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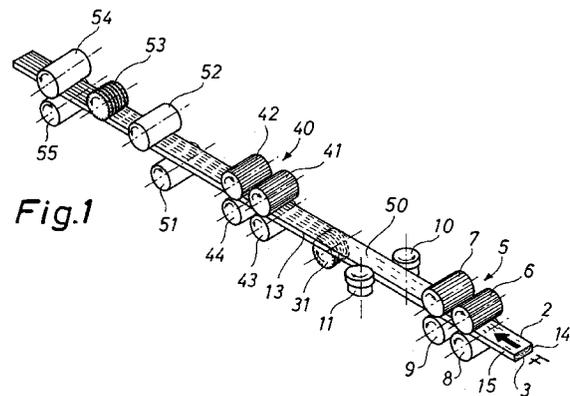
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Method and apparatus for planing and longitudinal sawing of lamellae, in particular for laminated wood.

By a method of planing and longitudinally sawing lamellae for laminated wood from wooden boards (2) being slightly curved in cross-section each wooden board (2) is arranged on a plane (1) with its hollow side (3) facing downwards. During movement along the plane (1) the lateral faces (14, 15) of the board (2) are smoothed by means of lateral cutters (10, 11), whereafter the board (2) guided by the abutment of the smoothed lateral faces against the lateral guides is sawn partially through from below by means of a lower saw (31) for the formation of a plurality of lamellae (33-39) mutually connected at their upper ends. The board (2) is then pressed downwards against the plane and planed on its upper and lower face by means of upper and lower cutters (52, 51) and thereafter sawn completely through by means of an upper saw (53) at least in the areas of the board corresponding to the areas partially sawn through from below. When the movement of the board is being guided the smoothed lateral faces are only made to abut against the lateral guides in an area of the board (2) above half the height thereof.



The invention relates to a method of planing and longitudinally sawing lamellae, in particular for laminated wood, from wooden boards being slightly curved in cross-section, said method comprising the steps of

- arranging each wooden board on a plane with its hollow side facing downwards;
- smoothing the lateral faces of the board during movement along the plane;
- sawing the board partially through from below for the formation of a plurality of lamellae mutually connected at their upper ends, while said board is guided by the abutment of the smoothed lateral faces against the lateral guides;
- pressing the board downwards against the plane and planing the upper and lower faces of the board, and
- sawing the board completely through from above at least in the areas corresponding to the areas partially sawn through from below.

By a known method of the above type for the manufacture of lamellae for laminated wood the wooden boards are guided by means of lateral guides abutting the lower area of smoothed lateral faces of the board. As the wooden boards are widest at the upper end because of their curvature and arrangement on the plane, the lateral faces have to be completely smoothed in their entire height to obtain a reliable abutment against the lateral guides. Furthermore, the lateral guides prevent the lower area of the board from expanding when the board is pressed against the plane, whereby the kerfs formed by the sawing from below are compressed at their lower ends. As a result, the subsequent sawing through from above causes a squeezing about the saw blades.

The object of the invention is to provide a method of the above type eliminating the risk of a squeezing about the saw blades and which further enhances the utilization of wood.

The method according to the invention is characterised in that the smoothed lateral faces are made to abut the lateral guides in an area of the board above half the height thereof. As the board is guided in its upper area, where it is the widest and where solid wood still remains after the sawing through from below and thus essentially no guiding is effected in the area of the kerfs formed by the partial sawing from below, the wood may expand freely in this area, when it is pressed downwards against the plane. Consequently, there is no risk of squeezing the saw blades.

Moreover, according to the invention the lateral faces may be smoothed solely for the formation of an abutment face in the upper area of the board. As the smoothing thus only takes place in the widest area of the board, an enhanced utilization of the wood is obtained compared to the known methods, wherein also the lateral faces at the narrow end of the board are smoothed.

Furthermore, according to the invention the

smoothed abutment face may have a height of essentially 20% to 50% and preferably 20% to 33% of the height of the board, whereby advantageous results have been obtained in practise.

The invention further relates to an apparatus for carrying out the method and comprises a feeding means for feeding the boards along the plane and, when viewed in the direction of feed, two lateral cutters for smoothing each face of the opposite lateral faces of the board, a lower saw for partial sawing through of the board from below for the formation of a plurality of mutually connected lamellae, an upper and a lower plane for planing the upper and lower faces of the board, an upper saw for sawing the board through from above at least in the areas corresponding to the areas partially sawn through from the below, said apparatus further comprising two parallel lateral guides adapted by abutment against the smoothed lateral faces of the board to guide the board at least in connection with the through sawing, as well as means for pressing the board against the plane at least in connection with the planing of the upper and lower face of the board and during the sawing from above.

The apparatus according to the invention is characterised in that the guiding faces of the lateral guides solely are above the plane at a level above than essentially half the height of the board. Consequently, the guiding of the board is only effected in the upper area of the board, where solid wood remains subsequent to the partial sawing through of the board by means of the lower saw, whereby the board may freely expand sideways in its lower area, when being pressed downwards against the plane. Thereby the risk of squeezing the saw blades is eliminated and an enhanced utilization of the material is made possible, as the smoothing of the lateral faces at the most narrow end of the board is not necessary.

According to the invention the lateral faces of the lateral guides may be above the plane at a level essentially within the upper third portion to the upper fifth portion of the board, whereby advantageous results have been obtained.

Furthermore, according to the invention the lateral faces of the lateral guides may essentially be in an area of the board not sawn through by means of the lower saw. This embodiment is particularly advantageous, as the lateral faces thus solely effect the solid wood area of the board, whereby a squeezing of the area partially sawn through is avoided with certainty.

Moreover, according to the invention the lateral guides may comprise a fixed lateral guide and a lateral guide adjustable essentially according to the distance between the lateral faces smoothed by means of the lateral cutters. This embodiment of invention enables a fast and simple resetting of the apparatus from one board width to another.

Further, according to the invention the lateral

guides may be provided with planar guide faces. In practise this simple and easily obtainable solution has been found particularly advantageous.

Finally, according to the invention the lateral guides may extend from the area just behind the lateral cutter to the area just in front of the upper saw.

The invention is described in greater details below with reference to the accompanying drawings, in which

Figure 1 is a diagrammatic perspective view of an apparatus according to the invention for carrying out the method according to the invention,

Figure 2 is a diagrammatic side view of the apparatus shown in Figure 1,

Figure 3 is a diagrammatic top view of the front area of the apparatus according to the invention,

Figure 4 is a sectional view taken along the line IV-IV of Figures 2 and 3 for illustration of the cross-sectional shape of the board in this area of the apparatus, and

Figure 5 is a sectional view taken along the line V-V of Figure 2 for the illustration of the cross-sectional shape of the board in this part of the apparatus.

The apparatus according to the invention for planing and longitudinal sawing of lamellae from wooden boards comprises a plane 1, on which the boards 2 are arranged with their hollow sides 3 facing downwards. The boards are pressed concurrently against a fixed lateral guide 4. The board is led past two lateral cutters 10,11 by means of a first feeder 5 comprising two upper feeder rollers 6,7 and two lower feeder rollers 8,9. The cutters mill an abutment face 12,13 on each of the lateral faces 14,15 of the wood. The abutment faces 12,13 are milled in the upper area of the lateral faces 14, 15, that is in the area, where the raw board is the widest, whereby the board 2 has the full width in its lower portion subsequent to the smoothing of the lateral faces 14,15, that is milling of the abutment faces 12,13. When passing the lateral cutters 10,11 the board 2 is pressed downwards by means of a hold-down means 16 comprising five hold-down rollers 17-21.

The board 2 is then introduced between a fixed lateral guide rail 22 and an adjustable lateral guide rail 23, see Figures 3 and 4. The fixed lateral guide rail 22 is provided with a guiding face 24 at its upper end, said guiding face being adapted to serve as a guiding abutment for the corresponding milled abutment face 13 of the board 2. Below the guiding face 24 the fixed lateral guide rail 22 comprises a clearance area 25 of such a size that the board may freely expand sideways in the mentioned area when pressed downwards to abut the plane 1. When seen in a cross-sectional view the adjustable lateral guide rail is essentially angular and provided with a horizontally extending leg 29, a vertical body 28 essentially corresponding to the fixed guide rail 22, a guiding face 26

corresponding to the guiding face 24 on the fixed guide rail, and a clearance area 27 corresponding to the clearance area 25 on the fixed lateral guide rail 22. The horizontally extending leg 29 of the adjustable lateral guide rail 23 is provided with a plurality of transverse slits 30 for securing the rail to the plane 1 by means of bolt/nut assemblies not shown. The slits (30) also allow an adjustment of the distance between the guiding faces 24,26 of the fixed and adjustable lateral guide rail 22,23, respectively, corresponding to the distance between the two abutment faces 12,13 of the two lateral faces 14, 15 of the board, said abutment faces being milled by means of the lateral cutters 10,11. The height and the level of the abutment faces 12,13 on the board 2 as well as the height and the level of the guiding faces 24,26 on the lateral guide rails 22, 23 are of course chosen so that the guiding faces 24,26 only abut the abutment faces 12,13. Additionally, the mentioned abutment is only provided above the plane 1 at a level higher than essentially half the height of the board 2, and preferably at a level above the plane within the upper third portion to the upper fifth portion of the board. In accordance herewith the size of the abutment face is essentially between 20% to 50%, preferably 20% to 33% of the height of the board.

Subsequent to being introduced between the lateral guide rails 22, 23 the wood is sawn partially through from below by means of a rotating lower saw 31 provided with five saw blades 32 for the formation of six lamellae 33-38 being mutually connected at their upper area. The partial sawing through is effected above a height corresponding to at least 50% of the height of the board 2, preferably between 66% and 75% of the height of the board.

Having been sawn through from below, the board is fed through a second feeder 40 comprising two upper feeder rollers 41,42 and two lower feeder rollers 43,44. Together with a pressing-down means 45 comprising three pressing-down rollers 46,47,48 the second feeder 40 presses the board hard downwards against the plane 1 in such a manner that the individual lamellae 33-38 abut the plane 1. As the lateral guide rails 22,23 are provided with an upper guiding face 24,26 and a clearance area 25,27 subjacent hereto, the wood may expand freely in the lower area, as it appears from Figures 4 and 5 illustrating the board prior and subsequent to being pressed downwards at high pressure, respectively.

While the board is pressed downwards against the plane 1, the lower face 49 and the upper face 50 thereof are planed by means of a lower cutter 51 and an upper cutter 52, respectively.

By means of an upper saw 53 the wood is sawn completely through from above in the same kerfs formed by the rotating lower saw 31. The upper saw 53 is provided with seven saw blades, of which at least the five middle blades saw in the same kerfs as

the lower saw 31 and are slightly wider than the saw blades of the latter, whereby the lateral faces of the lamellae resulting from the sawing are cut completely clean. The two outermost saw blades clean cut the lateral faces of the board.

Subsequent to the complete sawing through from above the sawn lamellae are planed by means of an upper and a lower smoothing cutter 54,55 to remove any marks in the wood or any chips formed at the complete sawing through of the wood. The rotational axes of the upper and lower smoothing cutter 54,55 are vertically arranged opposite each other to obtain a uniform thickness of wood regardless of its curvature.

The board and the lamellae, respectively, are kept in abutment with the plane 1 in the area behind the upper cutter 52 until the lamellae leave the apparatus by means of a pressing-down plate 56. When seen in the direction of feed F of the wood through the apparatus the lateral guide rails 22,23 extend from the area just behind the lateral cutters 10, 11 (see Figure 3) and to the area just in front of the upper saw 53 for complete sawing through of the board (not shown on the Figure). Even though the board, strictly speaking, only need be guided in connection with the two sawing steps, a continuous system of the guide rails is preferred in order to completely guide the movement of the wood in the area between the formation of the abutment faces thereon by means of lateral cutters and the final sawing through of the board for the formation of lamellae.

The invention is not limited to the above embodiment, but may be varied in many ways without thereby deviating from the scope of the invention. Thus, cutters with cylindrically arranged cutting edges may be used instead of lateral cutters 10,11 of the type described in the embodiment, the latter being provided with stepped cutting edges for the formation of a groove-like abutment face.

Claims

1. A method of planing and longitudinally sawing lamellae, in particular for laminated wood, from wooden boards (2) being slightly curved in cross-section, said method comprising the steps of
 - arranging each wooden board (2) on a plane (1) with its hollow side (3) facing downwards
 - smoothing the lateral faces (14, 15) of the board during movement thereof along the plane (1),
 - sawing the board (2) partially through from below for the formation of a plurality of lamellae (33-39) mutually connected at their upper ends, while said board is guided by the abutment of the smoothed lateral faces against the lateral guides (24, 26),
 - pressing the board downwards against the

plane (1) and planing the upper and lower faces (50, 49) of the board, and

- sawing the board completely through from above at least in the areas corresponding to the areas partially sawn through from below, characterised in that the smoothed lateral faces (14,15) are made to abut the lateral guides (24, 26) in an area of the board (2) above the half height hereof.

2. A method as claimed in claim 1, characterised in that the lateral faces (14, 15) are smoothed solely for the formation of an abutment face (12, 13) in the upper area of the board (2).
3. A method as claimed in claim 2, characterised in that the smoothed abutment face (12, 13) has a height of essentially 20% to 50%, preferably 20% to 33% of the height of the board (2).
4. An apparatus for carrying out the method according to one or more of the claims 1 to 3 comprising feeding means (5,40) for feeding the boards along the plane (1) and when viewed in the direction of feed, two lateral cutters (10,11) for smoothing each face of the opposite lateral faces (14, 15) of the board (2), a lower saw (31) for partial sawing through of the board (2) from below for the formation of a plurality of mutually connected lamellae (33-39), an upper and a lower cutter (52,51) for planing the upper and lower faces (50,49) of the board, an upper saw (53) for sawing the board (2) through from above at least in the areas corresponding to the areas partially sawn through from the below, said apparatus further comprising two parallel lateral guides (22,23) serving as abutments for the smoothed lateral faces of the board (2) to guide the board at least in connection with the sawing through, as well as means (45) for pressing the board downwards against the plane (1) at least in connection with the planing of the upper and lower faces (50, 49) of the board and during the sawing from above, characterised in that the guiding faces (24, 26) of the lateral guides (22,23) are situated above the plane (1) at a level above essentially half the height of the board (2).
5. An apparatus as claimed in claim 4, characterised in that guiding faces (24, 26) of the lateral guides (22, 23) are situated above the plane (1) at a level essentially within the upper third portion to the upper fifth portion of the board.
6. An apparatus as claimed in 4 or 5, characterised in that guiding faces (24, 26) of the lateral guides (22, 23) essentially are in an area of the board (2) not sawn through by means of the lower saw.

7. An apparatus as claimed in one or more of the claims 4-6, characterised in that the lateral guides (22, 23) comprise a fixed lateral guide (22) and a lateral guide (23) adjustable essentially according to the distance between the lateral faces smoothed by means of the lateral cutters (10, 11). 5
8. An apparatus as claimed in one or more of the claims 4-7, characterised in that the lateral guides (22, 23) are provided with planar guiding faces (24, 26). 10
9. An apparatus as claimed in one or more of the claims 4-8, characterised in that the lateral guides (22, 23) extend from the area just behind the lateral cutters (10, 11) to the area just in front of the upper saw (53). 15

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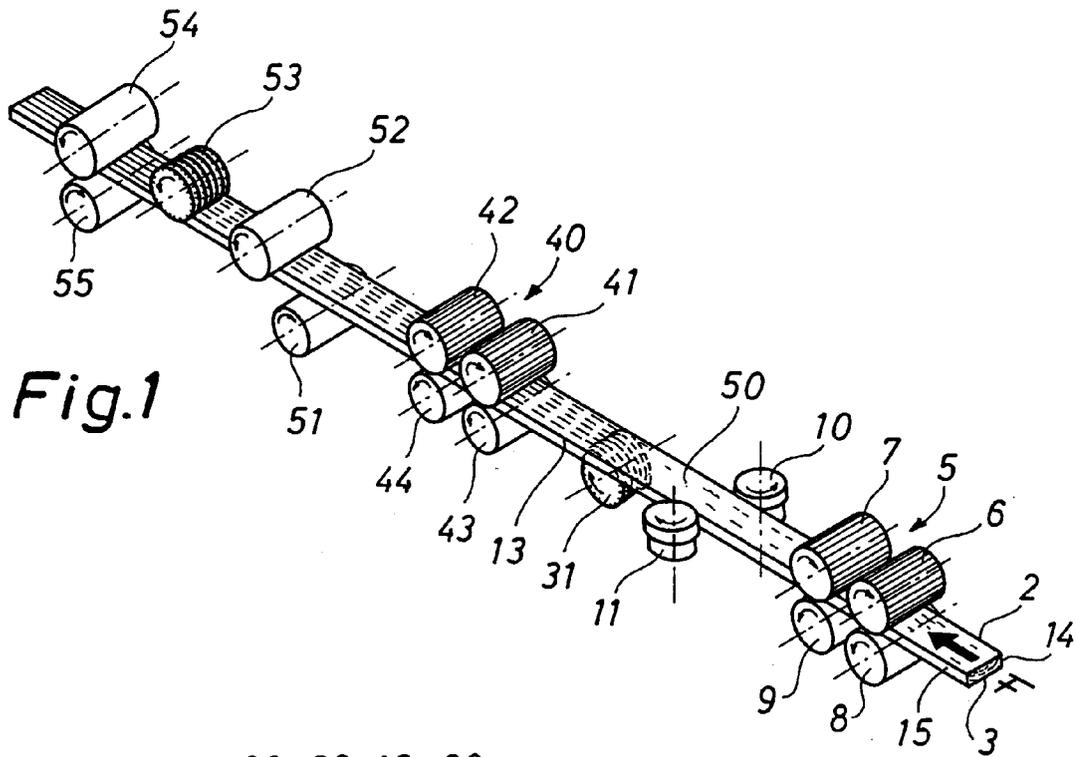


Fig.1

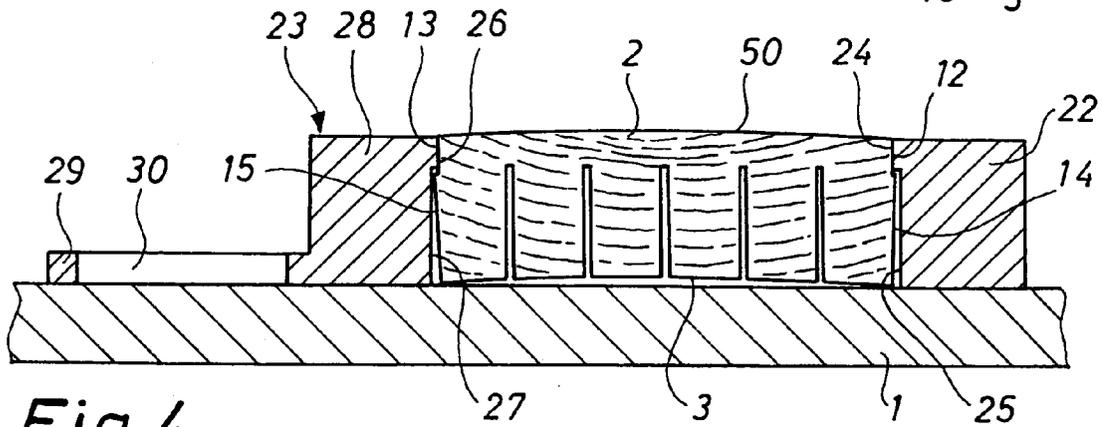


Fig.4

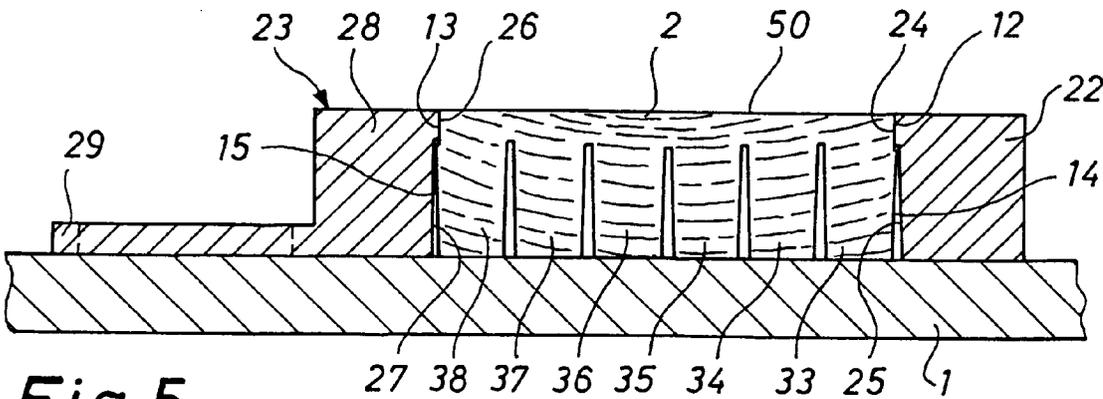


Fig.5

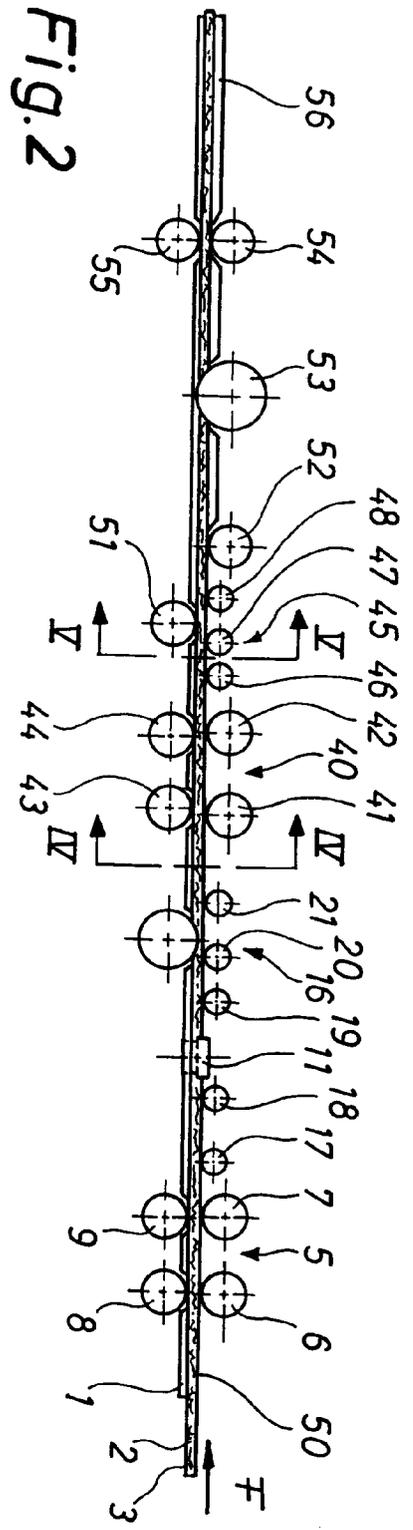


Fig. 2

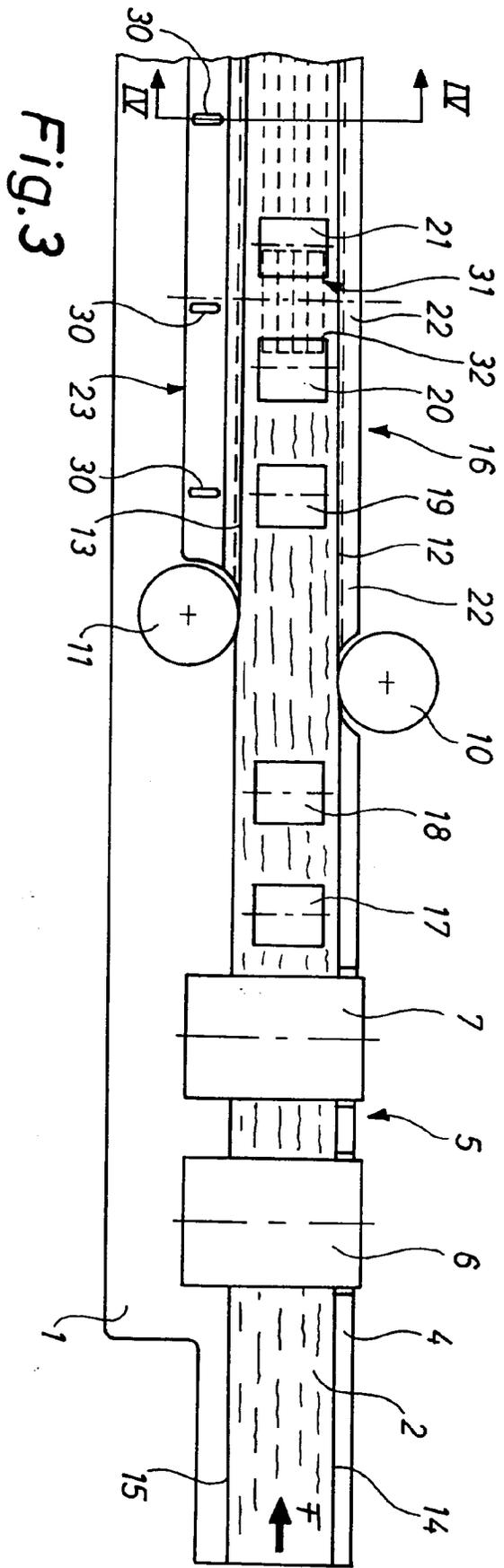


Fig. 3



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EUROPEAN SEARCH REPORT

Application Number

EP 92 61 0031

| DOCUMENTS CONSIDERED TO BE RELEVANT | | | |
|---|---|---|---|
| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int. Cl.5) |
| A | FR-A-1 540 353 (SOCOLEST-VALDOIE) * page 1, left column, line 1 - line 10 * * page 3, right column, line 24 - line 44 * * page 4, right column, line 36 - page 5, left column, line 4; figures 1-16 * --- | 1, 4 | B27G19/08 B27M3/04 B27B1/00 |
| A | DE-B-1 115 434 (WEINIG) ----- | - | |
| | | | TECHNICAL FIELDS SEARCHED (Int. Cl.5) |
| | | | B27G B27M B27C B27B |
| The present search report has been drawn up for all claims | | | |
| Place of search THE HAGUE | | Date of completion of the search 04 SEPTEMBER 1992 | Examiner MATZDORF U. |
| CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document | | T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document | |

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