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

(11) **EP 3 323 924 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
23.05.2018 Bulletin 2018/21

(21) Application number: **17193076.1**

(22) Date of filing: **26.09.2017**

(51) Int Cl.:
D04H 1/4218 *(2012.01)* ***D04H 1/4226*** *(2012.01)*
D04H 1/587 *(2012.01)* ***D04H 1/60*** *(2006.01)*
F16L 59/02 *(2006.01)*

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(30) Priority: **16.11.2016 FI 20165860**

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(54) METHOD FOR MANUFACTURING A DOUBLE OR MULTI-LAYER MINERAL WOOL INSULATION

(57) The invention relates to a method for manufacturing a double or multi-layer mineral wool insulation (1). In the method, on a mineral wool manufacturing line is continuously produced a mineral wool mat (2) having a bottom side and a top side defining the main surfaces of the mineral wool mat, in which the fibres are located substantially in levels parallel with said main surfaces. In the method, onto at least one of said main surfaces is brought an additional insulation layer (3, 3') containing recycled material, which contains shredded and/or crushed and/or pulverized mineral wool and into which recycled material is mixed binding agent in a powdered form before it is brought onto said at least one main surface of the mineral wool mat (2). The layer (3, 3') of recycled material is compressed into a mat-like layer before it is brought onto said at least one main surface of the mineral wool mat. Finally, the mineral wool insulation (1) formed from a mineral wool mat (2) and an additional insulation layer of recycled material (3, 3') added onto its at least one main surface is taken to a curing treatment (8).

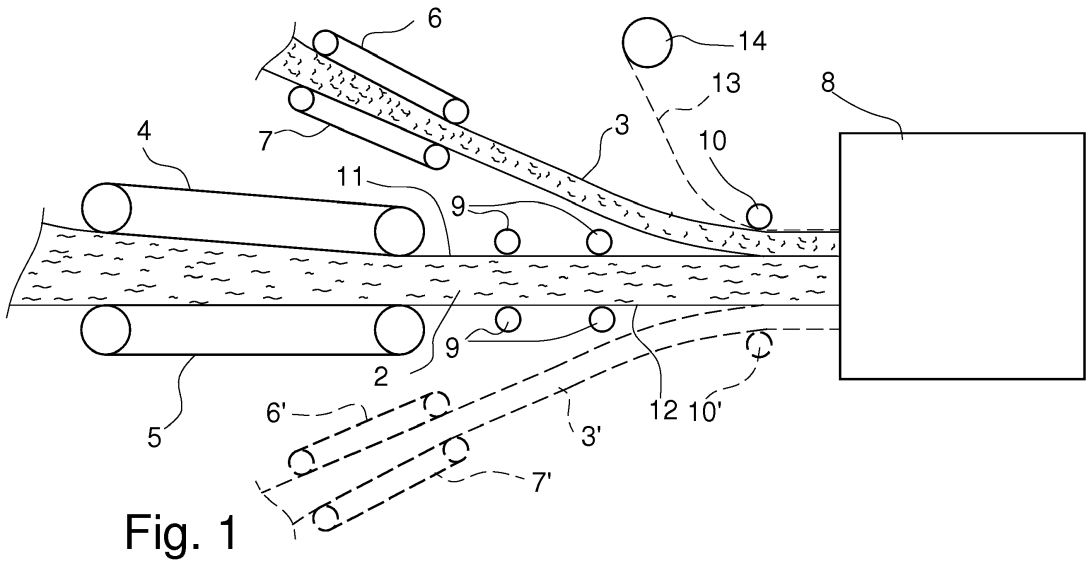

Fig. 1

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Description

[0001] The present invention relates to a method for manufacturing a double or multi-layer mineral wool insulation. The invention further relates to a mineral wool insulation manufactured by the method.

[0002] Various methods for manufacturing a multilayer insulation of mineral wool are known from prior art. WO2014090670 presents a method, in which is formed a base layer of mineral wool, in which the fibres are substantially perpendicular in relation to the main surfaces of the base layer, which is cured. On top of the cured base layer is spread an uncured mineral wool layer, and the combination is taken into a curing oven, in which the surface layer is compressed at least 50%. EP1180182 presents a method, in which a thin mineral wool sheet is cut from a mineral wool mat with a horizontal cutting blade, the cut sheet being compressed between the rollers into a denser form and spread back onto the rest of the mineral wool mat, from which the sheet was cut. Finally, loose material forming a rigid surface layer is spread onto the top surface of the compressed mineral wool layer and the product obtained is coated with a thin polyester fabric and taken to a curing treatment. The object is to produce a very rigid surface layer, the density of which is at least 450 kg/m^3.

[0003] The object of the present invention is to provide a relatively simple and easily implemented method for manufacturing a double or multi-layer mineral wool insulation utilizing recycling material, which is obtained either from the same facility, in which the mineral wool products are manufactured, or from customers as surplus material returns.

[0004] To achieve this object, a method according to the invention is characterized in that, in the method, on a mineral wool manufacturing line is continuously produced a mineral wool mat having a bottom side and a top side defining the main surfaces of the mineral wool mat, the fibres of which are located substantially in levels parallel with said main surfaces, that, in the method, onto at least one of said main surfaces is brought an additional insulation layer containing recycled material, which contains crushed and/or pulverized mineral wool and into which recycled material is mixed binding agent in a powdered form before it is brought onto said at least one main surface of the mineral wool mat, that, in the method, the layer of recycled material is compressed into a mat-like layer before it is brought onto said at least one main surface of the mineral wool mat, and that, finally, the mineral wool insulation formed from the mineral wool mat and the additional insulation layer of recycled material added onto its at least one main surface is taken to a curing treatment.

[0005] In a method according to the invention it is possible, if needed, to further compress the mineral wool insulation formed from the mineral wool mat and the additional insulation layer comprising recycled material before or in the curing oven in order to achieve a desired density (which can also be the final density).

[0006] The layer of recycled material is formed as different in at least one of its properties in comparison to the mineral wool mat layer, the property being selected from a group including fibre chemistry, fibre length, fibre orientation, binding agent, density, layer thickness, compression strength. In the method, onto the outer surface of the additional insulation layer of recycled material is preferably added a coating layer of fibreglass fabric before the mineral wool insulation is taken to the curing treatment. In the method, an additional insulation layer containing recycled material is preferably brought onto both main surfaces of the mineral wool mat. In a preferred further embodiment of the method, a second mineral wool mat is brought onto the other side of the additional insulation layer containing recycled material brought onto one main surface of the mineral wool mat, wherein the additional insulation layer of recycled material forms the middle layer of the mineral wool insulation.

[0007] The advantage of the present invention is that there is no need to make major changes to an existing mineral wool mat manufacturing line in order to introduce the method according to the invention. The mineral wool mat is manufactured normally and it does not require special handling before the additional layer is fed onto at least one main surface of the mineral wool mat. The additional layer is fed, for example, between the belt conveyors as compressed to the desired density onto the mineral wool mat and the insulation product thus obtained is taken to a curing treatment, for example, into a curing oven, in which the binding agents in the mineral wool mat and the additional insulation layer harden under the influence of heat and the layers simultaneously adhere to each other.

[0008] In the following, the invention is described in more detail with reference to the accompanying drawings, in which:

Fig. 1 shows a preferred embodiment of an apparatus suitable for performing a method according to the invention, and

Fig. 2 shows a diagrammatic cross-section of a mineral wool insulation manufactured by the method.

[0009] Insulation products of mineral wool, such as, for example, a raw mineral wool mat used in the manufacture of mineral wool boards and in the form of a mat, is manufactured on a basic production line by first forming mineral wool fibres from molten rock, from which, through pleating a primary mat of mineral wool, a secondary mat of mineral wool is formed. This manner of producing so-called raw wool is described, for example, in WO 94/16162, WO 2006/070055 and WO 03/008353.

[0010] In an apparatus according to Fig. 1, at the starting end (not shown) of a manufacturing line, a mineral wool mat 2 of raw wool manufactured in a per se known

manner is transported between the belt conveyors 4, 5 as compressed to a desired density and further by means of the rollers 9 towards the curing oven 8. The apparatus includes a feeding apparatus attached to the manufacturing line of the mineral wool mat 2, the feeding apparatus including the belt conveyors 6, 7, between which the additional insulation layer 3 is compressed (for example, to a desired density) before it is fed onto the top surface 11 of the mineral wool mat 2. The degree of compression can be, for example, 50% or more depending on the desired density. The mat-like additional insulation layer 3 is pressed by the guide roller 10 against the top surface of the mineral wool mat. The apparatus preferably includes means for feeding an optional coating material 13 from a roll 14 onto the outer surface of the additional insulation layer in order to keep the fibre material and the binding agent of the additional insulation layer in place in the additional insulation layer in the air flow of the curing oven. As the coating material 13 is preferably used fibreglass fabric or felt. Preferably, onto both sides of the mineral wool mat 2 are added additional insulation layers 3, 3' and also onto both outer surfaces of the additional insulation layer is preferably added a coating material 13.

[0011] Fig. 2 shows as a cross-section a mineral wool insulation 1 manufactured by the method according to the invention, the mineral wool insulation having a middle layer of mineral wool mat 2 and the additional insulation layers 3, 3' formed from recycled material on both of its sides. The amount of recycled material is preferably approx. 16% of the amount of the mineral wool mat. The middle layer 2 formed from a mineral wool mat of a mineral wool insulation 1 produced according to the invention is preferably in the range of 60-80 kg/m^3 in density and its thickness is, for example, 100 mm. The density of the additional insulation layer 3, 3' formed from recycled material is preferably in the range of 150-250 kg/m^3, its thickness being, for example, in the range of 10-20 mm.

[0012] The material of the additional insulation layer is primarily shredded/pulverized/crushed mineral wool material, to which is added in connection with shredding/pulverizing/crushing or thereafter dry powder-like binding agent, which can be different than the binding agent used in the mineral wool mat. The recycled material can also contain other crushed/chopped materials, such as concrete/wood fractions or fire retardants or other additives. Examples of additives acting as fire retardants are plaster, slaked lime, calcium carbonate, calcium sulphate hemihydrate, dolomite, aluminium hydroxide, aluminium sulphate, magnesium hydroxide, magnesium carbonate, montmorillonite, bentonite. Examples of additives acting as fire retardants expanding at high temperatures are vermiculite, perlite, pumice, and expanding varieties of clay.

[0013] By varying the thickness and density of the layers they can, if desired, be rendered to have different properties, such as, for example, compression strength.

Claims

1. A method for manufacturing a double or multi-layer mineral wool insulation (1), **characterized in that**, in the method, on a mineral wool manufacturing line is continuously produced a mineral wool mat (2) having a bottom side and a top side defining the main surfaces of the mineral wool mat, the fibres of which are located substantially in levels parallel with said main surfaces,
that, in the method, onto at least one of said main surfaces is brought an additional insulation layer (3, 3') containing recycled material, which contains shredded and/or crushed and/or pulverized mineral wool and into which recycled material is mixed binding agent in a powdered form before it is brought onto said at least one main surface of the mineral wool mat (2),
that, in the method, the layer (3, 3') of recycled material is compressed into a mat-like layer before it is brought onto said at least one main surface of the mineral wool mat,
and **that**, finally, the mineral wool insulation (1) formed from a mineral wool mat (2) and an additional insulation layer of recycled material (3, 3') added onto its at least one main surface is taken to a curing treatment (8).

2. A method according to claim 1, **characterized in that** the layer (3, 3') of recycled material is compressed to a desired density.

3. A method according to claim 1, **characterized in that**, in the method, the layer (3, 3') of recycled material is formed as different in at least one of its properties in comparison to the mineral wool mat layer (2), the property being selected from a group containing fibre chemistry, fibre length, fibre orientation, binding agent, density, layer thickness, compression strength.

4. A method according to any one of claims 1-3, **characterized in that**, in the method, onto the outer surface of the additional insulation layer (3, 3') of recycled material is added a coating layer (13) of fibreglass fabric before the mineral wool insulation (1) is taken to the curing treatment.

5. A method according to any one of claims 1-4, **characterized in that**, in the method, an additional insulation layer (3, 3') containing recycled material is brought onto both main surfaces of the mineral wool mat (2).

6. A method according to any one of the preceding claims, **characterized in that**, in the method, the density of the mineral wool

mat coming from the line is 60-80 kg/m^3 and the surface layer of recycled material is compressed to a density of 150-250 kg/m^3.

7. A method according to any one of the preceding claims, **characterized in that**, in the method, the thickness of the mineral wool mat coming from the line is 80-120 mm, preferably approximately 100 mm, and the thickness of the surface layer is in the range of 10-20 mm.

8. A method according to any one of the preceding claims, **characterized in that**, in the method, the portion of recycled material in the final product is in the range of 10-18%, preferably approx. 14-16%.

9. A method according to any one of claims 1-4, **characterized in**
that, in the method, a second mineral wool mat is brought onto the other side of the additional insulation layer (3, 3') containing recycled material brought onto one main surface of the mineral wool mat (2), wherein the additional insulation layer (3, 3') of recycled material forms the middle layer of the mineral wool insulation.

10. A cured mineral wool insulation (1) manufactured by a method according to any one of claims 1-8, having a middle layer (2) formed from a mineral wool mat and the additional insulation layers (3, 3') formed from recycled material on both of its sides.

11. A cured mineral wool insulation manufactured by a method according to claim 9, having a middle layer formed from recycled material and the surface layers formed from a mineral wool mat on both of its sides.

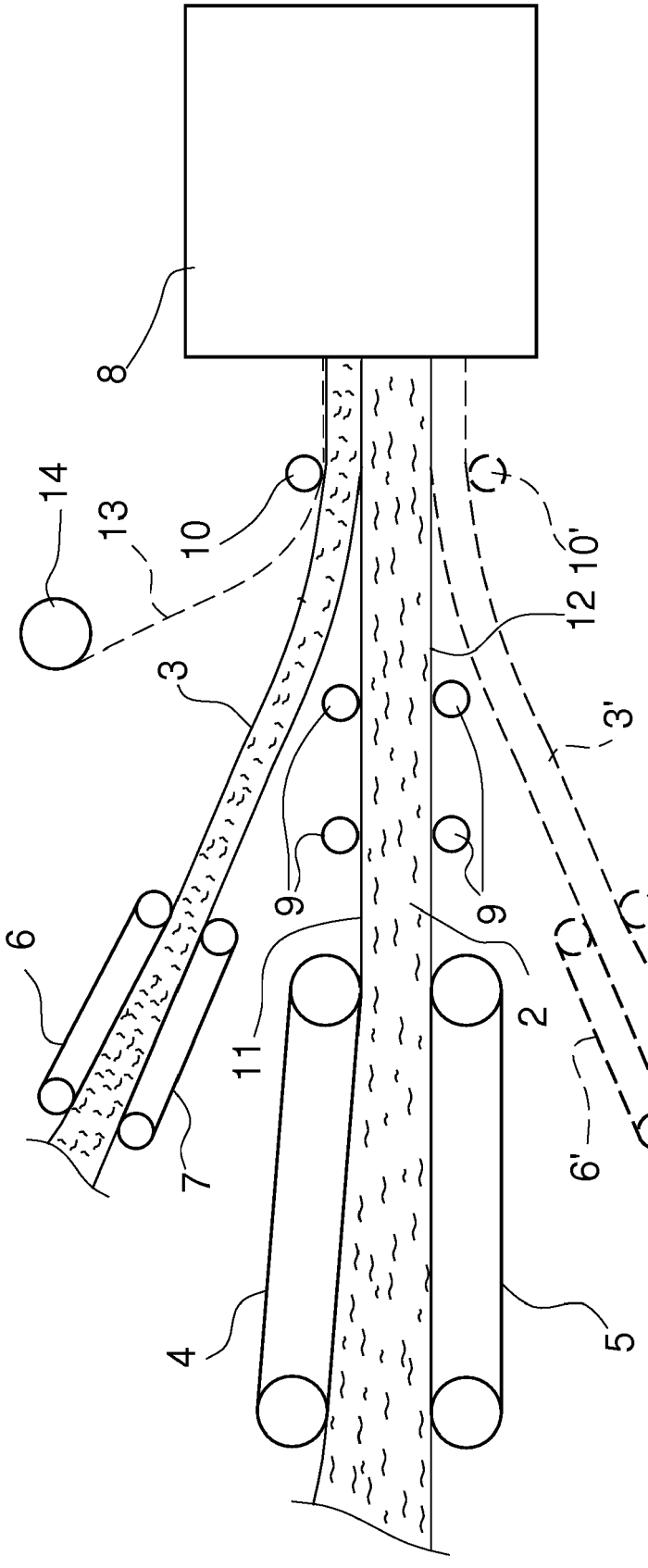

Fig. 1

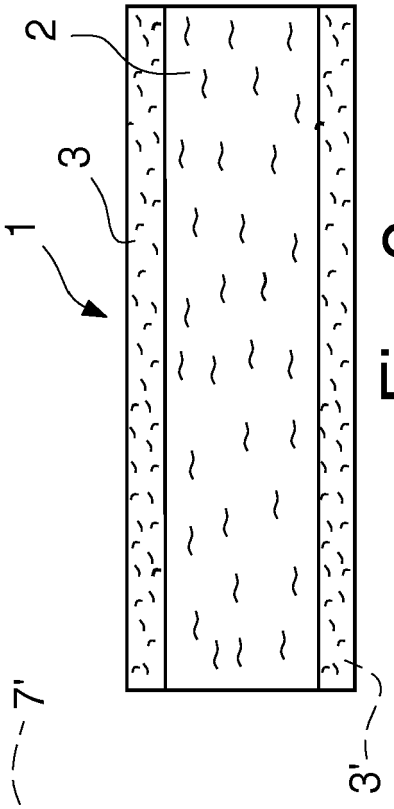

Fig. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 17 19 3076

DOCUMENTS CONSIDERED TO BE RELEVANT

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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
Munich	30 January 2018	Beckert, Audrey

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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