United States Court of Appeals for the Federal Circuit

04-1074
(Serial No. 09/136,483)

IN RE SUJEET KUMAR, HARIKLIA DRIS REITZ,
XIANGXIN BI, and NOBUYUKI KAMBE

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Appealed from: United States Patent and Trademark Office
Board of Patent Appeals and Interferences

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DECIDED: August 15, 2005

Before NEWMAN, Circuit Judge, ARCHER, Senior Circuit Judge, and DYK, Circuit Judge.

NEWMAN, Circuit Judge.

Sujeet Kumar, Hariklia Dris Reitz, Xiangxin Bi and Nobuyuki Kambe (together "Kumar") appeal the decision of the Board of Patent Appeals and Interferences of the Patent and Trademark Office, rejecting claims 1-3, 5-16, and 19-22 of patent application Serial No. 09/136,483 entitled "Aluminum Oxide Particles" as obvious under 35 U.S.C. §103. We vacate the Board's decision and remand for further proceedings.

BACKGROUND

The claims of Kumar's patent application are directed to aluminum oxide particles of submicron (nanometer) size,[1] having a specified size range and size distribution. The specification describes the production of the particles by laser pyrolysis, but the claims at issue are directed to the particles themselves, independent of their method of production. Due to their very small size and high degree of uniformity, the particles are described as well suited for use in polishing compositions.

The examiner had rejected all of the product claims, and on appeal the Board treated claims 1 and 19 as representative. Process claims have been allowed, and are not at issue. Kumar agrees that all of the claims on appeal rise or fall with claims 1 and 19.

> 1. A collection of particles comprising aluminum oxide, the collection of particles having
>
> an average diameter of primary particles from about 5 nm to about 500 nm and
>
> less than about one in 10^6 particles have a diameter greater than about three times the average diameter of the collection of particles.
>
> 19. A collection of particles comprising aluminum oxide, the collection of particles having
>
> an average diameter from about 5 nm to about 500 nm and
>
> a distribution of particle sizes such that at least about 95 percent of the particles have a diameter greater than about 40 percent of the average diameter and less than about 160 percent of the average diameter.

The Board held the claims unpatentable on the ground of obviousness in view of U.S. Patent No. 5,389,194 (the Rostoker patent), which shows aluminum oxide particles of nanometer size. The Board found that the particle sizes and size distributions[2] of the

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1 One micron equals 1,000 nanometers (nm).

2 The parties explain the difference between average particle size and particle size distribution with an analogy using balls: a collection of (1) softballs, baseballs and

Rostoker particles and of Kumar's claimed particles are overlapping. Kumar concedes that the Rostoker particles overlap the Kumar particles in average particle size, but argues that they do not overlap in particle size distribution. The appeal relates primarily to the Board's procedure, wherein the values deemed to overlap appear for the first time in the Board's decision. Kumar states that he was unfairly precluded from replying to this evidence, and that the Board improperly refused to consider the responsive evidence submitted with Kumar's request for reconsideration.

The Board's calculations were derived from the Rostoker reference, which describes aluminum oxide having a particle size and size distribution as follows:

> According to the invention, the alpha aluminum oxide particles used for polishing exhibit the following characteristics. Preferably, the particle size is "X" nm, and the distribution of particle sizes is controlled to within "Y" nm, and the particles used for polishing are "Z" percent (%) in the alpha phase, where:
>
> "X" is 10-100 nm, such as 10, 20, 30, 40 or 50 nm, and is preferably no greater than 50 nm; and
>
> "Y" is approximately "P" percent of "X", where "P" is 10%, 20%, 30%, 40% or 50%, and is preferably no greater than 50% to ensure a narrow (Gaussian) distribution of particle sizes about "X";
>
> "Z" is at least 50%, including at least 60%, 70%, 80% and 90%, and as high as 100%.
>
> A quality factor "Q" is inversely related to "Y", and is a measure of the distribution of particle sizes. "Q" can be calculated as the concentration of particles at the desired size "X", divided by the range of sizes of particles at 3 db (decibels) lower than "X". Preferably, the size distribution of alpha aluminum oxide particles used for polishing exhibits a "Q" of at least 10, including 10, 50, 100, 500, 1000, 5000, or 10,000 ("Q" is dimensionless).

Rostoker patent, col. 7, lines 4-27. The Board selected "X" and "P" values in the range disclosed by Rostoker, 10 nm and 10% respectively, to calculate a "Y" value of 1 nm (10

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tennis balls may have the same average size as a collection of (2) basketballs, baseballs and golf balls, but group (2) has a larger size distribution.

nm times 10% equals 1 nm), within which Rostoker's size distribution is controlled; this results in a particle size distribution range of 9-11 nm (10 nm ± 1). The Board found that this distribution range overlaps with the range in Kumar's claim 1, which the Board calculated to be 0-30 nm based on a particle size distribution controlled to within three times the average diameter (10 nm times 3 equals 30 nm). Thus the Board found that the Rostoker and Kumar distributions overlap.

Similarly, the Board selected "X" and "P" values in the range described by Rostoker, to calculate a "Y" value of 5 nm (10 nm times 50% equals 5 nm); this results in a Rostoker distribution range of 5-15 nm (10 nm ± 5). The Board found that this range overlaps with the range in Kumar's claim 19, which the Board calculated to be 4-16 nm based on the Kumar particle size distribution controlled to within 40-160% of the average diameter (10 nm times 40% and 160% equals 4 and 16 nm, respectively). The Board held that these overlapping values, and others shown by its calculations, established a *prima facie* case of obviousness of the Kumar particles.

These calculations had not been made by the examiner, and according to the record were not presented during the argument of the appeal to the Board. The Board apparently made these calculations during its decision of the appeal. The Board included these calculations in an Appendix to its decision, holding that they support a *prima facie* case of obviousness and that Kumar's evidence had not rebutted the *prima facie* case. Kumar's evidence included a declaration by co-inventor Dr. Kambe to the effect that Rostoker does not enable one of ordinary skill in the field of the invention to produce particles having Kumar's size range and distribution. Kumar cited Beckman Instruments, Inc. v. LKB Produkter AB, 892 F.2d 1547, 1551 (Fed. Cir. 1989), for the rule that "[i]n order to render a

claimed apparatus or method obvious, the prior art must enable one skilled in the art to make and use the apparatus or method." See also Motorola, Inc. v. Interdigital Tech. Corp., 121 F.3d 1461, 1471 (Fed. Cir. 1997); In re Payne, 606 F.2d 303, 314 (CCPA 1979). The Board rejected the Kambe declaration, finding that Mr. Kambe's assertions were conclusory and unsupported by evidence.

Kumar requested Board reconsideration, submitting the declaration of Dr. Rajiv Singh, Professor of Materials Science and Engineering at the University of Florida at Gainesville. Professor Singh explained that Rostoker's "Q" value defines size distribution, and criticized Rostoker's description of the "Q" value as internally inconsistent and not in conformity with standard representations of distribution functions. Professor Singh pointed out that Rostoker stated that he used the manufacturing method of Siegel, U.S. Patent No. 5,128,081, and opined that Siegel does not produce submicron particles. The Board refused to consider Professor Singh's declaration, ruling that Kumar had not shown good and sufficient reason why it was not earlier presented.

Kumar appeals, stating that a *prima facie* case of obviousness was not established, or if established was rebutted. Kumar objects to the tardy submission of the Board's calculations and states that he was entitled to consideration of Professor Singh's evidence. Kumar argues that the Singh evidence rebuts the *prima facie* case and that the Board should have either considered it or remanded to the examiner for that purpose.

DISCUSSION

Determination of obviousness under 35 U.S.C. §103 is a legal conclusion based on underlying facts. Graham v. John Deere Co., 383 U.S. 1, 17 (1966); In re Oetiker, 977 F.2d 1443, 1444 (Fed. Cir. 1992); In re Piasecki, 745 F.2d 1468, 1471 (Fed. Cir. 1984). We give

plenary review to the Board's legal conclusion, whereas the underlying factual determinations are reviewed to ascertain whether they are supported by substantial evidence. In re Gartside, 203 F.3d 1305, 1316 (Fed. Cir. 2000). Substantial evidence is "such relevant evidence as a reasonable mind might accept as adequate to support a conclusion." Consolidated Edison Co. v. NLRB, 305 U.S. 197, 229 (1938).

During examination, the examiner bears the initial burden of establishing a *prima facie* case of obviousness. Oetiker, 977 F.2d at 1445. The *prima facie* case is a procedural tool, and requires that the examiner initially produce evidence sufficient to support a ruling of obviousness; thereafter the burden shifts to the applicant to come forward with evidence or argument in rebuttal. Piasecki, 745 F.2d at 1475. When rebuttal evidence is provided, the *prima facie* case dissolves, and the decision is made on the entirety of the evidence. Oetiker, 977 F.2d at 1445; In re Spada, 911 F.2d 705, 708 (Fed. Cir. 1990); In re Rinehart, 531 F.2d 1048, 1052 (CCPA 1976).

A

A *prima facie* case of obviousness may be made when the only difference from the prior art is a difference in the range or value of a particular variable. In re Peterson, 315 F.3d 1325, 1329 (Fed. Cir. 2003); In re Woodruff, 919 F.2d 1575, 1578 (Fed. Cir. 1990). The Board found that Rostoker suggests restricting the particle size distribution to a range of 9-11 nm, which overlaps Kumar's claim 1 limitation of 0-30 nm when an average diameter of 10 nm is selected for the Rostoker particles (10 nm times 3 equals 30 nm). The Board similarly found that Rostoker suggests restricting particle size distribution to a range of 5-15 nm, which overlaps Kumar's claim 19 distribution of 4-16 nm when an

average diameter of 10 nm is selected (10 nm times 40% and 160% equals 4 and 16 nm, respectively).

Kumar argues that Rostoker's description of its particles is too indefinite to support any particular distribution of particle sizes. Kumar states that a skilled artisan would not understand Rostoker's "Y" variable to have the values that the Board calculated because Rostoker, in addition to stating that "Y" is approximately "P" percent of "X," requires that its particles meet a quality factor "Q" that is inversely related to "Y." Kumar argues that this renders the calculation of "Y" more complex than the Board's simplified calculation, and that Rostoker does not disclose the values the Board calculated and then used to conclude that Kumar's size distribution overlaps with that of Rostoker. Kumar also states that the Board should have provided an opportunity to support this argument with evidence showing that the Rostoker teachings do not support the Board's *sua sponte* calculations. Kumar states that the Singh declaration establishes the indefiniteness of the Rostoker reference, and challenges the assumptions underlying the Board's calculations.

The PTO responds that Rostoker's quality factor "Q" describes the extent to which his particle size distribution is controlled to within certain limits of the target particle size. The PTO suggests that Q is calculated as follows: Rostoker calls for the division of the amount of particles at the desired size X, by the amount of particles at a size 3 decibels ("db") from X. To find a value 3 db from X, which the Board labels "A," one must solve the logarithmic function, 10 log (X/A) = 3 db. The PTO solves this function and finds that if log (X/A) = 3/10, then $X/A = 10^{3/10}$, and thus X/A = 2, and A = X/2. This means that a value that is 3 db lower than X is X/2 or 50% of X. Thus the PTO states that the quality factor Q merely describes the extent to which the particles are within 50% and 150% of the target

particle size. For example, the "Q" value of 10,000 in the Rostoker reference indicates a high quality product in which 10,000 particles are of the target size for every particle at 50% or 150% of the target size. According to the PTO, rather than making indefinite the values for "X" and "Y" as shown by Rostoker and the ranges of those values, the "Q" factor provides an independent description of Rostoker's particle size distribution.

The PTO also responds that the Board was correct in refusing to consider the Singh declaration because its execution date shows that it was prepared before the Board issued its initial decision, and thus could have been earlier presented. Kumar states that the Singh declaration was prepared for use in a different patent application, and that its relevance to this application became manifest only after the Board's decision.

The values identified by the Board's calculations were not contained in the prior art or any examination record, but appeared for the first time in the Board's opinion. Although the PTO argues that the calculations the Board included in its decision were not new evidence, but simply an additional explanation of the Board's decision, these values produced and relied on by the Board had not previously been identified by the examiner or the Board. Kumar was entitled to respond to these calculations, and the Board committed procedural error in refusing to consider the evidence proffered in response. See In re DeBlauwe, 736 F.2d 699, 706 n.9 (Fed. Cir. 1984) ("Where the board makes a decision advancing a position or rationale new to the proceedings, an applicant must be afforded an opportunity to respond to that position or rationale by submission of contradicting evidence"). The PTO regulations so require. See 37 C.F.R. §1.196(b) ("when the Board . . . makes a new rejection of an appealed claim, the appellant may . . . submit . . . a showing of fact . . . and have the matter reconsidered").

Instead of basing its decision on the values directly disclosed by Rostoker, the Board "went off on its own in considering the differences" between Rostoker and the Kumar invention, see In re Eynde, 480 F.2d 1364, 1371 (CCPA 1973), the Board calculating particular distribution values based on the assumption that the Rostoker variables "X," "Y," "P," and "Q" would be understood by a skilled artisan in the same way in which they were understood by the Board. The Singh declaration challenges the Board's view of the Rostoker variables. While the PTO now argues that there is no merit to the Singh position, and offers its own explanation for the meaning of the "Q" variable, the merits of this evidence are not properly debated in the first instance on appeal. There is no record on this aspect, for the Board refused to consider it.

In accordance with the Administrative Procedure Act, the agency must assure that an applicant's petition is fully and fairly treated at the administrative level, without interim need for judicial intervention. See Dickinson v. Zurko, 527 U.S. 150, 154 (1999) (the PTO is an agency subject to the Administrative Procedure Act). The Board's rules are in accord. See 37 C.F.R. §1.196(b) (when the Board relies on a new ground of rejection, it is appropriate to provide the applicant with an opportunity to respond to that ground).

When a rejection for obviousness is based on overlapping values in the prior art, identification of the values deemed to overlap is material to the rejection. In this case the overlapping values were identified for the first time in the decision of the Board, and are not themselves set forth in Rostoker or any other reference. In calculating the overlapping values, the Board found facts not found by the examiner regarding the differences between the prior art and the claimed invention, which in fairness required an opportunity for response. See In re Kronig, 539 F.2d 1300, 1302 (CCPA 1976) ("the ultimate criterion of

whether a rejection is considered 'new' in a decision by the board is whether appellants have had fair opportunity to react to the thrust of the rejection").

We conclude that the Board's calculations and its decision based thereon constituted a new ground of rejection, and should have been so treated. See In re Waysmouth, 486 F.2d 1058, 1060-61 (CCPA 1973) (holding that a new rejection had occurred where the examiner and the board rejected a claim for different reasons).

B

Kumar also argues that even if a *prima facie* case of obviousness were established, Kumar rebutted that case with evidence and argument that Rostoker did not enable the Kumar product, and that the Board erred in refusing to consider the rebuttal evidence.

An applicant may rebut a *prima facie* case of obviousness by providing a "showing of facts supporting the opposite conclusion." Such a showing dissipates the *prima facie* holding and requires the examiner to "consider all of the evidence anew." Piasecki, 745 F.2d at 1472; In re Rinehart, 531 F.2d 1048, 1052 (CCPA 1976). Rebuttal evidence may show, for example, that the claimed invention achieved unexpected results relative to the prior art, In re Geisler, 116 F.3d 1465, 1469-70 (Fed. Cir. 1997); that the prior art teaches away from the claimed invention, id. at 1471; that objective evidence (e.g., commercial success) supports the conclusion that the invention would not have been obvious to a skilled artisan, Piasecki, 745 F.2d at 1475; or that the prior art did not enable one skilled in the art to produce the now-claimed invention, In re Payne, 606 F.2d 303, 314-15 (CCPA 1979).

Although published subject matter is "prior art" for all that it discloses, in order to render an invention unpatentable for obviousness, the prior art must enable a person of

ordinary skill to make and use the invention. Beckman Instruments, 892 F.2d at 1551. Thus when a *prima facie* case of obviousness is deemed made based on similarity to a known composition or device, rebuttal may take the form of evidence that the prior art does not enable the claimed subject matter. See Payne, 606 F.2d at 314-15 ("the presumption of obviousness based on close structural similarity is overcome where the prior art does not disclose or render obvious a method for making the claimed compound"); In re Hoeksema, 399 F.2d 269, 274 (CCPA 1968) ("the absence of a known or obvious process for making the claimed compounds overcomes a presumption that the compounds are obvious, based on close relationships between their structures and those of prior art compounds").

The applicant has the burden of coming forward with evidence in rebuttal, when the prior art includes a method that appears, on its face, to be capable of producing the claimed composition. This burden may be met by presenting sufficient reason or authority or evidence, on the facts of the case, to show that the prior art method would not produce or would not be expected to produce the claimed subject matter. Since Rostoker states that its particles were made by the method shown in the Siegel patent, it was reasonable for Kumar to argue that the Siegel process would not produce Kumar's particles. Kumar's argument was supported by the declarations of Drs. Kambe and Singh. Whether these expert declarations are sufficient, without experimental data or other evidence, is a question of fact to be determined on the record. Although the PTO now argues that the Singh declaration is insufficient, the Board erred in refusing to consider the Singh declaration, for Kumar correctly observed that the issue was not presented until the Board made its *sua sponte* calculations of particle size distribution. The Board's calculations raised new issues regarding enablement because they suggest particle size distributions Rostoker should be

enabled to attain. In addition, although the Board found the Kambe declaration conclusory and insufficient to rebut the *prima facie* case of obviousness, this declaration must be reevaluated in light of the Singh declaration. See Rinehart, 531 F.2d at 1052 (when evidence is submitted to rebut a *prima facie* case of obviousness, the decision maker must consider all of the evidence anew).

The PTO argues that as long as Rostoker enables the Rostoker invention, Rostoker renders the Kumar invention obvious, even if Kumar shows that Rostoker does not enable the Kumar invention. That is incorrect. To render a later invention unpatentable for obviousness, the prior art must enable a person of ordinary skill in the field to make and use the later invention. Beckman Instruments, Inc., 892 F.2d at 1551; Payne, 606 F.2d at 314. Thus the relevant inquiry is not whether the Rostoker patent was invalid for lack of enablement, but whether Rostoker enabled persons skilled in this art to produce particles of the size and distribution claimed by Kumar. Of course, if it were shown that the Rostoker product could not be produced by the Rostoker method, that would be relevant evidence concerning whether Rostoker rendered obvious the Kumar product. Kumar points out that his method of laser pyrolysis is quite different from that used by Rostoker.

After the Board adduced its calculations of particle size and distribution, Kumar was entitled to offer evidence in rebuttal, for consideration by the Board or on return to an examiner. The entirety of the evidence must be reviewed in order to determine whether the claimed invention as a whole would have been obvious to a person of ordinary skill in the field. See Rinehart, 531 F.2d at 1052.

CONCLUSION

In view of our holding that Kumar was entitled to respond to the evidence adduced *sua sponte* by the Board, we vacate the Board's decision and remand for appropriate further proceedings.

VACATED AND REMANDED