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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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MEXICHEM AMANCO HOLDING S.A. de C.V.  
Requester and Respondent

v.

HONEYWELL INTERNATIONAL INC.  
Patent Owner and Appellant

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Appeal 2016-006365  
Reexamination Control 95/001,920  
Patent US 8,053,404 B2<sup>1</sup>  
Technology Center 3900

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Before MARK NAGUMO, JEFFREY B. ROBERTSON, and  
RAE LYNN P. GUEST, *Administrative Patent Judges*.

GUEST, *Administrative Patent Judge*.

DECISION ON REHEARING

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<sup>1</sup> US Patent 8,053,404 B2 issued on November 8, 2011, to Rajiv R. Singh, et al. (hereinafter “the ’404 patent”).

On December 30, 2016, Patent Owner, Honeywell International Inc. (“Patent Owner”), requested rehearing under 37 C.F.R. § 41.79(a)(1) (“Request”) of our Decision on Appeal mailed November 30, 2016 (“Decision”), in which we affirmed rejections of all of the claims on appeal. On January 30, 2017, Third Party Requester Mexichem Amanco Holdings S.A. de C.V. (“Requester”) provided Comments under 37 C.F.R. § 41.79(c) (“Comments”) in opposition to Patent Owner’s Request.

In particular, Patent Owner contends that the Decision misapprehended or overlooked established tenets of claim interpretation in determining that the “comprising” transitional phrase of claim 1 renders claim 1 open to other refrigerants, including additional refrigerants of Formula I, notwithstanding the *Markush*<sup>2</sup> limitation reciting “one or more compounds of Formula I . . . selected from the group consisting of trans-1,1,1,3-tetrafluoropropene (HFO-1234ze) and 1,1,1,2-tetrafluoropropene (HFO-1234yf).” Request 2. Patent Owner further contends that the Board further erred in the interpretation of claim 30, which depends from claim 1 and further narrows the *Markush* limitation to trans-HFO-1234ze. *Id.* Finally, Patent Owner contends that a proper claim interpretation excludes from claim 30 any amount of cis-HFO-1234ze and thus distinguishes the prior art teaching of HFO-1234ze, which is understood to be a combination of cis- and trans-HFO-1234ze. *Id.*

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<sup>2</sup> “A Markush group is a listing of specified alternatives of a group in a patent claim, typically expressed in the form: a member selected from the group consisting of A, B, and C.” *Abbott Labs. v. Baxter Pharma. Prods. Inc.*, 334 F.3d 1274, 1280 (Fed. Cir. 2003).

Claim 1, which is illustrative of the appealed subject matter, reads as follows (with brackets and underlining showing language deleted and added, respectively, during reexamination):

1. A heat transfer composition comprising  
from about 1 to about 40 percent by weight of carbon dioxide (CO<sub>2</sub>) and  
from about 60 to about 99 percent by weight of one or more compounds of Formula I, XCF<sub>z</sub>R<sub>3-z</sub> (I)[, where X is a C<sub>2</sub> or a C<sub>3</sub> unsaturated, substituted or unsubstituted, radical, each R is independently Cl, F, Br, I or H, and z is 1 to 3] selected from the group consisting of trans-1,1,1,3-tetrafluoropropene (HFO-1234ze) and 1,1,1,2-tetrafluoropropene (HFO-1234yf).

PO App. Br. 33, Claims App'x (indentation further added for clarity).

In the Decision, we found that

[a]t one extreme, claim 1 is met by a composition comprising about 1 weight percent CO<sub>2</sub>, about 60 weight percent of one or both of transHFO-1234ze and HFO-1234yf, and about 39 percent “other” substances, the identity of which we now consider. There is no language in claim 1 that excludes non-recited substances, including compounds that are within the scope of Formula I from being part of the “other” substances. Similarly, claim 30 requires the presence of a measurable amount of the transHFO-12345ze compound.

...

Thus, the subordinate limitation (*Markush* limitation) of claim 1 is closed to alternative Formula I compounds, but the *claim* is open to the inclusion of additional compounds, including additional Formula I compounds. In other words, an anticipating composition (or an infringing composition) *must have* one of the disclosed Formula I compounds and CO<sub>2</sub>, because the subordinate limitation is closed to other Formula I compounds, but the infringing (or anticipating) composition *could also*

*include* other Formula I compounds, because the claim itself is open to any “other” substances.

Decision 32–33.

Patent Owner argues that the *Markush* language reciting “one or more compounds of Formula I,  $XCF_zR_{3-z}$  (I) selected from the group consisting of” in claim 1 closes the claim to all other Formula I compounds other than those expressly recited in the “Formula I” clause of claim 1. *See, e.g.*, Request 4–5.

Patent Owner’s reading of the claim is inconsistent with binding case law that considers the “comprising” transitional phrase of a claim to be open to other components not expressly recited in the various limitations of the claim.

As discussed in our Decision

The cases are clear, however, that an open claim transitional phrase cannot override the specific requirements of a closed subordinate limitation. However, when the scope of a closed subordinate limitation is defined by reciting individual members of a larger group, the claim must contain adequate language to maintain the exclusion of non-recited members of the larger group in addition to the inclusion of the recited members.

Decision 32. *See Mannesmann Demag Corp. v. Engineered Metal Prods. Co., Inc.*, 793 F.2d 1279, 1282 (Fed. Cir. 1986) (“[T]he phrase ‘consisting of’ appears in clause (a), not the preamble of the claim, and thus limits only the element set forth in clause (a). The court correctly declined to read this usage of ‘consisting of’ as excluding all other elements from the claim as a whole.”).

We disagree with Patent Owner's contention that our interpretation does not give meaning to the *Markush* claim. Request 6. As the reproduced portion of the Decision above makes clear, the *Markush* group in claim 1 defines at least one compound in the composition. But, without further definition or express limitation, claim 1 does not define an exclusive class of compounds, i.e., it does not exclude the presence of other compounds within the scope of Formula I as long as the *Markush* group is satisfied.

Patent Owner directs us to case law discussing the difference between “comprising” language and “consisting of” language and interpreting “consisting of” language, even that of a *Markush* group, as closed to other components. Request 5-8 (citing, e.g., *Abbott Labs. v. Baxter Pharma. Prods. Inc.*, 334 F.3d 1274, 1280-1282 (Fed. Cir. 2003); *Gillette Co. v. Energizer Holdings, Inc.*, 405 F.3d 1367, 1372 (Fed. Cir. 2005); *Multilayer Stretch Cling Film Holdings, Inc. v. Berry Plastics Corp.*, 831 F.3d 1350, 1357 (Fed. Cir. 2016)).<sup>3</sup> However, the case law cited by Patent Owner does not show error in our claim interpretation, because they do not support narrowing an otherwise open claim based on a single closed limitation within the claim.<sup>4</sup> Thus, Patent Owner has not shown error in our prior interpretation of claim 1.

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<sup>3</sup> Patent Owner also cites cases that are inapposite because they use “consisting of” as the transitional phrase and not as part of a *Markush* claim. Request 5-8 (citing *See Norian Corp. v. Stryker Corp.*, 363 F.3d 1321, 1331 (Fed. Cir. 2004); *Ex parte Davis et al.*, 80 USPQ 448, 1949 WL 3555, \*3 (BPAI 1948)).

<sup>4</sup> *See* Request 6-8 (citing *Spectrum Int'l, Inc. v. Sterilite Corp.*, 164 F.3d 1372, 1379-80 (Fed. Cir. 1988) and *Dippin' Dots, Inc. v. Mosey*, 476 F.3d 1337, 1342-43 (Fed. Cir. 2007)). Patent Owner further cites non-

*Reconsideration of the Decision in light of the related Federal Circuit*

*Decision in Reexamination 95/000,696 of U.S. Patent 7,557,301*

In *Honeywell Intl. Inc. v. Mexichem Amanco Holding S.A. DE C.V.*, 865 F.3d 1348 (Fed. Cir. 2017), the Federal Circuit determined that, in a reexamination of a patent related to the '404 patent, the Board's obviousness analysis was flawed in that the Board committed legal error by improperly relying on inherency in obviousness and in its analysis of motivation to combine the references, specifically with respect to the properties of miscibility and stability, which were properties of the obvious combination and not merely properties of HFO-1234yf. *Id.* at 1354. Specifically, the Federal Circuit determined that the Board was inconsistent in finding that the combination's stability/miscibility was an inherent property of HFO-1234yf while, at the same time, crediting the evidence of an unpredictability and unexpected results as to stability as persuasively establishing "overall predictability" in the art. *Id.* The Federal Circuit further found error in the Board's determination that "overall unpredictability" in the art was not persuasive because "routine testing" would have led to its discovery (*id.*), because such reasoning improperly relies on the manner in which the Patent Owner made the invention. *Id.* at 1356.

Because similar language was used in the Decision in this case and because the Federal Circuit's *Honeywell* decision was issued after the filing

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authoritative District Court decisions, which are both distinguishable and not binding on our Decision. *Id.* (citing *Dow Agrosciences LLC v. Crompton Corp.*, No. 1 :03-CV-0654-SEB-JPG, 2004 WL 1087362 (S.D. Ind. May 12, 2004) and *Bristol-Myers Squibb Co. v. Mylan Pharmaceuticals Inc.*, No. 09-651-LPS, 2012 WL 1753670 (D. Del. May 16, 2012)).

of the rehearing documents under 37 C.F.R. § 41.79 in this case, we revise the Decision as follows to address the issues raised in *Honeywell*.

The Decision states

The evidence also supports a finding that the particular concerns with stability, flammability, toxicity, and reactivity were known in the art and that the testing of prospective refrigerants for these properties was routine at the time of the invention.

...

Thus, the discovery that HFO-1234yf and HFO-1234ze (cis- and trans-) had other desirable properties for more nuanced application, namely for automobile air conditioning systems, is not an inventive contribution to the art of air conditioning or refrigeration generally, but the result of routine testing at the time of known good refrigerants for general use.

Decision 20 (citations omitted). The Decision further states “[a]s discussed above, the particular concerns with stability, toxicity, and reactivity and the testing of prospective refrigerants for these properties were known and routine in the art at the time of the invention.” Decision 28. We withdraw these portions of the Decision for the reasons explained below.<sup>5</sup>

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<sup>5</sup> We discuss the routine testing of HFO properties to address Patent Owner’s contention that no skilled artisan would have considered any HFOs “as a class” as a suitable refrigerant in the first instance. *See* Decision 18. The evidence of record shows that the industry indeed considered HFOs and thoroughly examined HFO properties through known testing methods, not only as a generic “heat transfer composition,” as recited in the claims, but also for the specific purpose of use in automobile air condition systems. *See* Decision 18, n. 23.



These portions are not necessary to the outcome of the Decision. The Decision explains in detail the reasons for combining Inagaki and Kruse based on the benefits expressly taught in the prior art for using HFO-1234yf or HFO-1234ze and CO<sub>2</sub>, respectively, in a refrigerant composition in the first instance and the expectation that such a combination would have been successful for the non-specific “heat transfer composition” use that is recited in the claims. *See* Decision 11-19. In particular, we highlight our discussion in which we gave more evidentiary weight to the specific teachings in the art of success using HFOs, and Inagaki’s teaching of successfully using HFO-1324yf and HFO-1234ze, in particular, as a heat transfer composition than we gave to general assertions that the HFOs “as a class” were too reactive for specific purposes. *See* Decision 17-19. Similarly, the Decision explains in detail why Patent Owner’s particular arguments regarding secondary considerations were not persuasive of non-obviousness. Decision 22-28.

The Decision further states “[t]he properties of the particular refrigerants are inherent to the *refrigerant*, whether specifically disclosed or not.” Decision 20. While this is true, footnote 26, at the end of this sentence, states

Such inherent properties of refrigerants include their specific toxicity, flammability, miscibility with specific lubricants, GWP, and ODP, whether or not these properties are predictable. One cannot obtain a patent for a composition of matter based on the inherent properties of an otherwise known refrigerant. “Inherency is not necessarily coterminous with the knowledge of those of ordinary skill in the art. Artisans of ordinary skill may not recognize the inherent characteristics or functioning of the prior art.” *In re Cruciferous Sprout Litig.*, 301 F.3d 1343, 1349 (Fed. Cir. 2002). The new realization alone does not render that prior art patentable.

Decision 20, n. 26. We revise this footnote to disregard reference to “miscibility with specific lubricants.” While toxicity, flammability, GWP and ODP are all inherent properties of HFO-1234yf, whether or not Inagaki describes these properties, the weight of the evidence of record suggests that miscibility with a lubricant is specific to the miscibility/lubricant pair and cannot merely be considered an inherent property of the refrigerant. However, claim 1 of the ’404 patent does not recite a lubricant, particularly a miscible lubricant. Thus, any references to miscibility with lubricants is not relevant to claim 1. We discuss this property further below with reference to the claims in Group VI, which specifically recite a heat transfer composition comprising CO<sub>2</sub>, transHFO-1234ze and a polyol ester (POE) lubricant.

We note that unlike in the *Honeywell* case heard by the Federal Circuit, this case did not include any arguments or evidence regarding any particular properties of the HFO-1234yf and CO<sub>2</sub> being unexpected. Decision 27 (“Patent Owner produces no evidence that the combination of HFO-1234yf or HFO-1234ze and CO<sub>2</sub> exhibit any unexpected properties.”). *See generally* Decision 22-28.

With respect to Group IV and Group V, which includes claims that specifically recite that the HFO and CO<sub>2</sub> composition is nonflammable and has a capacity substantially matching that of R-404A, the Decision states that these properties are an inherent property of the otherwise obvious combination. *See* Decision 37, 39. The Decision further states “[a]s discussed above, the particular issues with respect to flammability were known in the art at the time of the invention and the testing of prospective

refrigerants for these properties was routine in the art at the time of the invention.” Decision 38.

For clarity, we emphasize that, while stability of a refrigerant may convey a question as to whether the refrigerant in combination would have been capable of being used as a refrigerant at all (i.e., if it is too reactive, it could be useless in any refrigerant application, though Inagaki suggests otherwise for HFO-1234yf and HFO-1234ze), the record reflects that flammability does not affect operability of a general-purpose refrigerant.<sup>6</sup> *See* Decision 16-17 (discussing where the record describes ammonia, which is flammable, as a useful refrigerant). It is on this basis that “[w]e are not persuaded that the potential, although not realized, high flammability of HFO-1234yf or HFO-1234ze would have deterred an ordinary artisan from using Inagaki’s refrigerants as Kruse’s partially fluorinated hydrocarbon in combination with CO<sub>2</sub>.” Decision 38. Similarly, Inagaki teaches good capacity, even if it does not expressly teach that the capacity is “substantially matching that of R-404A.”

Because Kruse and Inagaki render obvious the identical combination of HFO-1234yf or HFO-1234ze and CO<sub>2</sub>, for the reason discussed in the Decision, the burden properly shifts to Patent Owner to show that the combination would not have been expected to have the identical “nonflammable” property or “a capacity substantially matching that of R-404A,” as recited in the claims. *See In re Best*, 562 F.2d 1252, 1254–55

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<sup>6</sup> Although the record suggests that flammability may be an issue of concern when the refrigerant is used for the specific purpose of automobile air conditioning systems, the claims do not recite any specific purpose for the “heat transfer composition.” *See* Decision 19.

(CCPA 1977) (“Whether the rejection is based on ‘inherency’ under 35 U.S.C. § 102, [or] on ‘prima facie obviousness’ under 35 U.S.C. § 103, . . . the burden of proof is the same.”). It is the identity of the otherwise obvious combination of HFO-1234yf or HFO-1234ze and CO<sub>2</sub>, for the reason discussed in the Decision, that gives the additionally claimed properties little patentable weight despite the fact they are properties not expressly taught in the prior art.

With respect to Group VII, which specifically recites a POE lubricant in the refrigerant composition, we highlight our discussion in which we gave more evidentiary weight to Inagaki’s teaching that HFO-1324yf and HFO-1234ze are “compatible with lubricants,” in particular, for use as a heat transfer composition, than we gave to Patent Owner’s general assertions that HFOs “as a class” were expected to be too reactive to be used as a refrigerant with known lubricants. *See* Decision 42-44. Further, we emphasize that our decision attributes more evidentiary weight to the copious teachings in the art of successfully using POE in refrigerant applications, than to Patent Owner’s assertion that POEs are not desirable lubricants due to their hygroscopic properties. Decision 44-45.

On the record before us, we decline to revise the interpretations of claim 1 and claim 30 set forth in the Decision. Patent Owner’s Request is granted to the extent the claim interpretation is reconsidered, but denied as to the merits of the Request. Further, the Decision is revised as discussed above in light of the Federal Circuit Decision in *Honeywell Intl. Inc. v. Mexichem Amanco Holding S.A. DE C.V.*, 865 F.3d 1348 (Fed. Cir. 2017).

DENIED

Appeal 2016-006365  
Reexamination Control 95/001,920  
Patent US 8,053,404 B2

PATENT OWNER:

HONEYWELL/FOX/BANNER  
PATENT SERVICES  
115 TABOR ROAD – PO BOX 377  
MORRIS PLAINS, NJ 07950

THIRD-PARTY REQUESTER:

PATRICK J. FLEIS  
RYAN KROMHOLZ & MANION, S.C.  
P.O. BOX 26618  
MILWAUKEE, WI 53226