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(54) **Rétegelt lemez**

Az európai szabadalom ellen, megadásának az Európai Szabadalmi Közlönyben való meghirdetésétől számított kilenc hónapon belül, felszólalást lehet benyújtani az Európai Szabadalmi Hivatalnál. (Európai Szabadalmi Egyezmény 99. cikk(1))

A fordítást a szabadalmas az 1995. évi XXXIII. törvény 84/H. §-a szerint nyújtotta be. A fordítás tartalmi helyességét a Szellemi Tulajdon Nemzeti Hivatala nem vizsgálta.

Plywood board

The present invention relates to a laminboard according to the preamble of claim 1. Such a laminboard is known from CH 233 120 A1.

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Laminboards of the type mentioned in the introduction are known from the prior art. They are often also referred to as wood core plywood boards and are used in furniture construction and in exhibition construction, internal fittings, ship, vehicle and mobile home construction. Laminboards are relatively light in comparison with other materials, but nonetheless very dimensionally stable and flexurally rigid.

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DE 600 000 C discloses a laminboard in which the plywood board core is covered at the upper side by a laminated wooden board which is connected to the plywood core by means of cold gluing. CH 230 120 A discloses a construction panel with two end boards, between which a central layer of mutually parallel wood veneer strips which are open at the longitudinal edges is arranged. The strips and the covering plates are also glued to each other. In these two documents, there are no indications relating to the type of glue used, in particular also no indications at all relating to the properties thereof in the event of fire.

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FR 896 990 A discloses a laminboard of the type mentioned in the introduction in which flame-retardant films of metal (for example, of aluminium) or asbestos are provided. The publication which can be found on the Internet under "www.graphite.de/pdf/blaehgraphit.pdf" describes the use of expanded graphite as flame-retardant films.

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GB 1 439 582 A discloses the use of a fire-retardant glue, preferably water glass, for gluing veneer rods.

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A disadvantage of the laminboards known from the prior art involves their properties in the event of fire.

In this instance, the present invention is formulated and has the objective of providing a laminboard of the type mentioned in the introduction which, in the event of a fire, has better properties than the laminboards known from the prior art.

- 5 This object is achieved with a laminboard of the type mentioned in the introduction having the features of the characterising portion of claim 1. The dependent claims relate to advantageous developments of the invention.

10 A laminboard according to the invention is distinguished in that the glue by means of which the thin strips of wood of the middle layer are glued to one another and the two covering layers are glued to the middle layer has a proportion of expanded graphite. The thin strips of wood of the middle layer of the laminboard preferably comprise spruce wood, pine wood, poplar wood, fir wood or overseas woods (Fromager, Albasia, Paulownia, Okoume, Gabon, etcetera). The logs from which
15 the thin wood strips are produced for the laminboard are first stripped of bark. There are thereby obtained barked veneer strips which preferably have a thickness of from approximately 1.5 to approximately 8.0 mm, in particular a thickness of from approximately 1.5 to approximately 6.5 mm. Several layers of these barked veneer strips are subsequently glued together to form boards. In this
20 instance, the glue containing expanded graphite is used. These boards are then separated orthogonally with respect to the direction of the barked veneer layers in the desired thickness of the middle layer. In this manner, there are obtained part-blocks of the boards which are glued together to form the middle layer of the laminboard using the glue containing expanded graphite. Subsequently, the
25 covering layers are glued on both sides by means of the glue containing expanded graphite transversely with respect to the middle layer. The laminboard produced in this manner can then be further processed.

30 It has been found that, as a result of the use of the glue containing expanded graphite for gluing, the properties of the laminboard in the event of fire can be considerably improved. In the event of fire, the expanded graphite expands in the glue. As a result of the expansion of the expanded graphite, there is formed a

- very large surface which enables rapid oxidation of the carbon. The oxygen is thereby removed from the ambient air. The ambient air is thus rendered inert and then acts to some degree as an extinguishing means against the fire and chokes it. On the whole, as a result of the use of the expanded graphite in the glue, the spread of the fire can be slowed or also completely contained so that in particular the formation of toxic gases and smoke can be effectively counteracted. The laminboard according to the invention has in comparison with the laminboards known from the prior art considerably improved properties in the event of fire.
- 10 In order to obtain particularly advantageous properties of the laminboard in the event of fire, expanded graphite which has the lowest possible starting temperature of approximately 150°C is preferably added to the glue.

According to the invention it is further proposed that the proportion by mass ω of the expanded graphite component $\omega = m_{\text{Blähgraphit}} : (m_{\text{Blähgraphit}} + m_{\text{Leim}})$ lies between 9/100 and 1/3. In this instance, $m_{\text{Blähgraphit}}$ denotes the mass of the expanded graphite component and m_{Leim} denotes the mass of the glue component. In a particularly advantageous embodiment, there is provision for the proportion by mass ω of the expanded graphite component to be from 0.2 to 0.3.

- 20 Preferably, the proportion by mass ω of the expanded graphite component is from 0.23 to 0.25. It is thereby possible in a particularly advantageous manner to achieve good workability of the glue/expanded graphite admixture for gluing the thin wooden strips of the middle layer to each other and the covering layers to the middle layer.

- In order to further improve the properties of the laminboard in the event of fire, in a particularly preferred embodiment there is provision for the covering layers which preferably have a thickness of approximately 2 mm to comprise flame-retardant board materials. Preferably, the covering layers may be constructed as high density fiber boards (HDF boards), medium-density fiber boards (MDF), hard fiber boards, chipboards or plywood boards (in particular beech plywood
- 30

boards). The middle layer is compressed during the production with the two covering layers with two glued joints being interposed.

With the measures set out in this instance, it is particularly advantageously
 5 possible to obtain a flame-retardant laminboard in accordance with the standard DIN EN 13501 (Part 1, 2007 - 05) in the class C - S2, d0.

It has surprisingly been found that, as a result of the use of particularly thin
 barked veneers up to a thickness of 3 mm, the concentration of the fire-retardant
 10 expanded graphite can be increased in such a manner that a flame-retardant laminboard in accordance with the standard DIN EN 13501 (Part 1, 2007-05) in the class B - S1, d0 can be obtained.

According to another aspect, the present invention relates to a blockboard
 15 comprising a middle layer of a plurality of strips of wood which are oriented parallel with one another and which are glued to one another and two covering layers which are glued on both sides transversely with respect to the middle layer. In order to improve the properties of such a laminboard in the event of fire, it is proposed according to claim 8 that the glue by means of which the thin strips
 20 of wood of the middle layer are glued to one another and the two covering layers are glued onto the middle layer have a proportion of expanded graphite. A blockboard differs from a laminboard in particular in that the strips of the middle layer at approximately from 24 to 50 mm have a greater width than the strips of a laminboard. The blockboard according to the invention has in comparison with
 25 the blockboards known from the prior art considerably improved properties in the event of fire.

According to the invention, the proportion by mass ω of the expanded graphite component $\omega = m_{\text{Blähgraphit}} : (m_{\text{Blähgraphit}} + m_{\text{Leim}})$ in the blockboard also lies
 30 between 9/100 and 1/3, where $m_{\text{Blähgraphit}}$ is the mass of the expanded graphite component and m_{Leim} is the mass of the glue component. Preferably, the proportion by mass ω of the expanded graphite component may be from 0.2 to

0.3, in particular from 0.23 to 0.24. In order to achieve particularly advantageous properties of the blockboard in the event of fire, expanded graphite which has the lowest possible starting temperature of approximately 150°C is preferably added to the glue.

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In a preferred embodiment, it is proposed that the covering layers be composed of flame-retardant board materials.

Both with the laminboard and with the blockboard, embodiments with high-
10 density fiber boards (HDF boards), medium-density fiber boards (MDF boards), hard fiber boards, chipboards or plywood boards or barked veneers of any wood type are possible as covering and/or blocking layers.

With the addition of expanded graphite to the glue which is intended to be used
15 for the gluing, it is possible to confer flame-retardant properties not only on blockboards or laminboards (so-called wood core boards), but also laminboards, high-density fiber boards (HDF boards), medium-density fiber boards (MDF boards) and hard fiber boards. It is thus possible in particular for the fire
20 properties of plywoods (in various embodiments and wood types) to be significantly improved by the addition of expanded graphite to the glue. Also in this instance, it is possible to work with the above-mentioned covering materials. The plywood can also be constructed in a flame-retardant manner in an unprocessed embodiment (that is to say, without additional covering and/or
25 blocking layers).

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Other features and advantages of the present invention will be appreciated from the following description of a preferred embodiment with reference to the appended drawing, in which:

Figure 1 is a perspective view of a portion of a laminboard according to a
30 preferred embodiment of the present invention.

A laminboard 1 which is constructed in accordance with a preferred embodiment

of the present invention comprises a middle layer 2 of a plurality of thin wooden strips 20 which are oriented parallel with one another and which are glued to one another and which are oriented in an upright manner with respect to the plane of the laminboard 1, and a first covering layer 3 and a second covering layer 4 which are glued onto the middle layer 2. The two covering layers 3, 4 preferably have a thickness of approximately 2 mm and extend at both sides of the middle layer 2 in the transverse direction thereof. The thin wooden strips 20 of the middle layer 2 preferably comprise spruce wood, pine wood, poplar wood, fir wood or overseas woods (Fromager, Albasia, Paulownia, Okoume, Gabon, etcetera).

The logs from which the wood strips 20 are produced are first stripped of bark. There are thereby formed barked veneer strips which preferably have a thickness of from approximately 1.5 mm to approximately 8 mm, in particular a thickness of from approximately 1.5 mm to approximately 6.5 mm. Several layers of these barked veneer strips are subsequently glued together to form boards. These boards are then separated orthogonally with respect to the direction of the barked veneer layers in the desired thickness of the middle layer 2. In this manner, there are obtained part-blocks of the boards which are again glued together to form the middle layer 2 of the laminboard 1. Subsequently, the covering layers 3, 4 are glued onto the central layer 2. In Figure 1, a corresponding glued joint 5 can be seen in each case between adjacent thin wood strips 20 of the middle layer 2. The corresponding glued joints 6, 7 between the two covering layers 3, 4 and the middle layer 2 can also be seen in Figure 1.

The glue (preferably a melamine resin glue) which is used to produce the glued joints 5, 6, 7 has an expanded graphite proportion. The proportion by mass ω of the expanded graphite component, that is to say, the relative mass of this component to the overall mass of the material admixture which is formed from the glue component and the expanded graphite component is defined as follows:

$$\omega = m_{\text{Blähgraphit}} : (m_{\text{Blähgraphit}} + m_{\text{Leim}})$$

where $m_{\text{Blähgraphit}}$ is the mass of the expanded graphite component and m_{Leim} is

the mass of the glue component.

Preferably, the proportion by mass ω of the expanded graphite component is between 9/100 and 1/3. In a particularly advantageous manner, a proportion by
5 mass ω is between 0.2 and 0.3, in particular between 0.23 and 0.25, in order to ensure good workability of the glue/expanded graphite material admixture. If, for example, in order to glue the wood strips 20 of the middle layers 2 and the covering layers 3, 4 of laminboards 1, a glue/expanded graphite admixture is used, wherein 50 kg of glue mass is used, between 5 kg and 25 kg, preferably
10 approximately 15 kg (30% with respect to 50 kg of glue, $\omega = 0.23077$) of expanded graphite is added to this glue mass.

In order to achieve particularly advantageous properties in the event of fire, expanded graphite which has the lowest possible starting temperature of
15 approximately 150°C is preferably added to the glue.

The covering layers 3, 4 preferably comprise flame-retardant board materials and may, for example, be formed by a high-density fiber board (HDF board), a medium-density fiber board (MDF board), a chipboard or a beech plywood
20 board. The middle layer 2 is compressed during the production with the two covering layers 3, 4 with the glued joints 6, 7 being interposed.

It is advantageously thereby possible to obtain a flame-retardant laminboard 1 in accordance with the standard DIN EN 13501 (part 1, 2007 - 05) in class C - S2,
25 d0 which in comparison with the laminboards known from the prior art has considerably improved properties in the event of fire.

It has surprisingly been found that, as a result of the use of particularly thin barked veneers up to a thickness of 3 mm, the concentration of the fire-retardant
30 expanded graphite can be increased in such a manner that a flame-retardant laminboard 1 in accordance with the standard DIN EN 13501 (Part 1, 2007-05) in the class B - S1, d0 can be obtained.

In the event of fire, the expanded graphite expands in the glue which was used to glue the wood strips 20 of the middle layer 2 to each other and to glue the covering layers 3, 4. As a result of the expansion of the expanded graphite, there is formed a very large surface which enables rapid oxidation of the carbon. The oxygen is thereby removed from the ambient air. The ambient air is thus rendered inert and then acts to some degree as an extinguishing means against the fire and chokes it. On the whole, as a result of the use of the expanded graphite, the spread of the fire can be slowed or also completely contained so that in particular the formation of toxic gases and smoke can be effectively counteracted.

The basic concept set out above for improving the fire properties can also be transferred to blockboards which differ from laminboards in particular in that the rods of the middle layer at approximately from 24 to 50 mm have a greater width than the thin wood strips 20 of the middle layer 2. As a result of the addition of expanded graphite to the glue used for gluing the covering layers, it is possible to produce blockboards which in comparison with the solutions known from the prior art have considerably improved properties in the event of fire.

With the addition of expanded graphite to the glue which is intended to be used for the gluing, it is possible to confer flame-retardant properties not only on blockboards or laminboards (so-called wood core boards), but also laminboards, high-density fiber boards (HDF boards), medium-density fiber boards (MDF boards) and hard fiber boards. It is thus possible in particular for the fire properties of plywoods (in various embodiments and wood types) to be significantly improved by the addition of expanded graphite to the glue. Also in this instance, it is possible to work with the above-mentioned covering materials. The plywood can also be constructed in a flame-retardant manner in an unprocessed embodiment (that is to say, without additional covering and/or blocking layers).

RÉTEGELT LEMEZ

SZABADALMI IGÉNYPONTOK

1. Furnérbetétetes asztaloslap (1), amelynek számos vékony falemezből (20) kialakított középső rétege (2) van, amelyek egymással párhuzamosan vannak elrendezve, és egymáshoz vannak ragasztva, továbbá két fedőrétege (3, 4) van, amelyek a középső réteg (2) mindkét oldalára keresztirányban vannak felragasztva, **azzal jellemezve**, hogy a ragasztó, amellyel a középső réteg (2) falemezei (20) egymáshoz, és a két fedőréteg (3, 4) a középső réteghez (2) van ragasztva, grafithabot tartalmaz, ahol grafithab összetevő ω tömegének részaránya

$$\omega = m_{\text{grafithab}} : (m_{\text{grafithab}} + m_{\text{ragasztó}}),$$

amely 9/100 és 1/3 között van, ahol $m_{\text{grafithab}}$ a grafithab összetevő tömege, és $m_{\text{ragasztó}}$ a ragasztó összetevő tömege.

2. Az 1. igénypont szerinti furnérbetétetes asztaloslap (1), **azzal jellemezve**, hogy a grafithab összetevő ω tömegének részaránya 0,2 és 0,3 között van.

3. Az 1. vagy 2. igénypontok bármelyike szerinti furnérbetétetes asztaloslap (1), **azzal jellemezve**, hogy a grafithab összetevő ω tömegének részaránya 0,23 és 0,24 között van.

4. Az 1. – 3. igénypontok bármelyike szerinti furnérbetétetes asztaloslap (1), **azzal jellemezve**, hogy a fedőrétegek (3, 4) gyulladásgátló lemezből vannak kiképezve.

5. Az 1. – 4. igénypontok bármelyike szerinti furnérbetétetes asztaloslap (1), **azzal jellemezve**, hogy a fedőrétegek (3, 4) vastagsága kb. 2 mm.

6. Az 1. – 5. igénypontok bármelyike szerinti furnérbetétetes asztaloslap (1), **azzal jellemezve**, hogy a vékony falemezek (20) furnérszalagok, amelyek vastagsága kb. 1,5 mm és 8 mm között van, célszerűen a vastagság 1,5 mm és 6,5 mm között van.

7. A 6. igénypont szerinti furnérbetétetes asztaloslap (1), **azzal jellemezve**, hogy a furnérszalagok maximális vastagsága 3 mm.

8. Enyvezett bútorlap, amelynek középső rétege számos egymással párhuzamosan elrendezett, egymáshoz ragasztott falemezekből van kialakítva, továbbá két fedőrétege van, amelyek keresztirányban vannak a középső réteg mindkét oldalára ragasztva, **azzal jellemezve**, hogy a ragasztó, amellyel a középső réteg (2) falemezei (20) egymáshoz, és a két fedőréteg (3, 4) a középső réteghez (2) van ragasztva, grafithabot tartalmaz, ahol grafithab összetevő ω tömegének részaránya

$$\omega = m_{\text{grafithab}} : (m_{\text{grafithab}} + m_{\text{ragasztó}}),$$

amely 9/100 és 1/3 között van, ahol $m_{\text{grafithab}}$ a grafithab összetevő tömege, és $m_{\text{ragasztó}}$ a ragasztó összetevő tömege.

9. A 8. igénypont szerinti enyvezett bútorlap, **azzal jellemezve**, hogy a fedőrétegek (3, 4) gyulladásgátló lemezből vannak kiképezve.

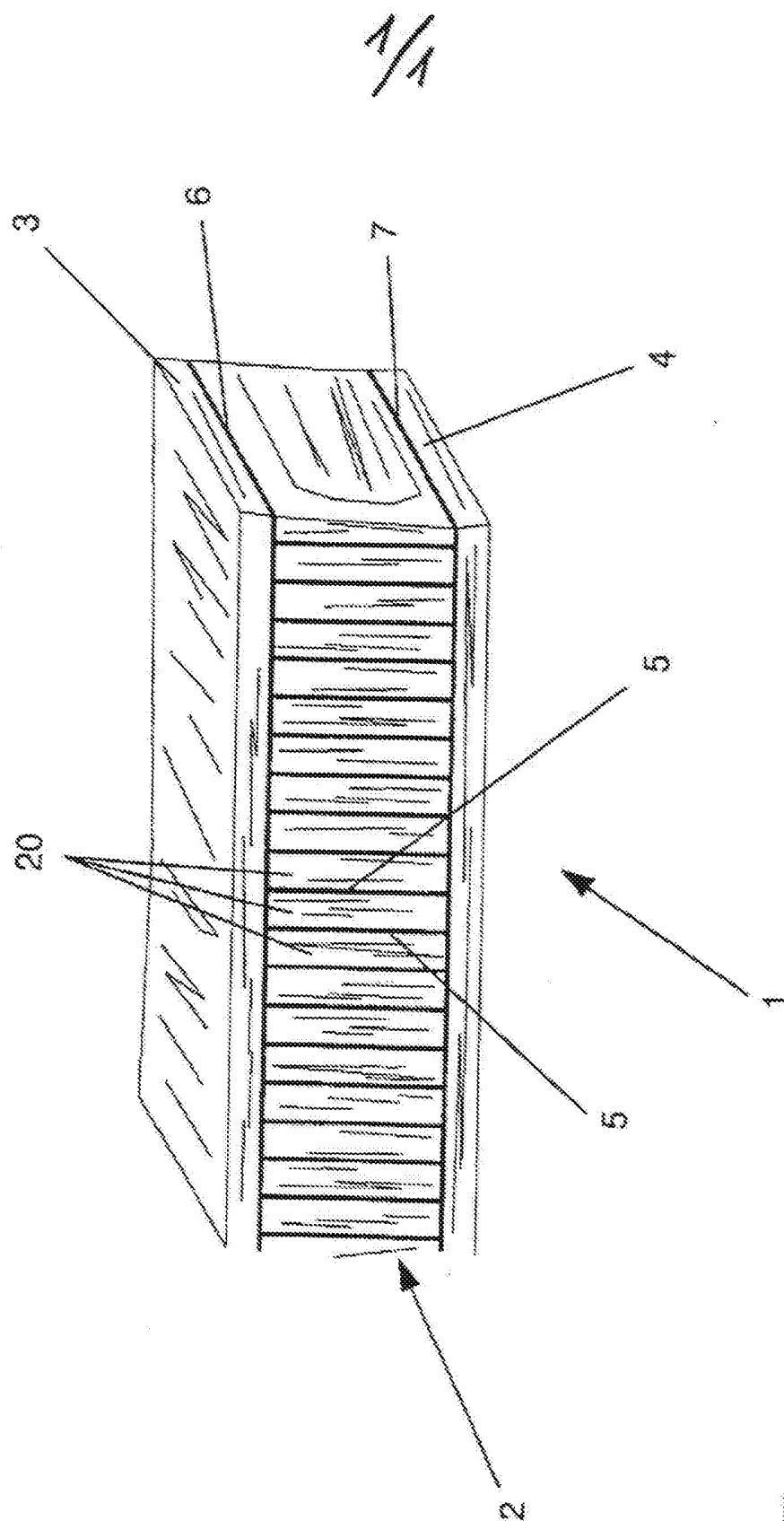


Fig. 1