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(54) **Process for bending lamellar wood**

(57) The process comprises the following steps:

- inserting some strips of wood (1), previously covered with glue, in a straight metal profile (2) having a U-shaped cross-section;
- interposing some strips of plastic (3) between the side walls (2.1) of the metal profile (2) and the strips of wood (1);
- feeding the metal profile (2), which contains the strips of wood and plastic (1, 3), to a roller bending

machine, which cambers the whole pack;

- allowing the metal profile (2) to rest until the glue applied between the strips of wood (1) dries;
- removing the cambered pack of strips of wood (1) and plastic (3) from the metal profile (2) and removing, if necessary, the side strips of plastic (3);
- transferring the cambered lamellar wooden element (4) so obtained to the next ordinary finishing steps.

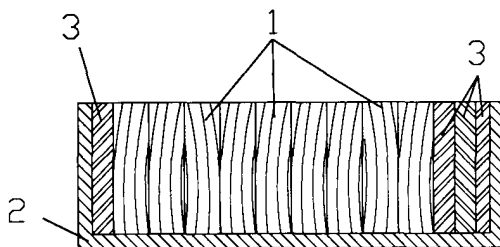


FIG. 2

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Description

Technical Field

[0001] The present invention relates to a process for the camber of lamellar wood by using roller bending machines. It may be applied in the field of window/door frame and furniture manufacturing.

Background Art

[0002] Often, when manufacturing window/door frames and furniture, it is necessary to produce wooden elements such as frames, mouldings, edge coverings, etc. having special cambers so as to fit into the perimeter of windows, doors, mirrors, pieces of furniture, etc. Said wooden elements may be used separately or combined (by means of binding resins, anchor elements or any other known system) to other elements made of the same material or other materials. With reference to window/door frames, sometimes wood is combined to profiles of aluminium or plastic so as to obtain multi-layered frames where the metallic or plastic profile is the outer portion of the frame, whereas wood is the inner part.

[0003] For practical reasons, such cambered wooden elements are obtained from strips of wood. The current cambering process starts from the design of the cambered lamellar wooden element to be obtained: measurement of the perimeter of the window, door, piece of furniture, etc., as well as of the radius/radii of curvature, or layout of a template identical to the shape of the window, door, etc.

[0004] The mill operator uses these measurements to trace a template, or he uses the template supplied. A set of jigs or a blocking bench is then arranged according to the template.

[0005] Next, the operator applies the glue to each strip, he superposes the various strips and puts the resulting pack of strips in the jigs or on the blocking bench. Said pack of strips is cambered by means of clamps so as to obtain the desired template. Then, the wood is allowed to rest so that the glue dries.

[0006] The wooden elements which are obtained from this process are finished by trimming and milling. This last operation is carried out in order to correct the thickness of the lamellar wooden element and to create chamfers, if any. Moreover, slots or notches may be milled so as to receive the resin or the anchor elements which are used to join the other aluminium or plastic profiles of the window/door frames or of the pieces of furniture.

[0007] It can be easily understood that the area of the mill which is occupied by the lamellar wooden elements during assembly is enormous. Moreover, it is clear that this technique requires a lot of time, and that this waste of time inevitably affects the costs of production.

[0008] Of course, it would be possible to use other processes to camber the lamellar wood, e.g. hot-cambering with matched dies. However, these processes entail some costs to manufacture the matched dies, and such costs are not affordable when few pieces, or even just one piece, are to be produced.

bering with matched dies. However, these processes entail some costs to manufacture the matched dies, and such costs are not affordable when few pieces, or even just one piece, are to be produced.

Disclosure of the invention

[0009] The main object of the present invention is that of creating a process which enables to obtain the simultaneous cambering of multiple strips of wood into any shape at very low costs and in a very short time of assembly.

[0010] This object and the other objects of the present invention are achieved by the process according to this invention, which provides for the insertion of multiple strips of wood, previously covered with glue, into a straight metal profile, whose cross-section is preferably U-shaped. The cross-section of said profile is larger than the cross-section of the lamellar wooden element to be obtained.

[0011] The strips of wood are quickly inserted by hand in the metal profile. They are arranged so that the longer sides of each strip of wood are parallel to the side walls of the supporting metal profile.

[0012] The strips of wood do not touch the side walls of the metal profile because some strips of plastic are interposed between the side walls of the supporting metal profile and the strips of wood. Their function is twofold: on the one side, they prevent any orthogonal movement of the strips of wood in the metal profile and, on the other side, they act as tolerance adjusters.

[0013] Other strips of metal, plastic or other materials may be interposed between the strips of wood, or between the side strips of plastic and the strips of wood.

[0014] Then, the metal profile, which contains the strips of wood and the strips of other materials, is fed to a roller bending machine, being already set to camber said metal profile according to the desired shape. Said machine is the one commonly used to camber metal profiles. Next, the metal profile, which contains the strips, is allowed to rest until the glue between the strips of wood dries.

[0015] Then, the cambered pack of strips is removed from the metal profile. At this point, the side strips of plastic may be removed, if necessary. The resulting lamellar wooden element is transferred to the next ordinary finishing steps.

[0016] The strips of metal, plastic or other materials which are interposed between the strips of wood may be removed (e.g. to create notches or slots), or they may be left in place for further references, couplings, patched pieces, etc.

[0017] The cross-section of said metal profile may have shapes other than the U-shape so as to obtain directly a negative shape of the desired cambered wooden element. However, said profile should always have a base and two walls in order to contain the strips. Metal profiles with special shapes, which are not commercially

available, should be extruded on purpose by using dies having the desired shape.

[0018] Thanks to the use of strips of plastic, the same metal profile may be used to obtain wooden elements having different thickness by simply acting on the ratio between the number of strips of wood and the number of strips of plastic. Said strips of plastic may have various sizes and shapes, and they may be suitably arranged in the metal profile so as to create a negative shape of the lamellar wooden element to be obtained.

[0019] Said process enables to obtain wooden elements with different types of cambers without any layout, template, bending jig or blocking bench. The use of a roller bending machine enables to obtain cambers with multiple radii, ellipses and centres. Said supporting metal profiles may no longer be used after cambering. However, the metal (preferably aluminium) they are made of may be recycled, thus entailing an economic gain. On the contrary, the strips of plastic which are removed, if necessary, from the wooden element may be reused, since they are elastic and they revert to their original straight shape.

[0020] It is no longer required to clamp the strips of wood since the deformation of the side walls of the supporting metal profile during cambering is proportional to the chosen radius of curvature and, therefore, their distance being decreased, they compress the strips of wood and actually block them as it occurs with ordinary clamps.

[0021] During the same day, many metal profiles containing strips of wood and plastic may be prepared and cambered, because they do not take up too much room in the mill.

[0022] Since the tolerance between the radius of curvature of the metal profiles which contain the strips of wood and the desired radius of curvature is minimised, the use of trimming and finishing machines is very limited. Hence, the waste of wood is reduced.

[0023] The use of modern roller bending machines enables to minimise the time to prepare the various radii of curvature.

Brief Description of Drawings

[0024] The additional features and advantages of the present invention are described in more detail below, in connection to a preferred embodiment thereof, which is shown by example and not in a limiting way with reference to the accompanying drawings, in which:

- figure 1 shows a cross-section view of a U-shaped supporting metal profile during the insertion into it of the strips of wood and plastic;
- figure 2 shows a cross-section view of the same metal profile which contains the strips of wood;
- figure 3 shows the wooden element resulting from the joined strips of wood;
- figure 4 shows, with fewer details, a metal profile

which contains strips of various materials being cambered;

- figure 5 is a cross-section view of the same metal profile which contains strips of plastic, whose number and size is different than those shown on figure 2;
- figure 6 shows the half-trapezoidal wooden element resulting from the joined strips shown on figure 5 after finishing one side only;
- figure 7 is a cross-section view of the same metal profile with a strip of plastic and a strip of metal interposed between the strips of wood;
- figure 8 shows the wooden element resulting from the joined strips shown on figure 7 after finishing.

Best Mode for Carrying Out the Invention

[0025] More in particular and with reference to the enclosed drawings, the process according to the present invention starts from the insertion of some strips of wood 1, previously covered with glue, in a straight U-shaped metal profile 2.

[0026] The strips of wood 1 are quickly inserted by hand in the metal profile 2, and they are arranged so that the longer sides of each strip of wood 1 are parallel to the side walls 2.1 of the metal profile 2.

[0027] Some strips of plastic 3 are interposed between said side walls 2.1 and said strips of wood 1. Their function is two-fold: on the one side, they prevent any orthogonal movement of the strips of wood 1 in the metal profile 2 and, on the other side, they act as tolerance adjusters.

[0028] The cross-section of said profile 2 is larger than the cross-section of the cambered lamellar wooden element 4 to be obtained.

[0029] Next, the metal profile 2, which contains the strips of wood 1 and the strips of plastic 3, is fed to a roller bending machine, being already set to camber said metal profile 2 according to the desired shape.

[0030] Then, the metal profile 2, which contains the strips of wood 1 and the strips of plastic 3, is allowed to rest until the glue between the strips of wood 1 dries.

[0031] Next, the bent pack of strips of wood 1 and strips of plastic 3 is removed from the metal profile 2. After removing the side strips of plastic 3, the cambered lamellar wooden element 4 is transferred to the next ordinary finishing steps.

[0032] If some strips of wood 1 having different heights are arranged so as to obtain a pyramid, and if some side strips of plastic 3 are arranged according to the corresponding negative shape, i.e. in order to obtain a double right-angled triangle (always with reference to the cross-section view), as shown on figure 5, then a cambered wooden element 4 with an essentially half-trapezoidal cross-section may be directly obtained. If one of the two oblique sides of the wooden element 4 so obtained is to be finished after cambering, then the waste of wood is minimised because it no longer nec-

essary to remove the triangular edge (which was occupied by the strips of plastic 3, then removed). Only the already existing oblique side is to be levelled.

[0033] The stepped notch which remains on the other oblique side and which can be seen on the right-hand side of figure 6 is used to receive fixtures, wires, etc.

[0034] A strip of plastic 5 may also be interposed between the strips of wood 1, and a strip of metal 6 may also be interposed between the strips of wood 1 and the side strips of plastic 3. When the strip of plastic 5 is removed after cambering, the glue being dried, a slot is created in the cambered lamellar wooden element 4. On the contrary, the strip of metal 6 is not removed and it is used as a guide.

Claims

1. Process for the camber of lamellar wood, characterised in that it comprises the following steps:

- programming or setting up a roller bending machine of the type commonly used to camber metal profiles, according to the shape of the cambered lamellar wooden element (4) to be obtained;
- inserting by hand the strips of wood (1), previously covered with glue, in a straight metal profile (2) having a U-shaped cross-section, said strips of wood (1) being arranged so that the longer sides of each strip of wood (1) are parallel to the side walls (2.1) of the supporting metal profile (2), and the cross-section of said metal profile (2) being larger than the cross-section of the cambered lamellar wooden element (4) to be obtained;
- interposing strips of plastic (3) between the side walls (2.1) of the metal profile (2) and the strips of wood (1);
- feeding the metal profile (2), which contains the strips of wood (1) and the strips of plastic (3), to a roller bending machine, which cambers both the metal profile (2) and the strips of wood and plastic (1, 3) contained in it;
- allowing the metal profile (2), which contains the strips of wood (1) and the strips of plastic (3), to rest until the glue applied between the strips of wood (1) dries; the side walls (2.1) of the metal profile (2) compress the cambered pack of strips of wood (1), thus preventing them from disjoining;
- removing the cambered pack of strips of wood and plastic (1, 3) from the metal profile (2) and removing the side strips of plastic (3);
- transferring the cambered lamellar wooden element (4) so obtained to the next ordinary finishing steps.

2. Process according to claim 1, characterised in that other strips of plastic (5), metal (6) or other materials may be interposed between the strips of wood (1), or between the side strips of plastic (3) and the strips of wood (1), said interposed strips of plastic (5), metal (6) or other materials being then removed from the cambered lamellar wooden element (4) so obtained to create notches or slots.

3. Process according to claims 1 and 2, characterised in that said strips of plastic (5), metal (6) or other materials interposed between the strips of wood (1) are left in place for further references, couplings, patched pieces, etc.

4. Process according to claim 1, characterised in that said strips of plastic (3) may have different sizes and shapes, and they may be suitably arranged in the metal profile (2) so as to create a negative shape of the cambered wooden element (4) to be obtained;

5. Process according to claim 1, characterised in that the cross-section of said supporting metal profile (2) may have shapes other than the U-shape so as to obtain directly a negative shape of the desired cambered lamellar wooden element (4); however, said metal profile (2) should always have a base and two side walls (2.1) in order to contain the strips of wood (1) and the strips of plastic (3).

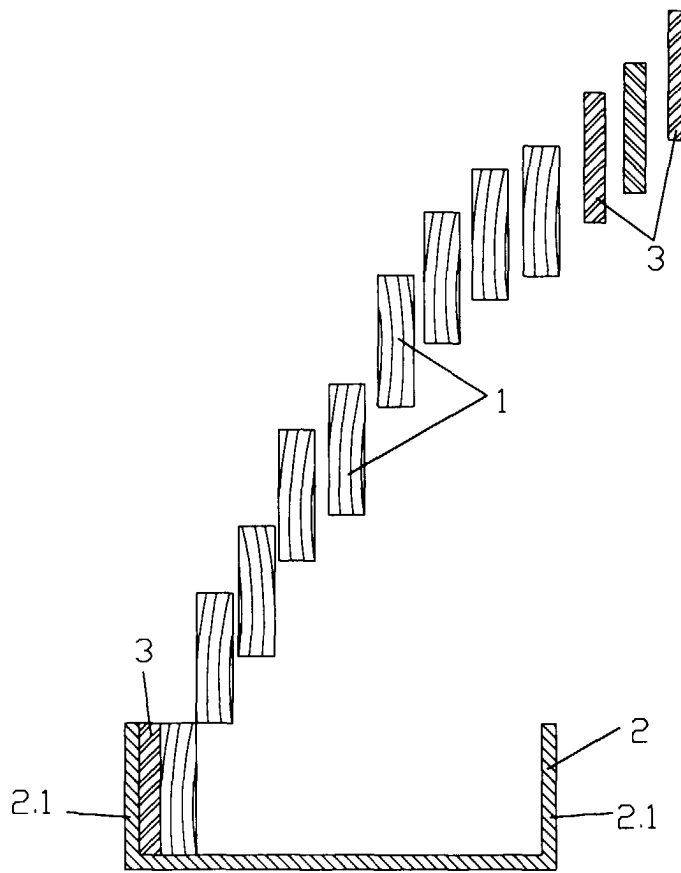


FIG. 1

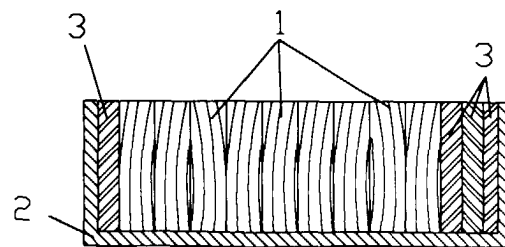


FIG. 2

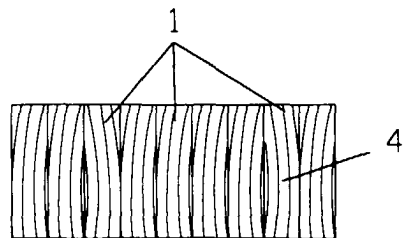


FIG. 3

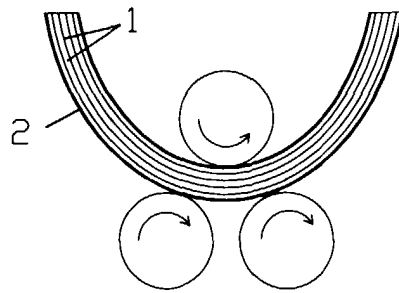


FIG. 4

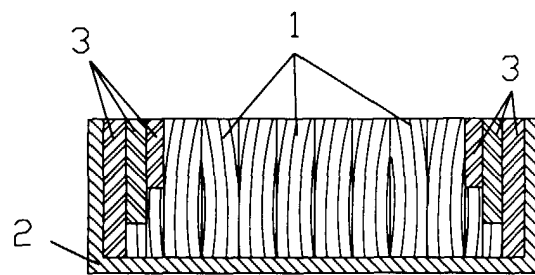


FIG. 5

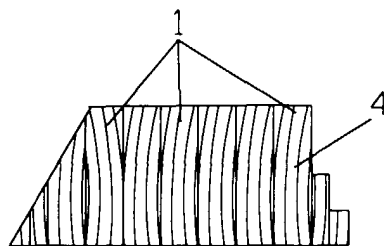


FIG. 6

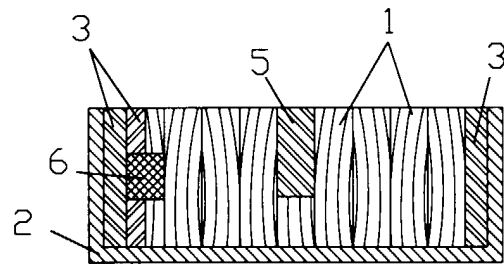


FIG. 7

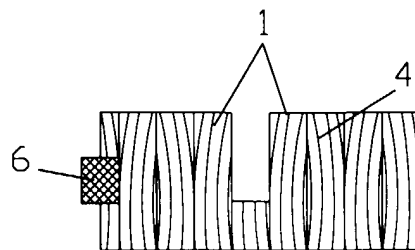


FIG. 8