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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte NOBUTAKA FUJIMOTO and MASAFUMI OKAMOTO

Appeal 2012-000530
Application 12/227,047
Technology Center 1700

Before FRED E. McKELVEY, CHUNG K. PAK and BEVERLY A. FRANKLIN,
Administrative Patent Judges.

McKELVEY, *Administrative Patent Judge.*

DECISION ON APPEAL

Statement of the case

1 Sumitomo Seika Chemicals Co., Ltd. (“applicant”), the real party in interest
2 (Brief, page 2), seeks review under 35 U.S.C. § 134(a) of a final rejection dated
3 3 June 2010.

4 The application was filed in the USPTO on 5 February 2009.

5 The application on appeal (1) was filed on 10 April 2007 as International
6 Application PCT/JP2007/057915 which entered the national stage as to the United
7 States. 35 U.S.C. § 371.

8 The application on appeal claims priority of Japanese Patent Application
9 2006-013114, filed 9 March 2006.

10 The application has been published as U.S. Patent Application Publication
11 2009/0240025 A1.

12 In support of prior art rejections, the Examiner relies on the following
13 evidence.

Korf	U.S. Patent 3,687,883	29 Aug. 1972
Carroll et al. “Carroll”	U.S. Patent 4,960,862	02 Oct. 1990
Ionue et al. “Ionue”	Japanese Published Patent Application 51065640 (Document 5215116)	15 Dec. 1977

14 Applicant does not contest the prior art status of the evidence relied upon by
15 the Examiner.

16 Applicant relies on data on page 22 of the Specification. We assume that the
17 data is a result of actual (as opposed to prophetic) examples.

1 We have jurisdiction under 35 U.S.C. § 134(a).

2 Claims on appeal

3 Claims 1-6 are on appeal. Brief, page 2; Answer, page 3; Reply Brief,
4 page 2.

5 Claims 1 and 6, which we reproduce from the Claim Appendix of the Brief
6 (page 11), read [matter in brackets and indentation added (*see* 37 C.F.R. § 1.75(i));
7 principal limitations in issue in italics]:

8 *Claim 1*

9 An organic zinc catalyst to be used for the reaction for
10 producing a poly(alkylene carbonate) from carbon dioxide and an
11 epoxide,

12 which is obtained by reacting

13 [1] a zinc compound,

14 [2] an aliphatic dicarboxylic acid and

15 [3] an aliphatic monocarboxylic acid in a mole ratio of
16 0.0001 to 0.1 relative to the aliphatic dicarboxylic acid.

17 *Claim 6*

18 A method of producing a poly(alkylene carbonate),
19 wherein carbon dioxide is reacted with an epoxide in the
20 presence of an organic zinc catalyst obtained by reacting

21 [1] a zinc compound,

22 [2] an aliphatic dicarboxylic acid and

23 [3] an aliphatic monocarboxylic acid in a mole ratio of
24 0.0001 to 0.1 relative to the aliphatic dicarboxylic acid.

1 Rejections

2 Rejection 1: In the Final Rejection, Claims 1-6 were rejected as being
3 unpatentable under § 103(a) over (1) Inoue (based on an “oral translation”),
4 (2) Carroll and (3) Korf. Final Rejection, page 2. It is not clear to us what is
5 meant by “oral translation.” Rejection 1 was maintained in the Answer. Answer,
6 page 5, ¶ 2.

7 Rejection 2: In the Answer, the Examiner entered a new rejection holding
8 Claims 1-6 to be unpatentable under § 103(a) over (1) Inoue (based on a “full
9 translation”), (2) Carroll and (3) Korf. Answer, page 7. We understand the “full
10 translation” to be a translation by Schreiber Translation, Inc. (PTO 11-3968), a
11 copy of which appears in the record. Applicant timely responded to the new
12 rejection when it filed its Reply Brief (pages 2 and 6-7).

13 We do not perceive any difference in the rationale in support of Rejection 1
14 vis-à-vis Rejection 2. Accordingly, we therefore address both rejections with a
15 single analysis. Reply Brief, pages 6-7.

16 **Analysis**

17 Applicant acknowledges that “organic metal salts obtained by reacting a
18 metal oxide such as zinc oxide . . . , a dicarboxylic acid such as isophthalic acid and
19 a monocarboxylic acid such as propionic acid have been proposed” In
20 support of its acknowledgment, applicant cites Inoue. Specification, page 2:22-26.
21 According to applicant, however, the problem with the Inoue process is its
22 “polymerizing activity . . . [is said to be] low.” Specification, page 2:35 to
23 page 3:1.

1 According to applicant, deficiencies said to be associated with the use of the
2 Inoue catalyst can be overcome by a catalyst prepared by reacting (1) a zinc
3 compound (*e.g.*, zinc oxide), (2) an aliphatic dicarboxylic acid (*e.g.*, malonic acid,
4 succinic acid, glutaric acid, adipic acid and sebacic acid) and (3) an aliphatic
5 monocarboxylic acid (*e.g.*, formic acid, acetic acid, and propionic acid) in a mole
6 ratio of 0.0001 to 0.1 relative to the aliphatic dicarboxylic acid. Specification,
7 page 3:28-33; page 4:3-4; and page 4:7-8.

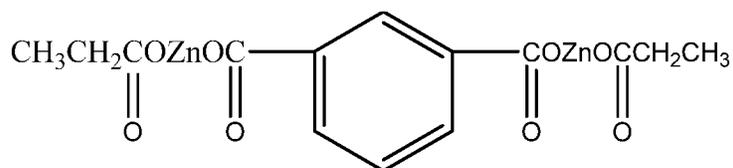
8 Inoue describes a similar method for making a catalyst suitable for
9 polymerizing an alkylene oxide (*e.g.*, ethylene oxide) and carbon dioxide.
10 *See, e.g.*, Inoue, page 11:17-18.

11 Inoue reveals the following (page 13:3-17):

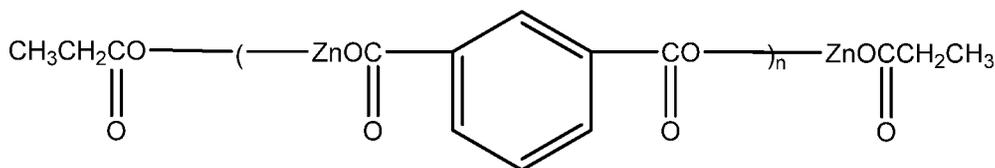
12 Examples of a dicarboxylic acid include: aromatic dicarboxylic
13 acids, such as phthalic acid, isophthalic acid, and terephthalic acid;
14 and aliphatic dicarboxylic acids, such as maleic acid and fumaric acid.
15 Examples of monocarboxylic acid[s] include: aromatic
16 monocarboxylic acids, such as benzoic acid; and aliphatic
17 monocarboxylic acids, such as acetic acid, and propionic acid. While
18 the starting materials, namely, a metal compound, a dicarboxylic acid
19 and a monocarboxylic acid can be reacted simultaneously, in general,
20 in order to form at least two monocarboxylic acid groups at the
21 terminals of the resulting reaction product, it is preferred that the
22 metal compound should be first reacted with the dicarboxylic acid,
23 and the resulting intermediate product should then be reacted with the
24 monocarboxylic acid.

1 According to Inoue, “the novel organic acid metal salt” catalyst is
2 particularly useful as a catalyst for polymerization of an epoxide and carbon
3 dioxide. Inoue, page 13:23 to page 14:2. Further according to Inoue, and contrary
4 to applicant’s characterization of Inoue, “[t]he use of the novel organic acid metal
5 salt . . . provides . . . excellent catalytic activity . . .” Inoue, page 14:2-4.

6 Inoue Embodiment 1 (page 18:21 to page 20:2) describes a process for
7 making an organic acid metal salt (1) by first reacting 0.1 mol of isophthalic acid
8 with 0.2 mol of zinc oxide to form a first product followed (2) by reacting the
9 product with 0.2 mol of propionic acid to form a second product. Elemental
10 analysis of the second product was consistent with the predicted formula:



11 Inoue Embodiments 2-4 describe a process similar to that of Embodiment 1
12 where the ratio of zinc oxide to isophthalic acid is varied to produce products
13 having the formula



14
15 wherein n is 2, 3, and 4 (see Embodiments 2, 3, and 4, respectively. Page 20:3-25.

16 Inoue also describes yields obtained by using the organic acid metal salts of
17 *inter alia* Embodiments 2-4 to polymerize ethylene oxide in the presence of carbon
18 dioxide. Inoue, page 25:15 to page 15. The yields are reported as follows:

Embodiment	Yield
2	24.0
2	22.3
3	33.0
4	8.3

1 Applicant also has presented data reporting yields. Specification, page 22.

2 Applicant's Example 1 describes a product made by simultaneously reacting
3 zinc oxide, glutaric acid and acetic acid. Since the Inoue data is based on a
4 sequential process for making a product, we believe it is not necessary to consider
5 yield data based on the product of Example 1.

6 Example 2 describes a process for making a catalyst. The catalyst is said to
7 have been used to polymerize propylene oxide and carbon dioxide. There is no
8 "prior art" test using propylene oxide to compare to Example 2.

9 Example 3 describes a process for making a catalyst from zinc oxide,
10 glutaric acid and acetic acid. The ratio of glutaric acid to acetic acid is within the
11 scope of applicant's Claim 1 ratio. The product was used to polymerize ethylene
12 oxide and carbon dioxide.

13 Example 4 is similar to Examples 2 and 3 except that formic acid was used
14 in place of acetic acid.

15 The Example 3 and 4 products fall within the scope of applicant's Claim 1.

16 In each of Examples 3-4 IR testing of the product is said to have revealed no
17 peak based carboxylic acid. The output of IR testing has not been placed in the
18 record.

1 Comparative Example 2 describes a process for making a catalyst from zinc
2 oxide, glutaric acid and acetic acid. The mole ratio of acetic acid with respect to
3 glutaric acid is said to have been 0.11364 (which is higher than the upper range of
4 applicant's claimed range of 0.0001 to 0.1).

5 Comparative Example 3 describes a process similar to Comparative
6 Example 2 where the mole ratio of acetic acid with respect to glutaric acid is said
7 to have been 0.000092 (which is lower than the lower range of applicant's claimed
8 range of 0.0001 to 0.1).

9 Based on yields of poly(alkylene carbonate) obtained using catalysts of
10 Examples 3-4 and Comparative Examples 2-3, applicant maintains that it has
11 achieved an unexpected result.

Example	Acetic acid ratio	Yield (%)
Example 3 (invention)	0.02083	70.1
Example 4 (invention)	0.02083	69.2
Comparative Example 2	0.11364	3.2
Comparative Example 3	0.000092	31.2

12 We have reproduced numbers to 5 or 6 significant digits recognizing that the
13 accuracy of the numbers may not be entirely accurate; the numbers are set out to
14 make it easy for the reader to understand applicant's position and our response to
15 that position.

16 Before proceeding to an analysis of the applicant's data, we will address
17 why one skilled in the art would have found it appropriate to use an aliphatic
18 dicarboxylic acid in the Inoue process for making a catalyst. In describing
19 dicarboxylic acids useful in its invention, Inoue identifies "examples" of

1 dicarboxylic acids “such as” and then goes on to list both aromatic and aliphatic
2 dicarboxylic acids. Inoue, page 13:3-6. After Inoue’s publication date of 15
3 December 1997, Carroll describes a process for reacting ethylene oxide with
4 carbon dioxide using a catalyst made from a dicarboxylic acid and *inter alia* a zinc
5 compound (col. 2:66—zinc oxide). Suitable dicarboxylic acid include isophthalic
6 acid (described by Inoue) and glutaric acid and adipic acid (described in
7 applicant’s Examples). Col.2:68 to col. 3:5; Example 1 (glutaric acid); Example 3
8 (adipic acid).

9 One skilled in the art reading Inoue would immediately appreciate based on
10 Carroll that the aliphatic dicarboxylic acids of Carroll would be useful in the Inoue
11 process, particularly given Carroll’s reference to isophthalic acid—an acid
12 emphasized by Inoue.

13 On this basis, the Examiner held that it would have been obvious to use a
14 known acid (Carroll) in a known process (Inoue) to accomplish a prior art
15 objective (that of Inoue), particularly where Inoue suggests use of aliphatic
16 dicarboxylic acids.

17 The question becomes: Has applicant demonstrated that it achieves an
18 unpredictable result? On the evidence of record, the Examiner found that it did
19 not. Answer, pages 9-11.

20 The Examiner found that applicant’s page 22 data did not compare the
21 closest prior art to the claimed invention. Answer, page 9. The Examiner also
22 noted that the comparison should be supported by Rule 132 testimony. *Id.* More
23 to the point is the Examiner’s finding in the Final Rejection that applicant’s
24 page 22 data is not commensurate in scope with the breadth of the claims. Final

1 Rejection, pages 3-4. Lastly, the Examiner was concerned that applicant might not
2 have an interest in succeeding when it comes to reproducing Inoue's process.
3 Answer, page 11, citing *In re Michalek*, 162 F.2d 229 (CCPA 1947) and *In re*
4 *Reid*, 179 F.2d 998 (CCPA 1950). For example, applicant reports no yield in a test
5 involving isophthalic acid. Specification, page 22, Comparative Example 4.

6 We view the data somewhat different from the manner in which it was
7 viewed by the Examiner. We do not believe that Rule 132 testimony is always
8 needed. However, in this case there is no underlying IR data from which one can
9 conclude that applicant's Example 3 and 4 embodiments had no carboxyl groups.
10 Rule 132 testimony accompanying by underlying IR data would have been useful.

11 The Example 3-4 data when compared to Comparative Example 2-3 data
12 does seem to be an "apple" to "apple" comparison. However, assuming the data
13 shows an unexpected result, the result would be true only for an acetic acid ratio of
14 0.02083. It is not clear on this record how applicant has established that 0.0001
15 and 0.1 are critical points in the range. On this record, yields may decrease at
16 0.02000 and below or at 0.0500 and above. The data does not appear to be
17 commensurate in scope with the scope of the dicarboxylic acids and
18 monocarboxylic acids claimed. *In re Harris*, 409 F.3d 1339, 1344 (Fed. Cir.
19 2005)("[T]he record does not show that the improved performance would result if
20 the weight-percentages were varied within the claimed ranges. Even assuming that
21 the results were unexpected, Harris needed to show results covering the scope of
22 the claimed range."). We are unable to find on this record that the yield results
23 said to have been obtained a solely a function of the ratio. Hence, we cannot say
24 that applicant has established by clear and convincing evidence that it achieves an

1 unexpected result throughout its claimed range with its claimed dicarboxylic acids
2 and monocarboxylic acids. *In re Heyna*, 360 F.2d 222, 228 (CCPA 1966) ("It was
3 incumbent upon appellants to submit clear and convincing evidence to support
4 their allegation of unexpected property."). *See also McClain v. Ortmyer*, 141
5 U.S. 419, 429 (1891) (conclusive evidence needed to establish new function).
6 Lastly, we observe that the claims do not require a particular yield.

7 We have another concern on this record with respect to Claims 1-5. It is true
8 that applicant's focus is on catalysts for polymerizing ethylene oxide in the
9 presence of carbon dioxide. But, Inoue describes the use of its organic acid metal
10 compounds as catalyst for other polymerizations, *viz.*, synthesis of polyesters and
11 inorganic polymers. Granting of a patent containing Claims 1-5 would preclude
12 those skilled in the art from using the Inoue compounds as polyester and inorganic
13 polymer catalysts. Thus, the objective reach of Claims 1-5 is beyond catalysis for
14 poly(alkylene carbonates). *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 419 (2007)
15 ("[w]hat matters is the objective reach of the claim. If the claim extends to what is
16 obvious, it is invalid under § 103."). *KSR* reaffirms prior Federal Circuit and
17 CCPA holdings in *In re Kemps*, 97 F.3d 1427, 1430 (Fed. Cir. 1996) (Archer)
18 ("Although the motivation to combine here differs from that of the applicant, the
19 motivation in the prior art to combine the references does not have to be identical
20 to that of the applicant to establish obviousness.") and *In re Muchmore*, 433 F.2d
21 824, 826 (CCPA 1970) (claims which include obvious subject matter and non-
22 obvious subject matter are not patentable under § 103). *See also In re Dillon*, 919
23 F.2d 688 (Fed. Cir. 1990) (en banc). In this case, the subject matter of Claim 1

1 would have been obvious as a catalyst for making polyesters and inorganic
2 polymers even if it would have been non-obvious for making polycarbonates.

3 We have not addressed the Korf reference because we do not believe on
4 this record that it necessary to establish obviousness of the subject matter of
5 Claims 1-6. Moreover, we agree with applicant that Korf does not have any
6 meaningful discussion with respect to the claimed ratio. From our point of view, it
7 is sufficient that Inoue can be said to describe suitable ratios and as a result it was
8 incumbent on applicant to establish unexpected results commensurate in scope
9 with the breadth of the claims.

10 **Decision**

11 Upon consideration of the appeal, and for the reasons given herein, it is

12 **ORDERED** that the decision of the Examiner rejecting Claims 1-6
13 over the prior art is *affirmed*.

14 **FURTHER ORDERED** that since our claim interpretation/rationale
15 differs from the rationale of the Examiner, our affirmance is designated as a new
16 rejection. 37 C.F.R. § 41.50(b).

17 **FURTHER ORDERED** that our decision is not a final agency
18 action.

19 **FURTHER ORDERED** that within **two (2) months** from the date of
20 our decision, appellant may further prosecute the application on appeal by
21 exercising on of the two following options:

22 Option 1: Request that prosecution be reopened by submitting
23 an amendment or evidence or both. 37 C.F.R. § 41.50(b)(1).

1 Option 2: Request rehearing on the record presently before the
2 Board. 37 C.F.R. § 41.50(b)(2).

3

4 **FURTHER ORDERED** that no time period for taking any
5 subsequent action in connection with this appeal may be extended under 37 C.F.R.
6 § 1.136(a)(1)(iv).

7

AFFIRMED

8

9 cam