(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 456 497 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
20.03.2019 Bulletin 2019/12

(21) Application number: **17751227.4**

(22) Date of filing: **30.06.2017**

(51) Int Cl.:
B27K 3/50 *(2006.01)*

(86) International application number:
PCT/CN2017/091100

(87) International publication number:
WO 2019/000395 (03.01.2019 Gazette 2019/01)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(71) Applicant: **Zhejiang Yongyu Bamboo Joint-Stock Co., Ltd.**
Huzhou, Zhejiang 313301 (CN)

(72) Inventors:
- **SONG, Jiangang**
  Huzhou
  Zhejiang 313301 (CN)
- **LIU, Fuqing**
  Huzhou
  Zhejiang 313301 (CN)
- **SUN, Fangli**
  Huzhou
  Zhejiang 313301 (CN)
- **ZHANG, Xiaochun**
  Huzhou
  Zhejiang 313301 (CN)

(74) Representative: **Garavelli, Paolo**
A.BRE.MAR. S.R.L.
Consulenza in Proprietà Industriale
Via Servais 27
10146 Torino (IT)

(54) RECONSTITUTED BAMBOO TIMBER

(57) A bamboo scrimber, prepared by press-fitting bamboo monomers and adhesive, includes bamboo monomer oil storage spaces which formed by said bamboo monomers, and adhesive oil storage spaces which formed by said adhesive; medium oil seeps into and is stored in at least part of said bamboo monomer oil storage spaces and at least part of said adhesive oil storage spaces.

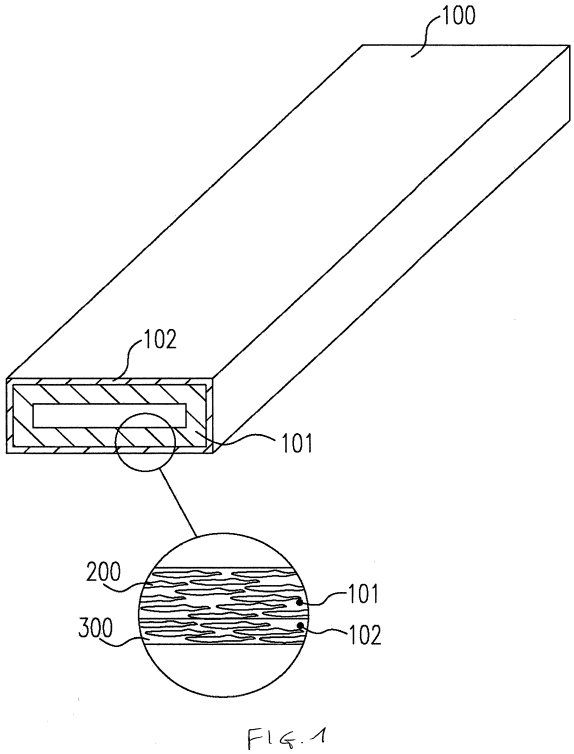

FIG. 1

EP 3 456 497 A1

Description

BACKGROUND OF THE INVENTION

1. Technical Field

[0001] The present invention relates to a scrimber, in particular a bamboo scrimber structure.

2. Description of Related Art

[0002] Bamboo scrimbers are a new bamboo material which is formed by re-constructing, reinforcing, and molding bamboos. The bamboo scrimber is a profiled material prepared by the steps of processing bamboos into long strip-like bamboo sheets, threads, or crushing the bamboos into bamboo thread harnesses, drying or carbonating the processed bamboo materials, then soaking the bamboo materials in adhesive, laying the same in molds, and thermal-curing the materials at a high temperature and at a high pressure (or at a normal pressure) in sequence. In order to improve the stability of the bamboo scrimber such that the bamboo scrimber can be adapted to the outdoor using, the bamboo sheets or bamboo threads usually need to be heat-treated. The heat-treatment, namely kiln-type or pot-type heat-treatment, which commonly applicable to wood materials is hardly applicable to bamboo sheets, in particular bamboo threads. The bamboo sheets and bamboo threads are small in size and light in weight, but the kiln-type and pot-type carbonization treatments both employ circulating hot air to heat the medium, and it is very difficult to fix the bamboo sheets and bamboo threads, so the processing is very difficult; moreover, the kiln-type and pot-type heat-treatments both take steam as the protective medium, greatly reducing the mass and mechanical strength of the bamboo sheets and bamboo threads, causing a great amount of material rupture and damage, so the yield is low.

[0003] In order to solve the problems above, a thermal processing technology applicable to sheets is needed. The Chinese patent 201410246548.4 discloses a method for modified treatment of wood and bamboos, modified wood and bamboos and floors, wherein a modified bamboo or wood scrimber is prepared by the following steps (1), placing the wood and bamboo sheets in high-temperature medium oil to carbonize the wood and bamboo sheets by using the high-temperature oil as the heating medium; (2) completing surface oil removal by hot-pressing, leaching, etc.; (3) applying adhesive and thermo-curing the materials at a high temperature and at a high pressure (or normal pressure).

[0004] However, the solution above has some defects. If the materials of sheet form are heat-treated inmedium oil with high-temperature, then the surface of the sheet is adhered with the medium oil after the treatment. Some inward-to-outward extraction means such as hot-pressing and leaching cannot completely clear the oil adhered to the sheet surface and the residual oil affects the adhesion of the sheet surface and hinders the formation of adhesive nails, so it is difficult for the adhesive to form a bonding force on the modified sheet surface. Therefore, the manufactured floors or profiles have poor adhesion strength. On the other hand, the modified bamboo and wood sheets and the adhesive are stirred and press-fitted, and the medium oil seeping into and stored in moisture channels such as the fiber channels and capillaries of the bamboo and wood sheets gradually seeps into the adhesive face between the adhesive and the sheets, damages the interface and then causes adhesive peeling off, further reducing the adhesion strength of the product.

BRIEF SUMMARY OF THE INVENTION

[0005] The objective of the present invention is to provide a bamboo scrimber with high adhesion strength.

[0006] The objective of the present invention is achieved by the following technical solution. A bamboo scrimber is prepared by press-fitting bamboo monomers and adhesives together, wherein said bamboo monomers form bamboo monomer oil storage spaces, at least part of said adhesive forms adhesive oil storage spaces; medium oil seeps into and is stored in at least part of said bamboo monomer oil storage spaces and at least part of said adhesive oil storage spaces.

[0007] In the invention disclosures here, the bamboo monomers include one or more of bamboo sheets, bamboo fibers and bamboo fiber harnesses. The bamboo scrimber is formed by mixing one or more kinds of the bamboo monomers together with the adhesive and press-fitting, therefore the bamboo scrimber is internally formed with at least two types of space that the medium oil can seep into and enter, namely moisture channels of bamboo monomers such as fiber channels and capillaries of the bamboo monomers, and molecular clearances of the adhesive. The bamboo monomers and the adhesive are mixed, press-fitted and cured to form blanks. The blanks are kept still in the medium oil with high-temperature. As the time goes by, the medium oil with high-temperature enters said bamboo monomer oil storage spaces and said adhesive oil storage spaces at the same time: (1) by the effect of the negative pressure in the moisture channels such as the fiber channels and the capillaries of the bamboo monomers, the medium oil with high-temperature is siphoned into the moisture channels, and is stored and solidified therein as the temperature declines; (2) the medium oil with high-temperature seeps into and enters the solidified adhesive, and is stored and solidified therein as the temperature declines; (3) further, the adhesive seeps into the pores in the surfaces of the bamboo monomers to form adhesive nails and to further form an adhesive interface with strength, and the medium oil seeps into and is stored in the molded adhesive interface (pores of the bamboo monomers and adhesive filled in the pores). The bamboo monomer, the adhesive, and the adhesive interface are further bonded through homogeneous medium oil, fur-

ther improving the adhesion strength. Further, the medium oil among the three units, namely the adjacent bamboo monomer, adhesive and the adhesive interface seeps into the three units at the same time at a high temperature and is stored and solidified there-among during cooling, and said bamboo monomer, said adhesive and said adhesive interface are saturated with the medium oil or achieve a stable medium oil content, so after the profiles are manufactured, the medium oil in any one of the three units does not seep into the other two adjacent units, avoiding the problem that after the profiles are manufactured, the medium oil in the bamboo monomers seeps into the adhesive interface at room temperature. The seepage of the medium oil toward the adhesive interface can cause adhesive peeling off (at room temperature, it is difficult for the medium oil to further seep into the adhesive, rather the medium oil stays on the adhesive interface).

[0008] In the invention disclosures here, the reconstructed bamboo material is placed in a high-temperature medium oil bath in the profile form, so the medium oil is not homogeneously distributed in the adhesive on the thickness cross section of the whole profile. In some embodiments, medium oil seeps into and is filled in the thickness cross section of the whole bamboo scrimber; in such circumstances, the medium oil seeps into and is stored in all the bamboo monomer oil storage spaces and adhesive oil storage spaces; in some other embodiments, on the thickness cross section of the bamboo scrimber, the medium oil seeps into and is filled in the layers close to the surface and the bottom face, and at this time, the medium oil seeps into and is stored in only a part of the bamboo monomer oil storage spaces and adhesive oil storage spaces.

[0009] As an optimization, the medium oil seeps into and is stored in the interspace among said bamboo monomer oil storage spaces and said adhesive oil storage spaces.

[0010] In other embodiments, while the weight ratio of bamboo material and adhesive of said bamboo scrimber is relatively large (with less use of adhesive), irregular interspaces exist between the bamboo monomers and the adhesive along the fiber direction of the bamboo monomer. In the invention disclosures here, the pores are also filled with the medium oil. Thus, the medium oil filled in the interspace, serving as the replaceable medium between the bamboo monomer and the adhesive, replaces the adhesive to fill in the interspace caused by missing adhesive, thus improving the mechanical strength of the material with a relatively low adhesive content.

[0011] As an optimization, a weight ratio of the medium oil and the adhesive contained in per unit of adhesive oil storage spaces is 2-10%.

[0012] As an optimization, the medium oil forms a first medium oil layer and a second medium oil layer in the bamboo scrimber, said second medium oil layer are formed on the surface of the bamboo scrimber; the second medium oil layer wraps the first medium oil layer, and a irregular boundary is formed between the first medium oil layer and the second medium oil layer.

[0013] As an optimization, the first medium oil layer is formed by the medium oil with a first temperature that soaks and seeps into the first bamboo scrimber, the second medium oil layer is formed by the medium oil with a second temperature that soaks and seeps into the bamboo scrimber including the first medium oil layer; the first temperature is within the ranged of 130-300°C, the second temperature is within the ranged of 10-35°C, and the moisture content of said bamboo scrimber is within the ranged of 10-30% before being soaked in the medium oil.

[0014] As a further optimization of the above technical solution, the first medium oil layer is formed by the medium oil with a first temperature that soaks and seeps into the first bamboo scrimber, the second medium oil layer is formed by the medium oil with a second temperature that soaks and seeps into the bamboo scrimber including the first medium oil layer; the first temperature is within the ranged of 130-220°C, the second temperature is within the ranged of 10-35°C, and the moisture content of said bamboo scrimber is within the ranged of 10-20% before being soaked in the medium oil.

[0015] As an optimization, the medium oil forms a first medium oil layer and a second medium oil layer on the surface in a hierarchical way in the bamboo scrimber; the second medium oil layer wraps the first medium oil layer; a third medium oil layer is formed between the first medium oil layer and the second medium oil layer; and the oil content of the third medium oil layer is smaller than which of the first medium oil layer and which of the second medium oil layer.

[0016] As a further optimization of the above technical solution, the first medium oil layer is formed by the medium oil with a first temperature that soaks and seeps into the first bamboo scrimber, the second medium oil layer is formed by the medium oil with a second temperature that soaks and seeps into the bamboo scrimber including the first medium oil layer; the first temperature is within the ranged of 220-300°C, the second temperature is within the ranged of 10-25°C, and the moisture content of said bamboo scrimber is within the ranged of 15-30% before being soaked in the medium oil; the time interval between the soaking treatment using the first medium oil and the soaking treatment is within the ranged of 3-10min.

[0017] As an optimization, the first medium oil layer has an oil content of 4-10%, and the second oil layer has an oil content of 2-8%.

[0018] As an optimization, the first medium oil layer has a thickness of 3-10mm on the longitudinal section and 5-20mm on the transverse section, and the second medium oil layer has a thickness of 1-5mm on the longitudinal section and 3-5mm on the transverse section.

[0019] As an optimization, the moisture content of the bamboo scrimber is 1-5% after being soaked in the medium oil; the performance parameters of the bamboo scrimber selected from the group consisting of 0 mold-

proof and anti-discoloring (mold and stain fungi) property 2-7% water-absorbing thickness increase rate, 1-3% water-absorbing width-increasing rate, horizontal shearing strength ≥12MPa and combinations thereof.

[0020] As an optimization, the medium oil selected from the group consisting of mineral oil, vegetable oil, alkyl biphenyl-type oil conducting oil, alkyl biphenylether-type heat conducting oil, low-melting biphenyl and biphenyl ether mixed-type heat conducting oil, alkyl naphthalene heat conducting oil or combinations thereof.

[0021] In conclusion, the bamboo scrimber of the present technical solution has the feature of high adhesion strength.

BRIEF DESCRIPTIONOF THE DRAWINGS

[0022]

FIG.1 is a schematic view of the longitudinal section of a bamboo scrimber according to embodiments 1-3 of the present disclosure;

FIG.2 is a schematic view of the transverse section of the bamboo scrimber according to embodiments 1-3 of the present disclosure;

FIG.3 is another schematic view of the longitudinal section of the bamboo scrimber according to embodiments 4-5 of the present disclosure;

FIG.4 is another schematic view of the transverse section of the bamboo scrimber according to embodiments 4-5 of the present disclosure;

FIG.5 is a comparison table of performance parameters of the bamboo scrimber according to embodiments 1-5 of the present disclosure.

[0023] As shown in the figures, 100-bamboo scrimber, 101-first medium oil layer, 102-second medium oil layer, 103-third medium oil layer, 200-bamboo monomer oil storage spaces, 300-adhesive oil storage spaces.

DETAILED DESCRIPTION OF THE INVENTION

[0024] The present invention is described in further detail in conjunction with the attached drawings and preferred embodiments.

[0025] As shown in FIG.1 and FIG.2, a bamboo scrimber of embodiments 1-3 is prepared by the following steps: first, cold pressing and thermo-curing the material mixed by dried bamboo threads and phenolic resin adhesive to obtain a primary material of the bamboo scrimber that has a moisture content of 10-20%; then, placing the primary material still in the medium oil with a first temperature to obtain a secondary material with a first medium oil layer, wherein the first temperature is 130-220°C; and finally, placing the secondary material still in the medium oil with a second temperature to obtain the bamboo scrimber with the first medium oil layer and a second medium oil layer that wraps the first medium oil, wherein, the second temperature is 10-35°C, wherein the second medium oil layer is positioned on the surface. It is all know to persons skilled in the art that by drying the primary material of the bamboo scrimber, an appropriate moisture content can be obtained, and by adopting an appropriate moisturemoisture content and appropriate standing time, the appropriate oil contents and thicknesses of the first medium oil layer and second medium oil layer and the oil content (the mass of the medium oil to the mass of the adhesive contained in the adhesive oil storage spaces in the adhesive oil storage space) defined in the technical solution can be obtained.

[0026] Embodiment 1: The primary material of the bamboo scrimber with a size of 1,920*200*24mm is selected, and mineral oil is selected as the medium oil, wherein the primary material of the bamboo scrimber has a moisture content of 10-16%, the first temperature is 135±5°C, the second temperature is within the range of 10-20°C (room temperature in winter); the first medium oil layer has a thickness of 3-6mm on the longitudinal section and 5-10mm on the transverse section, the second medium oil layer has a thickness of 1-3mm on the longitudinal section and about 3mm on the transverse section; the average oil content of the first medium oil layer is 6-10%, the average oil content of the second medium oil layer is 4-8%; the oil content in the adhesive oil storage spaces in the first medium oil layer is 5-7%, and the oil content in the adhesive oil storage spaces in the second medium oil layer is 3-6%.

[0027] Embodiment 2: The primary material of the bamboo scrimber with a size of 2,400*240*34mm is selected, and vegetable oil is selected as the medium oil, wherein the primary material of the bamboo scrimber has a moisture content of 12-16%, the first temperature is 180±5°C, the second temperature is within the range of 20-25 °C (room temperature in spring and autumn); the first medium oil layer has a thickness of 6-8mm on the longitudinal section and 10-15mm on the transverse section, the second medium oil layer has a thickness of 2-4mm on the longitudinal section and about 4mm on the transverse section; the average oil content of the first medium oil layer is 6-8%, the average oil content of the second medium oil layer is 3-6%; the oil content in the adhesive oil storage spaces in the first medium oil layer is 4-6%, and the oil content in the adhesive oil storage spaces in the second medium oil layer is 3-5%.

[0028] Embodiment 3: The primary material of the bamboo scrimber with a size of 2,400*260*40mm is selected, and alkyl biphenyl-type oil conducting oil is selected as the medium oil, wherein the primary material of the bamboo scrimber has a moisture content of 14-20%, the first temperature is 205 ± 5°C, the second temperature is 25-35°C (room temperature in summer); the first medium oil layer has a thickness of 8-10mm on the longitudinal section and 15-20mm on the transverse section, the second medium oil layer has a thickness of 3-5mm on the longitudinal section and about 5mm on the transverse section; the average oil content of the first medium oil layer is 4-7%, the average oil content of the

second medium oil layer is 2-4%; the oil content in the adhesive oil storage spaces in the first medium oil layer is 6-8%, and the oil content in the adhesive oil storage spaces in the second medium oil layer is 4-5%.

[0029] As shown in FIG.3 and FIG.4, a bamboo scrimber in embodiments 4-5 is prepared by the following steps: first, cold pressing and thermo-curing the material mixed by dried bamboo threads and phenolic resin adhesive to obtain a primary material of the bamboo scrimber that has a moisture content of 15-30%; then, placing the primary material still in the medium oil with a first temperature to obtain a secondary material with a first medium oil layer, wherein the first temperature is 220-300 °C, the time interval from the moment when the secondary material leaves from the medium oil layer with the first temperature to the moment when the secondary material enters the medium oil with the second temperature is 3-10min, the secondary material is exposed to the natural air environment during such time interval; and finally, placing the secondary material of the bamboo scrimber still in the medium oil with a second temperature to obtain the bamboo scrimber , wherein the bamboo scrimber includes the first medium oil layer, the second medium oil layer that wraps the first medium oil layer and is positioned on the surface, and a third medium oil layer positioned between the first medium oil layer and the second medium oil layer, and the second temperature is 10-25 °C. Those ordinarily skilled in the art know that by drying the primary material of the bamboo scrimber, an appropriate moisture content can be obtained, and by adopting an appropriate moisture content and appropriate standing time, the appropriate oil contents and thicknesses of the first medium oil layer and second medium oil layer and the oil content (the mass of the medium oil to the mass of the adhesive contained in the adhesive oil storage spaces in the adhesive oil storage space) defined in the technical solution can be obtained.

[0030] Embodiment 4: The primary material of the bamboo scrimber with a size of 1,920*200*24mm is selected, and low-melting biphenyl and biphenyl ether mixed-type heat conducting oil is selected as the medium oil, wherein the primary material of the bamboo scrimber has a moisture content of 15-22%, the first temperature is 225 ± 5°C, the second temperature is 10-20°C (room temperature in winter), the time interval between the soaking treatment using the first medium oil and the soaking treatment is 3-7min; the first medium oil layer has a thickness of 5-7mm on the longitudinal section and 7-12mm on the transverse section, the second medium oil layer has a thickness of 1-3mm on the longitudinal section and about 3mm on the transverse section, the third medium oil layer has a thickness of 0.5-1mm on the longitudinal section and about 1mm on the transverse section; the average oil content of the first medium oil layer is 4-8%, the average oil content of the second medium oil layer is 2-6%; the oil content in the adhesive oil storage spaces in the first medium oil layer is 6-8%, and the oil content in the adhesive oil storage spaces in the second medium oil layer is 2-5%.

[0031] Embodiment 5: The primary material of the bamboo scrimber with a size of 2,400*260*40mm is selected, and alkyl naphthalene heat conducting oil is selected as the medium oil, wherein the primary material of the bamboo scrimber has a moisture content of 20-30%, the first temperature is 295 ± 5°C, the second temperature is 18-25°C (room temperature in spring and autumn); the first medium oil layer has a thickness of 6-9mm on the longitudinal section and 13-17mm on the transverse section, the second medium oil layer has a thickness of 2-4mm on the longitudinal section and about 5mm on the transverse section, the third medium oil layer has a thickness of 1-1.5mm on the longitudinal section and about 2mm on the transverse section; the average oil content of the first medium oil layer is 6-10%, the average oil content of the second medium oil layer is 4-8%; the oil content in the adhesive oil storage spaces in the first medium oil layer is 6-10%, and the oil content in the adhesive oil storage spaces in the second medium oil layer is 4-6%.

[0032] In embodiments 1-5, the thickness on the longitudinal section is measured in the following way. Take longitudinal sections of the bamboo scrimber, and when the first medium oil layer is strip-like (the core of the bamboo scrimber contains the medium oil), the thickness of the first medium oil layer on the longitudinal section is the average value of the distance from any one of the upper surface on the strip to the corresponding lower surface, and when the first medium oil layer is ring-like (the core of the bamboo scrimber does not contain the medium oil), the thickness is the average value of the distance from any one of the upper surfaces on the ring to the corresponding lower surface. The thickness on the transverse section is measured by taking the transverse sections of the bamboo scrimber material, wherein the calculation method is identical with the calculation method for the longitudinal section case.

[0033] In embodiments 1-5, the average oil content is the ratio of the mass of the medium oil to the total mass of the bamboo monomers and adhesive contained in the first medium oil layer or the second medium oil layer.

[0034] In embodiments 1-5, the comparison between the obtained performance parameters of the bamboo scrimber and the performance parameters of control groups can be seen in FIG.5, wherein the control groups are bamboo scrimber products purchased on the market. The experiment method is subject to GB/T 30364-2013 Bamboo scrimber flooring.

[0035] The embodiments are only used to explain the present invention and do not limit the present invention. Those skilled in this field can make modifications on the present invention without creative labor upon needs after reading the Description, and those within the scope of claims of the present invention are under the protection of the Patent Law.

Claims

1. A bamboo scrimber, prepared by press-fitting bamboo monomers and adhesives together, comprising: bamboo monomer oil storage spaces which formed by said bamboo monomers, and adhesive oil storage spaces which formed by said adhesive; medium oil seeps into and is stored in at least part of said bamboo monomer oil storage spaces and at least part of said adhesive oil storage spaces.

2. The bamboo scrimber according to claim 1, wherein the medium oil seeps into and is stored in at least part of the interspace among said bamboo monomer oil storage spaces and said adhesive oil storage spaces.

3. The bamboo scrimber according to claim 1, wherein a weight ratio of the medium oil and the adhesive contained in per unit of adhesive oil storage spaces is 2-10%.

4. The bamboo scrimber according to claim 1, wherein the medium oil forms a first medium oil layer and a second medium oil layer that lays on the surface; said second medium oil layer wraps said first medium oil layer, and there forms a boundary between said first medium oil layer and said second medium oil layer.

5. The bamboo scrimber according to claim 4, wherein that said first medium oil layer has an oil content of 4-10%, and said second oil layer has an oil content of 2-8%.

6. The bamboo scrimber according to claim 1, wherein said medium oil forms two separate layers in the bamboo scrimber, a first medium oil layer and a second medium oil layer that lays on the surface; said second medium oil layer wraps said first medium oil layer; a third medium oil layer is formed between said first medium oil layer and said second medium oil layer; and the oil content of said third medium oil layer is smaller than the oil content of said first medium oil layer and the oil content of said second medium oil layer.

7. The bamboo scrimber according to claim 4, 5, or 6, wherein the medium oil with a first temperature soaks and seeps into said bamboo scrimber and then said first medium oil layer is formed , the medium oil with a second temperature soaks and seeps into said bamboo scrimber with said first medium oil layer and then said second medium oil layer is formed; said first temperature is within the ranged of 130-300°C, said second temperature is within the ranged of 10-35°C, and the moisture content of said bamboo scrimber before being soaked in the medium oil is within the rang of 10-30%.

8. The bamboo scrimber according to claim 4, 5, or 6, wherein said first medium oil layer has a thickness of 3-10mm on the longitudinal section and 5-20mm on the transverse section, and said second medium oil layer has a thickness of 1-5mm on the longitudinal section and 3-5mm on the transverse section.

9. The bamboo scrimber according to claim 1, wherein said bamboo scrimber has a moisture content of 1-5% after being soaked in the medium oil; the performance parameters of said bamboo scrimber selected from the group consisting of 0 mold-proof and anti-discoloring property, 2-7% water-absorbing thickness increase rate, 1-3% water-absorbing width-increasing rate, horizontal shearing strength ≥ 12MPa and combinations thereof.

10. The bamboo scrimber according to claim 1, wherein said medium oil selected from the group consisting of mineral oil, vegetable oil, alkyl biphenyl-type oil conducting oil, alkyl biphenylether-type heat conducting oil, low-melting biphenyl and biphenyl ether mixed-type heat conducting oil , alkyl naphthalene heat conducting oil or combinations thereof; and the adhesive is phenolic resin adhesive or modified phenolic resin adhesive.

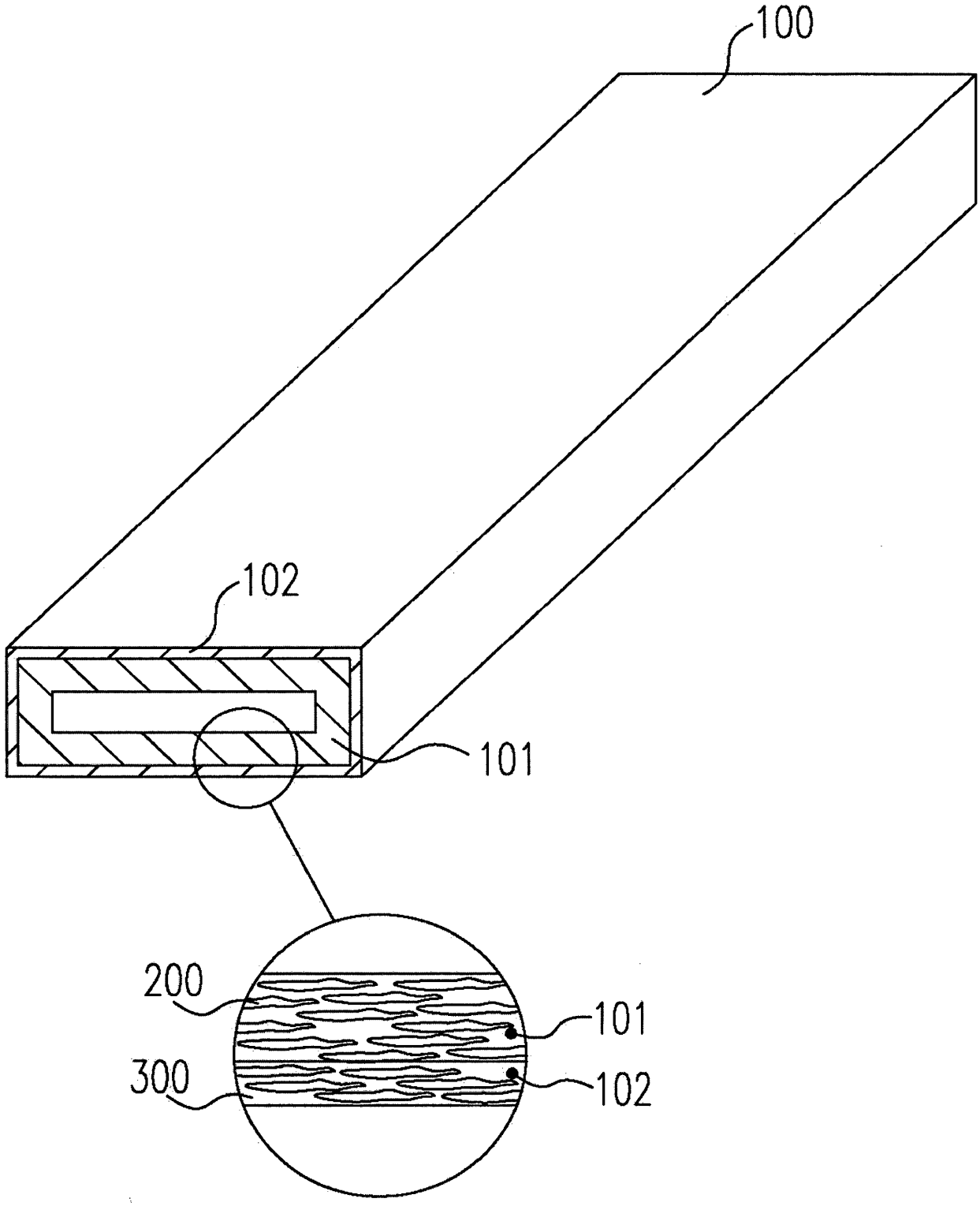

FIG. 1

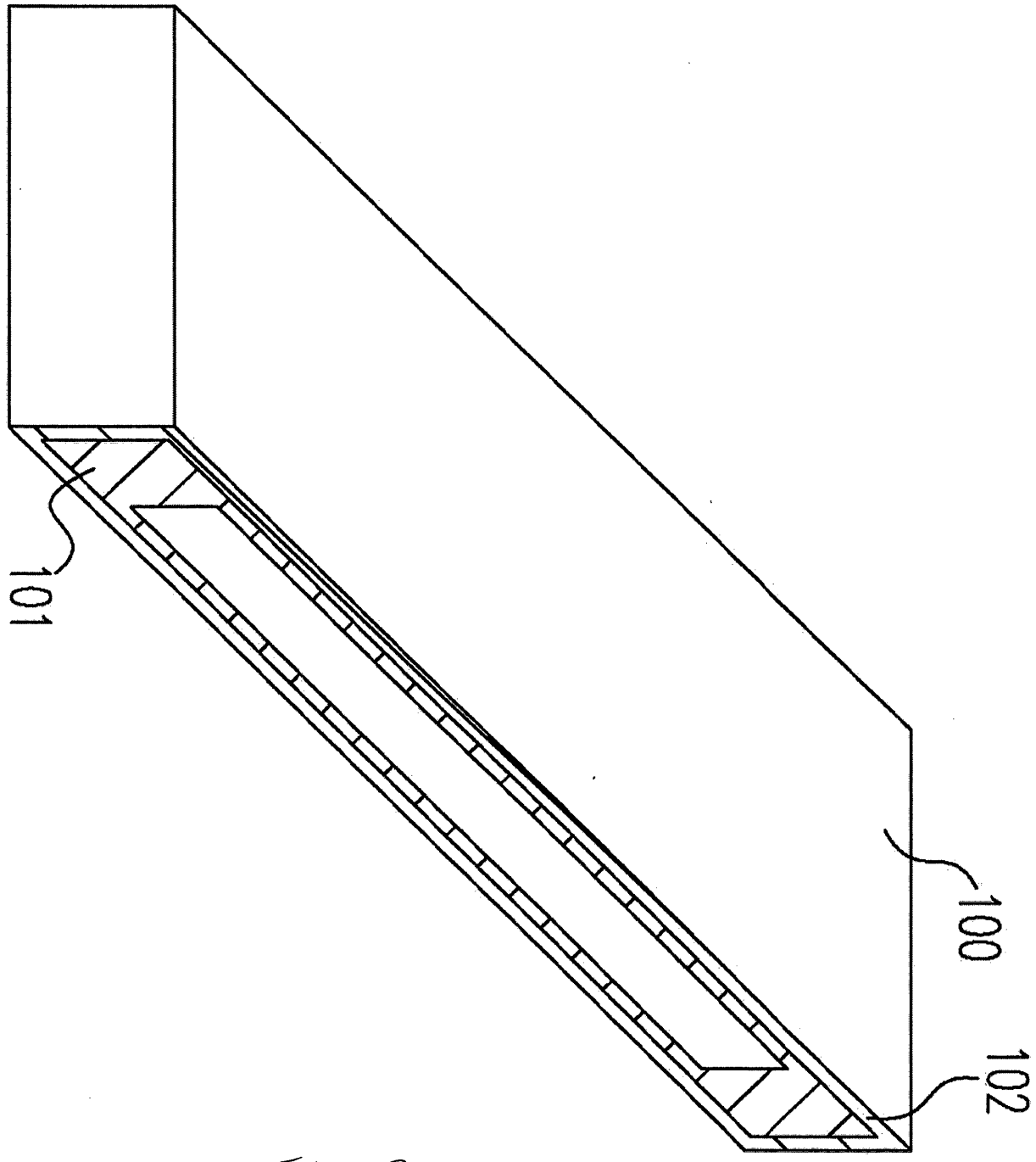

FIG. 2

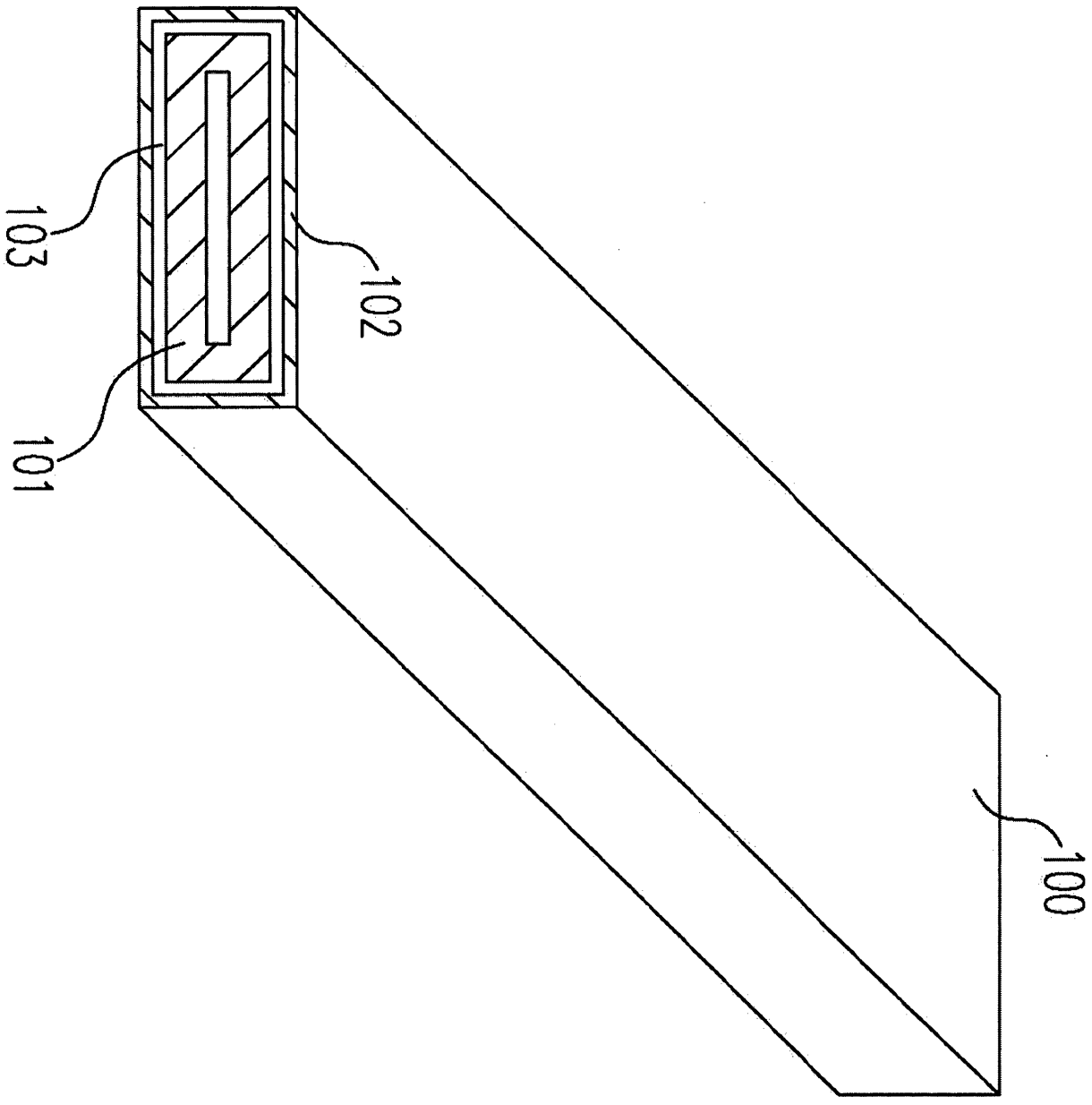

FIG. 3

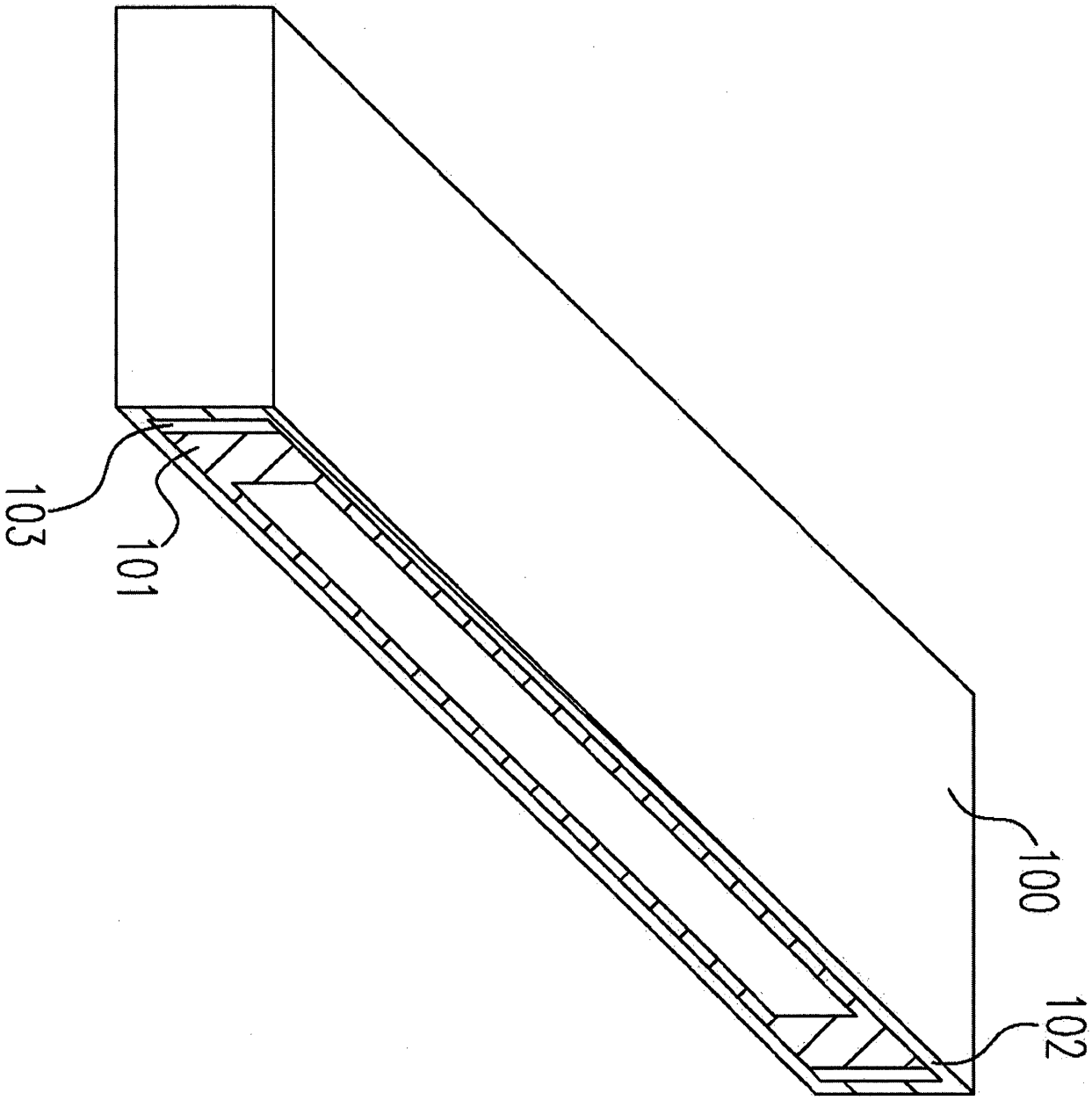

FIG. 4

FIG 5

Comparison Table of Performance Parameters of the Bamboo Scrimber in Embodiments 1-5

Item		Embodiment 1	Embodiment 2	Embodiment 3	Embodiment 4	Embodiment 5	Control Group
Moisture content/%		4.3	2.7	3.1	2.5	1.6	8.9
Thickness swelling rate of water absorption/%		6.3	4.9	4.2	4.7	3.1	7.8
Width swelling rate of water absorption/%		2.8	1.5	2.6	2.0	1.7	4.9
Horizontal shear strength/MPa		15	18	14	15	14	10.8
Anti-moulding and anti-discoloring propery	Mould	0	0	0	0	0	0
	Stain fungi	0	0	0	0	0	1

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2017/091100

A. CLASSIFICATION OF SUBJECT MATTER

B27K 3/50 (2006.01) i

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)

B27; B32B; E04F

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 practicable, search terms used)

CNABS; VEN; CNKI: 竹, 浸油, 浸泡, 浸泽, 胶, 渗透, 油, 介质油, oil, bamboo, dip+, immers+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E	CN 107053425 A (ZHEJIANG YOYU BAMBOO JOINT-STOCK CO., LTD.), 18 August 2017 (18.08.2017), claims 1-10	1-10
X	CN 105178557 A (ZHEJIANG YOYU BAMBOO JOINT-STOCK CO., LTD.), 23 December 2015 (23.12.2015), description, paragraphs 6-29, and figures 1-2	1-10
X	CN 105171888 A (ZHEJIANG YOYU BAMBOO JOINT-STOCK CO., LTD.), 23 December 2015 (23.12.2015), description, paragraphs 7-33	1-10
A	CN 105773755 A (NANJING FORESTRY UNIVERSITY), 20 July 2016 (20.07.2016), entire document	1-10
A	CN 1358616 A (XIE, Deming), 17 July 2002 (17.07.2002), entire document	1-10
A	CN 106891402 A (YICHUN MEIJIANG WOOD PRODUCTS CO., LTD.), 27 June 2017 (27.06.2017), entire document	1-10
A	CN 105196395 A (ZHEJIANG YOYU BAMBOO JOINT-STOCK CO., LTD.), 30 December 2015 (30.12.2015), entire document	1-10
A	JP 2007326246 A (HIDEYOSHI KK), 20 December 2007 (20.12.2007), entire document	1-10

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent 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	Date of mailing of the international search report
29 December 2017	24 February 2018
Name and mailing address of the ISA State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No. (86-10) 62019451	Authorized officer LI, Liang Telephone No. (86-10) 62085155

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2017/091100

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 107053425 A	18 August 2017	None	
CN 105178557 A	23 December 2015	CN 105178557 B	30 June 2017
		US 2017081861 A1	23 March 2017
CN 105171888 A	23 December 2015	CN 105171888 B	10 October 2017
CN 105773755 A	20 July 2016	None	
CN 1358616 A	17 July 2002	CN 1107577 C	07 May 2003
CN 106891402 A	27 June 2017	None	
CN 105196395 A	30 December 2015	None	
JP 2007326246 A	20 December 2007	None	

Form PCT/ISA/210 (patent family annex) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- CN 201410246548 **[0003]**