

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MEXICHEM AMANCO HOLDINGS S.A. de C.V.,
Petitioner,

v.

HONEYWELL INTERNATIONAL, INC.,
Patent Owner.

Case IPR2013-00576
Patent 8,444,874 B2

Before LINDA M. GAUDETTE, FRANCISCO C. PRATS, and
JACQUELINE WRIGHT BONILLA, *Administrative Patent Judges*.

BONILLA, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

Mexichem Amanco Holdings S.A. de C.V. (“Mexichem”) filed a corrected Petition (Paper 7, “Pet.”) to institute an *inter partes* review of claims 1–15 of U.S. Patent No. 8,444,874 B2 (Ex. 1001, “the ’874 patent”). 35 U.S.C. § 311.

Honeywell International, Inc. (“Honeywell”) filed a Preliminary Response (Paper 11, “Prel. Resp.”). We determined that the information presented in the Petition demonstrated that there was a reasonable likelihood that Petitioner would prevail in challenging claims 1–15 of the ’874 patent as unpatentable. Paper 13 (“Dec. to Inst.”), 2, 19. Pursuant to 35 U.S.C. § 314, we instituted this proceeding on February 27, 2014, to review whether claims 1–15 are unpatentable on the ground that such claims would have been obvious over Inagaki,¹ Konzo,² and Bivens,³ under 35 U.S.C. § 103. Dec. to Inst. 19.

After institution of trial, Patent Owner filed a Patent Owner Response. Paper 21 (“PO Resp.”). Petitioner subsequently filed a Reply to the Response. Paper 27 (“Reply”). Patent Owner also filed a Motion to Exclude seeking to exclude certain evidence. Paper 38. Petitioner filed an Opposition to Patent Owner’s Motion to Exclude (Paper 42), and Patent Owner filed a Reply (Paper 44).

An oral hearing was held on October 16, 2014. A transcript of the hearing has been entered into the record. Paper 49 (“Tr.”).

¹ Inagaki et al., JP-04-110388, published April 10, 1992 (“Inagaki”) (Ex. 1002) (English translation Ex. 1003, Ex. 1068).

² Konzo et al., “Winter Air Conditioning,” (The Industrial Press 1958), pp. 590–596 (“Konzo”) (Ex. 1004).

³ Bivens et al., U.S. Pat. No. 6,783,691 B1, issued Aug. 31, 2004 (“Bivens”) (Ex. 1005).

We have statutory authority under 35 U.S.C. § 6(c). This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a). Petitioner has shown by a preponderance of the evidence that claims 1 and 3–15, but not claim 2, of the '874 patent are unpatentable. Patent Owner's Motion to Exclude is dismissed-in-part and denied-in-part.

A. The '874 Patent (Ex. 1001)

The '874 patent relates to methods of transferring heat in a heat transfer system, such as a refrigerator or air conditioning system. Ex. 1001, 1:21–35. In the past, such systems have used compositions comprising chlorofluorocarbons (“CFCs”) or hydrochlorofluorocarbons (“HCFCs”), which have ozone-depleting properties. *Id.* at 1:62–2:4. The methods of the '874 patent use alternative compounds that do not deplete the ozone layer, i.e., hydrofluorocarbons (“HFCs”), in combination with lubricants. *Id.* at 2:8–12, 2:25–42.

In relation to HFCs, the '874 patent describes fluoroalkene compounds having Formula I ($\text{XCF}_z\text{R}_{3-z}$, where X is a C_2 , C_3 , C_4 or C_5 unsaturated, substituted or unsubstituted, radical, each R is independently Cl, F, Br, I or H, and z is 1 to 3). *Id.* at 3:43–53. The '874 patent describes compounds of Formula I comprising propenes, butenes, pentanes, and hexanes, and states that “[a]mong the propenes, tetrafluoropropenes (HFO-1234) and fluorochlorop[ro]penes . . . are especially preferred in certain embodiments.” *Id.* at 4:1–11, 22–33.

Regarding tetrafluoropropenes (“HFO-1234”), the '874 patent discusses specific isomers of 1,3,3,3-tetrafluoropropene (“HFO-1234ze”), cis-HFO-1234ze and trans-HFO-1234ze. *Id.* at 4:22–33, 6:54–59; *see also* Ex. 1008 ¶¶ 16, 19. In this context, the '874 patent further states:

Although the properties of (cis)HFO-1234ze and (trans)HFO-1234ze differ in at least some respects, it is contemplated that each of these

compounds is adaptable for use, either alone or together with other compounds including its stereo isomer, in connection with each of the applications, methods and systems described herein. For example, (trans)HFO-1234ze may be preferred for use in certain systems because of its relatively low boiling point (-19° C.), while (cis)HFO-1234ze, with a boiling point of +9° C., may be preferred in other applications. Of course, it is likely that combinations of the cis- and trans-isomers will be acceptable and/or preferred in many embodiments. Accordingly, it is to be understood that the terms “HFO-1234ze” and 1,3,3,3-tetrafluoropropene refer to both stereo isomers, and the use of this term is intended to indicate that each of the cis- and trans-forms applies and/or is useful for the stated purpose unless otherwise indicated.

Ex. 1001, 6:39–59.

In addition, the '874 patent describes HFC compositions containing other additional components. Such components include “Difluoromethane (HFC-32)” and/or “1,1,1,2-Tetrafluoroethane (HFC-134a),” among others. *Id.* at 8:4–27. Other components also may include “a lubricant, generally in amounts of from about 30 to about 50 percent by weight of the composition.” *Id.* at 10:12–20; *see also id.* at 2:23–42 (stating “it is highly desirabl[e] for refrigeration fluids to be compatible with the lubricant utilized in the compressor unit, used in most refrigeration systems”). The '874 patent describes “[c]ommonly used refrigeration lubricants such as Polyol Esters (POEs) and Poly Alkylene Glycols (PAGs), PAG oils, silicone oil, mineral oil, alkyl benzenes (ABs) and poly(alpha-olefin) (PAO).” *Id.* at 10:28–32.

Six examples in the '874 patent assess features of certain tetrafluoropropenes, including HFO-1225ye, trans-HFO-1234ze, cis-HFO-1234ze, and HFO-1234yf. *Id.* at 23:58-29:67. Example 2 describes the miscibility of HFO-1225ye and HFO-1234ze when combined with different lubricants at

temperatures ranging from -50° C to 70° C, using 5, 20, and 50 weight percent of lubricants, such as: (i) mineral oil, (ii) alkyl benzene, (iii) ester oil (Mobil EAL 22 cc and Solest 120, i.e., polyol esters), (iv) polyalkylene glycol (“PAG”) oil, or (v) poly(alpha-olefin) oil. *Id.* at 24:61–25:11. As stated in Example 2, the “polyalkylene glycol and [polyol] ester oil lubricants were judged to be miscible in all tested proportions over the entire temperature range,” except HFO-1225ye mixtures under certain conditions. *Id.* at 25:21–30.

B. Illustrative Claims

Claims 1, 9, and 12 are independent. Claim 1 is reproduced below:

1. A method of transferring heat to or from a body in a vapor compression system comprising:

(a) providing in at least a portion of said system a heat transfer composition comprising *at least about 5% by weight of trans-1,3,3,3-tetrafluoropropene and lubricant comprising polyol ester*; and

(b) causing heat to be transferred to or from trans-1,3,3,3-tetrafluoropropene and into or from said body by heat transfer contact between said trans-1,3,3,3-tetrafluoropropene and the body.

Id. at 30:1–11 (emphasis added).

Independent claim 9 is reproduced below:

9. A method of cooling a body in a heat transfer system by transferring heat from the body to at least a portion of a heat transfer fluid contained in the system, the method comprising;

(a) providing in the system *a heat transfer fluid comprising at least about 5% by weight of trans-1,3,3,3-tetrafluoropropene and from about 30 by weight to about 50% by weight of polyol ester lubricant*, wherein in at least a portion of said system said trans-1,3,3,3-tetrafluoropropene is in a gas phase at a first pressure and at a first temperature;

- (b) removing heat from said trans-1,3,3,3-tetrafluoropropene provided at said first temperature by condensing at least a portion of said trans-1,3,3,3-tetrafluoropropene to produce at least a portion of said heat transfer fluid in a liquid phase at about said first pressure;
- (c) reducing the pressure of at least a portion of said liquid heat transfer fluid from step (b) to produce a heat transfer fluid at a second temperature substantially below said first temperature and a second pressure substantially below said first pressure;
- (d) cooling the body by bringing said body into heat transfer contact with said heat transfer fluid at about said second temperature produced in step (c); and
- (e) providing at least a portion of said fluid at said first pressure in said step (a) by compressing said heat transfer fluid provided in step (d) from about said second pressure to about said first pressure.

Id. at 30:45–31:4 (emphasis added). Independent claim 12 is similar to claim 9, but, *inter alia*, refers to “a heat transfer fluid comprising at least about 5% by weight of trans-1,3,3,3-tetrafluoropropene and polyol ester lubricant.” *Id.* at 31:9–32:11.

II. ANALYSIS

A. Claim Construction

Consistent with the statute and legislative history of the America Invents Act, the Board interprets claims using the “broadest reasonable construction in light of the specification of the patent in which [they] appear[.]” 37 C.F.R. § 42.100(b); Office Patent Trial Practice Guide (“Practice Guide”), 77 Fed. Reg. 48,756, 48,766 (Aug. 14, 2012). There is a “heavy presumption” that a claim term carries its ordinary and customary meaning. *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002).

In our Decision to Institute, we construed the term “trans-1,3,3,3-tetrafluoropropene” recited in all challenged independent claims. Dec. to Inst. 7. We concluded that the broadest reasonable interpretation of that term, in view of the Specification of the ’874 patent, encompassed at least “trans-1,1,1,3-tetrafluoropropene,” “trans-1,3,3,3-tetrafluoro-1-propene,” and “trans-HFO-1234ze.” *Id.*; Ex. 1001, 4:22–33, 6:37–59.

Petitioner contends, relying on a Declaration by Dr. Stuart Corr (Ex. 1008), that the trans-form of 1,3,3,3-tetrafluoropropene, which may be denoted “trans-HFO-1234ze” or “HFO-1234ze(E),” also may be “referred to as an HFO (hydrofluoroolefin), HFC (hydrofluorocarbon) or R (refrigerant).” Pet. 11–12 (citing Ex. 1008 ¶ 18). Thus, according to Petitioner, trans-1,3,3,3-tetrafluoropropene may be called “HFO-1234ze(E),” “HFC-1234ze(E),” “trans-HFO-1234ze,” or “trans-HFC-1234ze,” among other names. *Id.* at 12.

Patent Owner disagrees that the term “HFC-1234ze” or “trans-HFC-1234ze” describes unsaturated fluorocarbons such as trans-1,3,3,3-tetrafluoropropene. PO Resp. 13. Relying on Declarations by Dr. Ian Shankland (Ex. 2041) and Dr. Donald Bivens (Ex. 2040), Patent Owner contends that an ordinary artisan would have understood “HFC” and “HFO” to have separate and distinct meanings. *Id.* (citing (Ex. 2041 ¶ 14) (Ex. 2040 ¶ 16)). Thus, Patent Owner contends, an ordinary artisan would not have referred to trans-1,3,3,3-tetrafluoropropene as “HFC-1234ze” or “trans-HFC-1234ze.” PO Resp. 13. Instead, according to Patent Owner, an ordinary artisan would have understood the term “HFC” in the prior art, such as in Bivens, to refer to saturated refrigerants only, not unsaturated fluorocarbons, such as the recited HFO. *Id.* at 13–14.

In support, Patent Owner also cites Petitioner’s “white paper,” and points us to where it states that “most of the potential alternatives to HFC 134a that are

actively being looked at as potential industrial refrigerants belong to the class of hydrofluoroolefins (HFOs),” which have “a significant number of different molecules and isomers possible—more so than with the simpler HFCs.” *Id.*; Ex. 2005, 5. Patent Owner also points to where the white paper refers to “Hydrofluoroa[l]kane (HFC) propellants,” which, according to Patent Owner, indicates that “HFC” refers to saturated compounds. PO Resp. 14; Ex. 2005, 3. Patent Owner also cites “Factsheet 19” prepared by a “European Fluorocarbons Technical Committee” (“EFCTC”), dated June 2011, which states that “HFOs contain hydrogen, fluorine and carbon like the HFCs, but they are distinctly different,” i.e., they “are olefins.” PO Resp. 14–15; Ex. 2009. Patent Owner, relying on Dr. Bivens’ Declaration, also refers to a website of EFCTC, “accessed 4/15/2014,” that also lists “HFCs” and “HFOs” separately under a heading of “families of fluorinated gases.” PO Resp. 14–15; Ex. 2040 ¶ 19.

Our reading of Petitioner’s “white paper” does not persuade us that an ordinary artisan would not have referred to a HFO as a HFC. Moreover, while we acknowledge statements by EFCTC as noted by Patent Owner, made well after the effective filing date of the ’874 patent, we find disclosures in the ’874 patent itself to be more persuasive on this issue. As Petitioner notes, the ’874 patent expressly defines HFCs as “hydrofluorocarbons” (not limited to “hydrofluoroalkane,” a species of hydrofluorocarbons), and states that HFCs includes HFOs, such as HFO-1243zf. Ex. 1001, 2:12, 2:61–67; Reply 4–5. In addition, as both parties acknowledge, Example 3 in the ’874 patent describes certain HFOs as “HFC-1234ze, HFC-1234zf, HFC-1225ye.” PO Resp. 43 (emphases added); Reply 5.

We are not persuaded that the descriptions in the ’874 patent of HFCs as “hydrofluorocarbons,” and the use of “HFC” in nomenclature as encompassing HFO compounds, correspond to “sloppy editing,” as Patent Owner contends. PO

Resp. 43. Petitioner points us to evidence indicating that it was common to refer to HFOs as HFCs. Reply 4–5 (citing Ex. 1070/1071 (testimony by Dr. Bivens), 109:22–110:16, and numerous patent references).

We conclude that a preponderance of the evidence establishes that, in the relevant time frame, an ordinary artisan would have understood “HFC” to refer to a hydrofluorocarbon, i.e., a compound comprising hydrogen, fluoride, and carbon, and that a HFO, such as trans-1,3,3,3-tetrafluoropropene, would have been called a hydrofluorocarbon, and one would have used “HFC” in nomenclature referring to HFOs.

B. Obviousness over Inagaki, Konzo, and Bivens

Petitioner contends that claims 1–15 of the ’874 patent would have been obvious over Inagaki, in view of Konzo and Bivens. Pet. 3, 7–11, 30–49.

1. Inagaki (English translation Ex. 1003/1068)^{4, 5}

Inagaki relates to fluids for heat transfer, such as compositions used in “a refrigerator, heat pump or the like,” and especially those fluids that “have fewer or no destructive effects against the ozone layer.” Ex. 1003, 27–28; Ex. 1068, 2356–57. Inagaki discloses a compound having the formula “C₃H_mF_n,” where “m= an integer of 1 to 5, n= an integer of 1 to 5 and the sum of m and n is equal to 6,” and “containing one double bond in its molecular structure.” Ex. 1003, 28; Ex. 1068,

⁴ Exhibit 1003 and other exhibits refer to page numbers in the following format: “MXC-000027.” We refer to such pages by their last non-zero numbers, e.g., “27.”

⁵ We refer to Exhibits 1003 and Exhibit 1068 in this Decision, although the Petition cites only Exhibit 1003. As discussed below, we find Exhibit 1003 to provide the same teachings in relevant parts as Exhibit 1068, cited in Petitioner’s Reply (Reply 13, n.2) and the translation of Inagaki submitted by Patent Owner during prosecution of the ’874 patent (Ex. 1017, 1004, 1117–1124).

2357. In this context, Inagaki discloses five specific compounds, Embodiments I–IV (also called Embodiments 1–4) and Embodiment 5, including Embodiment II (Embodiment 2), i.e., “F₃C-CH=CHF (1,3,3,3-tetrafluoro-1-propene),” with a boiling point of -16.0° C. *Id.*, see also Ex. 1003, 29–30; Ex. 1068, 2358–59 (describing results with Embodiments 1–5).

Inagaki also discloses “mixtures of C₃H_mF_n and at least one compound selected from a group consisting of R-22 (CHClF₂), R-32 (CH₂F₂), R-124 (CF₃CHClF), R-125 (CF₃CF₂H), R-134a (CF₃CFH₂), R-142b (CH₃CClF₂), 143a (CF₃CH₃) and R-152 (CHF₂CH₃),” which can enhance freezing capacity and performance. *Id.* Inagaki discloses that such mixtures “do not have any problem with respect to their general characteristics (e.g., compatibility with lubricants . . .).” Ex. 1003, 29; Ex. 1068, 2358.

2. *Konzo (Ex. 1004)*

Konzo discloses a heat pump process used in a refrigerator. Ex. 1004, 590. Konzo discloses: (a) a compressor that “pumps” a gas refrigerant from a low pressure to a high pressure, which increases the gas temperature; (b) a condenser that cools the hot gas, which involves heat transfer, and where the hot gas is condensed to a warm liquid while still at high pressure; (c) an expansion valve for the warm liquid; and (d) an evaporator, or cooling coil, which is maintained at a low temperature by expanding gases inside. *Id.* at 590–92. Konzo further discloses that “[a]ny food stored in the refrigerator . . . is cooled by the transfer of heat to the evaporator. The gas that passes through the evaporator is warmed by the food and is returned to the compressor.” *Id.* at 592.

3. *Bivens (Ex. 1005)*

Bivens discloses refrigerant compositions. Ex. 1005, 2:28–31. In its background section, Bivens states generally that “[h]ydrofluorocarbons (HFCs) are

gaining acceptance as replacements for CFCs and HCFCs as HFCs contain no chlorine and, therefore, have zero ozone depletion potential.” *Id.* at 1:33–36.

Bivens further states:

Mineral oils and alkylbenzenes have been conventionally used as lubricants in CFC-based refrigeration systems. However, the lack of solubility of these lubricants in HFC-based refrigerants has precluded their use and necessitated development and use of alternative lubricants for HFC-based refrigeration systems, which utilize polyalkylene glycols (PAGs) and polyol esters (POEs). A lubricant change from mineral oil or alkyl benzene to POE or PAG lubricants (which increases expenses in the refrigeration industry[sic]) is required when the HFC mixtures are used to replace CFC-based refrigerants.

Id. at 1:37–47. Thus, Bivens teaches that it previously was well known to use polyalkylene glycols (“PAGs”) or polyol esters (“POEs”), but not mineral oils or alkylbenzenes, as lubricants in “HFC-based refrigerants.” *Id.*

In the same background section, Bivens further teaches that “[w]hile the PAGs and POEs are suitable lubricants for HFC-based refrigeration systems, they are extremely hygroscopic,” which leads to “absorbed moisture,” which can cause problems such as the formation of “acids which causes corrosion” and “intractable sludges.” *Id.* at 1:47–54. In addition, Bivens teaches that “PAG and POE lubricants are considerably more expensive than the hydrocarbon lubricants,” i.e., mineral oils and alkylbenzenes. *Id.* at 1:56–57.

Bivens teaches that a need existed to resolve the “solubility problem” of mineral oils and alkylbenzenes “so that the refrigeration industry may utilize mineral oil and alkylbenzene lubricants with HFC-based refrigerants.” *Id.* at 1:59–62. Bivens further teaches a need for “compositions that are non-ozone depleting, nonflammable, and essentially non-fractionating azeotrope-like

compositions.” *Id.* at 2:17–44. Bivens then discloses “compositions of the present invention” that satisfy “the aforementioned needs confronting the refrigeration industry,” i.e., azeotrope-like compositions” consisting essentially of HFC-32 (difluoromethane, CH_2F_2), HFC-125 (pentafluoroethane, CF_3CHF_2), HFC-134a (1,1,1,2-tetrafluoroethane, CF_3CHF_2), and a hydrocarbon selected from a particular group, e.g., n-butane. *Id.* at 2:27–59, 1:13–18.

4. *Analysis—claims 1, 3, 4, 6, 7, 12–14*

Petitioner contends that Inagaki, in view of Konzo, expressly teaches most elements of the challenged claims. For example, Petitioner states “the system depicted in Inagaki is readily recognized by the skilled person as a vapor compression system, as demonstrated by Konzo.” Pet. 30. Petitioner also contends that Inagaki expressly teaches “ $\text{F}_3\text{C}-\text{CH}=\text{CHF}$ (1,3,3,3-tetrafluoro-1-propene)” as a component of a heat transfer composition, i.e., a compound that “reads directly on the trans-1,3,3,3-tetrafluoro-1-propene” recited in every challenged claim. Pet. 31–32 (citing Ex. 1003, 28 (Embodiment II); Ex. 1068, 2357). Petitioner further contends that Inagaki teaches that $\text{C}_3\text{H}_m\text{F}_n$ compounds, such as 1,3,3,3-tetrafluoropropene (Embodiment II), may be mixed with other compounds, such as R-32 (CH_2F_2) or R-134a (CF_3CFH_2), and such mixtures do not have problems with respect to general characteristics, such as compatibility with lubricants. *Id.* at 32 (citing Ex. 1003, 28–29; Ex. 1068, 2357-58).

Petitioner acknowledges that “Inagaki does not expressly recite a lubricant or class of lubricants to use with trans-1,3,3,3-tetrafluoropropene.” Pet. 33–34. In other words, while Inagaki refers to lubricants generally, the reference does not disclose a polyol ester (“POE”) lubricant in particular, as recited in the challenged claims. Petitioner relies on Bivens, however, to establish that it was known that POEs were commonly used lubricants for HFC-based refrigeration systems. *Id.* at

33–34 (citing Ex. 1005, 1:37–65). In this regard, Petitioner contends that HFOs are a subset of HFCs, and, therefore, trans-1,3,3,3-tetrafluoropropene (a HFO) is a HFC (as described in Bivens generally). *Id.* at 34. According to Petitioner, it was “simply a matter of routine to test the particular POE for compatibility with the trans-R1234ze.” *Id.*

In response, Patent Owner contends that Inagaki gives “no particular direction” to select Embodiment II, and indicates that “capacity” results for Embodiment II are “less attractive” than those for Embodiment I ($F_3C-CH=CH_2$). PO Resp. 18 (citing Ex. 2040 ¶ 29). Patent Owner also contends that Inagaki mentions using “machine oil” with a mixture of propenes (such as Embodiment II) and CFCs or HFCs, but provides no teaching of any specific machine oil, such as POEs. *Id.* at 18–20; *see* Ex. 1003, 28; Ex. 1068, 2357 (stating that “solubility in cooling *machine oil* may be improved by mixing cooling media having large evaporative latent heat” with “mixtures of $C_3H_mF_n$,” such as $F_3C-CH=CHF$ and R-32) (emphasis added). In addition, Patent Owner contends that the “only possible direction Inagaki offers is that CFCs or saturated HFCs are included in mixtures of the propenes and machine oil to help with solubility . . . thus implying that propenes and machine oil alone [are] not miscible,” which is “supported by Inagaki’s use of an oil separator in Figure 2.” *Id.* at 19 (citing Ex. 1003, 28–29, 32; Ex. 1068, 2357–58, 2361; Ex. 2040 ¶ 33; Ex. 2042 ¶¶ 6–8).

Patent Owner acknowledges that Inagaki teaches that mixtures of $C_3H_mF_n$ (such as Embodiment II) and another compound (such as R-32, R-125, or R-134a) “do not have any problem with respect to their general characteristics (e.g., *compatibility with lubricants*, non-erodibility against materials etc.)” Ex. 1003, 29; Ex. 1068, 2358 (emphasis added); PO Resp. 20. Patent Owner contends, however, that Inagaki does not explain what it means by “compatibility,” and does

not discuss “miscibility.” *Id.* Patent Owner also contends that the use of the oil separator in Figure 2 of Inagaki indicates that “that any refrigerant/lubricant combinations potentially used were not miscible.” *Id.* at 20–21 (citing Ex. 2040 ¶ 34; Ex. 2042 ¶¶ 6–8, 14–15). In addition, Patent Owner contends that an ordinary artisan could not have predicted whether a refrigerant/lubricant combination was miscible. *Id.* at 21–22 (citing Ex. 2042 ¶¶ 14–16, 20; Ex. 2040 ¶¶ 30–32).

Regarding Bivens, Patent Owner contends that the reference is directed to “azeotrope-like refrigerant compositions consisting essentially of three specific saturated refrigerants (HFCs) and one saturated hydrocarbon.” PO Resp. 22. According to Patent Owner, Bivens focuses on figuring out how to use mineral oil and alkylbenzene lubricants with HFC-based refrigerants. *Id.* at 22–23. In addition, Patent Owner contends that Bivens’ background section discusses the benefits of using HFCs, but without exemplifying any specific HFC. *Id.* at 23. Patent Owner then again argues, as discussed above, that one would not have considered HFOs to be a subset of HFCs, and therefore would not have considered Bivens to refer to HFOs where it discusses HFCs. *Id.* at 23–24, 40–45.

Patent Owner also contends that Bivens taught away from using “PAGs and POEs as lubricants because they are ‘extremely hygroscopic’ which can lead to absorbed moisture leading to problems such as formation of acids which cause corrosion of the refrigeration system and formation of intractable sludges.” *Id.* at 25; Ex. 1005, 1:47–53. In addition, Patent Owner contends one needed “extensive teaching and research” to “optimize POE-type refrigerant lubricants,” and that “properties of combined lubricants and refrigerants such as stability, flammability, toxicity, reactivity, and miscibility were unpredictable and needed to be tested.”

PO Resp. 26 (citing Ex. 1008 ¶¶ 21–22), 38–39 (citing Ex. 2020, 20:17–24, 21:11–14, 21:19–22:2, 51:24–52:6).

Based on the above-mentioned contentions, Patent Owner argues that Inagaki fails to disclose POE lubricant and teaches away from its use with trans-HFO-1234ze, and that Bivens fails to disclose trans HFO-1234ze and teaches away from its use with POE lubricant. PO Resp. 27. Patent Owner further contends that “reactive, toxic and flammable” characteristics of the compounds taught away from their combination, and therefore, one had no reasonable expectation of success in combining trans-HFO-1234ze with POE lubricant. *Id.* at 27, 32–37.

In further support, Patent Owner contends that Inagaki taught using “R-12, R-22 and R-502 as control examples,” and that the lubricant of choice for R-12, R-22 and R-502 was mineral oil or alkyl benzene. *Id.* at 28 (citing Ex. 2042 ¶¶ 11, 14). Inagaki also teaches using R143a (among a group), and Patent Owner contends that “it was well known that R143a was not compatible with POE lubricants.” *Id.* at 29–30 (citing Ex. 2012, 386; Ex. 2020, 281:22–282:3). Patent Owner also again points to where Bivens teaches that POEs “are extremely hygroscopic,” and discusses how HFOs and POE lubricants were known to be reactive and unpredictable, and HFOs were perceived to be toxic and flammable. *Id.* at 30 (citing Ex. 1005, 1:61–62), 31–40.

In its Response, Patent Owner does not dispute that Inagaki discloses $F_3C-CH=CHF$ (1,3,3,3-tetrafluoro-1-propene), i.e., 1,3,3,3-tetrafluoropropene as recited in the challenged claims, in Embodiment II. As discussed in our Decision to Institute, Inagaki does not describe expressly the trans isomer, as recited in the claims. The record before us, however, indicates that an ordinary artisan would have understood that Embodiment II constituted a mixture of two isomers, cis and trans. As also noted in our Decision to Institute, evidence cited by Patent Owner,

as well as the '874 patent itself, indicates that the 1,3,3,3-tetrafluoro-1-propene described in Inagaki includes more trans than cis form, because the boiling point of -16° C (as taught in Inagaki regarding this HFO) is closer to the boiling point of -19° C of the trans form, than +9° C of the cis form. Dec. to Inst. 11; Prel. Resp. 5–6 (citing Ex 1008 ¶ 27); Ex. 1001, 6:48–52; Ex. 1003, 28; Ex. 1068, 2357. Thus, we find that that Inagaki inherently discloses a relevant HFO isomer mixture, i.e., Embodiment II comprising trans-1,3,3,3-tetrafluoropropene, as recited in the challenged claims.

We also find that Inagaki suggests using Embodiment II (called “HFO-1234ze” in the '874 patent Specification, and “1,3,3,3-tetrafluoropropene” in the challenged claims) with a lubricant, even if the reference also suggests mixing in another non-HFO refrigerant, such as R-32 (CH₂F₂) or R-134a (CF₃CFH₂).

In addition, we find that Bivens expressly teaches that polyol ester lubricant, as recited in the challenged claims, is among “suitable lubricants for HFC-based refrigeration systems,” even if the reference also teaches that such lubricants have problems because “they are extremely hygroscopic” and are expensive. Ex. 1005, 1:47–59. In addition, we find that when Bivens refers to “[h]ydrofluorocarbons (HFCs)” and “HFC” in the context of “HFC-based refrigeration systems,” it refers to hydrofluorocarbons generally. For the reasons discussed above, we conclude that the evidence of record shows sufficiently that an ordinary artisan would have understood at the time of filing of the '874 patent that the term “HFC,” as used in Bivens, encompassed HFOs, such as those disclosed in Inagaki.

We are not persuaded otherwise by Patent Owner’s contentions regarding Inagaki’s use of “machine oil,” or the depiction in Figure 2 of Inagaki of an oil separator, which is not otherwise discussed in Inagaki. PO Resp. 18–22; Ex. 1003, 28, 32, Ex. 1068, 2357, 2361. Inagaki expressly teaches that its mixtures “do not

have any problem with respect to their general characteristics (e.g., compatibility with lubricants.” Ex. 1003, 28; Ex. 1068, 2357. Such teachings sufficiently suggest that Inagaki’s mixtures combined with lubricants did not have significant issues with miscibility. Moreover, Petitioner points us to evidence indicating that an oil separator was a common component in refrigerant systems, including ones using refrigerant/lubricants that were miscible. Reply 8–9 (citing Ex. 1035, Ex. 1063); *see, e.g.*, Ex. 1035, Fig. 1, 4:3–59 (describing an “oil-flooded twin screw, compression system” and that “[i]n a closed system the refrigerant gas and the oil will, to some extent, be mutually soluble or completely miscible dependent on the temperature and the concentration of the oil”); Ex. 1063, Fig. 1, 2:32–34 (showing “miscibility of several polyol esters with HFC-134a”), 6:8–50 (describing “use of oil separation equipment”).

Consistently, Bivens expressly teaches that “POEs are suitable lubricants for HFC-based refrigeration systems.” Ex. 1005, 1:47–48. Bivens suggested using POE lubricant with “HFCs,” which encompasses HFOs, such as those disclosed in Inagaki, as discussed above. We are not persuaded that Bivens’ teachings are limited to the “azeotrope-like refrigerant compositions consisting essentially of three specific saturated refrigerants (HFCs) and one saturated hydrocarbon,” as Patent Owner contends. PO Resp. 22.

Nor are we persuaded by Patent Owner’s teaching away arguments in relation to Inagaki or Bivens. For the reasons discussed above, we do not read Inagaki or Bivens as teaching away from the use of POE lubricant with Embodiment II, but rather find the references specifically suggest the combination of such compounds. Even assuming that HFOs and/or POE lubricant were known to be reactive, toxic and flammable, as Patent Owner contends (PO Resp. 27, 32–37), Inagaki expressly teaches using Embodiment II (an HFO) with a lubricant, and

Bivens expressly teaches using POE lubricant with HFC-based refrigeration systems, suggesting the use of POE lubricant with HFO-based refrigeration systems.

Thus, any “difficulties” or “problems” associated with such compounds would not have deterred an ordinary artisan from using the compounds, as evidenced by Inagaki and Bivens. *Cf.* PO Resp. 22, 25, 26, 27, 30–37 (describing alleged “difficulties” and “problems” associated with “stability, flammability, toxicity, reactivity, and miscibility”). Based on the combined teachings in Inagaki and Bivens, we find that an ordinary artisan would have had reason to predict that Inagaki’s mixture comprising Embodiment II, combined with a POE lubricant as taught in Bivens, would have worked as intended, i.e., to transfer “heat to or from a body in a vapor compression system” as recited in the challenged claims.

We also are not persuaded by Patent Owner’s contention that Inagaki only suggested the use of mineral oil or alkyl benzene based on the rationale that the reference discussed, among other compounds, “R-12, R-22 and R-502 as control examples,” and lists R143a. PO Resp. 28–30. Inagaki discusses additional compounds, such as HFCs R-32, R-125, and R-134a, in combination with Embodiment II and a lubricant. Ex. 1003, 28–29. Evidence of record does not suggest that an ordinary artisan would have used mineral oil or alkyl benzene only, and not POE, as a lubricant. For example, Bivens teaches that “PAGs and POEs are suitable lubricants for HFC-based refrigeration systems” and that mineral oils and alkylbenzenes did not work as well in such systems because of lack of solubility. Ex. 1005, 1:37–62.

In relation to the “at least about 5% by weight” component of the challenged independent claims, Petitioner acknowledges that “neither Inagaki nor Bivens teaches any specific ratio of trans-1,3,3,3-tetrafluoropropene to polyol ester

lubricant,” i.e., specific percent by weight of different components. Pet. 35. Petitioner contends, however, that specific recited percentages of such components correspond to optimum or workable ranges discovered by routine experimentation. *Id.* at 34–49. According to Petitioner, the recited percentage ranges or ratios do not support patentability, absent evidence indicating that the ranges or ratios are critical. *Id.* at 35 (citing *In re Aller*, 220 F.2d 454, 456 (CCPA 1955)). Petitioner contends that “no evidence of criticality of concentration” exists, for example, in the ’874 patent. *Id.* at 36.

As discussed in our Decision to Institute, *In re Aller* and other case law sets out the general rule that discovery of an optimum value of a variable in a known process is normally obvious. *In re Aller*, 220 F.2d at 456; *In re Geisler*, 116 F.3d 1465, 1470 (Fed. Cir. 1997) (stating that “it is not inventive to discover the optimum or workable ranges by routine experimentation” (quoting *In re Aller*, 220 F.2d at 456)); *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1368 (Fed. Cir. 2007) (stating that “discovery of an optimum value of a variable in a known process is usually obvious” (citing *In re Aller*, 220 F.2d at 456)).

This general rule is not limited to prior art that discloses “amounts that bracket the ranges recited in the claims,” as asserted by Patent Owner. Prel. Resp. 20. Rather, exceptions to the general rule exist where: (1) the variable to be optimized was not recognized as a “result-effective” variable; or (2) results of optimizing the variable, even if known to be result-effective, produced a new and unexpected result. *In re Antonie*, 559 F.2d 618, 620 (CCPA 1977); *In re Boesch*, 617 F.2d 272, 276 (CCPA 1980) (stating that “discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art”); *In re Luck*, 476 F.2d 650, 652-53 (CCPA 1973) (concluding that use of routine testing to identify optimum amounts of silane to be employed in a lamp

coating, without establishing a critical upper limit or demonstrating any unexpected result, lies within the ambit of the ordinary skill in the art).

Here, as discussed above, we agree with Petitioner that Inagaki and Bivens indicate that an ordinary artisan would have known that the recited HFO and POE lubricant would be useful components in a refrigerant composition. Pet. 30-34; *see also* Ex. 1003, 28–29; Ex. 1068 2357–58 (describing Embodiment (II) for use in “[m]ethods to solve the problem” of destructive effects on the ozone in refrigerants, and with lubricants); Ex. 1005, 1:47–49 (describing the use of POE lubricants with HFC-based refrigerants). Thus, the absence or presence of the recited HFO and POE lubricant in at least some amounts was known to be a result-effective variable in relation to the function of a refrigerant. Consequently, we consider whether the recited weight percentages of HFO and/or POE lubricant would have been “critical,” i.e., provided a new and unexpected result that differed “in kind and not merely in degree from the results of the prior art.” Pet. 34–35; *In re Aller*, 220 F.2d at 456.

Petitioner contends that the ’874 patent indicates no criticality of the recited weight percentages. Pet. 35. We agree. For example, the ’874 patent provides evidence that the amount of HFO-1234 is not critical to the function of the heat transfer composition/fluid in the recited methods of transferring heat. *See, e.g.*, Ex. 1001, 6:54–59 (stating that “each of the cis- and trans-forms . . . is useful for the stated purpose unless otherwise indicated”), 7:58–63 (stating that “compositions containing more than trace amounts and less than 100% of the compound are within broad the scope of the present invention”), 10:12–19 (indicating that additional components enhance or provide certain functionality); 10:54–60, 18:48–20:17. Example 1 indicates that each of the cis and trans forms provides positive coefficients of performance compared to HFC-134a. *Id.* at 23:64–24:59. In

addition, Example 2 indicates that PAG or polyol ester oil lubricant is miscible with either HFO-1225ye or HFO-1234ze at all lubricant percentages tested (i.e., 5, 20 and 50 percentage weight) over a range of temperatures. *Id.* at 24:60–25:31.

In addition, as discussed in our Decision to Institute, Patent Owner submitted a Declaration by Dr. Raymond Thomas during prosecution of the '874 patent. Dec. to Inst. 17–18; Prel. Resp. 3. Dr. Thomas “compare[d] the miscibility of three different lubricants with 2,3,3,3-tetrafluoropropene (HFO-1234yf) and with trans-1,3,3,3,tetrafluoropropene (trans-HFO-1234ze).” Dec. to Inst. 17–18 (quoting Prel. Resp. 3); Ex.1017, 1004, 1007 ¶¶ 7–10.

As stated in his Declaration, Dr. Thomas tested the miscibility of three different lubricants (mineral oil, a PAG, and a POE) with 1234yf (HFO-1234yf) or t-1234ze (trans-HFO-1234ze) (the recited HFO) at three different ratios (50:50, 80:20, or 95:5 “HFO:Lubricant Wt. Ratio”), at three different temperatures (0° C, 10° C, or 20° C). Ex 1017, 1009–1010. Data presented in Table 1 of that Declaration indicates that the tested samples were miscible at every tested parameter, except when using mineral oil as the lubricant. In other words, PAG or POE was miscible at every tested parameter (regardless of tested HFO, weight percentage, or temperature), while mineral oil was not miscible at any tested parameter. That PAG or POE was miscible with the tested HFOs, but mineral oil was not, is consistent with teachings in Bivens, as discussed above. Thus, evidence of record in this case indicates that Dr. Thomas’s findings regarding suitable lubricants were not unexpected in view of Bivens teaching regarding the suitability of PAG or POE, but not mineral oil, as a lubricant in HFC-based refrigerants. Ex. 1005, 1:37–50. Moreover, the Thomas Declaration supports Petitioner’s contention that the specific percentage weights recited in the challenged claims are not “critical.” Pet. 35–37.

Claims 1 and 12 recite “a heat transfer composition comprising at least about 5% by weight of trans-1,3,3,3-tetrafluoropropene and lubricant comprising polyol ester.” Claims 3 and 4, which depend from claim 1, recite that the composition comprises from about 5% by weight to about 99% by weight, or about 5% by weight to about 95% by weight, of the trans-1,3,3,3-tetrafluoropropene, respectively. Claims 12 and 13, which depend from claim 12, recite that the composition comprises at least about 50% by weight, or at least about 70% by weight, of trans-1,3,3,3-tetrafluoropropene, respectively. For the reasons discussed above, we conclude that the discovery of an optimum value of a “result-effective” variable in a known process, e.g., percentage amounts of trans-1,3,3,3-tetrafluoropropene, would have been obvious in view of the lack of sufficient evidence indicating that the specific percentages recited in claims 1, 3, 4, 6, 7, 12–14 were critical or produced some kind of new and unexpected result.

Regarding claims 6 and 7, we find that Inagaki teaches mixing the recited HFO with other refrigerants (“at least one co-heat transfer agent”), such as HFC-32 and HFC-134a, along with a lubricant, as Petitioner contends. Pet. 39-40; Ex. 1003, 28–29; Ex. 1068, 2357–58.

Based on the record before us, we conclude that Petitioner has established by a preponderance of the evidence that claims 1, 3, 4, 6, 7, 12–14 of the ’874 patent would have been obvious over Inagaki, in view of Konzo and Bivens.

5. Analysis—claims 5 and 9–11

For the same reasons discussed above, Petitioner contends that claims 5 and 9–11 would have been obvious over Inagaki, in view of Konzo and Bivens. Pet. 38–45. Patent Owner responds that dependent claim 5 and independent claim 9 require that the “methods employ a heat transfer composition (claim 5) or a heat transfer fluid (claim 9) having from about 30 to about 50 percent by weight of POE

lubricant.” PO Resp. 46–47. Patent Owner contends that none of Inagaki, Konzo, or Bivens suggests any particular amount of any lubricant when used with a refrigerant. *Id.* at 47. Thus, according to Patent Owner, those references could not have suggested to an ordinary artisan “any indication that about 30 to about 50 percent by weight of a POE lubricant would have been a suitable range when combined with any HFO lubricant, specifically trans-HFO1234ze.” *Id.* Patent Owner also quotes deposition testimony of Petitioner’s witness, Dr. Corr, as stating that he “wouldn’t think it was obvious to add 50 percent of oil to a refrigerant composition and have it—have it working well of 30 to 50 percent.” *Id.* at 47–48 (quoting Ex. 2020, 269:14–22). Petitioner disputes that interpretation of Dr. Corr’s testimony. Reply 11–12 (citing 2020, 270).

Once again, we point out that the discovery of an optimum value of a “result-effective” variable in a known process, i.e., percentage amounts of POE lubricant here, would have been obvious in the absence of evidence indicating that the specific percentages recited in claims 5 and 9 produced a new and unexpected result. Patent Owner’s contentions, as well as the record before us, fail to indicate sufficiently that the percentages recited in claims 5 and 9 were critical or produced some kind of new and unexpected result. Thus, we conclude that Petitioner has established by a preponderance of the evidence that claims 5 and 9 of the ’874 patent would have been obvious over Inagaki, in view of Konzo and Bivens.

We are also persuaded that Petitioner has established by a preponderance of the evidence that claim 10 (reciting “evaporating at least a portion of said heat transfer fluid”) and claim 11 (reciting a “chiller system using the method of claim 9”), which each depend from claim 9 of the ’874 patent, would have been obvious over Inagaki, in view of Konzo and Bivens, for the reasons stated in the Petition,

and evidence cited therein. Pet. 28, 44–45; *see also* PO Resp. 46–48 (addressing limitations recited in claims 5 and 9 only).

We note that Patent Owner contends that “Inagaki does not teach or suggest a chiller.” *Id.* at 56–57. We find that “Inagaki teaches an example of a vapor compression system in which the evaporator temperature is set between 14° F and 50° F and the condenser is set at 122° F,” which corresponds to a chiller, as Petitioner contends. Pet. 44–45 (citing Ex. 1003, 28–29, disclosing temperatures of an evaporator (-10° C and 10° C) and condenser (50° C) in corresponding “degrees C”); *see also id.* at 28 (noting that Specification defines “chiller” at Ex. 1001, 28:43–48).

6. *Analysis—claims 8 and 15*

Claims 8 and 15, which depend from independent claims 1 and 9, respectively, recite that the lubricant “has a degree of miscibility” with the trans-1,3,3,3-tetrafluoropropene “so that when up to five weight percent of lubricant is added to said trans-1,3,3,3-tetrafluoropropene the mixture has one liquid phase at at least one temperature between -50 and +70° C.”

For the same reasons discussed above, Petitioner contends that claims 8 and 15 would have been obvious over Inagaki, in view of Konzo and Bivens. Pet. 41–49. Petitioner further contends that “Konzo teaches that in a vapor compression system, the heat transfer fluid has at least one liquid phase after the heat transfer fluid is passed through the condenser.” *Id.* at 41, 28 (citing Ex. 1004, 591). In addition, Petitioner contends that Inagaki provides testing data for Embodiment II in a heat pump with the condenser set at 50° C, and therefore, “Inagaki teaches a system in which there is at least one liquid phase between -50 and +70° C.” *Id.* at 41, 48–49 (citing Ex. 1003, 29; Ex. 1068, 2358).

Patent Owner responds that Petitioner's witness, Dr. Corr, "admits that the Inagaki and Bivens references do not teach a system where the mixture would have one liquid phase at at least one temperature between -50 and +70° C.," and that Dr. Corr did not express "an opinion regarding one liquid phase at at least one temperature between negative 50 and positive 70." PO Resp. 49–50 (citing Ex. 2020, 260:13–20, 261:18–23). Patent Owner also contends that the portions of Inagaki cited by Petitioner do not support the contention that trans-HFO-1234ze is "miscible with lubricants" because Inagaki only discusses "solubility in cooling machine oil," and does not discuss miscibility. *Id.* at 50. According to Patent Owner, citing additional testimony by Dr. Corr, "Inagaki's reference to solubility would have had nothing to do with miscibility which is defined as a state between two liquids." *Id.* at 50–51 (citing 2020, 141:23–142:13). Patent Owner also contends that "compatibility and miscibility are not inter-changeable terms." *Id.* at 52 (citing Ex. 2040 ¶¶ 35, 36).

In addition, Patent Owner contends that Inagaki teaches, in relation to its disclosed mixtures, that "the solubility in cooling machine oil may be improved by [addition of a third compound]," i.e., "by mixing cooling media having large evaporative latent heat." *Id.* at 51; Ex. 1003, 28. According to Patent Owner, the "fact that the solubility needs to be 'improved' through addition of a third compound teaches [an ordinary artisan] that the solubility of trans HFO-1234ze and machine oil . . . by themselves is unacceptable." *Id.* at 51–52.

Patent Owner also again notes that Inagaki, in Figure 2, teaches use of an oil separator, and contends that "[s]uch an oil separator is required in a system where the refrigerant and the lubricant are immiscible." *Id.* at 52–53 (citing Ex. 2020, 208:6–9; Ex. 2040 ¶ 34). Thus, according to Patent Owner, by including an oil separator, Inagaki suggests that its system "involves a refrigerant and lubricant that

are substantially immiscible.” *Id.* at 53. Patent Owner also contends that an ordinary artisan could not have predicted whether a particular refrigerant and a lubricant were miscible.” *Id.* at 53–54 (citing 2041 ¶¶ 17–20; Ex. 2042 ¶¶ 14–16, 20; Ex. 2020, 192:9–16).

We are persuaded by Petitioner’s position and cited evidence indicating that Inagaki provides testing data for Embodiment II in a heat pump with a condenser set at 50°C, and, therefore, “Inagaki teaches a system in which there is at least one liquid phase between -50 and +70° C.” Pet. 41, 48–49 (citing Ex. 1003, 29; Ex. 1068, 2358). Patent Owner’s arguments relating to miscibility versus solubility or compatibility, contentions that Inagaki discloses an oil separator, and the lack of predictability of miscibility, do not persuade us otherwise.

We find that the teaching in Inagaki of a heat pump with a condenser (which converts refrigerant gas to liquid) at a temperature of 50°C suggests (even though it does not state expressly in such language) a “degree of miscibility” where the disclosed mixtures have “one liquid phase at at least one temperature between -50 and +70° C,” as recited in claims 8 and 15. Moreover, for the same reasons discussed above, Patent Owner’s contentions, as well as the record before us, fail to indicate sufficiently that the percentages of lubricant recited in claims 8 and 15 produced some kind of new and unexpected result in this regard.

We conclude that Petitioner has established by a preponderance of the evidence that claims 8 and 15 of the ’874 patent would have been obvious over Inagaki, in view of Konzo and Bivens.

7. *Analysis—claim 2*

Claim 2 recites that the heat transfer composition of claim 1 “comprises at least about 90% by weight of trans-1,3,3,3-tetrafluoropropene.” Petitioner contends that claim 2 would have been obvious over Inagaki, in view of Konzo and

Bivens for the same reasons discussed above, i.e., it was “not inventive to discovery [sic] the optimum or workable ranges by routine experimentation.” Pet. 37.

Patent Owner argues that nothing in any of the cited references “suggests, let alone discloses, a heat transfer composition containing at least about 90% by weight trans-1,3,3,3-tetrafluoropropene.” PO Resp. 55. Patent Owner also cites testimony by Dr. Corr stating that one reading Inagaki would view the reference as disclosing “80 percent trans 1234ze and 20 percent cis 1234ze . . . plus or minus 1 or 2 degrees,” but not “all the way from 80 percent up to 90 percent,” based on the boiling point of -16 °C, as disclosed for Embodiment II in Inagaki. *Id.* at 54–55; Ex. 1003, 28; Ex. 1068, 2357. Petitioner does not dispute Dr. Corr’s statement in this regard. Pet. 37; Reply 13–14.

Claim 2 differs from other challenged claims reciting percentages of the HFO and/or POE lubricant in that it recites a heat transfer composition comprising “at least about 90% by weight” of the trans-isomer of 1,3,3,3-tetrafluoropropene in particular. By contrast, other claims recite a composition comprising a certain “% by weight” of that HFO and lubricant in combination. Dependent claims 3 and 4 recite broad ranges for the trans-isomer form of the HFO, i.e., about 5% by weight to about 99% or 95% by weight, respectively, which encompass Embodiment II having approximately 80% trans-isomer and 20% cis-isomer.

We find that neither Inagaki alone, nor Inagaki in combination with Konzo and/or Bivens, teaches or suggests isolating or purifying a trans-isomer in particular from Embodiment II, and therefore does not teach or suggest obtaining “at least about 90% by weight” of the specific trans-isomer of Embodiment II in Inagaki. Purifying a trans-isomer would not have been “routine optimization” of amounts of known result effective variables (i.e., percentages of Embodiment II

and POE lubricant to use), but would have required an additional purification step of an isomer—a step that Petitioner has not established sufficiently is taught or suggested in the cited references.

We conclude that Petitioner has not established by a preponderance of the evidence that claim 2 of the '874 patent would have been obvious over Inagaki, in view of Konzo and Bivens.

C. Conclusion

In view of the above, we conclude that Petitioner has demonstrated by a preponderance of the evidence that claims 1 and 3–15, but not claim 2, of the '874 patent would have been obvious over Inagaki, in view of Konzo and Bivens.

III. MOTIONS TO EXCLUDE

A. Patent Owner's Motion to Exclude Evidence

Patent Owner moves to exclude Petitioner's Exhibit 1069 (a second Declaration by Mr. Robert Low) and related testimony, Exhibits 1003 and 1068 (English translations of Inagaki Ex. 1002), Exhibit 1008 (Declaration by Dr. Stuart Corr) and related testimony, as well as Exhibits 1030–1069 and 1077. Paper 38.

1. Exhibit 1069

Because we do not rely on Exhibit 1069 in reaching the Final Written Decision, we dismiss Patent Owner's Motion to Exclude in relation to that exhibit as moot.

2. Exhibits 1003 and 1068

In relation to Exhibits 1003 and 1068, Patent Owner argues that those English translations of Inagaki Exhibit 1002 are “unauthenticated translations and not trustworthy.” Paper 38, 5–7. In its Reply, Petitioner acknowledges in a footnote that a discrepancy between Petitioner's translation and Patent Owner's

translation of Inagaki Ex. 1002 “was recently realized,” and that Petitioner’s translator “reviewed the translation and has attested that there was an inadvertent omission in the Mexichem translation and has further verified that the rest of the Mexichem translation is consistent with what was submitted,” citing Ex. 1068. Reply 13 n.2. We note that Exhibit 1003 includes a translation “Certification” by the translator, Donald Hanley, CEO of Nelles Translations (Ex. 1003, 34), as does Exhibit 1068 (Ex. 1068, 2355).

In its Motion to Exclude, Patent Owner contends that “Petitioner left uncorrected the majority of the discrepancies between Petitioner’s translation and Patent Owner’s translation,” and “corrected only one discrepancy.” Paper 38, 5–6. Patent Owner contends that Exhibits 1003 and 1068 are not properly authenticated by the translator’s Certifications under Federal Rule of Evidence (“FRE”) 901. *Id.* at 6–7.

In its contentions regarding authentication under FRE 901, Patent Owner indirectly refers to requirements under § 42.63(b), which states that when a party relies on a document in a language other than English, a translation of the document into English and an affidavit attesting to the accuracy of the translation must be filed with the document. 37 C.F.R. § 42.63(b). Rule 42.63(b) requires an “affidavit,” defined as an “affidavit or declaration under § 1.68 of this chapter.” 37 C.F.R. § 42.2. “Certificates” of translation are not affidavits because, for example, they are not made under oath and do not warn that willful false statements and the like are punishable by fine or imprisonment, or both. 37 C.F.R. § 1.68. Thus, as Patent Owner suggests, the translator’s Certificates in Exhibits 1003 and 1068 do not satisfy those requirements. Paper 38, 6–7. Nonetheless, under our rules, we may waive or suspend the requirements of § 42.63(b). 37 C.F.R. § 42.5(b).

Here, the record reflects that Patent Owner prepared its own English translation of Inagaki, and provided a copy of that translation to Petitioner. Yet, Patent Owner does not cite to an exhibit providing that translation in its Motion to Exclude, nor identify with specificity any “discrepancies” in Exhibit 1003 or 1068, nor exactly how such “discrepancies” might be relevant in an obviousness analysis based on Inagaki. We note, however, that in its Preliminary Response, Patent Owner refers to an English translation of Inagaki, as translated by the same translator, Donald Hanley, which Patent Owner submitted during prosecution of the ’874 patent. Prel. Resp. 3; Ex 1017, 1028–1032 (Information Disclosure Statement), 1117–1124 (English translation of Inagaki); Paper 42, 7–8. Our review of Patent Owner’s translation of Inagaki indicates that it provides the same teachings or suggestions in relevant parts as Exhibits 1003 and 1068, discussed in this Final Written Decision. We also note that Petitioner provides a Declaration of Mr. Hanley, which discusses a clause omitted in Ex. 1003, and declares “under perjury that the foregoing is true and correct.” Ex. 1078; Paper 42, 7.

Based on the record before us, we waive the requirements under § 42.5(b) of an “affidavit” under § 1.68 in relation to Petitioner’s English translations of Inagaki in Exhibits 1003 and 1068. In addition, as the moving party, Patent Owner does not persuade us that those translations, in relevant parts, fail to disclose what Petitioner says they do, as required by FRE 901(a), or are not sufficiently authenticated by “[t]estimony of a witness with knowledge . . . that a matter is what it is claimed to be,” as required under FRE 901(b).

With regard to Patent Owner’s hearsay argument (Paper 38, 7), Exhibits 1003 and 1068 are offered as evidence of what Inagaki describes to an ordinary artisan, not for proving the truth of the matters addressed in the document.

Accordingly, Exhibits 1003 and 1068 are not hearsay requiring the remedy of exclusion.

Thus, we deny Patent Owner's Motion to Exclude in relation to Exhibits 1003 and 1068.

3. *Exhibit 1008*

Patent Owner contends that the Declaration of Stuart Corr (Ex. 1008) and his related deposition testimony "must be excluded because Dr. Corr used an improperly high level of ordinary skill in the art when rendering his opinions." Paper 38, 8–10. Even assuming Dr. Corr testified from the perspective of an "improperly high level of ordinary skill" (*id.*), Patent Owner's objections in this regard go to the weight that Exhibit 1008 should be afforded, rather than to its admissibility. A motion to exclude is not the proper vehicle to challenge the sufficiency of evidence. It is within our discretion to assign the appropriate weight to be accorded evidence. Thus, we deny Patent Owner's Motion to Exclude in relation to Exhibit 1008 and Dr. Corr's related deposition testimony.

4. *Exhibits 1030–1069 and 1077*

Patent Owner contends that Exhibits 1030–1069 and 1077 should be excluded because they inappropriately raise new issues or belatedly present evidence in Petitioner's Reply. Paper 38, 10–13.

A motion to exclude is not an appropriate vehicle for challenging a reply or a reply's supporting evidence as exceeding the scope of a proper reply. *Liberty Mutual Ins. Co. v. Progressive Casualty Ins. Co.*, Case CBM2012-00002, slip op. at 62 (PTAB Jan. 23, 2014) (Paper 66); *Norman Int'l, Inc. v. Andrew Toti Testamentary Trust*, Case IPR2014-00283, slip op. at 2 (PTAB Jan. 22, 2015) (Paper 33). The purpose of a motion to exclude is to challenge admissibility of evidence. Office Patent Trial Practice Guide, 77 Fed. Reg. at 48,767.

Patent Owner's objections go to the weight that Exhibits 1030–1069 and 1077 should be afforded, rather than to their admissibility. It is within our discretion to assign the appropriate weight to be accorded such evidence. Thus, we deny Patent Owner's Motion to Exclude in relation to Exhibits 1030–1069 and 1077.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1 and 3–15 of the '874 patent have been shown to be unpatentable;

FURTHER ORDERED that claim 2 of the '874 patent has not been shown to be unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Exclude is dismissed-in-part and denied-in-part; and

FURTHER ORDERED that because 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.

IPR2013-00576
Patent 8,444,874 B2

For PETITIONER:

Patrick J. Fleis
Joseph A. Kromholz
Ryan Kromholz & Manion, S.C.
IPR@rkmiplaw.com

For PATENT OWNER:

Joseph M. Skerpon
Joseph J. Berghammer
Banner & Witcoff, Ltd.
jskerpon@bannerwitcoff.com
jberghammerr@bannerwitcoff.com