(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 1 546 483 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
21.11.2012 Bulletin 2012/47

(21) Application number: **03762917.7**

(22) Date of filing: **03.07.2003**

(51) Int Cl.:
E04C 2/16 *(2006.01)*

(86) International application number:
PCT/NL2003/000488

(87) International publication number:
WO 2004/005643 (15.01.2004 Gazette 2004/03)

(54) **WOOD STRAND BOARD**

HOLZFASERPLATTE

PANNEAU DE COPEAUX LONGS

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PT RO SE SI SK TR

(30) Priority: **03.07.2002 NL 1020982**

(43) Date of publication of application:
29.06.2005 Bulletin 2005/26

(73) Proprietor: **Van Elten, Gerrit Jan**
NL-3781 TC Voorthuizen (NL)

(72) Inventor: **Van Elten, Gerrit Jan**
NL-3781 TC Voorthuizen (NL)

(74) Representative: **Plaggenborg, Menko Bernard et al**
Octrooibureau Novopatent
Top Tower, 6th Floor
Busplein 36
1315 KV Almere (NL)

(56) References cited:
DE-A- 19 520 023
DE-U- 7 914 865
US-A- 2 697 677
US-A- 3 164 511

EP 1 546 483 B1

Printed by Jouve, 75001 PARIS (FR)

Description

[0001] The invention relates to a mineral bonded Wood Strand Cement Board which is composed of a mixture of wood strands, cement as a binder and possibly additives, which mixture is cured under pressure to form a board with a practically fully closed surface, wherein the wood strands have a width of 1 to 12 mm and a thickness of 0.15 to 1.0 mm.

[0002] Wood Cement Boards and Fibre Cement Boards are used worldwide in a large number of varying applications. Advantages of these boards are, amongst others, the durability and the resistance against fire, moisture, rot, fungi and termites.

[0003] Wood Wool Cement Boards have been known for almost a century. These boards are made of wood wool, preferably curled fibres of restricted width, and cement, magnesite or gypsum. These known boards have an open matrix and therefore a relatively low density. Initially these boards were used for insulation purposes and as a base for stuccoed ceilings. Nowadays these boards are also used for decoration purposes and as sound absorbing boards. These applications are made possible by the introduction of automated machines for the production of these boards. With the development of machines with control systems that control the accurate dosing and mixing of the raw materials, the even distribution of the mixture in the moulds and the stacking and pressing of the moulds with the fresh mixture, the production of boards of a constant quality is feasible. With the availability of these machines it is possible to produce boards of high quality at low costs. In particular by using wooden moulds (concrete form boards) and a low pressure press, the costs for the equipment of a production line of Wood Wool Cement Boards are relatively low.

[0004] However, because of their open matrix structure, Wood Wool Cement Boards are unsuitable for structural applications like external wall claddings and roofing, for which a closed and water proof surface is important. Moreover, the strength of the Wood Wool Cement Boards is not sufficient for such applications.

[0005] To the present day applications like external claddings and roofing are amongst others made with corrugated or flat Fibre Cement Boards or shingles. These boards and products have a closed matrix and are waterproof. Optionally, flat boards can be provided with a relief in the surface, for example with a texture of slate, brick or imitation wood grain. Until recently these Fibre Cement Boards were mainly made from cement and asbestos fibres, which were suitable because of their durability, strength and low costs. In many countries asbestos fibres are now replaced by cellulose and synthetic fibres, mainly due to the legislation which forbids the use of asbestos because of the danger for the manufacturers and the processors of the boards. A disadvantage of the fibre cement boards is, however, that these boards are not as strong and not as durable as the asbestos boards and moreover synthetic fibres and strong cellulose are expensive.

[0006] The Dutch patent 1 010 195 describes Wood Strand Cement Boards which possess the advantages of Wood and Fibre Cement Boards concerning the durability and the resistance against fire, moisture, rot, fungi and termites.

[0007] However, these boards have a number of essential disadvantages.

[0008] One of the disadvantages is that in the compressed upper layer made of cement mortar or another sealing material, hair cracks can appear in the surface specially in case the cement layer is not supplied with a coating finish such as paint. Another disadvantage is that due to the relatively low density of these boards, of 800 to 900 kg per m3, the bending strength leaves much to be desired and further the screwability and nailability and screw and nail holding capability of these boards is problematic.

[0009] Other problems arise in the processing of such boards, like profiling, applying tongues and grooves and beveling of the edges of the boards. Further these boards may curve under the influence of a varying moisture content due to being not balanced with identical surfaces.

[0010] US 3 164 511 mentions a wood strand cement board comprising wood strands that are cut from wood veneer. As a consequence, the wood strands have a box shape cross section. Siad known board has a high stiffness and is brittle due to its high cement content.

[0011] The invention under consideration aims to provide a Wood Strand Cement Board that can annihilate the aforementioned disadvantages.

[0012] To this aim the present invention provides a Wood Strand Cement Board that is made from a mixture of wood strands, water, cement as a binder and possible supplements, which mixture is cured under pressure to form a board with a practically fully closed surface, wherein the wood strands have a width of 1 to 12 mm and a thickness of 0.15 to 1.0 mm, characterised in that the edges of the strands are pointed

[0013] It has shown that with the use of broader and thinner wood strands, compared to the wood strands as used in the acoustic Wood Wool Cement Boards up to date and by omitting the compressed upper layer composed of cement mortar or other sealing material, the aforementioned disadvantages are nullified quite effectively.

[0014] In order to achieve better results, it is advantageous to have a width of the wood strands of 3-10 mm, and a thickness of 0.15-0.3 mm.

[0015] Surprisingly it has been shown that with the use of wood strands with sharp edges in accordance with the present invention, the edges of the wood strands do no longer show. Furthermore it shows that whenever the wood strands are distributed at random, a smooth and almost ridge free surface is obtained after pressing without the use of a coating layer of saw dust and cement as described in the Dutch patent 1 010 195.

[0016] Since the boards according to the invention can

have a density of between 900 and 1200 kg per m^3, preferably of 1000- 1100 kg per m^3, it has turned out that the boards have a higher bending strength compared to the known boards as described in the before mentioned Dutch patent, which have a density of 800 to 900 kg per m^3.

[0017] Moreover, the boards according to the invention are better nailable and screwable and the screws, staples and nails hold better in the new material.

[0018] This higher density of the boards under consideration turns out to result in a considerable improvement in relation to the processing of the boards, such as profiling, the application of grooves and bevelling of the edges of the boards.

[0019] It is noted that although the board can be painted or stuccoed, there is no need for stuccoing on account of the particularly smooth surface. It has been proven that without further surface treatment like painting, the boards are weatherproof.

[0020] Surprisingly it has also turned out that the use of long wood strands according to the invention leads to a bending strength of more than double the Norm set for Cement Bonded Particle Boards at an approximately 20% lower density and in addition makes the boards considerably cheaper to produce.

[0021] The boards according to the invention can be supplied on one side with an embossing of for instance a brick, slate or wood grain texture, which makes them suitable as durable cladding boards or planks on the exterior of a building.

[0022] Another important advantage of the boards under consideration is their resistance to fire, moisture, rot and fungi, as well as thaw and frost. In addition, they are resistant to all weather conditions and the devastating effect of termites.

[0023] The boards according to the invention are very durable and can be applied successfully in tropical countries that are afflicted by hurricanes, rainstorms and earthquakes like in Central America (Honduras, Guatemala, El Salvador, Nicaragua).

[0024] Furthermore, an example of an operating process for the production of Wood Strand Cement Boards may comprise the following steps: a) distribution into moulds of a mixture consisting of wood strands, water, and cement, magnesite or gypsum; b) stacking of the moulds with raw material up to the desired height; c) pressing of the stack of moulds with raw material, in order to achieve the desired density of the boards; and d) maintaining of this height through a connection of a so-called Bottom which lies beneath the stack, with a top, which lies on top of the stack, using tie rods during the initial stage of curing of the cement, magnesite or gypsum.

[0025] Wood strands with a width of 1-12 mm or more, preferably 3-10 mm, and a thickness of 0.15-1.0 mm, preferably 0.15-0.3 mm are used.

[0026] It is particularly advantageous to use wood strands with pointed edges, especially if angles of less than 120 are provided on the strands.

[0027] Besides, for the production of the boards both moulds of plywood as cauls of steel can be used.

[0028] For the production of Wood Strand Cement Boards with a relief surface according to the invention a separate board with a counter-profile is placed in the mould respectively the top of the mould itself and is provided with a counter-profile.

[0029] For certain reliefs it is advantageous when onto the counter-relief board a mixture of wood strands, water and cement is distributed, which subsequently is being pressed to achieve the wanted relief, without using an additional sealing layer of cement, magnesite or gypsum possibly mixed with short fibres such as saw dust.

[0030] In a preferred implementation of the operating procedure according to the invention, at least part of the wood strands is oriented more longitudinally than transversely to the length of the board during the application and distribution of the mixture of wood strands, water and cement, magnesite or gypsum. Due to such orientation of the wood strands lengthwise in relation to the board, the strength and the elasticity of the board will increase in longitudinal direction and the linear stability in this direction due to variations in moisture content is improved.

[0031] In case the boards are made with sufficient thickness, they can be sawn into lath or strips of timber, or planks. I beam and other profiles are assembled from strips, lath or planks obtained from the invention. Such lath can be glued together to I beams. Those laths, planks and beams are, because of their strength and stability and their resistance to fire and termites, very suitable for applications in construction work, in particular in countries with many wooden buildings, such as the United States, Scandinavia, Canada, and so on. Such planks can also be favourably used for durable exterior claddings of buildings.

[0032] The invention under consideration is not restricted to the embodiments mentioned above but only to the following claims.

Claims

1. Wood Strand Cement Board, manufactured from a mixture consisting of wood strands, cement as a binder and water with possibly additives, which mixture is cured to form a board with a practically entirely closed surface, wherein the wood strands have a width of 1 to 12 mm and a thickness of 0.15 to 1.0 mm, **characterised in that** the edges of the strands are pointed.

2. Board as described in claim 1, **characterised in that** the wood strands have a width of 3 to 10 mm, and a thickness of 0.15 till 0.3 mm.

3. Board as described in claims 1-2, **characterised in that** the edges of the strands are sharp with angles less than 120°.

4. Beams, strips, lath or planks are sawn from relatively thick boards as described in claims 1-3.

5. I beam and other profiles are assembled from strips, lath or planks obtained according to claim 4.

Patentansprüche

1. Holzspan-Zementplatte, hergestellt aus einem Gemisch bestehend aus Holzspänen, Zement als Bindemittel und Wasser mit möglichen Additiven, wobei das Gemisch unter Bildung einer Platte mit einer im Wesentlichen vollständig geschlossenen Oberfläche ausgehärtetet wird , worin die Holzspähne eine Weite von 1 bis 12 mm und eine Dicke von 0,15 bis 1 mm aufweisen, **dadurch gekennzeichnet, dass** die Kanten der Spähne spitz zulaufen.

2. Platte nach Anspruch 1, **dadurch gekennzeichnet, dass** die Holzspähne eine Weite von 3 bis 10 mm und eine Dicke von 0,15 bis 0,3 mm aufweisen.

3. Platte nach einem der Ansprüche 1 - 2, **dadurch gekennzeichnet, dass** die Kanten der Spähne scharfkantig mit Winkeln von unter 120 ° sind.

4. Träger, Leisten, Latten oder Planken, gesägt aus einer relativ dicken Platte nach einem der Ansprüche 1 - 3.

5. Träger und andere Profile, aufgebaut aus Leisten, Latten oder Planken, erhalten nach Anspruch 4.

Revendications

1. - Panneau de ciment - copeaux longs, fabriqué à partir d'un mélange constitué de copeaux longs, de ciment en tant que liant et d'eau avec éventuellement des additifs, lequel mélange est durci pour former un panneau ayant une surface pratiquement entièrement fermée, les copeaux longs ayant une largeur comprise entre 1 et 12 mm et une épaisseur comprise entre 0,15 et 1,0 mm, **caractérisé par le fait que** les bords des copeaux longs sont pointus.

2. - Panneau selon la revendication 1, **caractérisé par le fait que** les copeaux longs ont une largeur comprise entre 3 et 10 mm, et une épaisseur allant de 0,15 jusqu'à 0,3 mm.

3. - Panneau selon l'une des revendications 1 et 2, **caractérisé par le fait que** les bords des copeaux longs sont en biseau avec des angles de moins de 120°.

4. - Poutres, bandes, lattes ou madriers sciés à partir de panneaux relativement épais tels que définis à l'une des revendications 1 à 3.

5. - Poutre en I et autres profilés assemblés à partir de bandes, lattes ou madriers obtenus conformément à la revendication 4.

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- NL 1010195 **[0006] [0015]**
- US 3164511 A **[0010]**