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Paper 38
Entered: October 6, 2015

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HENKEL CORPORATION,
Petitioner,
v.

H.B. FULLER CO.,
Patent Owner.

Case IPR2014-00606
Patent 6,833,404 B2

Before DONNA M. PRAISS, CHRISTOPHER L. CRUMBLEY, and BRIAN P. MURPHY, *Administrative Patent Judges.*

MURPHY, *Administrative Patent Judge*.

FINAL WRITTEN DECISION

35 U.S.C. § 318(a); 37 C.F.R. § 42.73

I. INTRODUCTION

On April 23, 2014, Henkel Corporation ("Petitioner") filed an Amended Petition requesting *inter partes* review of claims 22–28, 31, and 32 of U.S. Patent No. 6,833,404 B2 ("the '404 patent"). Paper 4 ("Pet."). H.B. Fuller Company ("Patent Owner") did not file a Preliminary Response to the Amended Petition. On October 10, 2014, we instituted *inter partes* review of (i) claims 22, 23, 25, 28, 31, and 32 as anticipated by the Eastotac Brochure[1] pursuant to 35 U.S.C. § 102(b); (ii) claims 22–25 and 28 as anticipated by the Exxon Reference[2] pursuant to 35 U.S.C. § 102(b); and (iii) claim 27 as obvious over one of the Eastotac Brochure or Exxon Reference and Litz[3] pursuant to 35 U.S.C. § 103. Paper 11 ("Dec."). We did not institute an *inter partes* review of claim 26 of the '404 patent. *Id.*

Patent Owner filed a Patent Owner Response (Paper 23, "PO Resp."), and Petitioner filed a Reply (Paper 24, "Pet. Reply"). Patent Owner filed a Motion to Exclude Exhibits 1040 and 1041 (Paper 28, "Mot."), Petitioner filed an Opposition to the motion (Paper 32, "Mot. Opp."), and Patent Owner filed a Reply (Paper 33, "Mot. Reply").

Petitioner relies on the Declaration of Shaw Ling Hsu, Ph.D. (Ex. 1015) in support of its Petition. Patent Owner does not rely on declaration testimony in support of its Response, but Patent Owner relies on the deposition testimony of Dr. Hsu. Ex. 1039.

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[1] Eastman Chemical Co. - Eastotac Hydrocarbon Resins Brochure, August 1992. Ex. 1002 ("Eastotac Brochure").
[2] Exxon Chemical Co. - Polymer Product Sheet, October 1990. Ex. 1003 ("Exxon Reference").
[3] R. J. Litz, *Developments in Ethylene-Based Hot Melt Adhesives*, 17 ADHESIVES AGE 35 (1974). Ex. 1005 ("Litz").

We heard oral argument on June 10, 2015. A transcript of the oral hearing is entered as Paper 37 ("Tr.").

We have jurisdiction under 35 U.S.C. § 6(c). This Final Written Decision is entered pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73.

We determine Petitioner has shown by a preponderance of the evidence that (i) claims 22, 23, 25, 28, 31, and 32 of the '404 patent are anticipated by the Eastotac Brochure pursuant to 35 U.S.C. § 102(b); (ii) claims 22–25 and 28 are anticipated by the Exxon Reference pursuant to 35 U.S.C. § 102(b); and (iii) claim 27 is obvious over the Eastotac Brochure or Exxon Reference and Litz pursuant to 35 U.S.C. § 103.

A. Related Proceedings

The parties identify the district court action captioned *H.B. Fuller Co. v. Henkel Corp.*, No. 13-cv-2980, pending in U.S. District Court for the District of Minnesota, as related to the '404 patent. Pet. 1; Paper 7, 1. Petitioner represents that it was served with the Complaint in that action on February 24, 2014. Pet. 1

B. The '404 Patent

The '404 patent is titled "Hot Melts Utilizing a High Glass Transition Temperature Substantially Aliphatic Tackifying Resin." Ex. 1001. The '404 patent issued December 21, 2004 from an application filed April 27, 1999, which claimed priority from a provisional application filed June 30, 1998. *Id.* The '404 patent relates to an improved hot melt adhesive composition utilizing a hydrogenated substantially aliphatic tackifying resin having a high glass transition temperature. *Id.* at 1:12–15. The glass transition temperature ("Tg") is the temperature at which a polymer

undergoes a transformation from a rubber to a glass. Ex. 1015 ("Hsu Declaration") ¶ 18 (citing Ex. 1010, 6 ("If the temperature [of a polymer melt] is reduced low enough it becomes rubbery and then as the temperature is reduced further it becomes a relatively hard and elastic polymer glass.")).[4]

Hot melt adhesives generally comprise a thermoplastic polymer component, a tackifying resin component, and either a wax or plasticizing component. Ex. 1001, 1:20–23. The claimed composition is useful for non-pressure sensitive adhesive applications such as bookbinding and packaging, and for structural applications, such as construction and automotive repairs. *Id.* at 3:47–51. The '404 patent states that by using tackifying resins with a high glass transition temperature greater than about 65º C. (149º F), the total amount of resin may be decreased and the resulting adhesive composition will have better hot and cold temperature resistance than "conventional products." *Id.* at 3:62–4:3. For example, if the polymer base is an ethylene copolymer, the total resin content is preferably equal to or less than the total polymer content by weight to provide an adhesive composition having better cold temperature resistance. *Id.* at 4:24–28.

Claims 22 and 31 of the '404 patent are illustrative and reproduced below.

> 22. A hot melt adhesive composition comprising:
>
> a) about 10% by weight to about 50% by weight of at least one hydrocarbon tackifying resin derived, at least in part, from dicyclopentadiene and having a glass transition temperature of greater than about 65º C.;

[4] Declaration of Shaw Ling Hsu, Ph.D. submitted in support of the Petition. Dr. Hsu is a Professor in the Department of Polymer Science and Engineering at the University of Massachusetts, Amherst, Massachusetts. Ex. 1016, 1.

b) about 10% by weight to about 80% by weight of at least one thermoplastic base polymer selected from the group consisting of copolymers and terpolymers of ethylene; amorphous polyalphaolefins, homogenous ethylene/α-olefin interpolymer, and mixtures thereof.

31. The adhesive composition of claim 22 wherein said tackifying resin concentration is 1ess than said thermoplastic base polymer concentration.

II. ANALYSIS

A. Claim Construction

In an *inter partes* review, we construe claim terms of an unexpired patent according to their broadest reasonable interpretation in light of the patent specification. 37 C.F.R. § 42.100(b); *In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268, 1278 (Fed. Cir. 2015). Under the broadest reasonable interpretation standard, we assign claim terms their ordinary and customary meaning, as understood by one of ordinary skill in the art, in the context of the entire patent disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). Any special definition for a claim term must be set forth in the specification with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).

1. "glass transition temperature"

Petitioner proposes constructions for several claim limitations,[5] but we determine there is no need to provide an express construction of these limitations beyond their ordinary and customary meaning, with one exception. The '404 patent defines "glass transition temperature" or "Tg" as

[5] For example, "hydrocarbon tackifying resin," "derived, at least in part, from dicyclopentadiene," "aliphatic tackifying resin," and "hydrogenated." Pet. 10–12.

the "onset temperature [of the transition] as determined using Dynamic Mechanical Analysis." Pet. 11 (citing Ex. 1001, 4:12–14). Patent Owner does not contest the construction of "glass transition temperature." PO Resp. 11–15. We adopt the express construction of "glass transition temperature," set forth with reasonable clarity and precision in the '404 patent, and otherwise proceed on the basis that claim terms are given their ordinary and customary meaning as understood by one of ordinary skill in the art in the context of the '404 patent.

2. "hot melt adhesive" preamble

Patent Owner argues that the preamble phrase "[a] hot melt adhesive" is a limitation of independent claims 22 and 28 that "is 'necessary to give life, meaning, and vitality' to the claim[s]." PO Resp. 11–12 (citing *Varco, L.P. v. Pason Sys. USA Corp.*, 436 F.3d 1369, 1373 (Fed. Cir. 2006); *Pitney Bowes, Inc. v. Hewlett–Packard Co.*, 182 F.3d 1298, 1305 (Fed. Cir. 1999)). Patent Owner argues that the '404 patent abstract, field of invention, background, object and summary of the invention, detailed description, testing examples, and prosecution history "all relate to and disclose" a hot melt adhesive composition. *Id.* at 12–13. Patent Owner asserts, in particular, that because "every composition that includes a resin and a polymer is not a 'hot melt adhesive,'" the preamble further defines the structure for the claimed hot melt adhesive. *Id.* at 13. Patent Owner also argues that the preamble provides antecedent basis for "[t]he adhesive" or "[t]he adhesive composition" recited in the preambles of claims 23–27, 31, and 32. *Id.* at 14–15. Petitioner contests each of Patent Owner's arguments. Pet. Reply 1, 3–8.

We conclude that the preamble language "[a] hot melt adhesive" is a statement of intended use, not a structural limitation of the claims, because the body of the claims defines a structurally complete composition. *Catalina Mktg. Int'l v. Coolsavings.com, Inc*., 289 F.3d 801, 808 (Fed. Cir. 2002) (a preamble is not limiting "where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention."). The parties agree that hot melt adhesives are understood in the art as "'100[%] solid thermoplastic materials that flow when heated' and then form a 'final bond . . . when the temperature has fallen to the ambient one, i.e., that of the material being glued.'" PO Resp. 5 (citing Ex. 1015 ¶ 15); Pet. Reply 4–5 (citing Ex. 1015 ¶ 15). The body of claims 22 and 28 recites a hot melt adhesive that flows when heated and bonds when cooled.

The claims recite a "hydrocarbon tackifying resin . . . having a [Tg] of greater than about 65º C.," which means the tackifier will begin to flow at temperatures greater than 65º C. and solidify at cooler ambient temperatures to provide specific adhesion to the material being glued. Pet. Reply 5 (citing Ex. 1015 ¶¶ 15, 18); Ex. 1015 ¶ 17 (citing Ex. 1001, 1:26–28). The claims also recite a "thermoplastic base polymer" that will soften upon heating and harden upon cooling. *Id.* (citing Ex. 1015 ¶ 24). Therefore, the body of the claims recites more than just "a resin and a polymer," as argued by Patent Owner. The body of the claims recites a composition comprising a particular type of tackifying resin and a thermoplastic base polymer selected from a subgroup that, together, will flow when heated above 65º C. and provide an adhesive bond when cooled to ambient temperature. Pet. Reply 1, 5–6 (citing Ex. 1005 at 3–4); Tr. 8:1–9:4.

Patent Owner, moreover, does not argue that the *claimed* composition components will not function as a hot melt adhesive. PO Resp. 12–13. Patent Owner avoids addressing the actual language in the body of the claim and fails to explain precisely what structural limitation is missing from the body of the claim that would be needed for the claimed composition to function as a hot melt adhesive. *Id.* Rather, Patent Owner argues, without any cited evidentiary support, that "every composition that includes a resin and a polymer is not a 'hot melt adhesive.'" Pet. Reply 5–6 (quoting PO Resp. 13). We do not credit Patent Owner's unsupported attorney argument, which is not commensurate with the scope of the claims.

Patent Owner also does not explain why the '404 patent specification indicates a need to read the preamble as a structural limitation of the claims. PO Resp. 12–13. Patent Owner's citations to the prosecution history of the '404 patent do not indicate that patent applicants relied on the preamble to distinguish the claims from the prior art. PO Resp. 13 (citing Ex. 2004, 132, 242–44). Patent Owner does nothing more than cite to statements made by patent applicants during prosecution characterizing the claimed invention as "**adhesive** compositions."[6] PO Resp. 13. And, although a preamble may be limiting "in situations where it is necessary to provide antecedent basis for the *body* of the claim," *Symantec Corp. v. Computer Associates International, Inc.*, 522 F.3d 1279, 1288 (Fed. Cir. 2008) (emphasis added), Patent Owner does not address why this principle should apply here, where the independent claim preambles provide antecedent bases only for the *preambles* of the dependent claims. *See* Pet. Reply 8 n.1. In sum, "[a]bsent

[6] Patent Owner does not analyze the prior art at issue or explain why the quoted statements support the assertion that the preamble language was needed to distinguish the claims from the cited prior art.

clear reliance on the preamble in the prosecution history, or in situations where it is necessary to provide antecedent basis for the body of the claim, the preamble 'generally is not limiting.'" *Symantec*, 522 F.3d at 1288 (quoting *Catalina*, 289 F.3d at 809).

Therefore, for the reasons given above, we decline to read the preamble "[a] hot melt adhesive" as a structural limitation of the challenged claims.

B. Anticipation of Claims 22, 23, 25, 28, 31, and 32 by the Eastotac Brochure

Petitioner argues that the Eastotac Brochure (Ex. 1002) discloses every limitation of claims 22, 23, 25, 28, 31, and 32 of the '404 patent and, therefore, anticipates the claims pursuant to 35 U.S.C. § 102(b). Pet. 13–29. The Eastotac Brochure qualifies as prior art under 35 U.S.C. § 102(b) because it was published in 1992, more than one year prior to the June 30, 1998 provisional filing date of the '404 patent. *Id.* at 3–4. Patent Owner argues that the Eastotac Brochure does not disclose every element of the claimed composition, arranged as in the claim. PO Resp. 15–16, 22–30.

1. Eastotac Brochure (Ex. 1002)

The Eastotac Brochure discloses four hydrogenated, C_6 aliphatic hydrocarbon tackifying resins, three of which are "available in four color levels with varying softening points which allow the selection of the resin most suitable for a particular application." Ex. 1002, 3; Ex. 1015 ¶ 42. For example, the H-100 tackifying resin has a "Ring & Ball Softening Point" of 100º C. and is available in four color levels designated as H-100E, H-100R, H-100L, and H-100W. Ex. 1002, 4, Table 1; Ex. 1015 ¶ 42. The H-115 and H-130 tackifying resins have Ring & Ball Softening Points of 115º C. and 130º C., respectively, and are available in the same four color levels. *Id.*

The H-142R tackifying resin has a Ring & Ball Softening Point of 142º C. and is available in one color level. *Id.*

The Eastotac Brochure states that, "[t]hese resins are especially suited for low-molecular-weight polyethylene-based hot melt adhesives where elevated temperature resistance and high cohesive strength are required." *Id.* at 4. Suggested hot melt adhesive applications include bookbinding and frozen food cartons. *Id.* at 4. We note that the '404 patent describes some of the same applications and identifies the Eastotac H-142R tackifying resin as an example of a hydrocarbon tackifying resin derived from dicyclopentadiene and "having a T_g at onset of about 82º C," for use in the claimed composition. Ex. 1001, 3:47–51, 5:16–28, 6:27–29; Ex. 1015 ¶ 43.

Table 3 in the Eastotac Brochure discloses "General Composition Ranges for *Eastotac* Resins in Hot Melt Adhesives." Ex. 1002, 6 (Table 3). Table 3 lists three different examples of hot melt adhesive compositions, each of which includes an "*Eastotac* resin." *Id.* Table 3 discloses particular composition ranges for the Eastotac resin and the amorphous polyolefin ("APP Base") and ethylene-vinyl acetate copolymer ("EVA Base") used in the hot melt adhesive compositions. *Id.* at 6; Ex. 1015 ¶ 53.

2. Anticipation Analysis

To anticipate a patent claim under 35 U.S.C. § 102, "a reference must describe, either expressly or inherently, each and every claim limitation and enable one of skill in the art to practice an embodiment of the claimed invention without undue experimentation." *Am. Calcar, Inc. v. Am. Honda Motor Co.*, 651 F.3d 1318, 1341 (Fed. Cir. 2011) (citing *In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009)).

Independent claim 22 of the '404 patent recites a hot melt adhesive composition comprising two components: 1) about 10–50% by weight of "at least one hydrocarbon tackifying resin derived, at least in part, from dicyclopentadiene and having a glass transition temperature of greater than about 65º C."; and 2) about 10–80% by weight of "at least one thermoplastic base polymer selected from the group consisting of copolymers . . . of ethylene; amorphous polyalphaolefins . . . ." Ex. 1001, 21:5–13. Petitioner asserts that Table 3 of the Eastotac Brochure expressly discloses both components, within the recited ranges, in a hot melt adhesive composition. Pet. 14–17 (citing Ex. 1015 ¶¶ 24–25, 53–55), 26 (citing Ex. 1001, 3:6–8, 5:21–23, 5:25–28, 6:27–29, 6:61–7:2, 7:15–16, 7:30–32, 7:61–63; Ex. 1002, 4–6 (including Tables 1 and 3)). Petitioner argues, in particular, that the Eastotac Brochure discloses two exemplary hot melt adhesive compositions. The first composition comprises: 1) 30 to 50% by weight of H-142R, an "Eastotac resin" that is a dicyclopentadiene-derived hydrocarbon tackifying resin having a T_g greater than about 65º C.; and 2) 50 to 70% by weight of APP Base, one of the thermoplastic base polymers recited in claim 22. *Id.* at 14–15 (citing Ex. 1015 ¶¶ 25, 53–55). The second exemplary composition comprises: 1) 30–60% by weight of H-142R; and 2) 30 to 50% by weight of EVA Base, another of the recited thermoplastic base polymers. *Id.* at 16–17 (citing Ex. 1015 ¶¶ 24, 53–55). Petitioner also provides a claim chart that correlates specific disclosures from the Eastotac Brochure to each and every limitation of claims 22, 23, 25, 28, 31, and 32 of the '404 patent. Pet. 26–29.

a. Weight of Dr. Hsu's testimony

Patent Owner first urges us to give Dr. Hsu's opinion testimony little or no weight because of asserted bias and lack of qualification. PO Resp. 18–22. The evidence establishes that Dr. Hsu has a longstanding consulting relationship with Petitioner, but the evidence does not establish any bias in Dr. Hsu's testimony in this proceeding. *Id.* at 22 (citing Ex. 1039, 15:16–20, 17:19–22, 20:21–21:3, 24:6–25:3, 27:15–20).

The thrust of Patent Owner's lack of qualification argument is based on Dr. Hsu's admission that he "do[es] not have any experience working with an actual hot melt adhesive," and Dr. Hsu's opinion that a person of ordinary skill in the art pertaining to the '404 patent does not require any experience working with hot melt adhesives. *Id.* at 20–21 (citing Ex. 1039, 48:14–22); *see also* Pet. 9–10 (citing Ex. 1015 ¶ 27 ("'[a] person of ordinary skill in the art to whom the '404 patent is directed would have a graduate-level degree in polymer science, engineering, chemistry, physics, or a related field, as well as at least two years of experience in the field of polymer science and engineering.'")). Petitioner does not contest Dr. Hsu's deposition testimony, but asserts that Dr. Hsu has acted as an "advisor regarding hot melt adhesives to many in industry." Pet. Reply, 3 (citing Ex. 1039, 15:16–20, 25:21–26:19, 263:21–264:6).

Regarding Petitioner's proposition that Dr. Hsu has been an advisor "regarding hot melt adhesives to many in industry," Dr. Hsu testified as follows on re-direct examination by counsel for Petitioner:

> Q. So, Dr. Hsu, in your last 16 years of advising companies such as Henkel, have you advised on tackifiers, polymers, and waxes as a component of hot melt adhesives?
>
> **A. I have looked at the waxes in the polymers**. . . . **As components of polymer adhesive.**

Ex. 1039, 263:21–264:6. The quoted testimony, standing alone, is not sufficient to support Petitioner's proposition. The record is clear, however, that as a longtime Professor of Polymer Science and Engineering and former Department Head at the University of Massachusetts, Amherst, Dr. Hsu is an established polymer expert and has published at least one article in the area of hot melt adhesives. Pet. Reply 3 (citing Ex. 1016); Ex. 1039, 23:12–24:18. Dr. Hsu also testified that he has performed substantial research funded by Petitioner for 16 years at a cumulative funding level of approximately $1.4 million, including research in the area of adhesives and polymer components of adhesives.[7] Ex. 1039, 17:14–18:7 ("We look at the miscibility behavior of various adhesives, and we look at the reactivity associated with the adhesives. And we've been looking at solidification process in various polymers and various components of polymers.").

Under Federal Rule of Evidence 702, a witness may be qualified as an expert by "knowledge, skill, experience, training, or education" and may give opinion testimony if the expert's "specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue." Fed. R. Evid. 702. We find Dr. Hsu to be qualified as an expert in polymers and adhesives, and we further find his specialized knowledge will help us

[7] Dr. Hsu originally was funded by National Starch and Chemical Co., a company that was acquired by Petitioner. Ex. 1039, 16:8–17:13.

understand the evidence regarding the claimed hot melt adhesive composition and determine facts in dispute between the parties. We further note that, although Patent Owner urges us to disregard Dr. Hsu's testimony, Patent Owner repeatedly relies on Dr. Hsu's testimony when necessary. Pet. Reply 2–3 (citing PO Resp. 5–8, 12, 17–22, 25–26, 32–33, 35–36). Patent Owner cannot have it both ways. Having considered the parties' arguments and cited evidence, we will assign the appropriate weight to the expert opinion testimony offered by Dr. Hsu.

b. Sufficiency of the Eastotac Brochure's disclosure

Patent Owner relies, *inter alia*, on the proposition that Petitioner must prove the Eastotac Brochure discloses the claimed compound "without *any* need for picking, choosing and combining various disclosures not directly related to each other by the teachings of the cited reference." PO Resp. 23 (citing *In re Arkley*, 455 F.2d 586, 587 (CCPA 1972)). Patent Owner challenges the sufficiency of the Eastotac Brochure's disclosure, arguing that Petitioner's anticipation argument relies on improper picking, choosing, and combining from among the "thirteen" hydrocarbon tackifying resins in Table 1 and "at least ten different and diverse" applications for those resins. PO Resp. 22–29. Patent Owner argues, in particular, that the Eastotac Brochure does not disclose a specific hot melt adhesive with H-142R resin, the only resin in Table 1 having a T_g greater than about 65º C. *Id.* at 24–26. In essence, Patent Owner acknowledges the Eastotac Brochure discloses the two components of the claimed composition, but argues there is insufficient disclosure to direct one of skill in the art to use the H-142R resin of Table 1 in the APP Base or EVA Base hot melt adhesive compositions disclosed in Table 3.

We agree with Petitioner that if one of ordinary skill in polymer science and engineering were to consider the four corners of the Eastotac Brochure, the H-142R hydrocarbon tackifying resin in Table 1 is directly related to the exemplary hot melt adhesive compositions in Table 3 by the teachings of the reference. Pet. Reply 8–10. The hydrocarbon tackifying resins of Table 1 are listed on pages 4 and 5 of the Eastotac Brochure. Ex. 1002, 4–5. At the top of page 4 just above Table 1, under the heading "Applications," the Eastotac Brochure states "*[t]hese resins* are especially suited for low-molecular-weight polyethylene-based hot melt adhesives where elevated temperature resistance and high cohesive strength are required." Ex. 1002, 4 (emphasis added); Pet. Reply 8. The next page following Table 1 (page 6) discloses exemplary hot melt adhesive compositions in Table 3, each one of which includes an "*Eastotac* resin" and thermoplastic base polymer in specified composition ranges by weight that overlap with the composition ranges recited in claim 22 of the '404 patent. Although Patent Owner counts ten different applications for the Eastotac resins of Table 1, the Eastotac Brochure provides specified composition ranges for use of the Eastotac resins in only one application – hot melt adhesives. Ex. 1002.

As recently reiterated by the Federal Circuit, "a reference can anticipate a claim even if it 'd[oes] not expressly spell out' all the limitations arranged or combined as in the claim, if a person of skill in the art, reading the reference, would 'at once envisage' the claimed arrangement or combination." *Kennametal, Inc. v. Ingersoll Cutting Tool Co.*, 780 F.3d 1376, 1381 (Fed. Cir. 2015) (citing *In re Petering*, 301 F.2d 676, 681 (CCPA 1962)). Patent Owner avoids addressing the teachings contained in

the text of the Eastotac Brochure and narrowly focuses its discussion only on the express disclosures contained in Tables 1 and 3. PO Resp. 24–26 (citing Ex. 1039, 104:17–20, 106:2–11, 115:2–5). Dr. Hsu testified that, although Table 1 does not list a specific application for the Eastotac resins and Table 3 lists "*Eastotac* resin" rather than a specific Eastotac resin from Table 1, a fair reading of the Eastotac Brochure indicates "all the ones [resins] in Table 1 can be used in this [Table 3] composition," including H-142R. Pet. Reply 9–10 (citing Ex. 1015 ¶¶ 41–42; Ex. 1039, 116:12–17, 116:21–117:3, 118:15–21, 121:7–18). Dr. Hsu further testified that one of ordinary skill would have been "motivated" to use the H-142R resin, listed in Table 1, in the hot melt adhesive compositions of Table 3 when a high peel value and high heat resistance were desired, "because Eastotac® H-142 has the highest T_g of the Eastotac® resins in the Eastotac Brochure." Ex. 1015 ¶ 54. We find Dr. Hsu's unrebutted testimony to be persuasive. As in the *Kennametal* case, we find that one of ordinary skill in the art of polymer science and engineering immediately would have envisaged the use of the H-142R hydrocarbon tackifying resin in combination with either APP or EVA thermoplastic base polymer in the exemplary hot melt adhesive compositions in Table 3 of the Eastotac Brochure. *See id.* at 1382–83.

c. Remaining claims

Claim 23 depends from claim 22 and recites a tackifying resin having "a T_g of greater than about 68º C." Ex. 1001, 21:14–15. As stated in the '404 patent, the Eastotac H-142R hydrocarbon tackifying resin has "a T_g at onset of about 82º C." Ex. 1001, 6:27–29; Ex. 1015 ¶ 57.

Claim 25 depends from claim 22 and recites a tackifying resin that is "hydrogenated." Ex. 1001, 20–21. The introduction to the Eastotac

Brochure discloses that the Eastotac resins are hydrogenated and "fully saturated." Ex. 1002, 3. Table 1 discloses a Molten Gardner Color of 4 and a Bromine number of 5 for the H-142 resin (Ex. 1002, 5), both objective indicators of a hydrogenated tackifying resin (Ex. 1001, 5:45–6:3). Pet. 19 (citing Ex. 1015 ¶ 58).

Therefore, we find that the Eastotac Brochure discloses a tackifying resin having a T_g greater than about 68° C., and a hydrogenated tackifying resin, in accordance with claims 23 and 25 of the '404 patent, respectively.

Independent claim 28 recites a hot melt adhesive composition comprising "about 10% by weight to about 80% by weight of at least one aliphatic tackifying resin." Ex. 1001, 21:27–28. The '404 patent recognizes that the Eastotac H-142R resin is an aliphatic tackifying resin. Ex. 1001, 6:27–29; Ex. 1015 ¶ 62.

Dependent claims 31 and 32 both recite a hot melt adhesive composition where the "tackifying resin concentration is less than said thermoplastic base polymer concentration." Ex. 1001, 22:22–27. Table 3 of the Eastotac Brochure expressly discloses a hot melt adhesive composition where the Eastotac resin concentration of 30–50% is less than the amorphous polyolefin base polymer concentration of 50–70%. Ex. 1002, 6; Pet. 19–20 (citing Ex. 1015 ¶ 59). Therefore, we find that the Eastotac Brochure discloses a hot melt adhesive composition wherein the tackifying resin concentration is less than the thermoplastic base polymer concentration, in accordance with claims 31 and 32 of the '404 patent.

Patent Owner does not address the cited evidence for claims 23, 25, 28, 31, and 32, choosing to rely on its arguments that the Eastotac Brochure does not anticipate claim 22. PO Resp. 30.

For the reasons given above, we are persuaded by Petitioner's evidence and conclude Petitioner has satisfied its burden of proving by a preponderance of the evidence that the Eastotac Brochure anticipates claims 22, 23, 25, 28, 31, and 32 of the '404 patent under 35 U.S.C. § 102(b).

C. Anticipation of Claims 22–25 and 28 by the Exxon Reference

Petitioner argues that the Exxon Reference (Ex. 1003) discloses every limitation of claims 22–25 and 28 of the '404 patent and, therefore, anticipates the claims pursuant to 35 U.S.C. § 102(b). Pet. 29–37. The Exxon Reference qualifies as prior art under 35 U.S.C. § 102(b) because it was published in October 1990, more than one year prior to the June 30, 1998 provisional filing date of the '404 patent. *Id.* at 3–4. Patent Owner argues that the Exxon Reference does not disclose a hot melt adhesive composition. PO Resp. 16–18, 30–37.

1. Exxon Reference (Ex. 1003)

The Exxon Reference discloses specialty polymers for adhesives and sealants. Ex. 1003, 1–2. Escorez 5340 is one of nineteen Escorez tackifiers, organized in five different series, used in an adhesive composition with a base copolymer and paraffin wax. *Id.* at 2. The Exxon Reference discloses one adhesive composition comprising 40% Escorez 5340 tackifier, 20% Escorene UL 7750 (an ethylene copolymer), and 40% paraffin wax (158º F melting point). *Id.* at 2 n.1. The '404 patent describes Escorez 5340 as a preferred "substantially aliphatic hydrocarbon resin having a T*g* at onset of about 76º C." Ex. 1001, 6:14–23, 9:3–10.

2. Anticipation Analysis

Petitioner argues that the Exxon Reference discloses a hot melt adhesive composition that anticipates claim 22, comprising 40% by weight of Escorez 5340 hydrocarbon tackifying resin, 20% by weight of Escorene UL 7750 thermoplastic base polymer, and 40% by weight of a paraffin wax. Pet. 29–30 (citing Ex. 1015 ¶¶ 67–68). Petitioner argues that Ecorene UL 7750 is an ethylene vinyl acetate copolymer, a "copolymer of ethylene" as recited in claim 22. *Id.* at 31 (citing Ex. 1015 ¶ 70). Petitioner provides a claim chart that correlates specific disclosures from the Exxon Reference to each and every limitation of claims 22–25 and 28 of the '404 patent. Pet. 36–37.

a. Independent claim 22

Patent Owner argues that the Exxon Reference does not disclose a "hot melt adhesive," repeating the argument that the preamble language of claim 22 (and claim 28) is "a limitation of all of the claims." PO Resp. 31. Patent Owner argues that, because the composition disclosed in footnote 1 of the Exxon Reference was used to determine the "wax cloud point" for each Escorez tackifying resin, there is no evidence that the tackifying resins and polymer disclosed in the reference could be used as a hot melt adhesive. *Id.* at 32–34. Patent Owner further criticizes Dr. Hsu for not actually making and testing the composition disclosed in footnote 1 of the Exxon Reference to determine whether the composition exhibited the properties of a hot melt adhesive. *Id.* at 33–34 (citing Ex. 1039, 220:11–222:10).

We reject Patent Owner's claim construction-based argument for the same reasons stated in section II.A.2., above. The Exxon Reference expressly discloses an adhesive composition comprised of 40% Escorez

5340 tackifying resin and 20% Escorene UL 7750, an ethylene copolymer. Ex. 1003, 2 n.1; Pet. 29–31 (citing Ex. 1015 ¶¶ 67–71), 36. The Escorez 5340 hydrocarbon tackifying resin is present in an amount within the recited range of about 10% to 50% by weight, satisfies the dicyclopentadiene derivation requirement, and has a glass transition temperature of about 76º C. as expressly recognized in the '404 patent. Pet. 30–31 (citing Ex. 1001, 6:14–29, 9:6–9). Escorene UL 7750 is a copolymer of ethylene, and it is present in an amount within the recited range of about 10% to 80% by weight. Nothing more is required. The fact that the composition was used to measure the wax cloud point of the composition, or that Dr. Hsu did not make and test the composition, is legally irrelevant. Pet. Reply. 11. Dr. Hsu's unrebutted testimony, moreover, is that the Exxon Reference composition would function as a hot melt adhesive. *Id.* at 12–13 (citing Ex. 1015 ¶¶ 68–71).

We similarly reject Patent Owner's argument that the 40% paraffin wax content of the Exxon Reference composition is inconsistent with the teachings of the '404 patent. PO Resp. 34–37. Patent Owner effectively reads a preferred wax content limitation into the challenged claims to sustain its argument that an ethylene copolymer composition "should not have more than about 30% by weight of wax." *Id.* at 36 (citing Ex. 1001, 9:57–59). Independent claim 22 (and claim 28) does not recite any limitation on wax content, much less a limitation requiring about 30% by weight or less of wax in an ethylene copolymer composition. In contrast, other non-challenged claims in the '404 patent affirmatively recite ethylene copolymer compositions that include up to "about 40% by weight" of a wax. Ex. 1001, claims 2 (incorporating limitation 1(c)), 14 (incorporating limitation 1(c)),

20, 21 (incorporating limitation 20(c)); Pet. Reply 13. Patent Owner's argument is not commensurate with the scope of the claim language in the '404 patent.

b. Remaining claims

Regarding claim 23, the '404 patent recognizes that Escorez 5340 has a T_g of about 76º C., which is greater than "about 68º C." Ex. 1001, 6:21–22, 9:6–9. Claim 24 recites an adhesive composition where "greater than about 80 wt-% of the total resin unit is derived from dicyclopentadiene." *Id.* at 21:17–19. The Exxon Reference does not indicate whether more than 80% of the Escorez 5340 hydrocarbon resin is derived from dicyclopentadiene, but the '404 patent does so indicate. Ex. 1001, 9:3–9. Therefore, we find that the Exxon Reference discloses a composition in accordance with claims 23 and 24 of the '404 patent.

Regarding claim 25, the Exxon Reference discloses a Molten Gardner Color of << 1 (Ex. 1003, 2), which is an objective indicator of a hydrogenated tackifying resin (Ex. 1001, 5:45–6:3). Pet. 33–34 (citing Ex. 1015 ¶ 75). Therefore, we find that the Exxon Reference discloses a hydrogenated tackifying resin in accordance with claim 25 of the '404 patent. We also find that Escorez 5340 is an aliphatic tackifying resin in accordance with claim 28. *Id.* at 34–36 (citing Ex. 1015 ¶¶ 76–80).[8]

Patent Owner does not address the cited evidence for claims 23–25 and 28, choosing to rely on its arguments that the Exxon Reference does not anticipate claim 22. PO Resp. 31–37.

[8] Page 35 of the Petition cites to paragraph 72 of Dr. Hsu's Declaration, but, in context, we understand the citation to be to paragraph 78.

For the reasons given above, we are persuaded by Petitioner's evidence and conclude Petitioner has satisfied its burden of proving by a preponderance of the evidence that the Exxon Reference anticipates claims 22–25 and 28 of the '404 patent under 35 U.S.C. § 102(b).

D. Obviousness of Claim 27 over One of the Eastotac Brochure or Exxon Reference, and Litz

Claim 27 depends from claim 22 and claims a hot melt adhesive, "wherein the peel values are greater than about 70º C." Ex. 1001, 21:24–25. Petitioner, in reliance on the teachings of Litz (Ex. 1005[9]) and the Hsu Declaration, asserts that obtaining a hot melt composition where peel values are greater than about 70º C. would have been obvious and routine for one of ordinary skill in the art of polymer science and engineering at the time of the '404 patent filing. Pet. 40–43 (citing Ex. 1015 ¶¶ 83–85). Petitioner argues, therefore, that claim 27 of the '404 patent would have been obvious over either the Eastotac Brochure or the Exxon Reference in combination with Litz, pursuant to 35 U.S.C. § 103. *Id.* Patent Owner opposes, arguing that (i) Dr. Hsu did not assess obviousness from the perspective of one of ordinary skill, (ii) the Eastotac Brochure and Exxon Reference do not anticipate claim 22, (iii) the phenolic terpene resins disclosed in Litz are disclaimed in the '404 patent, and (iv) Dr. Hsu does not explain how a person of ordinary skill would arrive at claim 27 from the asserted combinations. PO Resp. 39–41.

We have rejected Patent Owner's first two arguments in our analysis above.

[9] Litz published in August 1974 and is prior art to the '404 patent under 35 U.S.C. § 102(b).

We also reject Patent Owner's disclaimer argument. Although the '404 patent indicates that phenolic terpene resins are not preferred because of safety hazards associated with the toxicity of phenol and relatively higher production costs (PO Resp. 39–40 (citing Ex. 1001, 1:61–66)), the '404 patent claims do not exclude phenolic terpene resins. Pet. Reply 14–15 (citing Ex. 1001, claim 22). Although Litz discloses an EVA (ethylene copolymer) hot melt formulation containing phenolic terpene resins (Ex. 1005, 3 Table III), Patent Owner's argument does not address the basis for which Petitioner relies upon Litz — the commercial motivation for preparing and using a high peel value adhesive in either the Eastotac Brochure or Exxon Reference compositions. *Id.*

Regarding Patent Owner's argument of insufficient evidence of a motivation to combine the references, we note the lone difference between the prior art and claim 27 is the recited peel value of greater than about 70º C. The '404 patent describes peel values as a measure of heat resistance, with higher peel value temperatures corresponding to higher heat resistance of the hot melt adhesive composition. Ex. 1001, 1:25–27, 8:25–30. Heat resistance may be increased by increasing the resin concentration or using a resin having a higher glass transition temperature. *Id.* at 3:55–58, 8:37–40, Fig. 1. Petitioner contends that, prior to the filing date of the '404 patent, it was known that use of tackifiers having a higher glass transition temperature would increase heat resistance of hot melt compositions and, accordingly, increase peel values. Pet. 41 (citing Ex. 1001, 1:25–30; Ex. 1015 ¶ 84).

Litz provides an example where hot melt adhesive technology was developed to satisfy the "difficult standards" of Rule 41 issued by the Uniform Freight Classification Committee governing packaging

requirements of articles shipped by rail. Pet. 42 (citing Ex. 1005, 2 (middle column)). Rule 41 mandated hot melt adhesives that "maintain a bond" (i.e. peel value) at temperatures between -20º F and +165º F (between 29º C. and 74º C.). *Id.* (citing Ex. 1015 ¶ 85; Ex. 1005, 2 (middle column)); Pet. Reply 14. Dr. Hsu opines that Litz provides a reason and motivation for one of ordinary skill to modify the hot melt adhesive compositions disclosed in the Eastotac Brochure and Exxon Reference to obtain peel values greater than about 70º C, as recited in claim 27 of the '404 patent. Ex. 1015 ¶ 85.

Patent Owner does not provide any evidence that contradicts Dr. Hsu's testimony. PO Resp. 40–41. We also are not persuaded by Patent Owner's argument challenging the sufficiency of Petitioner's evidence in support of a motivation to combine the asserted references. Rule 41 of the Uniform Freight Classification Committee provides good reason for one of skill in the art to make the asserted modification to the compositions disclosed in the Eastotac Brochure or Exxon Reference. The compositions contain hydrocarbon tackifying resins, and the Eastotac Brochure expressly states that the resins listed therein are "especially suited" for hot melt adhesives where "elevated temperature resistance and high cohesive strength are required." Ex. 1002, 4. The '404 patent, moreover, acknowledges the known use of higher Tg tackifying resins to increase heat resistance, and the rail freight packaging requirement for maintaining a hot melt adhesive bond up to 74º C. provides a known application and commercial rationale for using a high peel value adhesive, as recited in claim 27. We also find Dr. Hsu's opinion articulates a specific, persuasive reason, based on the evidence of record, to explain why a person of ordinary skill in the art would

have used a high T_g tackifying resin to achieve a hot melt peel value > 70 ºC., with a reasonable expectation of success.

For the reasons stated above, we determine that one of ordinary skill in the art would have been motivated by the teachings of Litz to modify the adhesive compositions disclosed in either the Eastotac Brochure or the Exxon Reference to obtain a composition having a peel value of greater than about 70º C., with a reasonable expectation of success. Therefore, we conclude Petitioner has satisfied its burden of proving by a preponderance of the evidence that either the Eastotac Brochure or the Exxon Reference in combination with Litz would have rendered claim 27 of the '404 patent obvious to a person of ordinary skill in the art under 35 U.S.C. § 103.

E. Patent Owner's Motion to Exclude Evidence

Patent Owner seeks to exclude Exhibits 1040 and 1041 filed by Petitioner with Petitioner's Reply. Mot. 1 (Paper 28). Patent Owner's objections to Exhibits 1040 and 1041 were timely served within five (5) business days of service of the exhibits. *Id.* at 4 (citing Ex. 2005).[10] Petitioner opposes the motion to exclude. Mot. Opp. (Paper 32). We rule as follows.

Exhibit 1040 is a copy of U.S. Patent No. 5,939,483 to Kueppers ("Kueppers"). Ex. 1040. Exhibit 1041 is a copy of U.S. Patent No. 5,176,779 to Perrington et al. ("Perrington"). Ex. 1041. Patent Owner seeks

[10] Patent Owner served its objections to Exhibits 1040 and 1041 on April 6, 2015. At the time of service, 37 C.F.R. § 42.64(b)(1) provided "[o]nce a trial has been instituted, any objection must be served within five business days of service of evidence to which the objection is directed." The rule subsequently was amended, effective May 19, 2015, to provide for filing of objections to evidence.

to exclude Kueppers and Perrington as untimely and unfairly prejudicial to Patent Owner under Fed. R. Evid. 403, because the exhibits are alleged to be new evidence submitted to support a new argument to which Patent Owner did not have the opportunity to respond. Mot. 1–2. We do not rely on Kueppers or Perrington as evidence in support of any part of our Decision. Therefore, Patent Owner's motion to exclude Exhibits 1040 and 1041 is *dismissed as moot*.

III. CONCLUSION

For the foregoing reasons, we are persuaded Petitioner has shown, by a preponderance of the evidence, that claims 22–25, 27, and 28 of the '404 patent are unpatentable.

IV. ORDER

For the reasons given, it is

ORDERED that claims 22–25, 27, and 28 of the '404 patent have been shown by a preponderance of the evidence to be unpatentable; and

FURTHER ORDERED that Patent Owner's Motion to Exclude Evidence is dismissed as moot.

This is a Final Written Decision. Parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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