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EXAMINER

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte MARION LORGOUILLOUX, DIDIER LESUEUR,
MARC PELLETIER, FOUAD LAOUTID, and
PHILLIPPE DUBOIS

Appeal 2018-000918
Application 14/406,915
Technology Center 1700

Before JAMES C. HOUSEL, AVELYN M. ROSS, and
MERRELL C. CASHION, JR., *Administrative Patent Judges*.

HOUSEL, *Administrative Patent Judge*.

DECISION ON APPEAL¹

Appellant² appeals under 35 U.S.C. § 134(a) from the Examiner's decision rejecting claims 1–9, 11, 12, and 25–27. We have jurisdiction over the appeal under 35 U.S.C. § 6(b).

We REVERSE.

¹ Our decision refers to the Specification (“Spec.”) filed December 10, 2014, the Examiner’s Final Office Action (“Final”) dated January 3, 2017, Appellant’s Appeal Brief (“Br.”) filed May 24, 2017, and the Examiner’s Answer (“Ans.”) dated September 7, 2017.

² Appellant is the Applicant, S.A. Lhoist Recherche et Developpement, which is identified in the Appeal Brief as the real party in interest (Br. 3).

STATEMENT OF THE CASE

The invention relates to the flame-retardant polymer compositions comprising a polymer and a mineral filler comprising a calcium compound (Spec. 1: 7–8). Appellant discloses that flame retardant additives are incorporated into polymer matrices in order to slow down or stop combustion of the polymer in case of fire (*id.* at 1:12–14). Appellant further discloses that although calcium dihydroxide, $\text{Ca}(\text{OH})_2$, endothermically decomposes around 400°C , releasing water and giving rise to the formation of calcium oxide, CaO , this decomposition temperature means that $\text{Ca}(\text{OH})_2$ is only efficient as a flame-retardant at a temperature above the polymer degradation (*id.* at 3:17–24). However, upon combustion, Appellant discloses that a hard ash mainly of CaCO_3 is produced involving an exothermic carbonation reaction such that $\text{Ca}(\text{OH})_2$ is both less common than aluminum and magnesium hydroxides and not relevant as a flame-retardant (*id.* at 3:28; 5:3–14). Appellant desires a mineral filler comprising at least one calcium compound that benefits from its endothermic decomposition, while allowing acceptable mechanical characteristics for the polymer composition containing the filler and allowing formation of a cohesive combustion residue (*id.* at 6:20–25). For this purpose, Appellant provides a flame-retardant polymer composition comprising calcium hydroxide having a specific surface area, computed according to the BET method, greater than $25\text{ m}^2/\text{g}$ and less than $60\text{ m}^2/\text{g}$ (*id.* at 6:26–31). According to Appellant, this high specific surface area of calcium hydroxide allows formation of a particularly cohesive and possibly intumescent combustion residue (*id.* at 6:32–7:1).

Claim 1, reproduced below from the Claims Appendix to the Appeal Brief, is illustrative of the subject matter on appeal. The limitations at issue are italicized.

1. A flame-retardant polymer composition comprising a mineral filler and a polymer, said mineral filler comprising a calcium compound, characterized in that the calcium compound is a fire-resistant additive in the form of calcium hydroxide having a specific surface area computed according to the BET method *greater than 25 m²/g and less than 60 m²/g*, the mineral filler being incorporated into the flame-retardant polymer composition in an amount from *40 to 75% by weight*, based upon the total weight of the flame-retardant polymer composition.

Claim 25 recites a combustion residue of the composition of claim 1.

REJECTIONS

The Examiner maintains, and Appellant's request our review of, the following grounds of rejection under 35 U.S.C. § 103(a):

1. Claims 1, 8, 9, 11, 12, and 25–27 as unpatentable over Kraeuter³ in view of Seki,⁴ and
2. Claims 2–7 as unpatentable over Kraeuter in view of Seki, and further in view of Herbiet.⁵

³ DE 102009034700 A1, published April 15, 2010. The Examiner relies, without objection, on the European Patent Office machine translation (“Kraeuter”) of this patent application. We, likewise, rely on this machine translation in deciding the issues on appeal.

⁴ WO 2010/073595 A1, published July 1, 2010. The Examiner relies, without objection, on the English-language equivalent, US 2011/0257313 A1, published October 20, 2011 (“Seki”). We, likewise, rely on this English-language equivalent in deciding the issues on appeal.

⁵ US 2010/0160541 A1, published June 24, 2010 (“Herbiet”).

ANALYSIS

Claims 1, 8, 9, 11, and 12

The Examiner finds that Kraeuter teaches a polymer flame retardant composition comprising polymer and greater than 5 mass% calcium hydroxide having a BET surface area greater than 5 m²/g (Ans. 3). The Examiner acknowledges that Kraeuter fails to teach either the specific recited range of greater than 25 m²/g to less than 60 m²/g or the specific recited amount of calcium hydroxide of 40–75 wt.% (*id.*). However, the Examiner finds that Seki teaches metal hydroxide fillers for flame retardant polymers should have a BET surface area of 1–50 m²/g (*id.*). Therefore, the Examiner concludes that it would have been obvious to utilize a calcium hydroxide filler having a BET surface area up to 50 m²/g in Kraeuter's polymer composition because Seki teaches such values are suitable for providing excellent flame retardancy and heat resistance (*id.*). With regard to the amount of calcium hydroxide in the composition, the Examiner notes that, where the claimed range overlaps or lies inside the prior art range, as here, a prima facie case of obviousness exists (*id.*, citing MPEP 2144.05). In addition, the Examiner notes that because it has been held that it is not inventive to discover the optimum or workable ranges by routine experimentation, differences in concentration will not support patentability absent evidence that such differences are critical (*id.*, citing *In re Aller*, 220 F.2d 454, 456 (CCPA 1955)).

Appellant argues that the combination of Kraeuter and Seki teaches away from the invention as claimed (Br. 10). In particular, Appellant asserts that Seki discloses a flame retardant polymer composition having 3–15 wt.% of a phosphinate flame retardant, and only 0.05–2 wt.% of a metal

compound such as calcium hydroxide for suppressing corrosive wear of steel members (*id.* at 11). In addition, Appellant asserts that Seki expressly teaches that when the amount of this metal compound is greater than 2 wt.%, it results in low flame retardancy, heat resistance, and molding thermal stability (*id.* at 12). Moreover, Appellant urges that Seki's only example using calcium hydroxide in a polymer composition is Example 33 which uses calcium hydroxide with a BET surface area of 20 m²/g in an amount of only 0.40 wt.% (*id.*). Appellant contends that this calcium hydroxide falls within the standard range of BET surface areas of 15–20 m²/g as set forth in the Declaration under 37 C.F.R. § 1.132 of Marion Lorguilloux ("Decl.") filed June 6, 2016 (*id.* at 10, 12).

In response, the Examiner determines that the showing of unexpected results in the Lorguilloux Declaration fails to establish criticality for the BET surface area range recited in the claims because the data do not include data points just above and below the recited range with a sufficient number of samples within the range (Ans. 7). In addition, the Examiner determines that the data also fails to establish that standard slaked lime would necessarily have a BET surface area outside the recited range because the particle sizes of the calcium hydroxide in the Lorguilloux Declaration are an average of 2.9 microns, whereas those of Kraeuter are 50–100 nm (*id.*). As to Appellant's argument that Seki teaches away from the recited amounts of calcium hydroxide in the claims, the Examiner notes that the test for obviousness does not require bodily incorporation of the features of a secondary reference into the structure of a primary reference, but what the combined teachings of the references would have suggested to those of ordinary skill in the art (*id.* at 8, citing *In re Keller*, 642 F.2d 413 (CCPA

1981). As to Seki's Example 33, the Examiner notes that Seki teaches the metal hydroxide fillers should have a BET surface area of 1–50 m²/g, and Kraeuter also discloses calcium hydroxide having a BET surface area greater than 5 m²/g (*id.* at 9). As such, the Examiner finds that both Kraeuter and Seki suggest BET surface areas that overlap and, therefore, render obvious the claimed range (*id.*).

When the prior art teaches away from a combination, that combination is more likely to be nonobvious. *KSR Int'l. Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007). “A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.” *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994). Further, references in a combination may be said to teach away where their combined teachings would produce a “seemingly inoperative device”. *See In re Spinnoble*, 405 F.2d 578, 587 (CCPA 1969).

Teaching an alternative or equivalent method, however, does not teach away from the use of a claimed method. *See In re Dunn*, 349 F.2d 433, 438 (CCPA 1965). “A reference does not teach away, however, if it merely expresses a general preference for an alternative invention but does not ‘criticize, discredit, or otherwise discourage’ investigation into the invention claimed.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed. Cir. 2009) (citing *In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004)). Rather, teaching away requires “clear discouragement” from implementing a technical feature. *In re Ethicon, Inc.*, 844 F.3d 1344, 1351 (Fed. Cir. 2017). “A reference teaches away when it

suggests that the line of development flowing from the reference's disclosure is unlikely to be productive of the result sought by the applicant.” *Santarus, Inc. v. Par Pharm., Inc.*, 694 F.3d 1344, 1354 (Fed. Cir. 2012) (quoting *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006) (quotations omitted)).

Here, Seki clearly teaches that a flame retardant polymer composition having an amount of metal hydroxide such as calcium hydroxide in excess of 2 wt.% “tends to result in low flame retardancy, heat resistance and molding thermal stability” (Seki ¶ 102). Since the object of Appellant's invention as well as Seki's is a polymer composition with flame retardant properties, Seki's teaching that amounts of metal hydroxide such as calcium hydroxide greater than 2 wt.% result in low flame retardancy clearly discourages use of amounts greater than 2 wt.%. As such, Seki teaches away from the amounts recited in the claims which are at least 20 times more than Seki's upper limit and at least 8 times more than Kraeuter's most preferred lower limit.

Thus, although Kraeuter's amount of mineral filler containing calcium hydroxide—greater than 5 mass%—in the polymer composition appears to encompass the amount of mineral filler containing calcium hydroxide recited in the claims, Seki teaches away from optimizing the amount in Kraeuter significantly above Kraeuter's disclosed most preferred lower limit of 5 mass%. Therefore, the ordinary artisan would have no reasonable expectation of success in using amounts of mineral filler containing calcium hydroxide from 40 to 75 wt.% in a flame retardant polymer composition.⁶

⁶ We need not address the issue as to whether Appellant has demonstrated that the claimed amounts, when combined with calcium hydroxide having a

Accordingly, we do not sustain the Examiner's obviousness rejection of claim 1, nor of dependent claims 8, 9, 11, and 12.

Claims 25–27

Claims 25–27 recite a combustion residue of the composition of claim 1. We note, in rejecting claims 25–27, the Examiner relies on the same findings and conclusions as set forth above with regard to claim 1. Therefore, the rejection of these claims suffer from the same deficiency as identified above for the rejection of claim 1. Accordingly, we likewise do not sustain the Examiner's obviousness rejection of claims 25–27.

Claims 2–7

The Examiner rejects claims 2–7 adding Herbiet to the combination of Kraeuter and Seki applied to claim 1 above. However, the Examiner does not rely on Herbiet to remedy the deficiency in the combination of Kraeuter and Seki. Accordingly, we do not sustain the Examiner's obviousness rejection of claims 2–7 over Kraeuter in view of Seki and Herbiet.

DECISION

Upon consideration of the record, and for the reasons given above and in the Appeal Brief, the decision of the Examiner rejecting claims 1–9, 11, 12, and 25–27 is *reversed*.

REVERSED

BET surface area greater than 25 m²/g and less than 60 m²/g, produce unexpected results.