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(54) **Building closure panel**

(57) Building closure panel, with sound insulation properties, intended to constitute or form part of a roof or a wall, and comprising an outer side formed by a steel or aluminium corrugated sheet (1), designed to provide rigidity to the cover panel in question, and at least one layer of mineral wool (3), as acoustic insulation. Said closure panel comprises, at least, one steel tray panel (2) arranged in a plane parallel to the corrugated sheet (1) and forming the inner side of the cover panel, with at least a first layer and a second layer (4) of mineral wool, between which the first high density synthetic sheet (5) is disposed, being arranged between the corrugated plate (1) and the smooth tray panel (2).

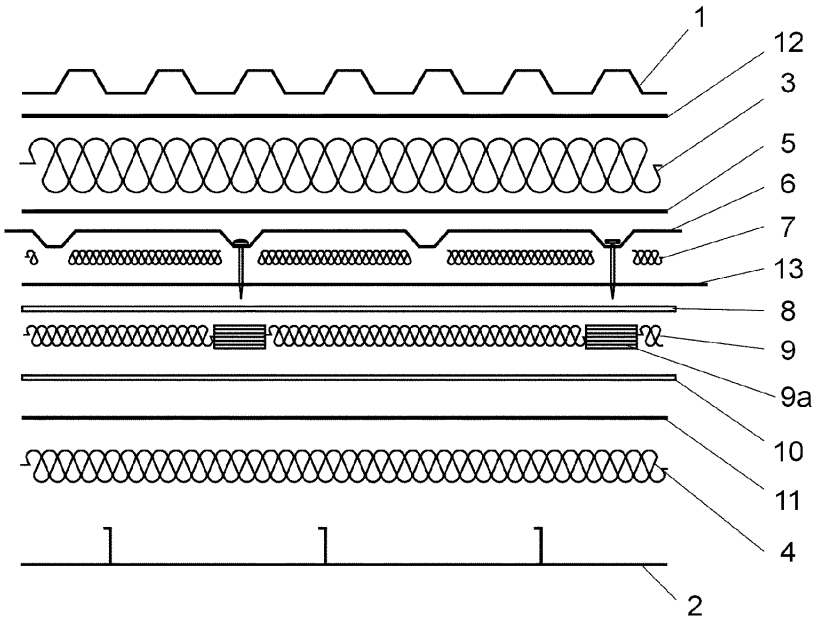

Fig. 4

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Description

Object of the invention.

[0001] The present invention relates to a closure panel for building, with sound insulation properties, intended to constitute or form part of a roof or a wall, and comprising an inner side made of a steel tray panel and an outer side formed by a steel or aluminium corrugated sheet, designed to provide rigidity to the closure panel in question, and at least one layer of mineral wool, as acoustic insulation.

Application field of the invention.

[0002] This invention is applicable in the field of construction and more specifically in the manufacture of closure panels with sound insulation properties for walls and roofs.

Background of the invention.

[0003] Presently, in the construction field, different acoustic panels are known and used and they are intended to be applied on the roof and wall structures so as to achieve a sound insulation and sound reduction between the inside of a room and the outside.

[0004] For example, in document ES 1073124 U an acoustic panel for facades and roofs is described, which adopts the configuration of a panel provided with a top plate of an acoustic insulation material fixed on a frame which constitutes the self-supporting structure of the panel and said panel having below an air chamber and two insulating fibre blocks, with the second block being adhered to a membrane and resting on a second membrane defining a folded edge that surrounds the support frame.

[0005] This type of acoustic panel has very limited resistance due to its composition, and lacks a suitable structure for certain applications, such as the formation of roof covers, closure panels or outside surfaces with insulating properties.

Description of the invention.

[0006] This invention relates to a closure panel for building with sound insulation properties, intended to constitute or form part of a roof or a wall, and comprising an inner side made of a steel tray panel and an outer side formed by a steel or aluminium corrugated sheet designed to provide rigidity to the closure panel in question and at least one layer of mineral wool, as acoustic insulation.

[0007] Said building roof cover has constructive particularities aimed at providing an also metallic inner side to the roof cover, constituted by at least one smooth and continuous tray panel, which, besides reinforcing the roof cover, provides an aesthetically correct finishing to said inner side, which can remain visible without applying any additional coating thereon.

[0008] Another object of the invention is to arrange, between the corrugated sheet conforming the outer surface of the roof cover and the smooth steel tray panel conforming the inner surface of the roof cover, a number of layers of material with sound insulation properties, with a variable number of layers of different materials and depending on the degree of sound reduction to be obtained from a basic configuration.

[0009] Another objective of the invention is to achieve a degree of sound insulation that is quantifiable by an overall weighted sound reduction index of a high value, reaching up to 70 dBA.

[0010] In order to achieve the intended objective of the invention, this closure panel comprising an outer side formed in a corrugated sheet in steel or aluminium, has the particularity of comprising at least one smooth steel tray panel arranged in a plane parallel to said corrugated sheet and forming the inner side of the closure panel; at least a first layer and a second layer of mineral wool being arranged between the corrugated plate and the smooth tray panel, with a first high density synthetic sheet being arranged between said layers, in a basic embodiment of the invention.

[0011] In a variation of one embodiment of the invention, said cover panel comprises, between the first synthetic high density sheet and the second layer of mineral wool, an intermediate corrugated steel sheet acting as an inner reinforcement and as separating element of the outer corrugated sheet and the first layer of mineral wool close to that, with respect to other elements or layers of the cover panel and nearest to the smooth steel tray panel conforming the inner side of the cover panel.

[0012] In one embodiment particularly suitable for use in roof covers or roofs, the closure panel comprises, between the corrugated sheet and the second intermediate layer of mineral wool, in succession: a first layer of fibreglass, a first board of MDF wood, a second layer of fibreglass, a second board of MDF wood and a second high density synthetic sheet.

[0013] As separating element of the two wood fibre boards, special pieces of 80 to 100 kg/m^3 density in longitudinal strips are used, these strips acting as sound absorbers. They are 6 cm height.

[0014] The incorporation of these first and second layers of fibreglass alternating with a first and a second board of MDF wood provides an additional sound insulation to the closure or cover panel, having foreseen that this embodiment can also incorporate, between the corrugated sheet of the outer side and the first layer of mineral wool, a third high density synthetic sheet, and, between the first layer of fibreglass and the first board of MDF wood, a fourth high density synthetic sheet.

[0015] The corrugated sheet of the outer side of the cover panel, the intermediate corrugated sheet and the smooth steel tray panel have a thickness between 1 and 1.2 millimetres which provides a high resistance to deformation of the closure panel.

[0016] The first layer and the second layer of mineral wool have a thickness between 60 and 100 millimetres each and a density ranging between 100 and 210 kg/cm^3.

[0017] The first and the second fibreglass layer have, according to the invention, a thickness of 50 millimetres each, and the first board and the second board of MDF wood have a thickness ranging between 15 and 25 millimetres each.

[0018] The high density synthetic sheets mentioned above have a surface density greater than 3.5 kg /m^2 and preferably greater than 10 kg/m^2.

Description of figures.

[0019] In order to complement the description that is being carried out and with the purpose of facilitating the understanding of the characteristics of the invention, the present description is accompanied by a set of drawings wherein, by way of a non-limiting example, the following has been represented:

- Figure 1 schematically shows a cross section of an embodiment of a building closure panel according to the invention in a basic embodiment.

- Figure 2 shows a variant embodiment of the closure panel of the figure above incorporating an intermediate corrugated steel plate for its reinforcement.

- Figure 3 shows a variation of the embodiment of the cover plate of Figure 2, particularly applicable on roofs or roof covers incorporating additional layers of fibreglass, wood fibre boards, separating elements between the wooden boards and additional high density synthetic sheet.

- Figure 4 shows an exploded view of the section of Figure 3, in order to facilitate the observation of the different layers of material making up the closure panel shown in said Figure 3.

Preferred embodiment of the invention.

[0020] In the embodiment shown in Figure 1, the building cover panel comprises a corrugated sheet (1) of steel or aluminium, having a thickness of 1 millimetre conforming the outer side of the cover panel and a smooth steel tray panel (2) of 1 millimetre thick, conforming the inner side of the cover panel, there being between the corrugated plate (1) and the smooth tray panel (2) a first layer (3) of mineral wool and a second layer (4) of mineral wool between which a first high density synthetic sheet (5) is arranged.

[0021] The first layer (3) of mineral wool is 80 millimetres thick and has double-density (135 to 210 kg/m^3).

[0022] The second layer (4) of mineral wool has a thickness of 60 millimetres and a density of 100 kg/m^3.

[0023] The first high density synthetic sheet (5) has a surface mass density of 10 kg/m^2.

[0024] In the embodiment shown in Figure 2 the building cover panel further comprises an intermediate corrugated sheet (6) of steel between the first high density synthetic sheet

(5) and the second layer (4) of mineral wool.

[0025] In this embodiment the corrugated sheet (1) corresponding to the outer side is 1 mm thick, while the smooth tray panel (2) of the inner side and the intermediate corrugated sheet have a thickness of 1.2 millimetres.

[0026] The first layer (3) of mineral wool is 100 millimetres thick and has double-density (135 to 210 kg/m^3), while the second layer (4) of mineral wool has a thickness of 140 millimetres and a density of 100 kg/m^3.

[0027] In the embodiment example shown in Figure 3, which exploded view is shown in Figure 4, the panel comprises, in addition to the elements shown in Figure 2, a number of additional layers. Specifically it comprises, between the intermediate corrugated sheet and the second layer of mineral wool, a first layer of fibreglass (7), a first board of MDF wood (8), a second layer of fibreglass (9) with spacers (9a), a second board of MDF wood (10) and a second high density synthetic sheet (11).

[0028] Between the corrugated sheet (1) of the outer side and the first layer (3) of mineral wool there is a third high density synthetic sheet (12), and between the first layer of fibreglass and the first board of MDF wood (8) there is a fourth high density synthetic sheet (13).

[0029] In the embodiment shown in Figures 3 and 4 the corrugated sheet (1) is 1 millimetre thick, while the intermediate corrugated sheet (6) and the smooth steel tray panel (2) have a thickness of 1.2 millimetres.

[0030] The first layer (3) of mineral wool and the fourth layer (4) of mineral wool respectively have thicknesses of 100 and 60 mm and a density between 100 and 210 kg/m^3.

[0031] The synthetic sheets (5, 11) have a surface mass density of 10 kg/m^2, the thicknesses of the first layer and the second layer of fibreglass being of 50 millimetres.

[0032] The first board (8) and the second board (10) of MDF wood have thicknesses ranging between 16 and 22 millimetres and a nominal density between 600 and 720 kg/m^3.

[0033] The spacers (9a) have a density of 80 to 100 kg/ m^3, and the fibreglass density is low, such as less than 23 kg/m^3.

[0034] Once the nature of the invention as well as an example of preferred embodiment have been sufficiently described, it is stated for all pertinent purposes that the materials, form, size and arrangement of the elements described are susceptible to changes, provided these do not involve an alteration of the essential characteristics of the invention that are claimed subsequently.

Claims

1. Building closure panel, with sound insulation properties, for conforming or forming part of a roof or a wall, and comprising an outer side formed by a corrugated sheet (1) of aluminium or steel intended to provide rigidity to the cover panel in question and at least one layer (3) of mineral wool, as sound insulation; **characterized in that** it comprises at least one smooth steel tray panel (2) arranged in a plane parallel to the corrugated sheet (1) and forming the inner side of the cover panel, with at least a first layer and a second layer (4) of mineral wool, between which the first high density synthetic sheet (5) is disposed, being arranged between the corrugated plate (1) and the smooth tray panel (2).

2. Closure panel, according to claim 1, **characterized in that** it comprises an intermediate corrugated sheet (6) of steel between the first high density synthetic sheet (5) and the second layer (3) of mineral wool.

3. Closure panel, according to claim 2, **characterized in that** it comprises, between the intermediate corrugated sheet (6) and the second layer (4) of mineral wool, and in succession: a first layer of fibreglass (7), a first board of MDF wood (8), a second layer of fibreglass (9) with spacers (9a), a second board of MDF wood (10) and a second high density synthetic sheet (11).

4. Closure panel, according to claim 3, **characterized in that** it comprises a third high density synthetic sheet (12) between the corrugated sheet (1) of the outer side and the first layer of mineral wool (3).

5. Closure panel, according to claim 3, **characterized in that** it comprises a fourth high density synthetic sheet (13) between the first layer of fibreglass (7) and the first board of MDF wood (8).

6. Closure panel, according to claim 3, **characterized in that** the corrugated sheet (1) of the outer side, the intermediate corrugated sheet (6) and the smooth tray panel (2) of steel have a thickness ranging between 1 and 1.2 millimetres.

7. Closure panel, according to any one of the preceding claims, **characterized in that** the first layer (3) and the second (4) layer of mineral wool have a thickness comprised between 60 and 100 millimetres each, and a density comprised between 100 and 210 kg/cm^3.

8. Closure panel, according to claim 3, **characterized in that** the first and the second layer of fibreglass (7, 9) each have a thickness of 50 millimetres each.

9. Closure panel, according to claim 3, **characterized in that** the first board (8) and the second board (10) of MDF wood have a thickness comprised between 15 and 25 millimetres each.

10. Closure panel, according to claim 5, **characterized in that** the high density synthetic sheets (5, 11, 12 and 13) have a surface density higher than 3.5 kg/m^2 and preferably more than 10 kg/m^2.

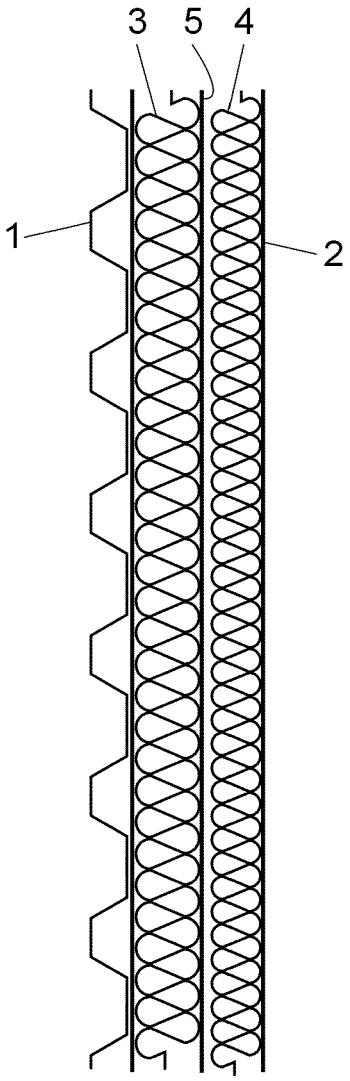

Fig. 1

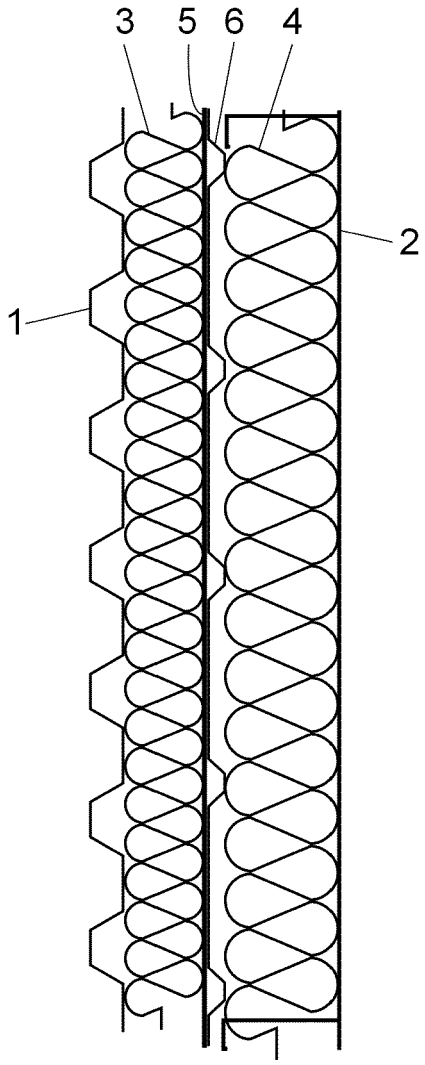

Fig. 2

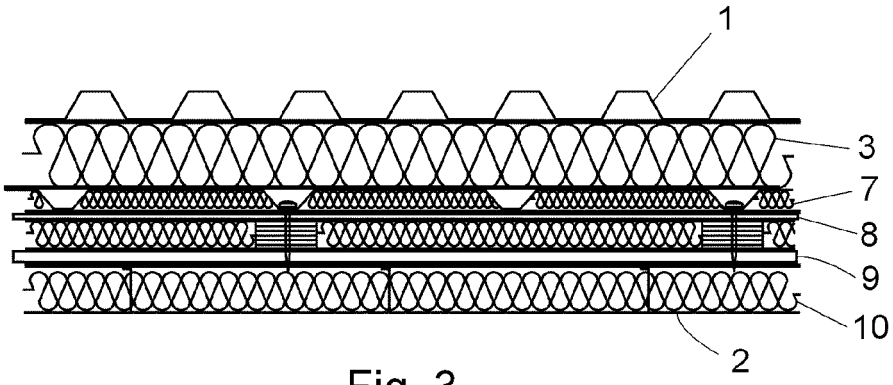

Fig. 3

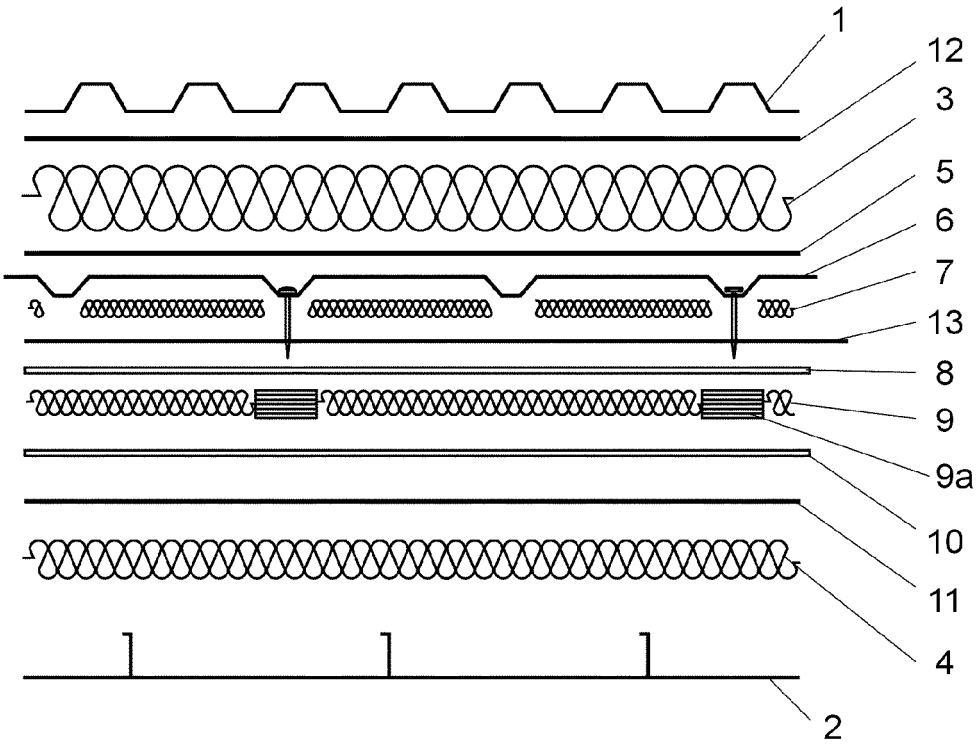

Fig. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 12 19 6802

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	US 5 334 806 A (AVERY ELLIOTT L [US]) 2 August 1994 (1994-08-02) * column 2, line 62 - column 3, line 23 * * column 4, line 31 - line 47 * * figures 1-4, 7 *	1-10	INV. E04B1/86 E04D3/35
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TECHNICAL FIELDS SEARCHED (IPC)
E04B
E04D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	28 January 2014	López-García, G

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 12 19 6802

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28-01-2014

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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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