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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte WOLFGANG STAFFEL, REGINA VOGELSANG,
ROLAND KESSINGER, LEMBIT TUTTELBERG, and BERND HEIDA

Appeal 2014-004021
Application 13/129,544¹
Technology Center 1600

Before JEFFREY N. FREDMAN, RICHARD J. SMITH, and
DAVID COTTA, *Administrative Patent Judges*.

COTTA, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 involving claims to a process for removing by-products from an N-vinylactam product mixture. The Examiner rejected the claims on appeal as obvious under 35 U.S.C. § 103(a).

We affirm.

¹ According to Appellants, the real party in interest is BASF SE. App. Br. 1.

STATEMENT OF THE CASE

Claims 1, 4–9, and 11–18 are on appeal. Claim 1, the only independent claim, is illustrative and reads as follows:

1. A process for removing by-products from an N-vinyl lactam product mixture, which comprises extracting a crude N-vinyl lactam with an organic solvent selected from the group consisting of an aliphatic solvent, a cycloaliphatic solvent and a mixture thereof as the extractant.

The Examiner rejected claims 1, 4–9, and 11–18 under 35 U.S.C. § 103(a) as unpatentable over the combination of Eck,² Sennewald,³ Hammon,⁴ Arakawa,⁵ Aldrett,⁶ and McDonald.⁷

In the Examiner's Answer, the Examiner withdrew the pending rejection of claims 1, 4–9, and 11–18 under 35 U.S.C. § 112 (b) as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. Ans. 2. This issue is thus no longer a part of this appeal.

² Eck et al., US Patent No. 6,703,511 B2, issued Mar. 9, 2004 (“Eck”).

³ Sennewald et al., US Patent No. 3,692,829, issued Sept. 19, 1972 (“Sennewald”).

⁴ Hammon et al., US Patent Publication No. 2004/0147763 A1, published July 29, 2004 (“Hammon”).

⁵ Arakawa et al., US Patent No. 4,147,848, issued Apr. 3, 1979 (“Arakawa”).

⁶ Aldrett et al., US Patent Publication No. 2003/0146081 A1, published Aug. 7, 2003 (“Aldrett”).

⁷ McDonald et al., US Patent Publication No. 2007/0249877 A1, published Oct. 25, 2007 (“McDonald”).

FINDINGS OF FACT

1. Eck discloses:

[A] process for the isolation of pure N-vinylpyrrolidone from N-vinylpyrrolidone-containing crude products, comprising a single-stage or multistage crystallization process, which comprises passing the mother liquor from the first crystallization stage either to a distillative and/or extractive purification, or returning it to an N-vinylpyrrolidone-containing product stream of the preparation process.

Eck Abstract.

2. Eck discloses:

Using a process according to the invention it is possible, in a simple manner, to obtain N-vinylpyrrolidone in two product grades, it being possible to match the quantitative ratios to requirements in a simple manner via the substream quantitative ratios T1/T2. The N-vinylpyrrolidone which forms during the crystallization usually comprises less than 0.1% by weight of impurities. Multistage crystallization can give product grades with impurities of less than 100 ppm. Distillative work-up produces product grades having impurities of less than 0.5% by weight, in particular less than 0.1% by weight.

Id. at col. 8, ll. 16–26.

3. Hammon discloses a process for the preparation of a purified melt of at least one monomer where the monomer is separated from a gas or liquid phase “by condensation, absorption or extraction.” Hammon ¶ 1. Exemplary monomers include “acrylic acid, methacrylic acid and N-vinylpyrrolidone.” *Id.* at ¶ 3.

4. Arakawa discloses a process for purifying a crude isoprene.

Arakawa Abstract.

5. Arakawa discloses “[t]he addition of the saturated hydrocarbons

of this invention permits easy removal of the impurities by conventional distillation procedures to such an extent that they do not interfere with the polymerization of isoprene.” *Id.* at col. 3, ll. 46–51. Among the saturated hydrocarbons specifically disclosed is methylcyclohexane, which is taught to be “normally commercially available as [an] industrial solvent[.]” *Id.* at col. 4, ll. 23–30.

6. Aldrett discloses methods of recovering acrylic acid from a mixture by “extracting acrylic acid from [a] mixture with a solvent mixture comprising ethyl acrylate as the preponderant component thereof and an organic co-solvent.” Aldrett claim 1. Among the organic co-solvents recited in the claim is methylcyclohexane. *Id.*

7. McDonald discloses methods of separating mixture components using “an extractive agent such as a hydrocarbon in an extractive distillation process to separate monomers.” McDonald ¶ 1. Among the extractive agents disclosed is methylcyclohexane. *Id.* ¶ 124.

8. Sennewald teaches “[a] process for isolating pure acrylic acid from an aqueous crude acid containing acrylic acid together with minor proportions of acetic acid, formaldehyde and high boilers boiling at a temperature higher than 220 °C, by liquid-liquid extraction with the use of 3,3,5-trimethylcyclohexanone, isophorone or mixtures thereof as an extractant . . .” Sennewald claim 1.

ANALYSIS

Appellants argue claims 1, 4–9, and 11–18 together as a group. We designate claim 1 as representative.

The Examiner found that Eck discloses that pure N-vinyl pyrrolidone (“NVP”) can be obtained by extractive purification. Ans. 3. Eck, however,

does not disclose extractive purification using an “aliphatic solvent, a cycloaliphatic solvent and a mixture thereof” as required by claim 1. The Examiner found that this limitation was obvious because the person of ordinary skill in the art would “understand the disclosure of Eck to include solvents routinely used and well-known in the art for extraction such as methycyclohexane which is specifically taught by Arakawa, Aldrett, and McDonald as successful in the purification of related monomer products.” *Id.* at 6.

Appellants argue that Eck does not render the claimed process obvious because in Eck, the extractive purification of NVP occurs after a crystallization process. Accordingly, the composition from which NVP is extracted is a “mother liquor resulting from crystallization.” Reply Br. 2. Appellants contend that “[a] mother liquor is not a crude N-vinyl lactam” as required by the claims. *Id.*

The Specification defines “crude N-vinylamide” as follows: “Crude N-vinylamide is understood to mean an N-vinylamide-rich product mixture.” Specification p. 2, l. 12; *see also id.* at p. 1, ll. 5–6 (“The invention relates to a process for removing by-products from N-vinylamide-rich product mixtures (crude N-vinylamide).” Appellants contend that the mother liquor of Eck – which is depleted of the NVP removed in crystallization (*see* Eck col. 2, ll. 17–25) – has too low a concentration of N-vinylamide to qualify as “crude N-vinylamide.” But the mother liquor in Eck includes at least enough N-vinylamide to provide a second source of purified NVP in addition to the NVP provided in the crystallization stage. *See* FF2 (“[u]sing a process according to the invention it is possible, in a simple manner, to obtain N-vinylpyrrolidone in two product grades,” a first grade obtained by

crystallization that “comprises less than 0.1% by weight of impurities,” and a second grade obtained by “distillative work-up” of the mother liquor “having impurities of less than 0.5% by weight”). Moreover, Appellants do not provide persuasive evidence to quantify the N-vinylamide remaining in Eck’s mother liquor or otherwise demonstrate that the mother liquor disclosed in Eck is not “N-vinylamide-rich.” Instead, Appellants rely on unsupported attorney argument that “[a] mother liquor is not a crude N-vinylactam.” This is insufficient. *See Johnston v. IVAC Corp.*, 885 F.2d 1574, 1581 (Fed. Cir. 1989) (“Attorneys’ argument is no substitute for evidence.”); *In re Pearson*, 494 F.2d 1399, 1405 (CCPA 1974). Absent persuasive evidence to the contrary, we find that a preponderance of the evidence supports the Examiner’s finding that Eck discloses extractive purification of crude N-vinylactam. *See In re Zletz*, 893 F.2d 319, 322 (Fed. Cir. 1989) (“[D]uring patent prosecution when claims can be amended, ambiguities should be recognized, scope and breadth of language explored, and clarification imposed.”)

Appellants argue that Arakawa, Aldrett, and McDonald do not render the claimed process obvious because “the product being purified is dissolved in an organic solvent,” and thus they do not disclose “dissolution of by-products of an N-vinyl lactam[] into an organic solvent.” Reply Br. 4. We are not persuaded. Appellants’ attempted distinction of Arakawa, Aldrett, and McDonald is not grounded in the language of the claims. Claim 1 recites “extracting a crude N-vinylactam with an organic solvent,” thus encompassing purification where the product being purified – N-vinylactam – is dissolved in the organic solvent. Moreover, Appellants have not provided persuasive evidence that the difference between extracting by-

products from a mixture and extracting the target compound from a mixture is significant.

Appellants fault the Examiner for relying on “secondary references which disclose specific solvents being used in extractive purifications, but not of a crude N-vinyllactam.” App. Br. 5. Appellants contend: “[a]s the products being extracted with an organic solvent are different from the by-products in a crude-N-vinyllactam, there would have been no motivation to have used the organic solvents of the secondary references as extractants for a crude N-vinyllactam.” *Id.* at 9.

We are not persuaded. Claim 1 broadly encompasses “extracting” using “an aliphatic solvent, a cycloaliphatic solvent and a mixture thereof.” Eck, Sennewald, Hammon, Arakawa, Aldrett, and McDonald all teach the extraction with a solvent to purify a monomer. *See* FF1–8. More specifically, Eck and Hammon teach that NVP can be purified by extraction, *see* FF1 and FF3, and Arakawa, Aldrett, and McDonald teach purification of monomers similar to NVP by extraction using a species of organic solvent that falls within the scope of the claims – methylcyclohexane. *See* FF4–7. Further, Arakawa teaches that methylcyclohexane is “normally commercially available as [an] industrial solvent.” FF5. Accordingly, we find that a preponderance of the evidence supports the Examiner’s findings that person of ordinary skill in the art would reasonably expect to be able to purify N-vinyllactam using an organic acid that falls within the scope of the claims and that a person of ordinary skill in the art would have been motivated to do so in order to optimize purity.

We affirm the Examiner’s rejection of claim 1 as unpatentable over the combination of Eck, Sennewald, Hammon, Arakawa, Aldrett, and

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McDonald. Because they were not argued separately, claims 4–9 and 11–18 fall with claim 1.

SUMMARY

For these reasons and those set forth in the Examiner’s Answer, the Examiner’s final decision to reject claims 1, 4–9, and 11–18 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1).

AFFIRMED