Decision on Opposition

Opposition No. 2018-700324

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The case of opposition against the patented invention "binder resin composition for toner" of Patent No. 6223109 has resulted in the following decision.

Conclusion

The correction of the Scope of Claims of Patent No. 6223109 shall be approved as stated in the Scope of Claims attached to the Written Correction Request, as for Claims [1 to 8 and 11 to 17] and [9 and 10] after correction.

The patents according to Claims 1, 2, 4, and 7 to 10 of Japanese Patent No. 6223109 are maintained.

The opposition to the grant of a patent according to Claim 3 of Patent No. 6223109 shall be dismissed.

Reason

No.1 History of the procedures

The application of the patent according to Claims 1 to 10 of Patent No. 6223109 (hereinafter, referred to as "the Patent") was filed on October 10, 2013, its patent right was registered on October 13, 2017, and a patent publication was issued on November 1, 2017.

After that, an Opposition to the Grant of Patent according to Claims 1 to 7 and 7 to 10 according to the patent was filed on April 7, 2017 by the Patent Opponent Mitsuyo Nakamura (hereinafter, referred to as "the Patent Opponent"). Reasons for Rescission were noticed on July 6, 2017. Then, on September 6, 2017, the Patentee submitted a Written Opinion and a request for correction (hereinafter, the request for correction is referred to as "the Correction Request" and the correction based on the Correction

Request is referred to as "the Correction").

Based on the provisions of Article 120-5(5) of the Patent Act, The Examiner gave the Patent Opponent the opportunity to submit a Written Opinion, but no Written Opinion was submitted.

No.2 Judgment on Propriety of Correction

1. Object of correction

The object of the Correction Request is "to request to correct the corrected Claims 1 to 17 of the Scope of Claims for Patent No. 6223109 to the corrected Scope of Claims attached to the Written Demand for Correction."

2. Contents of correction

The details of correction by the Correction are as follows. Underlines are added to the corrected portions.

(1) Correction A

Correct

"a hydrocarbon wax having a hydroxyl group with a melting point of 70 to 120°C"

stated in Claim 1 of the Scope of Claims to

"a hydrocarbon wax having a hydroxyl group with a melting point of 70 to 120°C <u>and a molecular weight of 500 to 2000</u>" (Claims 2, 4, 7, and 8, which depend from Claim 1, are also corrected in a similar manner).

(2) Correction B

Delate Claim 3 of the Scope of Claims.

(3) Correction C

Correct

"the binder resin composition for a toner according to any one of Claims 1 to 3"

stated in Claim 4 of the Scope of Claims to

"the binder resin composition for a toner according to Claim <u>1 or 2</u>."

(4) Correction D

Correct

"the binder resin composition for a toner according to any one of Claims 1 to 4, wherein the hydrocarbon wax having a hydroxyl group further comprises a carboxy group"

stated in Claim 5 of the Scope of Claims to

"a binder resin composition for a toner comprising a crystalline polyester and an amorphous polyester, wherein the crystalline polyester comprises a hydrocarbon wax having a hydroxyl group having a melting point of 70 to 120°C, an aliphatic diol having 6 to 14 carbon atoms, and an aliphatic dicarboxylic acid compound having 10 to 14 carbon atoms, and is obtained using a raw material monomer in which the content of the hydrocarbon wax is 1.0 to 15% by mass; and the hydrocarbon wax having a hydroxyl group further includes a carboxyl group."

(5) Correction E

Correct

"the binder resin composition for a toner according to any one of Claims 1 to 5, wherein the alcohol component as a raw material monomer of the amorphous polyester comprises an aliphatic diol having 2 to 3 carbon atoms"

stated in Claim 6 of the Scope of the Claims to

"a binder resin composition for a toner comprising a crystalline polyester and an amorphous polyester, wherein the crystalline polyester comprises a hydrocarbon wax having a hydroxyl group having a melting point of 70 to 120°C, an aliphatic diol having 6 to 14 carbon atoms, and an aliphatic dicarboxylic acid compound having 10 to 14 carbon atoms, and is obtained using a raw material monomer in which the content of the hydrocarbon wax is 1.0 to 15% by mass; and the alcohol component as a raw material monomer of the amorphous polyester has an aliphatic diol having 2 to 3 carbon atoms."

(6) Correction F

Correct

"the binder resin composition for a toner according to any one of Claims 1 to 6" stated in Claim 7 of the Scope of Claims to "the binder resin composition for a toner according to any one of Claims 1, 2, and 4 to 6."

(7) Correction G

Correct

"the binder resin composition for a toner according to any one of Claims 1 to 7"

stated in Claim 8 of the Scope of Claims to

"the binder resin composition for a toner according to any one of Claims 1, 2, and 4 to 7."

(8) Correction H

Correct

"a hydrocarbon wax having a hydroxyl group with a melting point of 70 to 120°C" stated in Claim 9 of the Scope of Claims to "a hydrocarbon wax having a hydroxyl group with a melting point of 70 to 120°C and a molecular weight of 500 to 2000" (Claim 10, which depends from Claim 9, is also corrected in a similar manner).

(9) Correction I

Among claims corresponding to

"the binder resin composition for a toner according to any one of Claims 1 to 4, wherein the hydrocarbon wax having a hydroxyl group further comprises a carboxy group"

stated in Claim 5 of the Scope of Claims, correct one dependent on Claim 2 to

"the binder resin composition for a toner according to Claim 5, wherein a mass ratio of the amorphous polyester to the crystalline polyester (amorphous polyester/crystalline polyester) is 65/35 to 95/5"

as new Claim 11.

(10) Correction J

Among claims corresponding to

"the binder resin composition for a toner according to any one of Claims 1 to 4, wherein the hydrocarbon wax having a hydroxyl group further comprises a carboxy group" stated in Claim 5 of the Scope of Claims, correct one dependent on Claim 3 to

"the binder resin composition for a toner according to Claim 5 or 11, wherein the hydrocarbon wax having a hydroxyl group has a molecular weight of 350 to 2000"

as new Claim 12.

(11) Correction K

Among claims corresponding to

"the binder resin composition for a toner according to any one of Claims 1 to 4, wherein the hydrocarbon wax having a hydroxyl group further comprises a carboxy group"

stated in Claim 5 of the Scope of Claims, correct one dependent on Claim 4 to

"the binder resin composition for a toner according to Claim 5, 11, or 12, wherein the hydrocarbon wax having a hydroxyl group has a hydroxyl value of 40 to 140 mg KOH/g"

as new Claim 13.

(12) Correction L

Among claims corresponding to

"the binder resin composition for a toner according to any one of Claims 1 to 5, wherein the alcohol component as a raw material monomer of the amorphous polyester comprises an aliphatic diol having 2 to 3 carbon atoms"

stated in Claim 6 of the Scope of the Claims, correct one dependent on Claim 2 to

"the binder resin composition for a toner according to Claim 6, wherein a mass ratio of the amorphous polyester to the crystalline polyester (amorphous polyester/crystalline polyester) is 65/35 to 95/5"

as new Claim 14.

(13) Correction M

Among claims corresponding to

"the binder resin composition for a toner according to any one of Claims 1 to 5, wherein the alcohol component as a raw material monomer of the amorphous polyester comprises an aliphatic diol having 2 to 3 carbon atoms"

stated in Claim 6 of the Scope of the Claims, correct one dependent on Claim 3 to

"the binder resin composition for a toner according to Claim 6 or 14, wherein the hydrocarbon wax having a hydroxyl group has a molecular weight of 350 to 2000"

as new Claim 15.

(14) Correction N

Among claims corresponding to

"the binder resin composition for a toner according to any one of Claims 1 to 5, wherein the alcohol component as a raw material monomer of the amorphous polyester comprises an aliphatic diol having 2 to 3 carbon atoms"

stated in Claim 6 of the Scope of the Claims, correct one dependent on Claim 4 to

"the binder resin composition for a toner according to Claim 6, 14, or 15, wherein the hydrocarbon wax having a hydroxyl group has a hydroxyl value of 40 to

140 mg KOH/g"

as new Claim 16.

(15) Correction O

Among claims corresponding to

"the binder resin composition for a toner according to any one of Claims 1 to 5, wherein the alcohol component as a raw material monomer of the amorphous polyester comprises an aliphatic diol having 2 to 3 carbon atoms"

stated in Claim 6 of the Scope of the Claims, correct one dependent on Claim 5 to

"the binder resin composition for a toner according to any one of Claims 6, and 14 to 16, wherein the hydrocarbon wax having a hydroxyl group further comprises a carboxy group"

as new Claim 17.

(16) The Correction Request

The Correction Request was demanded for a group of Claims [1 to 8] and for Claims [9 and 10].

3. Suitability of the purpose of correction

(1) Correction by Correction A is to restrict "the hydrocarbon wax having a hydroxyl group with a melting point of 70 to 120°C" in the invention stated in each of Claims 1, 2, 4, 7, and 8 before the Correction to "a hydrocarbon wax having a hydroxyl group with a melting point of 70 to 120°C and a molecular weight of 500 to 2000." In addition, Correction by Correction H is also to restrict the same matter stated in each of Claims 9 and 10 before the Correction as that of the above Correction A.

Therefore, each of Correction A and Correction H aims at matters listed in item (i) of the proviso to Article 120-5(2) of the Patent Act.

(2) Correction by Correction B is to delete Claim 3 of the Scope of Claims before the Correction and thus aims at matters listed in item (i) of the proviso to Article 120-5(2) of the Patent Act.

(3) The correction by Correction C is to correct the statement of Claim 4 stated by citing the statement of Claim 3 to prevent the statement of Claim 4 from becoming unclear (i.e., to prevent it from citing Claim 3) due to deletion of Claim 3 of the Scope of

Claims by Correction 2.

Therefore, Correction by Correction C aims at matters listed in item (3) of the proviso to Article 120-5(2) of the Patent Act.

(4) Corrections by Corrections D and I to K correct the statement of Claim 5 citing the statements of Claims 1 to 4 before correction to make Claims 5 and 11 to 13 that do not cite the statements of Claims 1 to 4 before correction.

Therefore, the corrections by Corrections D and I to K aim at matters listed in item (iv) of the proviso to Article 120-5(2) of the Patent Act.

(5) Corrections by Corrections E and L to O correct the statement of Claim 6 citing the statements of Claims 1 to 5 before correction to make Claims 6 and 14 to 17 that do not cite the statements of Claims 1 to 5 before correction.

Therefore, the corrections by Corrections E and L to O aim at matters listed in item (iv) of the proviso to Article 120-5(2) of the Patent Act.

(6) Closing

As described above, the Correction aims at matters listed in items (i), (iii), or (iv) of the proviso to Article 120-5(2) of the Patent Act.

4. Existence or absence of new matter

(1) Corrections A and H

In paragraph [0042] of the Specification attached to the application of the patent, it is described that "from the viewpoint of storage stability, the molecular weight of the hydrocarbon wax having a hydroxyl group is preferably 350 or more, more preferably 400 or more, even more preferably 500 or more, still more preferably 700 or more, further more preferably 900 or more, and particularly more preferably 1100 or more."

In view of the above, the corrections by Corrections A and H are made within the scope of the matter described in the Specification or the Scope of Claims attached to the application.

(2) Correction B

Correction by Correction B is to delate a claim, and thus the correction by Correction B is obviously made within the scope of the matter described in the Specification or the Scope of Claims attached to the application.

(3) Correction C

The correction by Correction C is to correct the statement of Claim 4 stated by citing the statement of Claim 3 to prevent the statement of Claim 4 from becoming unclear (i.e., to prevent it from citing Claim 3) due to deletion of Claim 3 of the Scope of Claims by Correction B. Thus, the correction by Correction C is obviously made within the scope of the matter described in the Specification or the Scope of Claims attached to the application.

(4) Corrections D and I to K

Corrections by Corrections D and I to K are just to correct the statement of Claim 5 citing the statements of Claims 1 to 4 before correction to Claims 5 and 11 to 13 that do not cite the statements of Claims 1 to 4 before correction. Thus, the corrections result in no change in contents of the invention.

Therefore, the corrections by Corrections D and I to K are obviously made within the scope of the matter described in the Specification or the Scope of Claims attached to the application.

(5) Corrections E and L to O

Corrections by Corrections E and L to O are just to correct the statement of Claim 6 citing the statements of Claims 1 to 5 before correction to Claims 6 and 14 to 17 that do not cite the statements of Claims 1 to 5 before correction. Thus, the corrections result in no change in contents of the invention.

Therefore, the corrections by Corrections E and L to O are obviously made within the scope of the matter described in the Specification or the Scope of Claims attached to the application.

(6) Closing

As described above, the Correction falls under the provisions of Article 126(5) of the Patent Act which is applied mutatis mutandis pursuant to Article 120-5(9) of the Patent Act.

5. Existence or absence of enlargement or alternation of the Scope of Claims

The corrections by Corrections A and H are to restrict "the hydrocarbon wax having a hydroxyl group with a melting point of 70 to 120°C" in the invention described in Claim 1 before correction to "a hydrocarbon wax having a hydroxyl group with a melting point of 70 to 120°C and a molecular weight of 500 to 2000." Thus, each of the corrections is substantially not an enlargement or alternation of the Scope of Claims.

The correction by Correction B is to delete a claim. Thus, the correction is not substantially an enlargement or alternation of the Scope of Claims.

The correction by Correction C is to correct the statement of Claim 4 stated by citing the statement of Claim 3 to prevent the statement of Claim 4 from becoming unclear (i.e., to prevent it from citing Claim 3) due to deletion of Claim 3 of the Scope of Claims by Correction B. Thus, the correction is not substantially an enlargement or alternation of the Scope of Claims.

Corrections by Corrections D and I to K are just to correct the statement of Claim 5 citing the statements of Claims 1 to 4 before correction to Claims 5 and 11 to 13 that do not cite the statements of Claims 1 to 4 before correction. Thus, the corrections are not substantially enlargement or alternation of the scope of claims.

Corrections by Corrections E and L to O are just to correct the statement of Claim 6 citing the statements of Claims 1 to 5 before correction to Claims 6 and 14 to 17 that do not cite the statements of Claims 1 to 5 before correction. Thus, the correction is not substantially an enlargement or alternation of the Scope of Claims.

Therefore, the Correction falls under the provisions of Article 126(6) of the Patent Act which is applied mutatis mutandis pursuant to Article 120-5(9) of the Patent Act.

6 Summary

As described above, the Correction aims at matters listed in item (i), (iii), or (iv) of the proviso to Article 120-5(2) of the Patent Act and falls under the provisions of Article 126(5) and (6) of the Patent Act which is applied mutatis mutandis pursuant to Article 120-5(9) of the Patent Act.

Therefore, the correction of the Scope of Claims shall be approved as stated in the Scope of Claims attached to the Written Correction Request, as for Claims [1 to 8 and 11 to 17] and [9 and 10] after correction.

No. 3 The Invention after correction

As described in the above II, the Correction Request shall be approved. Thus, the inventions recited in Claims 1, 2, and 4 to 17 (hereinafter, respectively referred to as "Patent Invention 1," "Patent Invention 2," and "Patent Invention 4" to "Patent Invention 17") are recognized to be as specified by the matters stated in the scope of claim after correction by the Correction Request, as below, Claims 1, 2, and 4 to 17. Note that Claim 3 is deleted by the Correction.

"[Claim 1]

A binder resin composition for a toner comprising a crystalline polyester and an amorphous polyester, wherein the crystalline polyester comprises a hydrocarbon wax having a hydroxyl group with a melting point of 70 to 120°C and a molecular weight of 500 to 2000, an aliphatic diol having 6 to 14 carbon atoms, and an aliphatic dicarboxylic acid compound having 10 to 14 carbon atoms, and is obtained using a raw material monomer in which the content of the hydrocarbon wax is 1.0 to 15% by mass.

[Claim 2]

The binder resin composition for a toner according to Claim 1, wherein a mass ratio of the amorphous polyester to the crystalline polyester (amorphous polyester/crystalline polyester) is 65/35 to 95/5.

[Claim 4]

The binder resin composition for a toner according to Claim 1 or 2, wherein the hydrocarbon wax having a hydroxyl group has a hydroxyl value of 40 to 140 mg KOH/g.

[Claim 5]

The binder resin composition for a toner comprising a crystalline polyester and an amorphous polyester, wherein the crystalline polyester comprises a hydrocarbon wax having a hydroxyl group with a melting point of 70 to 120°C, an aliphatic diol having 6 to 14 carbon atoms, and an aliphatic dicarboxylic acid compound having 10 to 14 carbon atoms, and is obtained using a raw material monomer in which the content of the hydrocarbon wax is 1.0 to 15% by mass; and the hydrocarbon wax having a hydroxyl group further includes a carboxyl group.

[Claim 6]

A binder resin composition for a toner comprising a crystalline polyester and an amorphous polyester, wherein the crystalline polyester comprises a hydrocarbon wax having a hydroxyl group with a melting point of 70 to 120°C, an aliphatic diol having 6 to 14 carbon atoms, and an aliphatic dicarboxylic acid compound having 10 to 14 carbon atoms, and is obtained using a raw material monomer in which the content of the hydrocarbon wax is 1.0 to 15% by mass; and the alcohol component as a raw material monomer of the amorphous polyester comprises an aliphatic diol having 2 to 3 carbon atoms.

[Claim 7]

The binder resin composition for a toner according to any one of Claims 1, 2, and 4 to 6, wherein a total content of the aliphatic diol having 6 to 14 carbon atoms and the aliphatic dicarboxylic acid compound having 10 to 14 carbon atoms is 80 to 100%

by mole in the raw material monomer of the crystalline polyester excluding the hydrocarbon wax having a hydroxyl group.

[Claim 8]

A toner for electrostatic charge image development comprising a binder resin composition for a toner according to any one of Claims 1, 2, and 4 to 7.

[Claim 9]

A toner for electrostatic charge image development comprising a crystalline polyester and an amorphous polyester, wherein the crystalline polyester comprises a hydrocarbon wax having a hydroxyl group with a melting point of 70 to 120°C and a molecular weight of 500 to 2000, an aliphatic diol having 6 to 14 carbon atoms, and an aliphatic dicarboxylic acid compound having 10 to 14 carbon atoms, and is obtained using a raw material monomer in which the content of the hydrocarbon wax is 1.0 to 15% by mass.

[Claim 10]

The toner for electrostatic charge image development according to Claim 9, further comprising 2 to 15 parts by mass of a wax having a melting point of 65 to 120°C with respect to 100 parts by mass of a binder resin.

[Claim 11]

The binder resin composition for a toner according to Claim 5, wherein a mass ratio of the amorphous polyester to the crystalline polyester (amorphous polyester/crystalline polyester) is 65/35 to 95/5.

[Claim 12]

The binder resin composition for a toner according to Claim 5 or 11, wherein the hydrocarbon wax having a hydroxyl group has a molecular weight of 350 to 2000.

[Claim 13]

The binder resin composition for a toner according to Claim 5, 11, or 12, wherein the hydrocarbon wax having a hydroxyl group has a hydroxyl value of 40 to 140 mg KOH/g.

[Claim 14]

The binder resin composition for a toner according to Claim 6, wherein a mass ratio of the amorphous polyester to the crystalline polyester (amorphous polyester/crystalline polyester) is 65/35 to 95/5.

[Claim 15]

The binder resin composition for a toner according to Claim 6 or 14, wherein the hydrocarbon wax having a hydroxyl group has a molecular weight of 350 to 2000.

[Claim 16]

The binder resin composition for a toner according to Claim 6, 14, or 15, wherein the hydrocarbon wax having a hydroxyl group has a hydroxyl value of 40 to 140 mg KOH/g.

[Claim 17]

The binder resin composition for a toner according to any one of Claims 6 and 14 to 16, wherein the hydrocarbon wax having a hydroxyl group further comprises a carboxy group.

No. 4 Reasons for rescission stated in the Notification of Reasons for Revocation

1 Outline of the reasons for rescission

The outline of the reasons for rescission notified on July 6, 2018 is as follows: the inventions stated in Claims 1 to 4 and 7 to 10 before the Correction are identical to those stated in the Specification, the Scope of Claims, or Drawings originally attached in the application mentioned below, which was filed before and published after the filing of the present patent application (deemed to be published at the time of publication of Japanese Patent Application No. 2014-154775 as a basis of priority claim of the present patent application in accordance with the provisions of Article 41(3) of the Patent Act); the inventors of the present patent application are not identical to the inventors of the above inventions of the above application filled before the present application; the applicant of the present application is not identical to the applicant of the above patent application at the time of filing the present patent; because of these reasons, the applicant should not be granted a patent for the Invention under the provisions of Article 29(2) of the Patent Act; and therefore the patent for the Invention shall be revoked.

1. Japanese Patent Application No. 2013-160759 (Japanese Unexamined Patent Application Publication No. 2015-45849)

(Note by the collegial body: Exhibit A1 is Japanese Unexamined Patent Application Publication No. 2015-45849 and Evidence No. 2 is the Specification, the Scope of Claims, and Drawings attached to Japanese Patent Application No. 2013-160759.

2 Described matters in Japanese Patent Application No. 2013-160759 and the inventions stated in Japanese Patent Application No. 2013-160759

(1) Described matters in Japanese Patent Application No. 2013-160759

In the Specification, the Scope of the Invention, and Drawings originally attached to the application of Japanese Patent Application No. 2013-160759 (hereinafter, referred to as "the originally attached description, etc.") filed before and published after the filing of the present patent application includes the described matters below. Here, the described matters are also found in the Specification and Drawings originally attached to Japanese Patent Application No. 2014-154775 claiming priority based on Japanese Patent Application No. 2013-160759. Underlines are added to portions used by the collegial body for the recognition of the Invention.

A "[Technical Field]

[0001]

The present invention relates to a toner for use in electrophotography, an image forming method for visualizing an electrostatic charge image, and a toner jet.

... (Omitted) ...

[Problem to be Solved by the Invention]

[0007]

An object of the present invention is to provide a toner which has solved the above problems.

In other words, an object of the present invention is to provide a toner having excellent low-temperature fixability, durability, and tribo-charging rate when being used on cardboard.

B "[0011]

According to the present invention, it is possible to provide a toner having excellent low-temperature fixability, durability, and tribo-charging rate when being used on cardboard.

[Brief Description of Drawings]

[0012]

[FIG. 1] FIG. 1 is a schematic diagram showing a microscopic state of crystalline polyester resin A in the toner of the present invention.

... (Omitted) ...

[0014]

The present invention is characterized in that the microscopic existence state of crystalline polyester resin A in a toner is controlled by allowing Sc, Sd, Se, and Sf to satisfy a specific relationship.

FIG. 1 schematically shows the microscopic presence of crystalline polyester resin A in the toner of the present invention. Needless to say, the present invention is not limited by FIG. 1.

In FIG. 1, C and D represent the polyester molecular chain (C) and the crystal nucleating agent site (D) of crystalline polyester resin A, respectively. E and F represent a polyester unit (E) and a vinyl polymer unit (F) of amorphous resin B, respectively.

Since the amorphous resin B of the present invention is a hybrid resin in which the polyester unit (E) and the vinyl polymer unit (F) are chemically bonded, it is a macroscopically uniform resin.

However, when viewed microscopically, the molecular structures of the polyester unit (E) and the vinyl polymer unit (F) are different from each other. Thus, each unit can be easily self-agglutinated and has a so-called microphase separation structure.

In the present invention, the phase composed of the polyester (E) in the microphase separation structure is referred to as phase E and the phase composed of vinyl polymer unit (F) therein is referred to as phase F.

... (Omitted) ...

[0022]

The crystalline polyester resin A of the present invention needs to be a resin having a crystal nucleating agent site (D) at the end of the polyester molecular chain (C).

... (Omitted) ...

[0023]

The crystal nucleating agent site (D) of the present invention is not particularly limited as long as it is a site derived from a compound having a higher crystallization rate than the crystalline polyester resin A composed only of the polyester molecular chain (C).

However, from the viewpoint of more stably expressing the nucleation effect, the main chain includes a linear hydrocarbon-based moiety and is preferably a site derived from a compound having a monovalent or higher functional group capable of reacting with the molecular chain terminal of the crystalline polyester resin.

Among them, from the viewpoint of becoming a toner with good low-temperature fixability, and durability when using cardboard, the crystal nucleating agent site (D) is preferably a site derived from an aliphatic monoalcohol having 10 to 30 carbon atoms (more preferably, 14 to 30 carbon atoms) and/or an aliphatic monocarboxylic acid having 11 to 31 carbon atoms (more preferably, 15 to 31 carbon atoms)

Specifically, the crystal nucleating agent site (D) preferably has a structure in which the aliphatic monoalcohol and/or aliphatic monocarboxylic acid are/is condensed at the terminal of the polyester molecular chain (C) in the crystalline polyester resin A.

The crystal nucleating agent site is preferably a site derived from an aliphatic monoalcohol having 10 or more carbon atoms and/or an aliphatic monocarboxylic acid having 11 or more carbon atoms as the durability of the toner can be improved by an increase in nucleation rate due to an increase in regularity of the molecular chain.

On the other hand, if it is a site derived from an aliphatic monoalcohol having 30 or less carbon atoms and/or an aliphatic monocarboxylic acid having 31 or fewer carbon atoms, an increase in molecular mobility at the time of heat melting occurs to plasticize the vinyl polymer unit (F). Therefore, it is preferable because the low-temperature fixability using cardboard can be improved.

Examples of the aliphatic monoalcohol include 1-decanol, 1-dodecanol, 1-tetradecanol, 1-hexadecanol, 1-octadecanol, 1-docosanol, 1-octacosanol, and 1-triacontanol.

... (Omitted) ...

[0056]

In the step of mixing raw materials, crystalline polyester resin A, amorphous resin B, a coloring agent, and optionally other additives and the like as materials constituting the toner particles are weighed in predetermined amounts and mixed. Examples of the mixing apparatus include a double cone mixer, a V-shaped mixer, a drum mixer, a super mixer, a Henschel mixer, a Nauta mixer, and a Mechano Hybrid (manufactured by Nippon Coke & Engineering, Co., Ltd.)

Then, the mixed materials are melt-kneaded to disperse a colorant or the like in a binder resin made of crystalline polyester resin A and amorphous resin B. In the melt-kneading step, a batch kneader, such as a pressure kneader or a Banbury mixer, or a continuous kneader can be used. A single-screw or twin-screw extruder is preferred because of the advantage of continuous production. Examples of such an extruder include a KTK-type twin-screw extruder (manufactured by Kobe Steel, Co., Ltd.), a TEM-type twin-screw extruder (manufactured by Toshiba Machine, Co., Ltd.), a PCM knealer (manufactured by Ikegai Co., Ltd), a twin-screw extruder (manufactured by KCK Co., Ltd.), and a Ko-Kneader (manufactured by Buss), a Needex (manufactured by Nippon Coke & Engineering Co., Ltd.)."

C "[0066]

<Production example of crystalline polyester A1>

In a reaction vessel equipped with a nitrogen introduction tube, dehydration tube, stirrer, and thermocouple, 1,10-decanediol as an alcohol monomer of the polyester molecular chain (C) and 1,10-decanedioic acid as an acid monomer were placed in mixing amounts shown in Table 1.

Then, 0.8 parts by mass of tin dioctylate as a catalyst was added to 100 parts by mass in total of the monomers, heated at 140°C under a nitrogen atmosphere, and reacted for 7 hours while water was distilled off under ordinary pressure.

Next, the reaction was carried out while being heated up to 200°C at a rate of 10°C/hour. After reaching 200°C, the reaction was carried out for 2 hours, and then the inside of the reaction vessel was depressurized to 5 kPa or less at 200°C, followed by reaction for 2 hours.

Subsequently, the pressure in the reaction vessel was gradually released and returned to normal pressure. The monomer (1-octadecanol) of crystal nucleating agent site (D) shown in Table 1 was added and reacted at 200°C for 1.5 hours under normal pressure. Then, the inside of the reaction vessel was depressurized again to 5 kPa or less at 200°C, followed by reaction at 200°C for 2.5 hours to obtain crystalline polyester resin A1.

Table 2 shows various physical properties of the obtained crystalline polyester resin A1.

In the MALDI-TOFMS mass spectrum of the obtained crystalline polyester resin A1, there is confirmed a peak of a composition in which 1-octadecanol is bonded to the terminal of polyester molecular chain (C). It is therefore confirmed that the crystalline polyester resin A1 is a resin in which the crystal nucleating agent site (D) is bonded to the terminal of the polyester molecular chain (C).

[0067]

[Table 1]

表１

	Sc	ポリエステル分子鎖(C)						Sd	結晶核剤部位(D)		
		アルコール成分	SP値	モル比	酸成分	SP値	モル比		モノマー	炭素数	モル比
A1	9.91	1, 10-デカンジオール	9.84	49.0	1, 10-デカン二酸	9.97	49.0	8.82	1-オクタデカノール	18	2.0
A2	9.91	1, 10-デカンジオール	9.84	49.0	1, 10-デカン二酸	9.97	49.0	8.40	n-オクタデカン酸	18	2.0
A3	9.77	1, 12-ドデカンジオール	9.57	47.5	1, 10-デカン二酸	9.97	47.5	8.51	1-トリアコンタノール	30	5.0
A4	9.62	1, 12-ドデカンジオール	9.57	49.4	1, 12-ドデカン二酸	9.66	49.4	8.92	1-ヘキサデカノール	16	1.2
A5	9.91	1, 10-デカンジオール	9.84	49.0	1, 10-デカン二酸	9.97	49.0	8.97	1-ペンタデカノール	15	2.0
A6	10.34	1, 12-ドデカンジオール	9.57	49.0	1, 6-ヘキサン二酸	11.10	49.0	8.97	1-ペンタデカノール	15	2.0
A7	10.34	1, 12-ドデカンジオール	9.57	49.0	1, 6-ヘキサン二酸	11.10	49.0	8.82	1-オクタデカノール	18	2.0
A8	10.96	1, 12-ドデカンジオール	9.57	49.0	コハク酸	12.35	49.0	8.25	n-トリアコンタン酸	30	2.0
A9	9.91	1, 10-デカンジオール	9.84	49.0	1, 10-デカン二酸	9.97	49.0	8.25	n-トリアコンタン酸	30	2.0
A10	9.36	1, 12-ドデカンジオール	9.57	49.0	1, 18-オクタデカン二酸	9.14	49.0	8.97	1-ペンタデカノール	15	2.0
A11	10.25	1, 6-ヘキサンジオール	10.83	49.0	1, 12-ドデカン二酸	9.66	49.0	8.25	n-トリアコンタン酸	30	2.0
A12	10.40	1, 6-ヘキサンジオール	10.83	49.0	1, 10-デカン二酸	9.97	49.0	8.25	n-トリアコンタン酸	30	2.0
A13	11.10	1, 10-デカンジオール	9.84	49.0	コハク酸	12.35	49.0	8.25	n-トリアコンタン酸	30	2.0
A14	11.34	1, 10-デカンジオール	9.84	49.0	フマル酸	12.83	49.0	8.25	n-トリアコンタン酸	30	2.0
A15	11.34	1, 10-デカンジオール	9.84	49.0	フマル酸	12.83	49.0	8.21	n-ヘキサトリアコンタン酸	36	2.0
A16	11.34	1, 10-デカンジオール	9.84	49.0	フマル酸	12.83	49.0	8.83	n-オクタン酸	8	2.0
A17	11.34	1, 10-デカンジオール	9.84	49.97	フマル酸	12.83	49.97	8.21	n-ヘキサトリアコンタン酸	36	0.06
A18	11.34	1, 10-デカンジオール	9.84	46.3	フマル酸	12.83	46.3	8.83	n-オクタン酸	8	7.4
A19	11.34	1, 10-デカンジオール	9.84	49.0	フマル酸	12.83	49.0	8.43	1-ヘキサトリアコンタノール	36	2.0
A20	11.10	1, 10-デカンジオール	9.84	49.0	コハク酸	12.35	49.0	9.69	1-オクタノール	8	2.0
A21	9.77	1, 12-ドデカンジオール	9.57	49.0	1, 10-デカン二酸	9.97	49.0	8.25	n-トリアコンタン酸	30	2.0
A22	12.28	1, 4-ブタンジオール 1, 6-ヘキサンジオール	11.87 10.83	42.0 7.0	フマル酸	12.83	49.0	8.25	n-トリアコンタン酸	30	2.0
A23	9.77	1, 12-ドデカンジオール	9.57	49.0	1, 10-デカン二酸	9.97	49.0	8.40	n-オクタデカン酸	18	2.0
A24	12.28	1, 4-ブタンジオール 1, 6-ヘキサンジオール	11.87 10.83	42.9 7.1	フマル酸	12.83	50.0	-	-	-	-

表１	Table 1
ポリエステル分子鎖	Polyester molecular chain
アルコール成分	Alcohol component
ＳＰ値	SP value
酸成分	Acid component
モル比	Molar ratio
モノマー	Monomer
炭素数	Carbon number
１，１０－デカンジオール	1,10-decanediol
１，１２－ドデカンジオール	1,12-dodecanediol
１，６－ヘキサンジオール	1,6-hexanediol
１，４－ブタンジオール	1,4-butanediol
１，１０－デカン二酸	1,10-decanedioic acid
１，１２－ドデカン二酸	1,12-dodecanedioic acid
１，６－ヘキサン二酸	1,6-hexanedioic acid
コハク酸	Succinic acid

１，１８－オクタデカン二酸	1,18-octadecanedioic acid
フマル酸	Fumaric acid
１－オクタデカノール	1-octadecanol
ｎ－オクタデカン酸	n-octadecanoic acid
１－トリアコンタノール	1-triacontanol
１－ヘキサデカノール	1-hexadecanol
１－ペンタデカノール	1-pentadecanol
ｎ－トリアコンタン酸	n-triacontanoic acid
ｎ－ヘキサトリアコンタン酸	n-hexatriacontanoic acid
ｎ－オクタン酸	n-octanoic acid
１－ヘキサトリアコンタノール	1-hexatriacontanol
１－オクタノール	1-octanol

... (Omitted) ...

[0069]

<Production examples of crystalline polyester resins A2 to A24>

Crystalline polyester resins A2 to A24 were prepared in the same manner as in the production example of crystalline polyester resin A1 as described in Table 1 in the production example of crystalline polyester resins A1, except for changing the monomer species of the polyester molecular chain (C), the monomer species of the crystal nucleating agent site (D), and their amounts in mixture. Their physical properties are shown in Table 2.

In each of the MALDI-TOFMS mass spectra of the obtained crystalline polyester resins A2 to 23, there was confirmed a peak of a composition in which a crystal nucleating agent site (D) monomer was bonded to the molecular end of polyester molecular chain (C). Therefore, it is confirmed that the crystalline polyester resins A2 to A23 are resins in which the crystal nucleating agent site (D) is bonded to the terminal of the polyester molecular chain (C).

[0070]

<Production example of amorphous resin B1>

In a reaction vessel equipped with a nitrogen introduction tube, dehydration tube, stirrer, and thermocouple, a polyester unit (E) monomer was placed in the mixing amount shown in Table 3, followed by addition of 1.5 parts by mass of dibutyltin as a catalyst to 100 parts by mass of the total amount of monomers of the polyester unit (E). Then, under a nitrogen atmosphere, the temperature was raised to 160°C while stirring.

Next, a mixture of vinyl polymer unit (F) monomers (including both reactive compounds) in mixing amounts shown in Table 3 and 2.0 parts by mole of benzoyl peroxide as a polymerization initiator was prepared and then dropped in the reaction vessel over 4 hours from a dropping funnel. At this time, the dripping amount was adjusted to attain a mass ratio of the polyester unit (E) to the vinyl polymer unit (F) shown in Table 3. After completion of dropping, the mixture was reacted at 160°C for 4 hours. Subsequently, the reaction system was depressurized while raising the temperature to 230°C to carry out a condensation polymerization reaction. At this time, the polycondensation time after the start of depressurizaion was set so that the softening point of amorphous resin B1 could be a value shown in Table 3.

After the reaction of amorphous resin B1, the resin was taken out from the reaction vessel, cooled, and pulverized to obtain amorphous resin B1. Table 3 shows the various properties of amorphous resin B1.

As a preliminary study for determining the polycondensation time for the desired softening point, the polycondensation time after the start of depressurizaion was changed at a plurality of points. Then, the amorphous resin was taken out of the reaction vessel, cooled, and ground, followed by measurement of a softening point. Based on the correspondence relationship between the polycondensation time and the softening point in the amorphous resin B1 formulation obtained in this preliminary study, the polycondensation time was determined so that the softening points shown in Table 3 could be obtained.

[0071]

<Production examples of amorphous resins B2 to B12>

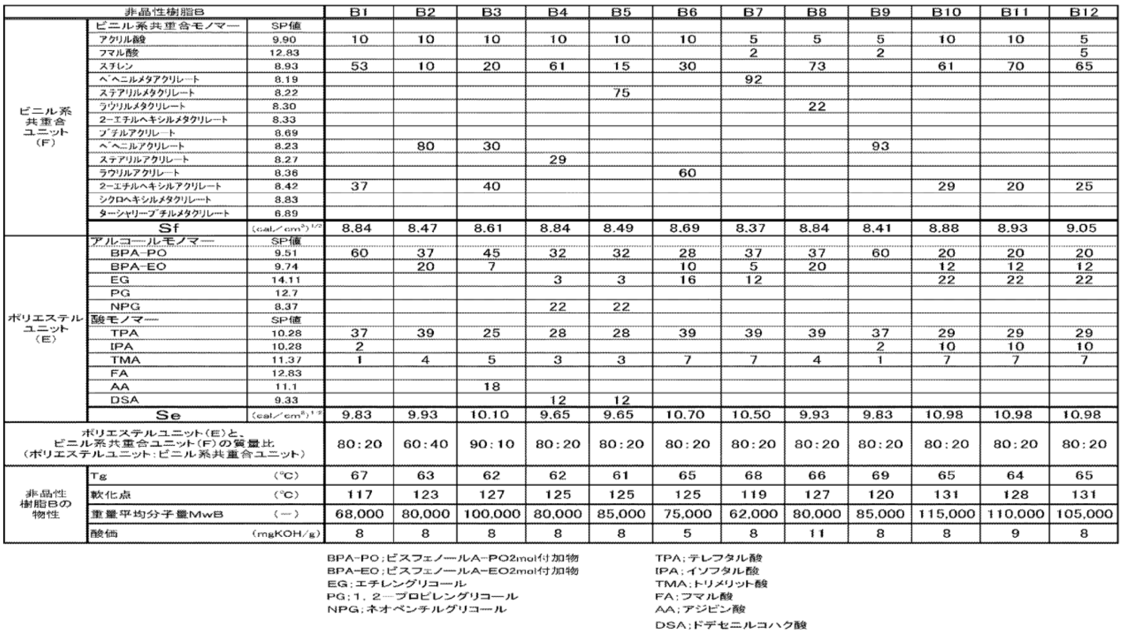
Amorphous resins B2 to B12 were prepared in the same manner as in the production example of amorphous resin B1, as described in Table 3 in the production example of amorphous resins B1, except for changing the monomer species of polyester unit (E), the monomer species of vinyl polymer unit (F), and their amounts in mixture, as well as polycondensation time. Their physical properties are shown in Table 3. A preliminary study for the polycondensation time was carried out in a manner similar to the production example of amorphous resin B1. Based on the correspondence relationship between the polycondensation time and the softening point in the amorphous resin formulation obtained in this preliminary study, the polycondensation time was determined so that the softening points shown in Table 3 could be obtained.

... (Omitted) ...

[0075]

[Table 3]

表３



非晶性樹脂B			B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12
ビニル系共重合ユニット（F）	ビニル系共重合モノマー	SP値												
	アクリル酸	9.90	10	10	10	10	10	10	5	5	5	10	10	5
	フマル酸	12.83							2		2			5
	スチレン	8.93	53	10	20	61	15	30		73		61	70	65
	べヘニルメタアクリレート	8.19							92					
	ステアリルメタクリレート	8.22					75							
	ラウリルメタクリレート	8.30								22				
	2−エチルヘキシルメタクリレート	8.33												
	ブチルアクリレート	8.69												
	べヘニルアクリレート	8.23		80	30						93			
	ステアリルアクリレート	8.27				29								
	ラウリルアクリレート	8.36						60						
	2−エチルヘキシルアクリレート	8.42	37		40							29	20	25
	シクロヘキシルメタクリレート	8.83												
	ターシャリーブチルメタクリレート	6.89												
	Sf	(cal／cm^3)$^{1/2}$	8.84	8.47	8.61	8.84	8.49	8.69	8.37	8.84	8.41	8.88	8.93	9.05
ポリエステルユニット（E）	アルコールモノマー	SP値												
	BPA−PO	9.51	60	37	45	32	32	28	37	37	60	20	20	20
	BPA−EO	9.74		20	7			10	5	20		12	12	12
	EG	14.11				3	3	16	12			22	22	22
	PG	12.7												
	NPG	8.37				22	22							
	酸モノマー	SP値												
	TPA	10.28	37	39	25	28	28	39	39	39	37	29	29	29
	IPA	10.28	2								2	10	10	10
	TMA	11.37	1	4	5	3	3	7	7	4	1	7	7	7
	FA	12.83												
	AA	11.1			18									
	DSA	9.33				12	12							
	Se	(cal／cm^3)$^{1/2}$	9.83	9.93	10.10	9.65	9.65	10.70	10.50	9.93	9.83	10.98	10.98	10.98
ポリエステルユニット（E）と、ビニル系共重合ユニット（F）の質量比（ポリエステルユニット：ビニル系共重合ユニット）			80：20	60：40	90：10	80：20	80：20	80：20	80：20	80：20	80：20	80：20	80：20	80：20
非晶性樹脂Bの物性	Tg	(℃)	67	63	62	62	61	65	68	66	69	65	64	65
	軟化点	(℃)	117	123	127	125	125	125	119	127	120	131	128	131
	重量平均分子量MwB	(−)	68,000	80,000	100,000	80,000	85,000	75,000	62,000	80,000	85,000	115,000	110,000	105,000
	酸価	(mgKOH/g)	8	8	8	8	8	5	8	11	8	8	9	8

BPA−PO；ビスフェノールA−PO2mol付加物
BPA−EO；ビスフェノールA−EO2mol付加物
EG；エチレングリコール
PG；1，2−プロピレングリコール
NPG；ネオペンチルグリコール

TPA；テレフタル酸
IPA；イソフタル酸
TMA；トリメリット酸
FA；フマル酸
AA；アジピン酸
DSA；ドデセニルコハク酸

表３ Table 3

非晶性樹脂Ｂ	Amorphous resin B
ビニル系共重合ユニット（Ｆ）	Vinyl copolymer unit (F)
ポリエステルユニット（Ｅ）	Polyester unit (E)
ポリエステルユニット（Ｅ）と、ビニル系共重合ユニット（Ｆ）の質量比	Mass ratio of polyester unit (E) and vinyl copolymer unit (F)
（ポリエステルユニット：ビニル系共重合ユニット）	(Polyester unit: vinyl copolymer unit)
非晶性樹脂Ｂの物性	Physical properties of amorphous resin B
ビニル系共重合モノマー	Vinyl copolymer monomer
アクリル酸	Acrylic acid
フマル酸	Fumaric acid
スチレン	Styrene
べヘニルメタアクリレート	Behenyl methacrylate
ステアリルメタクリレート	Stearyl methacrylate
ラウリルメタクリレート	Lauryl methacrylate
２−エチルヘキシルメタクリレート	2-ethylhexyl methacrylate
ブチルアクリレート	Butyl acrylate
べヘニルアクリレート	Behenyl acrylate
ステアリルアクリレート	Stearyl acrylate

ラウリルアクリレート	Lauryl acrylate
２－エチルヘキシルアクリレート	2-ethylhexyl acrylate
シクロヘキシルメタクリレート	Cyclohexyl methacrylate
ターシャリーブチルメタクリレート	Tertiary butyl methacrylate
アルコールモノマー	Alcohol monomer
酸モノマー	Acid monomer
軟化点	Softening point
重量平均分子量ＭｗＢ	Weight average molecular weight MwB
酸価	Acid value
ＳＰ値	SP value
ＢＰＡ－ＰＯ；ビスフェノールＡ－ＰＯ２ｍｏｌ付加物	BPA-PO; Bisphenol A-PO 2 mol adduct
ＢＰＡ－ＥＯ；ビスフェノールＡ－ＥＯ２ｍｏｌ付加物	BPA-EO; Bisphenol A-EO 2 mol adduct
ＥＧ；エチレングリコール	EG; Ethylene glycol
ＰＧ；１，２－プロピレングリコール	PG; 1,2-propylene glycol
ＮＰＧ；ネオペンチルグリコール	NPG; Neopentyl glycol
ＴＰＡ；テレフタル酸	TPA; Terephthalic acid
ＩＰＡ；イソフタル酸	IPA; Isophthalic acid
ＴＭＡ；トリメリット酸	TMA; Trimellitic acid
ＦＡ；フマル酸	FA; Fumaric acid
ＡＡ；アジピン酸	AA: Adibic acid
ＤＳＡ；ドデセニルコハク酸	DSA; Dodecenyl succinic acid

... (Omitted) ...

[0077]

<Production example of toner 1>

· Crystalline polyester resin A1	15.0 parts by mass
· Amorphous resin B1	85.0 parts by mass
· Carbon black	5.0 parts by mass
· Fischer-Tropsch wax (melting point 105°C)	6.0 parts by mass
· 3,5-di-t-butylsalicylate aluminum compound	0.8 parts by mass

The above materials were mixed with a Henschel mixer (FM-75 type, manufactured by Mitsui Miike Chemical Co., Ltd.) and then kneaded using a twin-screw kneader (PCM-30 type, manufactured by Ikegai Co., Ltd.) at a rotation rate of 3.3 s^{-1} while the temperature of a kneader barrel was adjusted to allow the kneading resin temperature to reach the softening point of amorphous resin B1 + 10°C.

The obtained kneaded product was cooled and coarsely pulverized to 1 mm or less with a hammer mill to obtain a coarsely pulverized material. The resulting coarsely pulverized product was finely pulverized with a mechanical pulverizer (T-250, manufactured by Turbo Industry Co., Ltd.). Furthermore, the finely pulverized powder thus obtained was classified using a multi-division classifier utilizing the Coanda effect to obtain negatively abrasion chargeable toner particles having a weight average particle diameter (D4) of 7.1 μm.

To 100 parts by mass of the obtained toner particles, 1.0 part by mass of titanium oxide fine particles, which had been surface treated with 15 mass% isobutyl trimethoxysilane and had an average particle size of primary particles of 50 nm, and 0.8 part by mass of hydrophobic silica fine particles, which had been surface treated with 20 mass% hexamethyldisilazane and had an average particle size of primary particles of 16 nm, were added, and the resulting mixture was mixed by using a Henschel mixer (manufactured by Mitsui Miike Chemical Engineering Machinery Co., Ltd., FM-75), thereby obtaining a toner 1.

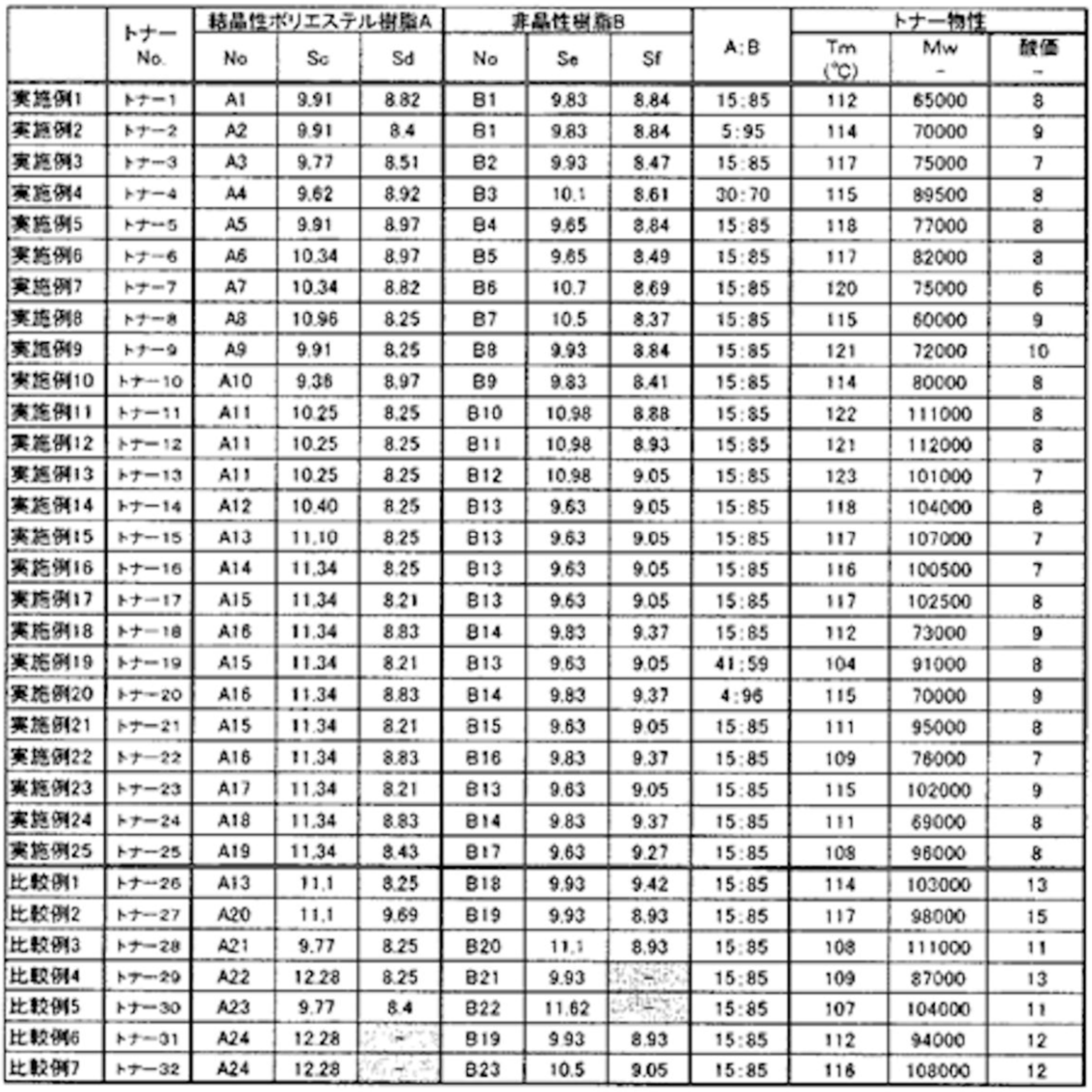
Table 5 shows the various physical properties of toner 1, Sc((cal/cm^3)$^{1/2}$), Sd((cal/cm^3)$^{1/2}$), Se((cal/cm^3)$^{1/2}$), and Sf((cal/cm^3)$^{1/2}$).

Table 6 shows relational expressions 1 to 4 relating to Sc to Sf of toner 1.

[0078]

[Table 5]

表 5



	トナー No.	結晶性ポリエステル樹脂A			非晶性樹脂B			A:B	トナー物性		
		No	Sc	Sd	No	Se	Sf		Tm (℃)	Mw -	酸価 -
実施例1	トナー1	A1	9.91	8.82	B1	9.83	8.84	15:85	112	65000	8
実施例2	トナー2	A2	9.91	8.4	B1	9.83	8.84	5:95	114	70000	9
実施例3	トナー3	A3	9.77	8.51	B2	9.93	8.47	15:85	117	75000	7
実施例4	トナー4	A4	9.62	8.92	B3	10.1	8.61	30:70	115	89500	8
実施例5	トナー5	A5	9.91	8.97	B4	9.65	8.84	15:85	118	77000	8
実施例6	トナー6	A6	10.34	8.97	B5	9.65	8.49	15:85	117	82000	8
実施例7	トナー7	A7	10.34	8.82	B6	10.7	8.69	15:85	120	75000	6
実施例8	トナー8	A8	10.96	8.25	B7	10.5	8.37	15:85	115	60000	9
実施例9	トナー9	A9	9.91	8.25	B8	9.93	8.84	15:85	121	72000	10
実施例10	トナー10	A10	9.38	8.97	B9	9.83	8.41	15:85	114	80000	8
実施例11	トナー11	A11	10.25	8.25	B10	10.98	8.88	15:85	122	111000	8
実施例12	トナー12	A11	10.25	8.25	B11	10.98	8.93	15:85	121	112000	8
実施例13	トナー13	A11	10.25	8.25	B12	10.98	9.05	15:85	123	101000	7
実施例14	トナー14	A12	10.40	8.25	B13	9.63	9.05	15:85	118	104000	8
実施例15	トナー15	A13	11.10	8.25	B13	9.63	9.05	15:85	117	107000	7
実施例16	トナー16	A14	11.34	8.25	B13	9.63	9.05	15:85	116	100500	7
実施例17	トナー17	A15	11.34	8.21	B13	9.63	9.05	15:85	117	102500	8
実施例18	トナー18	A16	11.34	8.83	B14	9.83	9.37	15:85	112	73000	9
実施例19	トナー19	A15	11.34	8.21	B13	9.63	9.05	41:59	104	91000	8
実施例20	トナー20	A16	11.34	8.83	B14	9.83	9.37	4:96	115	70000	9
実施例21	トナー21	A15	11.34	8.21	B15	9.63	9.05	15:85	111	95000	8
実施例22	トナー22	A16	11.34	8.83	B16	9.83	9.37	15:85	109	76000	7
実施例23	トナー23	A17	11.34	8.21	B13	9.63	9.05	15:85	115	102000	9
実施例24	トナー24	A18	11.34	8.83	B14	9.83	9.37	15:85	111	69000	8
実施例25	トナー25	A19	11.34	8.43	B17	9.63	9.27	15:85	108	96000	8
比較例1	トナー26	A13	11.1	8.25	B18	9.93	9.42	15:85	114	103000	13
比較例2	トナー27	A20	11.1	9.69	B19	9.93	8.93	15:85	117	98000	15
比較例3	トナー28	A21	9.77	8.25	B20	11.1	8.93	15:85	108	111000	11
比較例4	トナー29	A22	12.28	8.25	B21	9.93	-	15:85	109	87000	13
比較例5	トナー30	A23	9.77	8.4	B22	11.62	-	15:85	107	104000	11
比較例6	トナー31	A24	12.28	-	B19	9.93	8.93	15:85	112	94000	12
比較例7	トナー32	A24	12.28	-	B23	10.5	9.05	15:85	116	108000	12

表５ Table 5

トナー	Toner
結晶性ポリエステル樹脂Ａ	Crystalline polyester resin A
非晶性樹脂Ｂ	Amorphous resin B
トナー物性	Toner physical properties
酸価	Acid value
実施例	Example
比較例	Comparative example

... (Omitted) ...

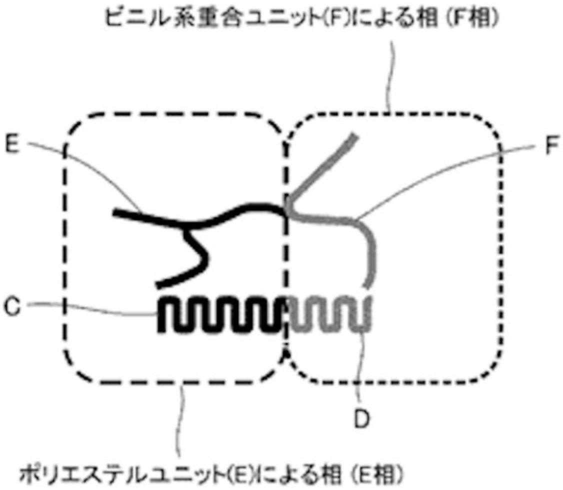
[0080]

<Production examples of toners 2 to 32>

Toners 2 to 32 were produced in the same manner as in the production example of toner 1, except for changing the species of crystalline polyester resin A and amorphous resin B and the mass ratio between them as shown in Table 5. The physical properties of toners 2 to 32 are shown in Table 5.

Table 6 shows relational expressions 1 to 4 relating to Sc to Sf of toners 2 to 32.

D "[FIG. 1]



ビニル系重合ユニット（Ｆ）による相（Ｆ相）	Phase composed of vinyl polymer unit (F)(Phase F)
ポリエステルユニット（Ｅ）による相（Ｅ相）	Phase composed of polyester unit (E) (Phase E)

"

(2) Invention disclosed in Japanese Patent Application No. 2013-160759

Based on the above described matter (1), it is recognized that the originally attached description, etc. of Japanese Patent Application No. 2013-160759 discloses the invention as Example 3 as described below. Here, raw material components and mixing amounts of crystalline polyester resin A3 and amorphous resin B2 as well as the mass ratio of polyester unit (E) to vinyl polymer unit (F) are numerical values described in Table 1 of [0067] and Table 3 of [0075], respectively. The mass ratio of crystalline polyester resin A3 to amorphous resin B2 is a numerical value described in Table 5 of [0078].

"A toner 3 obtained by

placing 1,12-dodecanediol as an alcohol monomer of the polyester molecular chain (C) and 1,10-decanedioic acid as an acid monomer in a mole ratio of 47.5: 47.5 in a reaction vessel equipped with a nitrogen introduction tube, dehydration tube, stirrer, and thermocouple;

adding tin dioctylate as a catalyst and reacting under normal pressure in a nitrogen atmosphere;

carrying out the reaction while raising the temperature, followed by depressurizing the inside of the reaction vessel to carry out the reaction;

subsequently, returning the pressure to normal pressure; followed by adding 1-triacontanol as a monomer of crystal nucleating agent site (D) and carrying out the reaction under normal pressure and then depressurize the reaction vessel again to react to obtain crystalline polyester resin A3;

in a reaction vessel equipped with a nitrogen introduction tube, dehydration tube, stirrer, and thermocouple, placing monomers of polyester unit (E) in mixing amounts of 37 parts by mass of a 2-mol bisphenol A-PO adduct, 20 parts by mass of a 2-mol bisphenol AEO adduct, 39 parts by mass of terephthalic acid, and 4 parts by weight trimellitic acid, followed by addition of dibutyltin as catalyst and heating up under a nitrogen atmosphere;

preparing a mixture of monomers of vinyl polymer unit (F) in mixing amounts of 10 parts of acrylic acid, 10 parts by mass of styrene, and 80 parts by mass of behenyl acrylate (including a direactive compound) and benzoyl peroxide as a polymerization initiator and then dropping the mixture into a reaction vessel so that the mass ratio of the polyester unit (E) and the vinyl polymer unit (F) is 60:40; after the reaction, depressurizing the reaction system while raising the temperature, followed by carrying out a condensation polymerization reaction so that amorphous resin B2 has a softening point of 123°C;

after completion of the reaction, taking out the reaction product from the reaction vessel, followed by cooling and pulverizing the product to obtain amorphous resin B2;

mixing materials described below by a Henschel mixer and then kneading the mixture by a twin-screw kneader;

cooling and pulverizing the obtained kneaded product, followed by classifying the product to obtain negatively abrasion chargeable toner particles; and

adding titanium oxide fine particles and hydrophobic silica fine particles and mixing them by a Henschel mixer to obtain toner particles.

(Materials)

· Crystalline polyester resin A3	15.0 parts by mass
· Amorphous resin B2	85.0 parts by mass

· Carbon black 5.0 parts by mass
· Fischer-Tropsch wax (melting point 105°C) 6.0 parts by mass
· 3,5-di-t-butylsalicylic acid aluminum compound 0.8 parts by mass" (hereinafter, referred to as "the earlier application invention")

3 Judgment by the body

(1) Patent Invention 1

A Comparison

Patent Invention 1 is compared with the earlier application invention.

(a) Crystalline polyester, amorphous polyester, and binder resin composition for a toner

From the technical point of view, the "crystalline polyester resin A3," "amorphous resin B2," and "toner 3" of the earlier application invention correspond to the "crystalline polyester", "amorphous polyester," and "binder resin composition for a toner" of Patent Invention 1.

"Toner 3" of the earlier application invention is obtained by "mixing" "crystalline polyester resin A3" and "amorphous resin B2".

Thus, "toner 3" of the earlier application invention satisfies the requirement of "a binder resin composition for a toner" of Patent Invention 1 "comprising a crystalline polyester and an amorphous polyester."

(b) Aliphatic diol and aliphatic dicarboxylic acid

From a technical point of view, "1,12-dodecanediol" and "1,10-decanedioic acid" in the earlier application invention correspond to "an aliphatic diol having 6 to 14 carbon atoms" and "an aliphatic dicarboxylic acid having 10 to 14 carbon atoms" in Patent Invention 1, respectively.

Then, "crystalline polyester resin A3" in the earlier application invention is obtained using "1,12-dodecanediol as an alcohol monomer and 1,10-decanedioic acid as an acid monomer."

Therefore, "crystalline polyester resin A3" in the earlier application invention and "crystalline polyester" in Patent Invention 1 are common in that "crystalline polyester" is "obtained using a raw material monomer" comprising "an aliphatic diol having 6 to 14 carbon atoms and an aliphatic dicarboxylic acid compound having 10 to 14 carbon atoms."

B　Corresponding features and different features

As described above, Patent Invention 1 and the earlier application invention coincide in a point that
"a binder resin composition for a toner comprising a crystalline polyester and an amorphous polyester, wherein the crystalline polyester is obtained using a raw material monomer comprising an aliphatic diol having 6 to 14 carbon atoms and an aliphatic dicarboxylic acid compound having 10 to 14 carbon atoms", and differ in the following feature:

(Different Feature 1)

In Patent Invention 1, "crystalline polyester" comprises "a hydrocarbon wax having a hydroxyl group with a melting point of 70 to 120°C and a molecular weight of 500 to 2000" and "the content of the hydrocarbon wax is 1.0 to 15% by mass."　In contrast, such specified matters are not found in the earlier application invention.

C　Judgment

The above Different Feature 1 will be examined.

"Crystalline polyester resin A3" of the earlier application invention, which corresponds to "crystalline polyester" in Patent Invention 1, contains no raw material monomer other than "1-triacontanol," "1,12-dodecanediol, and "1,10-decanedioic acid." In addition, none of these monomers does not corresponds to "a hydrocarbon wax having a hydroxyl group with a melting point of 70 to 120°C and a molecular weight of 500 to 2000" in Patent Invention 1 with respect to the above Different Feature 1. (
Note that "tin dioctylate" is a catalyst).

Since the above Different Feature 1 is a substantial difference, Patent Invention 1 and the earlier application invention cannot be said to be identical with each other.

Next, it is examined whether Patent Invention 1 and the earlier application invention are substantially identical with each other.

First, among the materials of "crystalline polyester resin A3" in the earlier application invention, "1,12-dodecanediol" and "1,10-decanedioic acid" correspond to an "aliphatic diol" and an "aliphatic dicarboxylic acid compound," of Patent Invention 1, respectively.　In addition, "tin dioctylate" is a catalyst.　Thus, even if these materials in the earlier application invention are changed to a degree that can be said to be a slight difference (addition, deletion, conversion, etc. of well-known technology or conventional technology), it can be said that "crystalline polyester" in Patent Invention 1 relating the above Different Feature 1 does not reach a configuration including "a hydrocarbon wax having a hydroxyl group with a melting point of 70 to 120°C and a molecular weight of 500 to 2000."

Secondly, among the materials of "crystalline polyester resin A3" in the earlier application invention, "1-triacontanol" will be examined.

In the light of the description of [0023] in the originally attached description, etc., "1-triacontanol" of the earlier application invention is a specific example of an aliphatic monoalcohol having 10 to 30 carbon atoms (aliphatic monoalcohol having 30 carbon atoms and a molecular weight of about 439). Even if "1-triacontanol" in the earlier application invention may be changed to a slight extent, it can be said that it will not be changed to one having a molecular weight of 500 or more (aliphatic monoalcohol having 35 or more carbon atoms). Thus, even if "1-triacontanol″ in the earlier application invention is changed to a degree that can be said to be a slight difference, it can be said that "crystalline polyester" in Patent Invention 1 relating the above Different Feature 1 does not reach a configuration including "a hydrocarbon wax having a hydroxyl group with a melting point of 70 to 120°C and a molecular weight of 500 to 2000."

From the above, Different Feature 1 cannot be said to be a slight difference in means for solving the problem. Therefore, Patent Invention 1 and the earlier application invention cannot be said to be substantially identical with each other.

The Patent Opponent also lists Exhibit A3 to Exhibit A5 in addition to Exhibit A1 and Exhibit A2. However, considering the statements in each Exhibit A, Patent Invention 1 and the earlier application invention cannot be substantially identical with each other.

(2) Patent Inventions 2, 4, and 7 to 10

Patent Inventions 2, 4, and 7 to 10 satisfy the requirements that "crystalline polyester" comprises " a hydrocarbon wax having a hydroxyl group with a melting point of 70 to 120°C and a molecular weight of 500 to 2000" and "the content of the hydrocarbon wax is 1.0 to 15% by mass." as Patent Invention 1.

Therefore, Patent Inventions 2, 4, and 7 to 10 are not identical with the earlier application invention, because of the same reasons as for Patent Invention 1.

No. 5 Closing

As described above, the patents according to claims 1, 2, 4, and 7 to 10 of the case cannot be canceled due to the reasons for rescission, which are stated in the Notice of Reasons for Revocation, and the reasons for opposition to the patent, which are stated in the Written notification of reason for rescission to the Grant of Patent.

Also, no other reason for revoking the patents according to Claims 1, 2, 4, and 7 to 10 of the case is found.

Since the patent according to Claim 3 of the case is delated by the correction, no applicable claim is found for the patent opposition filed by the Patent Opponent against Claim 3 of the case.

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

December 28, 2018

Chief administrative judge: HIGUCHI, Nobuhiro
Administrative judge: KAWAMURA, Daisuke
Administrative judge: SHIMIZU, Yasushi