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(54) **CONSTRUCTION BOARD.**

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Description

The invention relates to a sandwich element with a core of longitudinal lamellas, according to the preamble of claim 1.

Lamella cores of this type are prior known, having been used for instance in shipbuilding industry as insulating walls of various spaces.

Sandwich elements of mineral wool have been used to some extent within the shipbuilding industry. So far, however, longitudinal elements have not been available, neither as roof or floor elements, nor as wall elements.

SE-A 368 949 discloses a method for producing a lamella board having fibres oriented perpendicularly to the plane of the board. Such a result is obtained by rotating cut lamella strips by 90° and by reassembling the said strips in the reversed position. The so obtained lamella core has excellent resistance properties and is able to transfer shearing forces between its surface planes. However, the method is fairly complicated and expensive.

EP-A-445 245 also describes the manufacture of lamella board. Thereby, finished sandwich elements of mineral wool with the fibres oriented perpendicularly to the surface plane of the element would be usable as supporting roof, floor and wall elements, thus simplifying construction operations noticeably.

The object of this invention is to provide long sandwich elements having a core consisting of fire, noise and heat insulating lamella boards for roof, floor and wall constructions.

According to the invention, this object will be achieved by the characterizing portion of claim 1.

The facts mentioned about the joint surface of the lamella pieces are pertinent regardless of the joint surface being vertical to the surface layer of the lamella core or its being tilted, the joint surface being greater in the latter case than in the former. The total surface of the joint surfaces must not exceed one third of the cross-sectional surface. As an example one can mention a lamella core with nine lamella strips whereby the length a of the core may comprise three vertical joint surfaces, none of which is an inclined joint surface, which would result in a total joint surface that is greater than one third of the total cross-sectional surface.

According to the invention, a long sandwich element can be provided, of the size order of 9-10 m, by means of lamella strips rotated 90° and reassembled, without handling mineral wool mats nor lamella strips of the corresponding length. By distributing the joints between the various aligned lamella pieces appropriately over the surface of the lamella core, a core is obtained which used in a sandwich element has the same resistance properties as a core without joints, i.e. in which the weakening influence of the joints has been eliminated.

According to a preferred embodiment of the lamella core of the invention, none of the joints is closer to an end of the lamella core than a.

According to another preferred embodiment of the core, maximally one joint is disposed within the range 2a from either end of the core. According to a further development of the invention, maximally two joints are disposed within the distance 3a from either end of the core.

The facts mentioned above about the existence of joints at the ends of the lamella core, are also true about the areas on each side of intermediate supports of a multi-span construction. A force concentration namely arises at intermediate supports like at the end supports. These critical areas must not contain as many joints as interposed areas. The conclusion is valid for elements in a horizontal position as well as for elements in a vertical position.

As a general rule, the distance a indicating the length of the critical area, equals L/2n. Since the support points, among others, have a certain extension, the length a has to be made somewhat longer, and thus the length L is appropriately divided by 1,9n.

Further, the distance between joints in two adjacent lamella strips preferably equals at least the thickness of the strips in the lamella core, i.e. the thickness of the lamella core.

According to a preferred embodiment of the process, the lamella pieces are connected with a glue joint by applying glue to the end surfaces before connecting and fixing e.g. by drying subsequent to the forming of the sandwich board. The glue application is appropriately performed before the phase displacement of the flow of lamella pieces.

According to another preferred embodiment of the process, the end surfaces of the lamella pieces are face milled or prepared so as to match the surfaces well, before a possible glue application.

According to another preferred embodiment, the future lateral surfaces of the lamella pieces are face milled or prepared so that the lamella pieces will fit tightly to each other.

According to another embodiment, traces are made in the end faces of the lamella pieces, parallel to the plane of the lamella core or perpendicular to these, so as to provide a finger joint between the lamella pieces.

According to a further embodiment, the lamella pieces are pressed together during the connecting moment at a pressure exceeding 100 Pa, preferably 500 Pa.

The mineral wool mat used as starting material consists of a binder fixed mineral wool, which may be a rock wool or a glass wool, forming essentially plane parallel layers consisting of vitreous fibres more or less in disorder. By rotating the lamella pieces cut from the mat, lamella pieces having vertically oriented fibres are obtained, which is valuable for the resistance requirements of the lamella core when used in a sandwich element as a construction element. This fibre orientation, allowing shearing forces to be transferred between the surface planes of the element, enables the use of very long boards, of the size order of 9-10 m, for construction purposes.

The parameters a, L and n are used for determining the exact position for cutting a lamella strip to a lamella of the length of the lamella core in such a way that the joints of neighbouring lamella strips will be positioned according to the conditions defined in claim 1. Said parameters determine the length of phase displacing the lamella pieces and they are used for programming a computer for automatic control of the cutting of the lamella strips.

A preferred embodiment of the lamella core according to the invention is described below with reference to the enclosed figure 1.

The lamella core is indicated by 1, the lamella pieces by 2 and the joint between the lamella pieces forming the lamella strips of the lamella board by 3. In the lamella pieces 2 forming the outermost lamella strip, the vertical orientation of the fibre planes is indicated.

It can be noted that the joints 3 are relatively equally distributed over the lamella board and a comparison between the above parameters shows that all the criteria are being fulfilled.

As described in EP-A-445 240, the manufacture of the lamella core is carried out by assembling laterially lamella pieces cut from a mineral wool mat and rotated to form the lamella core. Assembling of the lamella pieces that have been cut off and rotated can be accomplished in various manners.

In a preferred manner, the lamella pieces are assembled consecutively into a long lamella strip from which lamellas having the desired length (= the length of the lamella core) are cut and laterally assembled into a lamella board.

In another preferred manner, several lamella pieces are cut from the mineral wool sheet and rotated and subsequently phase displaced axially. The phase displaced lamella pieces are subsequently assembled with a butting end faces against each other with the preceding flow of correspondingly cut and phase displaced lamella pieces into a flow of lamella strips, from which a length equalling the length of the lamella board is cut off. After that, the two surface layers are applied onto the lamella board to form the sandwich element.

Provided with surface layers, which can be of thin sheet metal, a concrete layer, minerite or similar, the sandwich element of the invention is usable as supporting wall, floor or roof elements. The element has good fire and heat insulation properties owing to its construction, and it is easy to install.

Claims

1. A sandwich element comprising a core (1) of adjacently disposed lamella strips of binder fixed mineral wool extending in the longitudinal direction of the element, and a surface layer, e.g. of metal sheet attached on both sides of the core, the mineral wool fibres being distributed in parallel planes which are perpendicular to the main surfaces of the element, characterized in that the lamella strips consist of lamella pieces (2) shorter than the lamella core (1), the opposing end surfaces of aligned lamella pieces (2) forming a joint (3), and in that the total of the joint surfaces within a certain interval having the longitudinal length "a", forms maximally one third of the cross-sectional surface of the core, said length "a" = L /(1,90n), wherein L = the length of the lamella core, when the element is a one-span element, and L = the span, when the element is a multi-span element, and n = the number of laterally adjacent lamella strips in the lamella core (1).

2. A sandwich element according to claim 1, characterized in that no joint (3) is disposed closer to an end of the lamella core (1) or a support line of a multi-span element, respectively, than "a".

3. A sandwich element according to claim 1 or 2, characterized in that maximally one joint (3) is disposed within the distance "2a" from one end of the lamella core (1) or from a support line of a multi-span element, respectively.

4. A sandwich element according to any of claims 1-3, characterized in that maximally two joints (3) are within the distance "3a" from one end of the lamella core (1) or from a support line of a multi-span element, respectively.

5. A sandwich element according to any of claims 1-4, characterized in that the longitudinal distance between two joints (3) in two adjacent lamella strips is at least equal to the thickness of the lamella core (1).

6. A sandwich element according to any of claims 1-5, characterized in that the opposing end surfaces of the joints (3) are pressed against each other forming a border zone, in which fibres from both opposing lamella pieces (2) are included.

7. A sandwich element according to any of claims 1-6, characterized in that the opposing end surfaces of the joints are glued against each other.

Patentansprüche

1. Sandwichelement mit einem Kern (1) von einander benachbart angeordneten Lamellenstreifen aus binder-fixierter Mineralwolle, die sich in Längsrichtung des Elementes erstrecken, mit einer Oberflächenlage, beispielsweise aus Blech, die auf beiden Seiten des Kernes befestigt ist, wobei die Mineralwollfasern in parallelen Ebenen verteilt sind, die senkrecht zu den Hauptflächen des Elementes verlaufen, dadurch gekennzeichnet, daß die Lamellenstreifen aus Lamellenstücken (2) bestehen, die kürzer als der Lamellenkern (1) ist, daß die einander zugewandten Stirnflächen der ausgerichteten Lamellenstücke (2) eine Stoßstelle (3) miteinander bilden, und daß die Gesamtheit der Stoßflächen innerhalb eines gewissen Intervalls mit der Länge "a" maximal ein Drittel der Querschnittsfläche des Kernes bildet, wobei die Länge "a" = L /(1,90 n) ist, wobei L = die Länge des Lamellenkernes ist, wenn das Element ein Ein-Spannweiten-Element ist, und L = der Spannweite, wenn das Element ein Mehr-Spannweiten-Element ist, und n = die Anzahl der seitlich benachbarten Lamellenstreifen im Lamellenkern (1).

2. Sandwichelement nach Anspruch 1, dadurch gekennzeichnet, daß keine Stoßstelle (3) näher an einem Ende des Lamellenkernes (1) oder einer Stützlinie eines Mehr-Spannweiten-Elementes ist als "a".

3. Sandwichelement nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß maximal eine Stoßstelle (3) innerhalb des Abstandes "2a" von einem Ende des Lamellenkernes (1) oder von einer Stützlinie eines Mehr-Spannweiten-Elementes angeordnet ist.

4. Sandwichelement nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß maximal zwei Stoßstellen (3) innerhalb eines Abstandes "3a" von einem Ende des Lamellenkernes (1) bzw. von einer Stützlinie eines Mehr-Spannweiten-Elementes angeordnet ist.

5. Sandwichelement nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß der Längsabstand zwischen zwei Stoßstellen (3) bei zwei einander benachbarten Lamellenstreifen wenigstens gleich der Stärke des Lamellenkernes (1) ist.

6. Sandwichelement nach einem der Ansprüche 1 bis 5, dadurch gekennzeichnet, daß die einander zugewandten Stirnflächen der Stoßstellen (3) aneinander angepreßt werden und eine Randzone bilden, in welcher Fasern aus den beiden einander zugewandten Lamellenstükken (2) eingeschlossen sind.

7. Sandwichelement nach einem der Ansprüche 1 bis 6, dadurch gekennzeichnet, daß die einander zugewandten Stirnflächen der Stoßstellen miteinander verleimt sind.

Revendications

1. Élément sandwich comprenant une âme (1) de bandes lamellaires disposées de façon adjacente en laine minérale fixée par un liant,s'étendant dans le sens longitudinal de l'élément, et une couche superficielle, par exemple en tôle métallique,attachée sur les deux côtés de l'âme, les fibres de laine minérale étant distribuées dans des plans parallèles qui sont perpendiculaires aux surfaces principales de l'élément, caractérisé en ce que les bandes lamellaires se composent de pièces lamellaires (2) plus courtes que l'âme (1), les surfaces des extrémités opposées des pièces lamellaires alignées (2) formant un joint (3), et en ce que le total des surfaces des joints à l'intérieur d'un certain intervalle ayant la longueur longitudinale "a", représente au maximum un tiers de la surface de la section transversale de l'âme, ladite longueur "a" = L/(1,90n), où L = la longueur de l'âme lamellaire, quand l'élément est un élément en une partie, et L = une partie quand l'élément est en plusieurs parties, et n = le nombre de bandes lamellaires latéralement adjacentes dans l'âme (1).

2. Élément sandwich selon la revendication 1, caractérisé en ce qu'aucun joint (3) n'est situé plus près d'une extrémité de l'âme lamellaire (1) ou d'une ligne de support d'un élément en plusieurs parties, respectivement que la longueur "a".

3. Elément sandwich selon les revendications 1 ou 2, caractérisé en ce que au maximum un joint (3) est situé à l'intérieur de la distance "2a" à partir d'une extrémité de l'âme lamellaire (1) ou d'une ligne de support d'un élément en plusieurs parties, respectivement.

4. Elément sandwich selon l'une quelconque des revendications 1-3, caractérisé en ce que au maximum deux joints (3) sont situés à l'intérieur de la distance "3a" à partir d'une extrémité de l'âme lamellaire (1) ou d'une ligne de support d'un élément en plusieurs parties, respectivement.

5. Elément sandwich selon l'une quelconque des revendications 1-4, caractérisé en ce que la distance longitudinale entre deux joints (3) dans deux bandes lamellaires adjacentes est au moins égale à l'épaisseur de l'âme lamellaire (1).

6. Elément sandwich selon l'une quelconque des revendications 1-5, caractérisé en ce que les surfaces des extrémités opposées des joints (3) sont pressées l'une contre l'autre pour former une zone limite où les fibres des deux pièces lamellaires opposées (2) se confondent.

7. Elément sandwich selon l'une quelconque des revendications 1-6, caractérisé en ce que les surfaces des extrémités opposées des joints sont collées l'une contre l'autre.

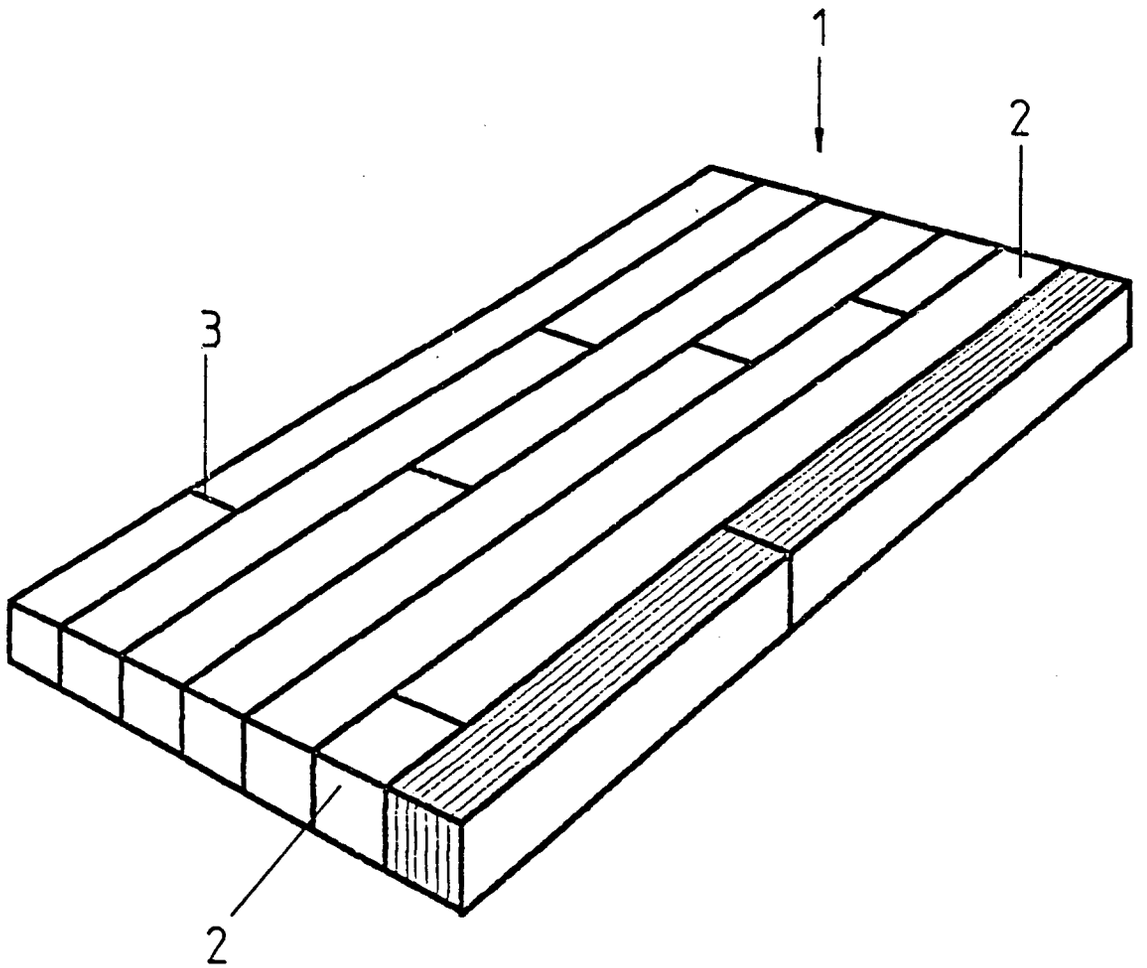

Fig. 1