Appeal decision

Appeal No. 2015- 6666

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The case of appeal against the examiner's decision of refusal regarding Japanese Patent Application No. 2012-56031, entitled "Method for Continuously Producing Polycarbonate by Melt Transesterification" (application published on July 26, 2012, Japanese Unexamined Patent Application Publication No. 2012-140632) has resulted in the following appeal decision.

Conclusion

The appeal of the case was groundless.

Reason

No. 1 History of the procedures

The present application is a divisional application based on the patent application (Japanese Patent Application No. 2002-583493) originally filed on April 23, 2002 as an international application (priority claim under the Paris Convention, April 24, 2001, Federal Republic of Germany (DE)). A written amendment and a written statement were submitted on April 11, 2012, and a notice of reasons for refusal dated on February 25, 2014 was issued. Despite submission of a written amendment and a written opinion on September 2, 2014, the decision of refusal dated on December 4, 2014 was issued. Against this, the request for appeal was submitted on April 8, 2015, and a written amendment (formalities) of the request for appeal was submitted on May 15, 2015, within 30 days from the date of the request for appeal.

No. 2 The Invention of the application

As viewed from the scope of claims for patent which has been amended by the written amendment submitted on September 2, 2014, and the patent specification (hereinafter, referred to as the "specification") and the description of the drawings which were first attached to the application, the invention according to Claim 1 of the present application (hereinafter, referred to as the "Invention") is acknowledged as follows, as specified by the matters described in Claim 1 according to the scope of claims for patent.

"[Claim 1]

A method of producing polycarbonate from oligocarbonate obtained by an ester interchange method of diaryl carbonate and diphenol under presence of a catalyst, for which a reactor including an annular punching disk is used, wherein a dimension A of a hole of the disk satisfies a formula:

[Mathematical formula 1]

$$x = \frac{A}{(\eta^2)^{1/3}}$$

(In the formula, x is between 2×10^{-3} to 3×10^{-2} $kg^{-2/3}m^{5/3}s^{2/3}$, η is kinematic melt viscosity, and A is a diameter of holes in a case of circular holes of an identical area), and wherein

in the disk, a ratio of the whole surface area (however, excluding an area of holes at a center portion, and including an area of holes on a disk peripheral portion) of the disk to an area of a web is 2.2-6.5."

No. 3 Outline of reasons for refusal stated in the examiner's decision

The outline of the examiner's decision of refusal dated December 4, 2014 is that "the present application should be rejected due to a reason No.2 described in the notice of reasons for refusal dated February 25, 2014." The reason No.2 described in the notice of reasons for refusal dated February 25, 2014 is that "in the present application, the description of the scope of claims for patent does not meet the requirement stipulated in Article 36(6)(i) of the Patent Act in terms of the following point."

No. 4 Judgment by the body

It will be examined below whether or not the reasons of the examiner's decision of No. 3 are reasonable.

4-1.The Invention

The Invention as recognized in No. 2 above relates to a reactor including an annular punching disk used in a method of producing polycarbonate from oligocarbonate obtained by an ester interchange method of diaryl carbonate and diphenol under presence of a catalyst, which satisfies the matter that "a dimension A of holes of the disk satisfies a formula:
[Mathematical formula 1]

$$x = \frac{A}{(\eta^2)^{1/3}}$$

(In the formula, x is between 2×10^{-3} to 3×10^{-2} $kg^{-2/3}m^{5/3}s^{2/3}$, η is kinematic melt viscosity, and A is a diameter of holes in a case of circular holes with an identical area)" (hereinafter, referred to as the "hole dimension matter"), and a matter that "in the disk, a ratio of the whole surface area (however, excluding an area of holes at a center portion, and including an area of holes on a disk peripheral portion) of the disk to an area of a web is 2.2-6.5" (hereinafter, referred to as the "hole area ratio matter"), as matters necessary for specifying the invention.

4-2. The detailed description of the invention in the specification

In the detailed description of the invention in the specification, there are the following descriptions about the hole dimension matter and the hole area ratio matter (hereinafter, referred to as "Indication a" and the like).

a. "The present invention relates to a method of continuously producing polycarbonate from oligocarbonate by an ester interchange method using a specific reactor." (Paragraph [0001])

b. "That is, the object of the present invention was to enable especially good evaporation of phenol and diaryl carbonate in some cases by generating a big melt surface, and on the other hand, to find out a reactor design which can be economically operated even if it is large-scale." (Paragraph [0014])

c. "Therefore, the object of the present invention was attained by the reaction apparatus which forms a free film continuously under the influence of gravity, and has a high film formation speed. This is attained by the annular rotary punching disk whose ratio of the whole surface area of a ring and the area which the web between holes occupies is 2.2-6.5, preferably 2.5-5. The fall length of the film was understood that it is advantageous to make it increase with viscosity. Formula:
[Mathematical formula 1]

$$A = x \left(\eta^2 / \left(kg^2 \, m^{-5} \, s^{-2} \right) \right)^{1/3}$$

According to the above formula, it is especially advantageous to choose an equivalent hole diameter. The equivalent hole diameter A is defined as a diameter of circles of an identical area. The dimensionless coefficient x may be between 0.002-0.030, preferably between 0.004-0.016. Various values about x may be assumed simultaneously at various places in the reaction apparatus, while changing their viscosity. η is kinematic melt viscosity (kinematic melt viscosity) (Pa*s)". (Paragraph [0015])

d. "[0055]
EMBODIMENT

The oligocarbonate melt manufactured using the tetraphenyl phosphonium phenolate catalyst from bisphenol A and diphenyl carbonate, which has a relative

viscosity of 1.081, an OH end group content of 0.55%, and a temperature of 270°C, is supplied to a reactor via pressure maintenance equipment as mentioned above. The reactor is heated to 270°C to make a vacuum of 7.3 mbar. A rotor speed is 2.5 rpm. An average residence time is 45 minutes. Output continuously picked out from the reactor by a gear pump has a relative viscosity of 1.171 and an OH end group content of 0.13%. This is conveyed to another reactor via a heat exchanger heated to be 295°C with heat medium oil, similarly to that above mentioned, except for being equipped for higher melt viscosity. A vapor stream is condensed partially and the remainder is returned to a vacuum station.

[0056]

A second reactor is adjusted to be 295°C to make a vacuum of 1.3 mbar. A rotor speed is 0.8 rpm. An average residence time is 130 minutes. Steam is detoured to a vacuum station. The polycarbonate continuously taken out using the gear pump has a relative viscosity of 1.287 and an OH end group content of 290 ppm. When a YI value is calculated in relation to polycarbonate, it is 1.42. [0057]

The YI value was calculated in relation to an injection-molding sample which is 4 mm in thickness according to ASTM E313. Injection-molding temperature was 300°C." (Paragraphs [0055]-[0057])

4-3. Judgment

The solution to the problems to be solved by the Invention is realized by attaining the object of the Invention; namely, according to the above Indications a. and b., the object of the Invention is attained by using the specific reactor (Indication a) or the reactor design (Indication b). In Indication c., it is described that the object of the present invention is attained by the reaction apparatus "which forms a free film continuously under the influence of gravity, and has a high film formation speed"; more specifically, the object of the Invention is attained by an annular rotary punching disk which satisfies the hole area ratio matter. Concerning the hole dimension matter, it is described that "it is especially advantageous" to satisfy such a matter.

However, there is no technical explanation about a relationship between using the annular rotary punching disk satisfying the hole area ratio matter and attaining the object of the Invention, and there is also no technical ground showing that the reaction apparatus "which forms a free film continuously under the influence of gravity, and has a high film formation speed" in Indication c. can be obtained by using the annular rotary punching disk satisfying the hole area ratio matter. Also, concerning the hole dimension matter, as mentioned above, it is described that only "it is especially

advantageous" to satisfy such a matter, and there is no technical explanation about what the meaning of the hole dimension matter will be by satisfying the range of the hole dimension matter according to the Invention. Therefore, it is not clear whether the hole dimension matter is indispensable for attaining the object of the Invention or not while it may show only an advantageous aspect of the Invention.

Consequently, there is no description at all about technical ground showing what technical significance the numerical range of the hole dimension matter and the hole area ratio matter according to the Invention causes in the reactor or the reaction apparatus for attaining the object of the Invention and how the numerical range was selected.

Furthermore, with reference to "EMBODIMENT" in Indication d., there is no description at all about what numerical values as the hole dimension matter and the hole surface ratio matter are selected in the reactor, so it cannot be confirmed how the reactor used in the embodiment satisfies the hole dimension matter and the hole area ratio matter. Also, no specific structure of the reactor is depicted at all, so it cannot be assumed what kind of a reactor should be used to attain the object of the Invention. Especially, in the embodiment, as mentioned in Indication d., "a reactor" described in Paragraph [0055] and "a second reactor" described in Paragraph [0056] are used, but there is no description or suggestion at all about how the annular rotary punching disks satisfying the hole dimension matter and the hole area ratio matter should be disposed for a plurality of reactors to attain the object of the Invention; namely, how many disks should be used in each reactor and how they should disposed there to attain an effect of the Invention. Besides, at the time of filing of the present application, it cannot be acknowledged that it had been known that the object of the Invention could be attained as long as the reactor satisfies the hole dimension matter and the hole area ratio matter.

Therefore, even in light of well-known technical matters at the time of filing of the present application, on the basis of the detailed description of the invention, a person who has ordinary skill in the art cannot acknowledge that the Invention with the reactor including annular punching disks satisfying the hole dimension matter and the hole area ratio matter could solve the problem to be solved.

Consequently, it cannot be said that the Invention satisfying the hole dimension matter and the hole area ratio matter as the matters specifying the invention is described in the detailed description of the invention.

4-4. The appellant's allegation

Although the appellant alleges in relation to the technical significance and

technical ground of 'x' concerned in the hole dimension matter as "the inventors experimentally found out a preferable range of the 'x' value by performing extensive research on the efficiency of mass transfer which is a function of a mass transfer coefficient. Specifically, the inventors modified the diameter 'A' of the holes according to required viscosity, and determined a mass transfer coefficient 'b' corresponding to each 'A' value. Therefore, they could thereby determine the maximum possible value to the mass transfer coefficient 'b', and if the 'x' value is between 2×10^{-3} and 3×10^{-2} ($kg^{-2/3}m^{5/3}s^{2/3}$) as described in Claim 1 of the present application, as mentioned above, then they found out that the mass transfer efficiency exceeds 80% of the maximum possible value," and "if the 'x' value is too small or too large, the stretching effect does not become effective, mass transfer is deteriorated to make a reaction insufficient, and a further longer residence time is required, so that quality is deteriorated, and a throughput (processing amount) to a predetermined reactor is deteriorated," concerning evaporation and diffusion, unlike a simple stationary gas-liquid two-phase system, the specified reactor of the present application has a complicated system accompanied with the transportation and fluctuation of a liquid phase, and a chemical reaction, so concerning the calculation and measurement of the mass transfer efficiency indicated in the "table", its derivation and condition are deemed to be important, but since in the specification of the present application, there is no description or suggestion about the mass transfer efficiency and the above-mentioned important matters, the above allegation is not based on the description of the specification of the present application, and cannot be acknowledged as obvious matters in light of well-known technical matters at the time of filing of the present application.

Also, the appellant alleges about the technical significance and technical ground related to the hole area ratio matter as “if the above ratio becomes too smaller than 2.2, an area of a web becomes small, and a surface of a disk which can be used for moving a membrane of a melt becomes too small, so the mass transfer is deteriorated, and if the ratio becomes too larger than 6.5, the area of the web becomes too large, and the membrane of the melt moved by the disk is increased too much, so that the amount of material which can be used for falling in the membrane of the melt is decreased”, the above allegation is also not based on the description of the specification of the present application, and cannot be acknowledged as obvious matters in light of well-known technical matters at the time of filing of the present application.

Furthermore, although the appellant alleges that "the reactor of the Invention, which was actually used, includes 'the annular punching disk' shown in the following table, and it satisfies the formula defined in Claim 1 of the present application," as

mentioned above, there is no specific description about the hole dimension matter and the hole area ratio matter in the description of the embodiment, and an evidence which shows that "the annular punching disk" shown in the table is a disk actually used in the embodiment of the Invention cannot be found. Besides, there are no well-known technical matters showing that "the annular punching disk" shown in the table is a disk actually used in the embodiment of the Invention.

Therefore, none of the appellant's allegations relating to the hole dimension matter and the hole area ratio matter can be accepted.

4-5. Summary

As described above, the Invention cannot be said to be described in the detailed description of the invention in the specification, and therefore the present application does not meet the requirement stipulated in Article 36(6)(i) of the Patent Act.

Therefore, the reasons for refusal stated in the examiner's decision in No. 3 above are still reasonable.

No. 5 Closing remarks

As described above, the present application should be rejected due to the reason for refusal stated in the examiner's decision.

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

October 31, 2016

Chief administrative judge: KATO, Tomoya
Administrative judge: JYOBOJI, Hiroe
Administrative judge: FUJIWARA, Hiroko