(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 916 338 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
30.04.2008 Bulletin 2008/18

(51) Int Cl.:
E01F 8/00 *(2006.01)* ***E02D 29/02*** *(2006.01)*

(21) Application number: **06022356.7**

(22) Date of filing: **25.10.2006**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

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(54) Self-supporting soundproofing and retaining prefabricated concrete panel

(57) This invention relates to a self-supporting prefabricated concrete panel designed for use in the construction of road and motorway barriers, which said panel simultaneously performs a soundproofing function and a road embankment retaining function.

More particularly, the panel according to the invention comprises a foot or base to be anchored to a foundation structure and an upright part which comprises a lower structure designed to act as a retaining wall for the road embankment, and an upper structure designed to project from the roadbed which is constructed in such a way as to have sound-absorbing and soundproofing characteristics.

The panel according to the invention takes up a minimal amount of space, with the result that it is particularly suitable for use in all cases in which there is little working space available, as in the case of road-widening work or the addition of a motorway lane.

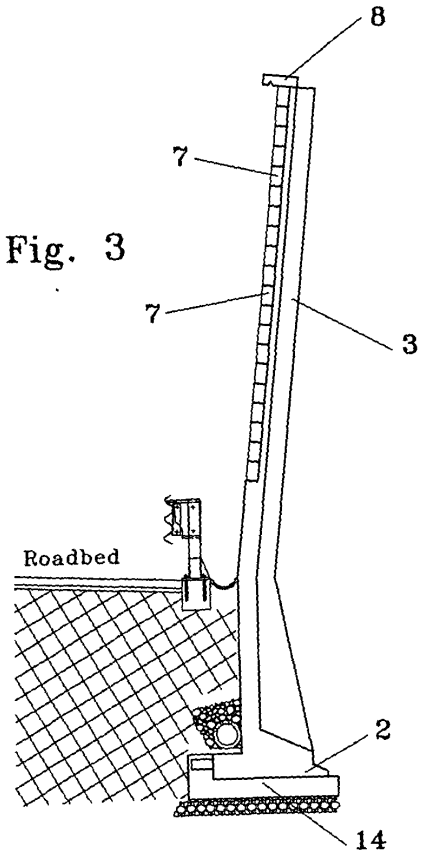


Fig. 3

EP 1 916 338 A1

Description

[0001] This invention relates to a self-supporting prefabricated concrete panel designed for use in the construction of road and motorway barriers, which said panel simultaneously performs a soundproofing function and a road embankment retaining function.

[0002] More particularly, the panel according to the invention comprises a foot or base to be anchored to a foundation structure and an upright part which comprises a lower structure designed to act as a retaining wall for the road embankment, and an upper structure designed to project from the roadbed which is constructed in such a way as to have sound-absorbing and soundproofing characteristics.

[0003] The panel according to the invention takes up a minimal amount of space, with the result that it is particularly suitable for use in all cases in which there is little working space available, as in the case of road-widening work or the addition of a motorway lane.

[0004] The invention relates to the sector of prefabricated reinforced concrete structures and, more particularly, to the sector of structures used for road works.

[0005] The continual increase in traffic causes considerable noise pollution, especially in the case of roads which run through or close to residential areas.

[0006] The increased speed of vehicles and the large number of heavy goods vehicles causes considerable disturbance to those who live close to such roads; as a result, suitable soundproofing barriers have been installed in recent years at the sides of roads which run close to residential areas.

[0007] Said barriers usually consist of prefabricated panels of various shapes and types.

[0008] Panels made entirely of concrete with a covering of sound-absorbing material are used in some cases, and panels in which the wall consists of a transparent material, especially plastic, are used in other cases.

[0009] These known panels are designed to be fitted to supporting structures such as pillars, uprights and the like which have their own foundations and are positioned at the roadside, or are self-supporting, ie. have a support base or foot, and are always designed to be positioned at the side of a road.

[0010] When road-widening work is performed, e.g. by adding a lane, and the available space is limited because the road embankment cannot be widened excessively, retaining walls must be built at the sides of the road to support the embankment.

[0011] According to the state of the art, the embankment retaining wall is built first, then the road is built, and panels that form soundproofing barriers are erected at the sides of the road.

[0012] This procedure is rather laborious, and takes up a great deal of time.

[0013] The present invention, which falls into this sector, provides self-supporting prefabricated panels which, due to their particular configuration, can act simultaneously as an embankment retaining wall and a soundproofing barrier.

[0014] In particular the panels have a foot designed to be connected to a foundation structure constructed *in situ,* a first lower section dimensioned to form an embankment retaining wall, and an upper part, projecting from the roadbed, which is thinner and made of or covered with sound-absorbing material. The part above ground can have an inclination of up to 10% from the vertical, so as to limit the "tunnel effect" on vehicle drivers.

[0015] The panel thus obtained is very practical, takes up little space, and is easier to instal than the solution which involves a separate retaining wall and soundproofing barrier.

[0016] This invention will now be described in detail, by way of example but not of limitation, by reference to the annexed drawings, wherein:

- figure 1 is a perspective view of a panel according to the invention, installed, showing part of the road embankment in cross-section;
- figure 2 is a perspective view of a panel shown from the back;
- figure 3 is the side view of a panel according to the invention;
- figure 4 is the view from above of a panel according to the invention;
- figures 5 and 6 show two possible types of soundproof coverings to be fitted to the panel according to the invention, in perspective view and front view respectively.

[0017] As shown in the annexed figures, the panel according to the invention comprises a foot or base 1 on which stands a wall 2 connected, at the sides, to a pair of ribs 3.

[0018] The structure as a whole forms a prefabricated panel, made of reinforced concrete, which is substantially divided into two parts: a lower part, shown as 4, designed to act as retaining wall for the road embankment, and an upper part, shown as 5, designed to act as a soundproofing barrier.

[0019] More particularly, in the lower part of the panel, together with suitable steel reinforcement, the dimensions of ribs 3 will be larger, and the concrete wall may be thicker, whereas in the upper part ribs 3 have a smaller cross-sectional area, and the panel wall is made of material with sound-absorbing and soundproofing characteristics.

[0020] For example, as shown in figures 1 and 3, the upper part of the panel may have a wall 6 with reduced thickness, covered with a set of panels or blocks 7 made of a suitable material, such as expanded clay, designed to absorb the noise produced by road traffic.

[0021] The upper part will present a ledge 8 fitted with a gutter 9, and the foot of the panel may project forwards with a section 10 of suitable dimensions, in order to increase the stability of the structure and form a support

surface on which pipes 11 or the like can be laid.

[0022] If required, the wall of the upper part of the panel could consist wholly or partly of a pane 12 made of transparent material, such as a pane made of polymethylmethacrylate or the like.

[0023] The barrier is constructed as follows.

[0024] Oversite concrete 13 is laid, then a foundation 14 is constructed *in situ,* to form a surface on which the panels can be installed.

[0025] The panels are installed side by side on foundation 14 and consolidated with an additional casting, and drainage pipes 11 (if any) are laid; the road embankment can then be filled and the road paved and completed with kerbs, guard-rails and everything else required.

[0026] The thrust of the embankment will be wholly absorbed by the lower part of panel, which acts as retaining wall, while the upper part, projecting above the road bed, forms the required soundproofing barrier.

[0027] In the projecting part, the panel walls can be made of or covered with panels made of an appropriate material such as expanded clay or other suitable material, or made wholly or partly of transparent panels such as polymethylmethacrylate panels.

[0028] The material used for the panels could also be a material which contains a photocatalytic product, such as a product based on titanium dioxide, which promotes the conversion of the pollutants present in the air, thus preventing blackening of the surface.

[0029] Different forms of embodiment relating to the same solution idea could be devised, all of which should be deemed to fall within the ambit of this invention, as defined by the annexed claims.

Claims

1. Self-supporting prefabricated panel for the construction of road and motorway barriers, **characterised in that** it comprises:

   • a base;
   • a first part, starting from said base, which is designed to act as an embankment-retaining wall;
   • a second part, connected to said first part, which is designed to act as a soundproofing barrier.

2. Panel as claimed in claim 1, wherein said part designed to act as a soundproofing barrier is made of or covered with sound-absorbing material.

3. Panel as claimed in claim 1, **characterised in that** it comprises a wall which has a lower part made of reinforced concrete, with a thickness sufficient to act as an embankment retaining wall, and an upper part made of or covered with sound-absorbing material, which said panel presents supporting and stiffening ribs at the sides which are connected to the support base.

4. Panel as claimed in claim 3, **characterised in that** it includes a ledge with a gutter at the upper edge.

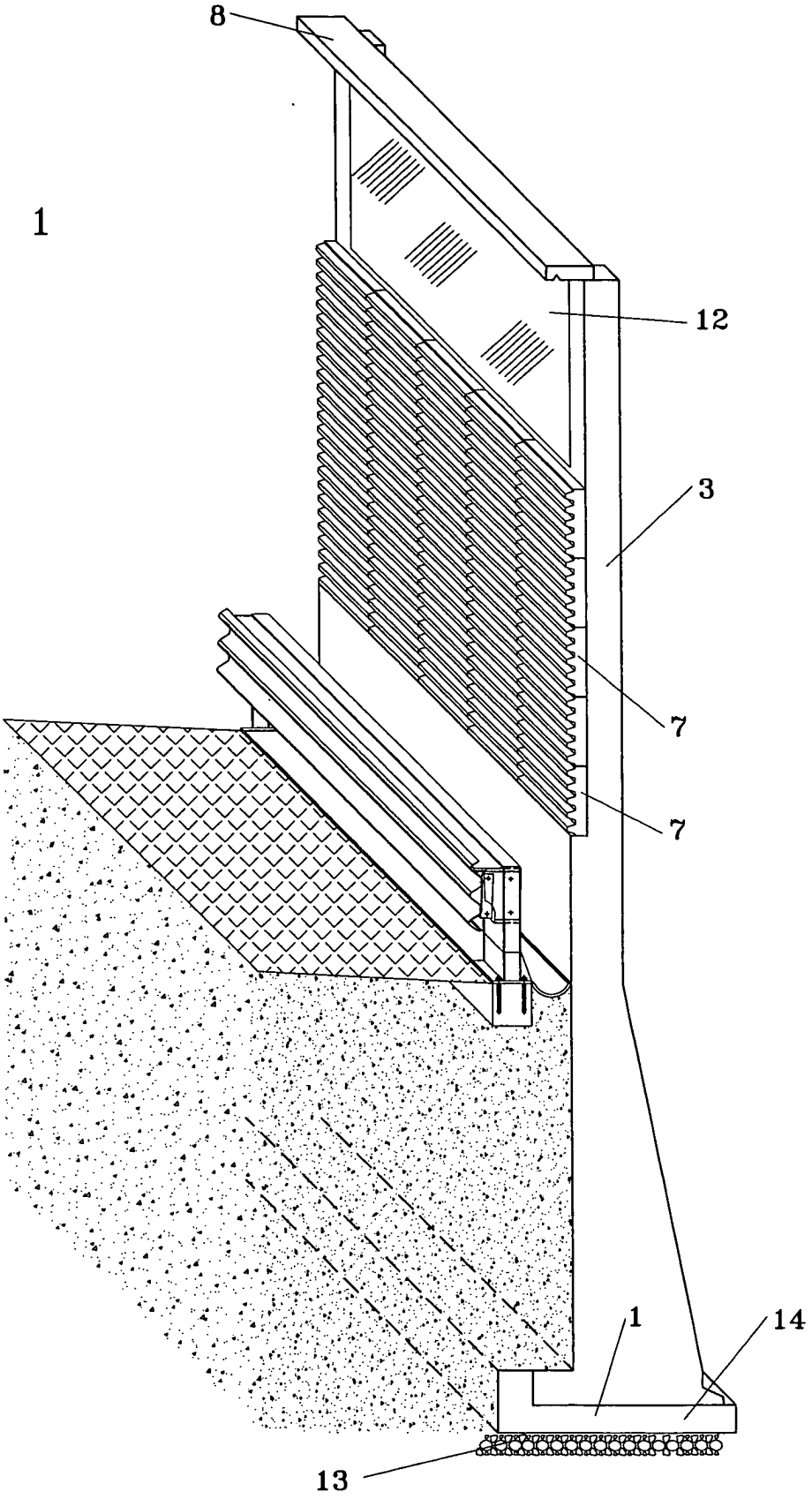
5. Panel as claimed in the preceding claims, **characterised in that** the part which acts as a soundproofing barrier is made wholly or partly of transparent material.

6. Panel as claimed in the preceding claim, **characterised in that** said transparent material is polymethylmethacrylate.

7. Panel as claimed in any of the preceding claims, **characterised in that** the above-ground part is inclined outwards, so as to limit the "tunnel effect" on vehicle drivers.

8. Panel as claimed in the preceding claim, **characterised in that** the above-ground part has an inclination of up to 10% from the vertical.

Fig. 1



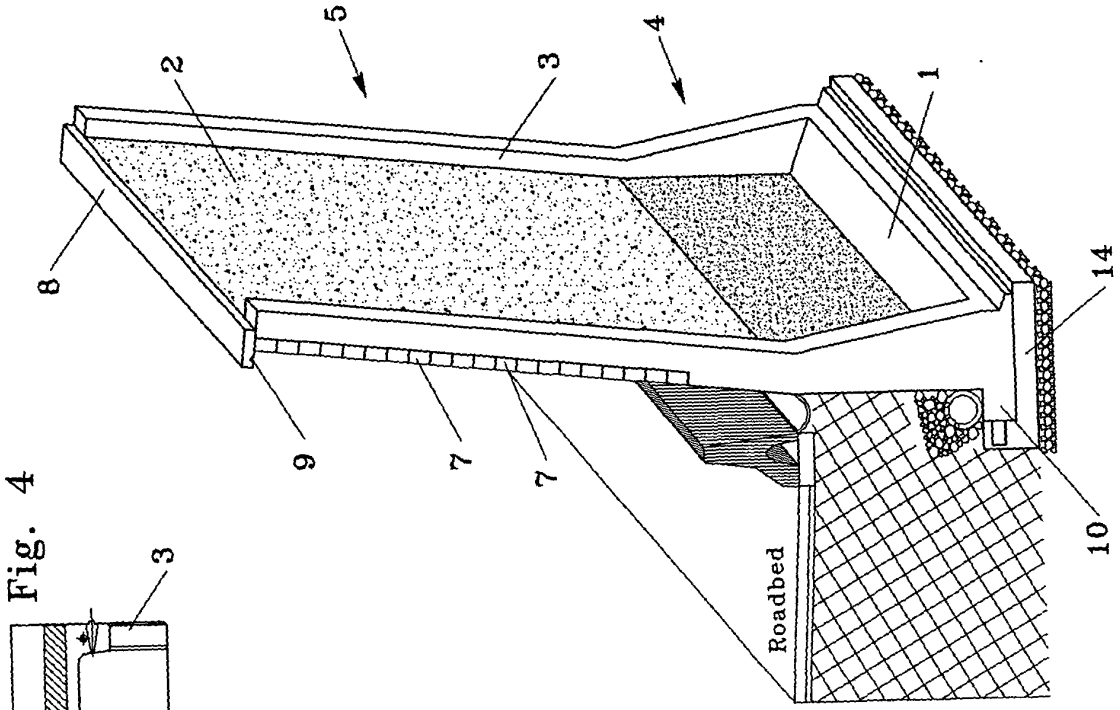


Fig. 2

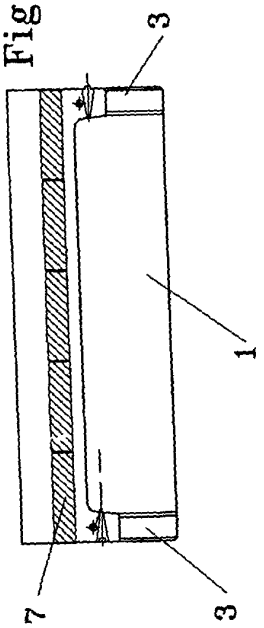


Fig. 4

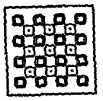


Fig. 6

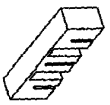


Fig. 5

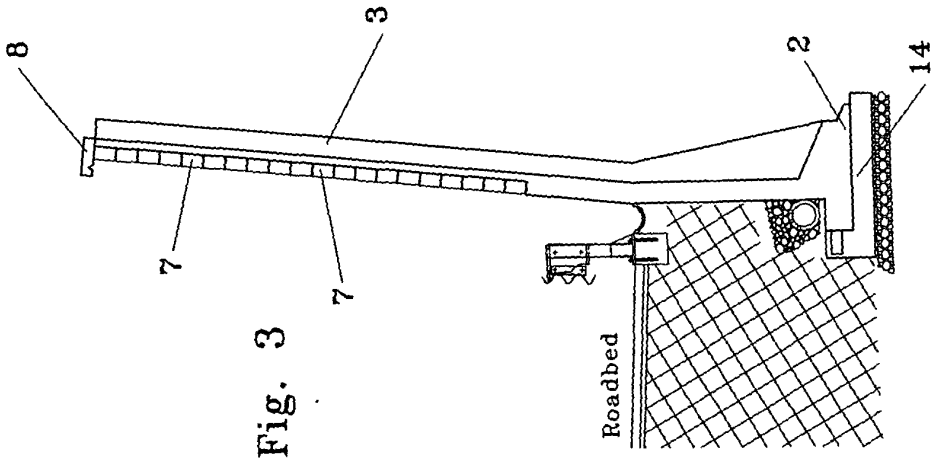


Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 06 02 2356

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	15 December 2006	Tran, Kim-Lien

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

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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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