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(54) Titre : PANNEAU COMPOSITE
(54) Title: COMPOSITE PANEL

(57) Abrégé/Abstract:
A composite panel comprising an in-plant assembly and an elastomer membrane. Two or more layers of insulating panels support the elastomer membrane, a first of the two layers laminated to the elastomer membrane. An adhesive layer and backing sheet are provided, the adhesive layer being on a second of the two layers of insulating panels. A method for fabricating a composite panel, comprises in plant: forming at least a first layer of insulating material. An elastomer membrane is cut to a size sufficient to cover the first layer and extend at least beyond one edge of the first layer. The cut elastomer membrane is heated while separate from the first layer. The heated elastomer membrane is heated onto the first layer.

ABSTRACT

A composite panel comprising an in-plant assembly and an elastomer membrane. Two or more layers of insulating panels support the elastomer membrane, a first of the two layers laminated to the elastomer membrane. An adhesive layer and backing sheet are provided, the adhesive layer being on a second of the two layers of insulating panels. A method for fabricating a composite panel, comprises in plant: forming at least a first layer of insulating material. An elastomer membrane is cut to a size sufficient to cover the first layer and extend at least beyond one edge of the first layer. The cut elastomer membrane is heated while separate from the first layer. The heated elastomer membrane is heated onto the first layer.

COMPOSITE PANEL

FIELD OF THE INVENTION

[0001] The present application relates to composite panels of the type used as a building material and, more particularly, of the type used as a roofing insulative panel with waterproofing and/or vapor barrier characteristics.

BACKGROUND OF THE ART

[0002] Polyisocyanurate is commonly used as an insulating roofing material, especially for low-slope roofing. One common technique used to create efficient isolating systems for roofs is to use at least two thinner superposed layers of insulating panels (e.g., polyisocyanurate), as opposed to having one thicker panel. Hence, it is common that on-site workers spend a non-negligible amount of time installing superposed layers of polyisocyanurate panels, in addition to under layers and over layers, such as a vapor barrier, and an elastomer membrane.

[0003] Moreover, on the construction site, once such insulating panels have been installed, a support panel is then laid on the polyisocyanurate panels to support a waterproof elastomer membrane. The support panel is necessary as the elastomer membrane must be welded onto the roofing structure, often by the use of a blow torch. Such welding could damage or burn the insulating layer, whereby the support panel forms a protective layer.

[0004] All in all, the construction of low slope roofs may be a costly procedure, taking into account the number of steps – installation of a vapor barrier, overlayering of polyisocyanurate panels, installation of support panel, welding of elastomer membrane – these steps performed by construction workers, often at higher wages than plant workers. Construction workers may also be exposed to hazardous climate conditions, which add another level of complexity to the installation process. Moreover, as more steps are performed, there may be an increased risk of faulty installation.

SUMMARY

[0005] It is therefore an aim of the present disclosure to provide a method of fabricating composite panels featuring an insulating material such as polyisocyanurate, e.g., for roofing applications.

[0006] It is a further aim of the present disclosure to provide a novel composite panel featuring an insulating material such as polyisocyanurate, e.g., for roofing applications.

[0007] Therefore, in accordance with the present disclosure, there is provided a method for fabricating a composite panel, comprising, in plant: forming at least a first layer of insulating material; cutting an elastomer membrane to a size sufficient to cover the first layer and extend at least beyond one edge of the first layer; heating the cut elastomer membrane while separate from the first layer; and adhering the heated elastomer membrane onto the first layer.

[0008] Further in accordance with the present disclosure, there is provided a composite panel comprising: an in-plant assembly; an elastomer membrane; at least two layers of insulating panels, a first of the two layers laminated to the elastomer membrane; and an adhesive layer and backing sheet, the adhesive layer being on a second of the two layers of insulating panels.

DESCRIPTION OF THE DRAWINGS

[0009] Fig. 1 is a perspective view of a composite panel featuring an insulating material, in accordance with the present disclosure; and

[0010] Fig. 2 is an assembly view of composite panels; and

[0011] Fig. 3 is a schematic view of a method for manufacturing the composite panels of the present disclosure.

DETAILED DESCRIPTION

[0012] Referring to Fig. 1, there is illustrated at A a composite panel according to the present disclosure. The composite panel A has an elastomer membrane 1 positioned onto a first layer 2 of insulating subpanels (e.g., such as polyisocyanurate subpanels, polystyrene subpanels (e.g., EPS subpanels), fiber subpanels, stone wool or rock wool subpanels, to name a few possibilities). A second layer 3 of insulating subpanels is

secured to the first layer 2 of insulating subpanels. A free portion 1A of the elastomer membrane 1 extends beyond edges of the first layer of insulating subpanels 2, on two sides. According to an embodiment, the first layer and the second layer 3 are molded into a monolithic piece.

[0013] The layers 2 and 3 of insulating subpanels (or the single molded panel emulating the combination of the layers 2 and 3) are also arranged to have extensions, as observed from Fig. 1. Indeed, this arrangement allows the interlocking of adjacent composite panels A. It is considered to provide an adhesive on the extensions 4 (ship lap joint) to facilitate bonding of adjacent panels. The extensions 4 are typically between 0.5 inches and 3 inches (but all the way to 12 inches being contemplated) to allow a strong mechanical bond between adjacent composite panels A.

[0014] It is also considered to provide an adhesive layer 5 on the lower exposed surface of the layer 3 of the composite panel A, for instance with a backing sheet 6 to protect same. The backing sheet 6 would allow stacking of composite panels A, during storage and transportation, to ultimately be removed at the construction site. However, the composite panel shown in Fig. 1 may be without the adhesive layer 5, which adhesive can be applied on site. As an embodiment, the adhesive is part of a vapor-barrier layer 5, with the exposed face of the vapor-barrier layer 5 exposing adhesive, for instance covered by a backing sheet 6. In such a case, the vapor-barrier layer 5 may have extensions 5A on one side and at one end, in a many similar to the extensions 4 in the layers 2 and 3. A suitable vapor-barrier layer 5 may have a high-density polyethylene top side (i.e., against the layer 3), woven or as a film. An aluminum film is another possible material for the top side of the vapor-barrier layer 5. The underside, i.e., facing downwardly with tacky adhesive, may be SBS (modified bitumen, i.e., asphalt mixture with rubber modifiers and solvents). The vapor-barrier layer 5 is for example a material selected according to ASTM D2178, ASTM E96.

[0015] It is also pointed out that a structural layer 6 may be provided between the elastomer 1 and the layer 2. For example, the structural layer 6 may be a fiberboard layer, etc.

[0016] Fig. 2 illustrates a pair of adjacent composite panels A, once assembled, as mated by the complementary edge geometries. The extension of the free portion 1A is

useful as it allows to form a waterproof joint between adjacent composite panels A, when installed side by side. In particular, the free portion 1A is not backed by polyisocyanurate, whereby it can be blowtorched either self-standing upwardly, or as laid over the elastomer membrane 1 of the adjacent composite panel A, whereby the layer of elastomer membrane 1 backed to polyisocyanurate is not directly welded. If the layer 5 is a vapor-barrier layer 5, the extensions 5A may be used in the manner shown in Fig. 2 is create a vapor-barrier overlap at the junction between panels A.

[0017] The composite panel A is entirely fabricated in plant, as opposed to being assembled on the construction site. Firstly, depending on the size of the composite panel A, an adhesive is deposited on the layers 2 and 3, to bond them together with the edge extensions. When assembling the layers 2 and 3, adhesive may be provided on both facing surfaces of the layers 2 and 3, to increase the bond between the layers 2 and 3 and thus the tear resistance. There also results from this dual application the presence of pressure-sensitive adhesive on the extensions 4. As the adhesive is being applied, it is considered to apply the adhesive layer 5 to then add the backing sheet 6. The type of adhesive may differ (e.g., hot melt, urethane derivatives). The layers 2 and 3 are connected right after application of the adhesive, whereby high-efficient curing adhesives can be used, whereas the adhesive layer 5 may be a pressure-sensitive adhesive that remains tacky, to provide adherence at the construction site. Alternatively, a monolithic panel is molded into the shape of the combined layers 2 and 3, with adhesive optionally applied to the extensions 4.

[0018] The insulating panels are typically 36" by 48", whereas the elastomer comes in rolls that are 36-40" wide. Hence, the arrangement of Fig. 3 is used at assembly. The composite panel A shown in Fig. 1 has two side-by-side insulating panels (referred to above as subpanels 2 or 3), thereby resulting in a 36" by 96" size, with the elastomer membrane 1 being rolled onto the top layer 2. This assembly method therefore allows even larger panels to be manufactured, from 36" by 96", to 36" by 192".

[0019] Once the layers 2 and 3 are assembled, the elastomer membrane 1 (or equivalent) may be laminated to the layer 2. It may firstly be cut to appropriate length. The adhering may be done by heating the elastomer membrane 1 only and not the panels 2 and 3 of polyisocyanurate. Indeed, in-plant assembly allows larger equipment to be used, as opposed to blow torches, and thus a high enough membrane

temperature may be reached such that, as a whole, it may be deposited on the layer 2 of insulating subpanels to form a solid structural bond. A press may then be used to laminate the elastomer membrane 1 into the layers 2 and 3. Other options are considered, such as applying a roll pressure on the elastomer membrane 1, etc. The elastomer membrane 1 may be a multi-ply membrane, i.e., having one or more layers of the elastomer. Moreover, on the construction site, an additional elastomer membrane may be placed on top of the panels A, as additional waterproofing layer.

[0020] Before or after the lamination of the waterproof membrane 1, vapor-barrier layer 5 (e.g., with backing layer 6) may be positioned on the layer 3, if the layer 5 is a vapor-barrier and not simply an adhesive layer. The vapor-barrier layer 5 may have an adhesive surface by which its bonds to the layer 3 and/or an adhesive may be applied to the layer 3 before laying or pressing the vapor-barrier layer 5 onto the layer 3. An appropriate size of the vapor-barrier 5 is used to form extensions 5A.

[0021] The method for fabricating the composite panel A is performed in plant at least by forming a first layer 2 of insulating material. The elastomer membrane 1 is cut to a size sufficient to cover the first layer 2 and extend at least beyond one edge of the first layer 2. The cut elastomer membrane 1 is heated while separate from the first layer 2. The heated elastomer membrane 1 is adhered onto the first layer 2.

[0022] It is considered to make the composite panel with insulating materials other than polyisocyanurate, such as foams of different natures, etc. The layers are between 0.5" and 3.0" thick. The elastomer membrane 1 may be SBS.

CLAIMS:

1. A method for fabricating a composite panel, comprising, in plant:

forming at least a first layer of insulating material;

cutting an elastomer membrane to a size sufficient to cover the first layer and extend at least beyond one edge of the first layer;

heating the cut elastomer membrane while separate from the first layer; and

adhering the heated elastomer membrane onto the first layer.

2. The method according to claim 1, wherein adhering the heated elastomer membrane onto the first layer comprises laminating the heated elastomer membrane with a press.

3. The method according to any one of claims 1 and 2, wherein forming a first layer comprises forming two layers, one layer being on top of the layer.

4. The method according to claim 3, wherein forming two layers comprises applying an adhesive on facing surfaces of the two layers.

5. The method according to any one of claims 3 and 4, wherein forming two layers, one layer being on top of the layer, comprises offsetting the layers to from a ship lap joint on at least two of four edge surfaces.

6. The method according to any one of claims 1 to 5, wherein forming a first layer comprises putting at least two subpanels of the insulating material in a side by side relation.

7. The method according to any one of claims 1 to 6, further comprising applying an adhesive and backing sheet on a surface of the composite panel opposite to the surface supporting the elastomer membrane.

8. The method according to any one of claims 1 to 6, further comprising applying a vapor-barrier layer on a surface of the composite panel opposite to the surface supporting the elastomer membrane.

9. The method according to claim 8, wherein applying the vapor-barrier layer comprises applying the vapor-barrier layer with an auto-adhesive and backing sheet on an underside of the vapor-barrier layer.

10. A composite panel resulting from the method of claims 1 to 9, the composite panel having at least the first layer of insulating material and the elastomer membrane.

11. A composite panel comprising:

an in-plant assembly;

an elastomer membrane;

at least two layers of insulating panels, a first of the two layers laminated to the elastomer membrane; and

an adhesive layer and backing sheet, the adhesive layer being on a second of the two layers of insulating panels.

12. The composite panel according to claim 11, wherein the at least two layers of insulating material are offset to form ship lap joints on at least two edge surfaces of the insulating panels.

13. The composite panel according to any one of claims 11 and 12, wherein the elastomer membrane extends beyond at least one edge surface of the insulating panels.

14. The composite panel according to any one of claims 11 to 13, wherein the insulating panels are made of at least one of polyisocyanurate, polystyrene, stone wool, fiberboard.

15. The composite panel according to any one of claims 11 to 14, wherein the adhesive layer includes a vapor-barrier film.

16. The composite panel according to claim 15, wherein the vapor-barrier film membrane extends beyond at least one edge surface of the insulating panels.

17. The composite panel according to any one of claims 11 to 16, wherein each layer of the insulating material are formed of at least two subpanels of the insulating material in a side by side relation.

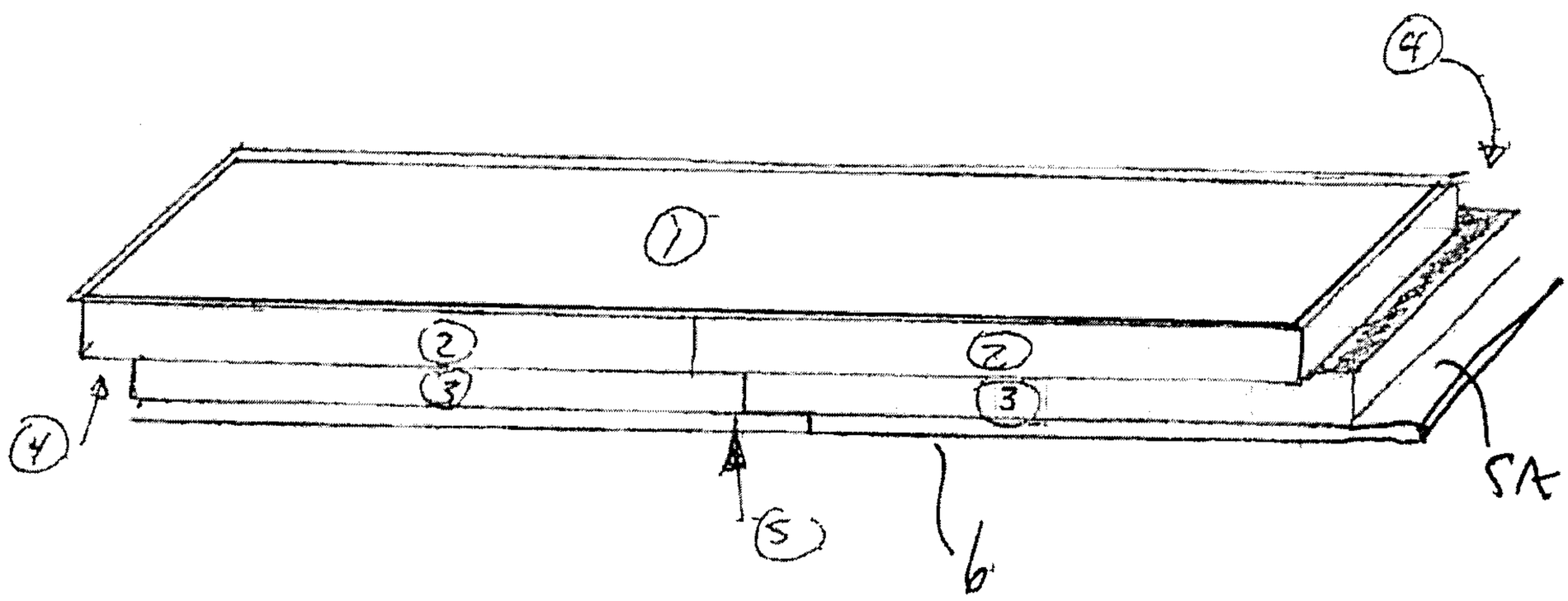

FIG. 1

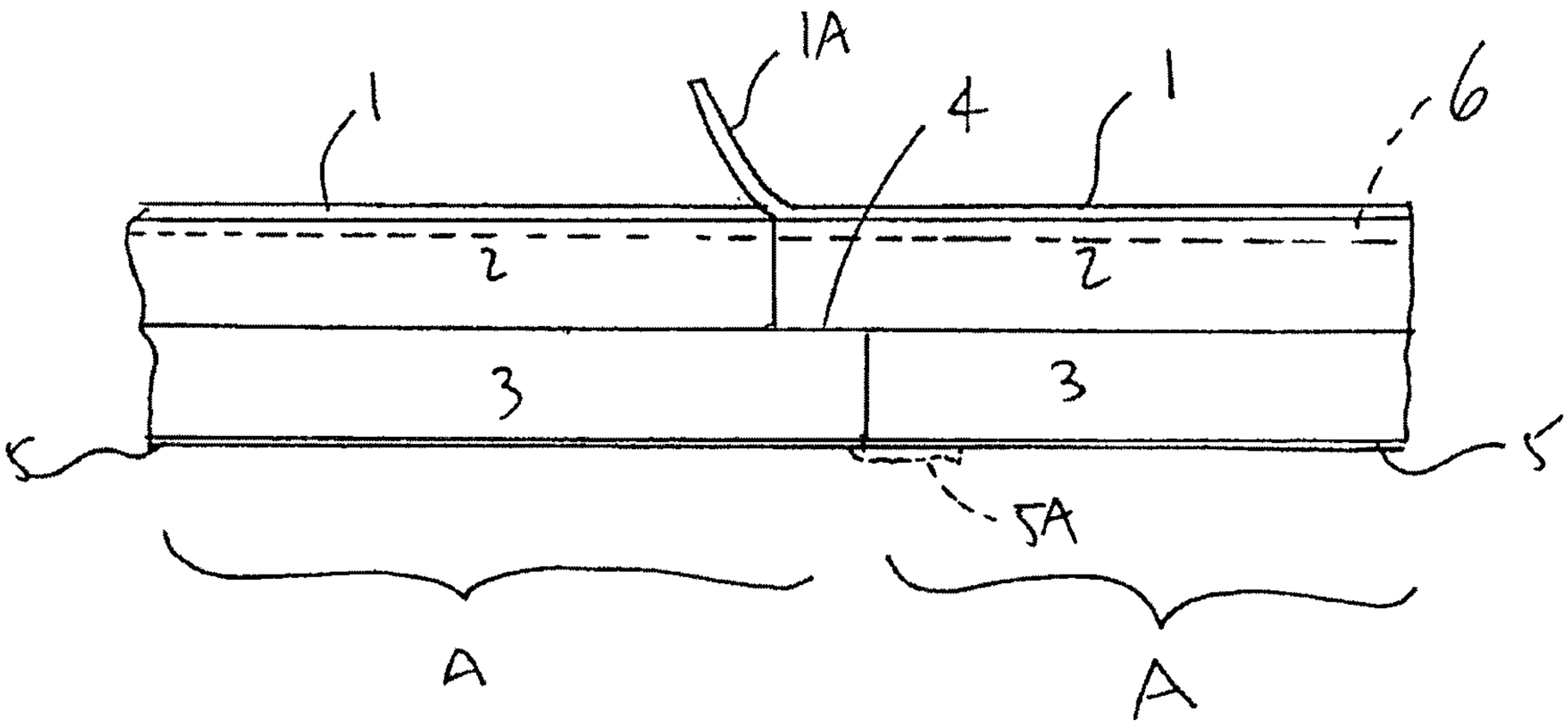

FIG. 2

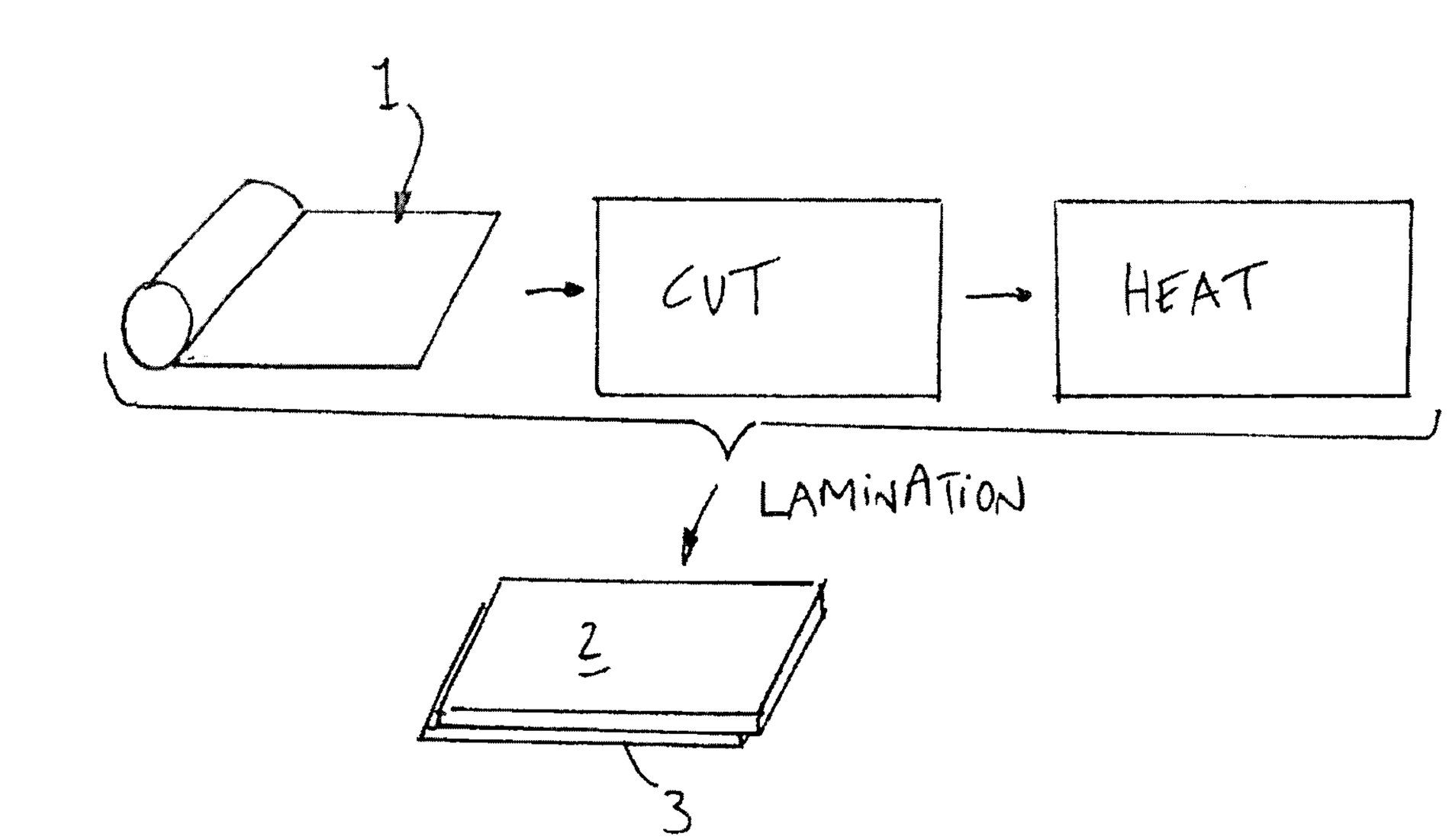

FIG. 3