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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte MARIE SAVONNET, DAVID FARRUSSENG, CATHERINE PINEL, DELPHINE BAZER-BACHI, NICOLAS BATS, and VINCENT LECOCQ[1]

Appeal 2015-005428
Application 13,496,308
Technology Center 1600

Before ULRIKE W. JENKS, TIMOTHY G. MAJORS, and DEVON ZASTROW NEWMAN, *Administrative Patent Judges*.

NEWMAN, *Administrative Patent Judge*.

DECISION ON APPEAL

This appeal under 35 U.S.C. § 134 involves claims to a crystallized hybrid solid. The Examiner entered final rejections for indefiniteness and that the claims have improper dependent form. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

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[1] Appellants identify the Real Party in Interest as Centre National De La Recherche Scientifique and IFP ENERGIES Nouvelles. App. Br. 1.

STATEMENT OF THE CASE

The Specification discloses "[t]his invention relates to a new crystallized hybrid solid with an organic-inorganic matrix, of three-dimensional structure, and to its process for preparation starting from the DMOF-1-NH_2 crystallized hybrid solid with an organic-inorganic matrix that is already described in the literature." Spec. 1:4–7. Further according to the Specification,

> [t]his invention has as its object a new crystallized hybrid solid with an organic-inorganic matrix that has a three-dimensional structure. This new solid is called DMOF-1-N_3. It contains an inorganic network of zinc-based metal centers that are connected to one another by organic ligands that consist of the -O_2C-C_6H_3-N_3-CO_2- and $C_6H_{12}N_2$ entities.

Spec. 6:4–8.

Claims 1 and 3 are on appeal[2] and are set forth below:

> 1. A crystallized hybrid solid having a DMOF-1-N_3 organic-inorganic matrix, of three-dimensional structure, containing an inorganic network of zinc-based metal centers connected to one another by the organic N_3-bdc ligand-O_2C-C_6H_3-N_3-CO_2 and the organic DABCO ligand $C_6H_{12}N_2$, such that it has a chemical composition that has Zn_2(-O_2C-C_6H_3-N_3-CO_2-)$_2$($C_6H_{12}N_2$) for its base pattern with said solid having an

[2] Claims 2, 4, and 6–13 were withdrawn in response to a Restriction Requirement. *See* Final Rejection, mailed June 25, 2014. Claim 5 was cancelled in Appellants' Amendment, mailed August 25, 2014. We recognize that Appellants submitted a Supplemental Amendment concurrently with the Reply Brief, both dated April 27, 2015, in which Appellants requested cancellation of claim 3; however, the Examiner has not entered the Amendment and it remains pending for purposes of this appeal.

X-ray diffraction diagram including at least the lines in the table below:

2 Thêta (°)	d_{hkl} (Å)	I/I_0	2 Thêta (°)	d_{hkl} (Å)	I/I_0
8.152	10.837643	F	27.609	3.228232	ff
9.19	9.615264	mf	27.813	3.205088	ff
11.538	7.663371	mf	29.029	3.0735	f
12.296	7.192531	mf	29.698	3.005821	ff
14.77	5.992845	ff	29.793	2.996423	ff
16.345	5.418821	FF	30.201	2.956894	ff
18.29	4.846741	f	30.938	2.888069	ff
18.44	4.807632	ff	31.15	2.868907	ff
18.782	4.720763	f	32.046	2.790679	ff
20.19	4.394638	ff	32.428	2.758663	ff
20.504	4.327992	ff	33.035	2.709411	ff
21.806	4.072553	ff	33.492	2.673413	ff
23.195	3.831685	ff	34.082	2.628514	ff
24.623	3.612547	f	34.36	2.607855	ff
24.737	3.596266	ff	35.102	2.554457	ff
24.996	3.559468	ff	35.184	2.548681	ff
25.978	3.427163	ff	35.373	2.535462	ff
26.086	3.413252	ff	36.361	2.468819	ff
26.333	3.381744	ff	36.52	2.458421	ff

where FF = Very High; F = High; m = Medium; mf = Medium Low; f = Low; ff = Very Low, with the relative intensity I/I_O being provided relative to a relative intensity scale where a value of 100 is assigned to the most intense line of the X-ray diffraction diagram: ff< 15; 15≤f< 30; 30 ≤ mf < 50; 50 ≤ m < 65; 65 ≤ F < 85; and FF≥ 85.

3. The crystallized hybrid solid according to Claim 1 indexed in a quadratic system of P4/m space group with, as mesh parameters, a = b = 10.837 Å; c = 9.614 Å, and alpha=beta=gamma=90°.

App. Br. Claims App'x. 7–8.

The Examiner rejects claims 1 and 3 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point

out and distinctly claim the subject matter which applicant regards as the invention (Ans. 3).

The Examiner also rejects claim 3 under 35 U.S.C. § 112, fourth paragraph, as being of improper dependent form for failing to further limit the subject matter of the claim upon which it depends, or for failing to include all the limitations of the claim upon which it depends (Ans. 4).

I.

The Examiner has rejected claims 1 and 3 under 35 U.S.C. § 112, second paragraph, as indefinite (Ans. 3). The Examiner finds that

> the *Markush* group is so expansive that one of ordinary skill in the art may not reasonably determine the metes and bounds of the claimed invention. Consequently, since the *Markush* group, *DMOF-1-N_3 organic-inorganic matrix, of three dimensional structure, containing an inorganic network of zinc-based metal centers connected to one another by the organic N_3-bdc ligand, -O_2C-C_6H_3-N_3-CO_2 and the organic DABCO ligand $C_6H_{12}N_2$,* encompasses such a vast number of distinct alternative species, the claim is rendered indefinite under 35 U.S.C. § 112, second paragraph, since, one of ordinary skill in the art may not reasonably determine the metes and bounds of the claim, due to an inability to envision all of the members of the *Markush* group.

Ans. 3–4 (italics in original).

According to the Examiner,

> the *claims* fail to *distinctly* identify the chemical composition containing *Zn_2(-O_2C-C_6H_3-N_3-CO_2-)$_2$($C_6H_{12}N_2$)* as a base

> pattern with such *particularity* that one of ordinary skill would *reasonably* envision a three-dimensional structure, where (1) every zinc [] atom is surrounded and linked to four oxygen []atoms coming from four *bdc-NH_2* organic ligands, and (2) each zinc [] atom is further surrounded and linked to one nitrogen [] atom coming from a *DABCO* organic ligand . . . the *claims* fail to *distinctly* correlate the Wang, et al.[3] evidentiary constitutional isomer representative of a chemical composition containing the empirical formula, *Zn_2(-O_2C-C_6H_3-N_3-CO_2-)$_2$(C_6H_{12})N_2)*, as a base pattern, with the instantly recited x-ray diffraction diagram data . . .

(Ans. 6–7) (italics in original).

The Examiner further states that "by relying on Wang [], appellant deviates from both the instant specification and the claims to arrive at one of over *100* constitutional isomers representative of a chemical composition containing the empirical formula, *Zn_2(-O_2C-C_6H_3-N_3-CO_2-)$_2$(C_6H_{12})N_2)*, as a base pattern." *Id.* at 8 (italics in original).

Finally, the Examiner states a number of patent claim construction axioms that the "[a]ppellant should note", including that a "*claim referring to the specification is improper,*" "*[I]somers having the same empirical* ***formula,*** *but different structures, are not necessarily considered equivalent by chemists skilled in the art and*

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[3] Wang et al., *Accessing Postsynthetic Modification in a Series of Metal-Organic Frameworks and the Influence of Framework Topology on Reactivity*, 48 INORG. CHEM. 296–306 (2009), is an evidentiary reference submitted by Appellants that discloses a molecule similar to the claimed invention. Appellants relied on Wang et al. as evidence of the definiteness of the claimed invention.

therefore are not necessarily suggestive of each other," that a claim should be rejected where *"the scope of the claims can't be determined when considered in light of the specification*", or where the claim may be "*amenable to* ***two or more*** *plausible claim constructions*", and that the "specification cannot impose a further limitation upon the plain meaning of the claim language." (*Id.* at 8–9, emphasis in original).

Appellants argue among other things that "one of ordinary skill in the art, from the description of the ligands surrounding the zinc atom, and the x-ray diffraction diagram, has a full and complete understanding of the me[te]s and bounds of the claim" and that the Examiner has not provided reasons "why the present claims cannot be determined when considered in light of the specification." App. Br. 3–4. According to Appellants, "an x-ray diffraction diagram, alone, will be sufficient to characterize the solid so as to result in definiteness under the statute." App. Br. 5. With regard to the additional axioms noted by the Examiner, Appellants dispute that the various issues raised apply to the claims at issue (e.g., "[i]t is not understood why this allegation is made since the claims do not refer to the specification"). Rep. Br. 2.

The issue with respect to this rejection is whether the evidence of record supports the Examiner's conclusion that the Markush group of claims 1 and 3 is unreasonably expansive such that it renders claims 1 and 3 indefinite.

Principles of Law

"Any analysis [of compliance with 35 U.S.C. § 112, first and second paragraphs] should begin with the determination of whether the claims satisfy the requirements of the second paragraph. . . . [T]he claims must be analyzed first in order to determine exactly what subject matter they encompass." *In re Moore*, 439 F.2d 1232, 1235 (CCPA 1971). "[B]readth is not to be equated with indefiniteness." *In re Miller*, 441 F.2d 689, 693 (CCPA 1971).

Analysis

The Specification discloses that the "The DMOF-1-N_3 crystallized hybrid solid according to the invention [] has a chemical composition that has $Zn_2(-O_2C-C_6H_3-N_3-CO_2-)_2(C_6H_{12}N_2)$ for its base pattern. This pattern is repeated n times, with the value of n based on the crystallinity of said solid." Spec. 9:8–11. Thus, the core inorganic-organic molecule has a precise chemical structure, with the number of repeating units varying according the size of the crystallized hybrid solid.

The *Markush* group of claim 1 states "at least the lines in the table below" must be present in the x-ray diffraction pattern of the claimed solid. Therefore, the 19 x-ray diffraction lines enumerated in claim 1 lines act as a "fingerprint" to guide one of skill in the art in identifying members of the claimed genus using elements familiar to those of skill in the art. Pursuant to *In re Moore*, 439 F.2d at 1235, the specificity of the claim terms here permits one of skill in the art to determine the subject matter encompassed because the claim elements

define the chemical structure of the base solid (varying only by size) and define a minimum set of additional characteristics (x-ray diffraction signature) that are required for the molecule to fall within the claim. We agree with the Appellants that the Examiner has not sufficiently articulated the rationale for the rejection because the Examiner has not identified why one of skill in the art would be unable to envision all of the members of the *Markush* group given the specific elements in the claim. That the claim may be "broad" is not alone a reason to find it indefinite. *In re Miller*, 441 F.2d at 693. Accordingly, the Examiner has not carried the burden of establishing a prima facie case of indefiniteness and we reverse the Examiner's rejection of claims 1 and 3 under 35 U.S.C. § 112, second paragraph, as indefinite.

II

The Examiner rejected claim 3 under 35 U.S.C. § 112, fourth paragraph, as being of improper dependent form (Ans. 4). The Examiner finds that

> the crystalline hybrid solid, as recited in claim 1, *is indexed in a quadratic system of the P4/m space group with, as mesh parameters, a = b = 10.837 Å; c = 9.614 Å, and alpha=beta=gamma=90°*. Consequently, since, the crystalline hybrid solid, as recited in claim 1, *being indexed in a quadratic system of the P4/m space group with, as mesh parameters, a = b = 10.837 Å; c = 9.614 Å, and alpha=beta=gamma=90°,* fails to result in a further structural limitation to the crystalline hybrid solid, as recited in claim 1, and/or fails to include all the limitations of the crystalline hybrid solid, as recited in claim 1, it is not given patentable weight and thus, renders the instant

> dependent claim improperly dependent under 35 U.S.C. § 112, fourth paragraph.

(Ans. 4–5, italics in original).

The Examiner finds "dependent claim 3 . . . fails to further limit the *indefinite* subject matter of the claim upon which it depends, since, it fails to *clearly* result in a further patentably distinct structural limitation to the *indefinite* crystalline hybrid solid, as recited in claim 1, and thus is rendered improperly dependent under 35 U.S.C. § 112, fourth paragraph." Ans. 10.

Appellants contend that "claim 3 reciting further parameters of the solid does . . . result in a further patentably distinct structural limitation to the crystalline hybrid solid of claim 1. No reasons why this is not the case had been offered, and none exist." App. Br. 5.

The issue with respect to this rejection is whether the evidence of record supports the Examiner's conclusion that claim 3 is of improper dependent form for failing to further limit the subject matter of claim 1.

Analysis

The Specification discloses:

> the DMOF-1-N_3 crystallized hybrid solid according to the invention is indexed in a quadratic system of the P4/m space group with, as mesh parameters, a = b = 10.837 Å; c = 9.614 Å, and alpha=beta=gamma=90°, with these definitions (quadratic system, space group and mesh parameters) being well known to one skilled in the art.

Spec 8:9–12.

As with the x-ray diffraction pattern above, the claim element "indexed in a quadratic system of the P4/m space group with, as mesh

parameters, a = b = 10.837 Å; c = 9.614 Å, and alpha=beta=gamma=90°" provides additional information to permit one of skill in the art to identify members of the claimed genus. Pursuant to *In re Moore*, 439 F.2d at 1235, the claim terms here permit one of skill in the art to determine the subject matter encompassed by claim 3 because the claim element at issue further identifies the structure of the base solid by defining a precise set of characteristics (quadratic system indices) that are required for the molecule to fall within the claimed category.

We agree with Appellants that the Examiner has not met the burden to identify reasons why the claim fails to further limit claim 1, which we held above was sufficiently definite. Accordingly, the Examiner has not carried the burden of establishing a prima facie case of indefiniteness and we reverse the Examiner's rejection of claim 3 under 35 U.S.C. § 112, fourth paragraph, as being of improper dependent form.

SUMMARY

We reverse the rejection of claims 1 and 3 under 35 U.S.C. § 112, second paragraph, for indefiniteness.

We reverse the rejection of claim 3 under 35 U.S.C. § 112, fourth paragraph, as being of improper dependent form.

REVERSED