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(54) Title: METHOD FOR MAKING A WOODEN BOAT

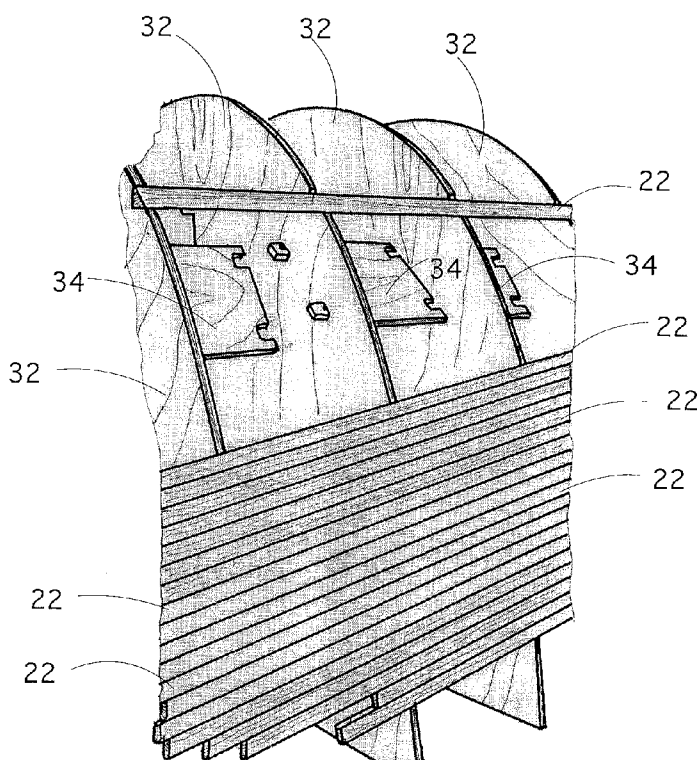


fig. 3

(57) Abstract: Method for making a boat using a plurality of wooden elements (22) able to form the external planking of the boat and a forming mold. The method comprises a first step in which, using electronic processing means, at least the external shape of said boat is defined. The method also comprises a second step in which, using the above electronic processing means, both the definitive shape of each of the wooden elements (22) and also their reciprocal position are defined in order to form the planking. For each of the wooden elements (22) its corresponding flat shape is also defined, a determinate numerical identification is assigned and an ordered sequence of use is defined, in order to make the planking.



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“METHOD FOR MAKING A WOODEN BOAT”

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FIELD OF THE INVENTION

The present invention concerns a method for making a wooden boat, intended
5 for both professional and leisure use.

In particular the present invention is applied to a method for the production, with characteristics of repeatability on a small or medium scale, of boats made of wood or wood-based composite material.

BACKGROUND OF THE INVENTION

10 In recent years, as a material for building boats, wood has been gradually replaced by fiberglass materials. Such materials have made the serial production of boats easier and more economical, due to the re-use of the molds used for producing the hull. This has allowed to accelerate the production process of the boats and to facilitate normal maintenance operations.

15 Wood is still used for making leisure boats or boats for particular uses, such as tourist boats or boats to be used in specific contexts such as historical regattas.

One of most employed methods for making wooden boats is the one that concerns the use of lamellar wood elements pressed on a shape. This method has a widespread use due to the use of glues and resins that are particularly resistant
20 to water. The method consists of making a shell formed by several layers of thin lamellar wood elements, glued to each other and subjected to pressure. The thickness and the size of the lamellar wood elements depend on the sizes and the shape of the boat. Construction according to this method is achieved through the deposition of wooden elements to cover a forming mold, which also constitutes
25 the supporting structure of the boat. Deposition is achieved by covering the forming mold with several layers of planking.

The disposition of the planking, according to such methods, is long and complicated. In fact, each single wooden element must be shaped in a specific manner so that it fits together with the adjacent elements. This shaping is
30 substantially performed on each single element and before its deposition.

Furthermore, the supporting structure of the boat, also used as a forming mold of a pre-defined shape, at the end of construction constitutes an integral part of the boat itself. This characteristic renders the forming mold unusable for the

production of other boats.

Another disadvantage of this method of production is connected to the fact that it is substantially of an artisan character, as it has to be performed by highly specialized personnel. This causes an increase in the overall production time and costs of the boat.

One purpose of the present invention is to achieve a method for the production of a wooden boat, for both leisure and professional use, which reduces production time and costs, also through a reduction in the wooden elements discarded during production.

A further purpose is to considerably reduce the probability of committing errors during the assembly step of the individual components.

Another purpose is to also allow the assembly of the wooden elements by personnel not particularly qualified in the field, contributing therefore to further reduce production costs.

SUMMARY OF THE INVENTION

The present invention is set forth and characterized in the independent claim, while the dependent claims describe other innovative characteristics of the invention.

In accordance with the above purpose, a method according to the present invention can be used to make a boat using a plurality of wooden elements, able to form the external planking of the boat, and a forming mold.

The method according to the present invention comprises a first step in which, by using electronic processing means, at least the external shape of the boat is defined.

The method according to the present invention also comprises a second step which defines, always using said electronic processing means, both the definitive shape of every single wooden element and its reciprocal position in the disposition able to form said external planking substantially in conformity with the external shape defined in the first step. Furthermore, during said second step, for each of said wooden elements the corresponding flat shape is defined. By corresponding flat shape we mean the projection on a plane of each wooden element, whose definitive shape is at least partly curved.

According to a characteristic feature of the present invention, during this

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second step a determinate identification is assigned to each of the wooden elements that form the external planking, using the above-mentioned electronic processing means.

5 According to another characteristic of the present invention, in this second step an ordered sequence of use is defined for each wooden element able to form the external planking, always using said electronic processing means.

The method according to the present invention also comprises a third step in which the wooden elements are made in their definitive form. This production is achieved starting from the corresponding flat shape, defined during the previous
10 second step of the method according to the present invention.

The method according to the present invention also comprises a fourth step in which the wooden elements are disposed on a forming mold so as to form the planking according to the external shape of the boat defined in the first step.

15 Therefore, the method according to the present invention, through the use of said ordered and sequential disposition of the wooden elements, allows both to reduce the deposition times and also to reduce the probability of committing positioning errors of said wooden elements, as well as a repeatable production process.

The method according to the present invention also comprises a fifth step in
20 which said forming mold is separated from the external planking.

Therefore, the forming mold does not form a single body with the boat, as happens with other production methods for wooden boats, and can be re-used for making another boat.

Furthermore, thanks to the use of the method described above, the boat that is
25 obtained has no internal transverse reinforcement structures and the internal walls are smooth.

According to a variant of the method according to the present invention, said external planking consists of a plurality of layers each made with said wooden elements.

30 According to a further variant of the present invention, said external planking comprises at least three layers. A first layer of planking is made by arranging the wooden elements on the forming mold according to a direction substantially parallel to the longitudinal direction of the boat. A second layer of planking is

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made by arranging the wooden elements on the mold with a pre-defined inclination, set intermediate between the direction according to which the wooden elements of the first layer are disposed and the direction orthogonal thereto. A third layer of planking is made by arranging the wooden elements on the forming mold with an opposite inclination with respect to the direction according to which the wooden elements of the second layer are disposed.

According to a variant of the method according to the present invention, in said second step, always using said electronic processing means, the figures relating to the shapes of the wooden elements are advantageously positioned inside figures that identify the panels intended for the production of the wooden elements. This positioning is performed so as to minimize the empty and unusable areas on the shapes that identify said panels, allowing to reduce the waste produced during the production of the wooden elements.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other characteristics of the present invention will become apparent from the following description of some preferential forms of embodiment, given as a non-restrictive example with reference to the attached drawings in which:

- fig. 1 is a three-dimensional view of a detail of a boat during a step of the method according to the present invention;
- fig. 2 is a three-dimensional view of a detail of the boat during a following step to that represented in fig. 1;
- fig. 3 is a three-dimensional view of a detail of the boat during a step following that shown in fig. 2;
- fig. 4 is a three-dimensional view of a detail of the boat;
- fig. 5 is a three-dimensional view of a detail of the boat during a step following that shown in fig. 3; and
- fig. 6 is a three-dimensional view of a detail of the boat during a step following that shown in fig. 5.

DETAILED DESCRIPTION OF A PREFERENTIAL FORM OF EMBODIMENT

With reference to the attached drawings, a method according to the present invention can be used to make a boat 20, of which only a part is illustrated, using a plurality of wooden elements 22 able to form the external planking 23 of the

boat 20.

The method according to the present invention comprises a first step in which an external shape of the boat 20 is defined, so as to satisfy the design specifications. The specifications substantially concern the overall sizes of the boat 20, such as the maximum width in determinate transverse sections, the length of the boat 20 and the shape of the boat 20. The first step is substantially performed using electronic processing means, advantageously consisting of programs for electronic processors of the three-dimensional CAD type.

The method according to the present invention also comprises a second step in which the shapes of each wooden element 22 and their reciprocal position are defined in order to form the planking 23 of the boat 20. The second step also comprises the assignment of a determinate numerical identification, advantageously sequential, and an ordered sequence of use for each of the wooden elements 22. In this second step a forming mold 30 is also defined, able to be used in the deposition of the wooden elements 22 in order to make the planking 23 of the boat 20 and consisting of templates 32 corresponding to a predefined number of transverse sections of the boat 20. Furthermore, suitable spacers 34 are defined, able to be interposed between said templates 32.

The second step is also performed with the aid of said programs for electronic processors of the three-dimensional CAD type, which simplify and quicken the definition of the shapes of the wooden elements 22 and allow an automatic assignment of their numerical identification and their ordered sequence of use.

According to a preferential embodiment of the method according to the present invention, in the second step a plurality of layers of planking 23 to be disposed on the forming mold 30 are defined.

In particular, the definition of at least three layers of planking 23 is provided. A first layer of planking 24, more internal, is disposed according to the longitudinal direction of the boat 20. A second layer of planking 25 is disposed according to a direction with an intermediate inclination between that of the first layer of planking 24 and a direction orthogonal to that of the first layer of planking 24. A third layer of planking 26 is disposed according to a direction with an inclination opposite to that of the second layer of planking 25.

Furthermore, in this second step a corresponding flat shape is defined for each

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of the wooden elements 22. The flat shape, characterized by a section 28 with two rectilinear sides 36 and two curvilinear sides 38, facilitates the use and the laying of the wooden elements 22 on the forming mold 30.

The method also comprises a third step in which the wooden elements 22 are made in their definitive form. In the third step the elements of the forming mold 30 comprising said templates 32 and the spacers 34 are also made.

The method also comprises a fourth step in which the forming mold 30 is assembled on which the wooden elements 22 are subsequently disposed, following the ordered sequence of use defined in said second step.

The templates 32 of the forming mold 30 are disposed, at distances corresponding to predefined sections of the boat, and are located so as to give shape to the boat 20 in an upside-down position (fig. 1). The spacers 34 are disposed between the templates 32 and joined thereto so as to keep the templates 32 parallel and give rigidity to the forming mold 30. Furthermore, in this preferential solution, seatings 40 are defined on each template 32, able to house known structural elements of the boat 20, and not represented in the drawings, such as shelves, battens, the keel and the stem.

Also, in the fourth step the wooden elements 22 are disposed on the seatings 40 of the templates 32, overlapping and laminated with resins, for example of the epoxy type, and able to form said structural elements. The wooden elements 32 are curved and kept in shape, adhering to the forming mold 30, by means of clamps 42 (fig. 2) until the end of the gluing action.

The shelves, in particular, once shaped on the forming mold 30 (fig. 2), are separated therefrom and positioned after the formation of the planking 23 of the boat, in order to allow the easy separation of the forming mold 30 and the boat 20.

The fourth step of the method also comprises (fig. 4) the formation of the first layer of planking 24, by laying the wooden elements 22 in the transverse direction of the boat 20. The laying is regulated by the ordered sequence of use defined in said second step. The wooden elements 22, consist of planks, preferably of cedar wood, which have said circular section 28 coupling (fig. 4) and formed by the respective curvilinear sides 38, able to increase the reciprocal gluing surface and to allow a reciprocal inclination of the wooden elements 22,

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so as to adapt their disposition on the curvilinear profile of the templates 32 of the forming mold 30.

5 The wooden elements 22 are therefore glued to one another and therefore to the templates 32 of the forming mold 30 and subsequently their ends are fixed with screws to the profiles of said templates 32. The screws are removed at the end of the laying of the first layer of planking 24 and in any case once the gluing action of the wooden elements 22 has ended. At the end of the laying of the first layer of planking 24, the boat 20 has assumed its external shape.

10 The fourth step also comprises the formation of the second layer of planking 25, inclined with respect to the direction of the first layer of planking 24 (fig. 5). Always following the ordered sequence of use, the wooden elements 22 that constitute the second layer of planking 25, advantageously treated with resins for example of the epoxy type, are fixed to the first layer of planking 24 by means of stainless steel staples. The wooden elements are then made to adhere to the
15 elements of the first layer of planking 24 with a vacuum technique by suction of the air present on the gluing surfaces. The disposition of the wooden elements 22 that make up the second layer of planking 25 is performed, according to the sequence of use defined in the second step, starting from the center of the boat 20. In fact, the length of the wooden elements 22 that make up the second layer
20 of planking 25 is longer at the center than at the ends of the boat 20. In this way possible angular positioning errors are reduced to a minimum. In order to facilitate the positioning, marking signs, not shown in the attached drawings, are indicated at pre-defined distances on pre-determined wooden elements 22 that make up the keel and the main batten of the boat 20; the signs are able to indicate
25 the inclination according to which the wooden elements 22 that constitute the second layer of planking 25 are to be positioned.

The fourth step ends with the formation of the third layer of planking 26. The laying of the third layer of planking 26 is performed in a manner identical to the laying of the second layer of planking 25.

30 At the end of the laying of the third layer of planking 26, the attachment staples are removed from the second layer of planking 25.

The method according to the present invention also comprises a fifth step in which the forming mold 30 is separated from the planking 23. In fact in the fifth

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step the boat 20 is lifted from the forming mold 30, which can possibly be dismantled and therefore re-used for the production of a new boat 20.

It is clear that modifications and/or additions of parts and/or steps may be made to the method as described heretofore, without departing from the field and
5 scope of the present invention.

For example, the sequence of layering of the planking 23 may not have the disposition of the first layer 24 disposed according to a longitudinal direction. Or, in the described deposition sequence, it is possible to provide the deposition of a further layer of planking 23 external and disposed inclined according to the
10 longitudinal direction of the boat 20.

The forming mold defined in the second step of the method can comprise, as well as said templates 32 which have a substantially constructive function, also templates 32 with a structural function which, remaining solid with the boat 20 following its separation from the forming mold 30, allow to make the boat 20
15 already provided with structural elements.

It is also clear that, although the present invention has been described with reference to some specific examples, a person of skill in the art shall certainly be able to achieve many other equivalent forms of method for producing wooden boats, having the characteristics as set forth in the claims and hence all coming
20 within the field of protection defined thereby.

CLAIMS

1. Method for making a boat using a plurality of wooden elements (22) able to form the external planking (23) of said boat, and a forming mold (30), comprising a first step in which, using electronic processing means, at least the
5 external shape of said boat is defined, characterized in that it comprises a second step in which, using said electronic processing means, both the definitive shape of each of said wooden elements (22), and also their reciprocal position are defined in order to form said planking (23), wherein for each of said wooden elements (22) its corresponding flat shape is defined, wherein to each of said
10 wooden elements (22) a determinate numerical identification is assigned and wherein an ordered sequence of use is defined for each of said wooden elements (22) in order to make said planking (23).
2. Method as in claim 1, characterized in that it also comprises a third step in which said wooden elements (22) are made in their definitive form starting from
15 the corresponding flat shape defined in said second step.
3. Method as in claim 2, characterized in that it also comprises a fourth step in which said wooden elements (22) are disposed on said forming mold (30) according to said ordered sequence so as to form said planking (23).
4. Method as in claim 3, characterized in that it also comprises a fifth step in
20 which said forming mold (30) is separated from said external planking (23).
5. Method as in claim 4, characterized in that said planking (23) comprises a plurality of layers each made with said wooden elements (22).
6. Method as in claim 5, characterized in that a first layer of said planking (24) is made by disposing said wooden elements (22) on said mold according to a
25 longitudinal direction of said boat, a second layer of said planking (25) is made by disposing said wooden elements (22) on said first layer of planking (24) with an inclination pre-defined and intermediate between said longitudinal direction and the direction orthogonal to said longitudinal direction, and a third layer of said planking (26) is made by disposing said wooden elements (22) on said
30 second layer (25) with an inclination opposite to the direction according to which said wooden elements (22) which form said second layer of planking (25) are disposed.
7. Method as in claim 6, characterized in that said inclination is in the range of

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about 45°.

8. Method as in claim 6, characterized in that said second layer of planking (25), treated with gluing means, is made to adhere to said first layer of planking (24) through suction of the air present on the gluing surfaces, and in that said third
5 layer of planking (26), treated with gluing means, is made to adhere to said second layer of planking (25) through suction of the air present on the gluing surfaces.

9. Method as in claim 5, characterized in that said forming mold (30), made during said fourth step, comprises templates (32) able to define the shape of the
10 transverse sections of said boat (20) and spacers (34) able to be placed between said templates so as to keep said templates (32) parallel and to make said forming mold (30) rigid.

10. Method as in claim 5, characterized in that said forming mold (30) comprises templates (32) able to be removed in a solid manner with respect to said boat
15 (20).

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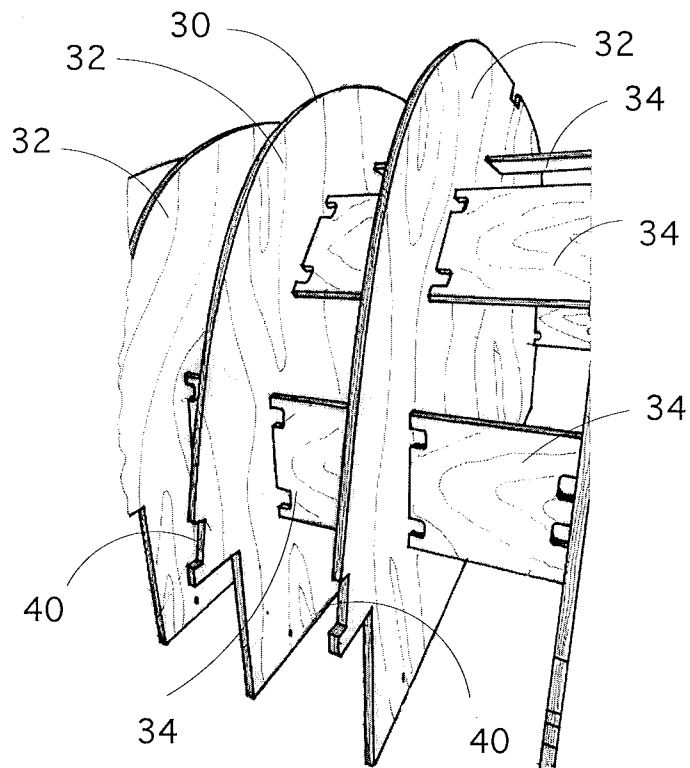


fig. 1

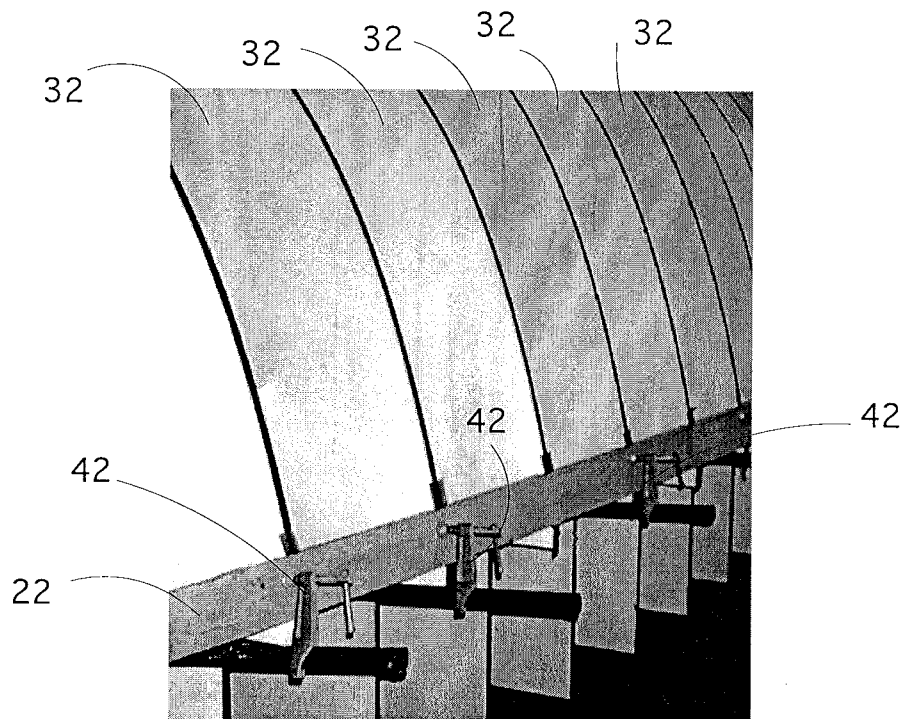


fig. 2

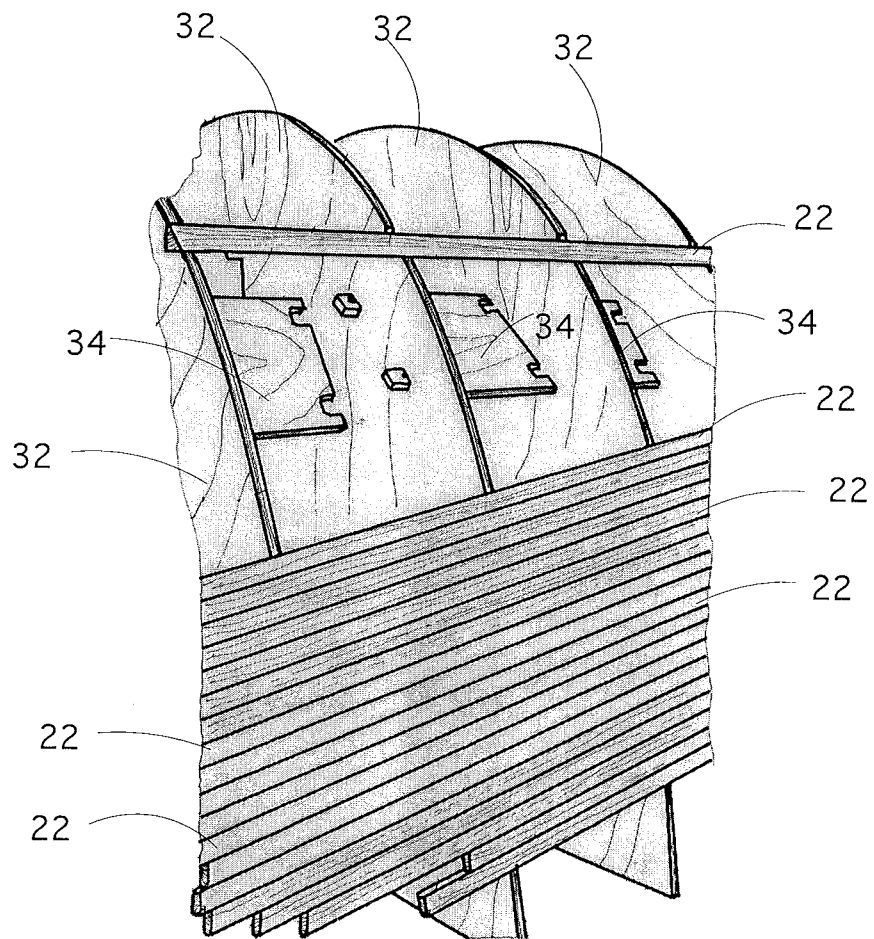


fig. 3

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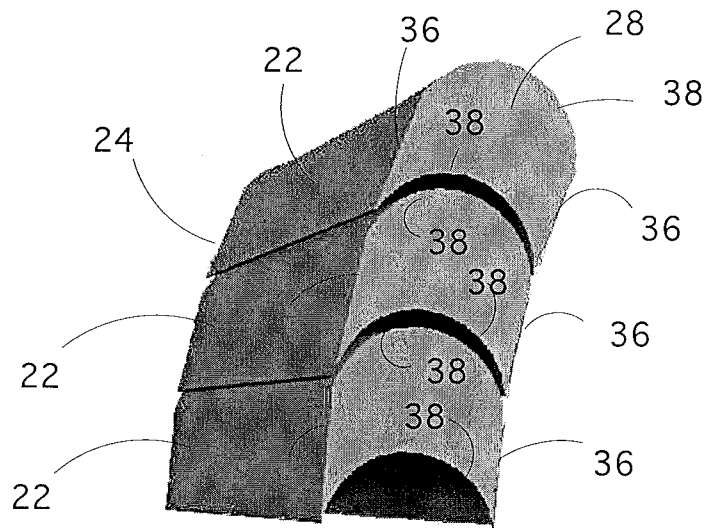


fig. 4

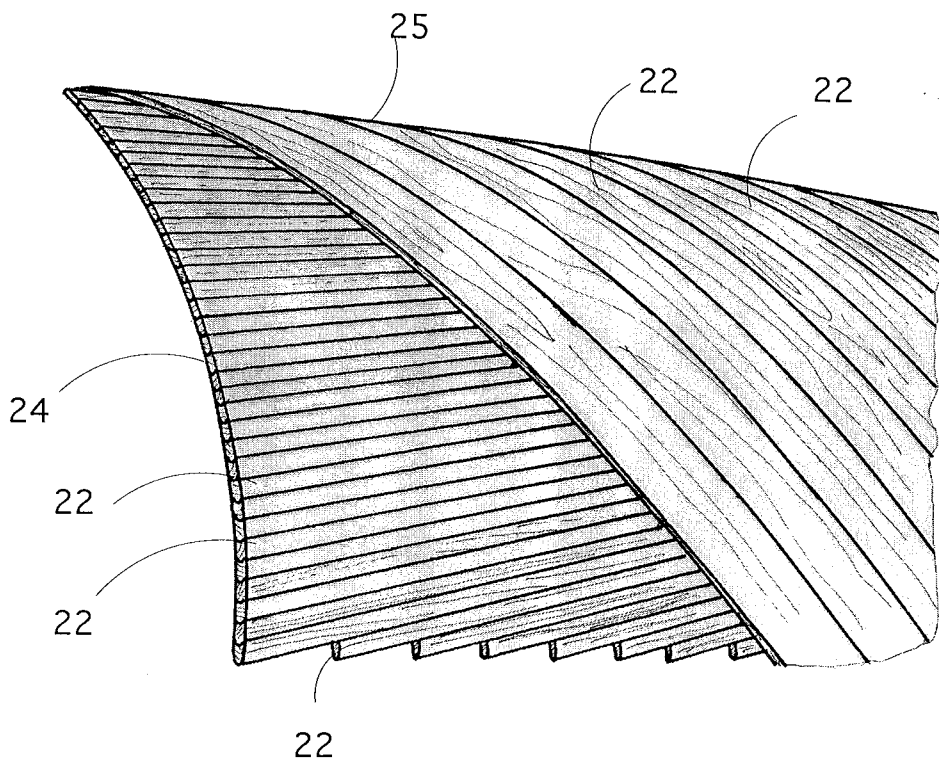


fig. 5

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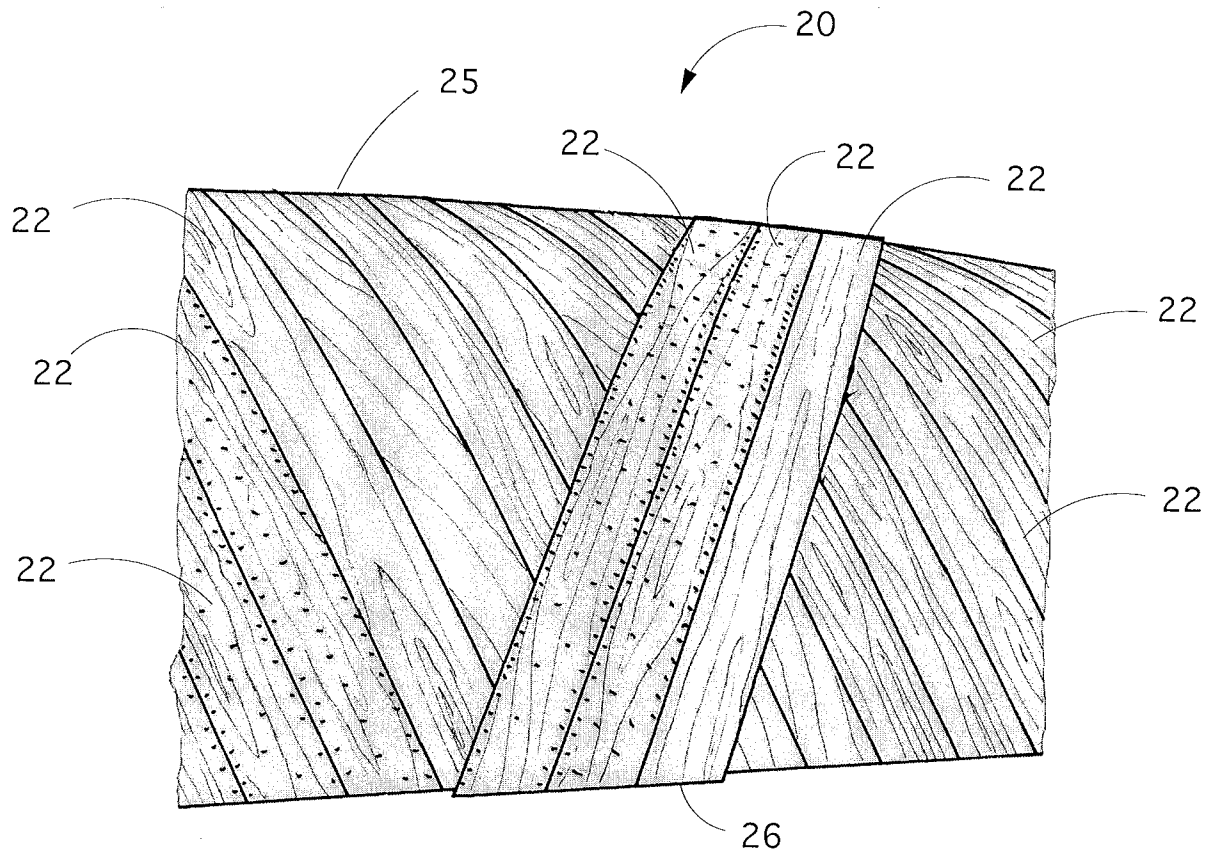


fig. 6