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(54) Noise barrier element

(57) Noise barrier element, comprising a first sheet-metal wall (1), which is placed on the side facing toward the noise source and provided with perforations (2), a second sheet-metal wall (3), which is a solid and continuous wall parallel to the first wall (1) and placed at a distance (L) from it so that there is an interior space (4) between the first and second walls, and a piece of noise damping board (5) made of sound absorbing material and disposed in the interior space (4). The noise damping board (5) is glued to the second sheet-metal wall (3).

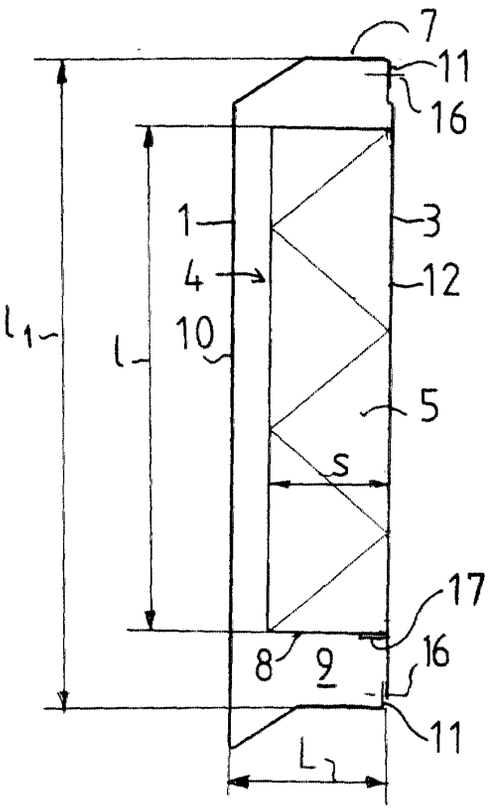

Fig 4

EP 1 148 175 A1

Description

[0001] The present invention relates to a noise barrier element as defined in the preamble of claim 1.

[0002] The invention concerns a noise barrier for obstructing the propagation of traffic noise from traffic routes, and especially a noise barrier element used to construct such a noise barrier. The noise barrier element comprises a first sheet-metal wall, i.e. a front wall, which is the wall facing toward the noise source and is provided with perforations. In addition, the element comprises a second sheet-metal wall, i.e. a back wall, which is a solid and continuous wall parallel to the first wall and spaced from it by an interior space between the first and second walls. Noise damping material is provided in the interior space between the walls. This type of noise barrier elements are known e.g. from specifications FI 92342 B, CH 672 932, EP 0 527 115 A1 and WO 98/58127.

[0003] A problem with previously known noise barrier elements is that that they contain various kinds of supporting structures for keeping the noise damping material in a desired position inside the element, which leads to a high price and a complexity of the elements. In specification FI 92342 B, the element comprises a pipe or equivalent placed between a mineral wool layer used as noise damping material and the bottom wall of the element, said pipe supporting the noise damping mineral wool. A problem with such a solution is that, with time, the mineral wool sinks to the bottom of the element, with the result that the noise damping capacity of the element is reduced. The mineral wool also has to be kept clear of contact with the perforated front wall so that the wool filling remains separated by a small distance from the front wall, because otherwise the wool would absorb water directly through the perforations, the wool would be exposed and susceptible to being torn by birds, there would be no ventilation inside the element and no space to allow for expansion resulting from freezing of the water absorbed by the wool. To this problem, FI 92342 B provides a solution in which the small sheet-metal portions (punchings) remaining after the perforations have been made in the front wall are left sticking to the front wall and pointing toward the inside of the element. The problem with this solution is that the sharp-edged punchings are an impediment to the handling of the sheet-metal parts during assembly, constituting a work safety risk. In addition, the punchings form a considerable addition to the total area of the structure. If the front wall part is to be completely protected against corrosion on the inside e.g. by applying an anti-corrosion agent on the surface, then a considerable amount of corrosion preventing agent will be spent on corrosion protection of the punchings.

[0004] The object of the invention is to eliminate the above-mentioned drawbacks.

[0005] In particular, the object of the invention is to disclose a noise barrier element having a structure as simple and cheap as possible. A further object of the invention is to disclose a noise barrier element in which the noise damping board is so mounted that it will reliably remain in a desired position inside the element.

[0006] The noise barrier element of the invention is characterized by what is presented in claim 1.

[0007] According to the invention, the noise damping board is fastened to a second sheet-metal wall with glue.

[0008] The invention has the advantage that the noise damping board does not require any other support besides being glued on one side to the second sheet-metal wall.

[0009] In an embodiment of the noise barrier element, the thickness of the noise damping board is less than the distance between the first and second sheet-metal walls.

[0010] In an embodiment of the noise barrier element, the noise damping board consists of mineral wool or fiberglass board.

[0011] In an embodiment of the noise barrier element, the noise barrier element comprises a bottom wall and a top wall, both extending between the first and second sheet-metal walls. The width of the noise damping board has been fitted to be substantially smaller than the distance between the bottom wall and the top wall. The noise damping board is so disposed that an intermediate space is formed between the lower edge of the noise damping board and the bottom wall.

[0012] In an embodiment of the noise barrier element, the box-like frame of the noise barrier element consists of a sheet-steel front part facing toward the noise source and bent into a substantially C-shaped profile and a mainly planar back plate. The front part comprises a perforated first sheet-metal wall, a bottom wall and a top wall and, at its longitudinal edges, mounting flanges parallel to and directed toward each other. The back plate forms the aforesaid second sheet-metal wall and is fastened by its longitudinal edges to the mounting flanges.

[0013] In an embodiment of the noise barrier element, the box-like frame of the noise barrier element has been formed from high-strength sheet steel, so the weight of the element can be reduced by as much as 25% as compared with prior-art elements.

[0014] In the following, the invention will be described by the aid of a few examples of its embodiments with reference to the attached drawing, wherein

Fig. 1 presents a noise barrier with noise barrier elements according to the invention, seen from the side facing toward the noise source,

Fig. 2 presents a section taken along line II-II in Fig. 1,

Fig. 3 presents an axonometric view of an embodiment of the noise barrier element of the invention with the front part and the back plate detached from each other, and

Fig. 4 presents a cross-section of the noise barrier element in Fig. 3.

[0015] Fig. 1 shows a stretch of a noise barrier, and Fig. 2 shows a cross-section of it. The noise barrier comprises a base 13 mounted in the ground and columns 14 fastened to the base and placed at a distance from each other. Elongate rectangular noise barrier elements 15 absorbing and reflecting traffic noise have been arranged one upon the other and fastened by their ends to the columns 14.

[0016] Figures 3 and 4 illustrate the structure of the noise barrier element 15. The noise barrier element 15 comprises a first sheet-metal wall 1, which is the wall placed on the side facing toward the noise source and is provided with perforations 2. The second sheet-metal wall 3 is a solid and continuous wall parallel to the first wall and placed at a distance L from it, so that an interior space 4 is formed between the first and second walls. Placed in the interior space 4 is a piece of noise damping board 5 made of sound absorbing material. The noise damping board 5, which may be a piece of mineral wool or fiberglass board, is glued fast on the second sheet-metal wall 3. Moreover, the element comprises a bottom wall 6 and a top wall 7 extending between walls 1 and 3. The top and bottom walls additionally have a complementary shape with respect to each other so that, when placed one upon the other, the elements 15 will be guided into a certain position relative to each other, as illustrated in Fig. 2. The width 1 of the noise damping board 5 has been fitted to be substantially smaller than the distance l_1 between the bottom wall 6 and the top wall 7. The noise damping board 5 is glued fast on the second wall 3 so that an intermediate space 9 is formed between the lower edge 8 of the noise damping board 5 and the bottom wall 6. The thickness s of the noise damping board 5 is smaller than the distance L between the first and second walls.

[0017] The casing of the noise barrier element consists of two parts, a sheet-metal front part 10 placed on the side facing toward the noise source and bent into a C-shaped profile, comprising a perforated first sheet-metal wall 1, a bottom wall 6, a top wall 7 and, at the longitudinal edges, mounting flanges 11 parallel to each other and directed toward each other, and a planar back plate 12 forming the aforesaid second sheet-metal wall 3, which is fastened by its longitudinal edges to the mounting flanges 11 e.g. via bolted joints 16. The box-like frame is preferably formed from high-strength sheet steel, in which case its wall thickness may be very small and the weight of the element may be as much as 25% smaller than that of previously known elements.

[0018] The invention is not restricted to the examples of its embodiments described above; instead, many variations are possible within the scope of the inventive idea defined in the claims.

Claims

1. Noise barrier element, comprising

- a first sheet-metal wall (1), which is placed on the side facing toward the noise source and provided with perforations (2);
- a second sheet-metal wall (3), which is a solid and continuous wall parallel to the first wall (1) and placed at a distance (L) from it so that there is an interior space (4) between the first and second walls;
- a bottom wall (6) and a top wall (7), extending between the first and second sheet-metal walls and defining the interior space in the upward and downward directions, and
- a noise damping board (5) made of sound absorbing material, disposed in the interior space (4) and fastened to the second sheet-metal wall (3) with glue,

characterized in that the width (1) of the noise damping board (5) has been fitted to be substantially smaller than the distance (l_1) between the bottom wall and the top wall; and that the noise damping board (5) is so disposed in the interior space of the element that an intermediate space (9) is formed between the lower edge (8) of the noise damping board (5) and the bottom wall (6).

2. Element as defined in claim 1, **characterized in that** the thickness (s) of the noise damping board (5) is smaller than the aforesaid distance (L).

3. Element as defined in claim 1 or 2, **characterized in that** the noise damping board (5) consists of mineral wool or fiberglass board.

4. Element as defined in any one of claims 1 - 3, **characterized in that** the box-like frame of the noise barrier element consists of:

- a sheet-steel front part (10) facing toward the noise source and bent into a substantially C-shaped profile, said front part comprising the aforementioned perforated first sheet-metal wall (1), bottom wall (6) and top wall (7) and, at its longitudinal edges, mounting flanges (11) parallel to and directed toward each other; and
- a substantially planar back plate (12) forming the aforementioned second sheet-metal wall (3) and fastened by its longitudinal edges to the mounting flanges (11).

5. Element as defined in any one of claims 1 - 4, **characterized in that** the box-like frame of the noise barrier element has been formed from high-strength sheet steel.

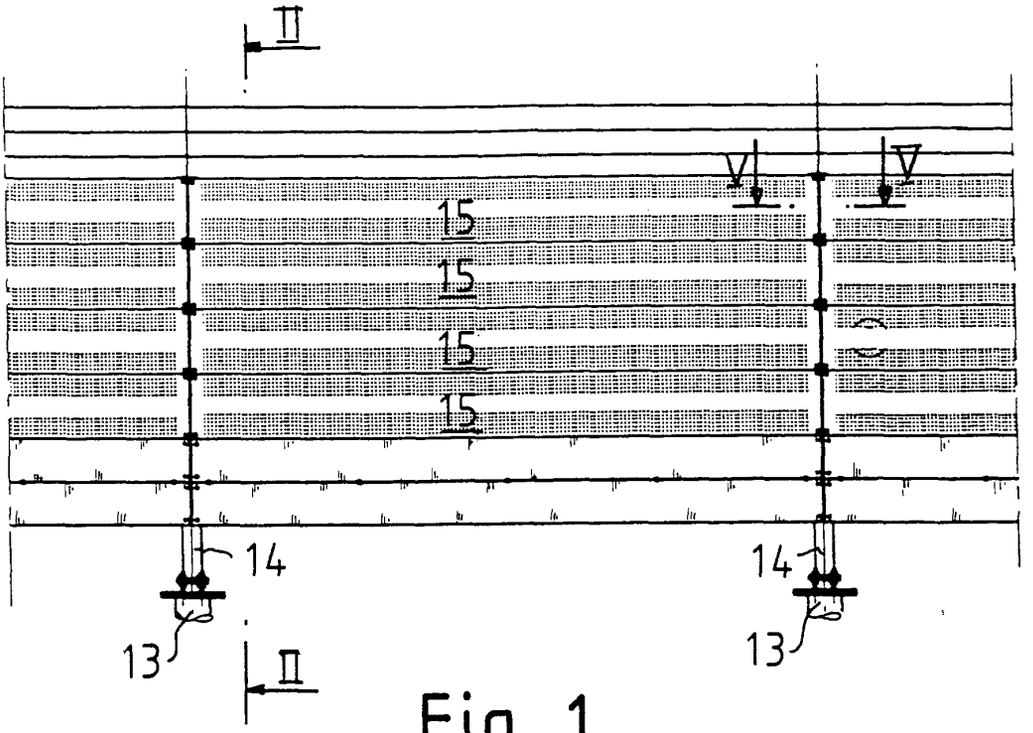

Fig 1

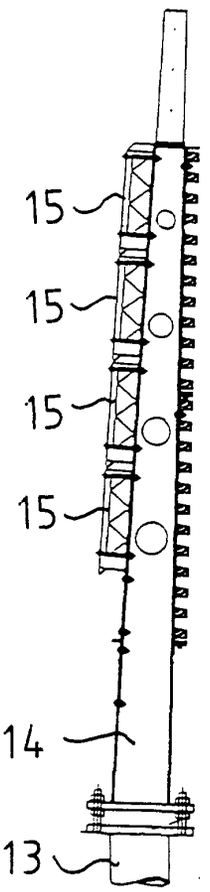

Fig 2

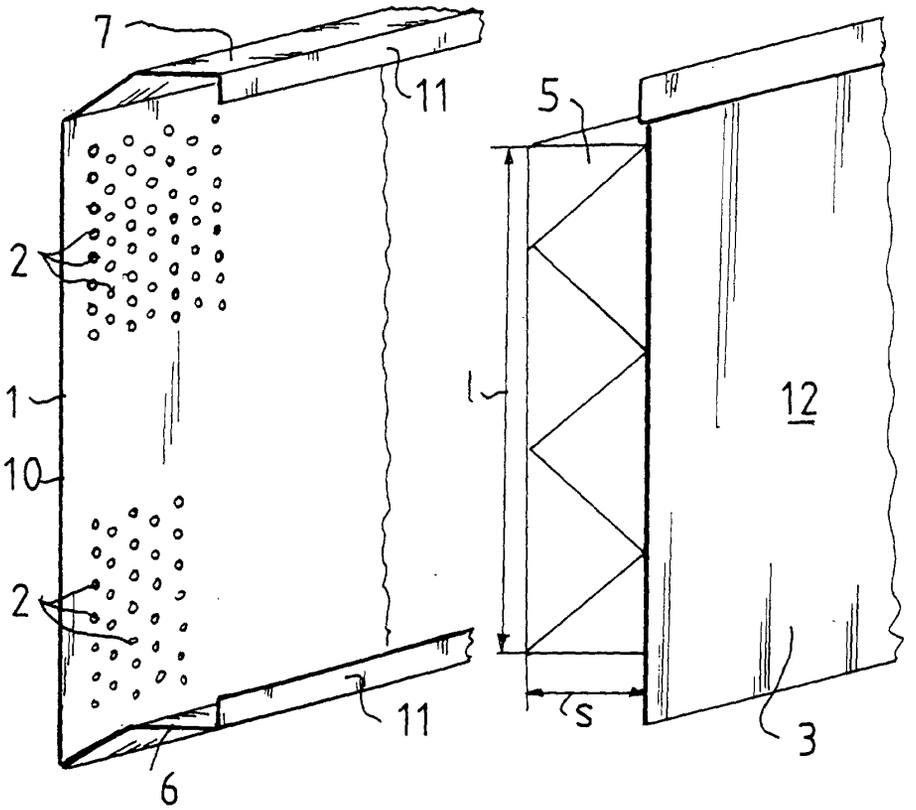

Fig 3

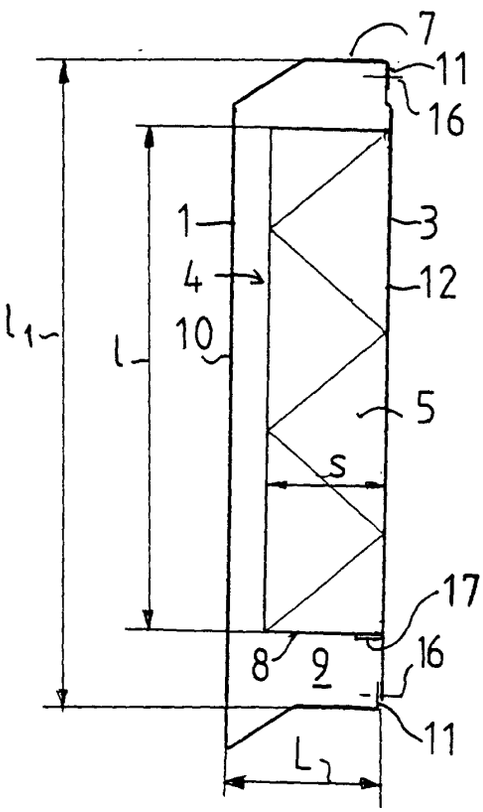

Fig 4

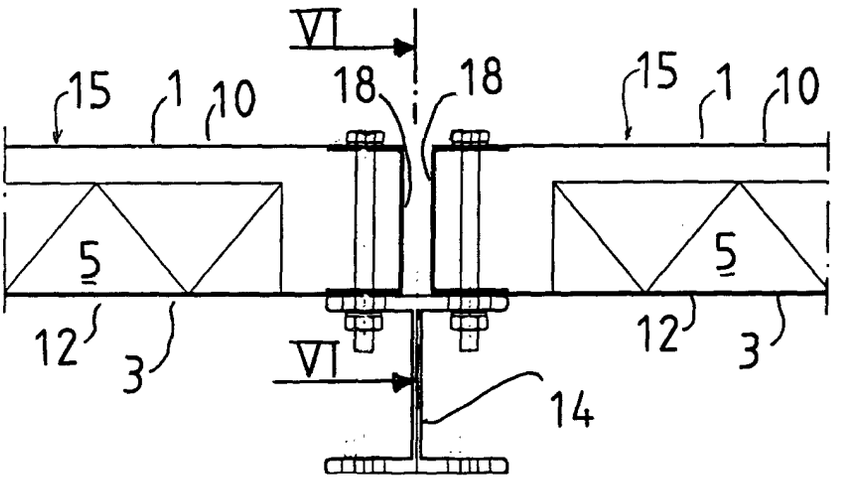

Fig 5

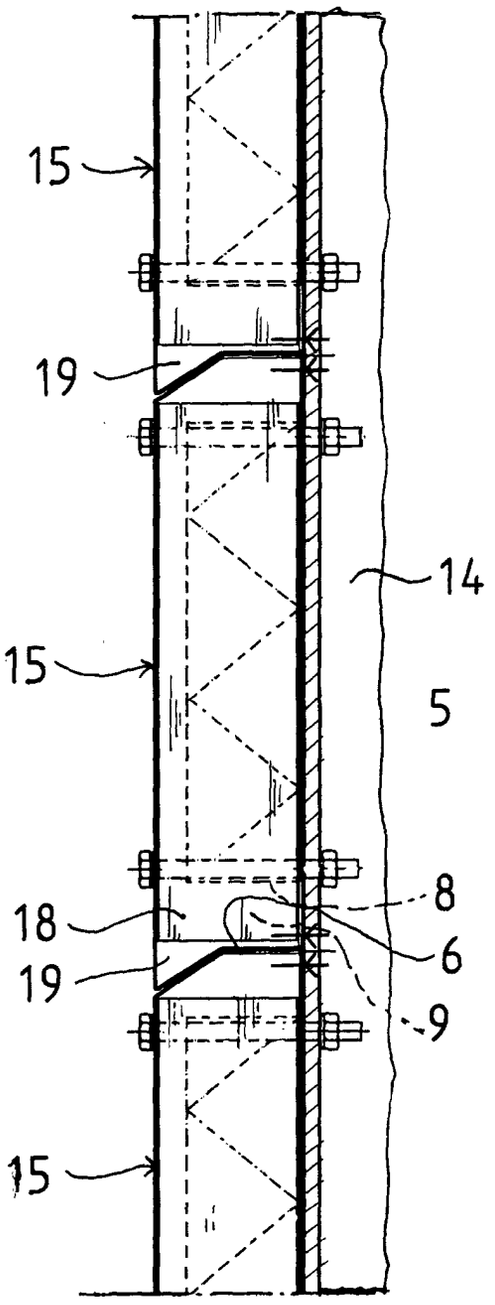

Fig 6

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 66 0069

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Y	GB 2 305 451 A (LIONWELD KENNEDY LIMITED) 9 April 1997 (1997-04-09) * page 7, line 21 - page 9, line 3; figures 7,8 *	1-5	E01F8/00
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			E01F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	26 June 2001	Mysliwetz, W

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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
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