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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/350,207	11/14/2016	Andrew Slark	PT032553/US-CNT	3961
31217	7590	09/17/2021	EXAMINER	
Henkel Corporation One Henkel Way Rocky Hill, CT 06067			TSCHEIN, FRANCISCO W	
			ART UNIT	PAPER NUMBER
			1712	
			NOTIFICATION DATE	DELIVERY MODE
			09/17/2021	ELECTRONIC

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ANDREW SLARK, DIRK KASPER,
LUAN KLUE, and SHEETAL SETHI

Appeal 2020-006200
Application 15/350,207
Technology Center 1700

Before ADRIENE LEPIANE HANLON, JAMES C. HOUSEL, and
JANE E. INGLESE, *Administrative Patent Judges*.

HOUSEL, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant¹ appeals from the Examiner's decision to reject claims 1–15. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

¹ We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies Henkel AG & Co. KGaA as the real party in interest. Appeal Brief (“Appeal Br.”) filed April 24, 2020, at 5.

CLAIMED SUBJECT MATTER

The invention recited in the claims on appeal relates to hot melt adhesive compositions comprising a mixture of at least two different thermoplastic polyurethane copolymers (A) and (B). Specification (“Spec.”) filed November 14, 2016, ¶ 1.² Each copolymer (A) and (B) comprises a reaction product of at least one polyester polyol and at least one polyisocyanate, wherein the number average molecular weight (“M_n”) of copolymer (A) is at least 25,000 g/mol and of copolymer (B) is less than 25,000 g/mol. *Id.* Appellant discloses that common hot melt polyurethane adhesives are reactive (containing isocyanate functional groups) and moisture cured, providing substrate bonding versatility and resistance to high and low temperatures and high humidity. *Id.* ¶ 2. However, Appellant further discloses that such reactive adhesives are moisture sensitive prior to use, require expensive application equipment, and undergo variable curing that may be slow. *Id.* In addition, Appellant discloses that these reactive polyurethanes contain an excess of free isocyanate monomers which are respiratory sensitizers and may cause health issues. *Id.* Appellant also discloses that, although non-reactive polyurethanes are known, the M_n is generally high (more than 40,000 g/mol) in order to achieve good mechanical properties. *Id.* ¶ 4. Appellant teaches that the inventive adhesive composition is based on a thermoplastic polyurethane with a low application viscosity, yet high level of adhesion. *Id.* ¶ 6.

² This Decision also cites to the Final Office Action (“Final Act.”) dated July 23, 2019, the Examiner’s Answer (“Ans.”) dated July 1, 2020, and the Reply Brief (“Reply Br.”) filed August 31, 2020.

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

1. A non-reactive hot melt adhesive composition comprising two thermoplastic polyurethane copolymers (A) and (B), wherein

the thermoplastic polyurethane copolymer (A) comprises a reaction product of at least one polyester polyol, and at least one polyisocyanate, and has a number average molecular weight (M_n) of at least 25,000 g/mol;

the thermoplastic polyurethane copolymer (B) comprises a reaction product of at least one polyester polyol, and at least one polyisocyanate, and has a number average molecular weight (M_n) of less than 25,000 g/mol; and

wherein the hot melt adhesive composition has a melt viscosity of 1,000 to 100,000 mPas at 160 °C and

wherein both thermoplastic polyurethane copolymers (A) and (B) are essentially free of NCO groups.

Claim 14 recites a method of applying the hot melt adhesive composition of claim 1, and claim 15 recites an article comprising the claim 1 composition.

REFERENCES

The Examiner relies on the following prior art:

Name	Reference	Date
Fabel et al. ("Fabel")	US 4,545,504	Oct. 8, 1985
Kramer et al. ("Kramer")	US 4,579,930	Apr. 1, 1986
Zschaeck	US 2003/0091736 A1	May 15, 2003
Huang et al. ("Huang")	US 2010/0317796 A1	Dec. 16, 2010
Kangas	WO 92/13017 A1	Aug. 6, 1992

REJECTIONS

The Examiner maintains, and Appellant requests our review of, the following rejections under 35 U.S.C. § 103:

1. Claims 1–13 and 15 as unpatentable over Kangas in view of Huang, Zschaeck, and Kramer; and
2. Claim 14 as unpatentable over Kangas in view of Huang, Zschaeck, and Kramer, and further in view of Fabel.

OPINION

The issue before us in this appeal is whether, as Appellant argues, the Examiner's proposed modification of Kangas' reactive polyurethane adhesive composition so that the polyurethane copolymers are thermoplastic and essentially free of NCO groups in view of Kramer renders Kangas' composition unsatisfactory for its intended purpose or changes Kangas' principle of operation. For the reasons given in the Appeal and Reply Briefs, we answer this question in the affirmative. As such, we do not sustain the Examiner's obviousness rejections based on the combined teachings of Kangas and Kramer.

The Examiner rejects claims 1–13 and 15 as unpatentable over Kangas in view of Huang, Zschaeck, and Kramer, and claim 14 adding Fabel. Final Act. 3–9. Appellant neither disputes the Examiner's findings regarding Huang, Zschaeck, and Fabel, nor the reasoning for concluding that their combination with Kangas would have been obvious to one of ordinary skill in the art. *See* Appeal Br. and Reply Br., *generally*. Therefore, we need not further discuss Huang, Zshaeck, and Fabel in this Decision. Instead, Appellant's arguments are directed to the Examiner's proposed combination of Kangas and Kramer, on which we focus our discussion below.

The Examiner finds that Kangas discloses a solvent-free hot melt adhesive composition comprising two thermoplastic polyurethane copolymers, wherein each copolymer is a reaction product of at least one polyester polyol and at least one polyisocyanate. Final Act. 3, 5. However, the Examiner finds that Kangas, in relevant part, fails to teach that the hot melt adhesive is non-reactive and that the polyurethane copolymers are essentially free of NCO groups. *Id.* at 5. Indeed, the Examiner acknowledges that Kangas teaches that the isocyanate-to-hydroxyl ratio (or isocyanate index) is preferably from about 1.2:1 to about 10:1, noting that “[a] non-reactive hot melt adhesive has less NCO to OH (i.e., no reactive NCO)”. *Id.* The Examiner further finds that Kramer teaches a solvent-free hot melt adhesive composition comprising polyurethane from polyester polyol and isocyanate, wherein the isocyanate index is from 0.9:1 to 1.05:1. *Id.* The Examiner concludes that it would have been obvious to modify Kangas’ polyurethane adhesive with an isocyanate index as taught in Kramer with a reasonable expectation of success “because Kramer discloses that such a ratio is suitable for reacting polyester polyol with polyisocyanate,” such that the resulting hot melt adhesive is essentially free of NCO groups and is non-reactive. *Id.* at 6.

Appellant raises two arguments against the Examiner’s obviousness conclusion based on the combination of Kangas and Kramer: 1) that modifying Kangas as the Examiner proposes would render Kangas unsatisfactory for its intended purpose (Appeal Br. 7–12); and 2) that modifying Kangas as the Examiner proposes would change Kangas’ principle of operation (Appeal Br. 12–16). With regard to the first argument, there is no suggestion or motivation to make a proposed modification if

doing so would render the prior art invention being modified unsatisfactory for its intended purpose. *In re Gordon*, 733 F.2d 900, 902 (Fed. Cir. 1984); *see also DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1326 (Fed. Cir. 2009) (“[T]he ‘predictable result’ discussed in [*KSR*] refers not only to the expectation that prior art elements are capable of being physically combined, but also that the combination would have worked for its intended purpose.”).

As to the second argument, combinations of prior art that change the “basic principles under which the [prior art] was designed to operate” may not support a conclusion of obviousness. *In re Ratti*, 270 F.2d 810, 813 (CCPA 1959). On the other hand, where the proposed modification allows operation “on the same principles as before,” *Ratti* is inapplicable. *In re Umbarger*, 407 F.2d 425, 430–431 (CCPA 1969); *see also In re Mouttet*, 686 F.3d 1322, 1332 (Fed. Cir. 2012) (difference in circuitry—electrical versus optical—does not affect the overall principle of operation of a programmable arithmetic processor). In determining a reference’s “principle of operation,” we may rely on the reference’s contribution to the art to understand its “principle of operation.” *Plas-Pak Industries, Inc. v. Sulzer Mixpac AG*, 600 Fed. Appx. 755, 758 (Fed. Cir. 2015).

Appellant first argues that Kangas is directed to a reactive thermoset hot melt adhesive composition, rather than a non-reactive thermoplastic composition as required by the claims. Appeal Br. 7–8. Appellant contends that reactive thermoset compositions are chemically different from non-reactive thermoplastic compositions, and, as such, their respective properties will be different both before and after application. *Id.* Appellant asserts that Kangas’ intended purpose is to provide a moisture reactive polyurethane hot

melt adhesive having an ultimate cured strength and excellent adhesion to metals. *Id.* at 8. Appellant also asserts that Kangas requires that the adhesive composition includes a plurality of different polyurethane prepolymers that are isocyanate terminated and have an isocyanate index from about 1.2:1 to about 10:1, such that these prepolymers can react with moisture to cure the composition. *Id.* at 8–9. However, Appellant contends that the Examiner’s proposed modification of Kangas would eliminate essentially all of the isocyanate moieties in the prepolymers, rendering them non-reactive and unsatisfactory for Kangas’ intended purpose. *Id.* at 11–12.

Appellant next argues that modifying Kangas as the Examiner proposes would change Kangas’ principle of operation from a moisture-reactive thermoset hot melt adhesive composition to a non-reactive thermoplastic hot melt adhesive. Appeal Br. 12. Appellant contends that such a change “must also change the properties provided by the reactive hot melt adhesive.” *Id.* Similar to Appellant’s first argument, Appellant contends that Kangas requires isocyanate terminated polyurethane prepolymers to cure via reaction with moisture to attain the desired ultimate strength and metal adhesion properties. *Id.* at 13–14. However, Appellant asserts that the Examiner concedes that eliminating the isocyanate groups from Kangas’ prepolymers renders the adhesive composition non-reactive. *Id.* at 14. Therefore, Appellant contends that the Examiner’s proposed modification would change Kangas’ principle of operation because the adhesive composition would no longer be a reactive, moisture-curable thermosetting polyurethane adhesive composition exhibiting an ultimate, cured bond strength and metal adhesion. *Id.* at 15.

We find both of Appellant's arguments persuasive of reversible error in the Examiner's obviousness rejections of claims 1–15. Appellant states that Kangas' intended purpose is to provide a moisture-reactive polyurethane hot melt adhesive having an ultimate cured strength and excellent adhesion to metal substrates. Appeal Br. 8. Appellant similarly describes Kangas' principle of operation as a moisture-reactive thermoset polyurethane hot melt adhesive having an ultimate cured strength and excellent adhesion to metal substrates. *Id.* at 12–15. On the other hand, the Examiner states that Kangas' intended purpose is to provide adhesives having good adhesion to metal and polymeric substrates.³ Ans. 3–4.

As discussed above, in determining Kangas' "principle of operation," we may rely on Kangas' contribution to the art to understand its "principle of operation." *Plas-Pak Industries, Inc.*, 600 Fed. Appx. at 758. We also find that Kangas' intended purpose is similarly tied to Kangas' contribution to the art. As such, we credit Appellant's statement of Kangas' intended purpose and principle of operation, both of which are more directed to Kangas's disclosure of the invention than the Examiner's position. For example, Kangas expressly states that the invention relates to mixtures of isocyanate-terminated polyurethanes having good adhesion to metal and polymeric substrates. Kangas 1:6–8. Kangas describes such polyurethanes as

³ The Examiner does not make any finding with respect to Kangas' principle of operation, nor does the Examiner explicitly address Appellant's second argument in this regard. However, as discussed above, we find that Kangas' intended purpose and principle of operation are intimately intertwined and are mutually resolved using the same reasoning, as evidenced by the nearly identical contentions and assertions Appellant raised in support of each argument.

reactive, achieving an initial bond strength upon cooling on a substrate, and eventually achieving an ultimate bond strength when cured with ambient moisture. *Id.* 1:13–26. In this context, Kangas describes the invention’s contribution to the art as a mixture of a plurality of isocyanate-terminated polyurethane prepolymers. *Id.* 5:6–34.

Conversely, the Examiner’s statement of Kangas’ intended purpose ignores Kangas’ contribution to the art and instead focuses merely on the highest level function of Kangas’ invention—to adhesively bond to a substrate. Were we to accept such a broad definition of a reference’s intended purpose, virtually any change to any adhesive using any other known adhesive would be permissible in formulating an obviousness rejection. We decline to do so because such a broad definition of intended purpose would be contrary to both the specific case law cited above and the underlying *Graham*⁴ factors relied on in every obviousness rejection.

Having determined Kangas’ intended purpose and principle of operation is to provide a moisture-reactive polyurethane hot melt adhesive having an ultimate cured strength and excellent adhesion to metal and polymeric substrates, we now assess whether modifying Kangas’ adhesive composition in view of Kramer renders Kangas inoperable for its intended purpose and improperly changes its principle of operation. As Appellant argues, applying Kramer’s teaching to Kangas necessarily converts Kangas’ composition from a moisture-reactive curable adhesive composition to a non-reactive thermoplastic adhesive composition. Such a conversion would render Kangas inoperable for its intended purpose because it would no

⁴ *Graham v. John Deere Co.*, 383 U.S. 1, 17, 36 (1966).

longer be moisture-reactive and curable, and would not achieve an ultimate cured strength and adhesion. Such a conversion also would change Kangas' principle of operation in that Kangas relies on moisture-reactivity to cure the adhesive and provide the ultimate cured strength and adhesion. As such, we are persuaded that modifying Kangas' adhesive composition in view of Kramer as the Examiner proposes would both render Kangas inoperable for its intended purpose and improperly changes its principle of operation. The Examiner does not rely on any of the remaining prior art to remedy the deficiency in the combination of Kangas and Kramer. Accordingly, we do not sustain the Examiner's obviousness rejections of claims 1–15.

CONCLUSION

Upon consideration of the record and for the reasons set forth above and in the Appeal and Reply Briefs, the Examiner's decision to reject claims 1–15 under 35 U.S.C. § 103 as unpatentable over Kangas in view of Huang, Zschaeck, and Kramer, alone or further in view of Fabel, is *reversed*.

DECISION SUMMARY

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1–13, 15	103	Kangas, Huang, Zschaeck, Kramer		1–13, 15
14	103	Kangas, Huang, Zschaeck, Kramer, Fabel		14
Overall Outcome				1–15

Appeal 2020-006200
Application 15/350,207

REVERSED