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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte MARKUS SIEGERT, NEVAN LANG, ECKHARD STROEFER, ACHIM STAMMER, and THORSTEN FRIESE

Appeal 2012-000839
Application 11/665,840
Technology Center 1600

Before TONI R. SCHEINER, ERIC GRIMES, and ERICA A. FRANKLIN, *Administrative Patent Judges*.

FRANKLIN, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134(a) involving claims to a process for preparing pure trioxane. The Patent Examiner rejected the claims as obvious. We have jurisdiction under 35 U.S.C. § 6(b). We reverse.

STATEMENT OF THE CASE

The invention concerns "a process for preparing trioxane from a highly concentrated aqueous formaldehyde solution." (Spec. 1, ll. 5-6.)

Claims 18-37 are on appeal. Claim 18 is representative and reads as follows:

18. A process comprising:
(a) reacting an aqueous formaldehyde solution in a reactor in the presence of a suitable catalyst to obtain a reaction product mixture comprising trioxane, formaldehyde and water;
(b) distilling the reaction product mixture in a column to form a top stream comprising crude trioxane having a ternary trioxane/formaldehyde/water azeotrope composition at the top pressure of the column; and
(c) treating the top stream in one or more additional stages to form pure trioxane;
wherein an aqueous sidestream is drawn off during the distilling of the reaction product mixture.

The Examiner rejected claims 18-37 under 35 U.S.C. § 103(a) as unpatentable over Freyhof[1] and Freyhof DE.[2]

OBVIOUSNESS

The Examiner's position is that Freyhof taught a process for removing trioxane from an aqueous mixture which consists substantially of trioxane, water, and formaldehyde, by removing trioxane from the mixture by pervaporation and separating the trioxane-enriched permeate by rectification into trioxane and an azeotropic mixture of trioxane, water and formaldehyde. (Final Rej. 2.) The Examiner found that Freyhof disclosed an example wherein: an aqueous mixture consisting of trioxane, water, and

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[1] Patent No. US 6,200,429 B1 issued to Reinhard Freyhof et al., Mar. 13, 2001.
[2] Patent No. DE 197 32 291 A1 issued to Reinhard Freyhof et al., Jan. 28, 1999. The Examiner relied on Freyhof as the English language equivalent of Freyhof DE. (*See* Ans. 5; App. Br. 3.)

formaldehyde is separated in a first distillation column into a water/formaldehyde mixture and an azeotropic mixture of trioxane/water/formaldehyde; the azeotropic mixture is passed into a pervaporation unit which yields a trioxane-enriched mixture that is recycled upstream of the pervaporation stage. (*Id*. at 2-3.) The Examiner states:

> Drawing off an aqueous side stream from the distillation column in which the trioxane/formaldehyde/water mixture is removed dist[i]llatively from the acid-catalyzed reaction makes possible an operating mode of distillation column in which the top stream drawn off is crude trioxane which has approximately the composition of the ternary trioxane/formaldehyde/water mixture at the top pressure of the column and which is the most economically viable starting basis for the further distillative workup corresponds the recited claims.

(*Id*. at 3.) The Examiner also found that "side stream withdrawal, as well as top or bottom, is a common separation technique in the chemical arts often done to obtain a particular desired component. These techniques are known to improve yields and purities." (*Id*.) Therefore, according to the Examiner, "to use somewhat different but otherwise analogous process parameters in another known process would not have been unobvious as the results, purified trioxane, would not have been unexpected." (*Id*.)

Appellants contend that "Freyhof does not teach or even suggest drawing off an aqueous sidestream during the distilling of the reaction product mixture." (App. Br. 4.) Moreover, Appellants assert that the Examiner has not provided any motivation for one of ordinary skill in the art to undertake such sidestream withdrawal in a process of Freyhof. (*Id*.)

After considering the evidence and the arguments, we agree with Appellants that Freyhof did not teach or suggest a process wherein an

aqueous sidestream is drawn off during the distilling of the reaction product mixture, as recited by the claimed invention. Indeed, as Appellants have asserted, Freyhof does not even mention such an aqueous sidestream withdrawal.

Moreover, we do not find that the Examiner has provided evidence supporting the conclusion that it would have been obvious "to use [a] somewhat different but otherwise analogous process parameter in an other known process…." (*See* Final Rej. 3; Ans. 6.) According to the Examiner, the claimed step of distilling a reaction product mixture to form a top stream of crude trioxane, wherein an aqueous sidestream is drawn off, is analogous to the prior art steps of distilling a reaction product mixture to form a top stream of crude trioxane and then subsequently subjecting the stream to pervaporation. (*Id*.) In particular, the Examiner asserts that "[t]he claimed side stream removal serves the same function as the pervaporation removal" and that "both steps occur during an initial separation procedure…." (Ans. 6.)

However, as Appellants have correctly asserted, the pervaporation step in Freyhof "functions to concentrate the trioxane in the trioxane-enriched permeate by removing (*i.e*., specifically separating) trioxane," while the claimed step of sidestream withdrawal "functions to remove aqueous content from a mixture during the actual distillation operation." (*See* Reply Br. 2.) Further, Freyhof disclosed that its pervaporation step occurs *after* the initial distillation step and prior to a second distillation step (Freyhof col. 1, l. 62- col. 2, l. 13, and Fig. 2) rather than occurring during its *initial* separation procedure. Based on these differences, we conclude

that the Examiner has not established that the claimed side stream removal serves the same function as the pervaporation removal.

Accordingly, we reverse the obviousness rejection of claims 18-37.

REVERSED

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