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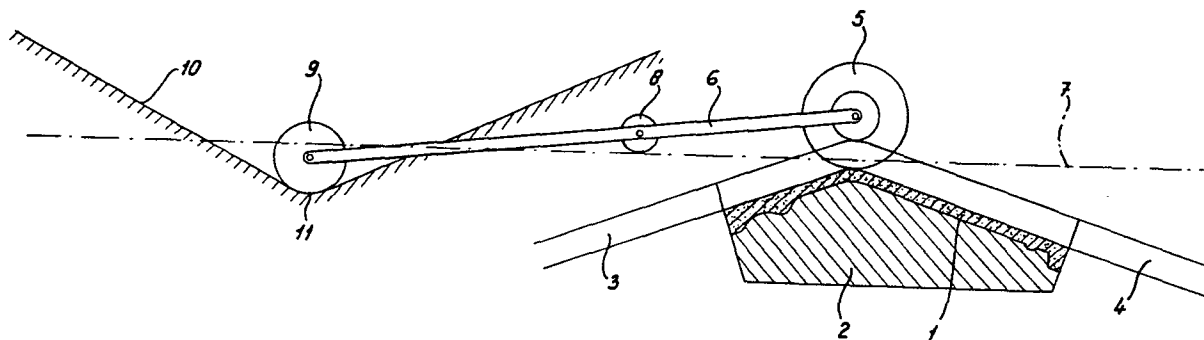
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**Method and apparatus for producing angled concrete roofing tiles.**

Method and apparatus for producing angled concrete roofing tiles (1), whereby an angled and profiled under mould (2) is placed in a worktable and a profiled roller (5) rotating around a horizontal axis is placed in one end of a balance

(6), the horizontal tilting axis of which is movable over a fixed flat plane (7), while the other end of the balance (6) is guided over a guiding rail (10) containing two inclined straight parts.



Method and apparatus for producing angled concrete roofing tiles.

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The invention refers to a method for the production of angled concrete roofing tiles, with the aid of an angled profiled under mould, which must form the underside of the tile and which will be placed in a worktable.

5 For roofs, whereby in one roofside different pitches of the roof are in line with each other, one uses so-called angled roof tiles. These roofs, e.g. mansardroofs are much less in use with modern building methods, but with renovation of existing roofs they appear frequently.

10 Though it is possible to construct the connection between the two different roofpitches in other ways, e.g. with a profile in zinc, preference will be given to a continuous roofcovering, whereby the angled rooftile is used. This solution is better looking and besides cheaper too.

15 These angled roof tiles were made up till now as handmade fittings, of which the quality not always was constant and the costs of production per unit were relatively high. The normally small quantities required do not justify large investments.

20 The invention intends to create a method, which facilitates a more mechanized production with small investments, with as advantages a better product with lower labour costs.

25 The method according to the invention can achieve this in that the upper side of the roofing tile will be formed by a profiled roller rotating around a horizontal axis, which axis is moved <sup>parallel</sup> to itself at a certain distance from the mould, following the angled shape of the mould.

30 The invention refers also to the apparatus for carrying out this method, comprising an angled and profiled undermould placed in a worktable, which apparatus is characterized in that a profiled roller rotating around a horizontal axis, is placed in one end of a balance, of which the horizontal tilting axis is movable over a fixed flat plane, while the other end of the balance will be guided by a guiding rail containing two inclined straight parts.

The invention will be explained more detailed with reference to the drawings, in which:

Fig. 1 is a front view of an angled rooftile, made with the method and the apparatus mentioned;

5        Fig. 2 is a longitudinal section over the line II-II of fig. 1;  
fig. 3, 4 and 5 are some schematic views of the apparatus according to the invention in different stages and

Fig. 6 is a sideview of an upper roller.

10        The angled rooftiles 1 (fig. 1 and 2) have an inclination angle (fig. 2), which usually is less than  $180^{\circ}$ , but can also be more than  $180^{\circ}$ , thus having an angle upwards instead of downwards. This would not be a mandardroof, but a leanto roof like with farmbuildings or similar.

15        The following description refers to an angled roofing tile 1 with an angle  $\alpha$  which in normal practice will be based on  $140^{\circ}$ .

The apparatus will produce with little effort and costs angled rooftiles with other angles, provided the moulds, on which these angles rooftiles are to be made, are of the right model and form.

20        The apparatus according to the invention exists of a worktable with placed on it a profiled mould 2, which forms the underside and the edges of an angled rooftile 1 to be produced. The profiled mould 2 will have the same shape as the connecting planes 3 and 4 of the worktable. These planes 3 and 4 will be profiled like the surface of the mould 2, but these planes taper gradually to the surface of the  
25        profile of the tile 1.

On the mould 2 with the connecting planes 3 and 4 fresh mortar will be placed in a simple way. This mortar can be batched as well as placed with simple means, by which the mortar roughly is spread evenly over the mould and connecting planes.

30        The compaction of the mortar is carried out in a similar way as the normal concrete roofing tile production, namely with a rotating profiled roller 5, but without the extrusion profile (slipper) as used in normal production of concrete roofing tiles. This profiled roller 5, of which an embodiment is shown in fig. 6, can rotate in both directions,  
35        also depending on the direction of movement over the tile 1.

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The profiled roller 5 driven by a motor is part of a mobile mechanism, which means the roller 5 is placed at the end of the balance 6. This mobile mechanism moves over a set of rails 7, on which a set of wheels 8 rests. In 8 we find also the turning point of balance 6 and at the other end of the balance 6 we find a set of guiding wheels 9.

These guiding wheels 9 guide the position of the profiled roller 5 via a curved rail 10, of which the deepest point corresponds with the highest point of the angled tile 1.

The profiled roller 5 will be pressed onto the tile to be shaped, via the guiding wheels 9, in such a way that a sufficient compaction in a correct profile height and shape is obtained, provided there is enough mortar placed on the areas to be compacted.

The movement of the set of wheels 8 will be made by means of hydraulic or pneumatic (double action) cylinders, spindle motor or direct drive (not indicated on the sketches). Starting from the begin position (fig. 3) the mechanism will move to the position according to fig. 4 and further to the position according to fig. 5. At the first cycle over the entire tile the places, where mortar has to be added become clear and after about 3 cycles in both directions together with the necessary mortar additions, the angled roofing tile is ready.

To protect the operator a handle on both sides of the roller 5 is placed, while the roller 5 is protected on its topside by a hood. If one presses the handle, the drive of the profiled roller 5 will stop.

After the angled roofing tile has been completed this will be cut at its both ends near the planes 3 and 4 with a profiled knife, which is provided at both ends with a peg. These pegs fit into a guiding bush, which guarantees the cutting in the right position and direction.

The angled roofing tile 1, now cut free, will be lifted out of the worktable together with the mould, either with hydraulic or pneumatic cylinder, or by means of a mechanical lever. Hereafter the angled roofing tile 1 will be carried off for further eventual finishing (e.g. finishing with slurry and granules) and curing. In the same way, but with adapted moulds 2, one can produce also left and right hand angled roofing verge tiles as well as half angled roofing tiles.

C L A I M S

1. Method for the production of an angled roofing tile, with the aid of an angled profiled undermould, which must form the underside of the tile and which will be placed in a worktable, characterized in that the upperside of the roofing tile  
5 will be formed by a profiled roller rotating around a horizontal axis, which axis will be moved parallel to itself at a certain distance from the mould, following the angled shape of the mould.

2. Apparatus for carrying out the method according to claim 1, comprising an angled and profiled undermould placed in a worktable,  
10 characterized in that a profiled roller (5) rotating around a horizontal axis is placed in one end of a balance (6), of which the horizontal tilting axis is movable over a fixed flat plane (7), while the other end of the balance (6) will be guided over a guiding rail (10) containing two inclined straight parts.

15

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fig -1

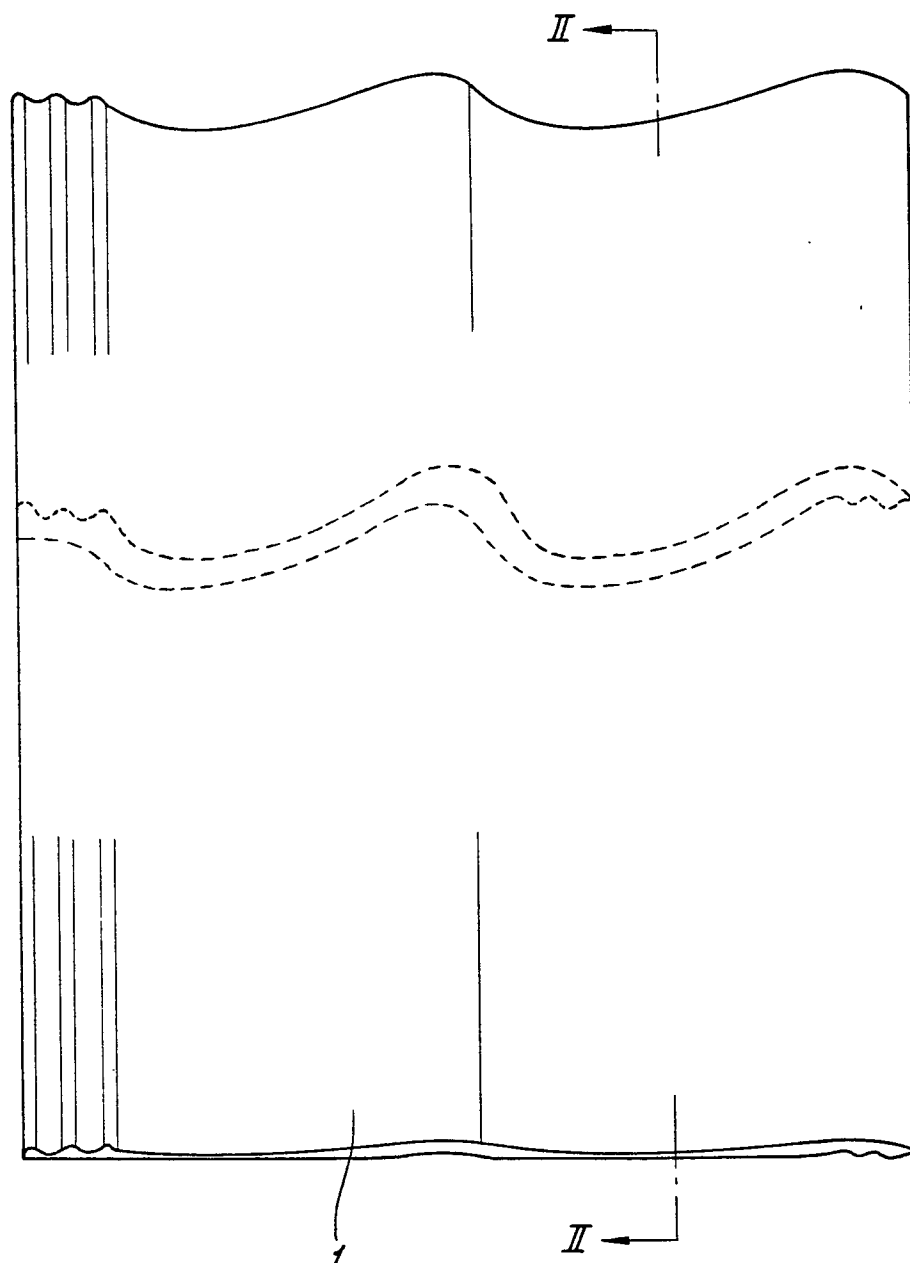


fig-2

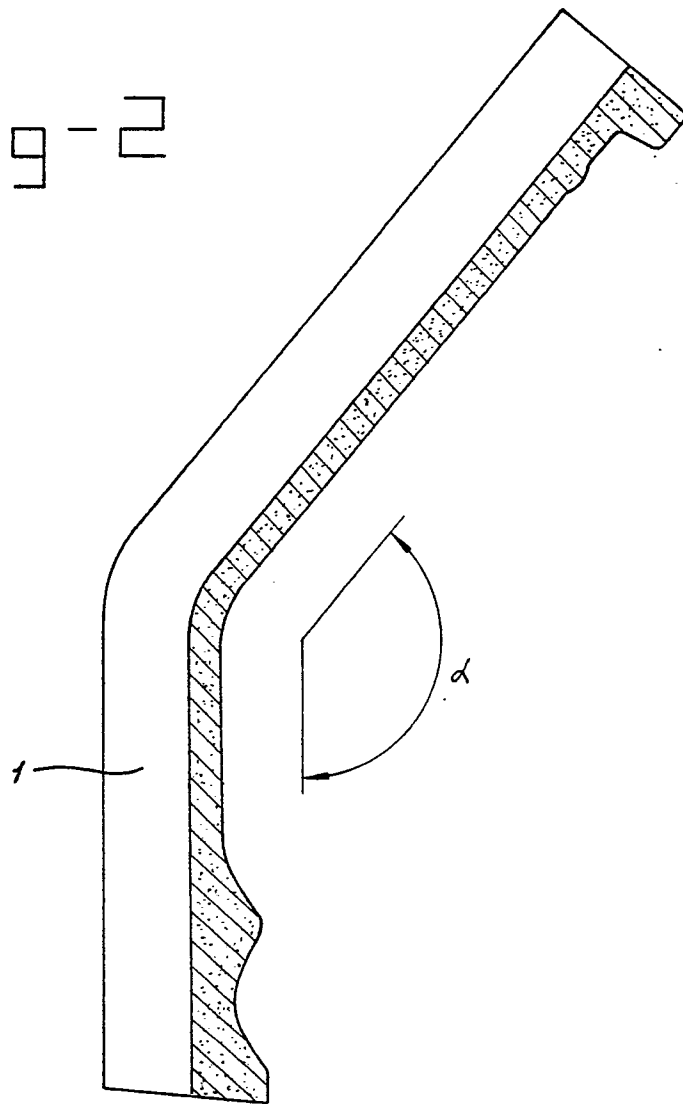
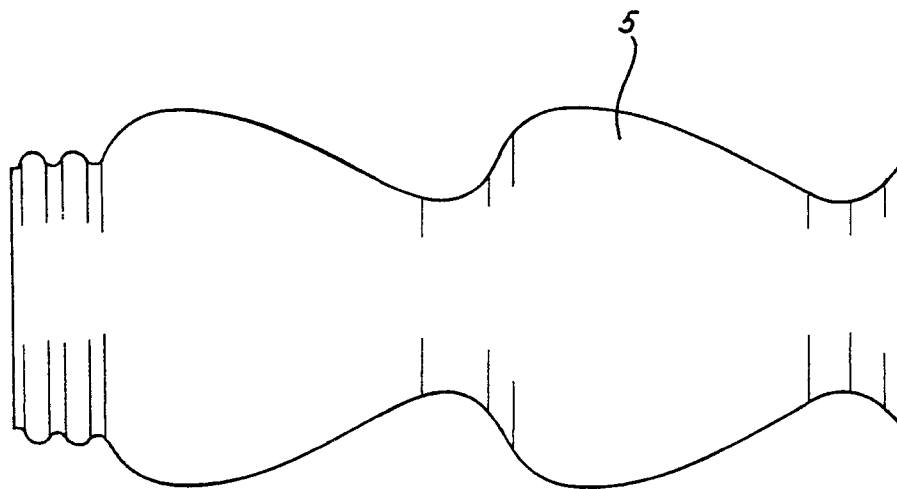


fig-6



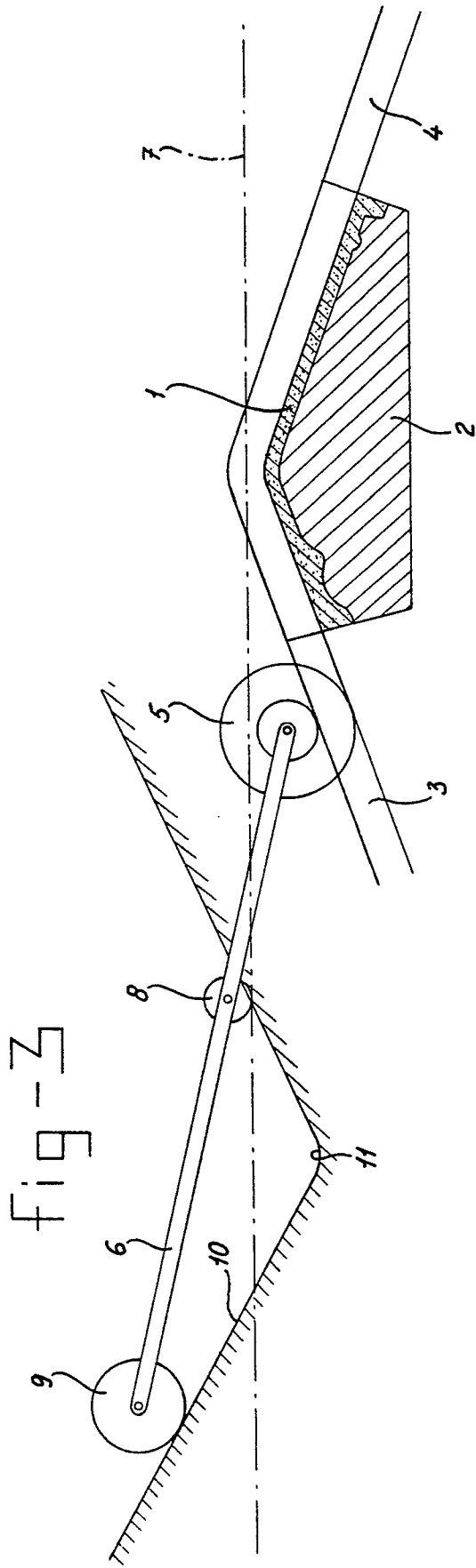


fig-4

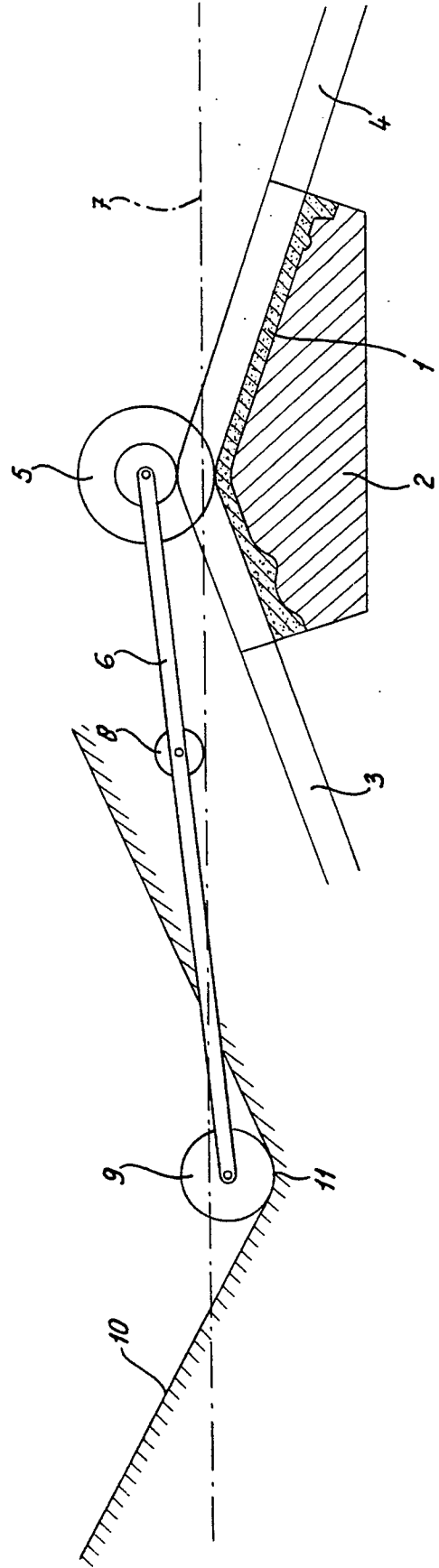
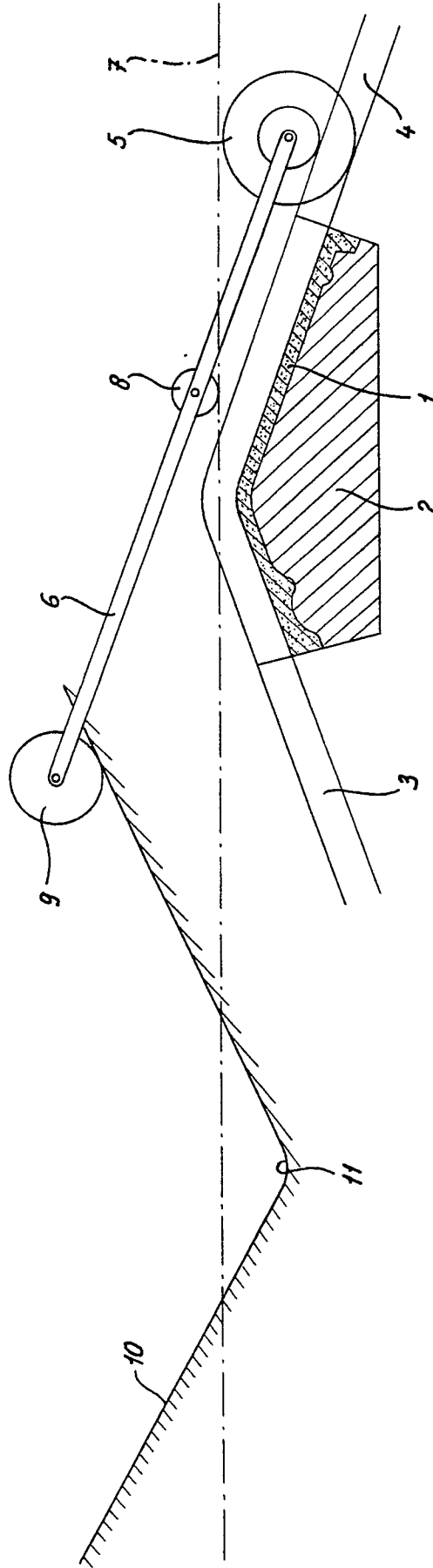


fig-5





| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                   |                                                                                                                                                                                                                                                                                                                                                |                   | CLASSIFICATION OF THE APPLICATION (Int. Cl.)                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Category                                                                                              | Citation of document with indication, where appropriate, of relevant passages                                                                                                                                                                                                                                                                  | Relevant to claim |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                                                                                       | <p>DE - A - 2 339 832 (W. BILM)<br/>* page 7, line 17 to page 10, line 2; figures 5.6 *</p> <p>--</p> <p>FR - A - 318 544 (M. SOBBE)<br/>* the whole document *</p> <p>--</p> <p>US - A - 1 428 351 (J.W. ALEXANDER)<br/>* the whole document *</p> <p>--</p> <p>US - A - 1 777 917 (R. GRETSCHEL)<br/>* the whole document *</p> <p>-----</p> | 1<br>1<br>1<br>1  | <p>B 28 B 3/02</p> <p>TECHNICAL FIELDS SEARCHED (Int. Cl.)</p> <p>B 28 B</p> <p>CATEGORY OF CITED DOCUMENTS</p> <p>X: particularly relevant<br/>A: technological background<br/>O: non-written disclosure<br/>P: intermediate document<br/>T: theory or principle underlying the invention<br/>E: conflicting application<br/>D: document cited in the application<br/>L: citation for other reasons</p> <p>&amp;: member of the same patent family, corresponding document</p> |
| <p><input checked="" type="checkbox"/> The present search report has been drawn up for all claims</p> |                                                                                                                                                                                                                                                                                                                                                |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Place of search                                                                                       | Date of completion of the search                                                                                                                                                                                                                                                                                                               | Examiner          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| The Hague                                                                                             | 09-04-1986                                                                                                                                                                                                                                                                                                                                     | BOLLEN            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

