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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JOON KOO KANG, YEONG RAE CHANG,
HEON KIM, and HAN NA LEE

Appeal 2019-003965
Application 14/776,979
Technology Center 1700

Before JEFFREY B. ROBERTSON, MONTÉ T. SQUIRE, and
AVELYN M. ROSS, *Administrative Patent Judges*.

SQUIRE, *Administrative Patent Judge*.

DECISION ON APPEAL¹

Appellant² appeals under 35 U.S.C. § 134(a) from the Examiner’s final decision rejecting claims 1–7, 9, 10, and 12–15, which are all of the claims pending in this application.³ We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

¹ In this Decision, we refer to the Specification filed Sept. 15, 2015 (“Spec.”); Final Office Action dated June 8, 2018 (“Final Act.”); Appeal Brief filed Jan. 2, 2019 (“Appeal Br.”); Examiner’s Answer dated Feb. 21, 2019 (“Ans.”); and Reply Brief filed Apr. 22, 2019 (“Reply Br.”).

² We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42(a). Appellant identifies LG CHEM LTD. as the real party in interest. Appeal Br. 2.

³ Claims 8 and 11 are cancelled. Appeal Br. 22 (Claims Appendix).

CLAIMED SUBJECT MATTER

Appellant's claimed subject matter relates to a method for preparing a plastic film comprising applying a coating composition and curing the coating composition with light and heat to form a coating layer. Spec. 1–2. According to Appellant's Specification, the plastic film prepared by the claimed method exhibits high hardness, impact resistance, scratch resistance and transparency and is said to be superior in terms of processability. Spec. 2; Abstract.

Claim 1 illustrates the claimed subject matter on appeal and is reproduced below from the Claims Appendix to the Appeal Brief:

1. A method for preparing a plastic film comprising a support substrate and a coating layer, said method comprising:

applying a coating composition comprising a tri- to hexafunctional acrylate-based monomer, a thermosetting prepolymer composition, an inorganic fine particle, and a photoinitiator to at least one side of the support substrate, ***wherein the tri- to hexafunctional acrylate-based monomer and the thermosetting prepolymer composition are used at a weight ratio of 1:0.01 to 1:1.2***, as measured on the basis of solid components thereof, and wherein the inorganic fine particle has a particle size of 100 nm or less; and

curing the coating composition applied to the support substrate with light and heat to form the coating layer,

wherein the plastic film has a pencil hardness of 6H or more at a load of 1 kg.

Appeal Br. 20 (key disputed claim language italicized and bolded).

REFERENCES

The Examiner relies on the following prior art references as evidence in rejecting the claims on appeal:

| Name | Reference | Date |
|------------------------------|--------------------|---------------|
| Bernheim et al. (“Bernheim”) | US 6,547,390 B1 | Apr. 15, 2003 |
| Cheng et al. (“Cheng”) | US 2010/0055468 A1 | Mar. 4, 2010 |
| Hong | KR20070096329 (A) | Oct. 2, 2007 |

REJECTION

On appeal, the Examiner maintains (Ans. 3) the following rejection: Claims 1–7, 9, 10, and 12–15 are rejected under pre-AIA 35 U.S.C. § 103(a) as being unpatentable over Hong⁴ in view of Cheng and Bernheim. Final Act. 3.

OPINION

Having considered the respective positions advanced by the Examiner and Appellant in light of this appeal record, we affirm the Examiner’s rejection based on the fact-finding and reasoning set forth in the Answer and Final Office Action, which we adopt as our own. We add the following primarily for emphasis.

In response to the Examiner’s rejection, Appellant presents argument for the patentability of claim 1 but does not present separate argument for the patentability of the remaining claims 2–7, 9, 10, and 12–15. Appeal

⁴ The Examiner refers and cites to the English machine language translation of the Hong reference provided in the record. Final Act. 3.

Br. 4. We select claim 1 as representative and the remaining claims 2–7, 9, 10, and 12–15 stand or fall with claim 1. 37 C.F.R. § 41.37(c)(1)(iv).

The Examiner determines the combination of Hong, Cheng, and Bernheim suggests a method for preparing a plastic film satisfying the limitations of claim 1 and concludes the combination would have rendered the claim obvious. Final Act. 3–6.

On the record before us, we find a preponderance of the evidence and sound technical reasoning support the Examiner’s findings and determination that the combination of Hong, Cheng, and Bernheim suggests a method satisfying the limitations of claim 1 and conclusion that the combination would have rendered the claim obvious. Hong, Abstract, 1:5–7, 1:19–20, 2:4–6, 2:15–19, 4:5–16, 6:7–9, 6:14–19, 6:17–19; Cheng, Abstract, 21, 31, 34; Bernheim, Abstract, 1:6–9, 2:15–36, 7:15–29.

Appellant argues the Examiner’s rejection should be reversed because the cited art fails to teach or suggest the claimed weight ratio of an acrylate-based monomer to a thermosetting prepolymer composition of “1:0.01 to 1:1.2.” Appeal Br. 4. *See also* Reply Br. 2 (same). Appellant contends that, in contrast to the claimed invention, Hong discloses a weight ratio of 1:1.5 to 1:9 of an acrylate-based monomer to a thermosetting prepolymer composition, which neither encompasses nor overlaps the claimed range. Appeal Br. 5–6. Appellant further contends that the differences between the claimed weight ratio and the weight ratio in Hong are meaningful and the claimed range produces meaningful and critical differences compared to a weight ratio outside of the claimed range. *Id.* at 8

(citing Tables 1 and 2 of the Specification and pages 7–9 of the Chang Declaration⁵).

Appellant also contends none of the other cited references (i.e., neither Cheng nor Bernheim) teaches the claimed weight ratio or remedies the deficiencies in Hong’s disclosure, and that none of the cited references provides any motivation or suggestion to modify the weight ratio disclosed in Hong to arrive at the claimed weight ratio. *Id.* at 6; *see also* Reply Br. 2 (arguing “the cited art fails to provide any motivation to use the claimed weight ratio”). Rather, relying principally on paragraph 15 of Hong, Appellant contends “Hong cautions against modifying the weight ratio either above or below the weight ratio of an acrylate-based monomer to a thermosetting prepolymer composition disclosed therein.” *Id.* at 7.

We do not find Appellant’s arguments persuasive of reversible error in the Examiner’s rejection based on the fact-finding and reasoning provided by the Examiner at pages 3–4 of the Answer and pages 3–5 of the Final Office Action, which is supported by a preponderance of the evidence. As the Examiner finds (Ans. 3; Final Act. 3–4), and Appellant does not dispute (Appeal Br. 5–6), Hong teaches a tri- to hexafunctional acrylate-based monomer and thermosetting prepolymer composition used at a weight ratio of 1:1.5 to 1:9. Hong, 1:19–20, 2:4–6, 2:15–19.

As the Examiner further finds (Ans. 3–4), Hong teaches that the color of the formed coating is affected by the amount of the acrylate-based monomer in the composition (Hong 2:5–6 (disclosing that when “the content of the multifunctional acrylate compound [is] excessively weak, the coloring

⁵ The “Chang Declaration” refers to the Declaration of Yeongrae Chang Under 37 C.F.R. § 1.132 dated January 11, 2018 provided in the record.

degree of discoloration is slow”) and that the surface hardness of the coating composition is affected by the amount of the thermosetting prepolymer (*id.* at 2:4–5 (disclosing that when “the polyester content is excessive in the urethane prepolymer the surface hardness of the coating film is weak”)). That is, the amount of acrylate-based monomer and the amount of thermosetting prepolymer used in the composition are result-effective variables. *See In re Applied Materials, Inc.*, 692 F.3d 1289, 1297 (Fed. Cir. 2012) (“A recognition in the prior art that a property is affected by the variable is sufficient to find the variable result-effective.”).

Thus, as the Examiner determines (Ans. 3–4; Final Act. 4), it would have been obvious to one of ordinary skill in the art to have arrived at the claimed weight ratio of an acrylate-based monomer to a thermosetting prepolymer composition of “1:0.01 to 1:1.2” by varying the amount of multifunctional acrylate to adjust the color of the formed coating and by varying the amount of thermosetting prepolymer to adjust the coating’s surface hardness, as a matter of routine experimentation. *In re Aller*, 220 F.2d 454, 456 (CCPA 1955) (“[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.”).

Appellant’s arguments do not reveal reversible error in the Examiner’s findings and analysis in this regard. Appellant’s contention that “Hong cautions against modifying the weight ratio either above or below the weight ratio of an acrylate-based monomer to a thermosetting prepolymer composition disclosed therein” (Appeal Br. 7) is not persuasive because we do not find that paragraph 15 of Hong teaches away from the claimed weight ratio. The fact that paragraph 15 of Hong mentions “if a content of the

multifunctional acrylate compound is too high, a degree of coloring is weak and a decoloring speed is slow, . . . the range set forth above is suitable,” without more, does not negate or teach away from the claimed weight ratio or discourage one of ordinary skill from modifying Hong to arrive at the claimed ratio. *In re Susi*, 440 F.2d 442, 445–46 (CCPA 1971) (disclosure of particularly preferred embodiments does not teach away from broader disclosure or non-preferred embodiments); *see also In re Applied Materials, Inc.*, 692 F.3d 1289, 1298 (Fed. Cir. 2012) (“A reference must be considered for everything that it teaches, not simply the described invention or a preferred embodiment.”).

Appellant further argues the Examiner’s rejection should be reversed because a person of ordinary skill in the art would not have had a reasonable expectation of success in arriving at a plastic film having “a pencil hardness of 6H or more at a load of 1kg,” as recited in the claim. Appeal Br. 14–15; *see also* Reply Br. 7–9 (same). In particular, Appellant contends a person of ordinary skill in the art would not have had a reasonable expectation of success incorporating the teachings of Bernheim into the teachings of Hong and Cheng because, although Bernheim discloses an example (Example 3) of a plastic film having a pencil hardness of 8H under a load, the reference does not provide any teaching or guidance regarding how to arrive at such a pencil hardness. Appeal Br. 15.

Appellant also contends the composition of Example 3 of Bernheim is “completely different than the composition of the claims” and, for example, does not include a “tri- to hexafunctional acrylate-based monomer,” as recited in claim 1. *Id.* at 14–15.

We do not find Appellant's arguments in this regard persuasive based on the Examiner's fact-finding and reasoning provided at pages 3–4 of the Answer and pages 5–6 of the Final Office Action, which we find is supported by a preponderance of the evidence. In particular, as the Examiner determines (Final Act. 5–6), because Hong teaches that the wear resistance and surface hardness of the coating are result-effective variables, which affect the formed coating's scratch resistance (Hong 2:4–6, 6:7–8, 6:17–18), it follows that one of ordinary skill would have arrived at a pencil hardness of 6H or more by adjusting the wear resistance/surface hardness properties to optimize the coating's scratch resistance as a matter of routine experimentation, and would have had a reasonable expectation of success in doing so. *Aller*, 220 F.2d at 456.

Appellant's contentions at pages 14–15 of the Appeal Brief that Bernheim is “completely different than the composition of the claims” and “does not include a tri- to hexafunctional acrylate-based monomer” are not persuasive because they are conclusory and do not address the Examiner's findings regarding Hong's disclosure and the coating's hardness being a result-effective variable, and reasoning that one of ordinary skill would have arrived at the claimed pencil hardness as a matter of routine optimization/experimentation.

Moreover, as the Examiner finds (Final Act. 6), based on Hong's disclosure regarding its photochromic coating being used for optical products, including optical lenses and goggles (Hong 4:14–15, 6:17–19) and Bernheim's disclosure regarding a photochromic coating having certain properties, for example, a pencil hardness of 8H being suitable for use as an optical lens (Bernheim 6:66–7:1, 7:23–26), it follows that one of ordinary

skill would have had reason to arrive at a coating having a pencil hardness of at least 8H, which would fall within the claimed range. *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 420 (2007) (explaining that any need or problem known in the art can provide a reason for combining the elements in the manner claimed); *see also In re Preda*, 401 F.2d 825, 826 (CCPA 1968) (“[I]n considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom.”).

Appellant’s disagreement as to the Examiner’s factual findings, including what the prior art’s disclosures would have suggested to one of ordinary skill, without more, is insufficient to establish reversible error. *SmithKline Beecham Corp. v. Apotex Corp.*, 439 F.3d 1312, 1320 (Fed. Cir. 2006) (“[M]ere statements of disagreement . . . as to the existence of factual disputes do not amount to a developed argument.”).

Lastly, Appellant argues that the claimed invention yields unexpected results. Appeal Br. 15–18; *see also* Reply Br. 9–12 (same). In particular, relying principally on Examples 1–5 and Table 2 of the Specification and Pages 7–9 of the Chang Declaration, Appellant contends

the claimed weight ratio produced unexpectedly, improved properties relative to weight ratios outside of the claimed range, including the weight ratios taught by Hong. . . . Specifically, the claimed weight ratio produces improved pencil hardness, scratch resistance, bending properties, and impact resistance.

Appeal Br. 15.

This argument is not persuasive. In attempting to overcome a prima facie case of obviousness by showing unexpected results, the burden rests

with Appellant to establish (1) that the alleged unexpected results presented as associated with the claimed invention are, in fact, unexpected, (2) that the comparisons are to the disclosure of the closest prior art, and (3) that the supplied evidentiary showing is commensurate in scope with the claimed subject matter. *See In re Klosak*, 455 F.2d 1077, 1080 (CCPA 1972).

Based on the fact-finding and for the well-stated reasons provided by the Examiner at pages 4–7 of the Answer, we concur with the Examiner that Appellant has not provided sufficient evidence to satisfy the requisite burden.

Appellant has failed to establish that the relied upon results are, in fact, unexpected. Appellant does not direct us to persuasive evidence or explain adequately why, for example, the alleged improved hardness and scratch resistance Appellant contends is shown in the experimental results (Appeal Br. 15) are considered unexpected results, as opposed to results that would have been reasonably expected by one of ordinary skill. *Klosak*, 455 F.2d at 1080 (“[T]he burden of showing unexpected results rests on [the party] who asserts them.”). In particular, based on Hong’s disclosure regarding prior art UV-cured, film compositions exhibiting improved scratch resistance and hardness properties for use in various applications such as optical lenses (Hong 1:4–6 (disclosing the prior art products being “excellent in wear resistance”), 6:7–9 (measuring “scratch resistance”), 6:15–18 (disclosing that the “wear resistance was also greatly improved”), we are not persuaded it would have been unexpected to one of ordinary skill in the art that the claimed UV-cured compositions would have exhibited improved scratch, wear, and hardness properties relative to other compositions.

We are also not persuaded Appellant's alleged showing of unexpected results is commensurate in scope with the claims. As the Examiner finds (Ans. 4–6), Appellant's claims are broader in scope than the examples tested and Appellant does not explain adequately why the examples tested are representative of the overall scope of the claims. For example, as the Examiner finds (Ans. 4–5), the examples in Table 1 of the Specification are not commensurate in scope with the claims because the acrylate monomer content used in these examples is limited to 5.4 grams of a specific acrylate monomer and the amount of thermosetting prepolymer is varied from only 0.5 to 6.3 grams of solids content. The claims, however, are not limited to the specific acrylate-based monomer tested by Appellant being present at 5.4 grams or to the amount of specific thermosetting prepolymer tested being present only within a range of 0.5 to 6.3 grams.

As the Examiner further finds (Ans. 5–7), the examples of Table 1 of the Specification (Spec. 24–25) and the Chang Declaration relied upon by Appellant only use one specific type of thermosetting prepolymer (Chang Decl. ¶¶ 7–8, 20 (Table 1)) and only two specific types of tri- to hexafunctional acrylate-based monomers (DPHA or TMPTA). The scope of the claimed method, however, is not limited to the use of only the three components used by Appellant in the examples. Thus, we are not persuaded Appellant has provided data sufficient to show that the alleged unexpected results occur over the entire breadth of the claimed composition and weight ratio range. *See In re Kao*, 639 F.3d 1057, 1068 (Fed. Cir. 2011) (“Evidence of secondary considerations must be reasonably commensurate with the scope of the claims.”).

Accordingly, we affirm the Examiner's rejection of claims 1-7, 9, 10, and 12-15 under pre-AIA 35 U.S.C. § 103(a) as obvious over the combination of Hong, Cheng, and Bernheim.

CONCLUSION

In summary:

| Claim(s) Rejected | 35 U.S.C. § | Reference(s)/Basis | Affirmed | Reversed |
|------------------------------|--------------------|---------------------------|----------------------|-----------------|
| 1-7, 9, 10, 12-15 | 103(a) | Hong, Cheng, Bernheim | 1-7, 9, 10, 12-15 | |

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a) (1)(iv).

AFFIRMED