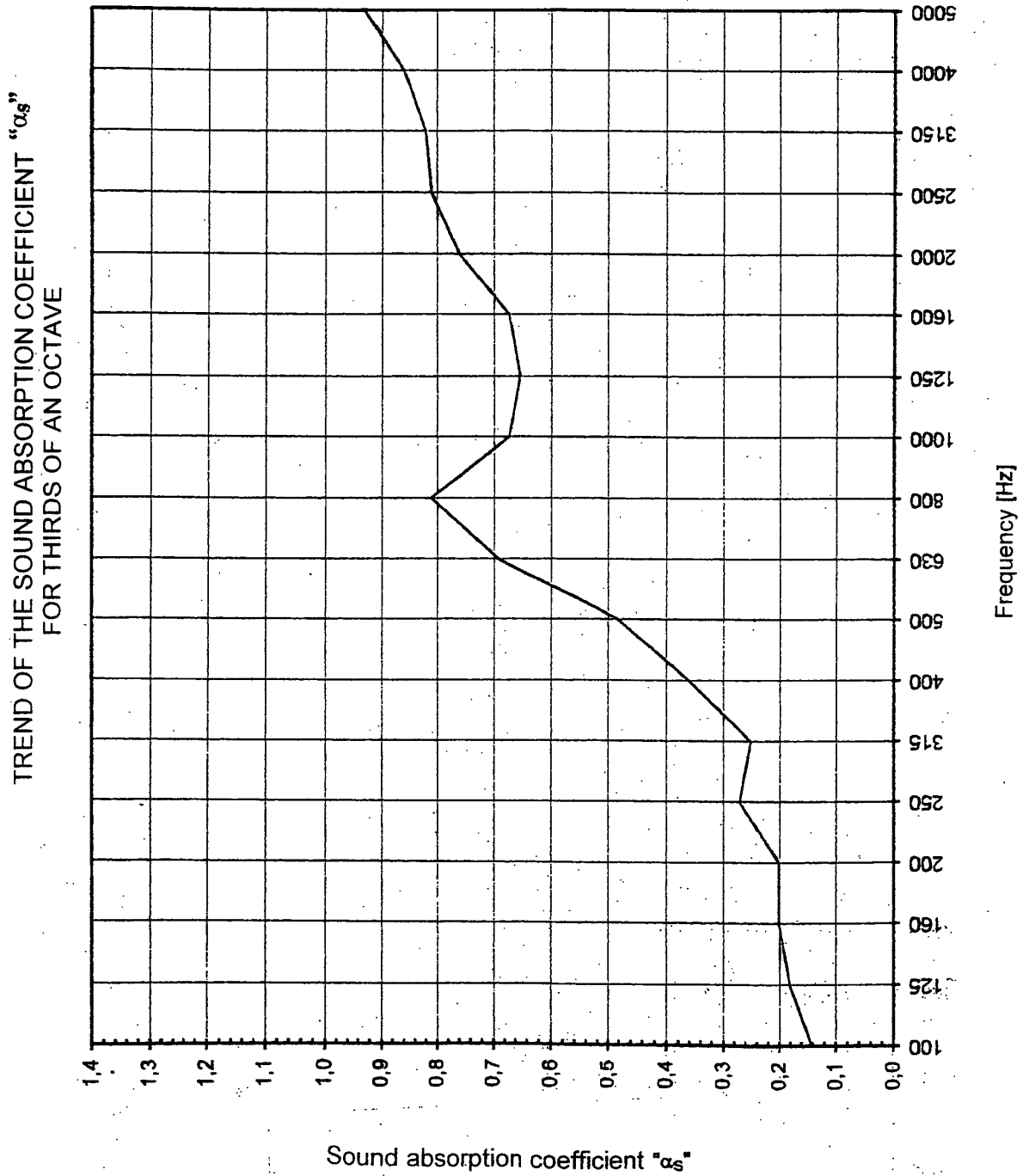


Fig. 6

TAB. A



TAB. B

