Paper No. 72

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte GERARD JOCHEM

Appeal No. 2003-1529
Application No. 08/499,442

HEARD: December 9, 2003

Before GARRIS, WALTZ, and JEFFREY T. SMITH, Administrative Patent Judges.

WALTZ, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal from the primary examiner's final rejection of claims 3 through 8, 17 and 20 through 26.[1] The only other claims remaining in this application are claims 9 through 12, with the examiner indicating that claims 9 through 11 are allowed and claim 12 is objected to as depending on a rejected

[1]Appellant's amendment subsequent to the final rejection dated Sept. 12, 2001, Paper No. 53, was refused entry by the examiner (see the amendment dated May 1, 2002, Paper No. 58, refused entry as per the Advisory Action dated May 16, 2002, Paper No. 59).

base claim but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims (final Office action dated Sept. 12, 2001, Paper No. 53, page 6; Brief, page 2). We have jurisdiction pursuant to 35 U.S.C. § 134.

According to appellant, the invention is directed to a process for drying a gaseous or liquid mixture with the aid of an adsorber composed of alumina and of a molecular sieve (Brief, page 4). Appellant states that claims 3, 7 and 23 stand or fall together while each of the other claims on appeal stand on their own (Brief, page 6). To the extent appellant has provided reasonably specific, substantive reasons for the separate patentability of individual claims, we consider these claims separately. See 37 CFR § 1.192(c)(7)(2000); *In re McDaniel,* 293 F.3d 1379, 1383, 63 USPQ2d 1462, 1465 (Fed. Cir. 2002). A copy of illustrative independent claims 3 and 17 is attached as an Appendix to this decision.

The examiner has relied upon the following references as support for the rejections on appeal:

Matyear, Jr. (Matyear)	2,910,139	Oct. 27, 1959
Bauer	3,691,251	Sept. 12, 1972

Claims 3-5, 7, 17 and 20-26 stand rejected under 35 U.S.C. § 102(b) as anticipated by Bauer (Answer, page 2). Claims 6 and 8 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Bauer (Answer, page 3). Claims 3-8, 17 and 20-26 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Matyear (Answer, page 4). We *affirm* all of the rejections on appeal essentially for the reasons stated in the Answer and those reasons set forth below.

OPINION

A. The Rejection under § 102(b) over Bauer

The examiner finds that Bauer discloses a process for the drying of a gas mixture by passing the gas mixture into an adsorption zone which contains an upstream alumina adsorbent and a downstream molecular sieve adsorbent (Answer, page 3). The examiner recognizes that Bauer does not specifically disclose that the ratio of the volume of alumina to the volume of the molecular sieve and the alumina (Q) is between 0.05 and 0.8 at an instant when water breaks through an exit of the adsorber (*id.*). The examiner also recognizes that Bauer does not specifically disclose that the adsorption zone comprises a mass transfer zone and an equilibrium zone (*id.*). However, the examiner states that the process of Bauer is the same or similar to the claimed process in

terms of the composition of the adsorption zone and the feedstock, the adsorption zone of Bauer has an active alumina zone and a molecular sieve zone which are operated the same as the claimed adsorption zone, and estimates a ratio Q for Bauer of about 0.20 based on the entire column (*id.*). Therefore the examiner concludes that the Bauer process inherently has a mass transfer zone and equilibrium zone within the limits as claimed by appellants (*id.;* see also the Answer, page 6).

Bauer discloses the drying of cracked gases such as a cracked propane stream containing ethylene (col. 1, ll. 56-60). Appellant discloses that the feedstock may be gases originating from steam cracking or fluid catalytic cracking, or natural gases such as methane or ethane "type" (specification, page 2, l. 25- page 3, l. 3). Bauer teaches using a "minor bed" by replacing "two-three feet of the usual molecular sieve desiccant with, say, activated alumina," thus protecting the expensive molecular sieve (col. 1, ll. 45-49; col. 2, ll. 15-19; col. 3, l. 66-col. 4, l. 3), with the alumina protecting the sieve material from fouling by polymers as well as effectively removing water (col. 2, ll. 25-30; col. 4, ll. 4-9).

Appellant teaches that it is essential that the alumina and molecular sieve should be introduced "in precise conditions," i.e., in the equilibrium zone of the adsorber the ratio of the volume of alumina to that of the alumina and the molecular sieve (Q) is generally between 0.05 and 0.8 (specification, page 3, l. 27-page 4, l.4; page 6, ll. 3-6 and 11-16).[2] Appellant discloses the running conditions of the adsorber as a surface velocity of the gaseous mixture between 1 and 20 m/min, a pressure between 600 mm Hg and 150 bars, and a temperature between -40 and 100 °C. (specification, page 11).

Bauer teaches running conditions of the adsorber as a temperature of about 50-60°F., a pressure of 202 psia, a flow rate of over 8000 mols/hr, and an amount of water of 0.10 mole percent (see Table 1 in col. 5 and col. 6, ll. 19-21). Bauer exemplifies an adsorber vessel where the ratio of the volume of activated alumina to the volume of alumina and molecular sieve at charging is approximately 0.2 (col. 6, ll. 59-67).[3]

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[2]Appellant defines the mass transfer zone and the equilibrium zone at page 4, ll. 17-22, and page 5, ll. 15-22, respectively, of the specification.

[3]See the Answer, page 3. Taking into account the approximate volume of the support materials 6, 7 and 14, the ratio only changes to approximately 0.21 (see col. 6, ll. 63-67).

As stated by a predecessor of our reviewing court:

> [I]t is elementary that the mere recitation of a newly discovered function or property, inherently possessed by things in the prior art, does not cause a claim drawn to those things to distinguish over the prior art. Additionally, where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an inherent characteristic of the prior art, it possesses the authority to require the applicant to prove that the subject matter shown to be in the prior art does not possess the characteristic relied on. [Citation omitted]. This burden was involved in In re Ludtke, 58 CCPA 1159, 441 F.2d 660, 169 USPQ 563 (1971), and is applicable to product and process claims reasonably considered as possessing the allegedly inherent characteristics.[4]

For the foregoing reasons, we determine that the examiner has reason to believe that the adsorber of Bauer possessed equilibrium and mass transfer zones as well as a ratio Q within the claimed range. Accordingly, the burden has shifted to appellant to prove that the prior art Bauer does not possess these characteristics. *See In re Best, supra.*

Appellant admits that the process disclosed in Bauer "may inherently possess 'a mass transfer zone' and 'an equilibrium zone' as those terms are defined in the present application." Brief,

[4] *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977), quoting *In re Swinehart*, 439 F.2d 210, 212-13, 169 USPQ 226, 229 (CCPA 1971)

page 8.[5] However, appellant argues that Bauer does not teach that using a controlled ratio Q provides advantages by increasing the lifetime of the molecular sieves and their adsorption effectiveness (Brief, page 6). Appellant further argues that Bauer teaches the use of alumina for other purposes than removing water as taught by appellant (Brief, page 7), and the examiner's estimate of the ratio of alumina to molecular sieve is "not really accurate." *Id.*

Appellant's arguments are not persuasive. As discussed above, the examiner finds that Bauer discloses a ratio of volume of alumina to volume of alumina and molecular sieve for the entire adsorber within the claimed range for Q (Answer, page 3). Furthermore, Bauer teaches the use of alumina for the same purpose as appellant, namely to effectively remove water from the feedstock gas, although it also prevents polymers from fouling the expensive molecular sieve (col. 2, ll. 25-30, and col. 4, ll. 4-9). The results desired by Bauer are also the same as appellant, namely increasing the lifetime of the molecular sieves (col. 7, ll. 31-35) and their adsorption effectiveness (col. 6, ll. 14-17). Finally, as discussed above (see footnote 3), the examiner's "estimate"

[5]We note that independent claim 17 on appeal, which appellant has not separately argued, only recites an equilibrium zone and does not require a mass transfer zone.

would not materially be affected by taking into account the volumes of the support materials such as gravel and wire mesh.

Appellant argues that the examiner's estimate of the volume ratio of Bauer is based on the entire volume of the vessel 3 rather than solely on the volume of the equilibrium zone within an adsorber as recited in the claims on appeal (Brief, page 8; Reply Brief, page 3). This argument is not persuasive for several reasons. We note that the equilibrium zone may be the only zone in the adsorber (see claim 17 on appeal), apparently corresponding to a process where the adsorbent was not saturated (specification, page 5, ll. 15-22). Thus it appears that the volume ratio of the equilibrium zone would correspond to the initial charging volume ratio. Additionally, the specification teaches that "the volume of alumina and of molecular sieve correspond to the volumes determined at the time of charging of the adsorber." Specification, page 6, ll. 7-10. Finally, as discussed above, the feedstock, process conditions, amounts of alumina and molecular sieve, and desired results taught by Bauer are the same or substantially similar to the claimed process, and thus the examiner has reason to believe that the equilibrium zone, the mass transfer zone, and the volume ratios of alumina and molecular sieve found in Bauer would have

been the same or substantially similar to the claimed zones and volume ratios. *See In re Best, supra.*

Appellant argues the specific values of Q recited in dependent claims 4, 5, 25, 26, and 20-22 (Brief, pages 10-11). For reasons adequately discussed above, we determine that the examiner has reasonable belief that the volume ratios of Bauer would have been the same or similar to those claimed.

Appellant also argues that there are significant differences between the claim 24 process and the Bauer process, namely that claim 24 is directed to natural gas while Bauer discloses a feed gas of cracked ethane (Brief, page 10). This argument is not persuasive since Bauer is directed generally to the drying of a gas (col. 1, l. 6), and exemplifies a gas containing methane (Table 1; col. 5, l. 39). The object of Bauer is "to dry a gas" (col. 4, l. 10). Although appellant argues that the "natural gas" recited in claim 24 contains "primarily methane," we note that appellant is relying on the examples in the specification and not on any claimed limitation (Brief, page 10).

For the foregoing reasons, we determine that the examiner has established a *prima facie* case of anticipation which has not been adequately rebutted by appellant. Accordingly, we affirm the

examiner's rejection of claims 3-5, 7, 17, and 20-26 under 35 U.S.C. § 102(b) over Bauer.

B. The Rejection under § 103(a) over Bauer

The examiner finds that Bauer does not specifically disclose the method of preparation of the alumina, as recited in claim 6 on appeal, nor the specific surface velocity as recited in claim 8 on appeal (Answer, page 4). Nonetheless, the examiner concludes that the alumina product is the same or similar regardless of its method of preparation, and the modification of the surface velocity would have been well within the ordinary skill in the art absent a showing of unexpected results (*id.*).

Appellant repeats the arguments against Bauer as discussed above (Brief, page 11), while merely stating that the limitations of claims 6 and 8 on appeal are "nowhere disclosed in any cited reference." Brief, page 12. This argument is not well taken since the examiner has admitted that Bauer does not specifically recited the limitations of claims 6 and 8. Appellant has not addressed the product-by-process format of claim 6, even as included in the process claim 3, and has failed to point out how the product alumina differs from the alumina of Bauer. *See In re Wertheim,* 541 F.2d 257, 271, 191 USPQ 90, 103 (CCPA 1976)(it is the patentability of the product defined by product-by-process claims

which must be gauged against the prior art, not the processes of making the product). Additionally, appellant has not established that the surface velocity of claim 8 produces some unexpected result over the flow rate in the process of Bauer (see Table 1; col. 5, ll. 33-34). *See In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

For the foregoing reasons and those set forth in the Answer, we determine that the examiner has established a *prima facie* case of obviousness in view of the reference evidence. Based on the totality of the record, including due consideration of appellant's arguments, we determine that the preponderance of evidence weighs most heavily in favor of obviousness within the meaning of section 103(a). Accordingly, we affirm the examiner's rejection of claims 6 and 8 under 35 U.S.C. § 103(a) over Bauer.

C. The Rejection under § 103(a) over Matyear

The examiner finds that Matyear discloses a process for drying a gaseous mixture by passing the mixture into an adsorption zone to remove water, where the adsorption zone comprises a first zone containing active alumina and a second zone containing a molecular sieve (Answer, page 4). The examiner recognizes that Matyear does not specifically disclose that the adsorption zone comprises a mass transfer zone and an equilibrium zone (*id.*). However, the examiner

finds that the Matyear adsorption is operated under the same or similar conditions to the claimed adsorption zone (see col. 3, ll. 4-23), thus inherently producing a mass transfer zone and an equilibrium zone (Answer, pages 4-5).

The examiner also recognizes that Matyear does not specifically disclose Q values within the claimed range (Answer, page 5). However, the examiner concludes that it would have been obvious to have modified the Matyear process by using an adsorption zone with the claimed Q values since Matyear teaches use of alumina and molecular sieve amounts within broad ranges (*id.*, citing vessel 10 with a molecular sieve adsorbent between 1 and 10 inches or more with the remainder of the column filled with alumina; see col. 2, ll. 62-70). We agree.

Appellant argues that Matyear does not provide sufficient information to allow even a hindsight calculation of a Q ratio, nor does Matyear provide any motivation to suggest such a calculation of Q (Brief, pages 14-15). This argument is not persuasive since Matyear exemplifies a drying vessel 10 about 6 feet in diameter and 20 feet high, disclosing that the amount of molecular sieve is usually between about 1-10 inches *or more* in thickness (col. 2, ll. 62-70, italics added). Furthermore, Matyear specifically teaches that "[i]t is possible for each drying operation to determine the

relative amounts of the conventional [alumina] and sieve material giving optimum results consistent with cost." Col. 2, ll. 20-22. Therefore Matyear has taught that the relative amounts of alumina and molecular sieve are result-effective variables and their optimization would have been well within the ordinary skill in the art. *See In re Woodruff, supra; In re Boesch,* 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980); *In re Antonie,* 559 F.2d 618, 620, 195 USPQ 6, 8-9 (CCPA 1977); *In re Sebek,* 465 F.2d 904, 907, 175 USPQ 93, 95 (CCPA 1972); *and In re Aller,* 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

We adopt our remarks from above concerning the Q values for the equilibrium zone relative to the entire vessel. We also adopt our remarks about the specific arguments concerning the dependent claims from above, including claims 6 and 8 (Brief, page 14). With regard to claim 24 (Brief, page 15), we adopt our remarks from above and note that Matyear is directed to the drying of gases in general (col. 1, l. 15; col. 1, ll. 59-62; and especially col. 4, ll. 3-5).

For the foregoing reasons and those stated in the Answer, we determine that the examiner has established a *prima facie* case of obviousness based on the reference evidence. Based on the totality of the record, including due consideration of appellant's

arguments, we determine that the preponderance of evidence weighs most heavily in favor of obviousness within the meaning of section 103(a). Accordingly, we affirm the examiner's rejection of claims 3-8, 17 and 20-26 under 35 U.S.C. § 103(a) over Matyear.

D. Summary

The rejection of claims 3-5, 7, 17 and 20-26 under 35 U.S.C. § 102(b) as anticipated by Bauer is affirmed. The rejection of claims 6 and 8 under 35 U.S.C. § 103(a) as unpatentable over Bauer is affirmed. The rejection of claims 3-8, 17 and 20-26 under 35 U.S.C. § 103(a) as unpatentable over Matyear is affirmed.

The decision of the examiner is affirmed.

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

AFFIRMED

BRADLEY R. GARRIS Administrative Patent Judge	)
THOMAS A. WALTZ Administrative Patent Judge	) BOARD OF PATENT APPEALS AND INTERFERENCES
JEFFREY T. SMITH Administrative Patent Judge	)

TAW/jrg

Appeal No. 2003-1529
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BURNS DOANE SWECKER & MATHIS L L P
POST OFFICE BOX 1404
ALEXANDRIA, VA 22313-1404

APPENDIX

3. A process for drying a gaseous or liquid mixture by passing said mixture into an adsorber, the adsorber including a water adsorption equilibrium zone and a water adsorption mass transfer zone, the equilibrium zone comprising an upstream alumina zone and a downstream molecular sieve zone, the mass transfer zone comprising a downstream portion of the molecular sieve zone, water concentration in the mass transfer zone varying from zero to the maximum water concentration at the equilibrium zone, wherein in the water adsorption equilibrium zone of the adsorber, the ratio Q of the volume of alumina to that of alumina and of the molecular sieve is between 0.05 and 0.8 at an instant when water breaks through at an exit of the adsorber.

17. A process for drying a gaseous or liquid mixture by passing said mixture into an adsorber, the adsorber including a water adsorption equilibrium zone comprising an upstream alumina zone and a downstream molecular sieve zone, the upstream alumina zone adsorbing water in liquid or gaseous form and the downstream molecular sieve zone adsorbing water in gaseous form during the process, a volume ratio of the alumina zone and the molecular sieve zone being 5 to 80%.