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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ROBERT MASON DARLING

Appeal 2019-004976
Application 14/652,131
Technology Center 1700

Before DEBRA L. DENNETT, LILAN REN, and
JANE E. INGLESE, *Administrative Patent Judges*.

DENNETT, *Administrative Patent Judge*.

DECISION ON APPEAL¹

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant² appeals from the Examiner's decision to reject claims 1–3, 6, 7, and 15–21 of Application 14/652,131, which constitute all the claims pending in this application. We have jurisdiction under 35 U.S.C. § 6(b).

¹ In our Decision, we refer to the Specification (“Spec.”) of Application No. 14/652,131 filed June 15, 2015; the Final Office Action dated Sept. 11, 2018 (“Final Act.”); the Response After Final Action filed Nov. 2, 2018 (“Response After Final”); the Appeal Brief filed Jan. 31, 2019 (“Appeal Br.”); the Examiner’s Answer dated Apr. 16, 2019 (“Ans.”); and the Reply Brief filed June 11, 2019 (“Reply Br.”).

² We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as United Technologies Corporation. Appeal Br. 1.

For the reasons set forth below, we AFFIRM IN PART.

The subject matter of the invention relates to graphite-containing electrodes with a porous body having a plurality of first graphite-containing elements intermingled with a plurality of second graphite-containing elements. Spec. ¶ 3. The graphite-containing elements may include portions that are graphite and portions of non-graphite carbon, such as amorphous carbon. Spec. ¶ 19. The degree of graphitization is said to influence the amount of oxygen-containing surface groups produced from activation treatment, the type and amount of chemically different oxygen-containing surface groups produced from activation treatment, or both. Spec. ¶ 20. The oxygen-containing sites can chemically or electrochemically reduce (i.e., decay) over time, diminishing performance. Spec. ¶ 21. The decay can be influenced by adjusting the degree of graphitization to control the amount of oxygen-containing surface groups produced in the activation treatment and/or the type and amount of chemically different oxygen-containing surface groups. Spec. ¶ 21.

The degree of graphitization influences other properties, such as electrical conductivity, thermal conductivity, and strength. Spec. ¶ 21. Thus, according to the Specification, although a lower degree of graphitization may be desired for lower decay and greater stability, electrodes of electrochemical devices can also require a good balance with the other properties. Spec. ¶ 21.

Claim 1, reproduced below from the Claims Appendix of the Appeal Brief, illustrates the claimed subject matter:

1. A graphite-containing electrode comprising:
a porous body including a plurality of first graphite-containing elements and a plurality of second graphite-

containing elements intermingled with the plurality of first graphite-containing elements, the plurality of first graphite-containing elements having a first degree of graphitization and the plurality of second graphite-containing elements having a second, different degree of graphitization, wherein the first degree of graphitization differs from the second degree of graphitization by 25%, wherein the degree of graphitization is an amount of graphite in the graphite-containing elements.

REFERENCES

The Examiner relies on the following references in rejecting the claims:

Name	Reference	Date
Fong et al. (“Fong”)	US 5,028,500	July 2, 1991
Ejiri et al. (“Ejiri”)	US 5,792,577	Aug. 11, 1998
Tamaki et al. (“Tamaki”)	US 6,287,729 B1	Sept. 11, 2001

REJECTIONS

The Examiner maintains the following rejections: (1) claims 1, 3, 17, 18, and 20 under 35 U.S.C. § 102(b) over Tamaki; (2) claims 1, 7, and 21 under 35 U.S.C. § 102(b) over Fong; (3) claims 2, 15, 16, and 19 under 35 U.S.C. § 103(a) over Tamaki in view of Ejiri; and (4) claim 6 under 35 U.S.C. § 103(a) over Fong in view of Tamaki. Final Act. 4–7.

DISCUSSION

We review the appealed rejections for error based upon the issues identified by Appellant and in light of the arguments and evidence produced thereon. *Ex parte Frye*, 94 USPQ2d 1072, 1075 (BPAI 2010) (precedential), (cited with approval in *In re Jung*, 637 F.3d 1356, 1365 (Fed. Cir. 2011)). (“[I]t has long been the Board’s practice to require an applicant to identify

the alleged error in the [E]xaminer’s rejections.”). After considering the evidence presented in this appeal and each of Appellant’s arguments, we reverse the rejections citing Tamaki as the primary reference and sustain the rejections citing Fong as the primary reference.

1. Rejection of claims 1, 3, 17, 18, and 20 as anticipated by Tamaki

Claim 1 is the only independent claim in this group. *See* Appeal Br. 8-9. Regarding claim 1, the Examiner finds that Tamaki discloses an apparatus comprising an electrode with spacing (considered by the Examiner as porous) including a plurality of graphite fibers and graphite material, the degree of graphitization of the graphite material being at least 2.0 and the degree of graphitization of the graphite fibers being 1.2 to 2.0. Final Act. 4.

The issue in this rejection is the limitation “wherein the first degree of graphitization differs from the second degree of graphitization by 25%, wherein the degree of graphitization is an amount of graphite in the graphite-containing elements.” *See* Appeal Br. 3–4, 8 (Claims App.).

The Examiner finds that the degrees of graphitization taught by Tamaki includes a 25% difference when the degree of graphitization of the graphite material is 2.0 and the degree of graphitization of the graphite fibers is 1.5. Final Act. 4; Ans. 6. The Examiner finds that no actual amount of graphite is claimed, rather the only value claimed is the 25% difference between the first and second degrees of graphitization. Ans. 6.

According to the Examiner, the plain and ordinary meaning of “graphitization” as a verb is “the process of making graphite from carbon,” and as an adjective is “the extent to which a carbon material is graphite.” *Id.* (citing Tamaki col. 7, ll. 32–35: “The degree of graphitization is used as the index which indicates the extent of graphitization of a carbon material.”).

The Examiner finds that the degree of graphitization is an amount of graphite in a material because the “extent” of graphite (as taught in Tamaki) is an amount. *Id.*

The Examiner acknowledges that Appellant correctly asserts that there is no evidence that the degree of graphitization values disclosed in Tamaki (1.2 to 2.0 for element (A) and 2.0 to 3.6 for element (B)) correlate to a 1:1 value in amounts of graphite. Ans. 6. The Examiner finds, however, that claim 1 does not require such correlation, as no actual amounts of graphite are claimed, but rather, only a percentage difference. *Id.* The Examiner finds that the disclosed values correlate to amounts of graphite. *Id.* Thus, the Examiner finds that Tamaki teaches “wherein the first degree of graphitization differs from the second degree of graphitization by 25%, wherein the degree of graphitization is an amount of graphite in the graphite-containing elements.” *See id.* at 6–7.

Appellant argues that the values upon which the rejection relies for the 25% difference are ratios of diffraction peaks in X-ray diffraction, but not an amount of graphite, which is claimed. Appeal Br. 3–4; *see also* Reply Br. 1. Appellant contends that there is neither evidence nor indication in Tamaki that the disclosed ratios relate to an amount of graphite in a one-to-one relationship, and Tamaki is silent as to a relationship between X-ray diffraction peaks and an amount of graphite. Appeal Br. 4.

Therefore, the dispute is not over merely the meaning of “degree of graphitization,” but rather the meaning of “the degree of graphitization is an amount of graphite in the graphite-containing element.”

During prosecution, we give the language of the proposed claims “the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art, taking into account

whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in the applicant's specification." *In re Morris*, 127 F.3d 1048, 1054–55 (Fed. Cir. 1997); *see also In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004) ("The words used in a claim must be read in light of the specification, as it would have been interpreted by one of ordinary skill in the art at the time of the invention."). "Under a broadest reasonable interpretation, words of the claim must be given their plain meaning, unless such meaning is inconsistent with the specification and prosecution history." *TriVascular, Inc. v. Samuels*, 812 F.3d 1056, 1062 (Fed. Cir. 2016).

The Specification discloses

In one example, the first degree of graphitization is 20% and the second degree of graphitization is 40%. In another example, the degrees of graphitization differ by at least 25%. In a further example, the porous body 60 has, by weight, 20% of the first graphite-containing elements 62 and 80% of the second graphite-containing elements 64.

Spec. ¶ 22. This indicates that the recited "amount of graphite" for the degree of graphitization in claim 1 refers to amounts or percentages of graphite, including by weight.

In contrast, Tamaki discloses that "degree of graphitization (P_{101}/P_{100}) [] is represented by the ratio of (101) diffraction peak in X-ray diffraction to (100) diffraction peak," and "[t]he degree of graphitization is used as the index which indicates the extent of graphitization of a carbon material." Tamaki col. 7, ll. 26–28, ll. 32–35. The record does not establish that values of degrees of graphitization (P_{101}/P_{100}) disclosed in Tamaki are amounts or percentages of graphite, but rather numbers that represent a ratio of diffraction peaks and are used as an index.

Anticipation requires that a single reference “describe the claimed invention *with sufficient precision and detail* to establish that the subject matter existed in the prior art.” *Verve, LLC v. Crane Cams, Inc.*, 311 F.3d 1116, 1120 (Fed. Cir. 2002) (emphasis added). For this reason, it has long been understood that ambiguous references do not, as a matter of law, anticipate a claim. *See, e.g., W.L. Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1554 (Fed. Cir. 1983) (refusing to find claims anticipated when the prior art references were “unacceptably vague”); *see also In re Hughes*, 345 F.2d 184, 188 (CCPA 1965); *In re Turlay*, 304 F.2d 893, 899 (CCPA 1962) (“It is well established that an anticipation rejection cannot be predicated on an ambiguous reference.”).

Tamaki’s disclosure of different diffraction peak ratios between element (A) and element (B) does not describe with sufficient precision “wherein the first degree of graphitization differs from the second degree of graphitization by 25%, wherein the degree of graphitization is an amount of graphite in the graphite-containing elements.” The Examiner’s determination that “the disclosed values correlate to amounts of graphite” is not supported by Tamaki’s disclosure. *Compare* Ans. 6 *with* Tamaki col. 7, ll. 26–35.

We do not sustain the rejection of claim 1 as anticipated by Tamaki. For the same reasons, we do not sustain the rejection of claims 3, 17, 18, or 20 as anticipated by Tamaki.

2. *Rejection of claims 1, 7, and 21 as anticipated by Fong*

Appellant argues the claims in Rejection 2 as a group. Appeal Br. 4–5. We select independent claim 1 as representative of the group. 37 C.F.R. § 42.37(c)(1)(iv).

Regarding claim 1, the Examiner finds that Fong discloses an electrode comprising two phases of graphitization, one ranging from 0.4 to 1.0 and the other less than about 0.4. Final Act. 5. The Examiner finds that Fong’s disclosed values of 0 to 1 for graphitization are reasonably inferred to mean 0% to 100%. Ans. 7. The Examiner notes that Fong defines degree of graphitization consistently with claim 1, i.e., the amount of graphite in a carbon material. *Id.*

The Examiner finds that the term “element” in claim 1 is undefined, and can mean a component or an aspect of the apparatus. *Id.* at 8. The Examiner finds that Fong’s disclosure of a first phase of carbon with a relatively high degree of graphitization and a second phase with a relatively low degree of graphitization is sufficient to anticipate claim 1’s limitation “a plurality of first graphite-containing elements and a plurality of second graphite-containing elements intermingled with the plurality of first graphite-containing elements.” *Id.*

Appellant argues that Fong does not disclose how the degree of graphitization is expressed or calculated. Appeal Br. 5; Reply Br. 2. Appellant also argues that Fong discloses a single element—particles—rather than first and second graphite-containing elements with differing degrees of graphitization. *Id.* These arguments are unpersuasive of reversible error.

Fong teaches:

The term “degree of graphitization” refers to a parameter of the microstructure further defined below, having a numerical value between 0 and 1.0. In general, carbon having a high degree of graphitization has a more ordered microstructure more closely resembling the microstructure of graphite, whereas carbon having a low degree of graphitization has a less ordered microstructure more closely resembling that of coke.

* * *

The first phase desirably has a relatively high degree of graphitization, preferably above about 0.40, more preferably above about 0.80 and most preferably about 1.0. The second phase of the composition may comprise a carbonaceous material having a relatively low degree of graphitization, desirably less than about 0.40.

Fong col. 2, l. 67–col. 3, l. 6 and col. 3, ll. 32–38. Fong thus discloses how the degree of graphitization is expressed, with less graphitization associated with a lower value, e.g., 0.40, and more graphitization associated with a higher value, e.g. most preferably about 1.0. *See id.* One of ordinary skill in the art reasonably would have inferred that 0.40 is the same as 40% and 1.0 is the same as 100% in Fong.

Anticipation is a question of fact. *In re Suitco Surface, Inc.*, 603 F.3d 1255, 1259 (Fed. Cir. 2010). When “one skilled in the art would reasonably understand or infer from the prior art reference’s teaching that every claim [limitation] was disclosed in that single reference,” anticipation is established. *Akamai Techs., Inc. v. Cable & Wireless Internet Servs., Inc.*, 344 F.3d 1186, 1192–93 (Fed. Cir. 2003) (quoting *Dayco Prods., Inc. v. Total Containment, Inc.*, 329 F.3d 1358, 1368 (Fed. Cir. 2003)). At the same time, anticipation may be established when there is a substantial overlap between the ranges disclosed in the prior art and recited in claims such that one of ordinary skill in the art could readily envisage the claimed range from the prior art range, especially when the ingredients or

compositions involved impart the same or similar property. *Perricone v. Medicis Pharm. Corp.*, 432 F.3d 1368, 1376–77 (Fed. Cir. 2005) (“Pereira’s disclosed range of concentration *does not exactly correspond* to Dr. Perricone’s claimed range. However, Pereira’s disclosure nonetheless discloses and anticipates Dr. Perricone’s particular claimed ‘effective amount’ ranges . . . [since] Pereira’s range entirely encompasses, and does not significant deviate from, Dr. Perricone’s claimed ranges.”); *Atlas Powder Co. IRECO Inc.*, 190 F.3d 1342, 1345 (Fed. Cir. 1999) (Anticipation was presumed based on a substantial overlap between the claimed ranges of ingredients in an explosive composition and the ranges of the same disclosed in a prior art reference.).

Fong discloses a particulate composition having both a relatively high degree of graphitization—“most preferably about 1.0”—which we interpret as about 100%, and a relatively low degree of graphitization—“desirably less than about 0.40”—which we interpret as desirably less than about 40%. *See* Fong col. 3, ll. 32–38. Given these ranges, one of ordinary skill in the art would readily envisage claim 1’s requirement “wherein the first degree of graphitization differs from the second degree of graphitization by 25%” of claim 1. *See Perricone*, 432 F.3d at 1376–77.

Fong does not disclose how the degree of graphitization is calculated, but claim 1 requires only that the first and second degrees of graphitization (amounts of graphite) differ by 25%. *See* Appeal Br. 8 (Claims App.). We find that Fong discloses the recited difference.

We next address Appellant’s argument that Fong discloses only a single element (particles), rather than first and second graphite-containing elements with differing degrees of graphitization. *See* Appeal Br. 5; Reply Br. 2. Appellant contends that regions of each particle do not constitute first

and second graphite-containing elements intermingled with one another.
Reply Br. 2.

Fong discloses an electrode that “preferably includes a composition including carbon, desirably in a particulate form.” Fong col. 2, ll. 58–60. At least a portion of the composition desirably is carbon having a degree of graphitization greater than about 0.40. *Id.* col. 2, ll. 64–66. According to Fong, “carbon having a high degree of graphitization has a more ordered microstructure more closely resembling the microstructure of graphite, whereas carbon having a low degree of graphitization has a less ordered microstructure more closely resembling that of coke.” *Id.* col. 2, l. 67–col. 3, l. 6.

Fong teaches two different types of carbon, one having a microstructure resembling graphite, another having a microstructure resembling coke. We interpret the first and second graphite-containing elements of claim 1 as reading on Fong’s two types of carbon. “The law of anticipation does not require that the reference ‘teach’ what the subject [application] teaches. . . . [I]t is only necessary that the claims under attack . . . ‘read on’ something disclosed in the reference, i.e., all limitations of the claim are found in the reference.” *Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 772 (Fed. Cir. 1983) (overruled on other grounds in *SRI Intern. v. Matsushita Elec. Corp. of America*, 775 F.2d 1107 (Fed. Cir. 1985)).

For the reasons discussed, we sustain the rejection of claim 1 as anticipated by Fong. We likewise sustain the rejection of claims 7 and 21 under 37 C.F.R. § 42.37(c)(1)(iv).

3. *Rejection of claims 2, 15, 16, and 19 as obvious over Tamaki in view of Ejiri*

Claims 2, 15, 16, and 19 depend directly or indirectly from claim 1. Appeal Br. 8–9. The Examiner relies on the findings regarding Tamaki in relation to claim 1 to support obviousness of claims 2, 15, 16, and 19, and relies on Ejiri to teach the additional limitations in the dependent claims. Final Act. 6.

Because we find that Tamaki does not disclose the limitations in claim 1, and the Examiner makes no additional findings in relation to Tamaki that support obviousness, we conclude that claims 2, 15, 16, and 19 are not rendered obvious by Tamaki in view of Ejiri.

4. Rejection of claim 6 as obvious over Fong in view of Tamaki

Claim 6 depends from claim 21 and further recites “wherein the porous body includes, by weight, 20% of the plurality of first graphite-containing elements and 80% of the plurality of second graphite-containing elements.” Appeal Br. 8, 9–10. Appellant argued patentability of claims 1, 7, and 21 over Fong as a group. *Id.* at 4–5. We found these claims to be anticipated by Fong.

The Examiner finds that Fong does not disclose the ratio between the two phases, but Tamaki discloses that the mix ratio between (A) and (B) is 90/10 to 50/50 by weight. Final Act. 7. The Examiner concludes that it would have been obvious to one of ordinary skill in the art to have mixed the phases of Fong in a desirable ratio to regulate the product specific surface area, as taught by Tamaki. *Id.*

With regard to claim 6, Appellant argues that this rejection and Rejection 3 “rely on Tamaki and/or Fong and should be withdrawn for at least the same reasons” discussed in the Appeal Br. *Id.* at 5–6.

Appellant's argument is insufficient to identify reversible error in the rejection, which we sustain.

DECISION SUMMARY

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1, 3, 17, 18, 20	102(b)	Tamaki		1, 3, 17, 18, 20
1, 7, 21	102(b)	Fong	1, 7, 21	
2, 15, 16, 19	103(a)	Tamaki, Ejiri		2, 15, 16, 19
6	103(a)	Fong, Tamaki	6	
Overall Outcome			1, 6, 7, 21	2, 3, 15–20

TIME PERIOD FOR RESPONSE

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

AFFIRMED IN PART