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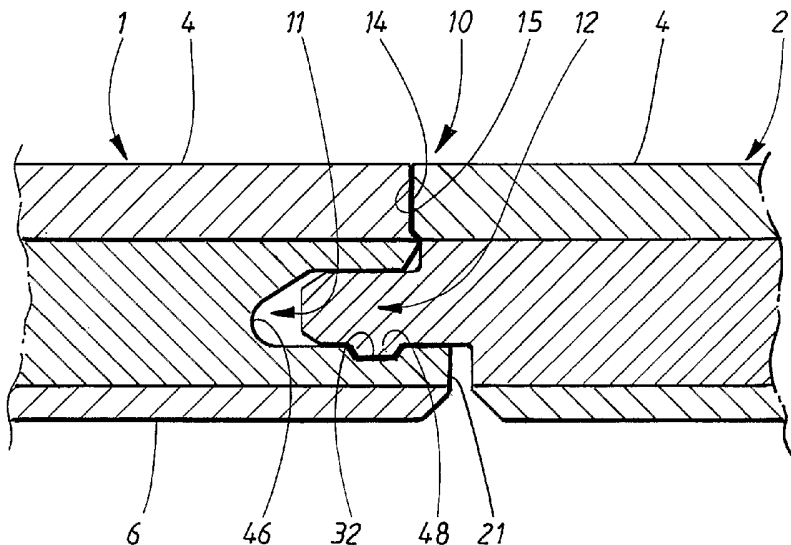
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(54) Title: Parquet board arranged for mechanical joint locking to corresponding parquet boards and method for manufacturing
parquet boards.



(57) Abstract: Parquet board arranged for mechanical joint locking to corresponding parquet boards, for example, for a floor covering. The joint locking is achieved by one of the boards being provided with a groove (11) and the other with a tongue (12) at the meeting edges (14, 15) of the boards (1, 2), which tongue can be inserted into the groove. A locking arrangement in the form of a recess (32) in the groove and a projection (48) on the tongue achieves the locking by snapping together. A method for manufacturing the boards by chipping is described.



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

TITLE

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Parquet board arranged for mechanical joint locking to corresponding parquet boards and method for manufacturing parquet boards.

TECHNICAL FIELD

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The present invention relates to a parquet board, preferably of wood and intended as a floor covering, which is arranged for mechanical joint locking to corresponding parquet boards, and also relates to a method for manufacturing parquet boards.

15

BACKGROUND ART

For covering surfaces such as buildings, floors of boards, staves or panels, which are joined together, the use has been known for a long time of a tongue and groove joint, with a board designed with a slot and the edge of the attached board being provided with a tongue. Such an arrangement makes it possible to fix the different boards in position in relation to each other in order to achieve a level facing surface without protruding edges. In order to hold the boards together, however, arrangements are required for joint locking, that is holding the boards together in the direction of the main plane of the boards. Well-known fixing methods are nailing, which can be concealed by the nailing being carried out inside the actual joint before the next board is attached. Such nailing is, however, time-consuming and requires, in addition, a subfloor in which it is possible to drive nails.

30

Another well-known jointing method is the use of adhesive. This has, however, other disadvantages, there is an additional cost of the adhesive,

there is a danger of the adhesive spreading to the visible outer face of the boards with staining as a result, and, when laying, it must be taken into consideration that the adhesive requires a certain amount of time to bond the parts together.

5

Joint-locking arrangements have therefore been sought which do not require nailing or the use of adhesives. For this purpose, it has been proposed that the boards should have an additional locking element which holds the boards together from their invisible underside, see for example EP 0 698 162 B1 (Pervan). With such systems, however, the utilization of separate locking components involves additional costs and additional work.

A system has therefore been sought in which a tongue projecting from one edge in the joint only needs to be inserted into a groove in the other edge of the joint and then the boards are pressed or pushed together, whereupon a hook element engages and holds the boards together by means of a snap-fit connection. Such a system is described in US 6 2002/0083673 A1 (Kettler et al).

20 In general, it can be stated that systems of this type are based on the tongue and groove joint which has been used for a very long time. "Tongued and grooved boards" are, after all, a commonly occurring product.

What these solution systems have in addition, to which the present invention relates as described here, is the introduction of a snap-fit lock. A relatively early example of a joint with the characteristics **"tongue, groove and an elongated projection on the tongue arranged to snap into a recess inside the groove"** is described in GB 2 256 023 published in 1992.

30 A number of parties within the product area in question have sought a solution to the said difficulties and have also sought a particularly advantageous form - perhaps seeking an optimal version within the

framework of a common basic solution with the characteristics marked by bold face above.

5 The current patent situation is that there are an enormous number of patents and applications relating to variants of the basic solution.

The solution with corresponding structures, consisting of the said known basic solution with some detail modified or repositioned, which has been utilized to emphasize the novelty and inventiveness, are represented by
10 large numbers of patents that have been granted in many territories.

One example is US patent 5 797 237, application from 1997. Claim 1 defines "A flooring system,..." completely in accordance with the characteristics of the basic solution but with the difference that the projection is associated
15 with the groove and the recess is associated with the tongue. The projection is described as "a ... barb".

Another example is US patent 6 006 486 in which Claim 1, "A floor covering ... panel" defines in full the said basic solution but with the characteristic of
20 "an ... locking recess being located ... distally beyond a distal edge...". Thus it is only the position of the locking recess relative to the edges where the boards make contact that constitutes anything specific over and above the basic solution.

25 DISCLOSURE OF INVENTION

With the design of a snap connection for the present purpose it is desirable for certain function requirements to be fulfilled which cause certain difficulties. These difficulties are primarily a result of the fact that the material
30 in the parquet boards, which is usually wood or plastic laminate, has a limited elasticity, which means that it is difficult to fulfil the conflicting requirements of a secure and precise locking by means of the spring force and the avoidance

- of further deformation of the edges, in particular the edge provided with the slot. Such deformation can cause damage to the material and a surface covering that is not level as a result of further outward springing of the edge material at the outward-facing side of the groove and possibly also damage
- 5 to the surface coating on the outward-facing side. Difficulties in laying can also arise, in that too large forces are required to insert the tongue into the groove. It is desirable that the joining together can be carried out by the boards being able to be brought together when they are in the same plane.
- 10 The choice of material used in the parquet boards is limited and is based on other premises than the elasticity of the material. Therefore the solution of the compromise between sufficiently hard locking and the said difficulties must accordingly be found by the shaping of the joint-locking connection.
- 15 An additional problem that is associated with a joint of this type is that the manufacture of parquet boards with the said recess inside a groove can cause manufacturing difficulties.
- The invention utilizes the last-mentioned type of joint-locking arrangement.
- 20 The invention accordingly describes an arrangement that achieves the following aims:
- achieving joint locking by means of a simple union of adjoining boards.
 - 25 - ensuring that that there is such give in the joint that the upper part of the edge provided with the groove is bent as little as possible during the union, which requires a certain widening of the slot for joining together the locking elements.
 - arranging a manufacturing method that permits a rational design of
 - 30 the joint-locking elements, and which method can be applied at a high rate of working.

The attached patent claims relate to parquet boards arranged for mechanical joint locking and are based on the important combination of particular shaped elements which form the total solution of the joint-locking connection, with the design of the bottom of the groove as a particularly advantageous
5 shaped element.

BRIEF DESCRIPTION OF DRAWINGS

An embodiment of the invention is described in the following, with reference
10 to the figures in the attached drawings. These show in cross-section the edges of two boards arranged to be joined together with joint locking, in which

Figure 1 shows a board provided with a groove,
15

Figure 2 shows a board provided with a tongue, and

Figure 3 shows these boards joined together.

20 PREFERRED EMBODIMENT(S)

In the embodiment, it is assumed that a floor covering is to be constructed with joined-together parquet boards. It is also assumed that the boards are a rectangular shape with an outward-facing surface which is to be visible and
25 which is here called the top side. For the joint-locking arrangement, one edge of the boards is provided with a groove and the other edge with the said tongue. These arrangements are found on the long sides of the rectangular boards and can also be implemented on the transverse short sides.

30

The said general design of the boards is probably the one that is the most commonly occurring in practice, but the invention can also be applied to

other designs, such as, for example, boards with edges set at an angle for laying patterns.

The figures show two edges arranged for joint locking of two boards that are adjacent to each other. The board provided with a groove is here designated by 1 and the board provided with a tongue is designated by 2. Each board consists of a layer 3 that faces the top side 4 of the board and will be visible after the laying. This layer is assumed to be of a decorative wood with good wearing qualities. It is normal, in the case of floorboards, for the layer to be so thick that it can be sanded several times to restore the appearance of the surface. The layer is generally provided with a surface coating, some type of varnish. Under the layer 3 there is an intermediate layer 5. This is preferably made of a hard flexible wood, which meets the requirements of the joint-locking arrangement. Finally, there is an inward-facing layer 7 that forms the underside 6 of the respective boards. This layer is in contact with the top side of the supporting floor when it is laid, but there can, if required, also be some intermediate layer for impact sound insulation or other purpose.

The three layers are attached to each other by the application of adhesives prior to cutting out the boards and constructing the joint-locking arrangement. By this means, the fibres can be laid in crossing directions in order to counteract stresses which could lead to the boards warping.

It is thus in the intermediate layer 5 that the said joint-locking arrangement is constructed. It is designated in its entirety as the joint-locking arrangement 10 and consists, as mentioned above, of a groove 11 in one board, board 1, and of a projecting tongue 12 in the other board 2. Above the joint-locking arrangement 10, the boards are provided with contact edges 14, 15 that go right up to the top side 4. As shown in the figures, they are limited to the thickness of the upper layer 3. It is thus these edges 14 and 15 that are to lie close to each other and with the position of the top sides 4 completely coinciding and without any step.

The board 1 provided with the groove 11 extends under the joint-locking arrangement 10, (see Figure 1), and has a lip 18 extending beyond the position of the contact edge 14. In the middle of this lip 18, the outline 19 of the board 2 is set back behind the position of the contact edge 15, (see Figure 2), so that in the joined-together position, a gap 21 is created at the end 20 of the lip 18 (see Figure 3).

In the direction going from the contact edge 14, the groove 11 has an upper surface 24 positioned towards the top side 4 and a lower surface 25 positioned towards the underside 6. These surfaces are parallel and also parallel to the main plane of the boards, the top side 4 and the underside 6.

Further into the groove beyond the surface 24, the surface turns in the direction towards the underside 6 with a part 26, while the surface 25 continues to run parallel to the underside to a bottom 28 in the groove, which is connected by curved parts to the surfaces 25 and 26. At its outer edge, the groove 11 terminates at the underside with a chamfer 29. In addition, in the longitudinal direction of the groove along the edge 14, the surface 25 in the groove is provided with a slot 32 with chamfered edges. The position of this slot is arranged so that its outer limit is approximately on a level with the contact edge 14 and its inner limit is within the contact edge. Outside the slot, the surface 25 continues along the lip 18 to the chamfer 29. On the top side of the groove there is a chamfer 34, which is connected to the contact edge 14 at an angle of approximately 30°.

The tongue 12 has an upper surface 38 and a lower main surface 39 with both these surfaces being parallel to each other and also parallel to the main plane 4 and 6 of the boards. The upper part of the tongue is connected close to the contact edge 15 by a part 37 that is set back slightly from the contact edge. On the underside, the tongue extends from the said surface 19. At the

tip, the tongue ends with an outer surface 42 which is connected to the surfaces 38 and 39 by chamfers 43 and 44 respectively. The length of the surfaces of the tongue that are in contact with surfaces in the groove is limited by means of the end surface 42, when it is inserted into the groove
5 11, stopping before the start of the angled part 26 of the groove, whereby a cavity 46 is created inside the groove (Figure 3).

A projection 48 with chamfered edges 49 extends from the downward-facing surface 39 of the tongue in the longitudinal direction of the boards. The
10 position of the projection 48 is arranged so that when the contact edges 14 and 15 are brought together, the projection will be positioned in the slot 32 in the groove.

When bringing together the boards 1 and 2 for locking, the tip of the tongue
15 up to the projection 48 will first enter the outer part of the groove 11. The dimensions of the groove and the tongue are so arranged that they can be joined without any great force needing to be applied. When the projection 48 on the tongue meets the chamfer 29 of the lip 18, a widening of the groove is required, however, so that the outer part of the projection 48 can pass inside
20 the chamfer 29. This will take place by bending of the material around the groove. It is important that the bending of the part of the material between the groove and the top side is limited, for which reason the part below the groove is responsible for practically all the requisite bending, while the part above the groove up to the top side 4 is affected as little as possible. This is
25 because if the part above the groove were to be subjected to bending, there is a danger that the relative positions of the top surfaces that are achieved in the contact between the surface 24 of the groove and the surface 38 of the tongue would be affected, so that there would be a danger of a step being created between the top surfaces 4.

30

This distribution of the bending in the parts above and below the groove is achieved by means of the locking element of the groove, thus the slot 32 is

positioned in the surface 25 of the groove facing towards the underside 6 and with the material part below the groove to the underside 6 being thinner than the part above the groove to the top side 4 and, in addition, the depth of the groove up to the end surface 28 is so arranged that the lip 18 has a
5 sufficient length of material so that bending can take place without too great a force being required. A large depth of the groove can, however, lead to bending of the part above the groove in addition, which is counteracted by the top surface 26 of the groove sloping down towards the bottom surface 25 of the groove, by means of which the material part above the sloping surface
10 26 is given a "cantilever effect" which supports the part above the groove but still enables there to be a sufficiently large depth of groove for bending to be able to take place without too great a force being required.

When the boards have been brought together into the final position with
15 contact between the edges 14 and 15, the projection 48 snaps into the slot 32 with the lip 18 resuming its original position. The boards are now locked to each other. Corresponding locking can be obtained at all edges that are provided with joint-locking elements.

20 By means of the design described, the joint-locking arrangement can be implemented for effective locking together by means of the insertion of the projection 48 into the slot 32, with the ability to adapt the relative bending characteristics within the material in the board provided with the groove, so that effective joint locking is obtained without too large a force being required
25 for the joining together, while at the same time limiting the bending of the upper part of the board at its top surface.

When manufacturing boards designed for joint locking, the groove 11 in the board 1 provided with a groove and at the same time its contact surface 14
30 and the lip 18 can be constructed using a milling cutter designed for this purpose, the axis of which is suitably perpendicular to the main surfaces 4 and 6 of the board. With such processing, however, the slot 32 creates an

undercut part which must be produced as a separate operation after the said operation. A milling cutter is a very effective production tool and it is therefore desirable that such a tool can also be used for making the slot 32. The joint-locking arrangement is accordingly designed in such a way that a milling
5 cutter set at a certain angle can be used for the design shown in the figure, see Figure 1. This is made possible as the chamfer 34 is arranged to leave free working space for the cutter, which is shown by dash-dotted lines and has the reference numeral 54. In addition, the slot 32 has been positioned in such a way on the downward projecting lip that, with the said inclination of
10 the axis of the milling cutter, the slot 32 can be positioned sufficiently far inside the groove. Figure 1 shows the angle between the axis 55 of the milling cutter and the top side of the board to be 33°. By selecting smaller angles, the slot 32 can be positioned further inside the groove. Useable angles can lie between 50° and 20° while taking into consideration the fact
15 that the slot 32 is to be positioned within the extent of the tongue 12 when it is positioned between an upper and a lower surface in the groove (the surfaces 24 and 25).

The design of the tongue 12 should not cause any difficulties, if one or more
20 milling tools are used. However, attention must be paid to the undercut part in relation to the projection 32 on the inside of the tongue up to the surface 19. A cut inside the projection 48 can, however, easily be carried out with tools that work from outside. The milling is suitably carried out by the board in question being fed past the tool in its longitudinal direction.

25

What has been described concerning the embodiment's general design of the parquet boards, excluding the joint-locking arrangement, is not intended to limit the patent claims to such a general design, the joint-locking arrangement also being able to be used with boards, staves or panels of a
30 design other than that described. It should also be mentioned that each board for laying must be provided with a groove on at least one edge and a

tongue on at least one other edge. It is also within the scope of the invention to design certain boards with grooves on opposite edges and other boards with tongues on opposite edges. However, designing the boards to be identical with at least one groove and one tongue would appear to be the

5 most rational.

CLAIMS

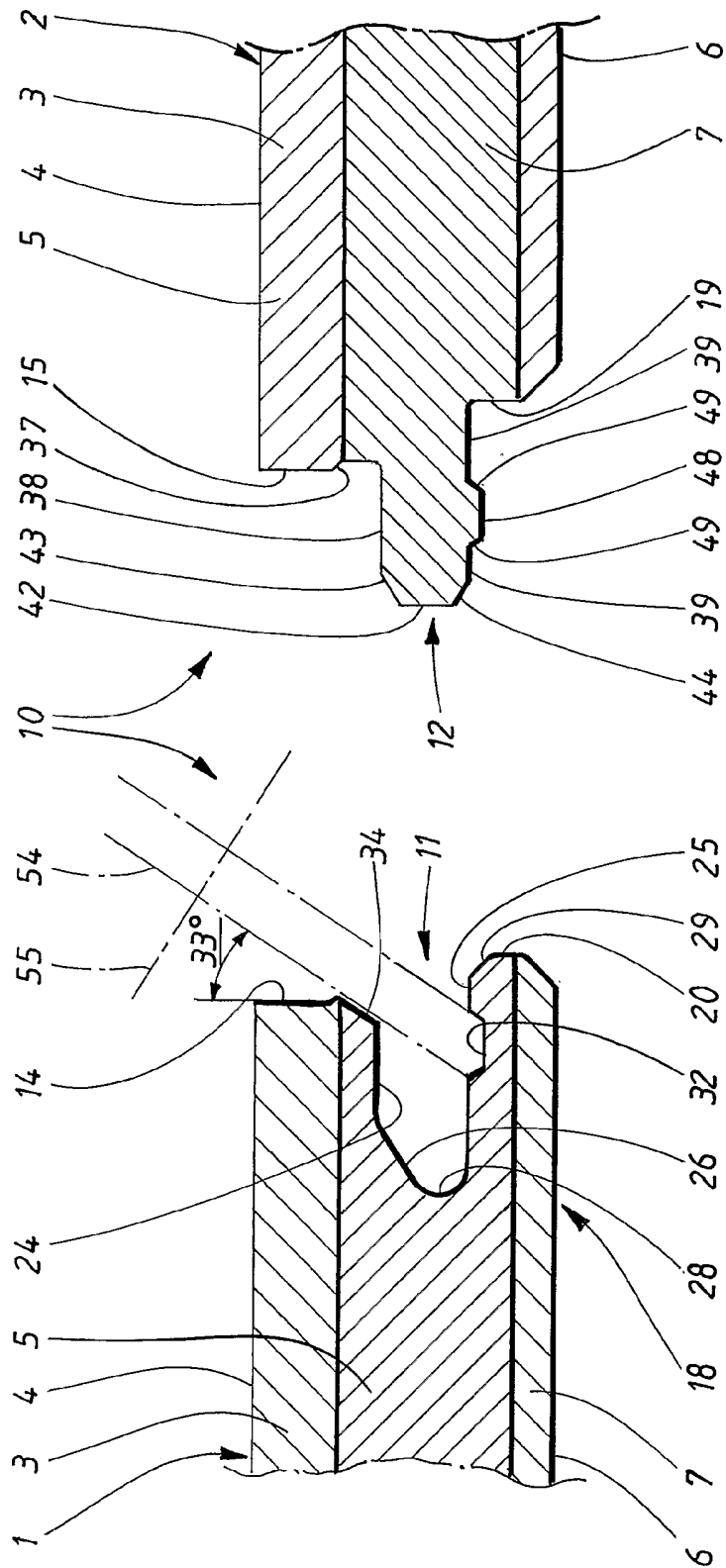
1. Parquet board arranged for mechanical joint locking to a corresponding parquet board with each of the boards provided with an outward-facing main surface (4) and an inward-facing opposing main surface (6), with the boards that are arranged for joining together designed for joint locking by means of a joint-locking arrangement (10) comprising a groove (11) in at least one edge of the respective board (1) and a tongue (12) on at least one edge of a corresponding board (2), with the groove dimensioned so that, when the tongue is in an inserted position, the enclosing surfaces (24, 25) of the groove makes contact with the opposing surfaces (38, 39) of the tongue, and with an interacting slot (32) and projection (48) being arranged in the said surfaces for joint locking, the slot and the projection being able to be brought together in a locking connection by means of the insertion of the tongue in the groove by means of a widening of the same by making use of the elastic bending of the material in the board (1) provided with the groove and, after complete bringing together so that the contact surfaces (14, 15) of the adjacent boards (1, 2) make contact and the projection (48) and the slot (32) are in positions opposite each other, locking takes place by the snapping of the projection (48) into the slot (32), characterized by the combination:
- of the slot (32) in the groove (11) being positioned set back from the contact edge (14) of the board (1) and only in the surface (25) of the groove that is positioned in the direction towards the inward-facing side (6) of the board,
- of the thickness of the material between the groove and the outward-facing side (4) of the board being greater than the thickness of the material between the groove and the inward-facing side (6) of the board, and
- of the groove (11) having a greater depth than is required to contain the surfaces (24, 25) that are arranged to make contact with the surfaces (38, 39) of the tongue, with a connecting surface (26) between the inner end of the contact surface (24) which is positioned at the outward-facing side (4) of the board, and the bottom (28) of the groove being curved inwards in the

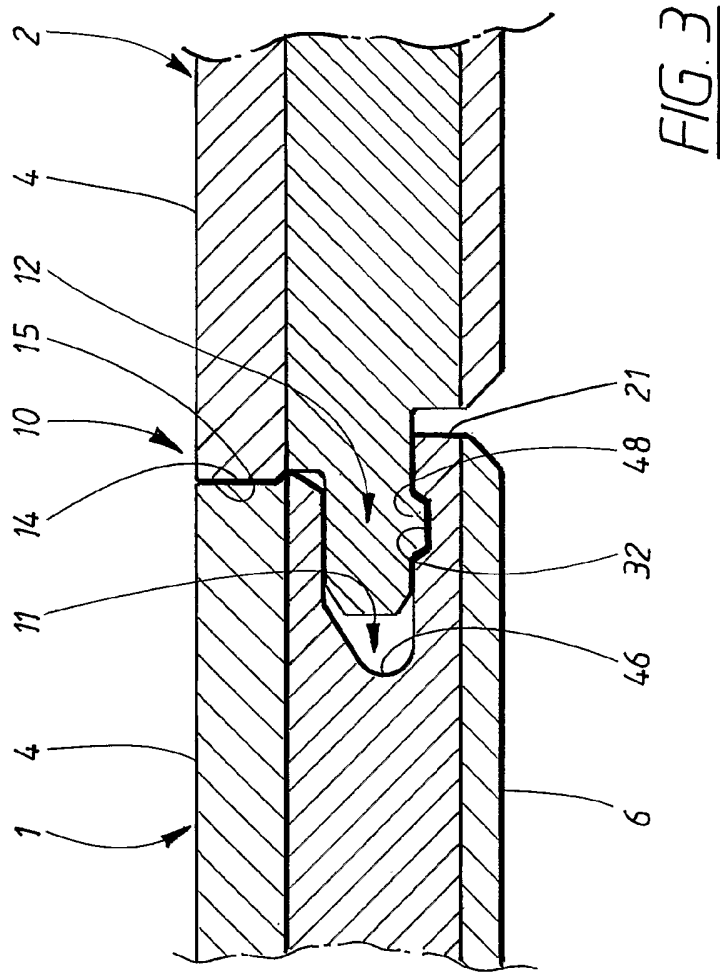
direction towards the contact surface (25) which is positioned at the inward-facing side of the board, so that, towards the bottom of the groove, there is an increasing thickness of material between the groove and the outward-facing side of the board.

5

2. Method for manufacturing a parquet board (1) according to Claim 1, characterized in that the groove (11) is produced by milling the material of the board with a milling cutter working into the material towards the contact edge (14), which milling cutter has an axis that is essentially perpendicular to the main plane of the board and has a shape suited to processing the said opposing surfaces (24, 25) and in that the recess (32) in the groove set back from its contact edge (14) is produced by milling using a milling cutter (54) which has an axis (55) that is set at such an angle to the main plane of the board that the disk of the milling cutter extends at an angle into the groove with free working space past the said contact edge (14) and with its peripheral surface suited to the production of the recess (32) in the groove.
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INTERNATIONAL SEARCH REPORT

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
EPO-INTERNAL, WPI DATA, PAJ		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 10001248 A1 (HORNITEX WERKE GEBR. KÜNNEMEYER GMBH & CO. KG), 19 July 2001 (19.07.2001), column 2, line 37 - line 62, claims 1,7 --	1-2
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<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "B" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
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