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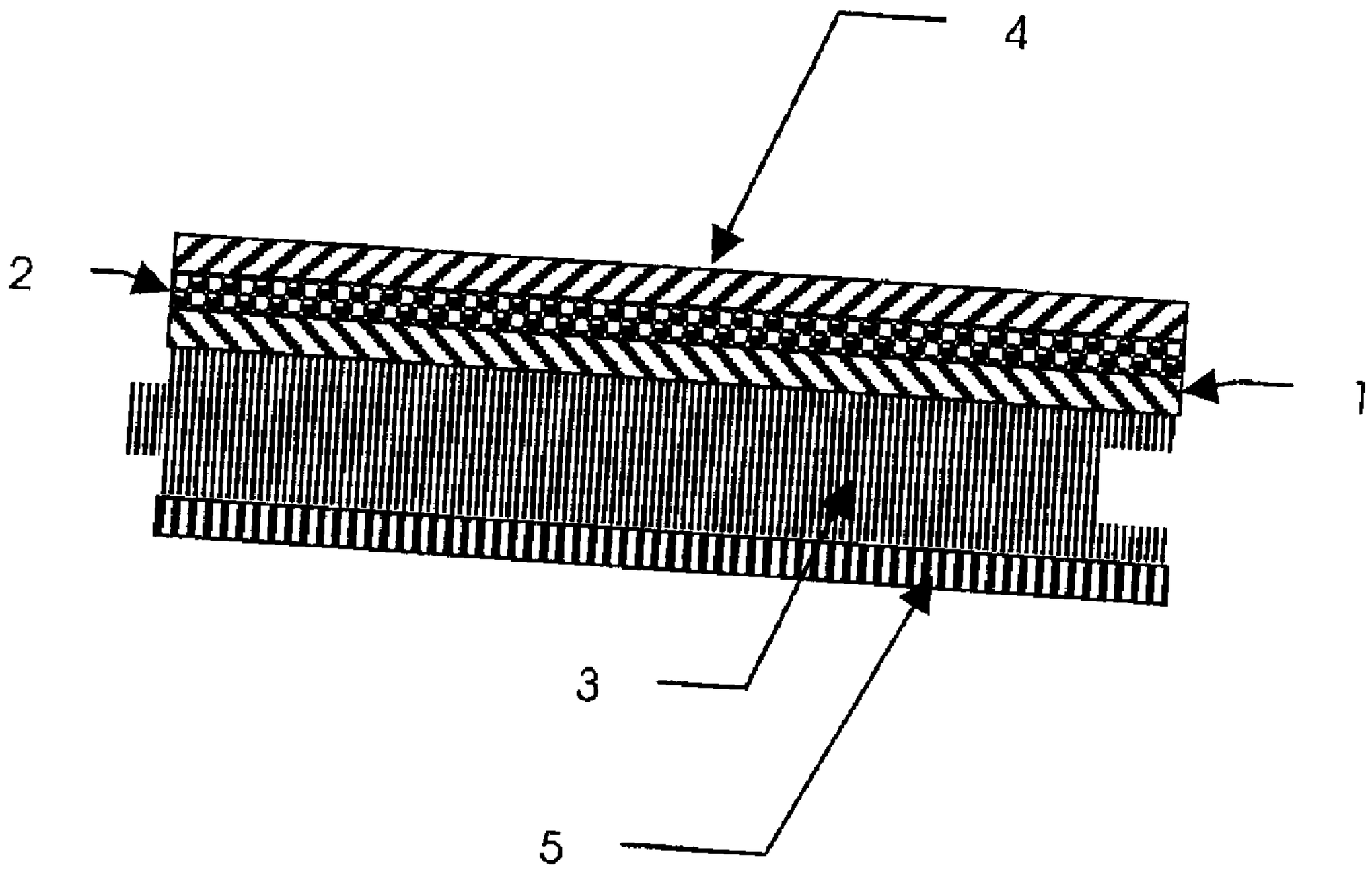
(54) Titre : PAPIER ET PANNEAUX ANTISTATIQUES
(54) Title: ANTISTATIC PAPER AND PANEL



(57) Abrégé/Abstract:
The present invention is directed to paper, in particular décor paper, comprising an application of abrasion-resistant particles. The abrasion-resistant particles are embedded in a resin. The paper is suitable for use in the manufacture of flooring panels. The flooring panels manufactured using the paper of the present invention are anti-static and exhibit lower static electricity activity than similar products.

Abstract

The present invention is directed to paper, in particular décor paper, comprising an application of abrasion-resistant particles. The abrasion-resistant particles are embedded in a resin. The paper is suitable for use in the manufacture of flooring panels. The flooring panels manufactured using the paper of the present invention are anti-static and exhibit lower static electricity activity than similar products.

Antistatic paper and panel

The invention relates to a paper and a flooring panel made with this paper. The panels comprise a carrier, to which the paper is attached. The paper is generally printed and is then referred to as décor paper. A counteracting element, preferably in the form of a paper, is generally provided beneath the carrier. Such panels provide coupling elements at the sides. Panels of this kind can therefore be connected together without glue, as described, for example, in WO 01/94721 A1.

The décor paper may comprise an application of abrasion-resistant particles made from corundum, aluminium oxide or silicon carbide, so that the paper is suitable for walking over. The abrasion-resistant particles are embedded in a resin matrix. For reasons of cost, melamine resins to which urea resins can be added are preferred. Methods for the manufacture of a décor paper for flooring panels are already known from US 4,940,503, WO 00/44576 A1, WO 00/44984 A1 and WO 02/066265.

The counteracting paper can be attached to the carrier by means of a resin. In this case, urea resin is the preferred resin, because resistance to moisture is less important on the underside. Accordingly, expensive additives such as melamine resin are not required.

A board made from a timber material is often used as the carrier. At present, HDF is the preferred carrier material, because this material provides structural stability and can be easily processed. A manufacturing

method for a panel of this kind is described in DE 20210718 U1.

However, a carrier for a laminate flooring can also consist of several paper layers, which have been glued together, as disclosed, for example, in WO 96/27721.

A laminate flooring of this kind can become charged with static electricity during walking, especially in the presence of a low relative atmospheric humidity. An atmospheric humidity lower than 50% is considered low in the sense of the invention. Under unfavourable conditions, a person can become charged to a human body voltage up to 25,000 Volts.

When approaching earthed elements such as heating elements, discharge sparks occur which can be perceived by sensitive persons at voltages above 2kV. With higher charges, the discharge can be painful. Electronic devices such as computers and electronic circuits can be damaged as a result of charges of this kind.

To combat this problem, panels with so-called "astatic" properties are available. According to the standard EN 1815, a panel can be designated as "astatic" if the possible human-body charging is below 2000 volts.

The object of the present invention is to create a décor paper and a panel with antistatic properties.

In one particular embodiment there is provided an antistatic décor paper having at least one surface, to which is applied a mixture, wherein the mixture consists of a melamine resin, about 10 wt% to about 20 wt% of quaternary ammonium compounds, and abrasion-resistant particles selected from the group consisting of corundum, aluminum oxide, and silicon carbide.

In another embodiment there is provided a décor paper having at least one surface, to which said surface is applied a mixture, wherein the mixture consists essentially of a melamine resin, about 10 wt% to about 20 wt% of quaternary amines, and abrasion-resistant particles selected from the group consisting of corundum, aluminum oxide, and silicon carbide.

According to the invention, a paper, for example, a décor paper or an overlay paper can be provided with a resin mixture, which contains quaternary ammonium compounds, preferably quaternary amines. In order to fulfil the requirements of the standard EN 1815, the proportion of quaternary ammonium compounds in the resin mixture is at least 10% by weight. Since quaternary ammonium compounds are relatively expensive, a proportion of 20% by weight should not be exceeded.

The paper can be fed in the form of a paper web through a mixture, which contains the named quaternary ammonium compounds alongside urea resin and/or melamine resin. The paper impregnated in this manner is dried and, after a given time, compressed with a carrier, preferably with a supply of heat.

Alternatively, the mixture may, for example, be sprayed onto the paper.

The result is a panel with improved antistatic properties by comparison with a panel, in which the paper has been impregnated with other conventional resins. In fact, as a result of the quaternary ammonium compounds, the electrical conductivity is increased in the surface region of the floor covering. This leads to a reduction in the human-body charging of persons walking over the floor.

According to the prior art described above, abrasion-resistant particles can be applied to the décor surface. To achieve cost-favourable production, the mixture already contains abrasion-resistant particles and indeed especially aluminium oxide / corundum, because this

material is generally hardly visible and therefore hardly impairs the visual appearance of the décor. Accordingly, in one operational process, abrasion-resistant particles are applied to the décor paper at the same time as improving the antistatic properties.

It is advantageous if the décor paper is first impregnated in the mixture with the abrasion-resistant particles, and the mixture is then at least partially removed, for example, by means of a scraper, from the underside of the décor paper. As a result, the abrasion-resistant particles are applied predominantly to one side of the décor paper. This is advantageous, because for the purpose required, the abrasion-resistant particles are needed only on one side, namely on the side with the decoration.

If the mixture contains abrasion-resistant particles, it may advantageously contain additional viscosity-increasing substances such as cellulose derivatives. As a result, the abrasion-resistant particles are held in suspension in the mixture in an improved manner. Accordingly, a good, even distribution of the abrasion-resistant particles is achieved on the surface of the paper.

Finally, an overlay is impregnated in a mixture, which contains a resin such as urea resin and/or melamine resin. Moreover, this mixture also contains substances, which increase the electrical conductivity, that is to say, especially the named quaternary ammonium compounds. Once again, the proportion is approximately 10 to 20% by weight.

The carrier, décor paper and overlay are compressed together to form a board. A counteracting paper disposed on the underside of the carrier is also generally compressed.

As an alternative, abrasion-resistant particles such as corundum may be applied to one side of the overlay. In this manner, the carrier, the décor paper, the overlay and, optionally, a counteracting paper are compressed together in such a manner that the abrasion-resistant particles are disposed between the décor paper and the overlay. The décor is then visible on the surface of the panel.

Exemplary embodiment

A paper 1, onto the upper surface of which a decoration has been printed, is impregnated in a metered manner with a mixture. The mixture comprises a urea resin and/or a melamine resin, quaternary amines, cellulose fibres and powdered corundum. The average grain size of the corundum is between 60µm and 120µm. The proportion of quaternary amines in the mixture is approximately 15% by weight. With the assistance of dosage rollers, this décor paper 1 is provided with the mixture in a metered manner and indeed with approximately 150 g/m^2 (measured after drying). The mixture is scraped from the underside of the décor paper 1 with a scraper. The abrasion-resistant particles 2 remain predominantly on the upper surface. Finally, the décor paper 1 with the application of abrasion-resistant particles is dried in a fluid-bed drier.

The dried décor paper 1 is attached by its underside to an 8 mm thick HDF board 3. A so-called "overlay" 4

impregnated with a mixture of melamine resin and quaternary amines is placed over the decorative paper. A paper 5 impregnated in urea resin is placed beneath the HDF board as a counteracting paper. The papers 1 and 5 as well as the overlay 4 are compressed together with the HDF board at temperatures of 180°C to 220°C.

By sawing and milling, panels with the dimensions 1400 mm x 200 mm and with coupling means are manufactured from the board 3 with the compressed papers. The result is shown schematically in the diagram.

A floor covering was made for test purposes using seven panels manufactured according to the example described above. The test area was approximately 1400 mm x 1400 mm. The antistatic properties were tested in accordance with the standard EN 1815 (1997), Method A. The floor covering was disposed on an insulating rubber mat. The measurements were carried out under two different climate conditions. For this purpose, the sample was placed in a climate chamber, in which it was possible to walk over the panels.

One test series was carried out at 23°C and 50% relative humidity, and another test series was carried out at 23°C and 25% relative humidity. The trial participants wore sandals with rubber soles as specified in the test document. In another test, the participants wore town shoes with rubber soles. The commercially available test equipment "Keithley 6517, S/N 0598551 was used with a capacitive handheld probe for measuring the human-body charge. The following results were obtained:

Climate	Shoe	Average voltage of trial participants *) in volts
23°C, 50% rel. humidity	Standard sandal Town shoe	63 107
23°C, 25% rel. humidity	Standard sandal Town shoe	-902 -415

*) average of the highest minima

The results of the tests therefore showed that the panels manufactured according to the invention provide "astatic" behaviour as defined with reference to the standard IEC 1340-4-1, because under conditions of 23°C and 50% relative humidity, and also 23°C and 25% relative humidity, also with non-conductive laying, the average voltage of the trial participants did not exceed the value of 2 kV. According to IEC 1340-4-1, the term "astatic" behaviour is defined by a human-body charging of less than 2kV. However, a method for measuring the human-body charging has not yet been defined. Accordingly, an unambiguous classification in accordance with this test standard is not permissible. However, the method according to the standard EN 1815 has been used and recognised for more than 20 years for the measurement of human-body charging when walking over various types of floor covering.

CLAIMS

1. An antistatic décor paper having at least one surface, to which is applied a mixture, wherein the mixture consists of a melamine resin, about 10 wt% to about 20 wt% of quaternary ammonium compounds, and abrasion-resistant particles selected from the group consisting of corundum, aluminum oxide, and silicon carbide.

2. The paper of claim 1 wherein the abrasion-resistant particles have an average size of about 60 microns to about 120 microns.

3. The paper of claim 1, wherein the mixture is present in a concentration of about 150 g/m^2.

4. A décor paper having at least one surface, to which said surface is applied a mixture, wherein the mixture consists essentially of a melamine resin, about 10 wt% to about 20 wt% of quaternary amines, and abrasion-resistant particles selected from the group consisting of corundum, aluminum oxide, and silicon carbide.

5. The paper of claim 4, wherein the mixture further comprises a urea resin.

6. The paper of claim 4 wherein the abrasion-resistant particles have an average size of about 60 microns to about 120 microns.

7. The paper of claim 4, wherein the mixture is present in a concentration of about 150 g/m^2.

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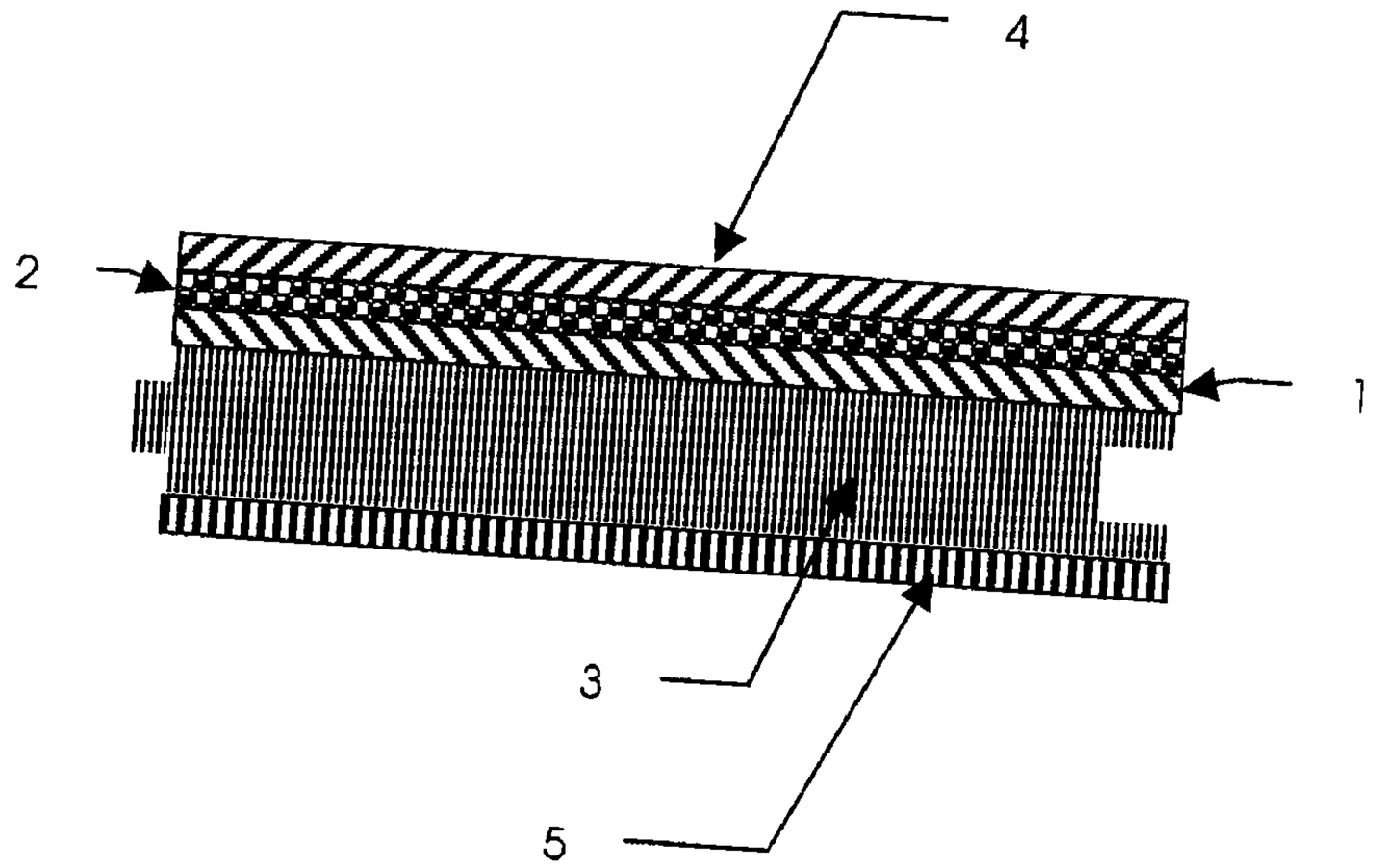

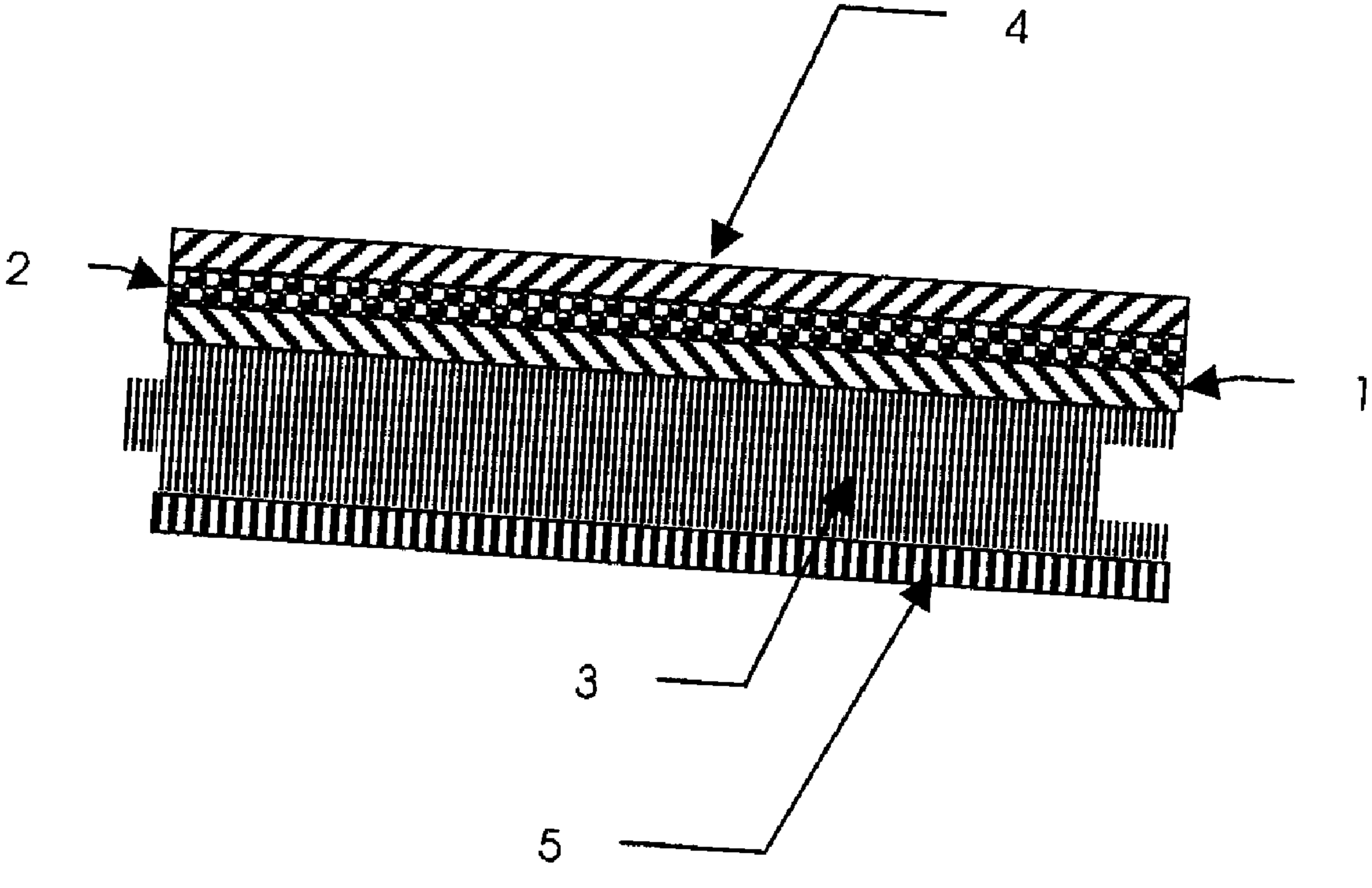
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