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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte CLAUS-PETER DREXEL, FRANK HASELHUHN,
FRANK HEINDL, RALF RAUSCH, and GUENTER STEIN

Appeal 2018-008254
Application 13/582,177
Technology Center 1600

Before DONALD E. ADAMS, DEBORAH KATZ, and JOHN G. NEW,
Administrative Patent Judges.

KATZ, *Administrative Patent Judge.*

DECISION ON APPEAL

Appellant¹ seeks our review,² under 35 U.S.C. § 134(a), of the Examiner's decision to reject claims 1–3, 12–16, 18–20, 23, 24 and 27–36. We have jurisdiction under 35 U.S.C. § 6(b). We REVERSE.

¹ We use the word “Appellant” as defined in 37 C.F.R. § 1.42. Appellant identifies the real party-in-interest as Evonik Degussa GmbH. (Appeal Br. 3.)

² We consider the Final Office Action issued May 5, 2017 (“Final Act.”), the Appeal Brief filed January 4, 2018 (“Appeal Br.”), the Examiner's Answer issued on May 16, 2018 (“Ans.”) in reaching our decision.

The Examiner rejected claims 1, 3, 23, 27–36 under 35 U.S.C. § 103(a) as unpatentable over Bouchara³ and Cabelka.⁴ (*See* Final Act. 3–11.) The Examiner also rejected claims 2 and 24 under 35 U.S.C. § 103(a) as unpatentable over Bouchara, Cabelka, and Deller.⁵ (*See id.* at 15–17.)

Appellant’s Specification is directed to granular silicas for use as carrier material, such as to produce solid formulations from liquid substances. (*See* Spec. 1.) Appellant reports that granular silicas of the invention have three characteristics: [1] a sufficiently high porosity (reported as “Hg pore volume”); [2] an optimized particle size (reported as “ $d_{Q3=10\%}$ ” and “ $d_{Q3=90\%}$ ” for the fine and coarse fractions, respectively); and [3] better-stabilized pore walls (reported as the ratio of the mean particle size (d_{50}) without ultrasound exposure to the mean particle size (d_{50u}) after 3 min. of ultrasound exposure element). (*See* Spec. 5.) According to Appellant, the claimed granular silicas have increased mechanical stability high absorptivity and optimal particle size distribution due to the recited particle porosity [1], size [2], and stability [3]. (*See* Spec. 5.)

Appellant’s claim 1 recites⁶:

Granular silica having

- [1] an Hg pore volume ($< 4 \mu\text{m}$) of 0.90 ml/g to 1.30 ml/g,

³ U.S. Patent Application Publication 2009/0050557 A1, published February 26, 2009.

⁴ U.S. Patent Application Publication 2010/0151038 A1, published June 17, 2010.

⁵ U.S. Patent 5,776,240, issued July 7, 1998.

⁶ Claim 1 has been modified by adding bracketed numbers to the elements of the claimed granular silica.

- [2] a $d_{Q3=10\%}$ of $\geq 428 \mu\text{m}$ with, at the same time, a $d_{Q3=90\%}$ of $923 \mu\text{m}$ to $2448 \mu\text{m}$, and
- [3] a ratio of the d_{50} without ultrasound exposure to d_{50} after 3 min of ultrasound exposure of 2.10 to < 4.00 , the measurement being effected on a fraction of particles from 400 to $500 \mu\text{m}$.

(Appeal Br. 34.) Appellant's independent claim 33 is similar, reciting limitations on Hg pore volume, $d_{Q3=10\%}$ and $d_{Q3=90\%}$ particle size distribution, and ratio of d_{50} without ultrasound exposure to d_{50} after three minutes of ultrasound exposure, but different values for these limitations. (See Appeal Br. 36.)

The third recited limitation on the claimed granular silica of claim 1, the “ratio of the d_{50} without ultrasound exposure to d_{50} after 3 min of ultrasound exposure of 2.10 to < 4.00 , the measurement being effected on a fraction of particles from 400 to $500 \mu\text{m}$. . . ,” is a determination of how much the particle size is reduced by mechanical stress and, therefore, is a determination of the hardness of the silica. (See Spec. 11.)

Bouchara teaches granular silica characterized by pore volume and mean particle size. (See Bouchara abstract, ¶¶ 6–9.) The granular silica of Bouchara is also characterized by a cohesion index (“CI”), which is a measure of the tendency of a sample to break or split up when handled or used and is an expression of median particle diameter with and without ultrasound treatment. (See Bouchara ¶¶ 10, 12–14, 16.) Bouchara teaches granular silica with a CI of less than 0.25 or even less than 0.07. (*Id.* ¶ 25.)

The Examiner finds that the CI taught in Bouchara “appear[s] substantially identical” to the d_{50} with and without ultrasound determinations

in the instant application. (Final Act. 10–11.) The Examiner finds that a 400 to 500 μm fraction of Bouchara’s “highly cohesive” silica granules would possess a ratio of d_{50} with and without ultrasound treatment of less than 3.00 and greater than 1.00, rendering obvious the claimed d_{50} range. (*Id.*)

The Examiner maintains that it would have reasonably been expected that the silica taught in Bouchara would “maintain cohesiveness in order to approach and overlap the instantly claimed d_{50} after 3 min of ultrasound” because Bouchara teaches that the lower the CI, the higher the cohesion of the sample and thus the lower the tendency of the sample to break or split when used. (Ans. 28, citing Bouchara ¶ 16.) According to the Examiner, the teaching in Bouchara of a CI of less than 0.25 is substantially identical to the claimed range because

a fraction of Bouchara’s highly cohesive silica granules per Cabelka would possess a 2.10 to 4.00 “ d_{50} ” ratio of median particle sizes (*wherein the “ d_{50} ” ratio of median particles sizes is the “ d_{50} ” without ultrasound exposure over the “ d_{50} ” after 3 minutes of ultrasound exposure*) similar to the granular silica of the instant claims, thereby rendering obvious the requirement for the ratio of median particle size (i.e., “ d_{50} ”) without ultrasound exposure to the “ d_{50} ” after 3 minutes of ultrasound exposure of “2.10 to < 4.00” (claim 1) and “2.50 to < 4.00” (claim 33).

(Ans. 29.) Thus, the Examiner finds that the CI of the granular silica of Bouchara is “substantially identical” to the d_{50} ratio of the claimed silica and, thus, renders it obvious.

Appellant disagrees with these findings, arguing that Bouchara bases its determinations on ultrasound treatment of only two minutes, whereas the

claimed d_{50} determinations are of ultrasound treatment for three minutes. (See Appeal Br. 23.) Appellant argues that there is no overlap between the d_{50} values recited in claim 1 and the CI taught in Bouchara and they are not substantially the same. (See Appeal Br. 23–24.)

To support these arguments, Appellant presents the affidavit of inventor Claus-Peter Drexel, executed February 26, 2014 (“First Drexel Affidavit”). Dr. Drexel reports that he performed tests on experimental grade silica of 400 – 500 μm to compare the effects of two versus three minutes of ultrasound exposure. (First Drexel Affidavit 1–2.) Dr. Drexel presents the results of these tests in Table I:

ID	Particle Fraction (μm)	Ultrasound Energy (W)	Ultrasound Duration (min.)	Ratio $d_{50P}:d_{50A}$
1	400 – 500	35 W	1 min.	1.37
2	400 – 500	35 W	2 min.	1.60
3	400 – 500	35 W	3 min.	1.85

(First Drexel Affidavit 2.) According to Dr. Drexel, changing from a two minute duration to a three minute duration was observed to yield a further increase in the “ D_{50} -Ratio” of approximately 15.6%. (See First Drexel Affidavit 2.) Dr. Drexel explains that “the term ‘Ratio $d_{50P}:d_{50A}$ ’ refers to the ratio of the d_{50} prior to the ultrasound exposure (*i.e.*, d_{50P}) to the d_{50} after the ultrasound exposure (*i.e.*, d_{50A}) of the tested granular silica.” (First Drexel Affidavit 1–2.) Dr. Drexel concludes that “as evidenced by the foregoing results in Table I, a difference in the duration of ultrasound exposure (including a difference between 2 minutes and 3 minutes) will yield an appreciable difference in the resulting D_{50} -Ratio of the granular silica – with longer durations yielding higher ratio values.” (First Drexel Affidavit 2.) Dr. Drexel concludes further that “it is incorrect to suggest that exposing a

granular silica to an ultrasound energy for a duration of 2 minutes can be expected to yield substantially the same result as exposing the same granular silica to an ultrasound energy for a duration of 3 minutes.” (First Drexel Affidavit 4.)

Appellant presents a second affidavit by Dr. Drexel, executed August 26, 2016 (“Second Drexel Affidavit”). (See Appeal Br. 25.) In this affidavit, Dr. Drexel reports the measurement of a silica sample (Tixosil® 38X) by laser diffraction without ultrasound treatment or with either two minutes or three minutes of ultrasound treatment, but otherwise the same conditions. (See Second Drexel Affidavit 1–2.) From the results reported by Dr. Drexel, Tixosil® 38X has a two minute d_{50} ratio of 2.85 and a three minute d_{50} ratio of 5.62. (See Second Drexel Affidavit 1–3.) Dr. Drexel concludes

it is understood that while a silica may have a “2 min. d_{50} ratio” that falls within a specified range, that same silica has been shown to have a “3 min. d_{50} ratio” that does not fall within that same range – as, for example, wherein the “2 min. d_{50} ratio” of the Tixosil® 38X (at 2.85) is within a range of less than 4.00, whereas the “3 min. d_{50} ratio” of the Tixosil® 38X (at 5.62) is outside the range of less than 4.00.

(Second Drexel Affidavit 3.)

Appellant argues that this evidence shows that a two minute ultrasound exposure will not necessarily yield a d_{50} ratio with the claimed range and that it is unreasonable for the Examiner to rely on an apparent similarity of the claimed range and the range taught in Bouchara based only on a numerical similarity. (See Appeal Br. 25–26.)

The Examiner dismisses Appellant's arguments, stating that Appellant focuses on the differing measurement criteria and not on the "high cohesiveness" of Bouchara's silica, which would provide it with "high bond strength" and, thus, the same cohesiveness as the claimed silica. (Ans. 29.) The Examiner explains the reliance on the cohesiveness determinations in Bouchara, wherein

a silica that is much softer than either instantly claimed silica or Bouchara is more likely to exhibit a "d₅₀ initial/d₅₀ 2 min" at 2 minutes of ultrasound that is greater than 4.00, which would not approach the instantly claimed "d₅₀" after 3 minutes of ultrasound since d₅₀ decreases with increasing ultrasound exposure times and the ratio increases, whereby the softer silica would be distinguishable from that of the instant claims.

(Ans. 29.)

The Examiner fails to provide evidence of CI determinations, or d₅₀ ratios that define silica with "high cohesiveness" or that define "softer" silica. We are not persuaded by the Examiner's reasoning because it is not based on specific evidence that the silica of Bouchara would demonstrate a d₅₀ ratio within the claimed range. "[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

The Examiner identifies Bouchara as the "closest prior art" and asserts that Appellant has the burden to provide evidence distinguishing the claimed silica from Bouchara's silica. (Ans. 32.) Although the silica of Bouchara *may* exhibit a CI at least overlapping with the claimed d₅₀ ratio range, we

disagree that merely being the “closest prior art” shifts the burden to Appellant. Rather, it is the Examiner’s burden to show that the silica of Bouchara is necessarily the same or overlapping with the claimed silica. Only then does the burden shift to Appellant to show that despite the appearance, they are not the same.

The Examiner also asserts that Appellant’s calculations regarding the CI taught in Bouchara “does not preclude the ‘D50_{initial}/D50_{3min}’ overlap of Bouchara and the claimed silica” (Ans. 32), but the Examiner fails to direct us to evidence that they necessarily overlap.

Appellant submitted evidence, specifically Dr. Drexel’s affidavits, that persuades us that because the ratio of d₅₀ at 1 minute to a d₅₀ at 2 minutes does not indicate the same ratio of d₅₀ at 1 minute to d₅₀ at 3 minutes, the Examiner has failed to provide the required showing that the prior art and the claimed ranges are necessarily the same.

The Examiner criticizes Dr. Drexel’s affidavits for several reasons. (See Ans. 36–39.) First, the Examiner find that because Bouchara does not teach the specific silica, “Tixosil® 38X” used in the studies reported by Dr. Drexel in his second affidavit, the affidavit is not a comparison of the particular silica of the closest prior art and mischaracterizes the rejection as being based on the properties of any silica. (See Ans. 36–37.) The Examiner states that the rejection is not based on *any* silica having a claimed range of a “d_{50-0 min}” to “d_{50-3 min}” ratio, but instead on the *particular, highly cohesive* silica of Bouchara. (Ans. 36.) According to the Examiner, absent evidence to the contrary, Bouchara’s silica would be expected to possess the claimed range of d₅₀ ratio. (See *id.*)

We disagree with the Examiner's understanding of Dr. Drexel's second affidavit. Rather than being evidence of what Bouchara specifically teaches regarding the cohesive index of the silica taught, we understand the second affidavit to demonstrate that one of ordinary skill would not have been able to determine the ratio of d_{50} with and without 3 minutes of ultrasound treatment from data about the ratio with and without 2 minutes of ultrasound treatment. We understand from Dr. Drexel's second affidavit that without knowing the CI that results from a ratio with three minutes of ultrasound treatment, the Examiner's finding that the silica of Bouchara is substantially identical to the claimed silica. The Examiner fails to direct us to evidence that the difference between two and three minutes of ultrasound treatment would be inconsequential for the silica used in Bouchara, when it provided for a different ratio with Tixosil® 38X.

The Examiner also rejects Appellant's arguments based on Dr. Drexel's affidavits because the results reported in Tables II and III of the first affidavit provide d_{50} ratios of particular particle fractions after one minute and three minutes. (*See Ans. 37–39.*) According to the Examiner, it would have been obvious to optimize the particle size distribution of the silica taught in Bouchara to obtain the specific values recited in Appellant's claims. (*See Ans. 37–39.*)

We do not find the Examiner to be responsive to the evidence presented in Dr. Drexel's first affidavit. Rather than demonstrating whether or not it would have been obvious to obtain granular silica of the recited particle size, the data reported by Dr. Drexel shows that one of ordinary skill would not have been able to determine that the silica of Bouchara has a d_{50} ratio claimed from the characteristics taught in Bouchara. Dr. Drexel

concludes: “as evidenced by the foregoing results in Table II and Table III, a difference in the particle fraction size will yield an appreciable difference in the resulting D₅₀-Ratio of the granular silica – with larger particle fractions yielding higher ratio values.” (First Drexel Affidavit 3.) We find that the reported data shows that it is inappropriate to draw the conclusion that the d₅₀ ratios reported in Bouchara are substantially identical to the claimed d₅₀ ratios.

In regard to obviousness due to the ability of an ordinarily skilled artisan to achieve the claimed d₅₀ ratio through routine optimization, the Examiner notes that Bouchara teaches calcination of silica by heat treatment. (See Ans. 34–35, citing Bouchara ¶¶ 77–79.) The Examiner relates this heat treatment to the heat treatment taught in Appellant’s Specification to achieve calcination and hardening of the silica. (See Ans. 34–35.) The Examiner finds that these disclosures demonstrate that calcination of silica is a result effective variable affecting the high-bond strength of silica and being subject to routine optimization. (See Ans. 35.) According to the Examiner,

[s]ince Bouchara describes a preparation for a high bond strength silica involving similar drying conditions, as well as similar treatments *identified in appellant’s specification for enhancing hardness*, namely exposure to water, exposure to alkaline, and calcination, it reasonably follows that Bouchara’s silica would have the same hardness as the silica of the instant application for exhibiting the claimed “d_{50-0 min}” to “d_{50 3 min}” ratio range.

(Ans. 35 (emphasis added).)

We are not persuaded by the Examiner’s reasoning because the Examiner does not demonstrate that the effect of heat or calcination on hardness, or more importantly on the d₅₀ ratio, was known to be a result

effective variable from the teachings of Bouchara or elsewhere in the prior art. The Examiner's reliance on Appellant's Specification does not persuade us that ordinarily skilled artisans would have considered it routine to optimize calcination to achieve a specific d_{50} ratio as claimed. *See In re Applied Materials, Inc.*, 692 F.3d 1289, 1295 (Fed. Cir. 2012) ("The question is whether the dimensions were known to be result-effective variables.").

We are not persuaded that Bouchara teaches or suggests granular silica having the ranges of d_{50} without ultrasound exposure to d_{50} after 3 minutes of ultrasound exposure required in claim 1 or claim 33. The basis of the Examiner's rejection is obviousness over Bouchara in view of Cabelka, with Cabelka cited for its teaching of particle sizes, not a d_{50} ratio with and without ultrasound exposure. (*See* Final Act. 4–5, citing Cabelka ¶ 24.) Because Cabelka does not cure the deficiency of the Examiner's findings regarding Bouchara, we are persuaded by Appellant's arguments that the Examiner has failed to show that the granular silica recited in independent claim 1 or 33 would have been obvious over Bouchara and Cabelka.

Similarly, in the rejection of dependent claims 2 and 24, the Examiner cites Deller for its teaching that the pH granular silica can be altered during pyrogenic preparation. (*See* Final Act. 15–17, citing Deller 6:12–19.) Because the Examiner does not cite Deller for a d_{50} ratio with and without ultrasound exposure, we are persuaded by Appellant's argument that the Examiner has failed to show why claims 2 and 24 would have been obvious over Bouchara, Cabelka, and Deller.

Conclusion

Upon consideration of the record and for the reasons given, we reverse the Examiner's rejections.

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1, 3, 23, 27–36	103	Bouchara, Cabelka		1, 3, 23, 27–36
2, 24	103	Bouchara, Cabelka, Deller		2, 24
Overall Outcome				1–3, 23, 24, 27–36

REVERSED