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EXAMINER	
QIAN, YUN	

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte SUN-CHUEH KAO, FRANCIS C. RIX, CHING-TAI LUE, MARK G. GOODE, and DONGMING LI

Appeal 2019-006726
Application 15/117,363
Technology Center 1700

Before KAREN M. HASTINGS, JEFFREY B. ROBERTSON, and MICHAEL G. MCMANUS, *Administrative Patent Judges.*

ROBERTSON, *Administrative Patent Judge.*

DECISION ON APPEAL[1]

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[1] This Decision includes citations to the following documents: Specification filed August 8, 2016 ("Spec."); Final Office Action mailed February 1, 2019 ("Final Act."); Appeal Brief filed June 3, 2019 ("Appeal Br."); Examiner's Answer mailed July 12, 2019 ("Ans."); and Reply Brief filed September 12, 2019 ("Reply Br.").

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant[2] appeals from the Examiner's decision to reject claims 17, 19, 21–26, 31, 33, 39, 40, and 42. Appeal Br. 6. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

CLAIMED SUBJECT MATTER

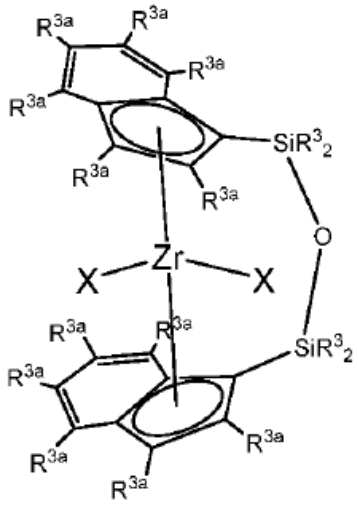
Appellant states the invention relates to a catalyst system including a first catalyst compound and a second catalyst compound that are co-supported to form a commonly supported catalyst system. Spec. ¶ 8. The catalyst system is used in a method of polymerizing olefins to produce a polyolefin polymer with a multimodal composition distribution. *Id*. Claim 17, reproduced below, is illustrative of the claimed subject matter (Appeal Br., Claims Appendix 15):

> 17. A catalyst composition comprising a first catalyst compound and a second catalyst compound that are co-supported forming a commonly supported catalyst system, wherein the first catalyst compound comprises the following formula:
>
> $$(C_5H_aR^1{}_b)(C_5H_cR^2{}_d)HfX_2$$
>
> wherein each R^1 is independently H, a hydrocarbyl group, a substituted hydrocarbyl group, or a heteroatom group; each R^2 is independently H, a hydrocarbyl group, a substituted hydrocarbyl group, or a heteroatom group; a and c are ≥ 3; a+b = c+d = 5; at least one R^1 and at least one R^2 is a hydrocarbyl or substituted hydrocarbyl group; adjacent R^1 and R^2 groups are optionally coupled to form a ring; and each X is independently

[2] We use the word Appellant to refer to "applicant" as defined in 37 C.F.R. § 1.42(a). Appellant identifies Univation Technologies, LLC, a wholly owned subsidiary of DOW Inc., as the real party in interest. Appeal Br. 3.

a leaving group selected from a labile hydrocarbyl, substituted hydrocarbyl, or heteroatom group, or a divalent radical that links to an R^1, or R^2 group;

and the second catalyst compound comprises the following formula:



,

wherein each R^3 or R^{3a} is independently H, a hydrocarbyl group, a substituted hydrocarbyl group, or a heteroatom group, wherein each R^3 or R^{3a} are optionally the same or different; and each X is independently a leaving group selected from a labile hydrocarbyl, a substituted hydrocarbyl, a heteroatom group, or a divalent radical that links to an R^3 group.

REFERENCES

The prior art relied upon by the Examiner is:

Name	Reference	Date
Wu et al. hereinafter "Wu"	US 2007/0043248 A1	February 22, 2007
Muruganandam et al.	US 2010/0063227 A1	March 11, 2010

hereinafter "Muruganandam"		
Follestad et al. hereinafter "Follestad"	WO 01/09200 A1	February 8, 2001
Reybuck et al. hereinafter "Reybuck"	Journal of Polymer Science: Part A: Polymer Chemistry, vol. 42, 3323–3331. "Ethylene/1-Hexene Copolymerization with Tetramethyldisiloxane-Bridged Bis(indenyl) Metallocenes."	February 26, 2004

REJECTIONS

1. The Examiner rejected claims 17, 19, 21, 24–26, 31, 33, 39, and 40 under pre-AIA 35 U.S.C. § 103(a) as unpatentable over Wu and Reybuck. Final Act. 4–6.
2. The Examiner rejected claims 22 and 23 under pre-AIA 35 U.S.C. § 103(a) as unpatentable over Wu and Follestad. Final Act. 6–7.
3. The Examiner rejected claim 42 under pre-AIA 35 U.S.C. § 103(a) as unpatentable over Wu, Reybuck, and Muruganandam. Final Act. 7–8.

OPINION

Rejection 1

Appellant presents arguments only with respect to claim 17 subject to this rejection. *See* Appeal Br. 6. Thus, we select claim 17 as representative for disposition of this rejection, with the patentability of the remaining claims standing or falling with claim 17. 37 C.F.R. § 41.37(c)(1)(iv).

The Examiner's Rejection

In rejecting claim 17 as obvious over Wu and Reybuck, the Examiner found Wu discloses a catalyst for polymerization comprising a carrier, supported alkylaluminum and two or more catalysts of metallocenes, but Wu does not specifically disclose the second catalyst compound recited in claim 17. Final Act. 4–5. The Examiner found Reybuck discloses a tetramethyldisiloxane-bridged bis(indenyl) zirconocene dichloride catalyst for polymerization as in claim 17. *Id.* at 5. The Examiner determined it would have been obvious to have combined the *meso* form of tetramethyldisiloxane-bridged bis(indenyl) zirconocene dichloride of Reybuck with the catalyst system disclosed by Wu because the *meso* form of the metallocene provides high activity for ethylene polymerization, is the most stable conformation, and shows a higher 1-hexene selectivity and a high product of reactivity. *Id.*

Appellant's contentions

Appellant contends that Wu discloses several critical factors for optimum results, which includes proper choice of metallocene catalysts, and that Wu expressly discloses the metallocene catalysts are unbridged. Appeal Br. 9. Thus, Appellant contends Wu teaches away from using the bridged metallocene catalysts disclosed in Reybuck. *Id.* Appellant argues that using the bridged metallocene catalysts disclosed in Reybuck in the process of Wu would defeat the intended purpose of Wu, which is to have high productivity, because Reybuck discloses the bridged metallocene catalysts disclosed therein have low productivity. *Id.* at 10–11. Appellant argues that

the reasoning provided by the Examiner, namely the more stable conformation and higher 1-hexene activity of the *meso* form of the bridged metallocene catalyst, is not sufficiently supported by Reybuck because Reybuck discloses the stability and 1-hexene selectivity is not with respect to all catalysts, but only as compared with the *rac* form of the catalyst. *Id.* at 11. Appellant argues one of ordinary skill would not have combined Reybuck's catalyst, which is disclosed for copolymerization of ethylene/1-hexene where the majority of polymers produced are solids at room temperature, with Wu, which discloses poly-alpha olefins that are liquids at room temperature and used for lubricating oils. *Id.* at 12.

Issue

Has Appellant demonstrated reversible error in the Examiner's position that one of ordinary skill in the art would not have utilized the bridged metallocene catalysts disclosed in Reybuck in conjunction with the catalyst system disclosed in Wu?

Discussion

We are not persuaded by Appellant's arguments. Initially, we agree with the Examiner that Wu does not teach away from the use of bridged metallocene catalysts. *See* Ans. 6. That is, although Appellant contends that Wu discloses unbridged metallocene catalysts are "critical" for the process described in Wu (*see* Wu ¶ 84), we observe that Wu discloses the catalyst compositions may be mixed with other known polymerization catalysts to achieve desired polymer or oligomer blends and further discusses the influence of bridging on choosing reactor residence times. Wu ¶¶ 193, 199.

Thus, Wu allows for the presence of bridged metallocene catalysts as disclosed in Reybuck. *Cf. In re Kerkhoven,* 626 F.2d 846, 850 (CCPA 1980) ("It is prima facie obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose.... [T]he idea of combining them flows logically from their having been individually taught in the prior art.") (Citations omitted). Moreover, the Examiner's rejection still includes the presence of an unbridged hafnium metallocene catalysts disclosed to be "critical" in Wu. Final Act. 4.

We are also not persuaded by Appellant's argument that due to the "high productivity" disclosed in Wu (Wu ¶ 21) and the productivity concerns with the bridged metallocene catalysts disclosed in Reybuck (Reybuck p. 3325), one of ordinary skill in the art would not have combined Wu with Reybuck. In particular, Wu discloses productivity may be sacrificed depending on the desired characteristics of the product. Wu ¶ 200. As discussed above, the Examiner's rationale relies in part on higher 1-hexene selectivity of the *meso* tetramethyldisiloxane-bridged bis(indenyl) zirconocene dichloride of Reybuck, and as such, is consistent with Wu's disclosure that productivity may be sacrificed in order to obtain desired oligomers, polymers, or blends thereof.

In this regard, Appellant's argument that Reybuck only provides comparisons between the *meso* and *rac* forms of the tetramethyldisiloxane-bridged bis(indenyl) zirconocene dichloride catalyst is not persuasive, because Reybuck expressly discloses the *meso* form exhibits higher 1-hexene when compared to other catalysts such as 2,2-bridged complex ethylene bis(2-indenyl) zirconium dichloride. Reybuck 3329. Such

comparisons provide support for the Examiner's rationale as to why one of ordinary skill in the art would have utilized the particular catalyst of Reybuck in Wu's system.

Last, we are not persuaded by Appellant's arguments that because the polymers produced in Reybuck are mostly solids, one of ordinary skill in the art would not have used such catalysts in producing poly-alpha olefins that are liquids at room temperature and used for lubricating oils. As pointed out by the Examiner, Reybuck and Wu disclose example polymerization conditions that are different from one another. Ans. 6, citing Wu, Table 1A, Table 3; Reybuck, Table 1. We do not find such examples to limit the teachings of either Reybuck or Wu, such that one of ordinary skill in the art would have been limited by the examples of either reference, particularly in view of our discussion of Wu above. Indeed, even the examples of the number average molecular weights and polydispersity obtained in Reybuck (Table 1) significantly overlap with the broad ranges disclosed in Wu (¶¶ 47, 48).

Accordingly, we affirm the Examiner's rejection of claim 17, and claims 19, 21, 24–26, 31, 33, 39, and 40 dependent therefrom as obvious over Wu and Reybuck.

Rejections 2–3

Appellant does not set forth separate arguments with respect to claims 22 and 23, subject to Rejection 2, and claim 42, subject to Rejection 3, rather relying on the dependency of these claims from claim 17. Appeal Br. 6.

Accordingly, we affirm the Examiner's rejection of claims 22, 23, and 42.

DECISION SUMMARY

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
17, 19, 21, 24–26, 31, 33, 39, 40	103	Wu, Reybuck	17, 19, 21, 24–26, 31, 33, 39, 40	
22, 23	103	Wu, Follestad	22, 23	
42	103	Wu, Reybuck, Muruganandam	42	
Overall Outcome			17, 19, 21–26, 31, 33, 39, 40, 42	

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). *See* 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED