Decision on Opposition

Opposition No. 2018-700758

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The Opposition case for the invention of Patent No. 6295938, titled "SHEET FOR FIBER-REINFORCED PLASTIC MOLD", has resulted in the following conclusion:

Conclusion

The patents according to Claims 1 to 11, 13, and 14 of Patent No. 6295938 shall be maintained.

Grounds

No. 1 History of the procedures

The application for the patents according to Claims 1 to 14 of Patent No. 6295938 was an application with an international filing date of December 11, 2014 (domestic priority date of December 13, 2013), followed by the registration of the patent right on March 2, 2018 (number of claims: 14), and then a patent gazette was published on March 20, 2018. The Opponent, Toray Industries, Inc. (hereinafter referred to as "the Opponent") filed an opposition to the grant of the Patent on September 19, 2018 regarding Claims 1 to 11, 13, and 14.

No. 2 The Patent Invention

The inventions according to Claims 1 to 11, 13, and 14 of the Patent (hereinafter referred to as "Patent Invention 1," etc. in accordance with sequence) can be specified respectively by the matters recited in Claims 1 to 11, 13, and 14 of the scope of the claims attached to the application of the Patent as set forth below:

"[Claim 1]

A sheet for fiber reinforced plastic mold comprising a reinforcing fiber and a thermoplastic resin comprising a retardant,

wherein, in a fiber reinforced plastic mold having a thickness of 1 mm obtained by subjecting said sheet for fiber reinforced plastic mold to pressurized molding with heat under the following conditions (a) and (b), 80% or more of a total number of said reinforcing fibers are present so that an angle from a center plane of said fiber reinforced plastic mold falls within ±20 degrees,

(a) pressurizing at a press pressure of 10 MPa and a press speed of 3.5 cm/sec,

(b) heating so that Q/P may be not less than 0.7, given that a true density (g/cm^3) of said sheet for fiber reinforced plastic mold is P, and a bulk density (g/cm^3) of fiber

reinforced plastic mold obtained by heating is Q while pressurizing under the above condition (a).

[Claim 2]

The sheet for fiber reinforced plastic mold of Claim 1, wherein said thermoplastic resin is a thermoplastic resin fiber.

[Claim 3]

The sheet for fiber reinforced plastic mold of Claim 1, wherein said thermoplastic resin is a thermoplastic resin powder.

[Claim 4]

The sheet for fiber reinforced plastic mold of any one of Claims 1 to 3, wherein, in a fiber reinforced plastic mold having a thickness of 1 mm obtained by subjecting said sheet for fiber reinforced plastic mold to pressurized molding with heat under the above conditions (a) and (b), a strength ratio of a bending strength in a first direction of said fiber reinforced plastic mold to a bending strength in a second direction orthogonal to said first direction is 3 or more.

[Claim 5]

The sheet for fiber reinforced plastic mold of any one of Claims 1 to 4, wherein said reinforcing fiber has a fiber length of 6 to 50 mm.

[Claim 6]

The sheet for fiber reinforced plastic mold of any one of Claims 1 to 5, wherein said reinforcing fiber is a carbon fiber.

[Claim 7]

The sheet for fiber reinforced plastic mold of any one of Claims 1 to 6, wherein said thermoplastic resin is polycarbonate.

[Claim 8]

The sheet for fiber reinforced plastic mold of any one of Claims 1 to 7, wherein said thermoplastic resin is a thermoplastic resin fiber, and said thermoplastic resin fiber is a chopped strand.

[Claim 9]

A fiber reinforced plastic mold formed by subjecting said sheet for fiber reinforced plastic mold of any one of Claims 1 to 8 to pressurized molding with heat at a glass transition temperature of said thermoplastic resin or a higher temperature,

wherein 80% or more of a total number of said reinforcing fibers are present so that an angle from a center plane of said fiber reinforced plastic mold falls within ±20 degrees.

[Claim 10]

The fiber reinforced plastic mold of Claim 9, wherein a strength ratio of a bending strength in a first direction of said fiber reinforced plastic mold to a bending strength in a second direction orthogonal to said first direction is 3 or more.

[Claim 11]

The fiber reinforced plastic mold of Claim 9 or 10, formed by subjecting to pressurized molding with heat at a temperature of 150 to 600°C.

[Claim 13]

A method of producing a sheet for fiber reinforced plastic mold comprising the steps of mixing a reinforcing fiber and a thermoplastic resin fiber comprising a retardant and producing a sheet for fiber reinforced plastic mold by a wet nonwoven fabric method,

wherein said step of producing a sheet for fiber reinforced plastic mold comprises a step

of making paper by use of a Fourdrinier machine or inclined wire machine,
wherein a wire of said Fourdrinier machine or inclined wire machine runs so that a jet wire ratio becomes 0.95 or less.
[Claim 14]
The method of producing a sheet for fiber reinforced plastic mold of Claim 13, wherein said step of producing a sheet for fiber reinforced plastic mold comprises a step of making paper by use of an inclined wire machine."

No. 3 Summary, etc. of reasons described in written opposition to the grant of a patent
The summary of reasons described in the written opposition to the grant of patent filed by the Opponent on September 19, 2018 is set forth as below.

1 Priority
The Patent is based on an application claiming the benefit of priority according to the Japanese Patent Application No. 2013-258485. However, Patent Inventions 1 to 11 cannot be allowed to obtain the benefit of priority. Thus, the provision of Article 29 of the Patent Act shall be applied to the patent application with respect to Patent Inventions 1 to 11. The application is regarded as having been filed on December 11, 2014.
Therefore, Evidence A No. 1 is a publication as provided in Article 29 of the Patent Act with respect to Patent Inventions 1 to 11.

2 Grounds 1 for Opposition (Novelty regarding Patent Inventions 1 to 7 and 9 to 11 over Evidence A No. 1 as a primary cited document)
Patent Inventions 1 to 7 and 9 to 11 are identical to inventions described in a distributed publication or made available for public use over telecommunications lines within Japan or in a foreign country prior to the filing of the patent application. Thus, these inventions are not patentable under the provision of Article 29(1)(iii) of the Patent Act. The patents according to Claims 1 to 7 and 9 to 11 of the Patent correspond to Article 113(ii) of the Patent Act and should be revoked.

3 Grounds 2 for Opposition (Inventive step regarding Patent Inventions 1 to 11 over Evidence A No. 1 as a primary cited document and Inventive step regarding Patent Inventions 13 and 14 over Evidence A No. 2 as a primary cited document)
Patent Inventions 1 to 11, 13, and 14 were inventions that a person of ordinary skill in the art of the inventions would have easily been able to make based on inventions described in a distributed publication or made available for public use over telecommunications lines within Japan or in a foreign country prior to the filing of the patent application. Thus, these inventions are not patentable under the provision of Article 29(2) of the Patent Act. The patents according to Claims 1 to 11, 13, and 14 of the Patent correspond to Article 113(ii) of the Patent Act and thus should be revoked.

4 Grounds 3 for Opposition (ministerial ordinance requirement for Patent Inventions 1 to 11)
Claim 1 recites that "In a fiber reinforced plastic mold having a thickness of 1 mm obtained by subjecting said sheet for fiber reinforced plastic mold to pressurized molding with heat under the following conditions (a) and (b), 80% or more of a total

number of said reinforcing fibers are present so that an angle from a center plane of said fiber reinforced plastic mold falls within ±20 degrees;

(a) pressurizing at a press pressure of 10 MPa and a press speed of 3.5 cm/sec,

(b) heating so that Q/P may be not less than 0.7, given that a true density (g/cm^3) of said sheet for fiber reinforced plastic mold is P, and a bulk density (g/cm^3) of fiber reinforced plastic mold obtained by heating is Q while pressurizing under the above condition (a)." The technical meanings of these technical matters are unclear.

Therefore, with respect to Patent Invention 1 and Patent Inventions 2 to 11 depending from Claim 1, the Detailed Description of the Invention does not conform to the ministerial ordinance requirement as specified in Regulations under the Patent Act, Article 24-2.

Therefore, the patents according to Claims 1 to 11 of the Patent were granted to a patent application that does not comply with the requirements of Articles 36(4)(i) of the Patent Act. Therefore, the patents correspond to the provision of Article 113(iv) of the Patent Act and should be revoked.

5 Grounds 4 for Opposition (support requirement for Patent Inventions 1 to 11)

Regarding the condition "(a) pressurizing at a press pressure of 10 MPa and a press speed of 3.5 cm/sec." recited in Claim 1, the Detailed Description of the Invention discloses in [0039] that "Under a condition (a), a press speed is set to 3.5 cm/sec. If the press speed falls within 3.5 ± 0.5 cm/sec, it becomes a pressurizing condition similar to the case of pressing with a press speed of 3.5 cm/sec." Only one press speed is specified there. No study was carried out on phenomena that could take place in a case deviating from this range. Thus the description does not fully support the condition. Therefore, Patent Invention 1 and Patent Inventions 2 to 11 depending from Claim 1 are not described in the Detailed Description of the Invention.

Further, the measurement condition of orientation angle recited in Claim 1 is to measure given a thickness of mold of 1 mm. The measurement method of "an angle from a center plane of a mold" of a bent fiber is not disclosed in the Detailed Description of the Invention. Thus Patent Invention 1 and Patent Inventions 2 to 11 depending from Claim 1 are not described in the Detailed Description of the Invention.

Therefore, the patents according to Claims 1 to 11 of the Patent were granted to a patent application that does not comply with the requirements of Articles 36(6)(i) of the Patent Act. Therefore, the patents correspond to the provision of Article 113(iv) of the Patent Act and should be revoked.

6 Grounds 5 for Opposition (definiteness requirement for Patent Inventions 1 to 11)

The measurement of the orientation angle recited in Claim 1 is conducted by setting mold thickness to 1 mm. However, a method of measuring "an angle from a center plane of a mold" of a bent fiber is not disclosed in the Detailed Description of the Invention. Thus Patent Invention 1 and Patent Inventions 2 to 11 depending from Claim 1 are indefinite.

Therefore, the patents according to Claims 1 to 11 of the Patent were granted to a patent application that does not comply with the requirements of Articles 36(6)(ii) of the Patent Act. Therefore, the patents correspond to the provision of Article 113(iv) of the Patent Act and should be revoked.

7 Means of Proof

Evidence A No. 1: Japanese Unexamined Patent Application Publication No. 2014-125532

Evidence A No. 2: International Publication No. WO2010-013645

Evidence A No. 3: Japanese Unexamined Patent Application Publication No. 2010-253938

Evidence A No. 4: Japanese Unexamined Patent Application Publication No. 2011-189747

Evidence A No. 5: Japanese Unexamined Patent Application Publication No. H4-208406

Evidence A No. 6: International Publication No. WO2007-097436

Evidence A No. 7: Japanese Patent Application No. 2013-258485

Note that the document names are generally in compliance with the description of the written Opposition to the Grant of Patent; they are hereinafter referred to as "A-1" and the like, in accordance with sequence.

No. 4 Judgment by the body with respect to the reasons described in the written opposition to the grant of the patent

1 Regarding the benefit of priority

The application of the Patent is an application claiming the benefit of priority based on Japanese Patent Application No. 2013-258485. Japanese Patent Application No. 2013-258485 (A-7) fails to describe the following conditions (a) and (b) and thickness in the technical matters recited in Claim 1 of the Patent: "In a fiber reinforced plastic mold having a thickness of 1 mm obtained by subjecting said sheet for fiber reinforced plastic mold to pressurized molding with heat under the following conditions (a) and (b), 80% or more of a total number of said reinforcing fibers are present so that an angle from a center plane of said fiber reinforced plastic mold falls within ±20 degrees;

(a) pressurizing at a press pressure of 10 MPa and a press speed of 3.5 cm/sec,

(b) heating so that Q/P may be not less than 0.7, given that a true density (g/cm^3) of said sheet for fiber reinforced plastic mold is P, and a bulk density (g/cm^3) of fiber reinforced plastic mold obtained by heating is Q while pressurizing under the above condition (a)."

Further, it cannot be said that these conditions are obvious according to the description.

Therefore, Patent Invention 1 and Patent Inventions 2 to 11 depending from Claim 1 cannot obtain the benefit of priority.

In addition, the publication date of A-1 is July 7, 2014, prior to the filing date of the Patent (December 11, 2014). Thus A-1 corresponds to a publication as provided in Article 29 of the Patent Act with respect to Patent Inventions 1 to 11.

2 Grounds 1 and 2 for the Opposition

Grounds 1 and 2 for the Opposition can be categorized into two Grounds:

A ground based on the evidence A-1 as a primary cited document (Novelty of Patent Inventions 1 to 7 and 9 to 11 over the document A-1 as a primary cited document, and inventive step of Patent Inventions 1 to 11 over the document of A-1) and; A ground based on the evidence A-2 as a primary cited document (Inventive step of Patent

Inventions 13 and 14 over the document of A-2). Thus examination is carried out according to the two Grounds.

(1) Described matters of A-1 to A-6

A Described matter of A-1 and A-1 Invention

A-1 contains the following descriptions regarding "fiber reinforced resin sheet, mold, integrated molded article and a production method thereof, and an implemented member". (The underlines are added by the body. The same applies to other documents.)

- "[Claims]

[Claim 1]

A fiber reinforced resin sheet in which a mat made of reinforcing fibers is impregnated with a thermoplastic resin (A) and a thermoplastic resin (B), wherein said mat is made of a nonwoven fabric with a ratio of reinforcing fibers Vfm of 20 volume% or less, and the thermoplastic resin (A) and the thermoplastic resin (B) form an interface layer with irregular shapes having a maximum height Ry of 50 μm or more and an average roughness Rz of 30 μm or more.

[Claim 2]

The fiber reinforced resin sheet of Claim 1, wherein said nonwoven fabric is made by dispersing discontinuous reinforcing fibers substantially in a monofilament form.

[Claim 3]

The fiber reinforced resin sheet of Claim 1, wherein said nonwoven fabric is made by randomly dispersing discontinuous reinforcing fibers in a monofilament form.

[Claim 4]

The fiber reinforced resin sheet of any one of Claims 1 to 3, wherein an out-of-plane angle θz of reinforcing fibers in said sheet is 5 degrees or more.

[Claim 5]

The fiber reinforced resin sheet of any one of Claims 1 to 4, wherein a usable temperature range of said thermoplastic resin (A) and a usable temperature range of said thermoplastic resin (B) overlap with a temperature range of 5°C or more.

[Claim 6]

The fiber reinforced resin sheet of any one of Claims 1 to 5, wherein said reinforcing fiber constituting said mat is a carbon fiber.

[Claim 7]

The fiber reinforced resin sheet of any one of Claims 1 to 6, wherein said thermoplastic resin (A) and thermoplastic resin (B) are selected from the group consisting of polyolefin-based resin, polyamide-based resin, polyester-based resin, polycarbonate-based resin, polystyrene-based resin, PPS-based resin, and polyetherketone-based resin.

[Claim 8]

A method of producing a fiber reinforced resin sheet of any one of Claims 1 to 7, comprising the steps of: applying a pressure to said thermoplastic resin (A) and thermoplastic resin (B) heated in a state to a melting or softening temperature or higher respectively; and impregnating said mat with the respective resins."

- "[0006]

Accordingly, the present invention solves the aforementioned technical problem

and provides a fiber reinforced resin sheet and a mold having strong bonding between mutually immiscible thermoplastic resins and an ability to be easily integrated with the other thermoplastic resin materials. Further, another object is to provide a mold, an integrated molded article, and an implemented member made of aforesaid fiber reinforced resin sheet or its preform."

- "[0026]

In an embodiment that can more effectively develop the aforementioned function, an out-of-plane angle θz of reinforcing fibers in a fiber reinforced resin sheet is preferably 5 degrees or more. Here, an out-of-plane angle θz of reinforcing fibers is a degree of slope of reinforcing fibers from a thickness direction of the fiber reinforced resin sheet. As the value increases, it is tilted as it stands in a thickness direction, and is provided in a range of 0 to 90 degrees. Specifically, the out-of-plane angle θz of reinforcing fibers within such a range can more effectively develop a reinforcing function in the aforementioned interface layer, and provide stronger bonding of the interface layer. The upper limit value of the out-of-plane angle θz of reinforcing fibers is not particularly limited, but is preferably 15 degrees or less, more preferably 10 degrees or less in view of a fiber volume content when making a fiber reinforced resin sheet."

- "[0029]

The reinforced fiber mat of the present invention needs to have more gaps in the mat as aforementioned. To satisfy such embodiments, it is in the form of nonwoven fabric. Nonwoven fabric form used herein means a form in which strands and/or monofilaments of reinforcing fibers (hereinafter strands and monofilaments are collectively referred to as fine size strands) are dispersed in plane, which includes a chopped strand mat, a continuous strand mat, a paper making mat, a carding mat, and an air laid mat. Strand means the one in which a plurality of monofilaments are arranged in parallel and assembled. It is also called a fiber bundle. In a nonwoven fabric form, usually a fine size strand does not have regularity in a dispersed state. Such mat in a nonwoven fabric form makes a steric barrier between reinforcing fibers large, so that a ratio of reinforcing fibers may be effectively decreased, and further has excellent moldability, and thus formation of a complex shape is easy. Further, a gap in the mat makes the progress of resin immersion complex. Thus said thermoplastic resin (A) and thermoplastic resin (B) form a more complex interface and develop excellent adhesion ability."

- "[0042]

The average fiber length Ln of discontinuous reinforcing fibers preferably ranges from 1 to 25 mm. The average fiber length within such range can improve reinforcing efficiency of reinforcing fibers, and provide excellent mechanical properties and adhesion strength in a mold and an integrated molded article as well as a fiber reinforced resin sheet. Further it facilitates the adjustment of out-of-plane angle of reinforcing fibers in a reinforced fiber mat. The average fiber length Ln is determined by randomly selecting 400 from reinforcing fibers remaining after burning thermoplastic resin components of the fiber reinforcing resin sheet, measuring the length to the nearest 10 μm, and calculating the number average thereof for use as an

average fiber length Ln."

- "[0049]

In a usable temperature range of thermoplastic resin (A), given that the lowest usable temperature is TA1 and the highest usable temperature is TA2, and in a usable temperature range of thermoplastic resin (B) given that the lowest usable temperature is TB1 and the highest usable temperature is TB2, values obtained in compliance with the following standards can be used for these temperatures. When it comes to the lowest usable temperatures TA1, TB1, a melting point measured in compliance with JIS K7120 (1987) in a case of crystalline resin may be used as TA1, and a temperature in which 100°C is added to Vicat softening temperature to be measured in compliance with JIS K7206 (1999) in a case of noncrystalline resin may be used as TB1. Further, when it comes to the highest usable temperatures TA2, TB2, a temperature subtracting 50°C from a temperature at which 1% weight loss from a baseline is observed (weight loss starting point) in a heat weight loss curve to be measured in compliance with JIS K7120(1987) may be used as the practical highest usable temperatures TA1 and TB1."

- "[0051]

Thermoplastic resin shown in the aforesaid group may include impact resistance improvers such as elastomers and rubber components, and other fillers and additives within a range that does not compromise the object of the invention. These examples may include inorganic fillers, retardants, electroconductivity imparting agents, crystal nucleating agents, ultraviolet absorbers, antioxidants, damping agents, antibacterial agents, insect repellents, deodorants, coloring protectors, thermostabilizers, peeling agents, antistatic agents, plasticizers, lubricants, colorants, pigments, dyes, foaming agents, antifoaming agents, and coupling agents."

- "[0053]

A method of producing fiber reinforced resin sheet of the present invention may include, for example, a method of producing a reinforced fiber mat in which reinforcing fibers are preliminarily dispersed in strand and/or monofilament form, and impregnating the mat with said thermoplastic resin (A) and thermoplastic resin (B). A method of producing reinforced fiber mat may include an air-laid method in which reinforcing fibers are dispersed in air flow to make a sheet; a dry process such as carding method that mechanically slices reinforcing fibers to make a sheet; and a wet process such as a RADLITE method that makes paper while stirring reinforcing fibers in water as a publicly known technique. The means for making reinforcing fibers closer to monofilament may include, for example, a method for disposing and further optionally vibrating an opening bar, or further making a card mesh finer, or adjusting a rotation speed of the card in a dry process. In a wet process, the means may include, for example, a method of adjusting a stirring condition of reinforcing fibers, a method of diluting a reinforcing fiber concentration of dispersion fluid, a method of adjusting viscosity of dispersion fluid, and a method of suppressing vortex flow in transporting the dispersion fluid. In particular, a wet process is preferable. The increase in concentration of fed fibers and the adjustment of flow rate of dispersion fluid and the speed of mesh conveyor may result in easy adjustment of the ratio Vfm of reinforcing fibers of reinforced fiber mat. For example, by lowering a speed of a mesh conveyor

compared to a flow rate of a dispersion fluid, the fibers in the resultant reinforced fiber mat becomes difficult to orient in a drawing direction, and production of a bulky reinforced fiber mat becomes possible. The reinforced fiber mat may be composed only of reinforced fibers. The reinforced fibers are mixed with a matrix resin component in a powder form or a fibril form, or mixed with an organic compound or an inorganic compound, or a gap between reinforcing fibers may be filled with a resin component."

- "[0055]

A fiber reinforced resin sheet of the present invention is subjected to molding to obtain a mold. Such mold forms an interface layer having an irregular shape with a maximum height Ry of 50 μm or more and an average roughness Rz of 30 μm or more between the thermoplastic resin (A) and the thermoplastic resin (B). A mold used herein means a mold molded by a means of heating and pressurizing said fiber reinforced resin sheet or a preform comprising said fiber reinforced resin sheet. ... (Omitted)...

[0056]

Further, reinforcing fibers used for the above fiber reinforced mold base may include reinforcing fibers exemplified as a constituent component of the aforementioned reinforced fiber mat. In particular, PAN-based, pitch-based, or rayon-based carbon fibers are preferably used from a viewpoint of high specific strength and specific rigidity as well as weight saving effects. Of these, PAN-based carbon fiber may be more preferably used since it is excellent in balance between kinetic properties such as strength and elastic modulus and cost. Further, one kind of reinforcing fiber may be solely used, or 2 or more kinds may be used in combination. Carbon fiber and glass fiber are preferably used in combination from a viewpoint of the balance between kinetic properties and economic efficiency of the resultant molded article. Carbon fiber and aramid fiber are preferable from a viewpoint of the balance between kinetic properties and shock absorption of the resultant mold."

- "[0076]

(9) Out-of-plane angle θz of reinforcing fibers in fiber reinforced resin sheet

From a fiber reinforced resin sheet a small piece with a width of 25 mm was cut out, and embedded into an epoxy resin, and polished so that a vertical cross section in a sheet thickness direction can be an observed surface, to thereby produce a sample. Said sample was magnified by 400 times with a laser microscope (manufactured by Keyence Corporation, VK-9510) to observe a fiber cross section profile. The observed image was loaded in general image analysis software, and individual fiber cross sections that could be seen in an observed image were extracted by use of a program embedded in the software, and an ellipse inscribing the fiber cross section was drawn to approximate shape (hereinafter referred to as fiber ellipse). Furthermore, for fiber ellipse with an aspect ratio of 20 or more represented by long axis length α/short axis length β of the fiber ellipse, an angle of the long axis direction from the X axis direction was calculated. An observation sample sampled from a different site of fiber reinforced resin sheet was repeatedly subjected to the above operation to measure an out-of-plane angle for 600 reinforcing fibers, and the average was calculated as an out-of-plane θz of fiber reinforcing resin sheet."

- "[0080]

[Reinforcing fibers 1]

Spinning and sintering treatment were implemented from a polymer with a major component of polyacrylonitrile to obtain a continuous carbon fiber with a total filament number of 12000. Furthermore, the continuous carbon fiber was subjected to electrolysis surface treatment, and dried in heated air at 120°C to obtain a reinforcing fiber 1. The properties of this carbon fiber 1 were as follows:

Density: 1.80 g/cm^3

Monofilament diameter: 7 μm

Tensile strength: 4.9 GPa

Tensile elastic modulus: 230 GPa

... (Omitted)...

[0082]

[Resin sheet 1]

By use of a master batch consisting of 90 mass% of unmodified polypropylene resin (manufactured by Prime polymer, "Prime Poly pro" (registered trademark) J106MG) and 10 mass% of acid-modified polypropylene resin (manufactured by Mitsui Chemical, "Adomer" (registered trademark) QE800), a sheet was made with a coating weight of 100 g/m^2. The properties of the resultant resin sheet are shown in Table 1.

[0083]

[Resin sheet 2]

A resin film made of Polyamide 6 resin (manufactured by Toray Industries, Inc. "Amiran" (registered trademark) CM1021T) was produced with a coating weight of 124 g/m^2. The properties of the resultant resin sheet are shown in Table 1.

... (Omitted)...

[0087]

[Reinforced fiber mat 1]

Reinforcing fiber 1 was cut into lengths of 5 mm to obtain a chopped reinforcing fiber. Chopped reinforcing fibers were fed to a cotton opener to obtain a floc reinforcing fiber assembly with almost no reinforcing fiber bundle having an initial diameter. This reinforcing fiber assembly was fed to a carding apparatus having a cylinder roll with a diameter of 600 mm to form a sheet-like web consisting of reinforcing fibers. The rotation number of cylinder roll was 320 rpm, and a doffer speed was 13 m/minute. This web was laminated to obtain a reinforced fiber mat 1. The properties of the resultant reinforced fiber mat are shown in Table 2.

... (Omitted)...

[0095]

(Example 1)

Two reinforced fiber mats 1 were sandwiched, with one resin sheet 1 disposed as the thermoplastic resin (A) on one side, and one resin sheet 2 disposed as the thermoplastic resin (B) on the other side, to thereby manufacture a laminate. The laminate was disposed in a mold cavity preheated at 230°C and the mold was closed. After holding for 120 seconds, a pressure of 3 MPa was applied and further kept for 60 seconds; while holding the pressure, a cavity temperature was cooled down to 50°C, the mold was opened to obtain a fiber reinforced resin sheet 1. The properties of the resultant fiber reinforced resin sheet are shown in Table 3-1."

- "[0103]

(Example 9)

Two reinforced fiber mats 3 were sandwiched, with one resin sheet 4 disposed as the thermoplastic resin (A) on one side, and two resin sheets 5 disposed as the thermoplastic resin (B) on the other side, to manufacture a laminate. The laminate was disposed in a mold cavity preheated at 300°C and the mold was closed. After holding for 120 seconds, a pressure of 3 MPa was applied and further kept for 60 seconds, and while holding the pressure, the cavity temperature was cooled down to 50°C, and the mold was opened to obtain a fiber reinforced resin sheet 9. The properties of the resultant fiber reinforced resin sheet are shown in Table 3-1.

[0104]

(Comparative Example 1)

Except that three sheets of reinforced fiber mat 7 were used in place of reinforced fiber mat 1, a fiber reinforced resin sheet 10 was obtained in a similar manner to Example 1. The properties of the resultant fiber reinforced resin sheet are shown in Table 3-2.

[0105]

(Comparative Example 2)

Except that an applied pressure was set to 10 MPa, a fiber reinforced resin sheet 11 was obtained in a similar manner to Comparative Example 1. The properties of the resultant fiber reinforced resin sheet are shown in Table 3-2."

- "[0110]

(Reference examples 1 to 13)

Except that the kind and number of reinforced fiber mat and resin sheet are different in a laminate and the setting temperature of the mold is different, in a similar manner to Example 1, mold bases 1 to 17 were manufactured. The molding conditions and properties of the respective mold bases are shown in Table 4."

- "[0112]

(Example 10)

One of fiber reinforced resin sheet 1 of Example 1 and four mold bases 6 of reference example 6 as a laminate unit (X) and four mold bases 7 of reference example 7 as a laminate unit (Y) were used to produce a preform. Said preform was disposed in a heat disk heating-type preheating apparatus maintained at 230°C and preheated for 2 minutes while applying a pressure of 0.1 MPa. Subsequently, a laminate taken out from the preheating apparatus was disposed in a mold cavity preheated at 120°C and the mold was closed. After holding for 120 seconds in a state of applying a pressure of 15 MPa, the mold was opened to obtain a mold 1. The laminate of the examples is shown in FIG. 8. The properties of the resultant mold are shown in Table 5-1."

- "[0118]

(Example 16)

One of a fiber reinforced resin sheet 8 of Example 8 and four mold bases 3 of reference example 3 as a laminate unit (X) and four mold bases 5 of reference example 5 as a laminate unit (Y) were used to produce a preform. Said preform was disposed

in a heat disk heating-type preheating apparatus maintained at 300°C and preheated for 2 minutes while applying a pressure of 0.1 MPa. Subsequently, a preform taken out from the preheating apparatus was disposed in a mold cavity preheated at 180°C, and the mold was closed. After holding for 120 seconds in a state of applying a pressure of 15 MPa, the mold was opened to obtain a mold 7. The properties of the resultant mold are shown in Table 5-1."

- "[0135]
(Example 22)
One of the fiber reinforced resin sheet 3 of Example 3 and one mold base 2 of reference example 2 were used to produce a preform. Except that said preform was disposed in a heat disk heating-type preheating apparatus maintained at 230°C and preheated for 1 minute while applying a pressure of 0.1 MPa, said preform was molded in a similar manner to Example 10 to obtain a plate mold with a width of 300 mm and a thickness of 1.1 mm. From the resultant plate mold a square with a length of 250 mm and a width of 160 mm was cut out to obtain a first member. Meanwhile, a mold base 14 of reference example 14 was disposed as a second member in a heat disk heating-type preheating apparatus maintained at 230°C and preheated for 1 minute while applying a pressure of 0.1 MPa. Subsequently, a first member was disposed in a mold for press molding preheated at 120°C so that a resin sheet 1 was positioned at the top surface. A mold base 14 was laid on the top after the completion of preheating, and the mold was closed. Holding 120 seconds in a state of applying a pressure of 15 MPa, a second member was adhered by press molding to obtain an integrated mold 6. The integrated mold of the example is shown in FIG. 12. The properties of the resultant integrated mold are shown in Table 7."

- "[0142]
[Table 3-1]

表3－1

		実施例1	実施例2	実施例3	実施例4	実施例5	実施例6	実施例7	実施例8	実施例9
強化繊維マット	－	強化繊維マット1	強化繊維マット2	強化繊維マット3	強化繊維マット4	強化繊維マット5	強化繊維マット3	強化繊維マット3	強化繊維マット3	強化繊維マット3
熱可塑性樹脂(A)	－	樹脂シート1	樹脂シート1	樹脂シート1	樹脂シート1	樹脂シート1	樹脂シート1	樹脂シート1	樹脂シート3	樹脂シート4
熱可塑性樹脂(B)	－	樹脂シート2	樹脂シート2	樹脂シート2	樹脂シート2	樹脂シート2	樹脂シート2	樹脂シート3	樹脂シート5	樹脂シート5
含浸温度	℃	230	230	230	230	230	230	220/270	285	300
含浸圧力	MPa	3	3	3	3	3	3	3	3	3
繊維体積含有率(Vfs)	体積%	20	20	20	20	42	20	20	20	20
面外角度(θz)	°	4.0	5.6	6.4	8.0	3.3	6.4	6.4	6.4	6.4
最大高さ(Ry)	μm	91	131	156	183	72	263	150	145	149
平均粗さ(Rz)	μm	54	79	93	110	43	157	91	80	89
未含浸率(B)	%	0	0	0	0	5	0	0	0	0

表３－１ Table 3-1

実施例	Example
強化繊維マット	Reinforced fiber mat
熱可塑性樹脂	Thermoplastic resin
樹脂シート	Resin sheet
含浸温度	Immersion temperature
含浸圧力	Immersion pressure
繊維体積含有率	Fiber volume content
体積	Volume
面外角度	Out-of-plane angle
最大高さ	Maximum height
平均粗さ	Average roughness
未含浸率	Un-impregnation rate

"

According to the matters described in A-1, particularly the described matter regarding the Example 1, A-1 discloses the following invention (hereinafter, referred to as the "A-1 Invention"). Since the Opponent does not specify an invention disclosed in A-1, the body concludes Example 1 to be the closest invention to Patent Invention 1.

"Sandwiching two reinforced fiber mats obtained by laminating a sheet-like web consisting of chopped reinforcing fibers obtained by cutting reinforcing fibers with a length of 5 mm, at one side a resin sheet was disposed as the thermoplastic resin (A), and at the other side a resin sheet was disposed as the thermoplastic resin (B) to manufacture a laminate. A fiber reinforced resin sheet was obtained by disposing said laminate taken out from the preheating apparatus in a mold cavity preheated at 230°C, closing the mold, after holding for 120 seconds, applying a pressure of 3 MPa, and further keeping for 60 seconds, while holding a pressure, cooling a cavity temperature down to 50°C, and opening the mold."

B Matters disclosed in A-2 and A-2 Invention

A-2 generally contains the following descriptions regarding "prepreg, preform, mold, and method of producing prepreg".

- "Claims

[Claim 1] A prepreg in which a reinforcing fiber base is impregnated with a thermoplastic resin, wherein the reinforcing fiber base is composed of 0 mass% or more to 50 mass% or less of reinforcing fiber with a fiber length greater than 10 mm, 50 mass% or more to 100 mass% or less of reinforcing fiber with a fiber length of 2 mm or more to 10 mm or less, and 0 mass% or more to 50 mass% or less of reinforcing fiber with a fiber length of less than 2 mm,

wherein the prepreg has an average of two-dimensional orientation angle of reinforcing fiber monofilament (a) against reinforcing fiber monofilament (b) crossing the reinforcing fiber monofilament (a) of 10 degrees or more to 80 degrees or less, and a thickness h0 (mm) at 23°C of 0.03 mm or more to 1 mm or less, and a tensile strength σ of 0.01 MPa or more.

... (Omitted)...
[Claim 13] A mold obtained by molding the prepreg of any one of Claims 1 to 7 or the preform of any one of Claims 8 to 12.
... (Omitted)...
[Claim 22] The prepreg of Claim 1, wherein said reinforcing fiber substrate is obtained by the following method a:

method a: a method of producing a reinforced fiber base comprising at least: a step (i) of feeding a reinforcing fiber bundle to a dispersant, a step (ii) of preparing a slurry in which reinforcing fibers constituting said reinforcing fiber bundle are dispersed into said dispersant, a step (iii) of transporting said slurry, and a step (iv) of obtaining a paper making base comprising said reinforcing fiber by removing said dispersant from said slurry, wherein said reinforced fiber base has a C1/C2 of 0.8 or more to 1.2 or less, given that a mass content of reinforcing fiber in a slurry prepared in said step (ii) is C1, and a mass content of reinforcing fiber in a slurry at the start of said step (iv) is C2."

- "[0015] ... (Omitted)...
[FIG 3] FIG 3 is a schematic drawing showing one example of a production apparatus of a reinforcing fiber base (paper making base)."

- "[0017] [Reinforcing fiber base]

Reinforcing fiber base of the present invention means a precursor in which reinforcing fibers are processed in a form of sheet, fabric, or web. The form or shape of the reinforcing fiber base is not particularly limited as long as there is a gap between reinforcing fibers to be impregnated with resin. For example, reinforcing fiber may be mixed with organic fiber, organic compound, or inorganic compound, or a gap between reinforcing fibers may be filled with the other component, or reinforcing fiber may be adhered to a resin component. A preferred embodiment of reinforcing fiber base may include a base in a nonwoven fabric form obtained by a dry process or wet process, in which reinforcing fibers are fully opened and a gap between the reinforcing fibers is filled with an organic compound from a viewpoint of easily producing a two-dimensional orientation of reinforcing fibers in the present invention."

- "[0034] An average of two-dimensional orientation angle of reinforcing fibers of the present invention is 10 degrees or more to 80 degrees or less, preferably 20 degrees or more to 70 degrees or less, more preferably 30 degrees or more to 60 degrees or less. It is preferable to get close to an ideal angle of 45 degrees. If an average of two-dimensional orientation angle is less than 10 degrees or greater than 80 degrees, many reinforcing fibers are present in a form of a bundle, which compromises kinetic properties. Furthermore, if two-dimensional isotropy is compromised, it is necessary to laminate a number of prepregs so that the orientation of reinforcing fibers may be directed to each direction to ensure isotropy of molded article properties. Further, in a case where reinforcing fibers in a thickness direction cannot be ignored, prepreg becomes so thick that it becomes difficult to handle the disposal and transportation of prepreg in lamination and economic cost becomes excessive in a lamination process.
[0035] Two-dimensional orientation angle can be brought closer to an ideal angle by dispersing reinforcing fibers and producing a reinforcing fiber base that is planar. To improve the dispersion of reinforcing fibers, a dry process and a wet process may be

used. A dry process is a method in which a reinforcing fiber bundle is dispersed in air. A wet process is a method in which a reinforcing fiber bundle is dispersed in water. Dry processes may include, for example, a method for disposing and further optionally vibrating an opening bar, a method for making a card mesh further fine, and a method for adjusting a rotation speed of the card. Wet processes may include, for example, a method of adjusting a stirring condition in dispersing reinforcing fibers, a method of diluting a reinforcing fiber concentration of dispersion fluid, a method of adjusting viscosity of a solution, and a method of suppressing vortex flow in transporting the dispersion fluid.

[0036] Further, to dispose a fiber base planar, dry processes may include, for example, a method of using static electricity, a method of using laminar flow air, and a method of adjusting a drawing speed of conveyor in collecting reinforcing fibers. Wet processes may include, for example, a method of preventing reaggregation of reinforcing fibers dispersed with supersonic processing, a method of adjusting a filtration speed, a method of adjusting a mesh diameter of conveyor, and a method of adjusting a drawing speed of conveyor. These methods are not particularly limited, but may be achieved by controlling the other manufacturing conditions while confirming a state of the reinforcing fiber base.

[0037] Particularly in a case of producing in a wet process, for example, a method of using a production apparatus of paper-making base as illustrated in FIG. 3 can be exemplified. The increase in concentration of fed fiber may increase a coating weight of the resultant reinforcing fiber base. Furthermore, the adjustment of a flow rate of dispersion fluid and a speed of a mesh conveyor may also adjust a coating weight. For example, the increase in a flow rate of a dispersion fluid while keeping a speed of the mesh conveyor constant may increase a coating weight of the resultant reinforcing fiber base. The decrease in a flow rate of a dispersion fluid while keeping a speed of the mesh conveyor constant may decrease a coating weight of the resultant reinforcing fiber base. Furthermore, the adjustment of a speed of the mesh conveyor relative to a flow rate of a dispersion fluid may also control the orientation of fiber. For example, by increasing a speed of the mesh conveyor relative to a flow rate of a dispersion fluid, fibers in the resultant reinforcing fiber base tend to be oriented in a drawing direction of the mesh conveyor. As seen above, by adjusting various parameters, the production of reinforcing fiber base is feasible."

- "[0048] [Resin]
Resin to be used for prepreg is not particularly limited as long as it is a resin that has an ability to impregnate a reinforcing fiber base and an ability to achieve a tensile strength for ensuring handleability in a lamination step. The following thermoplastic resin and uncured thermosetting resin may be used. Of these, a thermoplastic resin is used for the prepreg of the present invention."

- "[0055] For a resin component used in the present invention, a blend of thermosetting resin in the above thermoplastic resin matrix may also be used. Furthermore, a resin component may further include filler, electroconductivity imparting material, flame retardant, flame retardant auxiliary agent, pigment, dye, lubricant, mold lubricant, compatibilizing agent, dispersant, crystal core, plasticizer, heat stabilizer, antioxidant, color protector, ultraviolet absorber, fluidity modifier, foaming agent, antibacterial

agent, damping material, deodorant, abrasion modifier and antistatic agent, according to use. In particular, flame retardance is required in some cases in a case of the application to electric and electronic devices, automobiles, and aircraft. Thus, phosphorus-based flame retardant, nitrogen-based flame retardant, or inorganic-based flame retardant is preferably added. As seen above, in a case where a component other than thermoplastic resin is contained in resin components, a content of thermoplastic resin in resin components is 60 mass% or more so as not to compromise the effects achieved by using thermoplastic resin."

- "[0057] [Method of producing prepreg]
Much consideration has been given in the past as to a method of producing a prepreg in which reinforcing fibers are uniformly dispersed, like a prepreg of the present invention.
[0058] For example, the aforementioned International Publication No. WO2007-97436 discloses that when a monofilament carbon fiber with a mass average fiber length of 0.5 mm or more to 10 mm or less and an orientation parameter of -0.25 or more to 0.25 or less is used as a reinforcing fiber of fiber reinforced thermoplastic resin mold, a mold with excellent kinetic properties and isotropic kinetic properties may be obtained. This fiber reinforced thermoplastic resin mold is produced by (1) a step of heating and melting thermoplastic resin contained in a molding material, (2) a step of disposing the molding material in a mold, (3) a step of applying a pressure to the molding material in the mold, (4) a step of solidifying the molding material in the mold, and (5) a step of opening the mold and demolding a fiber reinforced thermoplastic resin mold.
... (Omitted)...
[0061] Every production method of prepreg of these patent documents makes a paper of reinforcing fibers including a resin. Increasing the number of varieties of resin requires cleaning of a device and an increase in the number of devices. Further, the orientation of carbon fibers needs to be controlled. Thus it is necessary to set detailed conditions for each process. Therefore, the production takes time and effort, and thus there is a problem on the application of prepreg for the effective production.
... (Omitted)...
[0063] Here, it is preferable in the present invention to produce a prepreg by the following method. Specifically, a method of producing a prepreg comprises a step (I) of dispersing a reinforcing fiber bundle to obtain a reinforcing fiber base, a step (II) of providing the reinforcing fiber base obtained in step (I) with a binder, a step (III) of combining the reinforcing fiber base provided with the binder obtained in step (II) with a matrix resin, wherein said steps (I) to (II) are implemented online, and the content of said reinforcing fiber bundle on a total prepreg basis is 10 mass% or more to 80 mass% or less, the content of said binder is 0.1 mass% or more to 10 mass% or less and the content of said matrix resin is 10 mass% or more to 80 mass% or less. The production method of prepreg of the present invention may provide a prepreg with excellent dispersion state of reinforcing fibers and excellent kinetic properties of a mold in a short time."

- "[0101] In step (iii), a slurry obtained in step (ii) is transported.
[0102] Step (iii) is conducted in a transporting unit that connects the dispersion bath conducting step (ii) and the paper making bath conducting step (iv)."

- "[0106] Step (iii) may be conducted in an overflow type transporting unit. This prevents the precipitation and aggregation of reinforcing fibers in a slurry to be transported due to the application of sheer force and maintains the dispersibility of the slurry. Further, it is feasible to economically transport without using input power such as that provided by a pump.
[0107] Overflow type means a type of sending a fluid overflowing from a container (bath) to the subsequent container (bath) by taking advantage of the force of gravity. Specifically, it is a type of sending a fluid substantially without the use of input power such as that of a fluid sending pump.
[0108] In a case of overflow type, a transporting unit is preferably tilted. Specifically, in a case of viewing a transporting unit from a horizontal direction, it is preferable that the connecting point between the dispersion bath and the transporting unit is located higher than the connecting point between the paper making bath and the transporting unit. The tilt angle is preferably 30 degrees or more to 60 degrees or less, and more preferably 40 degrees or more to 55 degrees or less. If the tilted angle is less than 30 degrees, it might take a long time for transportation in step (iii). If the tilted angle exceeds 60 degrees, a flow rate in transporting a slurry gets increased in a case of overflow type. Thus excess shear is applied to a slurry at the beginning of step (iv), so that a dispersion state of a slurry in step (iv) is likely to be insufficient."

- "[0113] Regarding the shape of the transporting unit, an explanation is given with examples of FIG. 13 to FIG. 20. FIG. 13 to FIG. 20 are schematic drawings of the positional relationship of a dispersion bath, a paper making bath, and a transporting unit as viewed from a horizontal direction in a case of said step (i) and step (ii) being conducted in a dispersion bath and said step (iv) being conducted in a paper making bath, and said step (iii) being conducted in a transporting unit that connects said dispersion bath and paper making bath. The transporting unit 213 in FIG. 13 to FIG. 18 and FIG. 20 is aligned linearly.
[0114] The tilt angle of the transporting unit means an angle r that is formed in a lower side of vertical direction between a center line q of the transporting unit 213 and a line p extending in the direction of gravity. The transporting unit 213 in FIG. 13, FIG. 17, and FIG. 18 is tilted from the dispersion bath 211 to the paper making bath 212 with a tilt angle of 30 degrees or more to 60 degrees or less. The transporting unit 213 in FIG. 14 connects the dispersion bath 211 horizontally to the paper making bath 212 with a tilt angle of approximately 90 degrees. The transporting unit 213 in FIG. 15 is tilted from the dispersion bath 211 to the paper making bath 212 with a tilt angle of 30 degrees or more to 60 degrees or less. The transporting unit 213 in FIG. 16 connects the dispersion bath 211 to the paper making bath 212 in a gravitational direction with a tilt angle of approximately 0 degrees. Similarly to FIG. 16, the transporting unit 213 in FIG. 20 has a tilt angle of approximately 0 degrees, and comprises the pump 225 in the middle of the transporting unit 213."

- "[0223] (Material 1) Carbon fiber 1
Spinning, sintering, and surface oxidation treatment were implemented from a copolymer with a major component of polyacrylonitrile to obtain a continuous carbon fiber with a total monofilament number of 12,000. The properties of this continuous

carbon fiber were as follows:
- Monofilament diameter: 7 μm
- Mass per unit length: 1.6 g/m
- Specific gravity: 1.8
- Tensile strength: 4600 MPa
- Elongation elastic modulus: 220 GPa."

- "[0238] (Example 1)

Carbon fiber 1 made of material 1 was cut into lengths of 6 mm with a cartridge cutter to obtain a chopped reinforcing fiber. A dispersion fluid in a concentration of 0.1 mass% consisting of water and surfactant (NACALAI TESQUE, INC., polyoxyethylenelaurylether (product name)) was prepared. By use of this dispersion fluid and the above chopped carbon fiber, a carbon fiber base was produced with a production apparatus of reinforcing fiber base (paper making base) of FIG. 3. The production apparatus is composed of a dispersion bath 21, a paper making bath 22, and a conveyor 32. The dispersion bath 21 was a cylindrical container with a diameter of 1000 mm, and comprised a linear transportation unit (tilt angle of 30 degrees) equipped with an opening cock at the bottom of the container. The transportation unit connects the dispersion bath with the paper making bath. A stirrer is attached to an opening of the top surface of the dispersion bath. From the opening, chopped carbon fiber and dispersion (dispersant) may be fed. The paper making bath comprises a mesh conveyor having a paper making surface with a width of 500 mm at the bottom. The conveyor 32 is disposed subsequent to a mesh conveyor 31, and transports a carbon fiber base 30. Paper making was conducted with a carbon fiber concentration of 0.05 mass% in a dispersion fluid. Carbon fiber base in paper was dried for 30 minutes in a drying furnace at 200°C. The resultant carbon fiber base had a width of 500 mm, a length of 500 mm, and a coating weight of 50 g/m^2. The properties of the resultant reinforced fiber base are shown in Table 1.

[0239] One of the above carbon fiber base and two films with the same thickness of CM1007 manufactured by Toray Industries, Inc. (nylon 6 resin) were laminated so as to become film/carbon fiber base/film. To this laminate a pressure of 5 MPa was applied for two minutes at a temperature of 250°C to produce a prepreg (1) with a width of 500 mm and a length of 500 mm in which a carbon fiber base was impregnated with nylon 6 resin. The properties of the resultant prepreg are shown in Table 2.

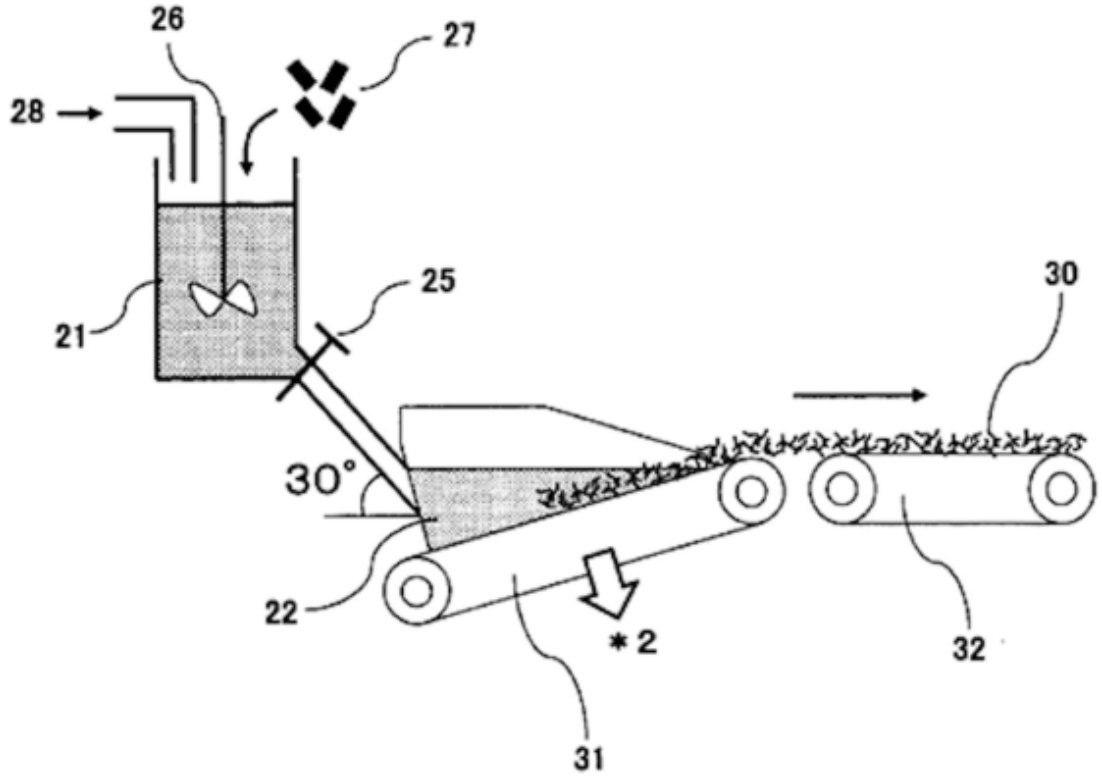
[0240] Eight sheets of prepreg (1) were laminated to produce a preform (A), and preheated at 280°C under a nitrogen atmosphere in a far-infrared heating furnace. In a stamping mold having a B5-size L-box shaped cavity with a cavity surface temperature of 120°C and a thickness of 1.1 mm as shown in FIG. 4, a preform (A) was disposed (at a charge rate of 110%), and a mold was closed, and pressurized at a molding pressure of 30 MPa, and kept for two minutes. Thereafter, the mold was opened and demolded to obtain an L-box shaped molded article. Preform (A) was well molded fit with a shape of a mold. A molded article with good shape quality was obtained. The properties of the resultant molded article are shown in Table 3 and Table 10."

- "[0245] (Example 6)

Except that the speed of mesh conveyor in paper making was adjusted to a speed four times a flow rate of the dispersion fluid, a carbon fiber base was manufactured in a

similar manner to Example 1. The properties of the resultant reinforced fiber base are shown in Table 1. By use of the obtained carbon fiber base, prepreg (6) impregnated with nylon 6 resin was produced in a similar manner to Example 1. The properties of the resultant prepreg are shown in Table 2. Except that prepreg (6) was used, in a similar manner to Example 1, a molded article of L-shaped box was manufactured. A preform was well molded fit with a shape of a mold. A molded article with good shape quality was obtained. The properties of the resultant molded article are shown in Table 3."

- "[FIG. 3]



"

According to the matters described in A-2, particularly the Example 6, A-2 discloses the following invention (hereinafter, referred to as the "A-2 Invention"). Since the Opponent does not specify an invention disclosed in the A-2, the body concludes Example 6 to be the closest invention to Patent Invention 13.

"A method of producing a prepreg (1) comprising the steps of: feeding a chopped carbon fiber obtained by cutting carbon fiber 1 into lengths of 6 mm with a cartridge cutter while feeding a dispersion consisting of water and surfactant to a dispersion bath 21 of a production apparatus constituted of an inclined type paper-making machine consisting of the dispersion bath 21, a paper making bath 22 comprising a mesh conveyor 31 and a conveyor 32, and stirring, paper making and drying to produce a carbon fiber base; laminating one of the above carbon fiber base and two films with the same thickness of CM1007 manufactured by Toray Industries, Inc. (nylon 6 resin) so as to form a laminate of film/carbon fiber base/film; and applying to this laminate a

pressure of 5 MPa for two minutes at a temperature of 250°C to produce a prepreg (1) in which a carbon fiber base is impregnated with nylon 6 resin, wherein a speed of mesh conveyor 31 in paper making is adjusted to a speed four times a flow rate of the dispersion."

C Matters described in A-3

Generally, A-3 contains the following descriptions regarding "a method of producing an integrated molded article":

- "[Claims]
[Claim 1]
A method of producing an integrated molded article comprising: a Step (I) of preparing a preform by laminating base having discontinuous reinforcing fibers and resin; a Step (II) of disposing a preform having the following charge ratio of greater than 100% in a mold and subjecting to press molding; and a Step (III) of inserting a planar mold obtained in Step (II) into a mold for injection molding and subjecting a thermoplastic resin to injection molding for integration.
Charge ratio (%) = 100 * base area (mm^2)/mold cavity total area (mm^2)
... (Omitted)...
[Claim 6]
The method of producing an integrated molded article of any one of Claims 1 to 5, further comprising adding 1 to 20 mass parts of retardant on a basis of 100 mass parts of a resin in the resin of base constituting said preform."

- "[0016]
First, an explanation is given to a base having discontinuous reinforcing fibers and a resin used in the present invention. The form of reinforcing fibers is not particularly limited; however, it is important to be discontinuous reinforcing fibers in view of moldability of base. For example, while discontinuous reinforcing fibers are distributed in a form of a bundle and/or monofilaments, reinforcing fibers may be aligned in one direction, or while discontinuous reinforcing fibers are distributed in a form of a bundle and/or monofilaments, reinforcing fibers may be randomly oriented."

- "[0019]
As aforementioned, a method of obtaining a base in a form of aligning in one direction in a form of bundle of discontinuous reinforcing fibers and/or a dispersed form of monofilaments is not particularly limited, but may include, for example, a method of obtaining by opening dispersing reinforcing fibers in a chopped form in a dispersion, subjecting them to paper making at a speed sufficiently higher than a flow rate of a dispersion on a porous support, and causing a paper to be impregnated with a resin to make a composite."

- "[0032]
The above retardant preferably contains 1 to 20 mass parts of retardant on the basis of 100 mass parts of resin to develop flame-retardant effect and maintain a good balance with kinetic properties of resin to be used or resin fluidity in molding, more preferably 1 to 15 mass parts."

D Matters described in A-4

A-4 generally discloses the following description of "a production method of press molded article":

- "[Claims]
[Claim 1]
A method of producing a press molded article, which is obtained by subjecting a preform composed of two or more layers of prepregs in which a reinforcing fiber base is impregnated with a thermoplastic resin to a press molding with an applied pressure of 0.1 to 100 MPa, wherein said reinforcing fiber base is composed of 0 mass% or more to 50 mass% or less of reinforcing fiber with a fiber length greater than 10 mm, 50 mass% or more to 100 mass% or less of reinforcing fiber with a fiber length of 2 mm or more to 10 mm or less, and 0 mass% or more to 50 mass% or less of reinforcing fiber with a fiber length of less than 2 mm, and wherein the prepreg has an average of two-dimensional orientation angle of reinforcing fiber monofilament (a) against reinforcing fiber monofilament (b) crossing the reinforcing fiber monofilament (a) of 10 degrees or more to 80 degrees or less, a thickness h0 (mm) at 23°C of 0.03 mm or more to 1 mm or less, and a tensile strength σ of 50 MPa or more to 1000 MPa or less."

- "[Claim 3]
The method of producing a press molded article of Claim 1 or 2, wherein an applied pressure is 10 to 100 MPa in said press molding."

- "[Claim 6]
The method of producing a press molded article of any one of Claims 1 to 5, wherein a maximum thickness of said molded article is 2 mm or less."

- "[0046]
For a resin component used in the present invention, a blend of thermosetting resin in the above thermoplastic resin matrix may also be used. Furthermore, a resin component may include ... (omitted)... halogenated retardant such as brominated resin, antimony-based flame retardant such as antimony trioxide and antimony pentaoxide, phosphorus-based flame retardant such as ammonium polyphosphate, aromatic phosphate, and red phosphorus, organic acid metal salt-based flame retardant such as organic borate metal salt, carboxylic acid metal salt, and aromatic sulfonimide metal salt, inorganic-based flame retardant such as zinc borate, zinc, zinc oxide, and zirconium compound, nitrogen-based flame retardant such as cyanuric acid, isocyanuric acid, melamine, melamine cyanurate, melamine phosphate, and nitrogenized guanidine, fluorine-based flame retardant such as PTFE, silicone-based flame retardant such as polyorganosiloxane, metal oxide-based flame retardant such as aluminum oxide and magnesium oxide ... (omitted)... according to use. In particular, flame retardance is required in some cases in a case of application to electric and electronic devices, automobiles, and aircraft. Thus phosphorus-based flame retardant, nitrogen-based flame retardant, and inorganic-based flame retardant are preferably added."

E Matters described in A-5

A-5 generally discloses the following description with respect to "a method of making a stampable sheet of unidirection fiber reinforced thermoplastic resin".

"2. Claims
1. A method of making a stampable sheet of unidirection fiber reinforced thermoplastic resin, wherein after forming a foamed dispersion of a discontinuous fiber and a thermoplastic resin in making a mixed layer thereof, said foamed dispersion is supplied to a mesh belt for transporting the foamed dispersion, and a negative pressure is applied from a side opposite to a supply side of the foamed dispersion to drain water of a liquid of the foamed dispersion via a mesh belt and drain outlet, in which a shape of the drain outlet to be disposed below the mesh belt is an assembly of slits with its opening being directed in parallel with a direction to which the mesh belt moves and a width of the opening being less than a discontinuous fiber length." (page 1, left bottom column, line 5 to 18)

- "Further, a stampable sheet of unidirectional fiber reinforced thermoplastic resin of the present invention may include additives such as reinforcing material including talc, filler, nucleating agent, retardant, pigment, stabilizer, plasticizer, and lubricant." (page 3, upper right column, line 14 to 17)

F Matters described in A-6

A-6 generally discloses the following description with respect to "fiber reinforced thermoplastic resin mold, molding material, and production method thereof".

- "1. A fiber reinforced thermoplastic resin mold consisting of 20 to 65 weight% of thermoplastic resin and 35 to 80 weight% of carbon fibers, the carbon fiber being monofilament, and a weight average fiber length (Lw) of the carbon fiber falls within 0.5 to 10 mm and the orientation parameter (fp) of the carbon fiber as defined in the specification falls within -0.25 to 0.25." (page 40, line 2 to 6)

- "'Additives, Fillers, etc.'

Furthermore, fiber reinforced thermoplastic resin mold of the present invention may include ... (omitted)... halogenated retardant such as brominated resin, antimony-based flame retardant such as antimony trioxide and antimony pentaoxide, phosphorus-based flame retardant such as ammonium polyphosphate, aromatic phosphate, and red phosphorus, organic acid metal salt-based flame retardant such as organic borate metal salt, carboxylic acid metal salt, and aromatic sulfonimide metal salt, inorganic-based flame retardant such as zinc borate, zinc, zinc oxide, and zirconium compound, nitrogen-based flame retardant such as cyanuric acid, isocyanuric acid, melamine, melamine cyanurate, melamine phosphate, and nitrogenized guanidine, fluorine-based flame retardant such as PTFE, silicone-based flame retardant such as polyorganosiloxane, metal oxide-based flame retardant such as aluminum oxide and magnesium oxide ... (omitted)... according to use." (page 13, line 8 to page 14, line 2)

(2) Grounds based on A-1 as a primary cited document
A Patent Invention 1
(A) Comparison

Patent Invention 1 is compared to A-1 Invention.

The "chopped reinforcing fibers obtained by cutting reinforcing fibers with a length of 5 mm" in the A-1 Invention corresponds to "reinforcing fibers" in Patent Invention 1. Hereinafter, similarly, "thermoplastic resin (A)" and "thermoplastic resin (B)" correspond to "thermoplastic resin", and "a fiber reinforced resin sheet" corresponds to "a sheet for fiber reinforced plastic mold".

Therefore, these inventions have the following Common Point:
"A sheet for fiber reinforced plastic mold comprising a reinforcing fiber and a thermoplastic resin."

Further, these inventions are different from each other in the following points:
<Different Feature 1>

"Thermoplastic resin" of Patent Invention 1 comprises "retardant", whereas it is not clear that "thermoplastic resin (A)" and "thermoplastic resin (B)" in the A-1 Invention corresponding to the "thermoplastic resin" of Patent Invention 1 comprises "flame retardant".

<Different Feature 2>

In Patent Invention 1, "said sheet for fiber reinforced plastic mold" is subjected to "(a) pressurizing at a press pressure of 10 MPa and a press speed of 3.5 cm/sec." and "(b) heating so that Q/P reaches not less than 0.7, given that a true density (g/cm^3) of said sheet for fiber reinforced plastic mold is P, and a bulk density (g/cm^3) of fiber reinforced plastic mold obtained by heating is Q while pressurizing under the above condition (a)." "In the resultant fiber reinforced plastic mold having a thickness of 1 mm obtained by subjecting said sheet for fiber reinforced plastic mold to pressurized molding with heat, 80% or more of a total number of said reinforcing fibers are present so that an angle from a center plane of said fiber reinforced plastic mold falls within ±20 degrees, and a thermoplastic resin comprises a retardant", whereas the A-1 Invention fails to specify as such.

(B) Judgment

a Regarding Different Feature 1

First, Different Feature 1 is examined.

According to [0082] of A-1, a resin sheet of the above Example 1 was made "by use of a master batch consisting of 90 mass% of unmodified polypropylene resin (manufactured by Prime polymer, 'Prime Poly pro' (registered trademark) J106MG) and 10 mass% of acid-modified polypropylene resin (manufactured by Mitsui Chemical, 'Adomer' (registered trademark) QE800)" and made "of Polyamide 6 resin (manufactured by Toray Industries, Inc. 'Amiran' (registered trademark) CM1021T)". No flame retardant was used.

Therefore, "thermoplastic resin (A)" and "thermoplastic resin (B)" of the A-1 Invention do not include "flame retardant". Different Feature 1 is a substantial difference.

b Regarding Different Feature 2

A-1 discloses in [0142], [Table 3-1] that out-of-plane angle θz of reinforcing fibers in a fiber reinforced resin sheet of Example 1 as a ground for the finding of the A-

1 Invention (corresponding to "an angle from a center plane of said fiber reinforced plastic mold" of "reinforcing fibers" in Patent Invention 1) is 4.0 degrees.

However, there is no description or demonstration in A-1 showing that, if the out-of-plane angle θz is 4.0 degrees, "80% or more of a total number of said reinforcing fibers are present so that an angle from a center plane of said fiber reinforced plastic mold falls within ±20 degrees" is satisfied, supposing that a heating condition and a thickness of fiber reinforced plastic mold are the same as in Patent Invention 1.

Further, according to [0095] of A-1, the above Example 1 is the one subjecting "a laminate" produced by "sandwiching two reinforced fiber mats 1 with a resin sheet disposed as the thermoplastic resin (A) on one side, and a resin sheet disposed as the thermoplastic resin (B) on the other side" and "disposing the mats in a mold cavity preheated at 230°C and closing the mold, and keeping for 120 seconds, and then applying a pressure of 3 MPa, and further keeping for 60 seconds, and cooling a cavity temperature down to 50°C while maintaining a pressure". The press pressure is not 10 MPa. The press speed, heating conditions, and a thickness of fiber reinforced plastic mold are indefinite.

Therefore, it cannot be seen from the matters described in A-1 that it is likely to satisfy the condition that "80% or more of a total number of said reinforcing fibers are present so that an angle from a center plane of said fiber reinforced plastic mold falls within ±20 degrees", supposing that a heating condition and a thickness of fiber reinforced plastic mold are the same as in Patent Invention 1, nor can it be said from the matters described in A-3 to A-5. Further, there is no other evidence sufficient to find that it is likely to satisfy the above conditions.

The Opponent alleges that the conditions shown in Different Feature 2 are not special in view from the description of Examples and Comparative Examples other than Example 1 of A-1, the description of A-3 and A-4, and the description of the patent specification, and it is hardly believed that Examples and Comparative Examples of A-1 deviate from the scope of "80% or more of a total number of said reinforcing fibers are present so that an angle from a center plane of said fiber reinforced plastic mold falls within ±20 degrees". Even if it is not a special condition, there is no motivation to adopt these conditions in the A-1 Invention. There is no evidence sufficient to find that it is likely to satisfy the condition that "80% or more of a total number of said reinforcing fibers are present so that an angle from a center plane of said fiber reinforced plastic mold falls within ±20 degrees", supposing that a heating condition and a thickness of fiber reinforced plastic mold are the same as in the patent invention, if these conditions are adopted. Thus the allegation is not acceptable.

Therefore, Different Feature 2 is a substantial difference.

Further, A-1 and A-3 to A-5 fail to describe any motivation to adopt matters specifying the invention according to Different Feature 2. It cannot be said that a person skilled in the art could have easily conceived of adopting matters specifying the invention according to Different Feature 2 in the A-1 invention.

c The effects caused by Patent Invention 1

Patent Invention 1 "can provide a sheet for fiber reinforced plastic mold capable of molding a fiber reinforced plastic mold having a sufficient flame retardance and suppressing the generation of drips in combustion" due to matters specifying the invention according to Different Features 1 and 2 (see [0012] of the patent

specification). In view of the A-1 invention and the matters described in A-3 to A-5, Patent Invention 1 causes a particularly significant effect.

d Summary

Therefore, it cannot be said that Patent Invention 1 is the A-1 invention; i.e., an invention described in Evidence A No. 1, nor can it be said that Patent Invention 1 was easily conceivable by a skilled person in the art on the basis of the A-1 invention; i.e., the invention described in Evidence A No. 1 and the matters described in A-3 to A-5; i.e., the matters described in Evidence A Nos. 3 to 5.

B Patent inventions 2 to 11

Patent inventions 2 to 7 and 9 to 11 directly or indirectly depend from Claim 1 and have all the matters for specifying Patent Invention 1, and thus, similarly to Patent Invention 1, cannot be said to be the invention described in Evidence A No. 1, nor can it be said that the patent inventions were easily conceivable by a skilled person in the art on the basis of the invention described in Evidence A No. 1 and the matters described in Evidence A Nos. 3 to 5.

Further, Patent Invention 8 directly or indirectly depends from Claim 1 and has all the matters for specifying Patent Invention 1, and thus, similarly to Patent Invention 1, it cannot be said that Patent Invention 8 was easily conceivable by a person skilled in the art on the basis of the invention described in Evidence A No. 1 and the matters described in Evidence A Nos. 3 to 5.

(3) Grounds with a main cited reference of A-2

A Patent Invention 13

(A) Comparison

Patent Invention 13 is compared to the A-2 Invention.

They have a common ground in "a method of producing a prepreg (1) comprising the steps of: feeding a chopped carbon fiber obtained by cutting carbon fiber 1 into lengths of 6 mm with a cartridge cutter and feeding a dispersion consisting of water and surfactant to a dispersion bath 21 of a production apparatus constituted of an inclined type paper-making machine consisting of dispersion bath 21, a paper making bath 22 comprising a mesh conveyor 31 and a conveyor 32, and stirring, paper making, and drying to produce a carbon fiber base; laminating one of the above carbon fiber base and two films with the same thickness of CM1007 manufactured by Toray Industries, Inc. (nylon 6 resin) so as to form a laminate of film/carbon fiber base/film; and applying to this laminate a pressure of 5 MPa for two minutes at a temperature of 250°C to produce a prepreg (1) in which a carbon fiber base is impregnated with nylon 6 resin" of A-2 invention includes "a step of mixing a reinforcing fiber and a thermoplastic resin fiber comprising a retardant and producing a sheet for fiber reinforced plastic mold by wet nonwoven fabric method" and "a step of producing a sheet for fiber reinforced plastic mold by a wet nonwoven method" of Patent Invention 13.

Further, "A method of producing a prepreg (1) comprising the steps of: feeding a chopped carbon fiber obtained by cutting carbon fiber 1 into lengths of 6 mm with a cartridge cutter and a dispersion consisting of water and surfactant to a dispersion bath 21 of a production apparatus constituted of an inclined type paper-making machine

consisting of dispersion bath 21, a paper making bath 22 comprising a mesh conveyor 31 and a conveyor 32, and stirring, paper making, and drying to produce a carbon fiber base; laminating one of the above carbon fiber base and two films with the same thickness of CM1007 manufactured by Toray Industries, Inc. (nylon 6 resin) so as to form a laminate of film/carbon fiber base/film; and applying to this laminate a pressure of 5 MPa for two minutes at a temperature of 250°C to produce a prepreg (1) in which a carbon fiber base is impregnated with nylon 6 resin" of the A-2 invention includes a "step of producing a sheet for fiber reinforced plastic mold that comprises a step of making a paper by use of a Fourdrinier machine or inclined wire machine" of Patent Invention 13.

Furthermore, "a speed of the mesh conveyor 31 in paper making is adjusted to a speed four times a flow rate of the dispersion" of the A-2 Invention corresponds to a jet wire ratio of 0.25, and thus corresponds to "a wire of said Fourdrinier machine or inclined wire machine runs so that a jet wire ratio becomes 0.95 or less" of Patent Invention 13.

Furthermore, "a production method of prepreg (1)" of the A-2 Invention corresponds to "a method of producing a sheet for fiber reinforced plastic mold" of Patent Invention 13.

Therefore, these inventions have the following Common Point:
"A method of producing a sheet for fiber reinforced plastic mold comprising the steps of producing a sheet for fiber reinforced plastic mold by a wet nonwoven fabric method,
wherein said step of producing a sheet for fiber reinforced plastic mold comprises a step of making paper by use of a Fourdrinier machine or an inclined wire machine,
wherein a wire of said Fourdrinier machine or inclined wire machine runs so that a jet wire ratio becomes 0.95 or less."

Further, these inventions are different from each other in the following points:
<Different Feature 3>

Regarding "a step of producing a sheet for fiber reinforced plastic mold by a wet nonwoven method", in Patent Invention 13 "reinforcing fibers and thermoplastic resin fibers including a retardant are mixed", whereas in the A-2 Invention, "A chopped carbon fiber obtained by cutting carbon fiber 1 obtained from material 1 into lengths of 6 mm with a cartridge cutter and a dispersion consisting of water and surfactant were fed to a dispersion bath 21 of a production apparatus constituted of a inclined type paper-making machine consisting of the dispersion bath 21, a paper making bath 22 comprising a mesh conveyor 31 and a conveyor 32, and stirred, paper making, and dried to produce a carbon fiber base. One of the above carbon fiber base and two films with the same thickness of CM1007 manufactured by Toray Industries, Inc. (nylon 6 resin) were laminated so as to form a laminate of film/carbon fiber base/film. To this laminate a pressure of 5 MPa was applied for two minutes at a temperature of 250°C, and a carbon fiber base was impregnated with nylon 6 resin".

(B) Judgment

a Regarding Different Feature 3

Different Feature 3 will be examined in the following.

According to [0238] to [0240] and [0245] of A-2, the prepreg of Example 6 as a ground for the finding of the A-2 Invention does not have a "thermoplastic resin fiber

comprising a retardant".

Further, according to [0061] to [0063] of A-2, the above Example 6 solves the problem of the production method of prepreg that "subjects reinforcing fibers to paper making including a resin" described in International publication No. WO2007-97436 (A-6) that was allegedly "problematic" due to "the necessity of the cleaning a device and the increase in the number of apparatus for increasing the number of resin species since reinforcing fibers are subjected to paper making including a resin", "the necessity of controlling the orientation of carbon fibers", and "the necessity of designing a detailed condition for each step". Thus the A-2 Invention does not "subject reinforcing fibers to paper making including a resin".

Therefore, it can be said that there is a disincentive to apply "subjecting reinforcing fibers to paper making including a resin" as described in A-6 to the A-2 Invention that does not "subject reinforcing fibers to paper making including a resin"; i.e. "mix" "reinforcing fibers" and "thermoplastic resin fibers".

In addition, the Opponent alleges that it is technically feasible to apply a paper making method described in A-6 to the A-2 Invention, and the presence of the problem on production efficiency is not a sufficient condition for disincentive to combine a paper making method described in A-6 with the A-2 Invention. Technical feasibility is not a sufficient reason for motivation. As aforementioned, the A-2 Invention solves a problem of paper making method described in A-6. Thus there is a disincentive to combine the A-2 Invention with a paper making method described in A-6. Thus the allegation is not acceptable.

Therefore, it cannot be said that it was easily conceivable to "mix" "reinforcing fibers" and "thermoplastic resin fibers" by applying the matters described in A-6 to the A-2 Invention. Further, it cannot be said that a person skilled in the art could have easily conceived of adopting the matters specifying the invention according to Different Feature 3 with a further limitation of "including flame retardant".

b The effects caused

Further, Patent Invention 13 "can provide a sheet for fiber reinforced plastic mold capable of molding a fiber reinforced plastic mold having sufficient flame retardance and suppressing the generation of drips in combustion" due to matters specifying the invention according to Different Feature 3, which is a significant effect in view of the A-2 Invention and the matters described in A-6.

c Summary

Therefore, it cannot be said that Patent Invention 13 was easily conceivable by a person skilled in the art on the basis of the A-2 Invention; i.e., the invention described in Evidence A No. 2 and the matters described in A-6; i.e., the matters described in Evidence A No. 6.

B Patent Invention 14

Patent Invention 14 depends from Claim 13 and has all the matters for specifying Patent Invention 13, and thus, similarly to Patent Invention 13, it cannot be said that Patent Invention 14 was easily conceivable by a person skilled in the art on the basis of the invention described in Evidence A No. 2 and the matters described in Evidence A No. 6.

(4) Summary of Grounds 1 and 2 for the Opposition

As per the above (3) and (4), the patents according to Claims 1 to 11, 13, and 14 of the Patent cannot be revoked by the reasons with a main cited document of A-1 and a main cited document of A-2; i.e., Grounds 1 and 2 for the Opposition.

3 Grounds 3 for the Opposition

(1) Determination criteria

The ordinance of the Ministry of Economy, Trade and Industry as delegated to Article 36(4)(i) of the Patent Act (Regulations under the Patent Act, Article 24-2) specifies that the Detailed Description of the Invention should describe "matters necessary for a person skilled in the art to understand the technical significance of the invention" including the problem to be solved by the invention and the means for solving the problem so as to find what technical contribution is caused by the invention, and serve for examination and search.

Consequently, the matters required to be described in ministerial ordinance requirement are construed as the following a and b.

a Technical field of the Invention

b Problem to be solved by the invention and means for solving the problem

(2) Examination

Regarding technical field to which the invention pertains, the Detailed Description of the Invention discloses in [0001] that "The present invention relates to a sheet for fiber reinforced plastic mold. Specifically, the present invention relates to a sheet for fiber reinforced plastic mold capable of molding a fiber reinforced plastic mold in which reinforcing fibers are oriented substantially in parallel with a center plane".

Further, regarding a problem to be solved by the invention, [0008] describes that "As aforementioned, flame retardance may be improved to some extent by incorporating a flame retardant in the fiber reinforced plastic mold. However, in a fiber reinforced plastic mold as disclosed in Patent Document 1, thermoplastic resin sometimes melts and drips in combustion and in some cases such dripped resin may become an igniting agent of the other material. Thus it was problematic. Further, it has been discovered through a consideration of the inventors that the drip of thermoplastic resin is not fully suppressed also in a fiber reinforced plastic mold disclosed in Patent Document 2." and [0009] describes that "Accordingly in order to solve such a problem of conventional technique, the present inventors have carried on the investigation with an object to provide a sheet for fiber reinforced plastic mold capable of molding a fiber reinforced plastic mold having sufficient flame retardance and suppressing the generation of drips in combustion."

Furthermore, as a means for solving the problem, paragraph [0010] describes that "as a result of intensive investigation for solving the above problem, the present inventors have found that the generation of drip may be suppressed in combustion and the flame retardance may be fully improved by aligning most of said reinforcing fibers substantially in parallel with a center plane of a fiber reinforced plastic mold in the mold obtained by subjecting a sheet for fiber reinforced plastic mold including a thermoplastic resin including a flame retardant to pressurized molding with heat.

Specifically, the present invention has the following constitution." and [0011] discloses "[1] a sheet for fiber reinforced plastic mold comprising a reinforcing fiber and a thermoplastic resin, wherein, in a fiber reinforced plastic mold having a thickness of 1 mm obtained by subjecting said sheet for fiber reinforced plastic mold to pressurized molding with heat in the following conditions (a) and (b), most of said reinforcing fibers are present substantially in parallel with a center plane of said fiber reinforced plastic mold;

(a) pressurizing at a press pressure of 10 MPa and a press speed of 3.5 cm/sec,

(b) heating so that Q/P may be not less, given that a true density (g/cm^3) of said sheet for fiber reinforced plastic mold is P, and a bulk density (g/cm^3) of fiber reinforced plastic mold obtained by heating is Q while pressurizing under the above condition (a).

[2] The sheet for fiber reinforced plastic mold of [1], in a fiber reinforced plastic mold having a thickness of 1 mm obtained by subjecting said sheet for fiber reinforced plastic mold to pressurized molding with heat under said conditions (a) and (b), 80% or more of a total number of said reinforcing fibers are present so that an angle from a center plane of said fiber reinforced plastic mold falls within ±20 degrees".

Therefore, it can be said that the Detailed Description of the Invention describes the technical field to which the invention pertains and the problem to be solved by the invention and means for solving the problem.

Further, a person skilled in the art could recognize a technical significance of matters specifying the invention from these description that "In a fiber reinforced plastic mold having a thickness of 1 mm obtained by subjecting said sheet for fiber reinforced plastic mold to pressurized molding with heat under the following conditions (a) and (b), 80% or more of a total number of said reinforcing fibers are present so that an angle from a center plane of said fiber reinforced plastic mold falls within ±20 degrees;

(a) pressurizing at a press pressure of 10 MPa and a press speed of 3.5 cm/sec,

(b) heating so that Q/P reaches not less than 0.7, given that a true density (g/cm^3) of said sheet for fiber reinforced plastic mold is P, and a bulk density (g/cm^3) of fiber reinforced plastic mold obtained by heating is Q while pressurizing under the above condition (a)." as recited in Claim 1.

Therefore, it can be said that the Detailed Description of the Invention describes "matters necessary for a person skilled in the art to understand the technical significance of the invention". Regarding Patent Invention 1, the Detailed Description of the Invention conforms to the provision as specified in Article 24-2 of Regulations under the Patent Act.

Further, Patent Inventions 2 to 11 directly or indirectly depend from Claim 1, and contain the above matters specifying the invention recited in Claim 1. Therefore, similarly to Patent Invention 1, Patent Inventions 2 to 11 conform to the provision as specified in Article 24-2 of Regulations under the Patent Act.

(3) Summary of Grounds 3 for the Opposition

As per the above item (2), the patents according to Claims 1 to 11 of the Patent cannot be revoked by the Grounds 3 for the Opposition.

4 Grounds 4 and 5 for the Opposition

(1) Determination criteria

A Determination criteria of the support requirement

Whether the statement of the scope of claims satisfies the Support Requirement of a Description should be determined by considering, through comparison of the statement of the scope of claims and the statement of the detailed explanation of the invention, whether the invention described in the scope of claims is the invention described in the detailed explanation of the invention that is within the scope for which a person ordinarily skilled in the art can recognize, based on the statement of the detailed explanation of the invention, that the invention can solve the problem to be solved by the invention, and also by considering whether the invention described in the scope of claims is an invention within the scope for which a person ordinarily skilled in the art can recognize, in light of the common general technical knowledge as of the time of filing the application, that the invention can solve the problem to be solved by the invention, even without the statement and indication thereof.

B Determination criteria of Definiteness requirement

Whether the invention for which the patent is sought is definite should be determined by considering, based on not only the statement of the scope of claims but also the statement of the detailed explanation and the drawings of the invention attached to the application form, in light of the common general technical knowledge as of the filing the application, whether the statement of the Claims is indefinite to the extent that the interest of a third party may be unreasonably prejudiced.

(2) Examination

A Regarding the support requirement concerning "(a) pressurizing at a press pressure of 10 MPa and a press speed of 3.5 cm/sec." recited in Claim 1

The recitation of Claim 1 of the scope of the claims of the Patent is as per the above No. 2 [Claim 1].

According to paragraph [0009] of the Detailed Description of the Invention that "Accordingly in order to solve such a problem of conventional technique, the present inventors have carried on the investigation with an object to provide a sheet for fiber reinforced plastic mold capable of molding a fiber reinforced plastic mold having sufficient flame retardance and suppressing the generation of drips in combustion.", a problem to be solved by Patent Invention 1 (hereinafter referred to as "the problem to be solved by the Invention") is "to provide a sheet for fiber reinforced plastic mold capable of molding a fiber reinforced plastic mold having a sufficient flame retardance and suppressing the generation of drips in combustion".

Further, paragraph [0038] describes that "the condition (a) specifies a pressurizing condition of a press pressure of 10 MPa and a press speed of 3.5 cm/sec. A press time is not particularly limited, but pressing is performed until a pressing machine stops by heating and pressurizing a sheet for fiber reinforced plastic mold under conditions (a) and (b). Further, after elevating a setting temperature, the temperature is kept for 5 minutes and cooled down to a prescribed temperature". Paragraph [0039] describes that "Under condition (a), a press speed is set to 3.5 cm/sec. If the press speed falls within 3.5 ± 0.5 cm/sec, it reaches a pressurizing condition similar to the case of pressing with a press speed of 3.5 cm/sec. Since a sheet for fiber reinforced plastic mold of the present invention originally has less orientation of reinforcing fibers in a thickness direction, even if a pressure should be applied at a relatively high press speed, reinforcing fibers become less oriented in a thickness

direction in a mold. At a press speed of 3.5 cm/sec, it is feasible to appropriately evaluate the fiber orientation of reinforcing fibers in a fiber reinforced plastic mold." The same paragraph [0040] describes that "The condition (b) specifies a heating condition, and given that a true density (g/cm^3) of said sheet for fiber reinforced plastic mold is P, and a bulk density (g/cm^3) of fiber reinforced plastic mold obtained by heating is Q while pressurizing in the above condition (a), it is a condition of heating such that Q/P reaches not less than 0.7." Further, [0086] to [0106] describe that the drip does not generate in a status of UL94 combustion test in a specific example pressurized at a press pressure of 10 MPa and a press speed of 3.5 cm/sec.

A person skilled in the art could recognize from these descriptions that Patent Invention 1 specified by a pressurizing condition of a press pressure of 10 MPa and a press speed of 3.5 cm/sec might solve a problem to be solved by the invention of "to provide a sheet for fiber reinforced plastic mold capable of molding a fiber reinforced plastic mold having sufficient flame retardance and suppressing the generation of drips in combustion".

In addition, the Opponent alleges that "[0039] describes that 'Under condition (a), a press speed is set to 3.5 cm/sec. If the press speed falls within 3.5 ± 0.5 cm/sec, it becomes a pressurizing condition similar to the case of pressing with a press speed of 3.5 cm/sec.' However, the press speed is only one point. No consideration is given to the phenomena that could take place in a case of deviating from this range. Thus the description is not fully demonstrated. Thus the invention according to Claim 1 and the inventions according to Claims 2 to 11 depending from Claim 1 are not described in the Detailed Description of the Invention." However, the effects of carrying out at a press speed of 3.5 cm/sec as specified in Patent Invention 1 are demonstrated. Thus it can be said that the effects of implementing the invention according to Claim 1; i.e., Patent Invention 1, are demonstrated. Thus the allegation is not acceptable.

Therefore, Patent Invention 1 is an invention described in the Detailed Description of the Invention and falls within such a scope that allows a person skilled in the art to recognize from the description of the Detailed Description of the Invention that the problem to be solved can be solved. Thus, the scope of claims of Patent Invention 1 conforms to the support requirement.

Further, Patent Inventions 2 to 11 depend directly or indirectly from Claim 1. Since these inventions contain a matter defining "(a) pressurizing at a press pressure of 10 MPa and a press speed of 3.5 cm/sec." recited in Claim 1, similarly to Patent Invention 1, the scope of claims of Patent Inventions 2 to 1 conforms to the support requirement.

B Support requirement and definiteness of the measurement condition of orientation angle recited in Claim 1

(A) Support Requirement

The recitation of Claim 1 and a problem to be solved by the invention of Patent Invention 1 are as per the above A.

Further, the Detailed Description of the Invention describes in [0098] "<Measurement of an angle between reinforcing fibers and fiber reinforced plastic mold>

An angle between reinforcing fibers and a center plane of fiber reinforced plastic mold was measured as follows. First, a fiber reinforced plastic mold after pressurized

molding with heat was cut out into a cross section of an MD direction (B-B' line of FIG. 3(a)). A cross sectional image in the MD direction is shown in FIG. 3(b). Reinforcing fibers of this cross section were imaged by a three-dimensional measurement X-ray CT apparatus (manufactured by Yamato Scientific co., ltd.; Product name "TDM1000-IS/SP") to obtain a cross sectional image by three-dimensional volume rendering software (manufactured by NVS; "VG-Studio MAX"). Further, for the resultant cross-sectional image, ten 10 μm-lines V were drawn in the Z-axis direction, and for all fibers seen in contact with the line, an angle of reinforcing fibers from a center plane of a fiber reinforced plastic mold was measured as shown with a white line of FIG. 4. Specifically, a line parallel with a center plane of a fiber reinforced plastic mold was represented by a line H (dotted line). An angle of this line H from reinforcing fibers was measured. The number of measured fibers was about 100 to 130. Further, a proportion of a number of fibers having an angle of a center plane of a fiber reinforced plastic mold falling within ± 20 degrees on a total number basis of measured reinforcing fibers is represented by Tables 1 to 3." The method of measuring a specific angle is described. Further, it is obvious that this measurement method can be applied also in a case of bent fibers.

Further, [0086] to [0106] describe that it was confirmed that the drip did not generate in a status of UL94 combustion test in a specific example that satisfied a measurement condition of the orientation angle recited in Claim 1.

A person skilled in the art could recognize from these descriptions that Patent Invention 1 defining a measurement condition of the orientation angle recited in Claim 1 solves a problem to be solved by the invention of "to provide a sheet for fiber reinforced plastic mold capable of molding a fiber reinforced plastic mold having sufficient flame retardance and suppressing the generation of drips in combustion".

Therefore, Patent Invention 1 is an invention described in the Detailed Description of the Invention and falls within such a scope that allows a person skilled in the art to recognize from the description of the Detailed Description of the Invention that the problem to be solved can be solved. Thus, the scope of claim of Patent Invention 1 conforms to the support requirement.

Further, Patent Inventions 2 to 11 depend directly or indirectly from Claim 1 and contain the above matters specifying the measurement condition of the orientation angle recited in Claim 1. Therefore, similarly to Patent Invention 1, the scope of claims of Patent Inventions 2 to 11 conforms to the support requirement.

(B) Definiteness requirement

As per the above (A), the Detailed Description of the Invention discloses a specific measurement condition of the orientation angle recited in Claim 1.

Therefore, it cannot be said that the scope of the claims of Patent Invention 1 is so indefinite as to unjustly impair third party's benefit.

Patent Inventions 2 to 11 depend directly or indirectly from Claim 1 and contain the above matters specifying the measurement condition of the orientation angle recited in Claim 1. Therefore, similarly to Patent Invention 1, it cannot be said that the scope of claims of Patent Inventions 2 to 11 is so indefinite as to unjustly impair third party's benefit.

(3) Summary of examination on Grounds 4 and 5 for the Opposition

Therefore, the patents according to Claims 1 to 11 of the Patent cannot be revoked by the Grounds 4 and 5 for the Opposition.

No. 5 Closing remarks

As stated in the above No. 4, the patents according to Claims 1 to 11, 13, and 14 of the Patent cannot be revoked by the reasons and the means of proof for the Opposition.

Further, there is no other reason to revoke the patents according to Claims 1 to 11, 13, and 14 of the Patent.

Therefore, the decision shall be made as described in the Conclusion.

November 20, 2018

Chief administrative judge: SUTO, Yasuhiro
Administrative judge: KATO, Tomoya
Administrative judge: FUCHINO, Ruka