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(71) Applicant: **Ekstrand & Son AB**
283 22 Osby (SE)

(72) Inventor: **Ekstrand, Bo**
283 91, OSBY (SE)

(74) Representative: **Simonsson, Erik**
Awapatent AB
P.O. Box 99
351 04 Växjö (SE)

(54) Door

(57) The invention concerns a door (1) including a first board (4), that defines a first flat side (6) of the door, an opposite second board (5), that defines a second flat side (7) of the door, and a framework (3), that is placed between said boards (4, 5). The framework (3) is permanently attached to the boards (4, 5) and extends along edges of these. Each board (4, 5) has on an inside facing the framework a first layer (4.1, 5.1), that comprises of a sheet of highpressure laminate, and on an outside of said first layer (4.1, 5.1) a second layer (4.2, 5.2), that comprises of a sheet containing a thermosetting plastic or plastic granules and a bonding agent, wherein the second layer (4.2, 5.2) in relation to the first layer (4.1, 5.1) has at least the double thickness.

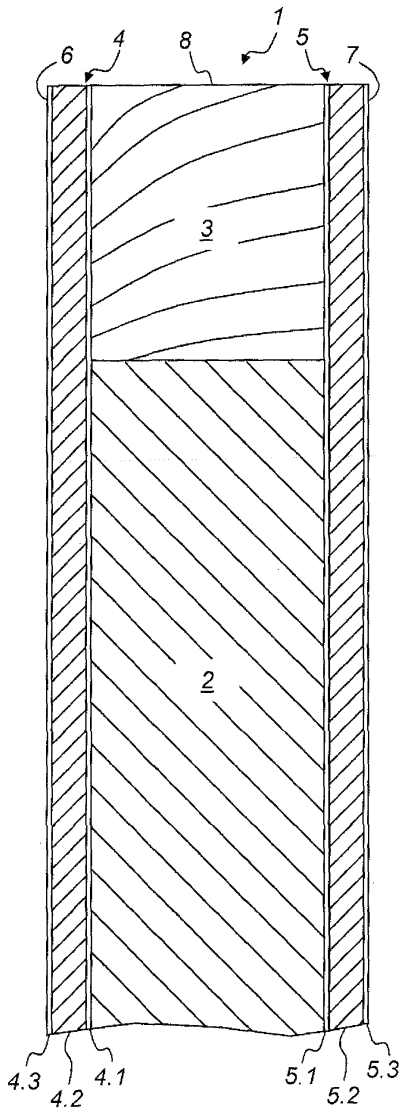

Fig 1

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Description

Technical Field

[0001] The present invention concerns a door including a first board, that defines a first flat side of the door, an opposite second board, that defines a second flat side of the door, and a framework, that is placed between said boards, wherein the framework is permanently attached to the boards and extends along edges of these, and wherein each board on an inside facing the framework has a first layer, that comprises of a sheet of high-pressure laminate.

Prior Art

[0002] Doors that are used in environments, in which frost occurs, such as entrance doors on northern latitudes, need in order to function in the long run a good built-in protection against moisture entry. If this protection is insufficient the door inevitably is bound to warp or is affected by frost erosion, which for instance can lead to delamination.

[0003] A common way to achieve protection against moisture entry is use of an aluminum sheet between the surface layer of the door and an inner framework thereof. The sheet works well as a moisture protection for the framework as such, but does not prevent entry of moisture into the surface layer of the door. Thus delamination between the aluminum sheet and the surface layer is by no means an exceptional problem with such doors.

[0004] A second problem especially with aluminum sheets is that the material has a rather large thermal expansion coefficient of 2,3 mm/metre/100 Kelvin. In wintertime for a door with a typical height of two metres this can mean temperature depending length differences of approximately 2 mm between the outside and the inside of the door at an outdoor temperature of -25°C and an indoor temperature of +20°C. This is of course disadvantageous for the dimensional stability of the door and can also contribute to the delamination mentioned above.

[0005] Today one therefore offers doors, in which different moisture proof surface materials of plastic come into use, above all in the form of cast or injection-moulded sheets. However, the costs for such doors are often significant, in particular if premium plastic materials are chosen showing good stability and little temperature dependency, wherein the costs due to the epithet "plastic" often can be difficult to price to the consumers.

[0006] All this has recently led to experiments with doors, that have flat sides made of thick high-pressure laminate sheets, wherein thick in this context means thicknesses of 4 mm and more. Such thick sheets, which in a known way are made of many layers of paper and phenolic resin, are of course not cheap either, but one expects that consumers will consider doors with such sheets to be more solid and therefore more purchase worthy. Moreover, one expects that they also in the long run will provide good protection especially against moisture entry.

[0007] The document US 4 146 662 discloses an alternative to the described thick sheets of high-pressure laminate, wherein a door face comprises of thin sheets of high-pressure laminate which are glued onto both sides of a wooden veneer. Such a door face can due to the material choice be produced at a lower cost than a door face including thick sheets of solid high-pressure laminate, but due to the wooden veneer there is great risk of moisture damages, delamination and so on.

Object of the Invention

[0008] In the light of the above the object of the invention is to further develop the idea of using high-pressure laminate sheets towards lower manufacturing costs, better heat insulation in spite of an unchanged total thickness and an enhanced freedom of design.

Summary of the Invention

[0009] According to the invention this object is achieved by means of a door according to the preamble, said door being **characterised in that** each board on an outside of said first layer has a second layer, that comprises of a sheet containing a thermosetting plastic or plastic granules and a bonding agent, wherein the second layer in relation to the first layer has at least the double thickness. Surprisingly it shows that even a door with a rather thin sheet of high-pressure laminate, laminated onto a somewhat thicker second sheet of thermosetting plastic or of plastic granules and a bonding agent, well meets all claims on moisture proofness and dimensional stability, despite the fact that the material costs become considerably lower. Moreover, the second sheet heat insulates rather well and is easier to work upon than a solid thick sheet of high-pressure laminate.

[0010] Preferably each board outside the second layer has a third layer, that comprises of a sheet of high-pressure laminate, wherein the second layer in relation to the third layer has at least four times the thickness thereof. In other words, according to this embodiment a sandwich is created, that provides for added rigidity compared with the first embodiment, wherein in this sandwich the first and the third layers preferably have the same thickness.

[0011] According to the invention the sheet material selected is rather easy to work upon and therefore it is possible, if desired, to form on at least one of the flat sides of the door decorative grooves in a board, said grooves leaving the first layer of the board intact. Hence, the dimensional stability is preserved on an acceptable high level.

[0012] According to a preferred embodiment of the invention the boards are glued directly to the framework, said framework having a filling of a dimensionally stable insulating material, that also is glue to the boards. Such a solution provides for unchanged properties during long

time.

[0013] According to the invention the first layer of high-pressure laminate has a thickness in the interval of 0,5 - 3,0 mm, preferably in the interval of 0,7 - 1,2 mm and most preferred of 0,8 mm, wherein the bigger thicknesses primarily come into use for solutions with only one sheet of high-pressure laminate on each side of the door and the smaller thicknesses primarily come into use for solutions with two sheets of high-pressure laminate on each side of the door (the sandwich mentioned above).

[0014] The plastic granules of the second layer preferably consist of shred, regained polyurethane of a mixed fraction. Such a regained material is rather inexpensive and is offered for sale in the form of sheets, for instance labeled Ekronit ™, which are held together by means of a bonding agent, such as isocyanate.

[0015] The bonding agent of the second layer suitably is diffusion proof, which also promotes the moisture proofness of the door.

Short Description of the Drawings

[0016] Two embodiments of the invention are described in more detail in the following with reference to the schematic drawings enclosed, on which:

Fig. 1 shows a cross-sectional view of an edge part of a door according to a first embodiment of the invention; and

Fig. 2 shows a corresponding cross-sectional view of an alternative embodiment of a door according to the invention.

Description of Two Embodiments

[0017] The door 1 shown in fig. 1 of the drawings is intended to be used as an entrance door especially in cold climates. Therefore it contains insulation 2 in the form of a dimensionally stable expanded plastic core (EPS or PUR), that fills the space inside of a rectangular wooden framework 3, which for instance can be sized WxHxD 920x2000x50 mm. Then the framework timber itself can have a cross-section of for instance 60x50 mm and is preferably of pinewood.

[0018] On each side of the framework 3 a first and a second board 4, 5 are attached by means of an appropriate moisture proof glue, such as a PUR glue. The boards 4, 5 define a first and a second flat side 6, 7 respectively of the door 1, which means that the framework 3 only shows along edges 8 of the door 1, that is, in case the door 1 does not have a rebate. The boards 4, 5 have a thickness of 8,6 mm each, which means that the described door 1 has a total thickness of 67,2 mm.

[0019] Both boards 4, 5 are identically made and comprise of three layers each. The first or internal layer, thus the one facing the framework 3, is a layer 4.1, 5.1 of high-pressure laminate. High-pressure laminates are offered for sale in the form of sheets with thickness dimensions ranging from approximately 0,5 mm to 20 mm and consist of a large number of sheets of paper, which with the aid of phenolic resin and high pressure have been formed into a unit, that has a rather hard surface, is diffusion or moisture proof and has a rather small coefficient of expansion. In the embodiment shown in fig. 1 the layers 4.1, 5.1 have a thickness of 0,8 mm.

[0020] Outside the first layer 4.1, 5.1 in the boards 4, 5 there is a second layer 4.2, 5.2 each. In the embodiment they consist of granules of polyurethane (especially regained), which with the aid of isocyanate as a bonding agent have been shaped into sheets. In the case at hand the sheets have a thickness of 7 mm, but, if one desires to form decorative grooves 9 in one of the flat sides 6, 7 of the door 1, they can be thicker than that or doubled, which without any further detailed description is shown in fig. 2. It is however important that such grooves 9 never affect one of the first layers 4.1, 5.1, since otherwise the moisture proofness of the door 1 would be jeopardized. The first and the second layers 4.1, 5.1, 4.2, 5.2 are attached to each other with the aid of a moisture proof glue, as for instance a PUR glue.

[0021] Preferably on the outside of each second layer 4.2, 5.2 there is a third layer 4.3, 5.3, which like the first layer comprises of a sheet shaped high-pressure laminate with a thickness corresponding to the one of the first layer 4.1, 5.1. Since the third layers 4.3, 5.3 have an outside that appears on the flat sides 6, 7 of the door 1, the high-pressure laminate of the third layers 4.3, 5.3 in a well-known way can be tinted or for instance wood patterned (compare kitchen worktops). However, they can also, exactly as the second layer 4.2, 5.2 where it shows, simply be varnished, wherein they due to their density form a basis, onto which the paint sticks for long time without risk for crackling. The second and third layers 4.2, 5.2, 4.3, 5.3 are like the layers described above also attached to each other with the aid of a moisture proof glue, such as a PUR glue.

[0022] In the light of fig. 2, which is mentioned above and for which the description concerning fig. 1 stands too, it is obvious that the door 1 described before can be altered in different ways within the scope of the claims. Thus it has shown that even a structure without an outer, third layer 4.3, 5.3 works (not shown), wherein it however can be appropriate to then somewhat increase the thickness of the inner, first layer 4.1, 5.1. In the claims this is considered by indicating of appropriate intervals of thickness in relation to the thickness of the second layer 4.2, 5.2, so that it clearly shows that the second layer 4.2, 5.2, which according to the invention comprises of a relatively cheap material with a certain insulation capability, generally is much thicker than both the first and the third layers 4.1, 5.1, 4.3, 5.3. This contributes to low production costs and favourable heat insulation properties.

Claims

1. Door (1) including a first board (4), that defines a first flat side (6) of the door, an opposite second board (5), that defines a second flat side (7) of the door, and a framework (3), that is placed between said boards (4, 5), wherein the framework (3) is permanently attached to the boards (4, 5) and extends along edges of these, and wherein each board (4, 5) on an inside facing the framework (3) has a first layer (4.1, 5.1), that comprises of a sheet of high-pressure laminate, **characterised in that** each board (4, 5) on an outside of said first layer (4.1, 5.1) has a second layer (4.2, 5.2), that comprises of a sheet containing a thermosetting plastic or plastic granules and a bonding agent, wherein the second layer (4.2, 5.2) in relation to the first layer (4.1, 5.1) has at least the double thickness.

2. Door (1) according to claim 1, wherein each board (4, 5) outside the second layer (4.2, 5.2) has a third layer (4.3, 5.3), that comprises of a sheet of high-pressure laminate, and wherein the second layer (4.2, 5.2) in relation to the third layer (4.3, 5.3) has at least four times the thickness thereof.

3. Door (1) according to claim 2, wherein the first (4.1, 5.1) and the third (4.3, 5.3) layers of each board (4, 5) have the same thickness.

4. Door (1) according to anyone of claims 1-3, wherein at least one of the flat sides (6, 7) of the door has decorative grooves (9) formed in a board (4, 5), said grooves (9) leaving the first layer (4.1, 5.1) of the board (4, 5) intact.

5. Door (1) according to anyone of claims 1-4, wherein the boards (4, 5) are glued directly to the framework (3).

6. Door (1) according to claim 5, wherein the framework (3) has a filling (2) of a dimensionally stable insulating material, that also adheres the boards (4, 5).

7. Door (1) according to anyone of claims 1-6, wherein the first layer (4.1, 5.1) of high-pressure laminate has a thickness in the interval of 0,5 - 3,0 mm, preferably in the interval of 0,7 - 1,2 mm and most preferred of 0,8 mm.

8. Door (1) according to anyone of claims 1-7, wherein the plastic granules of the second layer (4.2, 5.2) comprises of shred, regained polyurethane of a mixed fraction.

9. Door (1) according to anyone of claims 1-8, wherein the bonding agent of the second layer (4.2, 5.2) is isocyanate.

10. Door (1) according to anyone of claims 1-9, wherein the bonding agent of the second layer (4.2, 5.2) is diffusion proof.

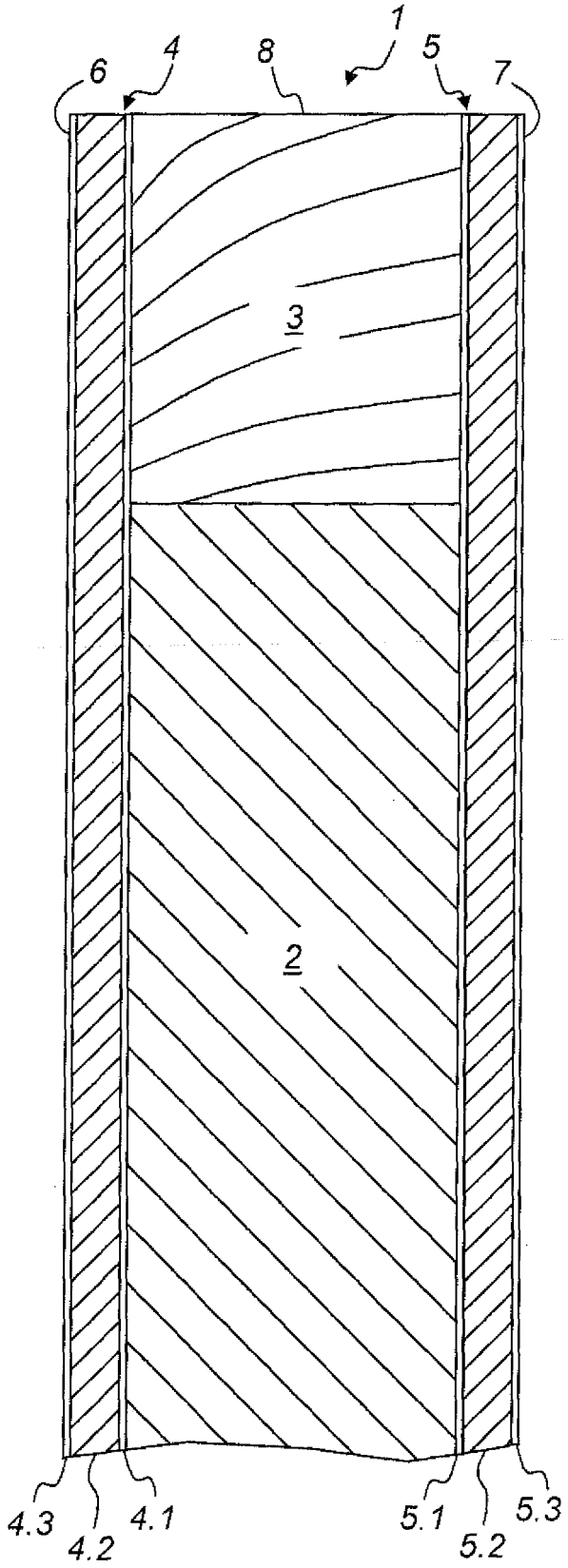

Fig 1

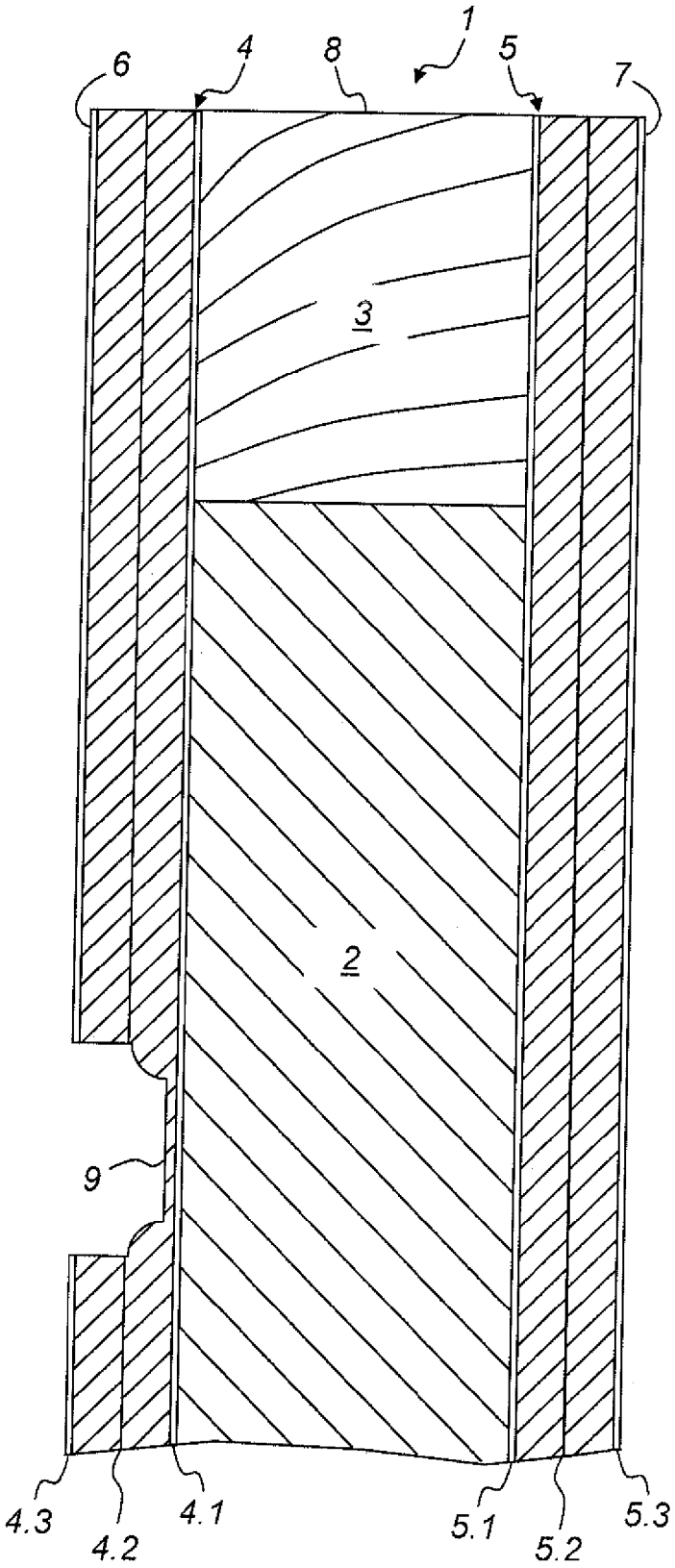

Fig 2

REFERENCES CITED IN THE DESCRIPTION

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