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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CELANESE INTERNATIONAL CORPORATION,
Petitioner,

v.

DAICEL CORPORATION,
Patent Owner.

Case IPR2017-00163
Patent 8,940,932 B2

Before SHERIDAN K. SNEDDEN, ZHENYU YANG, and TINA E. HULSE, *Administrative Patent Judges*.

YANG, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

INTRODUCTION

Celanese International Corporation ("Petitioner") filed a Petition for an *inter partes* review of claims 1–14 of U.S. Patent No. 8,940,932 B2 ("the '932 patent," Ex. 1001). Paper 1 ("Pet."). Daicel Corporation ("Patent Owner") filed a Preliminary Response. Paper 6 ("Prelim. Resp."). On May 8, 2017, the Board instituted a review of the patentability of the challenged claims. Paper 9 ("Dec.").

Thereafter, Patent Owner filed a Response (Paper 18 ("PO Resp.")), and Petitioner filed a Reply (Paper 26). The parties also briefed whether certain exhibits should be excluded from the record. Papers 34, 35, 37–40. In addition, Patent Owner filed observations on the cross-examination of Petitioner's reply declarant (Paper 33), and Petitioner filed a response thereto (Paper 36). An oral hearing for this proceeding was held on January 23, 2018. *See* Paper 45 ("Tr.").

The Board has jurisdiction under 35 U.S.C. § 6 and issues this final written decision pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons provided below, we conclude Petitioner has established by a preponderance of the evidence that claims 1 and 3–14 of the '932 patent are unpatentable. Petitioner, however, has failed to meet its burden of proof regarding the unpatentability of claim 2.

Related Proceedings

The parties represent that there are no related matters that would affect or be affected by this proceeding. Pet. 1; Paper 14, 1.

The '932 Patent

The '932 patent "relates to a process for stably producing acetic acid by carbonylation of methanol in the presence of a metal catalyst (such as a rhodium catalyst) and methyl iodide." Ex. 1001, 1:5–8.

Before the '932 patent, "[v]arious industrial production processes of acetic acid ha[d] been known." *Id.* at 1:12–13. One of them, according to the '932 patent, is "highly efficient" because of the "addition of a catalyst stabilizer (such as an iodide salt) and the reaction under a low water content condition." *Id.* at 1:17–22. The '932 patent states that the reaction mixture contains impurities, such as acetaldehyde, which deteriorates the quality of acetic acid. *Id.* at 1:25–34. The '932 patent acknowledges that prior-art methods exist to reduce the concentration of acetaldehyde in the reaction system. *Id.* at 1:57–2:41. For example, according to the '932 patent,

> Japanese Patent Application Laid-Open Publication No. 8-67650 (JP-8-67650A, Patent Document 2) discloses a process for producing high-purity acetic acid, comprising allowing methanol to continuously react with carbon monoxide in the presence of a rhodium catalyst, an iodide salt, and methyl iodide, wherein the reaction is carried out by removing acetaldehyde from a process liquid being circulated into a reactor to maintain the acetaldehyde concentration in the reaction mixture at 400 ppm or lower. . . .
>
> In addition, this patent document discloses, relating to a process for producing acetic acid while removing acetaldehyde, that the process comprises separating the reaction mixture into a volatile phase containing acetic acid, methyl acetate and methyl iodide and a low-volatile phase containing the rhodium catalyst, distilling the volatile phase to obtain a product mixture containing acetic acid and an overhead containing methyl acetate and methyl iodide, and recirculating the resulting overhead into the reactor, wherein the overhead or a carbonyl impurity

> (particularly acetaldehyde) condensate thereof is allowed to contact with water to separate an organic phase containing methyl acetate and methyl iodide and an aqueous phase containing the carbonyl impurity, and the organic phase is recirculated into the reactor.

Id. at 2:6–35. This document, however, the '932 patent states, "does not disclose that the flow rate of the overhead is controlled in recirculating the overhead into the reactor." *Id.* at 2:42–44.

The invention of the '932 patent allegedly provides a process for stably producing acetic acid while (1) efficiently removing acetaldehyde, and/or (2) recycling methyl iodide as a catalyst with a high efficiency. *Id.* at 2:57–62.

Illustrative Claim

Among the challenged claims, claim 1 is independent. It is reproduced below:

> 1. A process for producing acetic acid, which comprises:
>
> a reaction step for continuously allowing methanol to react with carbon monoxide in the presence of a catalyst system comprising a metal catalyst, a halide salt, and methyl iodide in a carbonylation reactor,
>
> a flash evaporation step for continuously feeding a flasher with a reaction mixture from the reactor and separating a lower boiling point component (2A) containing product acetic acid and methyl iodide and a higher boiling point component (2B) containing the metal catalyst and the halide salt,
>
> an acetic acid collection step for continuously feeding a distillation column with the lower boiling point component (2A), and separating a lower boiling point component (3A) containing methyl iodide and by-product acetaldehyde and a stream (3B) containing acetic acid to collect acetic acid,

a condensation step for condensing and temporarily holding the lower boiling point component (3A) in a decanter and discharging the lower boiling point component (3A) from the decanter, and

a separation and recycling step for separating the lower boiling point component (3A) discharged from the decanter into acetaldehyde and a liquid residue and recycling the liquid residue to a step from the reaction step to the acetaldehyde-separation step,

wherein in the condensation step, the amount of the lower boiling point component (3A) to be held is adjusted or controlled based on a fluctuating flow rate of the lower boiling point component (3A) to be fed to the decanter, and the amount of the lower boiling point component (3A) to be fed to the separation and recycling step is adjusted or controlled.

Reviewed Grounds of Unpatentability

We instituted *inter partes* review of the following grounds of unpatentability:

Ground	Claims	Basis	References
1	1, 4, 8, 12, 14	§ 103	Zinobile,[1] Hallinan,[2] and Ochiai[3,4]

[1] Zinobile, et al., U.S. Patent Application Publication No. 2006/0247466 A1, issued November 2, 2006 (Ex. 1010).
[2] Hallinan, et al., U.S. Patent No. 6,552,221 B1, issued April 22, 2003 (Ex. 1011).
[3] Shinya Ochiai, U.S. Patent No. 5,352,415, issued October 4, 1994 (Ex. 1009).
[4] Petitioner does not explicitly include Ochiai in the asserted obviousness grounds. *See* Pet. 19, 32, 37, 44, 47. In the Decision to institute, we, however, declined to, as Patent Owner would have us, deny the Petition based on this fact. Dec. 10–11. Instead, we added Ochiai to all reviewed grounds. *Id.* at 11.

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