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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ABHISHEK ROY, YASUSHI MAEDA, MOU PAUL,
STEVEN ROSENBERG, and IAN A. TOMLINSON

Appeal 2018-008120
Application 14/146,739
Technology Center 1700

Before DONNA M. PRAISS, DEBRA L. DENNETT, and
JANE E. INGLESE, *Administrative Patent Judges*.

INGLESE, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant¹ requests our review under 35 U.S.C. § 134(a) of the Examiner's decision to finally reject claims 12–16². We have jurisdiction over this appeal under 35 U.S.C. § 6(b).

We AFFIRM.

¹ Appellant is the Applicant, Dow Global Technologies LLC. According to the Appeal Brief, the real parties in interest are DowDuPont, The Dow Chemical Company, and their affiliates, FilmTec Corporation, and Dow Global Technologies LLC. Appeal Brief filed March 15, 2018 (“Br.”).

² Final Office Action entered January 1, 2018 (“Final Act.”), 1.

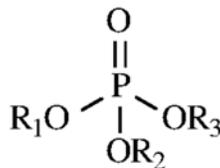
STATEMENT OF THE CASE

Appellant claims a method for making a composite polyamide membrane comprising a porous support and a thin film polyamide layer. Independent claims 12 and 16 illustrate the subject matter on appeal and are reproduced below with contested language italicized:

12. A method for making a composite polyamide membrane comprising a porous support and a thin film polyamide layer, wherein the method comprises:

i) applying an aqueous solution consisting from 2.5 to 10 wt % of a *m*-phenylenediamine monomer, and an isoparaffin solution comprising from 0.01 to 3 wt % of a trimesoyl chloride monomer to a surface of a porous support and interfacially polymerizing the monomers to form a thin film polyamide layer, and wherein the isoparaffin solution further comprises:

(a) a tri-hydrocarbyl phosphate compound represented by Formula (I):



wherein R_1 , R_2 and R_3 are independently selected from hydrocarbyl groups comprising from 1 to 10 carbon atoms, and wherein the tri-hydrocarbyl phosphate compound is provided in a molar ratio of 1:1 to 3:1 with the trimesoyl chloride monomer; and

(b) from 0.03 to 1 wt % of an acid-containing monomer comprising a C_2 - C_{20} arene moiety substituted with at least one carboxylic acid functional group or salt thereof and at least one acyl halide functional group, wherein the acid-containing monomer is distinct from the polyfunctional acyl halide monomer; and

ii) applying an aqueous solution of nitrous acid to the thin film polyamide layer.

16. A method for making a composite polyamide membrane comprising a porous support and a thin film polyamide layer, wherein the method comprises:

i) applying an aqueous solution consisting from 2.5 to 10 wt % of a *m*-phenylenediamine monomer, and an isoparaffin solution comprising from 0.01 to 3 wt % of a trimesoyl chloride monomer to a surface of a porous support and interfacially polymerizing the monomers to form a thin film polyamide layer, and wherein the isoparaffin solution further comprises:

(a) *tributyl phosphate* provided in a molar ratio of 1:1 to 3:1 with the trimesoyl chloride monomer; and

(b) from 0.03 to 1 wt % of an acid-containing monomer selected from: 1-carboxy-3,5-dichloroformyl benzene and 3-(chlorocarboynyl)benzoic [*sic*] acid; and

ii) applying an aqueous solution of nitrous acid to the thin film polyamide layer.

Br. 14–15 (Claims Appendix) (emphasis added).

The Examiner maintains the rejection of claims 12–16 under 35 U.S.C. § 103(a) as unpatentable over Mickols (US 2001/0050252 A1, published December 13, 2001) in view of Cadotte et al. (US 4,812,238, issued March 14, 1989) and Kurth et al. (US 2011/0005997 A1, published January 13, 2011) in the Examiner’s Answer entered June 11, 2018 (“Ans.”).

DISCUSSION

Upon consideration of the evidence relied upon in this appeal and each of Appellant’s contentions, we affirm the Examiner’s rejection of claims 12–16 under 35 U.S.C. § 103(a) for the reasons set forth in the Final Action, the Answer, and below.

We review appealed rejections for reversible error based on the

arguments and evidence the Appellant provides for each ground of rejection the Appellant contests. 37 C.F.R. § 41.37(c)(1)(iv); *Ex parte Frye*, 94 USPQ2d 1072, 1075 (BPAI 2010) (precedential) (cited with approval in *In re Jung*, 637 F.3d 1356, 1365 (Fed. Cir. 2011) (Explaining that even if the Examiner had failed to make a prima facie case, “it has long been the Board’s practice to require an applicant to identify the alleged error in the examiner’s rejections.”)).

Appellant presents separate arguments for each of claims 12 to 16, which we accordingly address individually. 37 C.F.R. § 41.37(c)(1)(iv).

Claim 12

Appellant does not dispute the Examiner’s factual findings directed to the disclosures of the applied prior art references. *Compare* Final Act. 3–4, *with* Br. 4–12. Nor does Appellant dispute the Examiner’s conclusion that the method of claim 12 would have been obvious in view of the Examiner’s proposed combination of the relied-upon disclosures in the references. *Compare* Final Act. 4, *with* Br. 4–12. Rather, Appellant argues that experimental examples provided in the Specification demonstrate that the method of claim 12 yields results that would have been unexpected by one of ordinary skill in the art at the time of the invention. Br. 9. More specifically, Appellant argues that Example 2 demonstrates a dramatic, unexpected improvement in membrane flux, and Examples 3 and 4 demonstrate an unexpected improvement (reduction) in salt passage (SP), “associated with the invention.” *Id.*

The Examiner finds, however, that the relied-upon evidence of unexpected results is “not commensurate in scope” with the claimed subject matter. Final Act. 4 (citing Spec. 15–20).

Appellant argues that “the Examiner has failed to set forth facts and reasoning to justify the position that claim 12 is not commensurate in scope with the proffered evidence of unexpected results.” Br. 11–12. Appellant also argues that “the Examiner has not addressed expert testimony specifically explaining the predictable extension of the unexpected results to the chemical reactants and quantities as claimed.” Br. 10.

We agree with the Examiner, however, that the relied-upon evidence of unexpected results is not reasonably commensurate with the scope of claim 12. And Appellant does not provide persuasive evidence establishing a trend in the relied-upon results that would allow one skilled in the art to conclude that similar results would be obtained for the full scope of methods of claim 12, for reasons that follow. Br. 4–12.

Example 2 describes preparing a series of membranes using various quantities of meta-phenylene diamine and trimesoyl acid chloride, with or without a single quantity of each of l-carboxy-3,5-dichloroformyl benzene and tributyl phosphate. Spec. 16, l. 3–17, l. 5, Table 2-1. Example 3 describes preparing a series of membranes using various quantities of meta-phenylene diamine, trimesoyl acid chloride, and tributyl phosphate, with and without various quantities of l-carboxy-3,5-dichloroformyl benzene. Spec. 18, ll. 1–10, Table 3. Example 4 describes preparing a series of membranes using various quantities of meta-phenylene diamine, trimesoyl acid chloride, and tributyl phosphate, with and without various quantities of 3-(chlorocarbonyl)benzoic acid. Spec. 19, ll. 1–11, Table 4.

The tri-hydrocarbyl phosphate genus recited in claim 1 is considerably broader in scope than the single tributyl phosphate species used in Examples 2, 3, and 4. Similarly, the acid-containing monomer genus recited in claim 1

is considerably broader in scope than the two 1-carboxy-3,5-dichloroformyl benzene species used in Examples 2 and 3, and the 3-(chlorocarbonyl)benzoic acid species used in Example 4. *In re Grasselli*, 713 F.2d 731, 743 (Fed. Cir. 1983) (“With respect to appellants’ broad claims to a catalyst with ‘an alkali metal,’ the experiments detailed in Friedrich III, being limited to sodium only, are not commensurate in scope, and are, therefore, insufficient to rebut the prima facie case.”).

Furthermore, the weight percentages of m-phenylenediamine, trimesoyl chloride, and acid-containing monomer recited in claim 12 are considerably broader than the weight percentages of the corresponding compounds used in Examples 2, 3, and 4. Specifically, the weight percentage of m-phenylenediamine used in Example 2 was either 2.5, 3.5, or 4.5; the weight percentage of m-phenylenediamine used in Example 3 was 2.5, 3, or 3.5; and the weight percentage of m-phenylenediamine used in Example 4 was 3.5. Spec. 17–19 (Tables 2-1, 3, and 4). In contrast, claim 12 recites a weight percentage of m-phenylenediamine of 2.5 to 10, which is considerably broader than the weight percentages tested in Examples 2, 3, and 4.

Similarly, the weight percentage of trimesoyl chloride used in Example 2 was either 0.16, 0.20, 0.21, 0.25 0.26, or 0.30; the weight percentage of trimesoyl chloride used in Example 3 was either 0.12, 0.13, 0.16, 0.21, 0.24, or 0.26; and the weight percentage of trimesoyl chloride used in Example 4 was either 0.22, 0.24, 0.25, or 0.26. Spec. 17–19 (Tables 2-1, 3, and 4). In contrast, claim 12 recites a weight percentage of trimesoyl chloride of 0.01 to 3, which is considerably broader than the weight percentages tested in Examples 2, 3, and 4.

Also similar, the weight percentage of the acid-containing monomer used in Example 2 was 0.04; the weight percentage of the acid-containing monomer used in Example 3 was either 0.03, 0.05, 0.10, 0.13, or 0.14; and the weight percentage of the acid-containing monomer used in Example 4 was either 0, 0.01, 0.03, 0.04, or 0.08. Spec. 17–19 (Tables 2-1, 3, and 4). In contrast, claim 12 recites a weight percentage of the acid-containing monomer of 0.03 to 1, which is considerably broader than the weight percentages tested in Examples 2, 3, and 4.

Thus, the weight percentages of m-phenylenediamine, trimesoyl chloride, and acid-containing monomer used in Examples 2, 3, and 4 are not commensurate in scope with the corresponding weight percentages recited in claim 12 because the tested percentages do not cover the scope of the recited ranges. *In re Inland Steel Co.*, 265 F.3d 1354, 1365–66 (Fed. Cir. 2001) (holding that Inland failed to overcome a prima facie case of obviousness where “the examiner expressed concern that insufficient data had been presented to prove the unexpectedly favorable results in the . . . claimed antimony ranges, because Inland offered only a few data points from one experiment comparing antimony within and below its claimed ranges.”); *In re Harris*, 409 F.3d 1339, 1344 (Fed. Cir. 2005) (“Even assuming that the results were unexpected, Harris needed to show results covering the scope of the claimed range. Alternatively Harris needed to narrow the claims.”).

Furthermore, amounts of m-phenylenediamine, trimesoyl chloride, and acid-containing monomer at the endpoints of the corresponding ranges recited in claim 12 were not tested in Examples 2, 3, and 4. Spec. 17–19 (Tables 2-1, 3, and 4). Such experimental data, as the Examiner explains (Ans. 4), could provide an adequate basis for concluding that similar results

would be obtained across the scope of the ranges recited in claim 12.

Consequently, the limited experimental data provided in in Examples 2, 3, and 4 does not provide an adequate basis to allow one of ordinary skill in the art to conclude that results similar to those obtained for the tested membranes would be obtained for the full scope of membranes prepared according to the method of claim 12. *In re Clemens*, 622 F.2d 1029, 1036, (CCPA 1980).

Although Appellant argues that “the Examiner has not addressed expert testimony specifically explaining the predictable extension of the unexpected results to the chemical reactants and quantities as claimed” (Br. 10), the Examiner explains in the Answer that the opinion testimony of Ian Tomlinson, one of the inventors of the present application, provided in Declarations dated March 27, 2017 and July 6, 2017, was given minimal weight because it was not persuasively supported. Ans. 4.

We agree with the Examiner that the opinion at issue set forth in the Tomlinson Declarations is not supported by objective evidence. Specifically, paragraph 5 of the July 6, 2017 Tomlinson Declaration states:

Based upon my past experimental work in the field using various quantities and ratios of these same monomers, and based upon the experimental results reported by Mickols in connection with various phosphate species, I believe the results reported in Tables 2-1, 2-1, 3 and 4 are representative of those that would be achieved using the carbyl phosphate species and monomeric concentration ranges set forth in claim 12. Moreover, I believe that one skilled in the art would share this same opinion.

Paragraph 6 of the March 27, 2017 Tomlinson Declaration includes a nearly identical statement. Mickols is the primary reference applied in the obviousness rejection, and neither Tomlinson Declaration provides a citation

that would allow identification of the “experimental results reported in Mickols” referred to in the Declarations. Nor does either Declaration discuss the “experimental results reported by Mickols” any further, much less provide an explanation of how any such results establish that the experimental results set forth in the cited tables of Appellant’s Specification are representative of results that would be achieved by the full scope of the compounds, monomers, and weight percentages recited in claim 12.

Thus, neither Appellant nor the relied-upon portions of the Tomlinson Declarations provides any objective evidence corroborating the conclusory opinion provided in the Declarations that one of ordinary skill in the art would consider the experimental results set for the in Tables 2, 3, and 4 to be representative of those that would be achieved using the monomers and concentration ranges recited in claim 12. It follows that we give the inherently self-interested and unsupported opinion provided in the Declarations little to no weight. *Velandier v. Garner*, 348 F.3d 1359, 1371 (Fed. Cir. 2003) (“[W]hat the Board consistently did was accord little weight to broad conclusory statements that it determined were unsupported by corroborating references. It is within the discretion of the trier of fact to give each item of evidence such weight as it feels appropriate”); *In re Am. Acad. of Sci. Tech Ctr.*, 367 F.3d 1359, 1368 (Fed. Cir. 2004) (“[T]he Board is entitled to weigh the declarations and conclude that the lack of factual corroboration warrants discounting the opinions expressed in the declarations”).

Considering the totality of the evidence relied upon in this appeal, a preponderance of the evidence weighs in favor of the Examiner’s conclusion of obviousness. We accordingly sustain the Examiner’s rejection of claim

12 under 35 U.S.C. § 103(a).

Claim 13

Claim 13 depends from claim 12 and recites, in pertinent part, including from 2.5 to 6 wt% of the m-phenylenediamine monomer in the aqueous solution, and including from 0.05 to 3 wt% of the trimesoyl chloride, and from 0.04 to 0.14 wt% of the acid-containing monomer, in the isoparaffin solution.

Appellant argues that “the ranges set forth in claim 13 are narrower and more closely encompass the concentrations used in the comparative examples, and Appellant requests reversal of the rejection of claim 13 “for the reasons set forth [] with respect to claim 12.” Br. 12.

Although the ranges recited in claim 13 are narrower than those recited in claim 12, the weight percentages of m-phenylenediamine and trimesoyl chloride tested in Examples 2, 3, and 4 are nonetheless not commensurate in scope with the corresponding weight percentage ranges recited in claim 13, because the tested percentages do not cover the scope of the recited ranges, including the endpoints of the ranges. Appellant does not establish that the results obtained with the weight percentages tested in Examples 2, 3, and 4 are representative of results that would be obtained by the full scope of the weight percentages recited in claim 13.

We accordingly sustain the Examiner’s rejection of claim 13 under 35 U.S.C. § 103(a).

Claim 14

Claim 14 depends from claim 12 and recites that the tri-hydrocarbyl phosphate compound comprises tributyl phosphate.

Appellant argues that “claim 14 sets forth the identical species used in

the comparative examples to produce the unexpected results,” and Appellant requests reversal of the rejection of claim 14 “for the reasons set forth with respect to claim 12.” Br. 13.

Although claim 14 does recite the tri-hydrocarbyl phosphate species used in Examples 2, 3, and 4, the claim does not recite the acid-containing monomer species used in these examples. As discussed above for claim 12, the acid-containing monomer of claim 14 (by virtue of its dependency from claim 12) is considerably broader in scope than the acid-containing monomer species tested in Examples 2, 3, and 4. Furthermore, as also discussed above for claim 12, the weight percentages of the m-phenylenediamine, trimesoyl chloride, and acid-containing monomer tested in Examples 2, 3, and 4 are not commensurate in scope with the corresponding weight percentages of claim 14 (by virtue of its dependency from claim 12), because the tested percentages do not cover the scope of the recited ranges, including the endpoints of the ranges. Appellant does not establish that the results obtained with the weight percentages and acid-containing monomer species tested in Examples 2, 3, and 4 are representative of results that would be obtained by the full scope of the acid-containing monomers and weight percentages encompassed by claim 14.

We accordingly sustain the Examiner’s rejection of claim 14 under 35 U.S.C. § 103(a).

Claim 15

Claim 15 depends from claim 12 and recites that the acid-containing monomer is selected from at least one of 1-carboxy-3,5-dichloroformyl benzene and 3-(chlorocarbonyl)benzoic acid.

Appellant argues that “claim 15 sets forth the identical species used in

the comparative examples to produce the unexpected results,” and Appellant requests reversal of the rejection of claim 14 “for the reasons set forth with respect to claim 12.” Br. 13.

Although claim 15 does recite the acid-containing monomer species used in Examples 2, 3, and 4, the claim does not recite the tri-hydrocarbyl phosphate species used in these examples. As discussed above for claim 12, the tri-hydrocarbyl phosphate compound of claim 15 (by virtue of its dependency from claim 12) is considerably broader in scope than the tri-hydrocarbyl phosphate compound species tested in Examples 2, 3, and 4. Furthermore, as also discussed above for claim 12, the weight percentages of the m-phenylenediamine, trimesoyl chloride, and acid-containing monomer tested in Examples 2, 3, and 4 are not commensurate in scope with the corresponding weight percentages of claim 15 (by virtue of its dependency from claim 12), because the tested percentages do not cover the scope of the recited ranges, including the endpoints of the ranges. Appellant does not establish that the results obtained with the weight percentages and tri-hydrocarbyl phosphate species tested in Examples 2, 3, and 4 are representative of results that would be obtained by the full scope of the tri-hydrocarbyl phosphate compounds and weight percentages encompassed by claim 15.

We accordingly sustain the Examiner’s rejection of claim 15 under 35 U.S.C. § 103(a).

Claim 16

Appellant argues that “claim 16 sets forth all of the identical species used in the comparative examples to produce the unexpected results,” and Appellant requests reversal of the rejection of claim 16 “for the reasons set

forth with respect to claim 12.” Br. 13.

Although (as set forth above) claim 16 does recite in pertinent part that the isoparaffin solution comprises tributyl phosphate and an acid-containing monomer selected from 1-carboxy-3,5-dichloroformyl benzene and 3-(chlorocarbonyl)benzoic acid, which are the species tested in Examples 2, 3, and 4, the weight percentage ranges of m-phenylenediamine, trimesoyl chloride, and the acid-containing monomer selected from 1-carboxy-3,5-dichloroformyl benzene and 3-(chlorocarbonyl)benzoic acid of claim 16 (by virtue of its dependency from claim 12) are considerably broader than the weight percentages of the corresponding compounds used in Examples 2, 3, and 4, as discussed above for claim 12. Consequently, the weight percentages of m-phenylenediamine, trimesoyl chloride, and acid-containing monomer tested in Examples 2, 3, and 4 are not commensurate in scope with the corresponding weight percentages of claim 16 (by virtue of its dependency from claim 12), because the tested percentages do not cover the scope of the recited ranges, including the endpoints of the ranges. Appellant does not establish that the results obtained with the weight percentages tested in Examples 2, 3, and 4 are representative of results that would be obtained by the full scope of the weight percentages encompassed by claim 16.

We accordingly sustain the Examiner’s rejection of claim 16 under 35 U.S.C. § 103(a).

DECISION

We affirm the Examiner’s rejection of claims 12–16 under 35 U.S.C. § 103(a).

Appeal 2018-008120
Application 14/146,739

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