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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte WISSAM RACHED, LAURENT ABBAS, and JEAN-CHRISTOPHE BOUTIER

Appeal 2016-006057
Application 13/386,701
Technology Center 1700

Before JAMES C. HOUSEL, JEFFREY R. SNAY, and DEBRA L. DENNETT, *Administrative Patent Judges*.

HOUSEL, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellants[1] appeal from the Examiner's decision to reject claims 1–4 and 8–19.[2] We have jurisdiction under 35 U.S.C. § 6(b).

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[1] Appellants identify the real party in interest as ARKEMA FRANCE (App. Br. 2).

[2] Appellants indicate that an amendment to claim 17 was filed concurrently with this appeal (*id.*, Status of Amendments). However, the application record does not include any amendment to claim 17. In addition, claim 17 is an apparent duplicate of claim 16.

We AFFIRM.[3,4]

STATEMENT OF THE CASE

The invention "relates to a heat transfer process using a composition containing hydrofluoroolefins" (Spec. 1:4–5).

Claim 1, reproduced below from the Claims Appendix to the Appeal Brief, is illustrative of the subject matter on appeal.[5] The limitation at issue is italicized.

1. A heat transfer process employing a compression system having at least one stage comprising successively: evaporating a refrigerant, compressing said refrigerant, *condensing said refrigerant at a temperature greater than or equal to 70°C* and expanding said refrigerant, wherein the refrigerant comprises at least one hydrofluoroolefin having at least 4 carbon atoms represented by the formula $R^1CH=CHR^2$ in which R^1 and R^2 represent, independently, alkyl groups having from 1 to 6 carbon atoms, substituted with at least one fluorine atom.

Independent claim 18 similarly recites a heat transfer process wherein the condensing step is performed at a

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[3] Our Decision refers to the Specification (Spec.) filed January 24, 2012, the Examiner's Final Office Action (Final) dated August 6, 2015, Appellants' Appeal Brief (App. Br.) filed January 6, 2016, the Examiner's Answer (Ans.) dated April 27, 2016, and Appellants' Reply Brief (Reply Br.) filed May 26, 2016.
[4] An oral hearing was held on February 15, 2018. A copy of the transcript of this hearing will be made of record in due course.
[5] The Claims Appendix to the Appeal Brief includes claims 5–7 which were withdrawn from prosecution and are not before us on appeal (App. Br. 2, Status of Claims).

temperature between 70 and 140°C and the refrigerant consists of 1,1,1,4,4,4-hexafluorobut-2-ene, at least one hydrofluorocarbon, and optionally at least one of a lubricant and a stabilizer.

REJECTIONS

The Examiner maintains, and Appellants request our review of, the following grounds of rejection:

1. Claims 1–4 and 8–19 on the ground of nonstatutory double patenting as unpatentable over claims 1–15 of copending U.S. Patent No. 9,267,066 B2 (issued Feb. 23, 2016);[6]
2. Claims 1–4 and 8–19 on the ground of nonstatutory double patenting as unpatentable over claims 1–12 of copending U.S. Patent No. 9,279,074 B2 (issued Mar. 8, 2016);[7] and
3. Claims 1–4 and 8–19 under 35 U.S.C. § 103(a) as

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[6] The Examiner maintained a provisional nonstatutory double patenting rejection over claims of U.S. Patent Application No. 13/989,437 (Final 2). That application subsequently issued as U.S. Patent No. 9,267,066 B2 on February 23, 2016. Accordingly, we have updated this rejection to reflect this fact.

[7] The Examiner maintained a provisional nonstatutory double patenting rejection over claims of U.S. Patent Application No. 13/386,719 (Final 2). That application subsequently issued as U.S. Patent No. 9,279,074 B2 on March 8, 2016. Accordingly, we have updated this rejection to reflect this fact.

unpatentable over Robin[8] in view of Fellows,[9] de La Farge,[10] Sun,[11] and Denis.[12]

ANALYSIS

Rejections 1 and 2: Obviousness-type Double Patenting (ODP)

Appellants neither request our review of nor respond to either of these rejections (*see* App. Br. and Reply Br., *generally*). Accordingly, we summarily affirm each of these rejections.

Rejection 3: Obviousness over Robin, Fellows, de La Farge, Sun, and Denis

Appellants' arguments against the Examiner's obviousness rejection contend that the Examiner has not established that it would have been obvious to try Robin's 1,1,1,4,4,4-hexafluoro-2-butene (Z-FC-1336 mzz) refrigerant in a heat transfer process in which the condensing step is performed at a temperature of at least 70°C (claim 1) or between 70 and 140°C (claim 18) (App. Br. 6–15; Reply Br. 2–6). As a result, Appellants urge that the Examiner's selection of Robin's Z-FC-1336mzz refrigerant for use in a heat transfer process having a condensing step performed at

[8] Robin, WO 2008/134061 A2, published November 6, 2008.
[9] Fellows et al., US 4,948,526, issued August 14, 1990.
[10] de La Farge et al., US 4,227,645, issued October 14, 1980.
[11] Sun et al., US 2009/0095014 A1, published April 16, 2009.
[12] Denis et al., US 4,465,609, issued August 14, 1984.

the above temperatures amounts to impermissible hindsight (App. Br. 10–12; Reply Br. 4–6).

Appellants' arguments are not persuasive of reversible error in the Examiner's rejection. Although Appellants characterize the Examiner's obviousness conclusion as being based on an obvious to try scenario, we disagree. As the Examiner finds (Ans. 2–3), Robin teaches azeotrope-like compositions consisting essentially of the Z-FC-1336mzz refrigerant and either 1,1,1,3,3-pentafluoropropane (HFC-245fa) or 1,1,1,3,3-pentafluorobutane (HFC-365mfc) (Robin 2:21–24, 2:34–3:2, 6:21–24, 29–32). In addition, as the Examiner finds (Ans. 2–3), Robin teaches that these compositions do not contribute to stratospheric ozone depletion, have low global warming potentials, and are useful as refrigerants and heat transfer media (Robin 2:1–5, 25:11, 13, 25:25–26:6, 26:22–28). Importantly, Robin does not disclose Z-FC-1336mzz in a listing of other possible refrigerants, but rather as a specifically disclosed component of particular refrigerant compositions within the scope of claim 1. Therefore, one of ordinary skill in the art need not select Z-FC-1336mzz from a finite list of potential solutions, as Robin already disclosed its selection for use with other identified hydrofluorocarbons. Robin also provides specific working examples of combinations of Z-FC-1336mzz with these other identified hydrofluorocarbons (Robin, 17 (Table 10), 18 (Table 11), 21 (Tables 15, 16)).

Appellants contend that the person of ordinary skill in the art would not have had a reasonable expectation of success in using the Robin compositions in a heat transfer process whose condensing step is performed at a temperature of at least 70°C (App. Br. 6–9). In this regard, Appellants assert that "[t]he chemical art of refrigeration is unpredictable" (App. Br. 6). Appellants also urge that Sun and Denis contradict the Examiner's assertion of predictability (Reply Br. 5). In particular, Appellants assert that Sun teaches there is a deficiency of substances with lower environmental impacts and efficient operation at the claimed range of condenser temperatures (*id.*). Appellants also urge that because Sun does not teach or suggest an *a priori* method to determine if compositions beyond those listed in Sun operate efficiently in a condenser operated at a temperature greater than or equal to 70°C, laborious tests are required to demonstrate such operability thereby establishing that the art is unpredictable (*id.*). Appellants further assert that both Sun and Denis include compositions known to operate efficiently in a condenser with a temperature above 70°C, but are avoided due to their environmental impact (*id.* at 5–6).

Appellants' argument is not persuasive that the art is unpredictable or that the art is so unpredictable that the ordinary artisan would not have a reasonable expectation of success in using Robin's disclosed compositions in heat transfer processes using condensing temperatures greater than or equal to 70°C.

Appellants fail to support their assertion of unpredictability in the art by either persuasive technical reasoning or an evidentiary showing. Further, contrary to Appellants' assertion, Sun and Denis do not support that the heat transfer art is unpredictable. Although Appellants urge that Sun and Denis teach compositions that operate efficiently at condenser temperatures above 70°C but are avoided due to their environmental impact, Sun and Denis nonetheless specifically motivate the use of higher temperatures greater than 70°C. Sun discloses that "the heat pump technique is developing towards to a moderate to high temperature (the condensation dew point temperature is 70–100°C.)" (Sun ¶ 5). Denis discloses heat pump operating temperatures higher than 80°C (Denis 1:57–58, 2:14–22).

Moreover, Robin specifically identifies the composition of Appellants' claims as both environmentally acceptable and useful in heat transfer processes. Further, Robin teaches that these compositions exhibit azeotrope-like properties at temperatures from –40°C to 160°C for compositions comprising Z-FC-1336mzz and HFC-365mfc and –40°C to 120°C for compositions comprising Z-FC-1336mzz and HFC-365mfc, thereby suggesting their operability over these temperature ranges (Robin Tables 10, 11, 15, 16). Robin also teaches the heat transfer process in which these compositions may be used includes steps of evaporation and condensation (*id.* at 25:25–26:6). However, Robin does not

specifically teach the conditions to be used in this heat transfer process, including the condensation temperature.

However, Robin's lack of an explicit teaching of the conditions of the heat transfer process including the condensation temperature for use in the heat transfer process using its disclosed compositions suggests that the determination of these conditions, including the condensation temperature, was within the ordinary skill in the art. We iterate Robin's teachings that compositions within the scope of Appellants' claims were evaluated for azeotropic properties over a wide range of temperatures including temperatures greater than 70°C. Moreover, Fellows teaches that "[t]he art is continually seeking new fluorocarbon based azeotrope-like mixtures which offer alternatives for refrigeration and heat pump applications" (Fellows 2:32–34), thereby suggesting that Robin's compositions exhibiting azeotrope-like properties above 70°C would be successful in heat transfer processes at condensation temperatures above 70°C. Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Boesch*, 617 F.2d 272, 276 (CCPA 1980); *In re Aller*, 220 F.2d 454, 456 (CCPA 1955). Exceptions to this rule include: (1) the results of optimizing a variable were unexpectedly good; and (2) the parameter optimized was not recognized in the prior art as one

which would affect the results. *In re Geisler*, 116 F.3d 1465, 1470 (Fed. Cir. 1997); *In re Antonie*, 559 F.2d 618, 620 (CCPA 1977).

In this case, Appellants contend that the results of selecting a condensation temperature greater than or equal to 70°C are unexpected (App. Br. 15–16; Reply Br. 6–7). Appellants direct our attention to the Declaration of Wissam Rached under 37 C.F.R. § 1.132 filed September 30, 2014 (Decl.) and Examples 1 and 2 of the Specification (Spec. 7–12) in support of this contention. In particular, Appellants assert that "[t]he use of 1,1,1,4,4,4-hexafluorobut-2-ene provides an unexpected high performance zone when the temperature of the condenser is from 70 to 140°C, as shown in the Expert Declaration of Wissam Rached" (App. Br. 15).[13] Appellants also assert that Examples 1 and 2 show that refrigerants comprising 1,1,1,4,4,4-hexafluorobut-2-ene "unexpectedly maintain 100% COP or more relative to HCFC-114 at condensation temperatures at 70 °C or above and from 70 °C to 140 °C" (*id.*). Appellants note the data for Example 2 show the COP is significantly increased at 140°C by 30–63% (*id.* at 16). According to Appellants, because "a successful selection of a composition for high temperature operation was not predictable," the presented evidence "with embodiments of the claims

[13] Appellants refer to "the two declarations" in their Reply Brief, page 6. However, only a single declaration under 37 C.F.R. § 1.132 has been filed in this application.

throughout the recited ranges exhibiting efficient operation, constitutes unexpected results" (Reply Br. 6).

Appellants' evidence is not persuasive of unexpected results. A party asserting unexpected results as evidence of nonobviousness has the burden of proving that the results are unexpected. *In re Geisler*, 116 F.3d at 1469–70. Appellants' arguments to that effect cannot take the place of evidence. *Id.* at 1471; *In re De Blauwe*, 736 F.2d 699, 705 (Fed. Cir. 1984); *In re Greenfield*, 571 F.2d 1185, 1189 (CCPA 1978); *In re Pearson*, 494 F.2d 1399, 1405 (CCPA 1974). Further, the burden of proving the results are unexpected requires Appellants to proffer factual evidence that actually shows unexpected results relative to the closest prior art, *see In re Baxter Travenol Labs.*, 952 F.2d 388, 392 (Fed. Cir. 1991), and that is reasonably commensurate in scope with the protection sought by claim 1 on appeal, *In re Grasselli*, 713 F.2d 731, 743 (Fed. Cir. 1983); *In re Clemens*, 622 F.2d 1029, 1035 (CCPA 1980); *In re Hyson*, 453 F.2d 764, 786 (CCPA 1972). "[I]t is not enough to show that results are obtained which differ from those obtained in the prior art: that difference must be shown to be an *unexpected* difference." *In re Klosak*, 455 F.2d 1077, 1080 (CCPA 1972). The extent of the showing relied upon by Appellants also must reasonably support the entire scope of the claims at issue. *See In re Harris*, 409 F.3d 1339, 1344 (Fed. Cir. 2005).

Here, Appellants fail to direct our attention to any disclosure in the Specification asserting that the results of Examples 1 and 2 were unexpected or surprising to one of ordinary skill in the art, nor do we find any. In addition, Declarant Rached makes no assertion that the results set forth in the Declaration were unexpected. Instead, the only references to unexpected results are arguments of Appellants' counsel which, standing alone, are insufficient to carry Appellants' burden of proof.

In addition, though Appellants argue that the results presented to only one compound within the scope of claim 1 at two condensation temperatures, 90°C and 140°C, is commensurate in scope with the claims, we disagree. Appellants' explanation regarding why the results are unexpected is premised on unpredictability in the art, which as indicated above has not been persuasively established. However, Appellants fail to explain how a single compound within the scope of claim 1 would be predictive of the entire scope of this claim. Moreover, we note that though Declarant Rached identifies a "High performance zone" as extending between 70°C and 140°C, the COP performance down to approximately 60°C appears to be about the same as at 140°C (Decl. 3, ¶ 5). Finally, neither Appellants nor Declarant address Robin's disclosure which not only teaches the same compound used to generate the results, but also teaches evaluation of this compound over a temperature range that significantly overlaps the claimed range. We are thus unpersuaded that the mere

successful performance of this compound within this range is itself unexpected.

CONCLUSION

In summary:

Claims Rejected	Basis	Reference(s)	Affirmed	Reversed
1–4, 8–19	ODP	US 9,267,066 B2	1–4, 8–19	
1–4, 8–19	ODP	US 9,279,074 B2	1–4, 8–19	
1–4, 8–19	§ 103(a)	Robin, Fellows, de La Farge, Sun, Denis	1–4, 8–19	
Summary			1–4, 8–19	

DECISION

Upon consideration of the record, and for the reasons given above and in the Examiner's Answer, the decision of the Examiner rejecting claims 1–4 and 8–19 is *affirmed*.

TIME PERIOD FOR RESPONSE

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).

AFFIRMED