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(54) Sealing strip, as well as synthetic plate material sealed with this and method for sealing synthetic plate material

(57) A strip is described which is suitable for sealing the ends of synthetic plate material dust-proof, yet water and water vapour permeable and ventilating. Such plate material comprises at least two basically parallel synthetic plates which are kept at each other's distance by means of dividing walls, enclosing a number of elongated channels which end at the ends of the synthetic plate material. The strip comprises a first strip with an open-pore structure which is air and (water) vapour permeable, yet dust-proof, and which has a pattern coat with a pattern of at least one layer which completely seals the pores at their location.

In addition, a synthetic plate material which is sealed by means of the above-mentioned strip, as well as a method for sealing the ends of such a synthetic material are described.

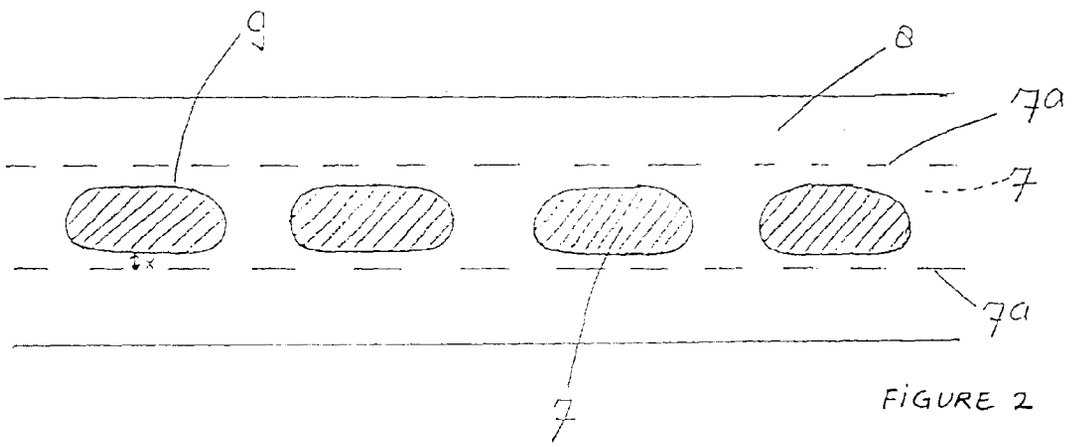

FIGURE 2

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Description

The present invention relates to a strip which is suitable for sealing dust-proof yet porous and water vapour permeable and ventilating the ends of synthetic plate material, which comprises at least two parallel synthetic plates, kept at each other's distance by means of dividing walls enclosing elongated channels, which lead to the ends laying opposite of the synthetic plate material.

Plate material of the above-mentioned kind is, for example, applied for coverings of light-transmitting roof coverings, sun rooms, etc. In these cases, translucent plastic is generally used, whether or not coloured, e.g. acrylate or polycarbonate, for example, those known by the trade names 'Plexiglas' and 'Lexan'. The dividing walls and the plates enclose cavity channels generally enclosing polygonal cross-sections, specifically triangular or quadrangular, which ensure the desired heat insulation.

In order to avoid dust particles and small organisms from entering into the channels, the leading ends of these channels are sealed dust-proof. A hermetic seal of the channel ends will, nevertheless, lead to condensation in the cavity of the plate material. Such condensation is not only irritating, it may well provide a culture medium for fungi, algae and micro-organisms, which are inevitably present in the air. In the long run, the growth of these organisms in the channels will lead to highly unpleasant looking sediment, which is disadvantageous to light transmission of the plate material.

Although the sealing of the channels is designed dust-proof, it is also porous, water vapour permeable and ventilating in order to avoid the above-mentioned problem. In that case, condensation, if any, may be discharged via the ends of the cavity channels.

A strip of the kind referred to at the beginning is known from the Dutch patent application available for inspection by the public under number 8803195. The strip described here comprises a first strip of non-woven material which, on the one hand, is dust-proof, on the other hand, however, ensures the desired ventilation and water (vapour) discharge, and a second strip attached onto the first in the form of an air-proof and humidity-proof film, which extends from the first strip and which is provided with a sealing coat adhering the film to the first strip, which serves to adhere the construction around the edge of the plate material. The film comprises a series of openings where the first strip is left clear.

A drawback of this strip is that it ensures ventilation and permeability of water (vapour) only at locations where the film is provided with openings. This means that ventilation and water (vapour) permeablility is only possible in a relatively small surface. As a consequence, condensed water seeping from the cavity channel accumulates beneath the openings where the strip is sealed. This is particularly the case, if the plate material is placed at a small angle, which is often the case with application in sun rooms or light-transmitting roof coverings. In addition to this, the common strip is characterised by the drawback that the film extends just a little from the first strip at the level of the openings in the film, which does not help the strength and life of the strip construction.

In addition to this, at the edge of the plate material the strip commonly comprises the construction, which consists of the first strip and the film, contrary to the part of the strip which is located at the outside wall of the plate material in an attached state, which only comprises the film extending from the first strip. As a result, the strip thickness is thicker at the edge than it is along the outside side wall of the plate material. This thickening is disadvantageous, since application of plate material sealed by means of the above-mentioned strip involves sliding elements which often slide onto the ends of the plate material, during which damage may be caused at the thickening along the edge part of the strip.

In addition to this, the common strip has a fixed ventilation value, which depends on the ventilating capacity of the first strip and the part of it left clear by the film. Adjusting it to the specific demands of the buyer is very laborious, since various machines need to be moved for this purpose, and thus from a cost-effective point of view this is out of the question.

The present invention aims at avoiding the above-mentioned problems and, to this end, provides a strip of the kind referred to at the beginning, which is characterised in that the strip comprises a first strip with an open-pore structure, which is air and (water) vapour permeable yet dust-proof, which is intended to extend over the entire width of the ends of the plate material and by the fact that the first strip is covered with a pattern of a layer which seals the pores at their location completely and in that the strip is provided with a sealing coat at least along the edge of it.

Such a strip provides a water (vapour) permeable and ventilating yet dust-proof material across the entire surface of the leading end of the cavity channels, while sufficient air and humidity control is realised by means of a pattern-based coating with a layer which seals the pores entirely at their location. Due to the fact that the entire surface of the end of the cavity channels are sealed with a water (vapour) permeability, the water is prevented from accumulating behind the strip.

The material for the strip with the open-pore structure is particularly selected on the basis of its filter function, while selectivity may be improved even more by means of the pattern-based coating and the ventilation may be reduced to a desired level, thus enhancing the insulation value of the plate material. The filter function of the material of the strip with the open-pore structure particularly refers to the pore size of the material. This determines which particles can permeate the material and which are stopped by it. In practice, the pore size will show a certain distribution which has a certain average value. This average value, as well as the absolute number of pores that are too large are decisive in the

selectivity process. By applying a layer in accordance with the invention, a number of these pores, whether or not too large, may be sealed.

Although many working methods can be opted for, for applying the pattern of the layer that completely seals the pores at their location, it is preferred to have the above-mentioned layer serve as a coat by means of screen printing. It is possible to apply a very accurately defined pattern by means of screen printing, as a result of which the ventilation is regulated to the greatest possible extent, while the pattern can be varied in a relatively simple way in order to have all this meet the customer's wishes optimally. Another advantage is that the accurately defined pattern-based coating of the first strip prevents a thickening of the strip at the edge of the plate material, and as a result, it does not have the drawbacks commonly known of the existing strip. Since the first strip is provided with a sealing coat, at least along its edge, application of a sealing film extending from or along the strip is unnecessary.

In an advantageous embodiment the layer which serves as a coating of the first strip is water and air impermeable. Preferably, this layer hardens by means of UV-radiation. If this is the case, a fluid layer is attached onto the first strip, for example by means of screen printing, which is then followed by the hardening process by means of UV-radiation, e.g. by means of flash treatment. Subsequently, another layer may be attached onto the layer covering the first strip by performing the same activities. Contrary to thermal hardening of the layer, applying a layer hardened by means of UV-radiation will not affect the layer already attached beneath it.

In an advantageous embodiment the layer, which serves as a coat for the first strip, is polyurethane, polyamide or polyvinyl chloride.

Since the strip pore size is generally selected in such a way that micro-organisms, e.g. fungi and algae, are stopped, it is preferred to have the strip treated with an agent against fungi and algae, thus preventing them from finding a medium for excess growth.

In addition, the present invention concerns a synthetic plate material comprising at least two basically parallel synthetic plates which are kept at each other's distance by means of dividing walls, thus enclosing a number of elongated channels, the ends of which are sealed dust-proof, yet water and water vapour permeable and ventilating. This synthetic plate material is characterised in that its channels are sealed by applying a strip according to the present invention.

Finally, the present invention concerns a method for sealing the ends of synthetic plate material, which comprises at least two basically parallel synthetic plates which are kept at each other's distance, thus enclosing a number of elongated channels which end at the ends of the synthetic plate material. This method is characterised in that a strip according to the present invention is applied against the end of the synthetic plate material.

The invention will be explained in more detail by means of the drawing annexed, in which:

figure 1 shows a schematic view of plate material, the leading end of which can be sealed by the strip according to the present invention;
figure 2 shows a schematic view of the existing strip; and
figure 3 shows a schematic view of a detail of the strip according to the present invention.

The drawings are purely schematic and not drawn to scale. Particularly for purposes of clarity, some dimensions have been represented in a greatly exaggerated manner. Whenever possible, parts in the figures are indicated with the same reference number.

Figure 1 shows synthetic plate material 1, which comprises two parallel translucent outside plates 2,3, which are kept at each other's distance by means of dividing walls 4. The translucent synthetic material comprises, for example, acrylic plastic or polycarbonate, commercially available under the name 'Plexiglas' or 'Lexan'. The outside plates 2,3 and the dividing walls 4 enclose a number of elongated cavity channels 5, which end at both sides of the plate material. In order to prevent dust particles and micro-organisms from permeating the cavity channels, the cavity channels may be sealed at their leading ends by means of a dust-proof, yet water and water vapour permeable strip.

Figure 2 schematically shows a part of the common dust-proof yet water (vapour) permeable strip. This strip comprises a first strip 7 of non-woven material which is dust-proof on the one hand, yet on the other hand, ensures ventilation and water (vapour) discharge. A film 8 which extends from strip 7 has been applied onto this first strip 7 and has been provided with a sealing coat with which film 8 adheres to first strip 7 and which is used to adhere the construction around the edge of the plate material. Film 8 also comprises a number of openings 9, which leave first strip 7 clear at the openings. Figure 2 shows an upper view of the strip. Here the shadings in the openings 9 indicate the visible part of first strip 7, while the edges of the non-visible part of the strip 7 beneath the film 8 are indicated by means of the dotted lines 7a. This figure clearly shows that beneath and next to the openings 9, relatively large continuous surfaces of the strip are sealed air-proof and water (vapour)-roof, thus ventilation and water drainage are impossible at the openings. As a consequence, the water will accumulate at these spots. In addition to this, film 8 extends from first strip 7 over a relatively small distance at the same level of the openings 9, which is indicated by means of 'x' in figure 2. This does not help the strength and life of strip 7 and, in addition, might cause problems if the film comes loose from first strip 7.

Figure 3 schematically shows a part of strip 10 according to the present invention. Strip 10 comprises a first strip with an open-pore structure 11, which is intended to extend over the entire width of the plate material

end, unlike the existing strip, in which the film 8 extends over the entire width. According to the present invention, the first strip 10 with an open-pore structure is provided with a layer 12 which seals the pores completely at their positions. This layer 12 preferably comprises an air-proof and a waterproof layer of, for example, polyurethane, polyamide or polyvinyl chloride, which has been applied according to a pattern. This is preferably realised by means of screen printing. Preferably a layer 12 is applied which hardens by means of UV-radiation. With this, it is possible to apply a fluid layer by means of screen printing, which can be hardened by means of UV-radiation, for example by means of a flash treatment. Subsequently, a second layer, which hardens by means of UV-radiation, may be applied onto the hardened layer 12 without affecting the first layer 12. The various layers 12 may have different patterns, colours and constructions. Advantageously, strip 10 is provided with a sealing coat, at least around its edges, in order to attach strip 10 to the plate material 1. This sealing coat is not shown in the figures and is preferably placed at the back of strip 10. In this way, the edges of strip 10 can be attached against the outside of the outside walls 2, 3 when folding them.

The pattern of layer 12 has a regular shape in figure 2; it is, of course, also possible to apply a more irregular or asymmetrical pattern. The choice of pattern in this, depends on the ventilation desired and the filter function of underlying strip 11 with an open-pore structure. Advantageously, the pattern is applied in such a way that thickenings at the edges of the plate material 1 are avoided when attaching strip 10 to the plate material 1. In this way, damage to plate material 1 is avoided during further activities.

The application of strip 6 according to the present invention has a dust-proof, yet water and water vapour permeable sealing of the leading ends of the cavity channels 5 across their entire surface. Contrary to the common strip, it is avoided that relatively large continuous surfaces of the leading ends are covered by impermeable material. As a result, the accumulation of moisture beneath the strip is avoided.

Although the invention has merely been explained by means of an example showing the design, it may be obvious that the invention is by no means limited to this example. On the contrary, many more designs and variations are available for the expert. As referred to above, the pattern-based coating is available in various patterns and, in addition to the screen printing method, it can be designed in various ways.

In addition, the invention is not limited to double-walled plates and plate material, the strip according to the present invention, however, may also be applied for sealing the leading ends of plate material which exists of more than two plates, while the plates are, again, attached to each other by means of dividing walls.

Claims

1. Strip, suitable for sealing dust-proof, yet water and water vapour permeable and ventilating the ends of synthetic plate material which comprises at least two basically parallel synthetic plates, which are kept at each other's distance by means of dividing walls, thus enclosing a number of elongated channels ending in the ends of the synthetic plate material, characterised in that the strip comprises a first strip with an open-pore structure which is air and (water) vapour permeable yet dust-proof, which is intended to extend over the entire width of the ends of the plate material and that the first strip has a pattern coat of at least one layer which seals the pores here completely and in that the strip, at least around its edge, is provided with a sealing coat.

2. Strip according to claim 1, characterised in that the first strip has a coat by means of screen printing.

3. Strip according to claim 1 or 2, characterised in that the layer which serves as a coat for the first strip is waterproof and air-proof.

4. Strip according to one or more of the claims 1-3, characterised in that the layer which serves as a coat for the first strip hardens by means of UV-radiation.

5. Strip according to one or more of the claims 1-4, characterised in that the layer which serves as a coat for the first strip comprises polyurethane, polyamide or polyvinyl chloride.

6. Strip according to one or more of the above-mentioned claims, characterised in that the strip is treated with an agent against fungi and algae.

7. Synthetic plate material, comprising at least two basically parallel synthetic plates, which are kept at each other's distance by means of dividing walls, enclosing a number of elongated channels which are sealed dust-proof, yet water and water vapour permeable and ventilating at their ends, characterised in that the channels are sealed by applying a strip according to one or more of the claims 1-6.

8. Method for sealing the ends of synthetic plate material dust-proof, yet water and water vapour permeable, which comprises at least two basically parallel synthetic plates which are kept at each other's distance of by means of dividing walls, enclosing a number of elongated channels which end at the ends of the synthetic plate material, characterised in that a strip according to one or more of the claims 1-6 is applied against the end of the synthetic plate material.

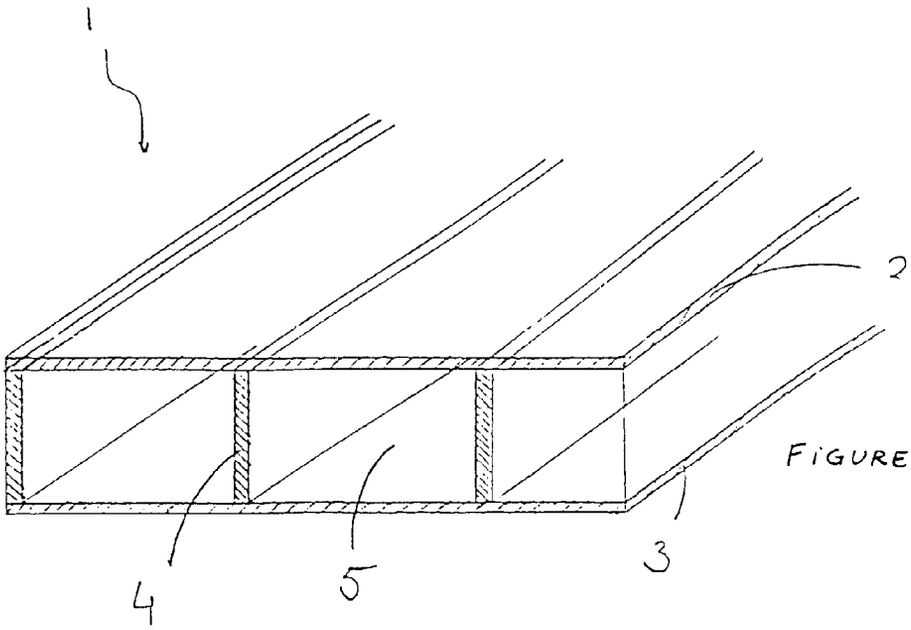

FIGURE 1

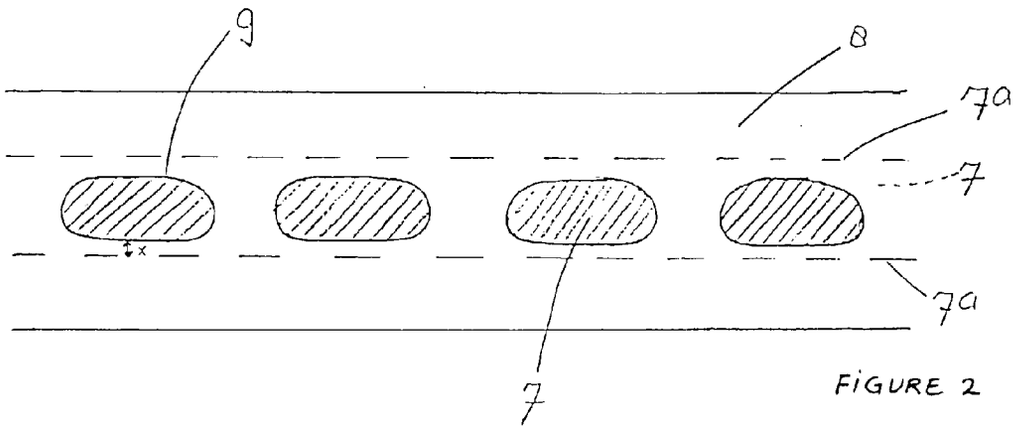

FIGURE 2

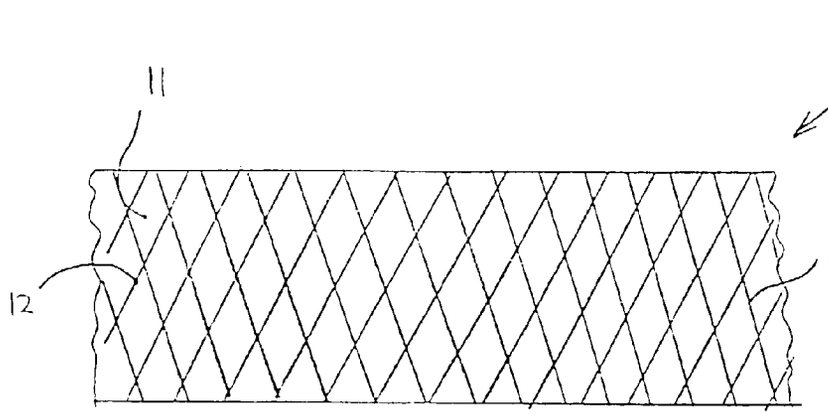

FIGURE 3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 20 2552

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	EP 0 711 883 A (MULTIFOIL) * column 4, line 9 - line 59; claims 1,3; figure 1 * ---	1,6-8	E04C2/54
A	DE 38 38 641 A (POWER SYSTEME) * column 2, line 64 - column 3, line 40; figures 1,2 * -----	1,7,8	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

A47C
E04C
E04D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	12 November 1997	Mysliwetz, W

CATEGORY OF CITED DOCUMENTS

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