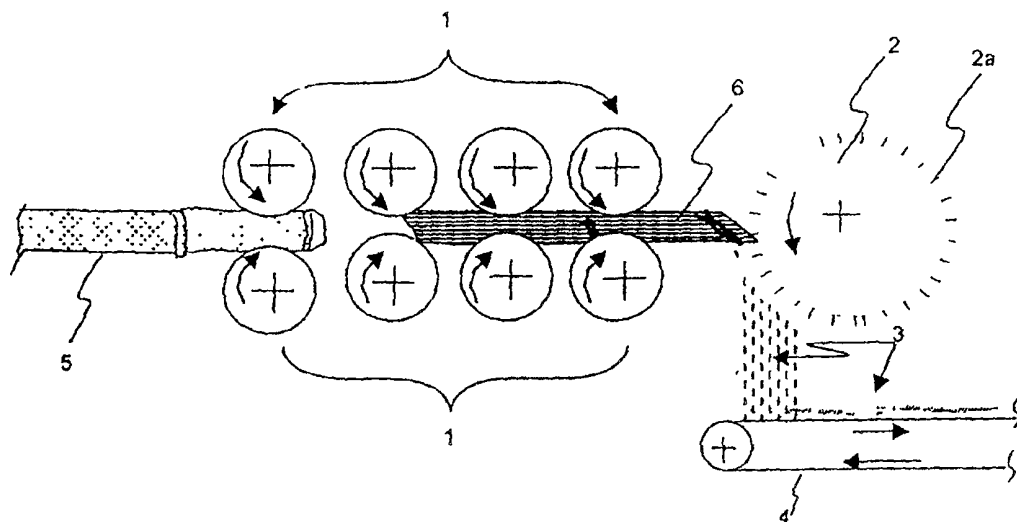


INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : B27N 3/04	A1	(11) International Publication Number: WO 00/54947 (43) International Publication Date: 21 September 2000 (21.09.00)
(21) International Application Number: PCT/ID99/00001 (22) International Filing Date: 22 December 1999 (22.12.99) (30) Priority Data: P990237 17 March 1999 (17.03.99) ID (71)(72) Applicant and Inventor: SENDAYUNG, Handay [ID/ID]; Jalan Tanjung Sari 11-15, P.O. Box 139, Sukabumi 43151 (ID).	(81) Designated States: AT, AU, BR, CA, CN, CZ, DE, ES, GB, IN, JP, KR, LK, MX, PL, PT, RO, RU, SE, SK, TR, US, VN, YU, ZA, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>	

(54) Title: A METHOD FOR PRODUCING SHEET OR BOARD OF BAMBOO TREES FIBERS



(57) Abstract

Being explained that a method for producing a sheet or board that made from a number of bamboo stems which are firstly made into fibers, consists of steps as follows: (a) to cut the bamboo stems into a three meters long each; (b) to mill or to press the cut of bamboo to form a plaque by rolls; (c) to fiberize the plaque of bamboo stems by using scratchier pipe or drum which has many nails; (d) to collect the fibers obtained from the step of fiberizing; (e) to dry the fibers collected in the temperature of 60–100 °C for the duration of time 10–20 minutes and the water content of 6–14 %; (f) to solidify the dry fibers by using a punching machine to make a soft fiber sheet; (g) as a first alternative step is to glue the fibers with latex type adhesive in making an elastic sheet, and as a second alternative step is to glue the fibers with a resin type adhesive in making a hard sheet; (h) to dry the fibers which have been glued by using latex or resin type adhesive in a drying room with a mechanical dryer in a temperature of 40–70 °C for 10–20 minutes; and the next step (i) is to hot press the sheet or board being obtained from the alternative step in a certain pressure and time duration.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon			PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

A METHOD FOR PRODUCING SHEET OR BOARD OF BAMBOO TREES FIBERS

The Technical Field

This present invention relates to a method for producing a sheet or board of fibers taken from bamboo tree. Especially, the present invention is concerned with a method for producing a sheet or board made from a number of bamboo trees which have been processed into the fibers and are glued by an adhesive material or latex or type of certain resin type adhesive which is heat pressed to form a sheet or board. Then, if needed, the sheets are produced in various characteristics, that are elastic, rather hard or hard board like, the method of the invention can be done by using different type of adhesive and hot pressed conditioning.

The Background Art

Conventionally, we found a lot of sheets or board that are made from fibers of plants, animals, and minerals. Most plant fibers are made from seeds or fruits, for example cotton seeds, kapok, and coconut peel. The plant fibers can also obtained from jute, gunny, elephant jute, Indian jute, and arrange tree fibers. Besides that, the plant fibers can also obtained from leaf fiber, such as manila, and sisal fibers.

From the group of certain animals, there are also fibers that are available such as hair fibers or body's hair fiber, for example, goat's hair, camel's hair, rabbit's hair, and duck's feather. There are fibers from digested product as well which can be obtained from silkworm fiber. It can also be obtained from mineral products, such as asbestos.

The use of fibers which is obtained from many resources is various, depend on the type and function itself. For example, the fiber that being processed into an elastic sheet can be use as a mattress, seat or mat materials, voice reducing device, as a filter and the like. The other type of fibers that is being processed into a hard characteristic or inelastic sheets can be use as a isolator, plants vase, hat, spring bed upholder, partition, plafond, furniture materials and the like.

Furthermore, the use of wood as a raw material is generally strong depends on the stock of wood or forest wood. The slow growing of wood in the forest does not balance with excessive and immediate demand of wood. The problem of it will continue and the dependence on wood as a raw material is increase.

Facing to this problem the present invention is striving for a raw material from the relatively short aged plant with abundant population, but the fibers can be taken and

processed to be elastic, rather hard, and hard board like sheet. The raw material of this invention is obtained from the bamboo tree, from which the fiber is taken and processed to become sheets as prefer.

As mentioned above, the present invention is limited to the method of producing a board or sheet by making use of fibers of plants, especially from bamboo tree which can substitute the dependence on wood as a raw material or population of tree will decrease.

Furthermore, features of the present invention will be explained below.

Disclosure of Invention

The present invention provides a method for producing a sheet or board that taken from bamboo tree which is processed into bamboo fibers and glued with adhesive material then heat pressed to form a sheet or board which is useful as a material to fulfill the need of sheet or board.

Preferably in obtaining fibers from bamboo tree, the pressing work is done with formation of rolls to form groovy cracked plague. Then, a part of surface of the pressing rolls is preferably grooved and the another part is preferably flat ungrooved.

It is also prefer that on the last roll, there should be a roll in the shape of pipe or drum with a number of nails as scratchier which are set around the pipe or drum. The pipe or drum should have 40 - 50 cm in diameter. The nails that are set on the pipe or drum are used to ripe or to fiberize the plague of the bamboo which has been provided before. There are relatively no hinds to plague which is fiberized because it has hollow crack, as a result of pressing before. The produced fiber has among 0.2 - 3 mm in diameter and not more than 50 cm in length.

Furthermore, produced fibers is dried by a oil or coal fueled mechanic dryer in between 60 and 100°C of temperature, for about 10-20 minutes to reach 6 - 14 % of water content. Then, the dried fibers will be solidified by a punching machine which has more than 600 needles, so the distant fibers will become solid and in the form of sheet.

Moreover to make a hard board like sheet, fibers will be sprayed and submersed in a thin adhesive. Type of adhesive is resin, preferably, urea formaldehyde resin or melamine formaldehyde resin which is contain 10-30% of total weight of glued fibers. The fibers which has been glued will become hard sheet or board after getting a hot pressure in 100-180°C of temperature for 5-15 minutes on 15 kg/cm² of pressure and then the sheet or board will be produced in 400-800 kg/cm³ of specific gravity.

Preferably in making an elastic sheet, adhesive being used is rubber or latex type, containing 15-50% of total weight of the fiber that has glued.

Beside that, preferably in making a hard but not as hard as a wood board, thicker than the elastic one, the resin that has just mentioned above also can be used for this type of sheet. The hot pressed which is treated on the adhesive resin type for this rather hard sheet is as same as for the hard one that has just explained before. The temperature and duration of time for the two of them are same. The difference is only in pressure that is not more than 2 kg/cm², to produce the rather hard sheet with specific gravity in 70-350 kg/cm³.

Preferably in making an elastic sheet or a rather hard sheet (not elastic) with more than one layer, in spraying or submersing the fibers in an adhesive liquid, the glued wet fibers will be laid or stacked in a desirable thickness, then hot pressed together on a pressure of not more than 2 kg/cm² for 5-15 minutes in 100-180°C.

The thickness of each single layer of elastic sheets is 2-15 mm and around 4-30 mm for double, and so on.

For a hard board like, the thickness of each single layer is 1.5 - 3.0 mm and 3 - 6 mm for double, and so on. For a board with 1.5 cm of total expected of thickness, there should be piled 5-10 layers.

Specifically for the rather hard sheet, the thickness is fixed with the needed.

Then, the present invention will be explained in more detail by referring to the accompanying drawings.

Brief Description of Drawings

Figure 1 is a view that show pressing rolls to press and cut the bamboo which is ripped or fiberize by scratching roll in a pipe or drum shape with a number of nails;

Figure 2 is a view that show a sample of sheet that made of fibers of this invention;

Figure 3 is a flow chart of the method for producing sheet or board of this invention;

Preferred Embodiments for Carrying Out The Invention

In general, the present invention is concerned to a method for producing a sheet or board that made from bamboo stem which has made into bamboo fibers before, then dried and solidified by punching machine having over 600 needles and glued by using resin or

latex type of adhesive and hot pressed to obtain sheet, both a single or many layers. For understanding, the providing of the sheet of bamboo stem of this invention will be explained sequentially.

The bamboo stem is selected in a certain length to enable pressing work with pressing rolls. For example, a bamboo stem is cut in a three meters long each. To enable processing the plague of bamboo is splitted at it's one side, easier to make it flat of cracked plague with cavities. It should note that the bamboo that will be processed should require the strength age as a raw material of construction. The bamboo affair expert has been familiar with the right age of bamboo that will be used, while the various diameter of the stem does not constitute a constraint.

To clarify the method of producing of a sheet or board by providing fibers from bamboo stem will be explained by referring to figure 3.

Figure 3 is a diagram of flow chart of the method for producing sheet or board of this invention that consist of steps as follows: to cut (A) a bamboo stem in a three long each; to mill or to press (B) the cut bamboo by using rolls to form plague; to fiberize (C) the plague of bamboo by using punching drum or a drum with a number of nails; to collect (D) the fibers obtained from fiberized; to dry (E) the collected fibers in 60-100°C of temperature for 10-20 minutes until it reach 6-14% of water content; to solidify (F) the dried fibers by using punching machine to make a soft fibers sheet; then as an first alternative step, to glue (G1) the fibers with latex type adhesive to make an elastic sheet, and as an second alternative, to glue (G2) the fibers by using resin type adhesive to make a hard sheet; to dry (H) the glued fibers in a drying room by using a mechanic dryer in 40-70°C for 10-20 minutes; as a further step of the first alternative is to heat press (I1) the elastic sheet which is rather dry in 100-180°C of hot temperature on not over 2 kg/cm² for 5-15 minutes to make a single layer sheet, or as another further step of the first alternative is to arrange (I2) the rather dry sheet in parallel or crossing formation, then to be pressed in a same temperature, pressure and time to make an elastic board with many layers, or as another further step of the first alternative is to arrange (I3) the sheet in pile as mentioned above with a different hot press treatment, that is in the same temperature and time duration but on a different pressure of hot press, that is 2 kg/cm² so it will produce a rather hard sheet with specific gravity at around 70-350 kg/m². Then, as a further step of the second alternative is to heat press (I4) the rather dry sheet in 100-180°C of hot temperature on 2 kg/cm² for 5-15 minutes to make a hard sheet. Then, preferred type of resin and latex adhesive will be explained next.

Moreover, in order to easy understand this method's implementation, it will gain explain by referring to figures 1 and 2.

Referring to figure 1, a bamboo stem at a mature age will be cut into three meters long each. Then it will be inserted in between a first formation (1) for pressing work, when inserting them, some cut of bamboo are arranged in a wide position of 20-100 cm wide without being piled up. Some of the first rolls (1) have flat surfaces and others have groovy surfaces. The result of this pressing work that doing by the first rolls (1) is in the form of cracked and groovy plague (6). The plague then to be fiberized by scratchier pipe or drum with diameter of 40-50 cm and the length is around 50-100 cm. This scratchier pipe or drum (2) has a number of nails surrounding on its surface which is used to rip or to fiberize the plague (6) to make it become fiber with diameter of 0.2 - 3 mm and not over 50 cm of its length, all formation of rolls (1) and scratchier pipe or drum (2) rotates as an arrow direction in figure 1. The fibers (3) then to be brought by a belt conveyor to be accumulated into a retaining vessel (not to be shown).

Returning to the scratchier pipe or drum (2) where a number of scratchier nails are set surrounding the surface area (2a). The nails (2a) are placed with the distance each on the width direction of pipe or drum of 1-2 cm, and the distance each on the round direction of pipe or drum is 3-5 cm. The scratching nails (2a) are made of specific steel which is designed in certain thickness (not explained here, because it is not a decisive thing in this present invention).

After the fibers are obtained (3), they are dried by an artificial dryer where they are piled up and blow a dry air in the temperature of 60-100°C for 10-20 minutes till they reach 6-14% of water content.

Afterward, the fibers (3) are solidified by a punching machine (not to be shown) which have over six hundreds needles. By continuously stabbing in the punching machine, the fibers (3) will be solid in the form of soft sheet and then cut into a desirable length of between 200-300 cm with 0,5-20 cm of thickness.

The fibers with the form of sheet are then glued by resin type adhesive material for a hard board like sheet and latex type adhesive for an elastic sheet. Between these two types of sheets, there is also a rather hard sheet, where the adhesive being used for gluing the hard board like sheet, but the treatment of hot pressed is different, so the specific gravity of produced sheet is also different between those.

Now, it will be explained how to gain a hard board like sheet. Firstly, the fiber which has become a soft sheet is coated or sprayed or dipped in a resin type adhesive

liquid, especially an urea formaldehyde resin or melamine formaldehyde resin with the content of 10-30% of total weight of glued fibers. Then, the drying work will be done to decrease the water content of adhesive, so the sheet which is obtained will become dry.

The drying tool which is used in this work is same as the tool which is used to dry the fibers mentioned above. The duration of time of drying is between 10-20 minutes in a temperature of 40-70°C. Next preferably the hard sheet could be coated by more than one layer, may be two, three, or more, it will be piled up when the adhesive is still wet. Then, the pile will be heat pressed in between 100-180°C and in about 15 kg/cm² of pressure for 5-15 minutes. The obtained result for the two layers' sheets will have 3-6 mm of thickness. It should be noted that the thickness of one layer each is about 1.5 - 3 mm. So, if there are more than two layers, the thickness will be in proportional to multiplication of the number of layer to the thickness of one layer.

In order to obtain an elastic sheet, we can do the same process as the process of making a hard sheet that mentioned above. However the type and the content of adhesive are different. The adhesive for an elastic sheet is latex type which containing 15-50% of total weight of the fibers that will be glued. Beside the differences of the adhesive type and the content, the whole procedure of making hard sheet is basically same as of making an elastic sheet.

Beside that, preferably in making a hard sheet (but not so hard as wood board) which thicker than an elastic one, we can also use a resin type adhesive as had mentioned before. The hot pressing for the resin type adhesive for a rather hard sheet is same as for a hard sheet, and the content of adhesive, temperature and pressing work are same for both. The differences are the use of pressure that is maximum 2 kg/cm² and the specific gravity of the rather hard sheet will be 70-350 kg/m³.

Ending the explanation of this invention, the sheet as a product by using the steps of processing will be explained as follows:

A sheet made from a bamboo stem that is firstly made into fibers consist of:

- a. A number of fibers made from bamboo stem with a average water content of 6-14%;
- b. A number of adhesive materials to glue the fibers in making a hard board like sheet is a resin type adhesive, especially urea formaldehyde resin or melamine formaldehyde resin with content of 19-30% of total weight of soft fibers which have been glued; and
- c. To glue the fibers in making an elastic sheet needs a number of latex type adhesive with content of 15-50% of the total weight of glued soft sheet, or, preferably for rather hard sheet, the adhesive that used has the same type and content as that for a hard sheet.

Only the hot pressing which is different for both, that is 2 kg/cm² of the maximum pressure;

- d. The fibers that have been glued by the respective adhesive type will be dried to decrease its water content, and then it can be made into a single layer or a number of
5 pilled layers. The fibers which have been glued and dried will be heat pressed in a temperature of 100-180°C and in a pressure of 12 kg/cm² are for a hard sheet type, and for an elastic type of sheet, the maximum pressure is 2 kg/cm² that will be done for 5-15 minutes, so the glued fibers can be formed into a hard sheet (with an resin type adhesive), and for making an elastic type of sheet (with latex adhesive) or preferably
10 for making a rather hard sheet type, we can use a resin type adhesive with a different pressure with a hard sheet pressure.

Then, to recognize one of this invention's figures, figure 2 shows a sheet that made from bamboo's fibers according to the inventor.

That is all explanation about this present invention and it should be noted that if
15 there is a modification and combination of the present invention, it could still be affordable as long as not to deviate from the scope of this proposed invention. The scope of the present invention is limited by the claims given below.

20

25

30

CLAIMS

1. A method for producing a sheet or board of fibers that made from bamboo stem fibers consist of steps as follows:
- 5 (a) to cut the bamboo stem into a three meters long each;
(b) to mill or to press the cut of bamboo to form a plague by rolls;
(c) to fiberize the plague of the bamboo stem by using scratchier pipe or drum which has many nails;
(d) to collect all fibers gained from the step of fiberizing;
10 (e) to dry the fibers collected on the temperature of 60-100°C for the duration of time 10-20 minutes and the water content of 6-14%;
(f) to solidify the dry fibers with a punching machine to make a soft fiber sheet;
(g) as a first alternative step is to glue the fibers with latex type adhesive in making an elastic sheet, and as a second alternative step is to glue the fibers with a resin type adhesive in making a rather hard sheet;
15 (h) to dry the fibers which have been glued by using latex or resin type adhesive in a drying room with a mechanic dryer in a temperature of 40-70°C; and
(i) as a further step of the first alternative step is to hot press the rather soft and dry in a temperature of hot press of 100-180°C and on a pressure of not more than 2 kg/cm² and for 5-15 minutes to make an elastic sheet, and as a further step of the second alternative step which is done after drying as mentioned above is to hot press the rather dry sheet in a temperature of hot press of 100-180°C on a pressure of 2 kg/cm² and for 5-15 minutes to make a hard sheet, or as another further step of the first alternative is to arrange the rather dry sheets in a parallel or crossing formation to be hot pressed altogether then, in 100-180°C of temperature, on the pressure of 1.5 kg/cm², and in the same duration of time as above to form a many layers sheet with the specific gravity of 400-800 kg/cm³ in average, or as another further step of the first alternative is to piled up the sheet as mentioned before in a temperature treatment and for a same duration but on a different pressure of hot press, that is 2 kg/cm², to make a 70-350 kg/cm³ of average specific gravity of rather hard sheet.
20
25
30
2. The method for producing a sheet or board that made from a number of bamboo stems which are firstly made into fibers as the claimed in claim 1, wherein the scratchier pipe or drum (2) has a number of nails (2a) which is placed within a distance of each in

width direction of 1-2 cm, and in around direction of 3-5 cm to scratch or to fiberize the plague (6) to make fibers (3) with diameter of 0.2 - 3 mm and not over 50 cm long.

- 5 3. The method for producing a sheet or board that made from a number of bamboo stems which are firstly made into fibers as the claimed in claim 1, wherein the resin type adhesive is urea formaldehyde or melamine formaldehyde resin with 10-30 % of total weight and the latex type adhesive which can use adhesive of natural rubber or the mixture with the content in between 15-50% of total weight of the soft fibers that
- 10 have been glued.
4. The method for producing a sheet or board that made from a number of bamboo stem which are firstly made into fibers as the claimed in claim 1, wherein the solidifying step of he fibers with a punching machine that have more than 600 nails by continuously
- 15 stabbing until the stabbed fibers become solid.
5. The method for producing a sheet or board that made from a number of bamboo stem which are firstly made into fibers as the claimed in claim 1, wherein a number of soft fibers of bamboo stem has water content of around 6-14%.
- 20
- 25
- 30

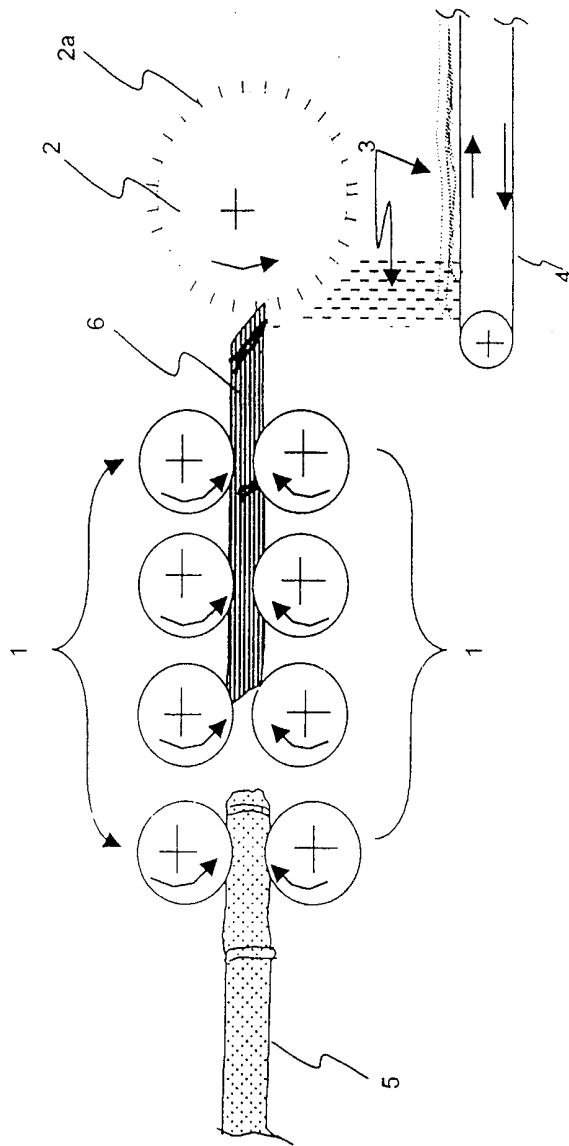


Figure 1

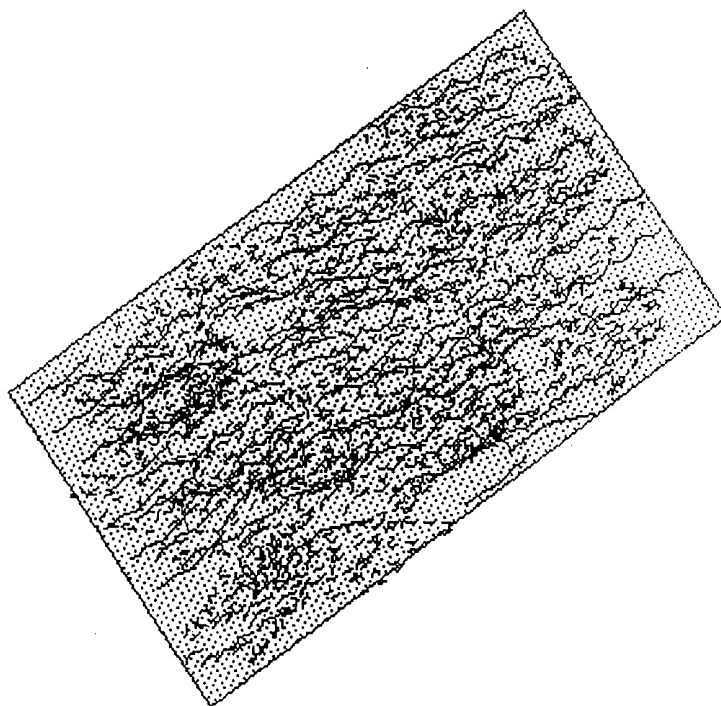
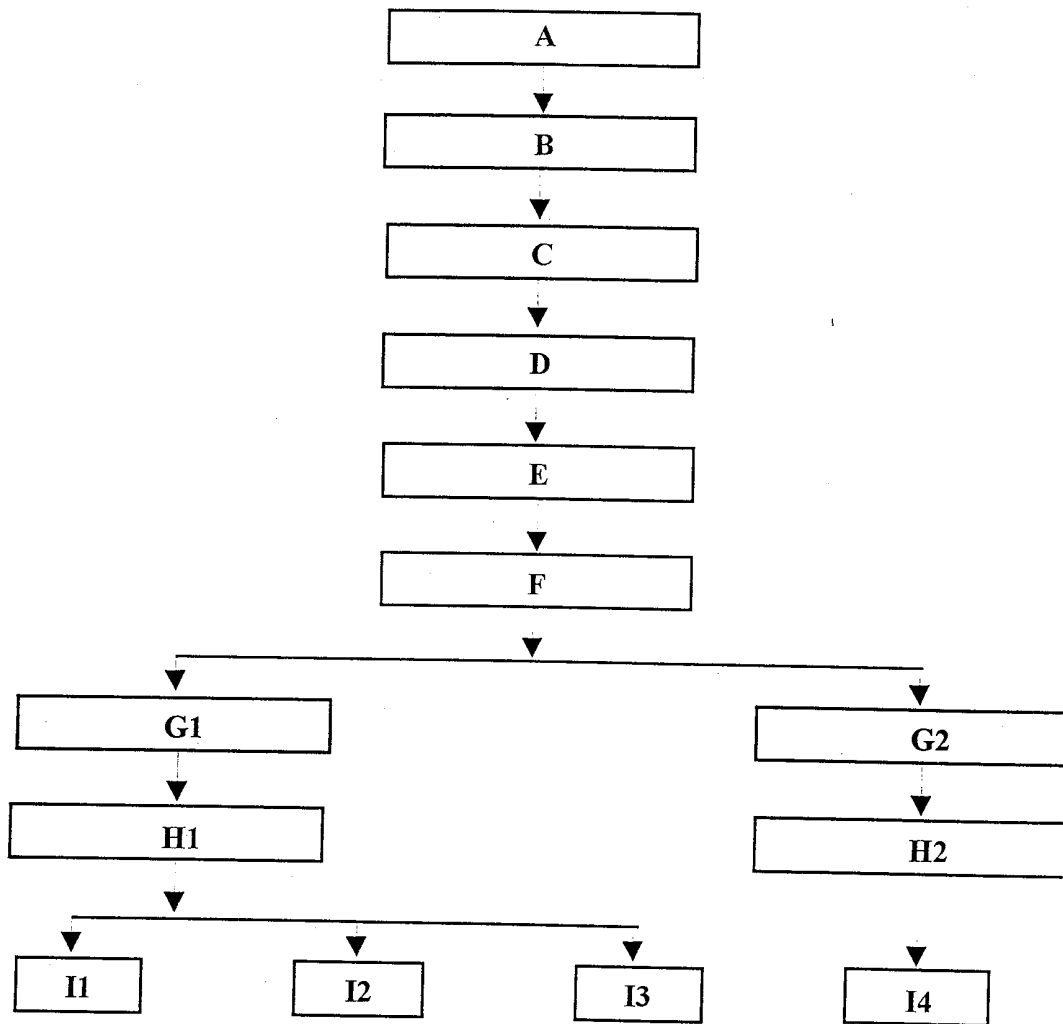


Figure 2

Figure 3



INTERNATIONAL SEARCH REPORT

In. ational Application No
PCT/ID 99/00001

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 B27N3/04				
According to International Patent Classification (IPC) or to both national classification and IPC				
B. FIELDS SEARCHED				
Minimum documentation searched (classification system followed by classification symbols) IPC 7 B27N				
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched				
Electronic data base consulted during the international search (name of data base and, where practical, search terms used)				
C. DOCUMENTS CONSIDERED TO BE RELEVANT				
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
X	EP 0 666 155 A (FORESTRY AND FOREST PRODUCTS R) 9 August 1995 (1995-08-09) abstract; claims; figures 1-3 ---	1-5		
X	GB 2 251 002 A (ASK CORP ;SANSHIN THERMAL INSULATION COM (JP)) 24 June 1992 (1992-06-24) abstract; claims page 6, line 10 - line 17 ---	1-5		
A	EP 0 658 407 A (ROHM & HAAS) 21 June 1995 (1995-06-21) ---			
A	WO 97 49531 A (VEKEMANS HENRICUS JOHANNES ;ARCE VILLALOBOS OSCAR ANTONIO (CR)) 31 December 1997 (1997-12-31) --- -/--			
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C.				
<input checked="" type="checkbox"/> Patent family members are listed in annex.				
* Special categories of cited documents :				
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> *A* document defining the general state of the art which is not considered to be of particular relevance *E* earlier document 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 </td> <td style="width: 50%; border: none; vertical-align: top;"> *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 </td> </tr> </table>			*A* document defining the general state of the art which is not considered to be of particular relevance *E* earlier document 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
A document defining the general state of the art which is not considered to be of particular relevance *E* earlier document 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			
Date of the actual completion of the international search <div style="text-align: center; font-size: 1.2em;">13 April 2000</div>		Date of mailing of the international search report <div style="text-align: center; font-size: 1.2em;">25/04/2000</div>		
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer <div style="text-align: center; font-size: 1.2em;">Soederberg, J</div>		

INTERNATIONAL SEARCH REPORT

Int. Application No PCT/ID 99/00001
--

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 415 821 A (ABE MOTONOBU ET AL) 16 May 1995 (1995-05-16) ---	
A	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 12, 25 December 1997 (1997-12-25) & JP 09 216208 A (YANO HIROYUKI), 19 August 1997 (1997-08-19) abstract -----	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/ID 99/00001

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0666155	A	09-08-1995	US 5441787 A	15-08-1995
			DE 69409495 D	14-05-1998
			DE 69409495 T	24-09-1998
			US 5505238 A	09-04-1996
GB 2251002	A	24-06-1992	JP 5031708 A	09-02-1993
			JP 5138617 A	08-06-1993
			JP 2879979 B	05-04-1999
			JP 4216007 A	06-08-1992
EP 0658407	A	21-06-1995	AU 686262 B	05-02-1998
			AU 8029494 A	22-06-1995
			BR 9405124 A	22-08-1995
			CA 2137727 A	16-06-1995
			DE 69412218 D	10-09-1998
			DE 69412218 T	06-05-1999
			JP 7214518 A	15-08-1995
			US 5695823 A	09-12-1997
			US 5786072 A	28-07-1998
WO 9749531	A	31-12-1997	NL 1003451 C	07-01-1998
			AU 3194397 A	14-01-1998
US 5415821	A	16-05-1995	JP 6015628 A	25-01-1994
			CN 1081951 A, B	16-02-1994
			GB 2268517 A, B	12-01-1994
			US 5393214 A	28-02-1995
JP 09216208	A	19-08-1997	NONE	