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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JOHN BIESER and FENGKUI LI

Appeal 2018-002815
Application 13/413,125
Technology Center 1700

Before BRADLEY R. GARRIS, ADRIENE LEPIANE HANLON, and MARK NAGUMO, *Administrative Patent Judges*.

HANLON, *Administrative Patent Judge*.

DECISION ON APPEAL

A. STATEMENT OF THE CASE

The Appellant[1] filed an appeal under 35 U.S.C. § 134(a) from an Examiner's decision finally rejecting claims 39–42, 44–49, and 51–67. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

Representative claim 39 is reproduced below from the Claims Appendix to the Appeal Brief.

[1] 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 Fina Technology, Inc. Appeal Brief dated August 18, 2017 ("App. Br."), at 5.

39. A modified polyolefin comprising:

a continuous polyolefin phase, wherein the polyolefin of the continuous polyolefin phase comprises polyethylene or polypropylene; and

a separate and discontinuous nanoparticulate polymer phase dispersed within the continuous polyolefin phase, wherein the nanoparticulate polymer phase comprises a polymer of a monomer system, and wherein the monomer system comprises at least one acrylic monomer, wherein an average particle size of the nanoparticulate polymer phase ranges from about 2 nm to about 500 nm, and wherein at least 50% of the particles of the nanoparticulate polymer phase have a maximum particle size of 50 nm;

wherein the at least one acrylic monomers [sic, monomer] is 2-(2-ethoxyethoxy) ethyl acrylate, diethylene glycol diacrylate, tridecyl acrylate, hexanediol diacrylate, lauryl acrylate, alkoxylated lauryl acrylate, caprolactone acrylate, 1,6-hexanediol diacrylate, trimethylolpropane triacrylate, polyethylene glycol diacrylate, or neopentane diol diacrylate; and

wherein the monomer system comprises from 10 to 90 weight percent of the at least one acrylic monomer.

App. Br. 20.

The claims on appeal stand rejected as follows:

(1) claims 39–42, 44–49, 51, and 53–67 under 35 U.S.C. § 103(a) as unpatentable over Kopchik et al.;[2]

(2) claim 52 under 35 U.S.C. § 103(a) as unpatentable over Kopchik in view of Marston et al.;[3] and

[2] US 2005/0154128 A1, published July 14, 2005 ("Kopchik").
[3] WO 02/083787 A2, published October 24, 2002 ("Marston").

(3) claims 39–42, 44–49, and 52–67 under 35 U.S.C. § 103(a) as unpatentable over Beckley et al.[4] in view of Marston.[5]

B. DISCUSSION

1. Rejection (1)

The Examiner finds Kopchik discloses a modified polyolefin comprising a continuous polyolefin phase and a discontinuous nanoparticulate polymer phase dispersed within the continuous polyolefin phase. Final Act. 5.[6] The Examiner finds the nanoparticulate polymer phase comprises a polymer of a monomer system, wherein the monomer system comprises an acrylic monomer. Final Act. 5. The Examiner also finds the monomer system may comprise additional monomers such as styrene. Final Act. 6.

The Examiner finds "Kopchik does not specifically teach the particular amount of the acrylic monomers which are used in the monomer system." Final Act. 6. Nonetheless, the Examiner finds that "[i]ncreasing the amount of acrylic monomers will result in increasing the elasticity of the polymer but decreasing the hardness in comparison to polymers with greater amounts of monomers such [as] a styrene." Final Act. 6. Conversely, the Examiner finds that "[d]ecreasing the amount of acrylic monomers will result in decreasing the elasticity of the polymers formed but increasing the hardness of the polymer in comparison to polymers with lesser amounts of monomers such as styrene." Final Act. 6. Based on those findings, the Examiner concludes that it would have been obvious to one of ordinary skill in the art "to optimize the amount of the acrylic polymer which is

[4] US 2003/0059599 A1, published March 27, 2003 ("Beckley").
[5] The statement of the rejection has been corrected to omit claim 43. Claim 43 was cancelled by the Appellant in an Amendment dated November 29, 2016.
[6] Final Office Action dated March 16, 2017.

used in the nanoparticulate phase for the purpose of tailoring the mechanical properties of the final composite material." Final Act. 6 (emphasis omitted).

The Appellant argues that "the Examiner has provided no evidence that changing the amount of acrylic monomer would have any appreciable effect on the mechanical properties of the polymer." App. Br. 15.

The Examiner, however, finds that Blum[7]

> provides evidence that . . . it is known that styrene is a hard monomer which increases the glass transition temperature and the softening point of the [disclosed] polymers and the hardness of the [disclosed] coatings, and additionally teaches that acrylate monomers such as tridecyl acrylate are soft monomers which lessen these properties but bring about an improvement in elasticity (column 14 lines 35–45).

Final Act. 27–28.

On appeal, the Appellant does not address the Examiner's findings as to Blum or the application of Blum as evidence in the obviousness rejection based on Kopchik. Thus, on this record, there is no reason to believe that the acrylic monomers disclosed in Kopchik, which include tridecyl acrylate,[8] would not affect Kopchik's modified polyolefin in the manner disclosed in Blum. *See* Kopchik ¶ 42 (disclosing that modulus properties of polymer/monomer formulations can be controlled by the glass transition temperature of acrylate monomers).

Moreover, claim 39 recites, in relevant part, that "the monomer system comprises *at least one acrylic monomer* . . . wherein the at least one acrylic monomers [sic, monomer] is . . . tridecyl acrylate . . . caprolactone acrylate . . . polyethylene glycol diacrylate, *or* neopentane diol diacrylate; and wherein the monomer system comprises from 10 to 90 weight percent *of the at least one*

[7] US 5,558,911, issued September 24, 1996.
[8] Kopchik ¶ 18.

acrylic monomer." App. Br. 20 (emphasis added). We interpret claim 39 as reciting that a single acrylic monomer in the monomer system is present in an amount of 10 to 90 weight percent of the monomer system. *See Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1456 (Fed. Cir. 1998) (claim construction is a question of law subject to *de novo* review).

Kopchik discloses that "[a] preferred monomer system comprising polyfunctional monomers comprises 50% by weight tridecyl acrylate, 35-45% by weight caprolactone acrylate, and 5-15% by weight polyethylene glycol diacrylate." Kopchik ¶ 18; *see also* Final Act. 5 (citing Kopchik ¶ 18). Thus, the monomer system disclosed in Kopchik, which comprises 50% by weight tridecyl acrylate, comprises at least one acrylic monomer recited in claim 39 (i.e., tridecyl acrylate) in an amount (i.e., 50% by weight) that falls within the claimed range.

Based on the foregoing, a preponderance of the evidence supports the Examiner's conclusion of obviousness. Therefore, the obviousness rejection of claims 39–42, 44–49, 51, and 53–67 based on Kopchik is sustained.[9]

2. Rejection (2)

Claim 52 depends from claim 39 and recites that "the polyolefin of the continuous polyolefin phase comprises a linear low density polyethylene, a high density polyethylene, a low density polyethylene, or a medium density polyethylene." App. Br. 23.

The Examiner finds Kopchik discloses that polyethylene can be used as the continuous polyolefin phase. Final Act. 12 (citing Kopchik ¶ 25). The Examiner,

[9] The Appellant does not present arguments in support of the separate patentability of any of claims 40–42, 44–49, 51, and 53–67.

however, finds Kopchik does not expressly disclose that the polyethylene is one of the polyethylenes recited in claim 52. Final Act. 12.

The Examiner finds Marston discloses polymeric composites comprising a polyolefin matrix, such as polyethylene, and acrylic polymer nanoparticles. Final Act. 12. The Examiner finds Marston discloses that useful polyethylenes include low density polyethylene, high density polyethylene, and linear low density polyethylene. Final Act. 12. The Examiner concludes that it would have been obvious to one of ordinary skill in the art to use Marston's particular polyethylenes in Kopchik's modified polyolefin "for the purpose of providing a polyethylene which is particularly useful in composite materials." Final Act. 12 (emphasis omitted).

The Appellant argues that Marston's polymer matrix does not include a continuous phase and a discontinuous phase. App. Br. 16. Therefore, the Appellant argues that one of ordinary skill in the art would not have combined the polyethylene polymers disclosed in Marston with the film, sheet, film, or molded articles of Kopchik as proposed by the Examiner. App. Br. 16.

The Appellant's argument is not persuasive of reversible error. Marston, like Kopchik, discloses a polyolefin for use in forming a fiber. Marston 1, ll. 6–10; Kopchik ¶ 22 (disclosing that the modified polyolefins may be used to form a fiber, a sheet, a film, or molded articles); *see also* Marston 6, ll. 10–12 (disclosing that the composition of Marston's invention may be formed into films or molded articles).

The Examiner finds:

> Marston teaches that the acrylic polymer additive is substantially immiscible with the polyolefin polymer and that examination of the melt indicate[s] a two phase system in which [the] immiscible molten acrylic polymer is usually in the form of spherical particles or

> globules dispersed in a continuous molten polymer matrix (pg 22 lines 20–30). This indication of a polymer matrix with the acrylic polymer additive dispersed therein is indicated to hold for the solid form of the polymer (pg 23 lines 1–5)[.] Further the final product of the composition is indicated to have the acrylic polymer additive present with a maximum cross section dimension which is on the order of nanometers (pg 23 lines 10–20).

Ans. 27–28;[10] *see also* Marston 23, ll. 7–11 (disclosing that the acrylic polymer additive in the ultimate end product, i.e., fiber, film, or shaped article, may have a maximum cross-sectional dimension of less than or equal to 400 nm).

The Appellant does not direct us to any error in the Examiner's findings. Therefore, the obviousness rejection of claim 52 based on the combination of Kopchik and Marston is sustained.

3. Rejection (3)

The Examiner finds Beckley discloses polymeric composites which contain acrylic polymer nanoparticles. Final Act. 13. The Examiner finds "Beckley is silent as to the use of a continuous polyolefin phase which comprises polyethylene or polypropylene." Final Act. 14.

The Examiner finds Marston discloses polymeric composites comprising a polymer matrix, such as polyethylene or polypropylene, and acrylic polymer nanoparticles dispersed therein. Final Act. 14. The Examiner concludes that it would have been obvious to one of ordinary skill in the art to modify Beckley's polymer composite to include the polyethylene or polypropylene matrix of Marston "for the purpose of providing a useful and well known polymer matrix which is compatible with acrylic nanoparticles." Final Act. 14 (emphasis omitted).

[10] Examiner's Answer dated November 27, 2017.

The Appellant argues that neither Beckley nor Marston discloses a continuous polyolefin phase and a separate and discontinuous nanoparticulate polymer phase dispersed within the continuous polyolefin phase. App. Br. 18.

The Appellant's argument is not persuasive of reversible error. For the reasons discussed above in the section entitled "Rejection (2)," a preponderance of the evidence supports the Examiner's finding that Marston discloses an acrylic polymer additive dispersed in a continuous polymer matrix.

As for Beckley, the Examiner finds:

> Beckley teaches . . . that the polymer nanoparticles can be dispersed in a monomer or monomer mixture and used in a subsequent polymerization, by methods such as bulk polymerization, for the preparation of polymeric composites (paragraph 0082). This would result in a continuous polymer phase around the polymeric nanoparticles.

Final Act. 29.

In response, the Appellant argues that the monomer mixture described in paragraph 82 of Beckley "is ethylenically unsaturated, not a polyolefin." App. Br. 17. Therefore, the Appellant argues that the monomer mixture described in paragraph 82 "would not result in a continuous polyolefin phase" as found by the Examiner. App. Br. 17.

Beckley discloses:

> In one embodiment of the present invention, PNPs ["crosslinked polymeric nanoparticles"[11]] can be dissolved or *dispersed in a monomer or monomer mixture and used in a subsequent polymerization for preparing polymeric composites*. The monomers used can be any monomer mixture useful for forming polymeric materials, and are preferably ethylenically unsaturated. Any type of polymerization, including emulsion, mini-emulsion, bulk,

[11] Beckley ¶ 1.

> solution, gas-phase, suspension, and combinations thereof, are useful for preparing the polymeric composites.

Beckley ¶ 82 (emphasis added).

Polyethylene is produced by polymerizing ethylene. Marston discloses that the acrylic polymer additive (or PNP) may be incorporated into a polymer, including polyethylene, by various methods, including *during* the polymerization process for forming the polymer. Marston 36, ll. 21–24. Consistent with that disclosure in Marston, the Examiner finds that "although the monomer mixture of Beckley does not specifically teach that there is a polyolefin polymer matrix it does teach that a polymer can be formed around the nanoparticle which would give a continuous polymer matrix." Ans. 30 (citing Beckley ¶ 82). The Appellant does not direct us to any evidence to the contrary.

The Appellant also argues that the Examiner's motivation to combine Beckley and Marston (i.e., "'for the purpose of providing a useful and well known polymer matrix which is compatible with acrylic nanoparticles'") does not support the Examiner's conclusion of obviousness because Beckley discloses a coating material and Marston discloses a melt spinning yarn. App. Br. 18–19.

The Appellant's argument is not persuasive of reversible error. The Examiner finds "Beckley is not drawn only to polymer coatings but is also indicated to be drawn to polymer composites." Ans. 31 (citing Beckley ¶¶ 1, 82). Likewise, the products disclosed in Marston are not limited to melt spinning yarns but also include fibers, *films*, and shaped articles. Marston 23, ll. 7–11. Thus, on this record, we find that one of ordinary skill in the art, looking for a suitable polymer matrix for Beckley's polymer composites, would have been motivated to use the polymers disclosed in Marston, which include polyethylene and polypropylene as recited in claim 39.

For the reasons set forth above, the obviousness rejection of claims 39–42, 44–49, and 52–67 based on the combination of Beckley and Marston is sustained.[12]

C. CONCLUSION

The Examiner's decision is affirmed.

Claims Rejected	35 U.S.C. §	Rejection(s)/Basis	Affirmed	Reversed
39–42, 44–49, 51, 53–67	103(a)	Kopchik	39–42, 44–49, 51, 53–67	
52	103(a)	Kopchik, Marston	52	
39–42, 44–49, 52–67	103(a)	Beckley, Marston	39–42,44–49, 52–67	
Overall Outcome			39–42, 44–49, 51–67	

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

[12] The Appellant does not present arguments in support of the separate patentability of any of claims 40–42, 44–49, and 52–67.