The opinion in support of the decision being entered today was **not** written for publication and is **not** binding precedent of the Board.

Paper No. 19

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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Ex parte MADHU ANAND, SHIVAJI SIRCAR
and BRIAN T. CARVILL

_____

Appeal No. 1998-1219
Application 08/419,317

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ON BRIEF

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Before WALTZ, LIEBERMAN and PAWLIKOWSKI, **Administrative Patent Judges**.

WALTZ, **Administrative Patent Judge**.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 1 through 22, which are the only claims in this application (see the Brief, page 3).

According to appellants, the invention is directed to a process for operating equilibrium controlled reactions under isothermal conditions including the steps of countercurrently

purging the reactor with the less adsorbable product and countercurrently repressurizing the reactor with the less adsorbable product prior to commencing the next process cycle (Brief, pages 4-5). A copy of illustrative claim 1 is attached as an Appendix to this decision.

The examiner relies upon the following references as evidence of obviousness:

Stönner et al. (Stönner)	4,491,573	Jan. 1, 1985
Sauvion et al. (Sauvion)	4,906,448	Mar. 6, 1990
Keefer	5,256,172	Oct. 26, 1993
Dandekar et al. (Dandekar) (filed Aug. 1, 1994)	5,449,696	Sep. 12, 1995
Hirai et al. (JP '436) (published kokai application)[1]	58-049436	Mar. 23, 1983

Kikuchi et al. (Kikuchi), "Hydrogen Production from Methane Steam Reforming assisted by use of Membrane Reactor," 509-515, *Natural Gas Conversion,* Elsevier Science Publishers B.V., Amsterdam, 1991.

Claims 1-22 stand rejected under 35 U.S.C. § 112, ¶2, "as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards

[1]We rely upon a full English translation of this document, previously made of record.

[sic, appellants regard] as the invention." Answer, page 3. Claims 1-7 stand rejected under 35 U.S.C. § 103 as unpatentable over Keefer (*id.*). Claims 11-16, 20 and 21 stand rejected under section 103 as unpatentable over Keefer in view of Dandekar (Answer, page 4). Claim 22 stands rejected under section 103 over Keefer in view of Dandekar and JP '436 (*id.*). Claims 8-10 stand rejected under section 103 over Keefer in view of Sauvion (Answer, page 5). Claims 17-19 stand rejected under section 103 over Keefer in view of Stönner and Kikuchi (*id.*). We *reverse* all of the examiner's rejections essentially for the reasons in the Brief and the reasons set forth below.

OPINION

A. The Rejection under 35 U.S.C. § 112, ¶2

"The legal standard for definiteness [under section 112, ¶2] is whether a claim reasonably apprises those of skill in the art of its scope. [Citations omitted]." *In re Warmerdam,* 33 F.3d 1354, 1361, 31 USPQ2d 1754, 1759 (Fed. Cir. 1994). "[T]he definiteness of the language employed must be analyzed - not in a vacuum, but always in light of the teachings of the

prior art and of the particular application disclosure as it would be interpreted by one possessing the ordinary level of skill in the pertinent art." *In re Angstadt,* 537 F.2d 498, 501, 190 USPQ 214, 217 (CCPA 1976), quoting from *In re Moore,* 439 F.2d 1232, 1235, 169 USPQ 236, 238 (CCPA 1971).

The examiner has stated that the term "equilibrium controlled" and the word "predetermined" in claim 1 on appeal are unclear (Answer, page 3).

It is well settled that the initial burden of presenting a *prima facie* case of unpatentability, based on prior art or any other ground, rests with the examiner. *See In re Oetiker,* 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). The only basis the examiner has presented to establish the indefiniteness of "equilibrium controlled" is that the claimed process is not a closed system required for equilibrium, thus rendering the claimed language unclear (Answer, page 3). However, as noted by appellants on pages 8-9 of the Brief, the specification defines the term "equilibrium controlled" (page 1, l. 13-page 2, l. 2) and furthermore discloses representative equilibrium controlled reactions (page 2, ll.

4-13). Therefore we determine that the examiner has failed to present convincing evidence or reasoning that one of ordinary skill in the art would not have been apprised of the scope of the language in question.

The only basis the examiner has set forth to establish the indefiniteness of the word "predetermined" is this word is unclear "in the basis for determining it." Answer, page 3. Again we determine that the examiner has not met the initial burden of establishing that one of ordinary skill in the art would not have been apprised of the scope of the language in question, when read in light of the specification disclosure. As noted by appellants on page 9 of the Brief, the specification teaches the determination of time sequences (page 26, ll. 6-13). Furthermore, the specification discloses specific "predetermined time sequences" (pages 19-21).

For the foregoing reasons and those set forth in the Brief, we determine that the examiner has not established a *prima facie* case of unpatentability regarding the definiteness of the language in question. Accordingly, the rejection of the claims on appeal under 35 U.S.C. § 112, ¶2, is reversed.

B. The Rejections under 35 U.S.C. § 103

Claims 1-7 stand rejected under section 103 over Keefer (Answer, page 3). The examiner finds that Keefer teaches the water gas shift reaction using sorbent/catalyst mix wherein carbon dioxide is the most adsorbed product and the products are separated by PSA [pressure swing adsorption] using a purge gas with recycling (*id.*). The examiner further finds that Keefer suggests isothermal reaction and discloses plural countercurrent purges (*id.*). From these findings, the examiner concludes that Keefer differs only in teaching "the claimed features in a host of embodiments, rather than having an anticipatory example." *Id.*

The examiner has not pointed to any disclosure or suggestion in Keefer that the disclosed reactions are "isothermal." Keefer discloses "maintaining the first end of the adsorbent bed at substantially a first temperature, and the second end of the adsorbent bed at substantially a second temperature." Col. 4, ll. 3-5; see also col. 5, ll. 3-5; col. 7, ll. 65-67. Keefer further teaches to maintain a "temperature gradient" in the gas working space (col. 5, ll.

6-12), where the second end of the adsorbent bed is at a higher temperature than the first end (col. 8, ll. 1-5; claim 1, step (I)). The term "thermal coupling" appears in col. 17, ll. 33 and 54-55, but there is no disclosure or suggestion that the adsorbent beds are operated isothermally. Accordingly, the examiner's conclusion of obviousness is not supported by a proper factual basis.

Additionally, although the examiner has cited portions of Keefer that separately disclose a countercurrent purge with the more adsorbable product and a countercurrent purge with the less adsorbable product (Answer, page 3, citing col. 7, ll. 35-40, and col. 16, ll. 35-45), the examiner has not presented any convincing evidence or reasoning why one of ordinary skill in the art would have used these purges together in the order recited in claim 1 on appeal. The examiner's citation of col. 20, ll. 40-48 and 60-68, of Keefer does not show the "coupled" purges as argued by the examiner nor as recited in claim 1 on appeal (*id.*). Similarly, although depressurization and pressurization are both disclosed by Keefer, the examiner has not established why

these steps would be separate and in the order as recited in claim 1 on appeal.

For the foregoing reasons and those set forth in the Brief, we determine that the examiner has not presented a *prima facie* case of obviousness. Accordingly, the rejection of claims 1-7 under section 103 over Keefer is reversed.

All other rejections on appeal have Keefer as the primary reference. Dandekar, JP '436, Sauvion, Stönner and Kikuchi have been applied as secondary references by the examiner to show various aspects of the dependent claims (see the Answer, pages 4-6). However, none of these secondary references remedy the deficiencies discussed above with respect to Keefer. In the "Response to Argument" section of the Answer (page 7), the examiner notes that Dandekar teaches isothermal conditions but fails to refer to any specific portion of this reference. Dandekar teaches incorporation of controls "to minimize the temperature increase" but fails to disclose or suggest isothermal operation (col. 7, ll. 36-38). Additionally, the examiner has failed to identify any factual basis or reasoning to support the proposed motivations or

suggestions to combine the references. *See Micro Chemical Inc. v. Great Plains Chemical Co.,* 103 F.3d 1538, 1546, 41 USPQ2d 1238, 1244-45 (Fed. Cir. 1997)(The motivation to combine references may come from the references themselves, the knowledge of those skilled in the art, or the nature of the problem to be solved). For example, the examiner has not identified why one of ordinary skill in the art would have desired PSA "without altering the equilibriums" or have been motivated to make methanol in the process of Keefer, when combined with Dandekar (Answer, page 4).

For the foregoing reasons and those set forth in the Brief, we determine that the examiner has failed to present a *prima facie* case of obviousness in view of the reference evidence. Accordingly, all of the examiner's rejections under section 103 over the reference evidence of Keefer, Dandekar, JP '436, Sauvion, Stönner and Kikuchi are reversed.

C. Summary

The rejection of claims 1-22 under the second paragraph of 35 U.S.C. § 112 is reversed. The rejection of claims 1-7 under 35 U.S.C. § 103 over Keefer is reversed. The rejection

of claims 11-16, 20 and 21 under 35 U.S.C. § 103 over Keefer in view of Dandekar is reversed. The rejection of claim 22 under 35 U.S.C. § 103 over Keefer in view of Dandekar and JP '436 is reversed. The rejection of claims 8-10 under 35 U.S.C. § 103 over Keefer in view of Sauvion is reversed. The rejection of claims 17-19 under 35 U.S.C. § 103 over Keefer in view of Stönner and Kikuchi is reversed.

The decision of the examiner is reversed.

REVERSED

THOMAS A. WALTZ Administrative Patent Judge	)
PAUL LIEBERMAN Administrative Patent Judge	) BOARD OF PATENT) APPEALS AND) INTERFERENCES
BEVERLY A. PAWLIKOWSKI Administrative Patent Judge	)

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APPENDIX

1. A process for operating an equilibrium controlled reaction in a system utilizing a plurality of reactors operated isothermally and in a predetermined timed sequence, the process which comprises the following steps performed in a cycle with each reactor;

(a) reacting a feedstock at a first pressure in a first reactor containing an admixture of an adsorbent and a catalyst suitable for conducting the equilibrium controlled reaction under reaction conditions sufficient to convert the feedstock into a more adsorbable product which is selectively adsorbed by the adsorbent and a less adsorbable product and withdrawing the less adsorbable product in substantially pure form under a relatively constant flow rate at the first pressure;

(b) countercurrently depressurizing the first reactor to a second pressure by withdrawing a mixture comprising unreacted feedstock, a portion of the less adsorbable product and a portion of the more adsorbable product;

(c) countercurrently purging the first reactor at the second pressure with a weakly adsorbing purge fluid with respect to the adsorbent wherein the weakly adsorbing purge fluid is a fluid other than the less adsorbable product to desorb the more adsorbable product from the adsorbent and withdrawing a mixture comprising unreacted feedstock, a portion of the more adsorbable product and a portion of the less adsorbable product;

(d) countercurrently purging the first reactor at the second pressure with the less adsorbable product to desorb the weakly adsorbing purge fluid and withdrawing a mixture

comprising the weakly adsorbing fluid, a portion of the more adsorbable product and a portion of the less adsorbable product; and

(e) countercurrently pressurizing the first reactor from the second pressure to the first pressure with the less adsorbable product prior to commencing another process cycle within the first reactor.