

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 15

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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Ex parte MICHAEL W. PETERS and YU-HWA E. SHEU

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Appeal No. 96-2339  
Application 08/299,391<sup>1</sup>

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ON BRIEF

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Before DOWNEY, KIMLIN and OWENS, Administrative Patent Judges.  
OWENS, Administrative Patent Judge.

*DECISION ON APPEAL*

This is an appeal from the examiner's final rejection of claims 11-17, which are all of the claims remaining in the application.

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<sup>1</sup> Application for patent filed July 1, 1994. According to the appellant, the application is a division of Application 08/147,507, filed November 5, 1993.

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*THE INVENTION*

Appellants claim a method for continuously preparing methyl tertiary butyl ether (MTBE) by reacting tertiary butyl ether and methanol, and for continuously purifying the MTBE product. At one point in the purification method, an isobutylene stream is fed to an extraction tower at a height of about 1 to 3 theoretical plates below the point of introduction of the MTBE-containing feed to the tower, to facilitate the removal of MTBE from the extract (specification, page 6, line 22 - page 7, line 11). Claim 17 is illustrative and is appended to this decision.

*THE REFERENCE*

Kruse et al. (Kruse)                      5,243,091                      Sep. 7, 1993

*THE REJECTION*

Claims 11-17 stand rejected under 35 U.S.C. § 103 as being unpatentable over Kruse.

*OPINION*

We have carefully considered all of the arguments advanced by appellants and the examiner and agree with appellants that the aforementioned rejection is not well

founded. Accordingly, we do not sustain this rejection.

Kruse discloses a method for the continuous preparation of MTBE by reacting tertiary butyl alcohol and methanol, and for the continuous purification of the MTBE product (col. 1, lines 9-15; col. 4, lines 32-35). In Kruse's method, isobutylene recycle fraction 83, isobutylene conversion fraction 42, fifth distillation fraction 72, and recycle fraction 120 are combined and fed to methanol extraction zone 50 (figure 1). In the methanol extraction zone, methanol is extracted from the feed to provide an extract (64) which includes methanol and water, and a raffinate (60) which includes MTBE and isobutylene (col. 14, lines 22-27).<sup>2</sup>

Appellants' claimed embodiment, shown in their figure 2, differs from Kruse's method in that appellants' isobutylene fraction (82) is fed to the extraction zone (50) at about 1 to 3 theoretical plates below the point of introduction of the MTBE-containing feed stream (46). Appellants argue that the

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<sup>2</sup>In Kruse, the names given to fractions 60 and 64 are reversed. Fraction 60 should be called the raffinate and fraction 64 should be called the extract.

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isobutylene fraction, because it is introduced at this position, strips the extract of MTBE (brief, pages 7-8). Appellants provide a comparison (specification, page 40) in which Kruse's method produced an extract containing 11.75 wt% MTBE and a raffinate containing 0.49 wt% methanol, whereas appellants' method produced an extract containing only 0.33 wt% MTBE, while producing a raffinate which, as in Kruse's method, contained a small concentration, i.e., 0.53 wt%, of methanol.

The examiner argues that appellants are merely optimizing the Kruse process (answer, pages 4-5). Varying known result-effective variables for purposes of optimization generally is considered to be *prima facie* obvious to one of ordinary skill in the art. See *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990); *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955); *In re Sebek*, 465 F.2d 904, 907, 175 USPQ 93, 95 (CCPA 1972). The examiner's argument, however, is deficient in that the examiner has provided no evidence that the height in the extraction zone at which Kruse's isobutylene fraction is fed, relative to the height at

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which the MTBE-containing feed to the extraction zone is fed, was a known result-effective variable. Kruse discloses only introducing the entire feed at the same point.

The examiner argues that the extraction steps of Kruse and appellants are the same and produce the same results due to the same reactants being treated the same, and that Kruse's method and that of appellants, therefore, are equivalents (answer, page 5). This argument is not well taken because, first, the examiner does not give weight to the requirement in appellants' claims that the second isobutylene recycle fraction is fed to the methanol extraction tower at a point about 1 to 3 theoretical plates below the point of introduction of the isobutylene conversion product. All limitations must be given effect when interpreting claims. See *In re Angstadt*, 537 F.2d 498, 501, 190 USPQ 214, 217 (CCPA 1976); *In re Geerdes*, 491 F.2d 1260, 1262-3, 180 USPQ 789, 791 (CCPA 1974); *In re Wilder*, 429 F.2d 447, 450, 166 USPQ 545, 548 (CCPA 1970). The examiner has provided no reason why Kruse would have fairly suggested this limitation to one of ordinary skill in the art. Second, as discussed above,

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appellants provide evidence that the extraction method recited in their claims does not produce the same result as Kruse's method. The examiner provides no evidence or technical reasoning to the contrary.

For the above reasons, we find that the examiner has not set forth a factual basis which is sufficient to support a conclusion of obviousness of the method recited in any of appellants' claims. We therefore do not sustain the examiner's rejection.

*DECISION*

The rejection of claims 11-17 under 35 U.S.C. § 103 over Kruse is reversed.

*REVERSED*

MARY F. DOWNEY

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Administrative Patent Judge	)	
	)	
	)	
	)	BOARD OF PATENT
EDWARD C. KIMLIN	)	
Administrative Patent Judge	)	APPEALS AND
	)	
	)	INTERFERENCES
	)	
TERRY J. OWENS	)	
Administrative Patent Judge	)	

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#### APPENDIX

17. A method for the continuous preparation of methyl tertiary butyl ether (MTBE) from tertiary butyl alcohol (TBA) and methanol (MeOH), which comprises the steps of:

a) continuously passing a feed mixture comprising substantially peroxides-free tertiary butyl alcohol and methanol through a methyl tertiary butyl ether etherification reaction zone containing a bed of a TBA/MeOH etherification catalyst under etherification reaction conditions to form an etherification reaction product comprising unreacted methanol, unreacted tertiary butyl alcohol, water, isobutylene and

methyl tertiary butyl ether;

b) continuously charging said etherification reaction product to a first methyl tertiary butyl ether distillation zone and separating it therein into a first lighter distillation fraction comprising isobutylene, methanol and methyl tertiary butyl ether and a second heavier distillation fraction comprising methanol, tertiary butyl alcohol and water;

c) continuously charging an isobutylene reaction mixture comprising the first distillation fraction and a first recycle isobutylene fraction (IBTE) to an isobutylene conversion reaction zone containing a solid resin IBTE/MeOH etherification catalyst and partially reacting the isobutylene and methanol contained in the isobutylene reaction mixture to form an isobutylene conversion product containing isobutylene, methanol, tertiary butyl alcohol and water;

d) continuously charging said isobutylene conversion product to a methanol extraction zone comprising a counter-current contact tower, continuously charging a second isobutylene recycle fraction to said counter-current contact tower at a charge point about 1 to 3 theoretical plates below the point of introduction of said isobutylene conversion product and countercurrently contacting said isobutylene conversion product therein with water and with said second isobutylene recycle fraction to provide an overhead raffinate comprising isobutylene, methyl tertiary butyl ether and a minor amount of water and an extract substantially free from methyl tertiary butyl ether comprising methanol and water;

e) continuously charging said raffinate to a second methyl tertiary butyl ether purification distillation zone and separating said raffinate therein into a third lighter distillation fraction comprising isobutylene and water and a fourth heavier distillation fraction consisting essentially of methyl tertiary butyl ether;

f) continuously charging said third distillation fraction

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to a decantation separation zone and separating it therein into a distillate isobutylene fraction and a water fraction; and

g) continuously returning from about 85 to about 90 wt.% of said distillate isobutylene fraction to said counter-current contact tower as said second isobutylene recycle fraction and returning the remaining 10 to 15 wt.% of said distillate isobutylene fraction to said isobutylene fraction as said first isobutylene recycle fraction.