

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* KENNETH ALLEN WINDHORST, JENNIFER L. BAILEY, and  
GABRIEL R. CHAPA

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Appeal 2008-3645  
Application 10/635,983  
Technology Center 1600

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Decided: July 24, 2008

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Before RICHARD E. SCHAFER, SALLY GARDNER LANE, and  
MICHAEL P. TIERNEY *Administrative Patent Judges*.

LANE, *Administrative Patent Judge*.

DECISION ON APPEAL

**I. STATEMENT OF THE CASE**

The appeal is from a Final Rejection of claims 1-9 and 14-20, all of the pending claims. 35 U.S.C. § 134. We have jurisdiction under 35 U.S.C. § 6(b).

The application was filed August 7, 2003. The real party in interest is said to be Celanese International Corporation. (App. Br. 2).

The Examiner relied on U.S. Patent No. 3,214,347 (“Grekel”), which issued October 26, 1965. Appellants did not argue against the prior art status of this reference.

Appellants appealed the rejection of claims 1-9 and 14-20 under 35 U.S.C. § 102(b), and alternatively under 35 U.S.C. § 103(a), over Grekel. Appellants also argued separately against the rejection of claim 8 and the rejection of claims 14-20.

We reverse.

## **II. FINDINGS OF FACT**

The record supports the following findings of fact as well as any other findings of fact set forth in this opinion, by at least a preponderance of the evidence.

1. Claim 1 recites:

A process for preparation of a color stable organic compound/water mixture from an organic compound selected from the group consisting of C<sub>1</sub> to C<sub>6</sub> carboxylic acids, ketones having boiling points from 154°C to 170°C, and esters having boiling points from about 168°C to about 250°C, the process comprising

combining the organic compound with water under conditions of agitation to form a mixed solution of the organic compound and water having a consistent concentration of water comprising from about 100 ppm to about 50,000 ppm water to produce the color stable organic compound/water mixture, wherein the color stable organic compound/water mixture has an APHA color value of 15 or less after being boiled for at least one hour at one atmosphere of pressure.

2. Claim 14 recites:

A process for preparation of a color stable organic compound/water mixture, wherein the organic compound is selected from the group consisting of C<sub>1</sub> to C<sub>6</sub> carboxylic acids, ketones having

boiling points from 154°C to 170°C, and esters having boiling points from about 168°C to about 250°C, the process comprising:

(a) removing a crude product stream comprising the organic compound from a reaction zone in which the organic compound is prepared;

(b) introducing the crude product stream into a distillation column having a lower portion and an upper portion wherein the upper portion and the lower portion are maintained at a temperature of about 23°C to about 250°C and at a pressure of about 10.1 kPa to about 202.6 kPa;

(c) removing the organic compound as a side-stream from the distillation column to produce a finished organic compound; and

(d) combining the finished organic compound with water under conditions of agitation to form a mixed solution of the organic compound and water having a consistent concentration of water comprising from about 100 ppm to about 50,000 ppm water to produce the color stable organic compound product,

wherein the color stable organic compound/water mixture has an APHA color value of 15 or less after being boiled for at least one hour at one atmosphere of pressure.

3. Appellants' specification reports that "commercially produced butyric acid" had an APHA color of 4, but it was "found to have an APHA color of 31 after boiling" for one hour. (Spec. 6, ll. 24-26).

4. Grekel provides "a novel method for purifying certain organic chemicals by means of an improved distillation technique. More particularly, it is concerned with a procedure for purifying such chemicals substantially miscible in the azeotroping agent employed – such as, for example, water-miscible carboxylic acids which form azeotropes with water." (Grekel col. 1, ll. 17-23).

5. Grekel states: "It is another object of our invention to provide a process for the purification of the aforesaid acids by means of azeotropically distilling out the impurities therein in the presence of water wherein very

little – if any process water need be added during operation after steady-state conditions have been established in the system.” (Grekel col. 2, ll. 14-20).

6. In Example I of Grekel, crude n-butyric acid, a C<sub>4</sub> carboxylic acid, is purified by distillation. (Grekel col. 7, ll. 23-29).

7. In Example I, Grekel teaches using a first distillation column, wherein the “temperature employed at the bottom of the column is about 175° C. (440 mm.) and the top tower temperature is about 132° C. (330 mm.)” (Grekel col. 7, ll. 28-32).

8. In Example I, Grekel teaches that a stream containing non-acid impurities “approximately 2 percent of the n-butyric acid present in the original feed” results from the first distillation. (Grekel col. 7, ll. 39-42).

9. Grekel teaches using a second column, in Example I, which contain[s] only water [and] is then started up under total reflux, after which the aforesaid distillate is used as feed. Water is removed from the column under refluxing conditions until the temperature at a point in the solvent removal zone in the lower part of the fractionating tower reaches a value of about 130° C. (corrected to atmospheric pressure). The temperature at the base of the column is about 164° C. [(1940 mm.) and the top tower temperature is 100° C. (760 mm.).

(Grekel col. 7, ll. 42-51).

10. Grekel next teaches in Example I that the [d]istillate is brought overhead, cooled to about 52° C. and allowed to stratify into an upper organic layer consisting essentially or impurities, together with dissolved acids, and a lower aqueous layer containing water-soluble acids. The organic layer is removed from the system at the rate of 145 pounds per hour and contains 4.0 percent of the n-butyric acid present in the aforesaid original feed.

(Grekel col. 7, ll. 51-58).

11. Grekel teaches that the lower aqueous layer from the second column used in Example I is refluxed back to the distillation column with the introduction of water “in order to compensate for the quantity of water removed from the system via the aforesaid organic layer.” (Grekel col. 7, ll. 59-64).

12. Ultimately, Grekel teaches that a “substantially dry stream (0.5 weight percent water) of water-soluble C<sub>2</sub>-C<sub>4</sub> acids free from non-acid impurities is withdrawn . . .” from the second column in Example I. (Grekel col. 7, ll. 64-65).

13. Example I of Grekel continues by teaching use of a third column to obtain “highly purified” n-butyric acid from the dry acid mixture. (Grekel col. 7, l. 69, through col. 8, l. 6).

14. The stream from the third column in Example I of Grekel is subjected to “further fractionation.” (Grekel col. 8, ll. 6-10).

15. Grekel teaches that a product is obtained from the third column and “further fractionation” with “99.2 percent purity, boiling at 162° to 164.2° C. and having a color (APHA scale) of 5.” (Grekel col. 8, ll. 11-13).

### **III. ISSUES**

The issues are:

(1) whether Appellant has shown that the Examiner erred in rejecting claims 1-9 and 14-20 under 35 U.S.C. § 102(b) over Grekel; and

(2) whether Appellant has shown that the Examiner erred in rejecting claims 1-9 and 14-20 under 35 U.S.C. § 103(a) over Grekel.

#### IV. LEGAL PRINCIPLES

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987). If, though, a product or process was "accidentally and unwittingly produced, whilst the operators were in pursuit of other and different results, without exciting attention and without its even being known what was done or how it had been done, it would be absurd to say that this was an anticipation . . . ." *Tilghman v. Proctor*, 102 U.S. 707, 711-12 (1880). *See also Eibel Process Co. v. Minnesota & Ontario Paper Co.*, 261 US 45, 66 (1923) (if the prior reference disclosed the claim elements "under unusual conditions, accidental results, not intended and not appreciated, [it does] not constitute anticipation.").

To determine whether subject matter would have been obvious, "the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. . . . Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented." *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17-18 (1966).

The Supreme Court has noted:

When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability.

*KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1740 (2007). “Under the correct analysis, any need or problem known in the filed of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.” *Id.* at 1742.

## V. ANALYSIS

### 35 U.S. C. § 102(b) - Grekel

Appellants assert that they have found “processes for preparing certain organic compounds such as carboxylic acids, ketones, and esters having low color characteristics.” (Spec. 2). Appellants’ claim 1, which recites:

A process for preparation of a color stable organic compound/water mixture from an organic compound selected from the group consisting of C<sub>1</sub> to C<sub>6</sub> carboxylic acids, ketones having boiling points from 154°C to 170°C, and esters having boiling points from about 168°C to about 250°C, the process comprising  
combining the organic compound with water under conditions of agitation to form a mixed solution of the organic compound and water having a consistent concentration of water comprising from about 100 ppm to about 50,000 ppm water to produce the color stable organic compound/water mixture,  
wherein the color stable organic compound/water mixture has an APHA color value of 15 or less after being boiled for at least one hour at one atmosphere of pressure.

Appellants’ claim 14 recites:

A process for preparation of a color stable organic compound/water mixture, wherein the organic compound is selected from the group consisting of C<sub>1</sub> to C<sub>6</sub> carboxylic acids, ketones having boiling points from 154°C to 170°C, and esters having boiling points from about 168°C to about 250°C, the process comprising:  
(a) removing a crude product stream comprising the organic compound from a reaction zone in which the organic compound is prepared;

(b) introducing the crude product stream into a distillation column having a lower portion and an upper portion wherein the upper portion and the lower portion are maintained at a temperature of about 23°C to about 250°C and at a pressure of about 10.1 kPa to about 202.6 kPa;

(c) removing the organic compound as a side-stream from the distillation column to produce a finished organic compound; and

(d) combining the finished organic compound with water under conditions of agitation to form a mixed solution of the organic compound and water having a consistent concentration of water comprising from about 100 ppm to about 50,000 ppm water to produce the color stable organic compound product,

wherein the color stable organic compound/water mixture has an APHA color value of 15 or less after being boiled for at least one hour at one atmosphere of pressure.

Both claim 1 and claim 14 recite a process that includes “combining” the organic compound with water “to form a mixed solution of the organic compound and water having a consistent concentration of water comprising from about 100 ppm to about 50,000 ppm water to produce [a] color stable organic compound/water mixture.” Thus, the claims require the specific step of combining a specific amount of water to an organic compound.

Claims 1 and 14 also require that “the color stable organic compound/water mixture has an APHA color value of 15 or less after being boiled for at least one hour at one atmosphere of pressure.” According to Appellants’ specification the APHA color level can increase significantly after boiling. For example, Appellants report that “commercially produced butyric acid” had an APHA color of 4, but after it was boiled for one hour it was “found to have an APHA color of 31 after boiling.” (FF 3).

Grekel relates not to achieving specific color characteristics in organic compounds, but to purifying azeotropes by distillation. (FF 4). Grekel

states that it is an objective of the invention to purify “in the presence of water wherein very little – if any process water need be added during operation after steady-state conditions have been established in the system.” (FF 5). The process taught by Grekel in Example I includes processing n-butyrlic acid through three distillation columns and further fractionation. (FFs 6-14). The first distillation provides initial purification of a crude n-butyrlic acid mixture.

In the second distillation of Grekel, a “column containing only water is . . . started up under total reflux, after which the aforementioned distillate is used as feed.” (FF 9). Next, “[w]ater is removed from the column under refluxing conditions until the temperature at a point in the solvent removal zone in the lower part of the fractionating tower reaches a value of about 130° C. (corrected to atmospheric pressure).” (FF 9). After distillation, Grekel teaches that an organic layer containing the n-butyrlic acid is removed. (FF 10). Grekel ultimately concludes the description of the second distillation and this further purification by stating: “From the bottom of the tower a substantially dry stream (0.5 weight percent water) of water-soluble C<sub>2</sub>-C<sub>4</sub> acids free from non-acid impurities is withdrawn . . . .” (FF 12).

The process described by Grekel continues with a third distillation and “further fractionation.” (FF 13-14). Grekel reports that “[o]verhead product n-butyrlic acid is obtained in 99.2 percent purity, boiling at 162°-164° C. and having a color (APHA scale) of 5.” (FF 15).

The Examiner asserted that the “difference between the process set forth in the rejected claims and the process set forth by Grekel is that Grekel fails to specifically teach the [sic] at the end of the disclosed process, water

is combined with butyric acid.” (Ans. 5). But, the Examiner asserted that “those of ordinary skill would consider the disclosed steps in Grekel of adding a stream comprising n-butyric acid to the second column and further purifying n-butyric acid as combining with water.” (Ans. 5). The Examiner noted that the claimed “range including 100 ppm . . . would be considered by those of ordinary skill as ‘substantially dry.’” (Ans. 6).

We disagree that the steps of Grekel amount to “combining” as used in Appellants’ claims. In particular, we understand the Appellants’ claims to require the addition of water to the organic compound to obtain a specified concentration of water. Grekel does not teach a step of adding water to the organic compound but rather removing water after the organic compound is introduced into a distillation column that contains water. (FF 9). While both the organic compound and water are present in the column, we do not view the “combining” step as including the removal of water. Thus, even if the water removal step of Grekel results in a concentration of water within the claimed range, it was not achieved by adding or “combining” the organic compound with water.

We further note that even were we to agree that Grekel teaches a combining step, we still would find that Grekel does not anticipate the claimed invention. We agree that there may have been a concentration of water of 100 ppm to 50,000 ppm present at some point in the second distillation column taught by Grekel, but such an intermediate mixture would not be anticipatory. First, it would not be a “consistent concentration,” as claimed. Second, anticipation may not occur if the claim limitations are “accidentally or unwittingly produced, whilst the operators were in pursuit of other and different results, without exciting attention and

without its even being known what was done or how it had been done . . . .”  
*Tilghman*, 102 U.S. at 711-12. For example, in *In re Felton*, 484 F.2d 495  
(CCPA 1973), even though the characteristics of the claimed dropper were  
found in an intermediate structure of the medicine dispenser disclosed in the  
prior art, anticipation was not found. The court noted that

in view of the purpose for which the [prior art’s] device is  
intended, it is apparent that it requires no critical dimension  
which would lead to a structure inherently having those  
characteristics. Therefore, it would be mere happenstance if  
any structure made according to [the prior art] met the  
limitations of the claims. An accidental or unwitting  
duplication of an invention cannot constitute an anticipation.

*Id.* at 499-500. We determine that, even were the claimed process practiced  
at some point within the second distillation column of Grekel, that  
“unappreciated” process does not anticipate the claimed process.

Finally, we note that Grekel reports a APHA color value of 5 only  
after a third distillation and “further fractionation,” (FFs 13-15), not after the  
second distillation column. Furthermore, Grekel does not report that this  
APHA color was obtained after boiling the n-butyric acid for at least one  
hour at one atmosphere of pressure, as claimed. We note that Appellants’  
specification reported increased color (to an APHA of 31) after boiling (FF  
3). The Examiner did not explain why there would have been a reasonable  
basis for concluding that the APHA color value of the product of the second  
distillation column in Grekel would be 15 or less after boiling for one hour.  
*See Ex parte Levy*, 17 USPQ2d 1461, 1464 (BPAI 1990) (“In relying upon  
the theory of inherency, the examiner must provide a basis in fact and/or  
technical reasoning to reasonably support the determination that the

allegedly inherent characteristic *necessarily* flows from the teachings of the applied prior art.").

We determine that the Examiner erred in finding the subject matter of claims 1-9 and 14-20 anticipated by Grekel.

35 U.S. C. § 103(a) - Grekel

The Examiner made an alternate rejection under 35 U.S.C. §103(a) over Grekel, asserting that “the step of combining an organic compound with water is well within the motivation of those of ordinary skill” and that “this reference teaches the elements of the rejected claims with the requisite particularity and with a reasonable expectation of success.” (Ans. 5).

Given, though, that Grekel concerns purifying n-butyric acid as an azeotrope by generally removing water through distillation, the Examiner has not explained why those in the art would have added the amount of water claimed to n-butyric acid to achieve purification of the azeotrope.

Accordingly, the Examiner erred in rejecting claims 1-9 and 14-20 under 35 U.S.C. § 103(a).

**VI. ORDER**

Upon consideration of the record and for the reasons given, the Examiner’s rejection of claims 1-9 and 14-20 under 35 U.S.C. § 102(b) over Grekel is REVERSED;

the Examiner’s rejection of claims 1-9 and 14-20 under 35 U.S.C. § 103(a) over the Grekel is REVERSED.

REVERSED

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Application 10/635,983

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