



Patent- og  
Varemærkestyrelsen

- (51) Int.Cl.<sup>®</sup>: **E 06 B 5/16 (2006.01)**                      **B 32 B 21/04 (2006.01)**                      **B 32 B 21/14 (2006.01)**  
**E 06 B 3/70 (2006.01)**
- (21) Patentansøgning nr: **PA 2010 70429**
- (22) Indleveringsdag: **2010-10-01**
- (24) Løbedag: **2010-10-01**
- (41) Alm. tilgængelig: **2012-04-02**
- (45) Patentets meddelelse bkg. den: **2012-01-30**
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- (54) Benævnelse: **Insulated composite door with a layer of high pressure laminate**
- (56) Fremdragne publikationer:  
**WO A1 03066321**  
**EP A1 2065183**  
**EP A2 2192258**  
**EP B1 1327048**  
**US B1 6497938**  
**US A 4146662**  
**US A1 2007196676**  
**DE A1 19542497**

- (57) Sammendrag:

An insulated composite door (1) comprising a wooden frame (2) covered by a facing sheet layer (3,4) on one major surface of the door, said facing sheet layer comprising a layer of veneer (5) and a layer of High Pressure Laminate (6), said layer of High Pressure Laminate being arranged further from the centre of the door than the layer of veneer, and where the thickness of the layer of High Pressure Laminate is greater than 3mm.

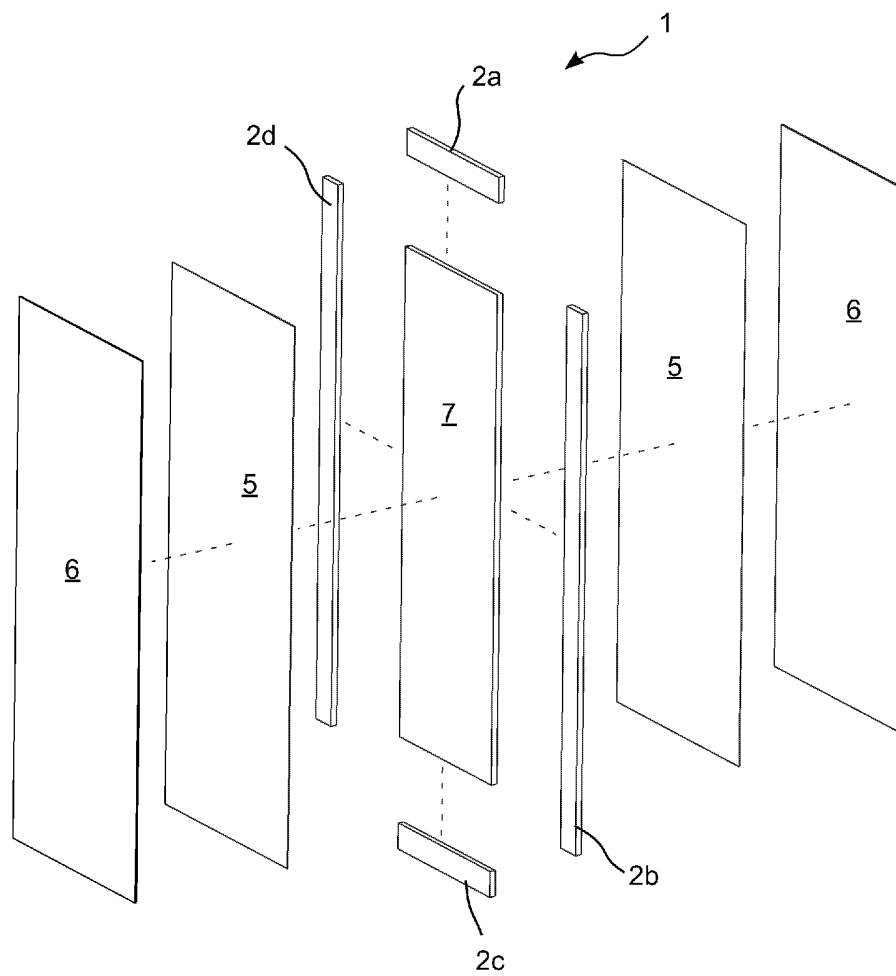


Fig. 5

Insulated composite door with a layer of High Pressure Laminate

5 The current invention relates to an insulated composite door comprising a wooden frame covered by a facing sheet layer on one major surface of the door, said facing sheet layer comprising both a layer of veneer and a layer of High Pressure Laminate, said layer of High Pressure Laminate being arranged further from the centre of the door than the layer of veneer.

10

Description of related art

Traditional insulated composite doors are formed from a wooden rectangular frame with a facing sheet layer of plywood glued to both sides of the frame.

15 This results in a light, cheap and strong door.

More advanced insulated composite doors comprise facing sheet layers comprising a number of different layers having different properties. For example, it is common to provide a facing sheet layer comprising a veneer layer arranged closest to the frame, then a thin aluminium sheet layer which acts as a vapour barrier and then one or more external veneer layers to give a combination of strength and a nice appearance.

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More recently plastic materials have also started to be used on doors. For example thin layers of resin impregnated overlays have been added to the outside surface of insulated composite doors. Resin impregnated overlays are usually comprised of one or more layers of paper or thin fabric which are saturated with resin and pressed together under high pressure. For examples of such doors, see WO 2003/066321, EP 2192258, EP 2065183 and EP

30 1327048.

Summary of the invention

5 The prior art doors however all have various disadvantages as will be known to the person skilled in the art. It is therefore a first aspect of the current invention to provide a new type of insulated composite door having advantages over the prior art types of insulated composite doors.

10 This first aspect is provided by an insulated composite door as mentioned in the opening paragraph where the thickness of the layer of High Pressure Laminate (HPL) is greater than 3mm. In this way, the layer of HPL acts as a proper vapour barrier without the need for an aluminium layer. Furthermore, the thickness of the HPL allows grooves to be machined into the exposed surface of the door without breaking through the HPL layer.

15 Previously, it has not been thought possible to build an insulated composite door with a wooden frame and a thick layer of HPL due to the fact that HPL is a material which has very low coefficients of expansion due to heat and/or moisture whereas wood has much higher coefficients of expansion due to  
20 heat and/or moisture. By gluing a thick layer of HPL to a wooden frame, there would be serious delamination problems when the door was exposed to heat and/or moisture. However, by adding a thin layer of veneer between the wooden frame and the thick HPL layer, these problems are avoided. In the prior art insulated composite doors which comprise a layer of HPL, a thick  
25 veneer layer is fastened to the wooden frame and a thin layer of HPL is fastened to the veneer layer.

Additional aspects of the invention are provided by the dependent claims.

30 It should be emphasized that the term "comprises/comprising/comprised of" when used in this specification is taken to specify the presence of stated

features, integers, steps or components but does not preclude the presence or addition of one or more other features, integers, steps, components or groups thereof. For example, in the claims it is stated that the door comprises a facing sheet layer arranged on one major surface of the door. However, it should be clear to the reader, that this should be understood as “arranged on at least one major surface of the door”. The case where both major surfaces of the door are covered by a facing sheet layer is also included in the scope of protection. The facing sheet layers on the two major surfaces of the door could be identical or different. For example, on one side of the door could be arranged a facing sheet layer according to the invention whereas on the other side only a simple veneer layer could be provided. Many possibilities will be available as should be understood by the person skilled in the art.

#### Brief description of the drawings

In the following, the invention will be described in greater detail with reference to embodiments shown by the enclosed figures. It should be emphasized that the embodiments shown are used for example purposes only and should not be used to limit the scope of the invention.

Figure 1 shows a perspective view of an insulated composite door according to the current invention.

Figure 2 shows a cross section view according to the line II-II defined in figure 1.

Figure 3 shows a detailed cross section according to the circle III defined in figure 2.

Figure 4 shows a cross section view according to the line IV-IV defined in figure 1.

Figure 5 shows a perspective exploded view of the insulated composite door shown in figure 1.

#### 5 Detailed description of the embodiments

The door 1 shown in figures 1-5 comprises a wooden frame 2 which is made up of four frame elements 2a,2b,2c,2d. Two horizontal frame members 2a,2c are joined together to two vertical members 2b,2d to make up the rectangular frame. In a typical frame, the frame elements would be joined together with fastening means (not shown) at the corners. A non-limiting list of example fastening means includes dowels, screws, nails and glue. The wooden frame when assembled has two major surfaces and four edge surfaces.

15 A facing sheet layer 3, 4 is then fastened to each of the two major surfaces of the rectangular frame with an adhesive. The facing sheet layers 3, 4 are identical in the current embodiment. The facing sheet layers 3, 4 both comprise a thin layer of veneer 5 adjacent to the wooden frame and a thicker layer of HPL 6 arranged on the layer of veneer. The veneer layer 5 in the current embodiment is formed from a material having a high porosity which can absorb a large amount of adhesive and in this way establish a good connection to the HPL layer 6 and to the wooden frame 2. In the current embodiment, the layer of veneer is 1,5mm thick and the layer of HPL is 4 mm thick. It has been found that layers of HPL having a thickness of greater than or equal to 4mm can in certain cases be advantageous, since this allows a deeper groove to be machined into the door without breaking through the HPL layer.

30 In the current embodiment, the door is designed as an exterior door. In this case, the layer of HPL would be chosen as a type of HPL which is suitable for external use.

In the hollow of the door between the frame and the facing sheet layers is arranged an insulating core of insulation material 7.

5 As can be seen from the figures, in the current embodiment, the facing sheet layers 3,4 cover essentially the entire surface area of the major surfaces of the door. The wooden frame defines the exterior dimensions of the surface area of the door and the facing sheet layers provide a covering for the door.

10 One method of manufacturing the insulated composite door according to the invention would proceed according to the following description. A layer of HPL and a layer of veneer are provided and the layer of veneer is glued to one side of the layer of HPL to form a first compound layer. The compound layer is pressed in a press at a high pressure. A second compound layer  
15 identical to the first compound layer is then provided. The frame members 2a,2b,2c,2d are then assembled around the insulating core 7 and nailed at the corners. A compound layer of veneer and HPL is then glued to each side of the wooden door frame with the layer of veneer being in contact with the door frame.

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However, many different combination possibilities with regards to the method of manufacture will be possible and should be understandable to the person skilled in the art. For example, it is not necessary that two identical compound layers be fastened to the two sides of the door. One side could be  
25 according to the current invention, the other side could be something different. Another example could be that the different layers are all glued together in a single operation and then the entire door is pressed in a press in one step. It should also be mentioned that the steps of the method above are varied, for example, the frame could be assembled before the compound  
30 layers are provided.

While the figures do not show it, it is possible to machine grooves into the exterior HPL layer which can be used to give the door a more interesting visual appearance. For example, spaced apart vertically arranged grooves which run the length of the door give the door a nice visual appearance.

5 These grooves are typically at least 2mm deep.

It should be noted that the figures have only shown one embodiment, however the person skilled in the art will be able to develop other insulated composite doors which are covered by the teaching of this invention. For  
10 example, the embodiment shown has been a rectangular door, however, one could also imagine doors with a non-rectangular shape, for example a door with an arc shaped top portion.

It is to be noted that the figures and the above description have shown the  
15 example embodiments in a simple and schematic manner. Detailed mechanical features have not been shown since the person skilled in the art should be familiar with these details and they would just unnecessarily complicate this description. For example, the frame members are shown as simple rectangular elements. However in a real insulated composite door, the  
20 frame members are often formed with engaging elements or fasteners whereby the frame members are structurally joined together before the facing sheet layers are applied.

25



## Krav

1. En isoleret kompositdør (1) omfattende en træramme (2) med to hovedflader, hvoraf den ene af de to hovedflader er dækket af en dækplade (3,4), hvilken dækplade omfatter et lag finér (5) og et lag højtryksslaminat (6), hvilket lag højtryksslaminat er placeret længere væk fra dørens midte end finérlaget, **kendetegnet ved**, at tykkelsen på laget af højtryksslaminat er større end 3mm.
2. En isoleret kompositdør (1) ifølge krav 1, **kendetegnet ved**, at finérlaget (5) er limet til dørens træramme (2).
3. En isoleret kompositdør (1) ifølge et hvilket som helst af kravene 1-2, **kendetegnet ved**, at laget af højtryksslaminat (6) er limet til finérlaget (5).
4. En isoleret kompositdør (1) ifølge et hvilket som helst af kravene 1-3, **kendetegnet ved**, at tykkelsen på finérlaget (5) er mellem 1 og 2 mm.
5. En isoleret kompositdør (1) ifølge et hvilket som helst af kravene 1-4, **kendetegnet ved**, at laget af højtryksslaminat (6) er mindst to gange større end tykkelsen på finérlaget (5).
6. En isoleret kompositdør (1) ifølge et hvilket som helst af kravene 1-5, **kendetegnet ved**, at en dekorativ rille er fræset ind i den synlige flade af laget af højtryksslaminat (6).
7. En isoleret kompositdør (1) ifølge krav 6, **kendetegnet ved**, at rillen har en dybde på mindst 2 mm.

8. En bygning omfattende en isoleret kompositdør (1) ifølge et hvilket som helst af kravene 1-7, hvilken dør er anbragt som en udvendig dør, og hvor laget af HPL (6) er anbragt på den udvendige side af døren.

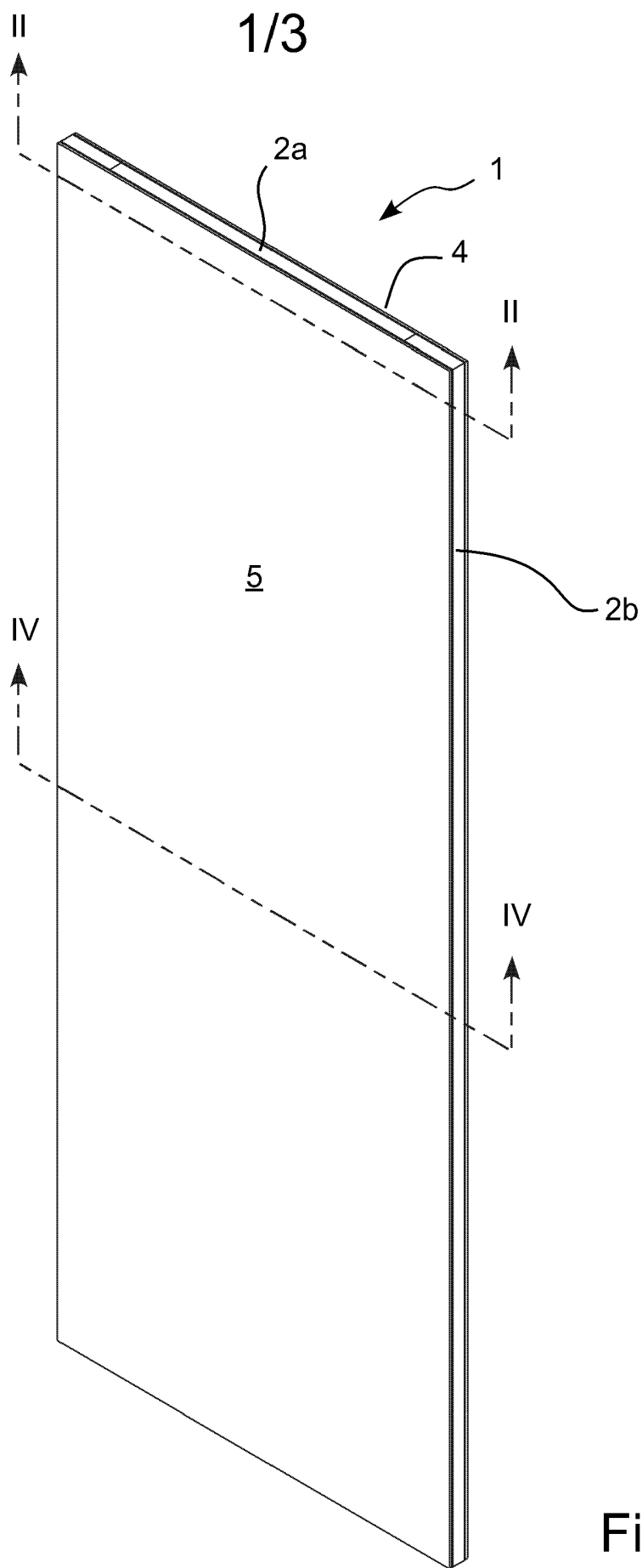


Fig. 1

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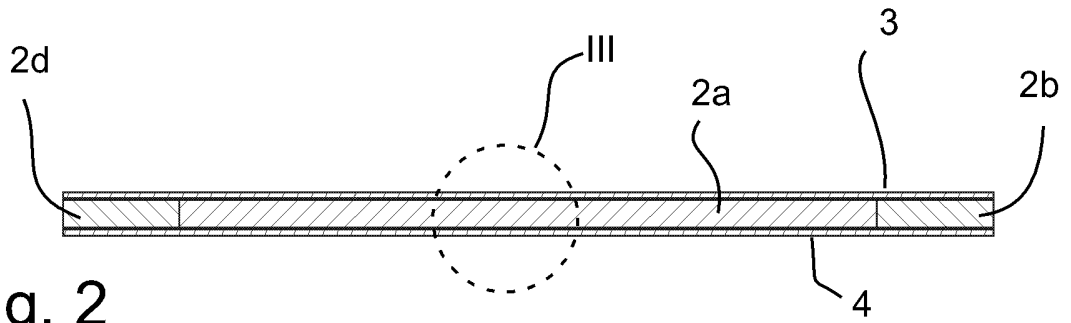


Fig. 2

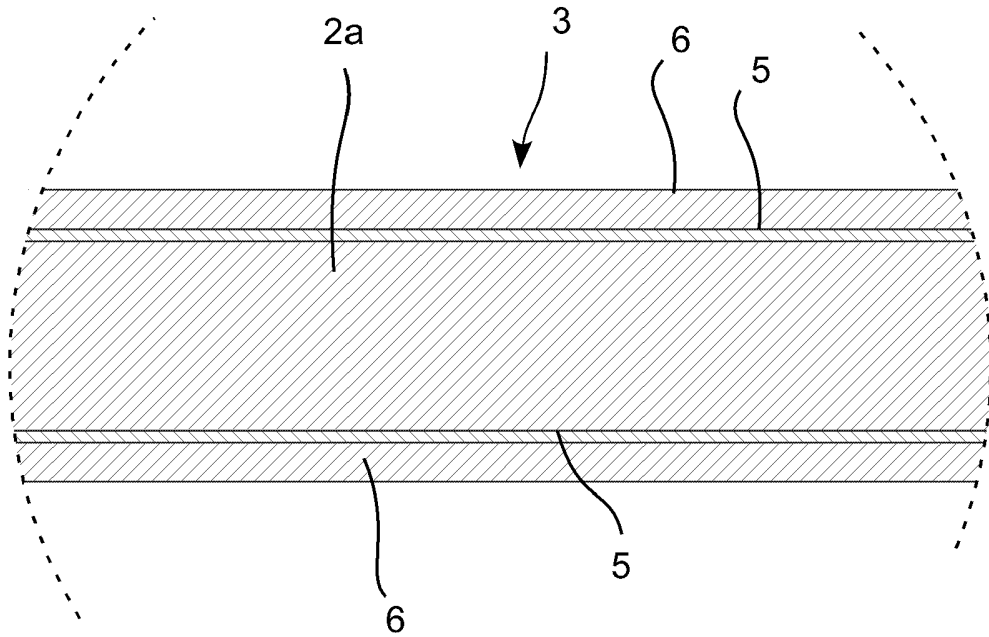


Fig. 3

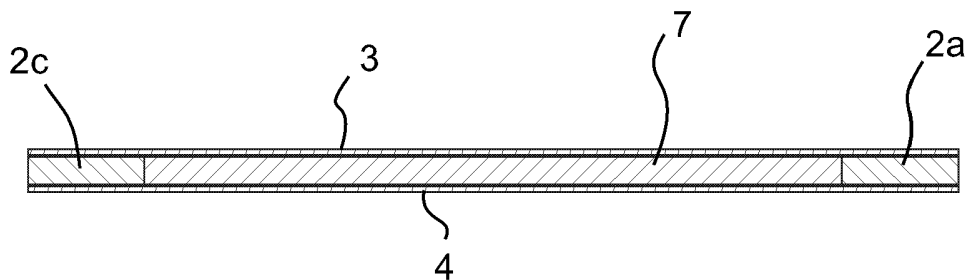


Fig. 4

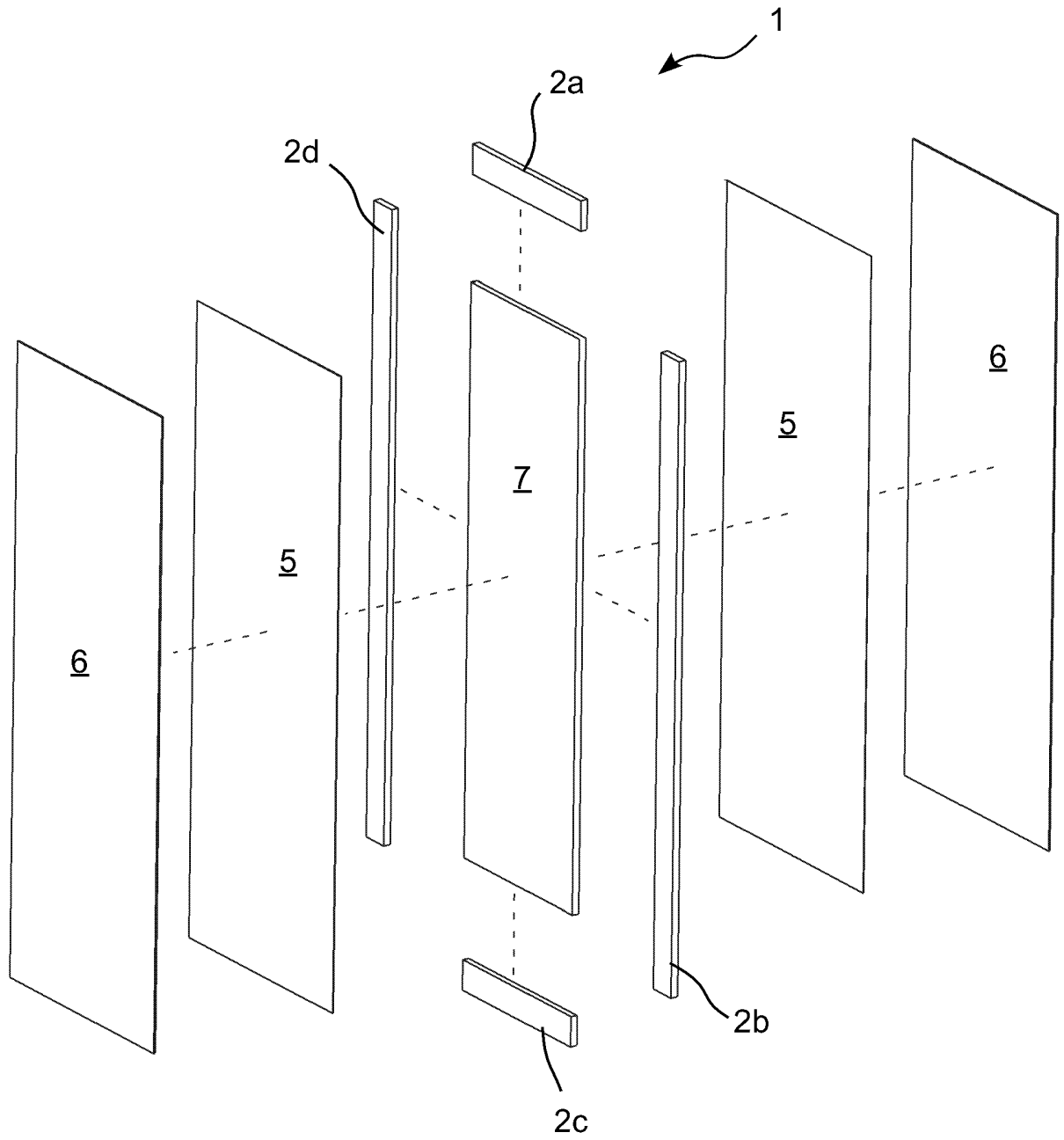


Fig. 5