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(54) MINERAL WOOL INSULATION

ISOLIERUNG AUS MINERALWOLLE

ISOLATION EN LAINE MINÉRALE

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Description

[0001] The present invention relates to a mineral wool insulation panel for thermal and/or acoustic insulation of household appliances, for example electrical appliances, particularly ovens.

[0002] Heat generating household appliances or heat requiring household appliances commonly comprise double walls defining a space between them which is generally filled with insulation material. Mineral wool is often a preferred insulation material for such applications thanks to its thermal insulation properties, its resistance to relatively high temperature exposure and its good fire resistance. Any organic binders used in the mineral wool product tend to decompose when first subjected to high temperatures and to generate unpleasant or undesired gas emissions; consequently the insulation mineral fibre material for such applications preferably contains only low levels of organic binders and, more preferable, does not include any organic binders. The insulation material is intended to: reduce loss of energy to the surroundings, thus reducing energy consumption of the appliance; and/or shield elements of the relevant appliances, for example wiring and electrical motors, and/or adjacent spaces or furniture from high temperature exposure; and/or reduce noise emission.

[0003] To facilitate assembly of the insulation material with the appliance, for example a domestic oven, it is desirable to provide the insulation material in the form of a pre-cut mat of mineral wool and to apply such pre-cut mat around the appliance by folding it along an edge of the relevant appliance, around at least two sides of the appliance, preferably three or four or even five sides thereof, the front side generally being provided with a door and control means. Traditionally, homogenous fibre mats have been used to insulate such domestic appliances.

[0004] In the case of household ovens, different types and models of oven exist, classified in different energy classes, having individual configurations which differ for example in the position of their heating elements, the type of heating elements, the position and type of fans, the provision of a high temperature or pyrolytic cleaning function and whether they are designed to be self-standing or incorporated in to a kitchen unit. Similar variations in configuration exist for other types of domestic appliances.

[0005] Different sides of an oven, for example, may require different levels of thermal insulation. For example, the upper face of an oven may require a higher level of thermal insulation than the lateral sides. The bottom side may require yet a different level of thermal insulation, depending on the presence or absence of heating elements and other characteristics. Increasing the thickness of the insulation material all over is not desirable as that is likely to increase the outer dimensions of the oven (which would be particularly problematic for fitted ovens) or to reduce the inner dimensions of the oven (which would reduce the usable volume inside the oven).

[0006] Producers of such appliances also emphasize the energy efficiency of their devices and demand improved insulation at low cost.

[0007] There is thus a need to optimise the insulating characteristics of the insulation material in order to improve the thermal and/or acoustic insulation while maintaining or even increasing the useable space of the relevant household appliance.

[0008] According to one aspect, the present invention provides a unitary household appliance mineral wool insulation panel as defined in claim 1. Other aspects are defined in the other independent claims. The dependent claims define preferred and/or alternative embodiments.

[0009] The provision of a unitary panel, that is to say a panel which is a continuous extension which can be handled and manipulated as a single unit (as opposed to a collection of two or more freely separable individual pieces of mineral wool) facilitates assembly of the panel as part of an appliance. For example, with reference again to the example of an oven in respect of which five sides generally require insulation (the sixth side of a generally cubic oven being provided by a door), providing a series of individual mineral wool panels each corresponding to a single side of the oven and each having different thicknesses and/or fibre density and which require assembly together, is cumbersome, entails handling problems, risks creating multiple thermal bridges at joints between panels and is prone to assembling errors which may ultimately lead to malfunction of the device.

[0010] The thermal insulation performance of a mineral wool insulation panel depends, inter alia, upon the panel's thickness and density. The thicker the insulation material, the higher its insulation or thermal resistance. As far as density is concerned, thermal resistance will increase with density up to a certain optimum; further increase of density then leads to excess contact between individual fibres and hence to reduced insulation characteristics, and reduced performance of the insulation material. Insulation performance will thus depend on the balance between thickness and density.

[0011] The at least two bands of the insulation mat may be substantially parallel; all of the bands may be parallel. The bands may be adjacent; they may be arranged across the width of the insulation mat or panel, for example so that the width of the mat or panel is made up of the sum of the widths of each band.

[0012] The density and/or orientation of the mineral wool fibres may be non-homogeneous across the thickness of a part of or the entire mineral wool panel. At one surface of the panel, the mineral wool may have a greater density, notably a density that may be greater by at least 10 kg/m³ than at the other surface of the mineral wool panel. Alternatively or additionally, at one surface of the panel the mineral wool fibres may generally lie substantially parallel to the surface of

the panel whilst at the other face of the panel the mineral wool fibres may lie substantially perpendicular to the surface of the panel. This may be achieved by arranging for a greater intensity of needling at one surface of the mineral wool with respect to the needling, if any, at the other surface, for example by (a) needling from only one side of the panel or by (b) needling more from one side of the panel than from the other, for example by varying the type and/or density and/or speed of needling from one side of the panel with respect to the other side. Part or all of one, more than one or all bands of the mineral wool panel may have such configurations.

[0013] The unitary mineral wool insulation panel may be used to cover at least two sides of a household appliance, each band of the mat corresponding to a side of the household appliance; this may provide a differential in the thermal resistance or insulating power of the mat at at least two sides of the appliance and thus facilitate optimisation of insulation and useable inner space for the appliance. In the case of a household oven, such a unitary mineral wool insulation panel may cover two or more sides of the oven with different insulation requirements on each side, thereby liberating an optimum space inside the oven. Different insulation characteristics may be obtained by varying the thickness and/or the density on the relevant parts of the panel that insulates the relevant sides of the oven.

[0014] In one embodiment, the unitary insulation panel may have a first band having a width corresponding to the height of an appliance it is intended to insulate, and a second band having a width corresponding to the width of the appliance, and a length corresponding to the depth of the appliance; such an insulation panel may be arranged to cover one lateral side and a bottom side or a lateral side and the top side of the appliance, e.g. a household oven. In another embodiment, the unitary insulation panel may have one band having a width corresponding to the height of the appliance, a second band having a width corresponding to the width of the appliance and a third band having a width corresponding to the height of the device, and a length corresponding to the depth of the appliance; such an insulation panel may be arranged to cover and insulate one lateral side and the bottom or top side and the other lateral side of the appliance, e.g. an oven. The remaining faces of an oven may then be covered by an element cut out of a two band panel such as to cover the top or bottom side and the back side of the appliance.

[0015] The density and thickness of the insulation panel and/or of one or more bands of the insulation panel may be obtained by needling. Needling is a process in which a plurality of needles are punched in and out of the mineral wool insulation mat thus leading to a rearrangement of the fibres in the mat and generally to an increase of fibre density concomitant with a reduction in thickness. Needling of different bands may be performed with different numbers of needles per surface area, with different types of needles, from the bottom and/or the top in order to obtain the effect sought. At least one of the bands may have areas of different densities obtained by differential needling of the mineral wool insulation. Needling of the insulation mat is preferably carried out on line, for example prior to cutting the panel from the mineral wool blanket. Alternatively, or additionally, needling may be carried out off-line. A lubricant, typically an oil, may be provided at the mineral wool to facilitate needling; where this is the case, any such organic lubricant or oil is preferably removed subsequent to needling, for example by heating and/or decomposition.

[0016] The insulation panel may comprise at least three adjacent bands, each band having dimensions corresponding to adjacent sides of a household appliance. The insulation panel may be folded around the appliance, for example folded at about 90° around one at least of edge of the appliance.

[0017] Where different bands of a mineral wool panel have different thicknesses, the difference in the weighted thickness between different bands may be at least 5 mm, at least 8mm or at least 10 mm; it may be no more than 30 mm or no more than 25mm. The weighted thickness of each band is calculated as:

$$\text{Weighted thickness} = ((t^1 \times A^1) + (t^2 \times A^2) + \dots (t^n \times A^n)) / A^{\text{total}}$$

where $t^1, t^2, \dots, t^n$ represents the thickness of each respective surface area $A^1, A^2, \dots, A^n$ lying within the periphery of a band and having a different thickness and A^{total} represents the total surface area of the band (i.e. $A^1 + A^2, \dots + A^n$).

[0018] Where different bands of a mineral wool panel have different densities, the difference in weighted density between different bands may be at least 10 kg/m³, at 20 kg/m³ or at least 30 kg/m³; it may be not more than 60 kg/m³, not more than 50 kg/m³ or not more than 40 kg/m³. The weighted density of each band is calculated as:

$$\text{Weighted density} = ((d^1 \times A^1) + (d^2 \times A^2) + \dots (d^n \times A^n)) / A^{\text{total}}$$

where $d^1, d^2, \dots, d^n$ represents the density of each respective surface area $A^1, A^2, \dots, A^n$ lying within the periphery of a band and having a different density and A^{total} represents the total surface area of the band (i.e. $A^1 + A^2, \dots + A^n$).

[0019] The insulation mat or panel may comprise between two and six bands, notably two, three or four bands.

[0020] The width of each band is at least 20 cm and may be at least 40 cm, at least 50 cm or at least 60 cm; it may be no more than 150 cm, no more than 120 cm or no more than 100 cm.

[0021] The length of the mineral wool panel may be at least 40 cm, at least 50 cm or at least 60 cm; it may be no more than 150 cm, no more than 120 cm or no more than 100 cm. The width of the mineral panel may be at least 80 cm, at least 100 cm or at least 120 cm; it may be no more than 300 cm, no more than 280 cm or no more than 260 cm. The length of the mineral wool panel may correspond to the depth of the appliance it is intended to insulate.

[0022] The mineral wool insulation panel may comprise less than 6% by weight of an organic binder, preferably less than 4% by weight and more preferably less than 2% by weight as determined by loss on ignition (LOI). In preferred embodiments the mineral wool insulation panel may comprises less than 0.5% by weight binder or more preferable is free of or at least substantially free of organic binder. This reduces undesired off gassing of the mineral wool upon first heating.

[0023] The insulation panel may comprise cut outs; these may be convenient for the arrangement of cable ducts or tubing, such as water connections or similar, or for the arrangement of electrical fans or other equipment elements. Further cut outs or notches may be provided to facilitate connection of two adjacent insulation panels. Yet further cut outs or notches may be provided in order to adapt the insulation panel to the design requirements of the household appliance it is intended to insulate.

[0024] An embodiment of the invention will be described in more detail, by way of example only, with reference to the attached drawings of which:

- Fig. 1 is a perspective view of a unitary, three band insulation panel for an oven;
- Fig. 2a is a plan view of a unitary, two band insulation panel for an oven;
- Fig. 2b is a side view of the panel of Fig 2a;
- Fig. 2c is a cross section along line 2-2' of Fig 2a;
- Fig. 3a is a side view of a variable compression roller;
- Fig 3b is a side view of an alternative variable compression roller arrangement;
- Fig. 4 is a side view of a production line; and
- Fig. 5 is a schematic plan view of a production line.

[0025] Fig. 1 illustrates a mineral fibre insulation panel 10 having a width w and a length l and adapted to cover three sides of a household oven, more particularly the top and two lateral sides of the oven. It thus comprises three bands, 3, 5 and 7. A mineral fibre insulation panel adapted to cover the back side and the bottom side of the oven may be similar to that represented in Figure 2. The sixth side of the oven comprises an oven door, for example a full side glass door.

[0026] As can be seen in Fig. 1, the three bands 3, 5 and 7 are arranged across the width of the mineral fibre insulation panel 10. The first band 3 is arranged at one side edge of the insulation panel 10, the second band 5 is arranged next to the first band across the width of the insulation panel 10 with respect to the first band 3 and the third band 7 is arranged next to the second band 5 further across the width of the insulation panel 10.

[0027] The central band 5 of the three band panel 10 is intended to cover the top side of the oven and has a greater thickness than the peripheral bands 3, 7 which are intended to cover the lateral sides of the oven.

[0028] An insulation panel 10 as shown in Fig 1 may be cut from a continuous mineral wool blanket having three bands 3, 5 and 7 of different thickness and/or density.

[0029] The thickness t of each band of the insulation panel 10 may be modulated as follows. In a process for producing binder-free stone wool insulation panels, a primary insulation wool blanket 42 is provided having a substantially uniform weight per unit area across its width w . The primary insulation wool blanket 42 may be deposited using a pendulum (not shown) which distributes a blanket of mineral wool across the width of an advancing conveyor belt 43; this may be used to facilitate provision of a blanket having substantially uniform weight per unit area across its width w and/or influence orientation of fibres in the blanket.

[0030] As illustrated in Fig 4, the primary insulation wool blanket 42 passes through a series of compression rollers 44 which reduce its thickness and increase its density prior to stripping off of a top layer 48 of the blanket using a horizontal knife blade 45 extending over the whole width w of the blanket 41.

[0031] As illustrated in Fig 3a, the last compression roller 46 in the series of compression rollers 44, when seen in the direction in which the blanket 42 advances along the production line, comprises three coaxial portions 461, 462, 463. The second (in this case central) coaxial portion 462 has a radius which is greater than the radius of the first and third (in this case peripheral) coaxial portions 461, 463. Consequently, when the primary blanket 42 is compressed between this compression roller 46 and the conveyor belt 43, a central band across the width of the primary blanket is compressed more than the peripheral bands. After removal of the top layer 48 of the blanket in its compressed state, this central band thus expands more than the peripheral bands thus creating a secondary blanket 49 having a central band 492 that has a greater thickness than the peripheral bands 491, 493.

[0032] The weighted radius at each portion of the compression roller 46 is calculated as:

$$\text{Weighted radius} = ((r^1 \times A^1) + (r^2 \times A^2) + \dots (r^n \times A^n)) / A^{\text{total}}$$

where $r^1, r^2, \dots, r^n$ represents the radius of each respective surface area $A^1, A^2, \dots, A^n$ lying within the portion of the compression roller having different radii and A^{total} represents the total surface area of the portion of the (i.e. $A^1 + A^2, \dots + A^n$).

[0033] In an alternative differential compression arrangement 47 illustrated in Fig 3b, each band is created by an individual roller 471, 472, 473 whose height with respect to the conveyer 43 may be individually adjusted.

[0034] Following differential compression across its width and removal of its top layer, the blanket 49 passes through an on-line needling station 47 at which it is needled preferably from above and below to rearrange the orientation of some of the fibres in the blanket and provide integrity to the blanket. Needling generally results in an increase in density and a decrease in thickness. The configuration of the needling (e.g. types of needles and/or density of needles) may be different at individual bands of the blanket. Subsequent to the needling operation, where appropriate the blanket passes through an oven to decompose and remove any lubricating needling oil that has been used.

[0035] A panel 10 is then die cut from the secondary blanket 49. Die cutting provides the outer peripheral edge 11 of the panel 10 and may also provide cut-outs 12, 13, for example for arranging tubing or cable duct, and/or notches 14, 15 adapted to the design of the domestic appliance which the panel 10 is intended to insulate and/or adapted to facilitate assembly of two adjacent panels.

[0036] Figure 2 illustrates a two band panel 20. A first band 21 of the two band panel 20 corresponds in its dimension to and is intended to insulate the bottom side of a household oven; a second band 22 of the two band panel 20 corresponds in its dimension to and is intended to insulate the back side of the oven. Preferably, the first 21 and second 22 bands of this two band panel 20 have different thickness and/or densities; this facilitates optimisation of the panel for a particular oven. The possible presence of one or more embossing 23 and/or protrusion 24 of the mineral wool at one or more bands is illustrated in Figs 2a, 2b and 2c. These may be created by providing corresponding protrusions and/or embossing (not shown) at the compression roller 46.

[0037] Whilst the invention relates particularly to ovens, more particularly household or domestic ovens including gas oven and electric ovens, it may also find application in other appliances, including dish washers, steam cookers and storage heaters.

Claims

1. A unitary household appliance mineral wool insulation panel comprising a mineral wool insulation mat **characterized in that**, prior to installation in a household appliance, the mineral wool insulation mat comprises at least two bands, each band having a width of at least 20cm, and in which:

- a) the said bands have a difference in weighted thickness of at least 5mm; and/or
- b) the said bands have a difference in weighted density of at least 10 kg/m³.

2. A unitary household appliance mineral wool insulation panel in accordance with claim 1, in which the mineral wool insulation panel is a needled mineral wool insulation panel which is substantially free of binder.

3. A unitary household appliance mineral wool insulation panel in accordance with any preceding claim, in which the mineral wool insulation mat consists essentially of stone wool fibres.

4. A unitary household appliance mineral wool insulation panel in accordance with any preceding claim, in which the mineral wool insulation panel comprises at least three substantially parallel bands, each band having a width of at least 20cm, in which each of the three bands has

- a) a difference in weighted thickness of at least 5mm; and/or
- b) a difference in weighted density of at least 10 kg/m³;

which respect to at least one of the other bands.

5. A unitary household appliance mineral wool insulation panel in accordance with any preceding claim, in which bands are substantially parallel.

6. A unitary household appliance mineral wool insulation panel in accordance with any preceding claim, in which the bands are adjacent bands arranged across the width of the insulation panel.

7. A unitary household appliance mineral wool insulation panel in accordance with any preceding claim, in which the mineral wool insulation mat comprises cutouts and/or notches.

8. A household appliance comprising a unitary household appliance mineral wool insulation panel in accordance with any preceding claim, in which the width of each band of the mineral wool insulation panel corresponds to a dimension of a side of the household appliance, notably in which the mineral wool insulation panel further comprises one of more portions of increased or reduced cross-section which cooperate with embossments or auxiliary equipment of the household appliance.

9. A household appliance in accordance with claim 8, in which the household appliance is a domestic oven, notably a domestic oven having a pyrolytic cleaning function.

10. A method of manufacturing a unitary household appliance mineral wool insulation panel in accordance with any of claims 1 to 7 comprising:

a) providing a primary mineral wool insulation blanket having substantially constant weight per area across its width;

b) creating a secondary mineral wool insulation blanket from the primary mineral wool insulation blanket so as to create the at least two substantially parallel bands across the width of the secondary mineral wool insulation blanket; and

c) cutting the secondary mineral wool insulation blanket to create the unitary household appliance mineral wool insulation panel.

11. A method in accordance with claim 10, in which creating the at least two bands across the width of the secondary mineral wool insulation blanket comprises compressing the primary mineral wool insulation blanket to create at least two bands subjected to different amounts of compression and removing material from a surface of the thus compressed primary mineral wool insulation blanket.

12. A method in accordance with claim 11, in which compressing the primary mineral wool insulation blanket to create at least two bands subjected to different amounts of compression comprises contacting the primary mineral wool insulation blanket with:

a) a compression roller having at least first and second coaxial portions, each of which extends for at least 20 cm along the axis of the roller and in which the difference in the weighted radius at the first portion with respect to the weighted radius at the second portion is at least 5 mm; or

b) at least two compression rollers, each roller having a length along its axis of at least 20 cm, and each of the said at least two rollers being arranged such as to create a difference in weighted height of at least 5mm between the at least two rollers with respect to the primary mineral wool insulation blanket;

and notably in which at least one compression roller comprises embossments and/or protrusions.

13. A method in accordance with any of claims 11 to 12, in which removing material from a surface of the thus compressed primary mineral wool insulation blanket comprises removing a substantially horizontal surface layer of the thus compressed primary mineral wool insulation blanket over the entire width of the primary mineral wool insulation blanket.

14. A method in accordance with any of claims 10 to 13, comprising needling the secondary mineral wool insulation blanket.

15. A method in accordance with any of claims 10 to 14, in which cutting the secondary mineral wool insulation blanket to create the unitary household appliance mineral wool insulation panel comprises pressing a die in to the secondary mineral wool insulation blanket such that a cutting blade of the die creates a continuous incision in the secondary mineral wool insulation blanket corresponding to the peripheral edge of the unitary household appliance mineral wool insulation panel.

Patentansprüche

1. Einheitliche Haushaltsgeräte-Mineralwolleisulationsplatte, umfassend eine Mineralwolleisulationsmatte, **dadurch gekennzeichnet, dass**, vor der Installation in einem Haushaltsgerät, die Mineralwolleisulationsmatte mindestens zwei Bänder umfasst, wobei jedes Band eine Breite von mindestens 20 cm aufweist, und wobei:
 - a) die Bänder einen Unterschied in gewichteter Dicke von mindestens 5 mm aufweisen; und/oder
 - b) die Bänder einen Unterschied in gewichteter Dichte von mindestens 10 kg/m³ aufweisen.
2. Einheitliche Haushaltsgeräte-Mineralwolleisulationsplatte nach Anspruch 1, wobei die Mineralwolleisulationsplatte eine vernadelte Mineralwolleisulationsplatte ist, welche im wesentlichen frei von Bindemittel ist.
3. Einheitliche Haushaltsgeräte-Mineralwolleisulationsplatte nach einem der vorhergehenden Ansprüche, wobei die Mineralwolleisulationsmatte im wesentlichen aus Steinwollefasern besteht.
4. Einheitliche Haushaltsgeräte-Mineralwolleisulationsplatte nach einem der vorhergehenden Ansprüche, wobei die Mineralwolleisulationsplatte mindestens drei im wesentlichen parallele Bänder umfasst, wobei jedes Band eine Breite von mindestens 20 cm aufweist, wobei jedes der drei Bänder
 - a) einen Unterschied in gewichteter Dicke von mindestens 5 mm, und/oder
 - b) einen Unterschied in gewichteter Dichte von mindestens 10 kg/m³, bezogen auf mindestens eines der anderen Bänder, aufweist.
5. Einheitliche Haushaltsgeräte-Mineralwolleisulationsplatte nach einem der vorhergehenden Ansprüche, wobei Bänder im wesentlichen parallel vorliegen.
6. Einheitliche Haushaltsgeräte-Mineralwolleisulationsplatte nach einem der vorhergehenden Ansprüche, wobei die Bänder benachbarte Bänder sind, welche entlang der Breite der Isolationsplatte angeordnet sind.
7. Einheitliche Haushaltsgeräte-Mineralwolleisulationsplatte nach einem der vorhergehenden Ansprüche, wobei die Mineralwolleisulationsmatte Ausschnitte und/oder Einschnitte umfasst.
8. Haushaltsgerät, umfassend eine einheitliche Haushaltsgeräte-Mineralwolleisulationsplatte nach einem der vorhergehenden Ansprüche, wobei die Breite von jedem Band der Mineralwolleisulationsplatte einer Dimension einer Seite des Haushaltsgeräts entspricht, insbesondere wobei die Mineralwolleisulationsplatte weiter ein oder mehrere Bereiche von vergrößertem oder verkleinertem Querschnitt umfasst, welche mit Erhebungen oder Zusatzausrüstung des Haushaltsgeräts zusammenwirken.
9. Haushaltsgerät nach Anspruch 8, wobei das Haushaltsgerät ein Heimofen ist, insbesondere ein Heimofen mit einer pyrolytischen Reinigungsfunktion.
10. Verfahren zur Herstellung einer einheitlichen Haushaltsgeräte-Mineralwolleisulationsplatte nach einem der Ansprüche 1 bis 7, umfassend:
 - a) Bereitstellen eines primären Mineralwolleisolationstuches, welches im wesentlichen ein konstantes Gewicht pro Bereich entlang seiner Breite aufweist,
 - b) Erzeugen eines sekundären Mineralwolleisolationstuches aus dem primären Mineralwolleisolationstuch, um die mindestens zwei im wesentlichen parallelen Bänder entlang der Breite des sekundären Mineralwolleisolationstuches zu erzeugen, und
 - c) Schneiden des sekundären Mineralwolleisolationstuches, um die einheitliche Haushaltsgeräte-Mineralwolleisulationsplatte zu erzeugen.
11. Verfahren nach Anspruch 10, wobei das Erzeugen der mindestens zwei Bänder entlang der Breite des sekundären Mineralwolleisolationstuches das Komprimieren des primären Mineralwolleisolationstuches, um mindestens zwei Bänder zu erzeugen, welche verschiedenen Mengen an Kompression unterzogen wurden, und das Entfernen von Material von einer Oberfläche des derart komprimierten primären Mineralwolleisolationstuches, umfasst.
12. Verfahren nach Anspruch 11, wobei das Komprimieren des primären Mineralwolleisolationstuches, um mindestens

zwei Bänder zu erzeugen, welche verschiedene Mengen an Kompression ausgesetzt wurden, das Inkontaktbringen des primären Mineralwolleisolationstuches mit:

a) Einer Kompressionswalze, welche mindestens erste und zweite koaxiale Bereiche aufweist, von welchen jeder um mindestens 20 cm entlang der Achse der Walze hervorsteht und wobei der Unterschied im gewichteten Radius des ersten Bereichs bezogen auf den gewichteten Radius des zweiten Bereichs mindestens 5 mm beträgt, oder

b) mindestens zwei Kompressionswalzen, wobei jede Walze eine Länge entlang ihrer Achse von mindestens 20 cm aufweist und jede der mindestens zwei Walzen derart angeordnet ist, um einen Unterschied in der gewichteten Höhe von mindestens 5 mm zwischen den mindestens zwei Walzen, bezogen auf das primäre Mineralwolleisolationstuch, zu erzeugen,

umfasst,

und wobei insbesondere mindestens eine Kompressionswalze Erhebungen und/oder Vorsprünge umfasst.

13. Verfahren nach einem der Ansprüche 11 bis 12, wobei das Entfernen von Material von einer Oberfläche des derart komprimierten primären Mineralwolleisolationstuches das Entfernen einer im wesentlichen horizontalen Oberflächenschicht des derart komprimierten primären Mineralwolleisolationstuches über die gesamte Breite des primären Mineralwolleisolationstuches umfasst.

14. Verfahren nach einem der Ansprüche 10 bis 13, umfassend das Vernadeln des sekundären Mineralwolleisolationstuches.

15. Verfahren nach einem der Ansprüche 10 bis 14, wobei das Schneiden des sekundären Mineralwolleisolationstuches, um die einheitliche Haushaltsgeräte-Mineralwolleisulationsplatte zu erzeugen, das Pressen eines Schneidwerkzeugs in das sekundäre Mineralwolleisolationstuch umfasst, so dass eine Schneidklinge des Schneidwerkzeugs einen kontinuierlichen Einschnitt in das sekundäre Mineralwolleisolationstuch erzeugt, welcher der äußeren Kante der einheitlichen Haushaltsgeräte-Mineralwolleisulationsplatte entspricht.

Revendications

1. Un panneau unitaire d'isolation de laine minérale d'équipement électroménager comprenant un matelas d'isolation de laine minérale **caractérisé en ce que**, avant l'installation dans un équipement électroménager, le matelas d'isolation de laine minérale comprend au moins deux bandes, chaque bande ayant une largeur d'au moins 20 cm, et dans lequel :

a) lesdites bandes ont une différence d'épaisseur pondérée d'au moins 5 mm ; et/ou

b) lesdites bandes ont une différence de densité pondérée d'au moins 10 kg/m³.

2. Un panneau unitaire d'isolation de laine minérale d'équipement électroménager selon la revendication 1, dans lequel le panneau d'isolation de laine minérale est un panneau d'isolation de laine minérale aiguilleté qui est substantiellement dépourvu de résine.

3. Un panneau unitaire d'isolation de laine minérale d'équipement électroménager selon l'une quelconque des revendications précédentes, dans lequel le matelas d'isolation de laine minérale consiste essentiellement de fibres de laine de roche.

4. Un panneau unitaire d'isolation de laine minérale d'équipement électroménager selon l'une quelconque des revendications précédentes, dans lequel le panneau d'isolation de laine minérale comprend au moins trois bandes substantiellement parallèles, chaque bande ayant une largeur d'au moins 20 cm, et dans lequel chacune des trois bandes a:

a) une différence d'épaisseur pondérée d'au moins 5 mm ; et/ou

b) une différence de densité pondérée d'au moins 10 kg/m³ ;

par rapport à au moins une des autres bandes.

5. Un panneau unitaire d'isolation de laine minérale d'équipement électroménager selon l'une quelconque des revendications précédentes, dans lequel les bandes sont substantiellement parallèles.
6. Un panneau unitaire d'isolation de laine minérale d'équipement électroménager selon l'une quelconque des revendications précédentes, dans lequel les bandes sont des bandes adjacentes disposées en travers de la largeur du panneau d'isolation.
7. Un panneau unitaire d'isolation de laine minérale d'équipement électroménager selon l'une quelconque des revendications précédentes, dans lequel le matelas d'isolation de laine minérale comprend des découpes et/ou des entailles.
8. Un équipement électroménager comprenant un panneau unitaire d'isolation de laine minérale selon l'une quelconque des revendications précédentes, dans lequel la largeur de chaque bande du panneau d'isolation de laine minérale correspond à une dimension d'un côté de l'équipement électroménager, notamment dans lequel le panneau d'isolation de laine minérale comprend en outre une ou plusieurs parties augmentée ou réduite de coupe transversale qui coopèrent avec des bosselages ou des équipements auxiliaires de l'équipement électroménager.
9. Un équipement électroménager selon la revendication 8, dans lequel l'équipement électroménager est un four domestique, notamment un four domestique ayant une fonction de nettoyage par pyrolyse.
10. Procédé de fabrication d'un panneau unitaire d'isolation de laine minérale d'équipement électroménager selon l'une quelconque des revendications 1 à 7 comprenant :
 - a) mettre à disposition une nappe d'isolation de laine minérale primaire ayant un poids surfacique substantiellement constant en travers de sa largeur ;
 - b) créer une nappe d'isolation de laine minérale secondaire à partir de la nappe d'isolation de laine minérale primaire de telle sorte à créer les au moins deux bandes substantiellement parallèles en travers de l'épaisseur de la nappe d'isolation de laine minérale secondaire ; et
 - c) découper la nappe d'isolation de laine minérale secondaire afin de créer le panneau unitaire d'isolation de laine minérale d'équipement électroménager.
11. Procédé selon la revendication 10, dans lequel créer les au moins deux bandes en travers de la largeur de la nappe d'isolation de laine minérale secondaire comprend comprimer la nappe d'isolation de laine minérale primaire pour créer au moins deux bandes soumises à différents taux de compression et enlever de la matière d'une surface de la ainsi comprimée nappe d'isolation de laine minérale primaire.
12. Procédé selon la revendication 11, dans lequel comprimer la nappe d'isolation de laine minérale primaire pour créer au moins deux bandes soumises à différents taux de compression comprend mettre en contact la nappe d'isolation de laine minérale primaire avec :
 - a) un rouleau de compression ayant au moins une première et une seconde parties coaxiales, chacune d'elle s'étend sur au moins 20 cm le long de l'axe du rouleau et dans lequel la différence dans le rayon pondéré à la première partie par rapport au rayon pondéré à la seconde partie est d'au moins 5 mm ; ou
 - b) au moins deux rouleaux de compression, chaque rouleau ayant une longueur le long de son axe d'au moins 20 cm, et chaque rouleau desdits au moins deux rouleaux étant disposé de telle sorte de créer une différence de hauteur pondérée d'au moins 5 mm entre les au moins deux rouleaux par rapport à la nappe d'isolation de laine minérale primaire ;et notamment dans lequel au moins un rouleau de compression comprend des bosselages et/ou des saillis.
13. Procédé selon l'une des revendications 11 à 12, dans lequel enlever de la matière d'une surface de la ainsi comprimée nappe d'isolation de laine minérale primaire comprend enlever une couche de surface substantiellement horizontale de la ainsi comprimée nappe d'isolation de laine minérale primaire sur toute la largeur de la nappe d'isolation de laine minérale primaire.
14. Procédé selon l'une des revendications 10 à 13, comprenant aiguilleter la nappe d'isolation de laine minérale secondaire.

15. Procédé selon l'une des revendications 10 à 14, dans lequel découper la nappe d'isolation de laine minérale secondaire pour créer le panneau unitaire d'isolation de laine minérale d'équipement électroménager comprend presser une matrice dans la nappe d'isolation de laine minérale secondaire de telle sorte qu'une lame de découpe de la matrice crée une incision continue dans la nappe d'isolation de laine minérale secondaire correspondant au bord périphérique du panneau unitaire d'isolation de laine minérale d'équipement électroménager.

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Fig. 1

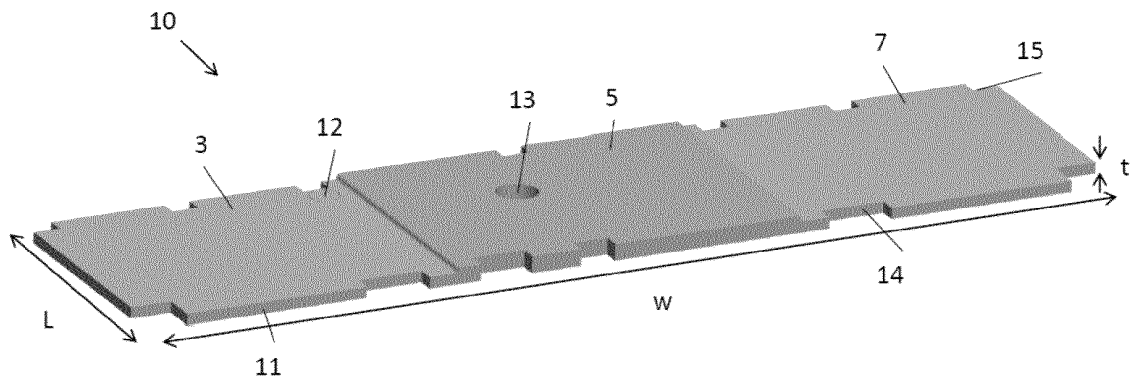


Fig. 2a

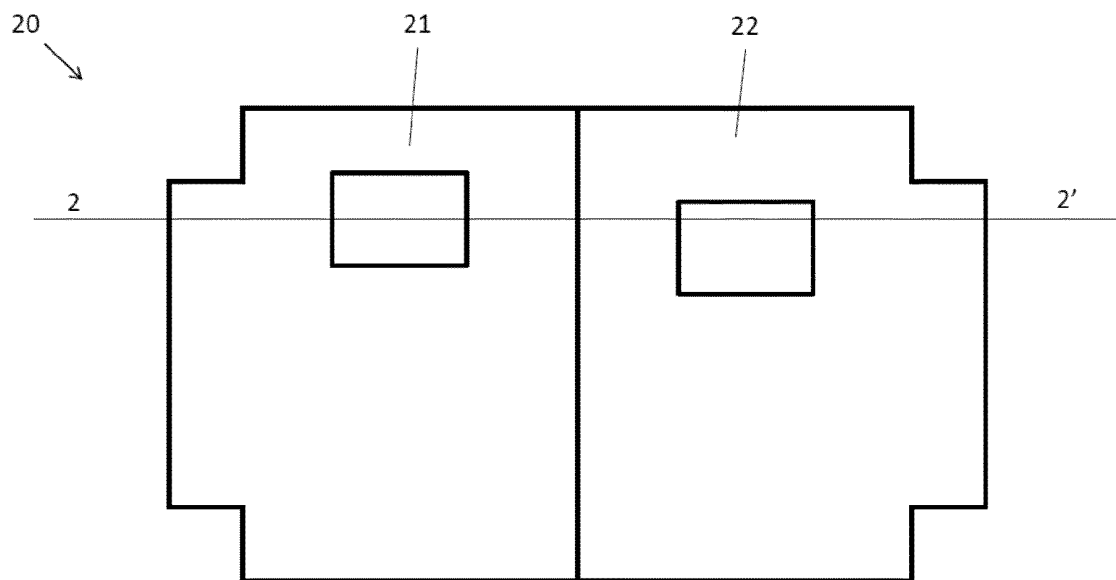


Fig. 2b

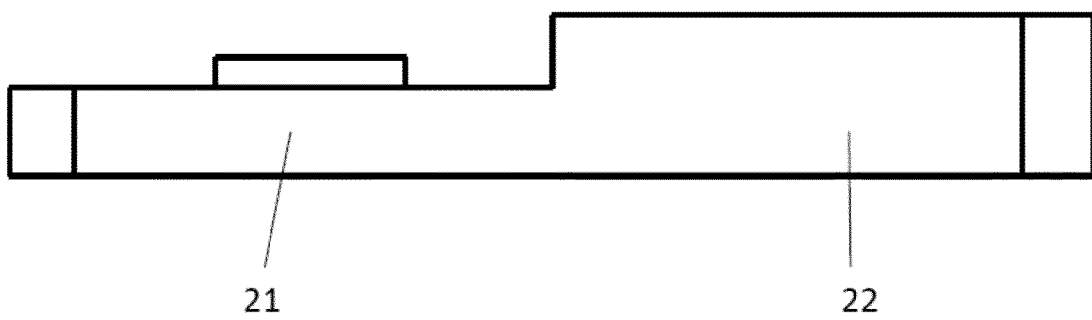


Fig. 2c

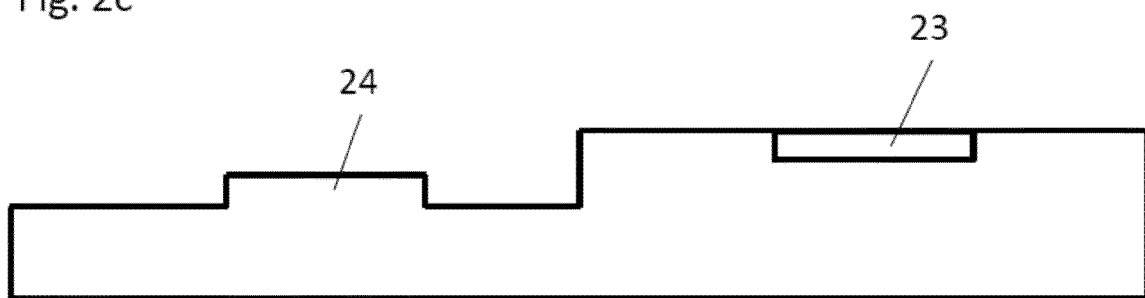


Fig. 3a

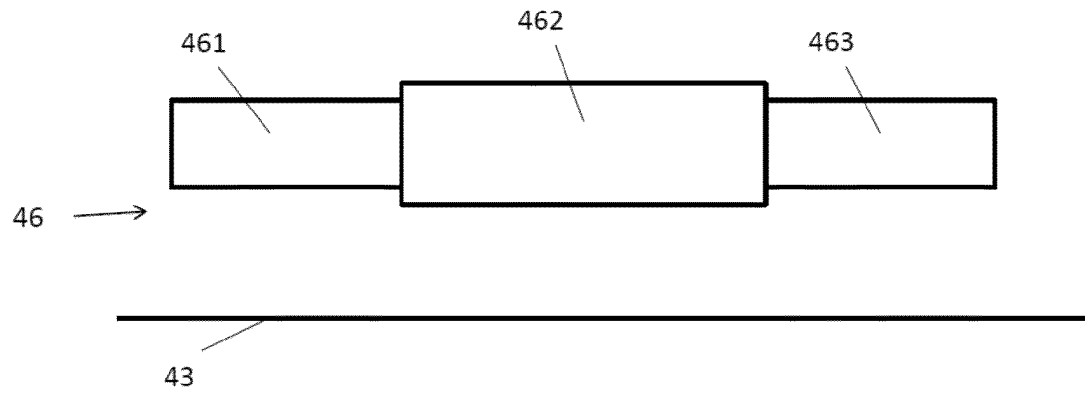


Fig. 3b

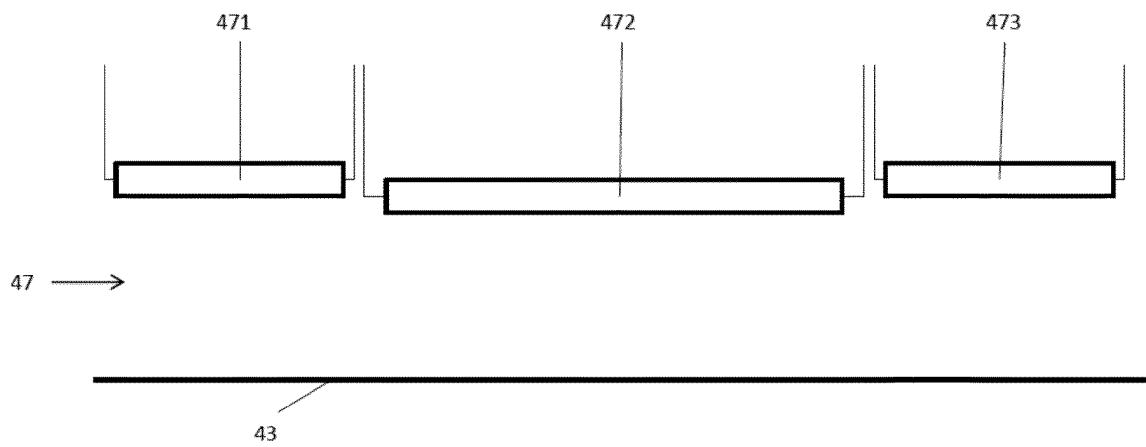


Fig. 4

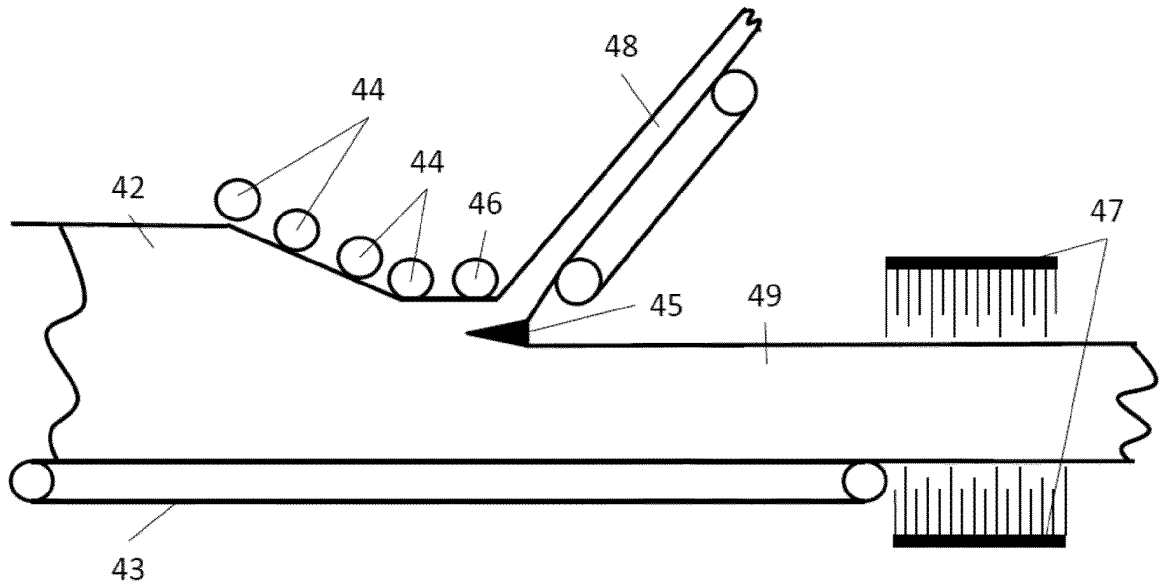


Fig. 5

