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(54) **INSULATING PLATE**
ISOLATIONSPANEEL
PANNEAUX ISOLANTS

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CH-A- 584 819 **DE-C- 803 369**
FR-A- 887 453

EP 0 765 423 B1

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Description

[0001] The invention relates to an insulation board defined in the introductory part of the independent patent claim.

[0002] In the prior art there is known, from the Finnish patent application 33,675, a slab-shaped insulant compiled of alternating corrugated and plain paper lamellas. The problem with this type of insulation is how it can be compactly fitted in a wall, in between vertical spars. Another problem is brought about by the air channels left in between the plain and corrugated paper lamellas, through which channels air can flow and thus eliminate the heat insulation capacities.

[0003] The prior art CH 316088 and DE 803369 disclose chipboards having several layers. Each layer is composed of wood chips and adhesive. Chipboards are e.g. wallboards for covering purposes in construction. They are solid and dense in spite of the fact that the chipboard can be bent to some extent. Insulation elements are normally porous and elastic. That kind of property would be a drawback of chipboards, because covering plates should be strong enough so, that they can be fixed on the wall by nails, screws or so. Insulation property is not important, when we consider utilization of the chipboards. More important is e.g. smooth and firm surface, which is easy to finish such as to paint. Accordingly, the chipboards are not directed to the same purpose as the invention.

[0004] The prior art FR 887453 discloses a wall construction where multiplied air layers separate in and out parts of the wall. The wall construction has a plurality of wooden frames to each of which a paper sheet is glued and accordingly there are air gaps or layers between paper sheets. A serious drawback of the wall construction is that it is not easy to seal slits between the wooden frames and the support structure around them so, that there are no air leakage; if air can flow through the slits and the whole construction the insulation properties are really poor.

[0005] The object of the invention is to introduce a novel insulation board manufactured of organic wood fiber pulp pulp, particularly which insulation board has good heat, fire and sound insulation capacities.

[0006] The insulation board according to the invention is characterized by the novel features enlisted in the characterizing part of patent claim 1.

[0007] It is an advantage of the invention that the insulation board thereof is moisture resistant and respiring and has good heat insulation capacities. This type of insulation board is particularly suited to be used as heat insulation in wooden buildings; as was mentioned above, the board is made of wood fiber.

[0008] Another advantage of the invention is that the insulation board is formed of several porous wood fiber material layers, which are advantageously joined without using any adhesives proper. If an adhesive is used, it is advantageously an ordinary, commercially available

wood adhesive.

[0009] Yet another advantage of the invention is that the wood fiber material layers together form a uniform insulation board without any open air apertures there-between.

[0010] Yet another advantage of the invention is that the insulation board is porous, flexible and easy to handle. It can be installed in place quickly and compactly as a cut-to-size insulation board for instance in between the vertical spars of a wall.

[0011] An embodiment of the invention is described in more detail below, with reference to the appended drawings, wherein

- 15 Figure 1 is a perspective illustration of an insulation board according to the invention;
 Figure 2 illustrates the cross-section A - A of the insulation board of Figure 1;
 Figure 3 illustrates another possible cross-section A - A of the insulation board of Figure 1;
 20 Figure 4 illustrates a third possible cross-section A - A of the insulation board of Figure 1;
 Figure 5 illustrates a fourth possible (partial) cross-section A - A of the insulation board of Figure 1; and
 25 Figure 6 illustrates the section B - B of the insulation board of Figure 5.

[0012] The insulation board 1 comprises a number of overlapping insulation board layers 2. The insulation board layers 2 are made of some porous organic pulp, to which there is possibly added fire retarding agents, anti-rot agents and other similar agents generally used in organic insulants. The said material is advantageously heat fiberized pulp made of pine wood, so-called high-bulk pulp, where the fiber length is in the range 1.0 - 5.0 mm, most advantageously 2.5 - 4.0 mm. The thickness e of the insulation board layer 2 is for instance 2 - 15 mm. In an insulation board layer 2, the fibers are evenly distributed and directed at random to different directions. The insulation board 1 is compiled of for example 10 - 50 insulation board layers 2, in which case the thickness k of the insulation board is for example 25 - 150 mm. The width l and length p of the insulation board 1 are of the order $l = 500 - 900$ mm, and respectively $p = 1,000 - 1,500$ mm, but other measures are possible, too. The heat insulation capacity of the insulation board 1 is advantageously of the order $0,025 - 0,035$ W/mK°. The bulk density of the insulation board 1 is of the order 25 kg/m³. The border areas 3 of the insulation board 1 are formed of a uniform insulating layer 4; 5; 6, located on a perpendicular plane to the insulation board layers 2, and this insulating layer is made of the same organic pulp.

55 **[0013]** The insulation board 1 is advantageously manufactured as follows. Into wood fiber pulp, such as the said high bulk pulp, there are mixed possible fire retarding agents, such as borax, plus possible anti-rot and an-

ti-mildew agents etc, already at the production stage. The insulation board layers 2 are compressed of wood fiber pulp into porous lamellas with a thickness within the range of a few millimeters, as was maintained above. Thereafter the insulation board 1 is compiled by arranging a number of insulation board layers 2 on top of each other and by compressing the lamellas together and cutting them simultaneously to a predetermined width and length. In between the insulation board layers, there can be provided occasional adhesion spots 7, for instance at spaced points, where some adhesive, advantageously wood adhesive, is applied in order to ensure the gripping of the layers (figures 5 and 6).

[0014] The border areas 3 of the insulation board 1 are treated with a water spray or a water-glue spray (this being an aqueous glue mixture made of water and a suitable poisonless glue, such as wood adhesive), which decomposes the wood fiber pulp so that the lignin contained therein is at least partly released. In a way it can be said that the border areas 3 melt owing to the effect of the water. When drying, the wet wood fiber pulp forms a uniform fiber pulp layer, which at the same time binds the insulation board layers 2 together. In the border areas 3, around the insulation board 1, there is now formed a uniform border insulation layer 4 (Figure 2), transversal to the plane of the insulation board 1 and the insulation board layers 2.

[0015] As an alternative, at the edges of the overlapping insulation board layers 2 there are glued, most advantageously with a suitable water-based poisonless adhesive, at right angles with respect to the insulation board layers, an insulation board strip 5, 6, to serve as the border insulation layer, by means of which strip the insulation board layers 2 are primarily interconnected as a uniform insulation board (Figures 3 and 4). In width, the insulation board strip 5 corresponds to the thickness of the insulation board 2 (Figure 3), or the insulation board strip 6 is wider than the thickness k of the insulation board 1 (Figure 4). In the latter case, the edges 6a, 6b of the insulation board strip are turned over and attached, for instance glued, to the top and bottom surfaces of the insulation board 1.

Claims

1. An insulation board (1), which comprises a number of overlapping porous and flexible insulation board layers (2), made of organic wood fiber pulp, such as heat fiberized pulp, where two opposing edges (3a, 3b) of the insulation board (1) are formed of a uniform border insulation layer (4; 5, 6), which is directed at right angles to the insulation board layers (2), **characterized in that** the border insulation layers (4; 5, 6) are of the same material as the insulation board layers (2).
2. The insulation board according to claim 1, **charac-**

terized in that the fiber length in the organic wood fiber pulp is in the range 1.0 - 5.0 mm, most advantageously 2.5 - 4.0 mm.

- 5 3. The insulation board according to claims 1 or 2, **characterized in that** the border insulation layers (4) are formed of the border areas of the insulation board layers (2) by melting them into a uniform, homogeneous pulp.
- 10 4. The insulation board according to claim 1 or 2, **characterized in that** the border insulation layers (5; 6) are formed of insulation board strips.
- 15 5. The insulation board according to claim 4, **characterized in that** the border insulation layers (6) are formed of insulation board strips with their edges (6a, 6b) turned over and attached, advantageously by adhesion, to the top and bottom surfaces of the insulation board (1).
- 20 6. The insulation board according to any of the preceding claims, **characterized in that** the overlapping insulation board layers (2) are interconnected by at least occasional adhesion, advantageously with wood adhesive.
- 25 7. The insulation board according to claim 6, **characterized in that** in between insulation board layers (2), there are arranged spaced adhesion spots (7).
- 30 8. The insulation board according to any of the preceding claims, **characterized in that** in the wood fiber pulp of the insulation board layers (2), there are mixed fire retarding agents, such as borax, and/or anti-rot agents and/or anti-mildew agents.

Patentansprüche

- 40 1. Isolationspaneel (1), welches eine Reihe von überlappenden, porösen und flexiblen, aus organischem Holzfaserbrei, wie zum Beispiel hitzefaserisierter Brei, hergestellten Isolationspaneelschichten (2) umfaßt, wobei zwei einander abgewandte Kanten (3a, 3b) des Isolationspaneels (1) aus einer gleichmäßigen Randisolationssschicht (4; 5, 6) gebildet sind, welche im rechten Winkel zu den Isolationspaneelschichten (2) ausgerichtet ist, **dadurch gekennzeichnet, dass** die Randisolationssschichten (4; 5, 6) aus demselben Material wie die Isolationspaneelschichten (2) bestehen.
- 45 2. Isolationspaneel nach Anspruch 1, **dadurch gekennzeichnet, dass** die Faserlänge in dem organischen Holzfaserbrei im Bereich von 1,0 bis 5,0 mm, vorteilhafter 2,5 bis 4,0 mm, liegt.

3. Isolationspaneel nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Randisolations-schichten (4) aus den Randbereichen der Isolationspaneelschichten (2) gebildet sind, indem diese in eine gleichmäßigen homogenen Brei geschmolzen werden.
4. Isolationspaneel nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Randisolations-schichten (5; 6) aus Isolationspaneelstreifen gebildet sind.
5. Isolationspaneel nach Anspruch 4, **dadurch gekennzeichnet, dass** die Randisolations-schichten (6) aus Isolationspaneelstreifen gebildet sind, deren Ränder (6a, 6b) umgebogen sind und auf den oberen und unteren Oberflächen des Isolationspaneels (1), vorteilhaft durch verkleben, befestigt sind.
6. Isolationspaneel nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die überlappenden Isolationspaneelschichten (2) durch wenigstens gelegentliche Verklebung, vorteilhaft mit Holzkleber, verbunden sind.
7. Isolationspaneel nach Anspruch 6, **dadurch gekennzeichnet, dass** zwischen den Isolationspaneelschichten (2) in Abständen Klebpunkte (7) angeordnet sind.
8. Isolationspaneel nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** in den Holzfaserbrei der Isolationspaneelschichten (2) Flamm-schutzmittel, wie z. B. Borax, und/oder Anti-Fäul-nismittel und/oder Anti-Schimmelmittel gemischt sind.

Revendications

1. Panneau d'isolation (1), qui comporte plusieurs couches de panneau d'isolation poreuses et souples se chevauchant (2), constituées d'une pâte de fibre de bois organique, telle que de la pâte mise en fibre à chaud, deux bords opposés (3a, 3b) du panneau d'isolation (1) étant constitués d'une couche d'isolation uniforme de bordure (4 ; 5, 6) qui est dirigée perpendiculairement par rapport aux couches de panneau d'isolation (2), **caractérisé en ce que** les couches d'isolation de bordure (4 ; 5, 6) sont constituées du même matériau que les couches de panneau d'isolation (2).
2. Panneau d'isolation selon la revendication 1, **caractérisé en ce que** la longueur de fibre dans la

pâte de fibre de bois organique est dans la plage allant de 1,0 à 5,0 mm, de la manière la plus avantageuse de 2,5 à 4,0 mm.

3. Panneau d'isolation selon la revendication 1 ou 2, **caractérisé en ce que** les couches d'isolation de bordure (4) sont constituées des zones de bordure des couches de panneau d'isolation (2) en les faisant fondre en une pâte homogène uniforme.
4. Panneau d'isolation selon la revendication 1 ou 2, **caractérisé en ce que** les couches d'isolation de bordure (5 ; 6) sont constituées de bandes de panneau d'isolation.
5. Panneau d'isolation selon la revendication 4, **caractérisé en ce que** les couches d'isolation de bordure (6) sont constituées de bandes de panneau d'isolation ayant leurs bords (6a, 6b) retournés vers les surfaces supérieure et inférieure du panneau d'isolation (1), et fixés sur celles-ci, de manière avantageuse par mise en adhérence.
6. Panneau d'isolation selon l'une quelconque des revendications précédentes, **caractérisé en ce que** les couches de panneau d'isolation se chevauchant (2) sont connectées mutuellement par au moins une mise en adhérence occasionnelle, de manière avantageuse à l'aide d'adhésif pour bois.
7. Panneau d'isolation selon la revendication 6, **caractérisé en ce qu'**entre les couches de panneau d'isolation (2), on a agencé des points d'adhérence espacés (7).
8. Panneau d'isolation selon l'une quelconque des revendications précédentes, **caractérisé en ce que** dans la pâte de fibre de bois des couches de panneau d'isolation (2), on a mélangé des agents retardateurs de feu, tels que du borax, et/ou des agents antimoisissure et/ou des agents anti-mildiou.

FIG. 1

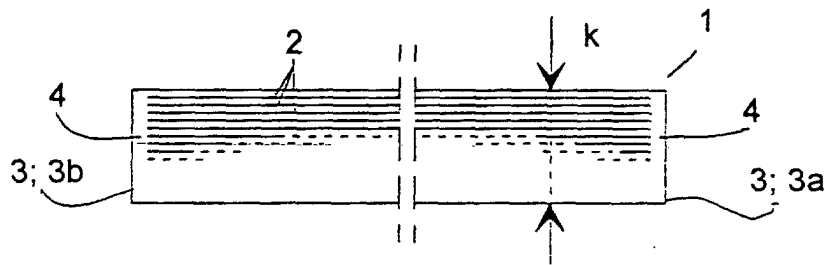
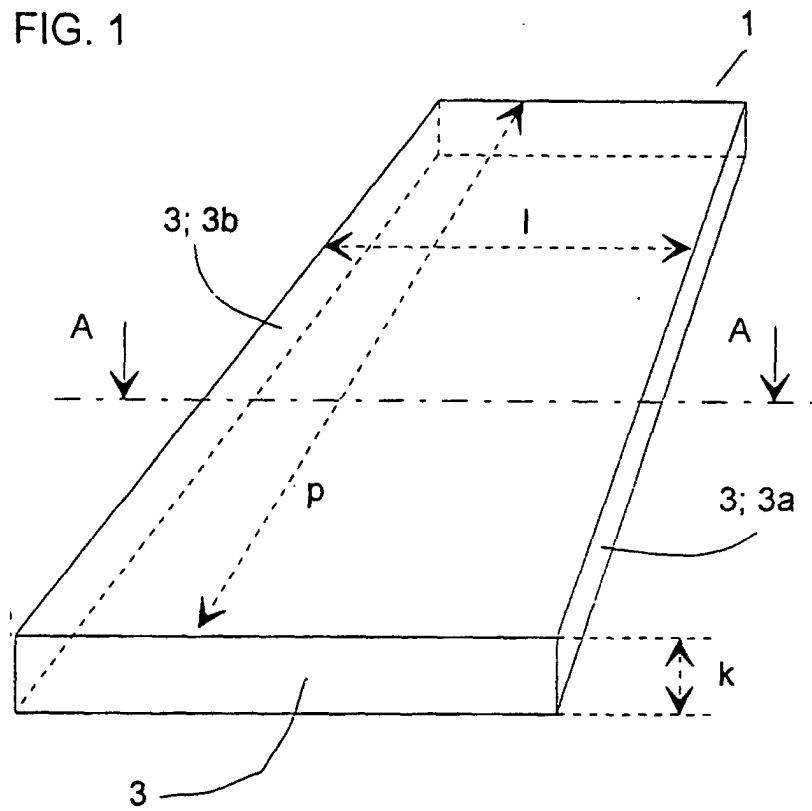


FIG. 2

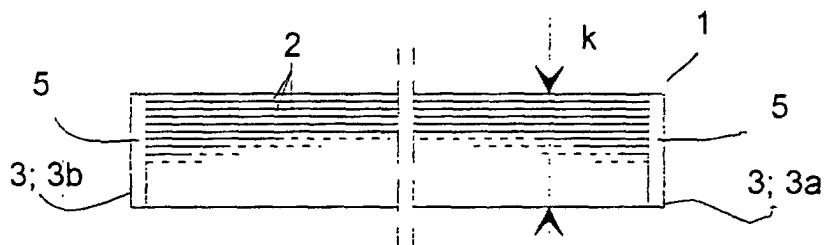


FIG. 3

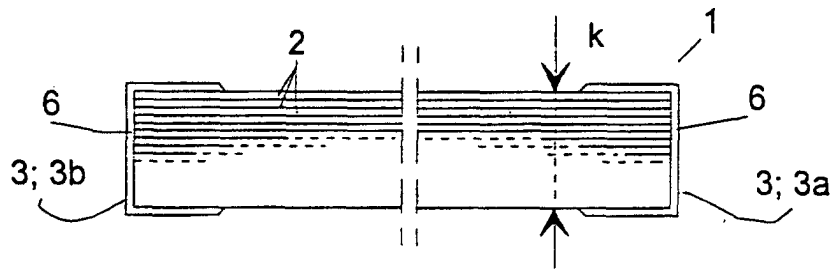


FIG. 4

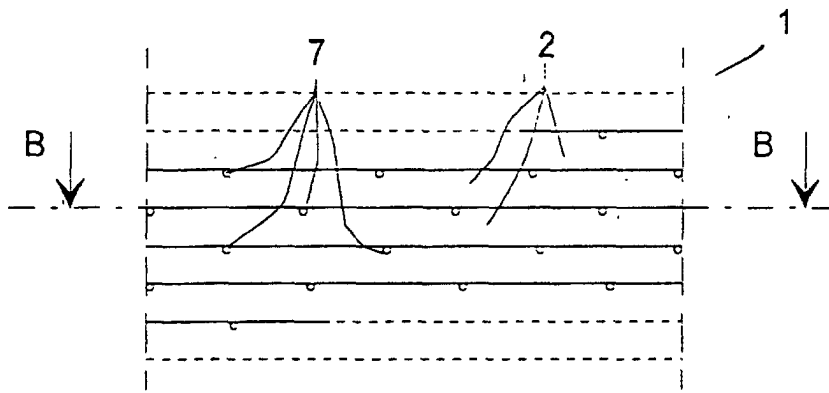


FIG. 5

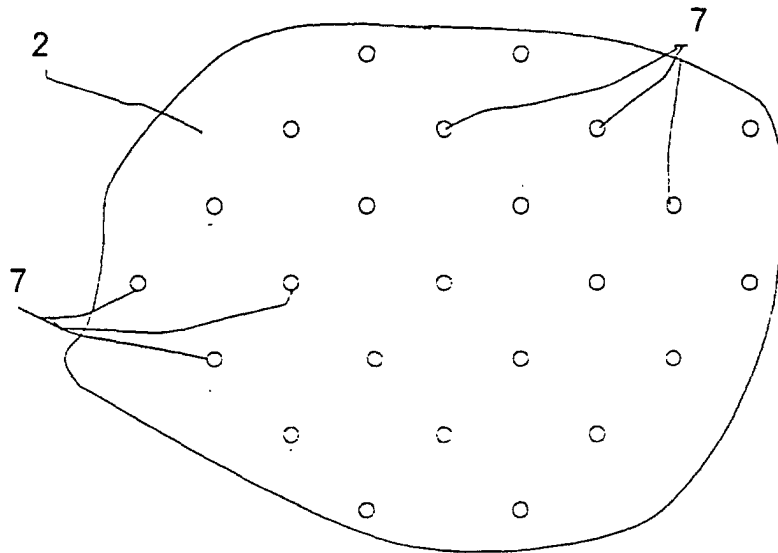


FIG. 6