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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte EBEN BAYER and GAVIN R. McINTYRE

Appeal 2019–004790
Application 15/266,760
Technology Center 1600

Before ERIC B. GRIMES, ULRIKE W. JENKS, and
ROBERT A. POLLOCK, *Administrative Patent Judges*.

POLLOCK, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant¹ appeals under 35 U.S.C. § 134(a) from the Examiner’s rejections of claims 1 and 6, 7, 12, and 13.² We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

¹ We use the word Appellant to refer to “applicant” as defined in 37 C.F.R. § 1.42(a). According to Appellant, the Real Party in Interest is Ecovative Design LLC. App. Br. 1.

² Although Appellant refers to claim 14 in the Appeal Brief, the Examiner subsequently withdrew the rejection of claims 1, 6 and 12–14 for nonstatutory double patenting in view of claims 1–4 of US Pat No. 8,999,687 (B2) alone, and the rejection of claims 1 and 6–14 for nonstatutory double patenting in view of claims 1–4 of US Pat No. 8,999,687 (B2) in view of Hagaman (US 7,073,306), such that claims 8–11 and 14 are no longer subject to appeal. *See* Ans. 3.

STATEMENT OF THE CASE

Appellant’s invention relates to self-supporting composite materials comprising discrete particles bonded together with a network of fungal mycelia. Claim 1, the sole independent claim on appeal, reads as follows:

1. A self-supporting composite material comprising
 - a substrate of discrete particles; and
 - a network of interconnected mycelia cells extending through and around all of said discrete particles to fully colonize said substrate and bond said discrete particles together.

The following grounds of rejection are before us for review:

Claims 1 and 6 stand rejected under pre-AIA 35 U.S.C. § 102(a) as anticipated by Mushroom Growers’³ as evidenced by universaloilfield.org.⁴

Claims 1, 6, 7, 12, and 13 stand rejected under pre-AIA 35 U.S.C. § 102(a) as anticipated by Stamets.⁵

Claims 1, 6, and 12 stand rejected under pre-AIA 35 U.S.C. § 102(a) as anticipated by Rai.⁶

Claims 1, 6, and 7 stand rejected under 35 U.S.C § 101 as directed to non-statutory subject matter.

³ Mushroom Growers’ Handbook 2: *Shiitake Cultivation*, MushWorld, pp. 73–90 (2005).

⁴ <http://www.universaloilfield.org/shredded-cedar-fibre-saw-dust/58/> (downloaded Aug. 23, 2018).

⁵ Stamets, P. *Mycelium Running*, 2005, Ten Speed Press, 356 pages, pp. 18, 56, 58, 59, 85, 149, 157, 160, and 291.

⁶ Chapter 21, “*Production of Edible Fungi*” of “*Fungal Biotechnology in Agricultural, Food, and Environmental Applications*” Edited by Dilip K. Arora, Publisher Marcel Dekker, Inc., 2004, pp. 383-404.

Claim 1 stands provisionally rejected on grounds of nonstatutory double patenting of at least claims 1 and 5 of co-pending U.S. Application No. 15/266,640.⁷

ANALYSIS

35 U.S.C. § 102(a)

Mushroom Growers’ as Evidenced by Universaloilfield.com

According to the Examiner, claims 1 and 6 are anticipated under pre-AIA § 102(a) because:

Mushroom Growers’ disclose a self-supporting composite material comprising a substrate of discrete particles said particles are in the form of fibers (hardwood sawdust substrate, which is fibrous) (p.75 last paragraph “Substrate formulation”, and Table 3 formulations), and a network of interconnected mycelia cells extending through and around all of said discrete particles to fully colonize said substrate and bond said discrete particles together (sawdust substrate block fully colonized by shiitake mycelia, mycelial block, composite taken the shape of the container in which it was placed in) (see for example, p.77, Figure 4B and 4C., corresponding legends, and p. 76 3rd paragraph “spawn run ... ”).

Final Act. 12. With respect to claim 6, the Examiner further points to universaloilfield.org as evidence that sawdust is fibrous. *Id.*

In determining that Mushroom Growers’ anticipates claims 1 and 6, the Examiner interprets the claim language, “a network of interconnected mycelia cells extending through and around all of said discrete particles to

⁷ Because this rejection is provisional, we decline to reach it here. *See Ex parte Moncla*, 95 USPQ2d 1884, 1885 (BPAI 2010); *Ex Parte Jerg*, No. 2011-000044, 2012 WL 1375142, at *3 (Apr. 13, 2012) (Informative Decision).

fully colonize said substrate and bond said discrete particles together,” to mean “a substrate of discrete particles that is fully or completely colonized by mycelia.” *See, e.g.*, Ans. 8. The Examiner supports this interpretation with reference to figure 6 of the Specification and the corresponding description stating that “engineered substrate 6 has been fully colonized and all of the discrete particles bonded by mycelia 7.” *Id.*; Spec. 14. As we understand the rejection, the Examiner equates “fully colonized” with a state in which all of the discrete substrate particles are bound together. Neither the Specification, nor any other evidence provided by the Examiner, however, convince us that “fully colonized” necessarily means that all discrete substrate particles are bound together. Moreover that claim 1 refers to mycelia cells extending through and around all of said discrete particles to (1) “fully colonize said substrate *and*” (2) “bond said discrete particles together,” this language admits at least the possibility of two independent and separable conditions (emphasis added); *see In re Wilson*, 424 F.2d 1382, 1385 (CCPA 1970); *see also* MPEP § 2143.03 (“All words in a claim must be considered in judging the patentability of that claim against the prior art.”).

In an earlier appeal on a related case, we addressed claim language reciting a method in which fungal hyphae “form a network of interconnected mycelia cells through and around [a substrate of] discrete particles thereby bonding said discrete particles together to form a self-supporting composite material.” *See* Appeal 2016-000561, Decision dated February 29, 2016 at 2, 5. Focusing on “said discrete particles,” we interpreted this language as “not requiring that *all* substrate particles be bound together,” such that the claim at issue was anticipated by Mushroom Growers’. *See* Appeal 2016-000561

Decision on Rehearing dated April 12, 2016 at 2. Notably, Appellant in that case relied on declaration testimony indicating that the process according to Mushroom Growers’ resulted in a self-supporting structure in which the interior portion was highly friable and, thus, did not have all substrate particles bound together. *See* Appeal 2016-000561, Decision at 4; Decision on Rehearing at 3.

Reflecting our Rehearing Decision, the claims presently on appeal recite “a network of interconnected mycelia cells extending through and around *all* of said discrete particles to . . . bond said discrete particles together.” Claim 1 (emphasis added). Consistent with our Decision in Appeal 2016-000561, we interpret the instant claims as requiring that mycelia cells penetrate and surround (i.e., “extend[] through and around”) *all* of the discrete particles of substrate, thereby binding all of the discrete particles of substrate together. But in equating “fully colonized” with binding together all discrete particles in a substrate, the Examiner has not established that the “fully colonized” substrates in Mushroom Growers’ meet all limitations of independent claim 1 from which claim 6 depends. On the present record, therefore, we reverse the rejections.⁸

Stamets

In determining that Stamets anticipates claims 1, 6, 7, 12, and 13 under pre-AIA 35 U.S.C § 102(a), the Examiner states:

Stamets disclose a self-supporting composite material comprising a substrate of discrete particles said particles are in the form of fibers (sawdust, which is fibrous) (see for example,

⁸ Accordingly, we need not reach Appellant’s argument that the Examiner is collaterally estopped from finding claim 1 is anticipated by Stamets. *See* App. Br. 10–12.

p. 102 left-hand column 2nd paragraph) and a network of interconnected mycelia cells extending through and around all of said discrete particles to fully colonize said substrate and bond said discrete particles together (burlap bags stuffed with sawdust, dowel, and spawn, the mycelium fully colonizes) (see for example, p. 291 Fig. 346, its legend, p. 291 left-hand column 3rd paragraph, p. 18 Figures 25 & 26 and legends, p. 58 left-hand column 1st paragraph, p. 59 right-hand column 1st paragraph, p. 85 Fig. 93, its legend, and p. 85 left-hand column last paragraph -continued on the right-hand paragraph),

Ans. 10. As with the rejection over Mushroom Growers', the Examiner, absent adequate justification, equates the claim term "fully colonized" with binding together all discrete particles in a substrate. *See id.* Because the Examiner has not established that the "fully colonized" substrates in Stamets meet all limitations of independent claim 1 from which claims 6, 7, 12, and 13 depend, we reverse the rejections.

Rai

In determining that Rai anticipates claims 1, 6, and 12 under pre-AIA 35 U.S.C § 102(a), the Examiner finds that "Rai et al. disclose a mixture of a substrate of discrete particles and a nutrient material, and further disclose to grow hyphae and to fully colonize the substrate." Ans. 13. In particular, the Examiner states:

Rai disclose forming a mixture of a substrate of discrete particles and a nutrient material (compost/substrate is seeded with spawn and filled in polybags with supplements added), spawn preparation, spawn is a term used for vegetative growth of mushroom mycelium, grain spawn, growing mushroom mycelium on substrate/cereal grains in containers or breathing bags that allow gaseous exchange wood chips and saw dust-cereal bran mixtures, ... , added to glass bottles or polypropylene bags (p. 388 1st paragraph), and further disclose substrate consists of sawdust, cotton seed hulls, bran, and other

cereal grains, for example, ingredients sawdust 78%, bran 20%, CaCO₃, and sucrose 1 % (a mixture of a substrate of discrete particles and a nutrient material). Rai et al. further disclose a mycelial colonization and the compost is completely colonized, complete colonization and white mycelium becomes visible.

Id. at 12–13.

As discussed above in connection with Mushroom Growers’ and Stamets, the Examiner fails to explain why the claim term “fully colonized” equates or encompasses a state in which mycelia cells penetrate and surround all of the discrete particles of a substrate, thereby binding all of the discrete particles of substrate together. *See id.* 12. Because the Examiner has not established that the “fully colonized” substrates in Rai meet all limitations of independent claim 1 from which claims 6 and 12 depend, we reverse the rejections.

35 U.S.C § 101

The Examiner rejects claims 1, 6, and 7 under 35 U.S.C § 101 as reciting unpatentable subject matter. *See* Final Act. 3 (referencing Office Action dated 08/31/2018 (“OA”)). The Examiner bears an initial burden of factually supporting an articulated rejection. *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992). On the present record, we disagree with the Examiner’s findings and conclusion that the claims are directed to patent-ineligible subject matter.

According to the Examiner, the rejected claims “recite or involve a judicial exception, a natural product, i.e., a composite material comprising a substrate of discrete particles in the form of fibers and a network of interconnected mycelia cells extending through and around all of said discrete particles to fully colonize said substrate and bond said discrete

particles together, claims as a whole do not recite or involve something significantly more than the judicial exception.” OA, 3. In particular, the Examiner states that:

a composite material comprising a fully colonize[d] substrate of discrete particles in the form of fibers and a network of interconnected mycelia cells extending through and around all of said discrete particles to and bond said discrete particles together (wood chips which are discrete particles in the form of fibers fully colonized by growing mycelium outdoors and binding together the subterrain, etc.), and elements in said substrate having a dimension 5 times larger than the mean diameter of the largest average particle size (wood pieces at least 5 times larger than smaller chips) is a nature-based product and a very well-known composite material (see for example, p. 291 Fig. 346, its legend, and lefthand column 3rd paragraph, p. 18 Figures 25 and 26 and legend, p. 56 left-hand column 1st paragraph, p. 58 left-hand column 1st paragraph, p. 59 right-hand column 1st paragraph, p. 85 Fig. 93, its legend, and p. 85 left-hand column last paragraph -continued on the right-hand paragraph of “Mycelium Running”, by Paul Stamets, 2005, also see Mushroom Growers’, and Rai cited in 102 rejections below for more detail), and the claimed composite material does not include any additional features that could add significantly more to the exceptions.

Id. at 3–4; *see also* Final Act. 3–4; Ans. 5–7.

For the purpose of this analysis, we need not address the Examiner’s underlying assumption that Stamets, Mushroom Growers’ and Rai disclose embodiments meeting the limitations of claims 1, 6, and 7. *But see* section 102(a) analysis, above. Instead, we analyze this case under the two-step framework described by the Supreme Court in *Mayo Collaborative Services v. Prometheus Laboratories, Inc.*, 566 U.S. 60 (2012) and *Alice Corp. v. CLS Bank Int’l*, 573 U.S. 208 (2014) taking into consideration the “2019 Revised Patent Subject Matter Eligibility Guidance” (“Revised Guidance”),

issued by the Director of the USPTO on January 7, 2019 and the October 2019 Update to the Revised Guidance (“Update”), which provides further details regarding how the Patent Office is to analyze patent-eligibility questions under 35 U.S.C. § 101. 84 Fed. Reg. 50–57 (Jan. 7, 2019); 84 Fed. Reg. 55,942 (Oct. 18, 2019).

Accordingly, we first examine whether evidence of record shows that the compositions of claims 1, 6, and 7 are directed to a product of nature. Not every claim that involves natural products is directed to patent-ineligible subject matter. As the Supreme Court noted “[t]he rule against patents on naturally occurring things is not without limits, ... for ‘all inventions at some level embody, use, reflect, rest upon, or apply laws of nature, natural phenomena, or abstract ideas,’ and ‘too broad an interpretation of this exclusionary principle could eviscerate patent law.’” *Association for Molecular Pathology v. Myriad Genetics, Inc.*, 569 U.S. 576, 589 (2013) (quoting *Mayo*, 566 U.S. at 71). Thus, “[d]iscoveries that possess ‘markedly different characteristics from any found in nature’ [] are eligible for patent protection.” *In re Roslin Institute*, 750 F.3d 1333, 1336 (Fed. Cir. 2014 (quoting *Diamond v. Chakrabarty*, 447 U.S. 303, 310 (1980))).

In asserting that the instant claims read on natural products, the Examiner points to “evidence . . . presented on pages 3 and 11 of the Office action mailed on 11/27/2018.” Final Act. 5. The referenced citations relate to, e.g., fungal mycelia inoculated onto various substrates, specifically, wood chips (Stamets, 18), wood chips stuffed in burlap bags (Stamets, 291), “truckloads of wood chips [dumped] into a depression” (Stamets, 59), and wood chips layered onto gravelly sandy soil (Stamets 85). *See id.* In addition to citing Stamets, the Examiner makes passing reference to

Mushroom Growers’ and Rai, but does not indicate how those documents read on the rejected claims. *See* OA, 3–4. As discussed in the context of § 102(a), above, these references generally teach methods of growing mushrooms in bags of supplemented sawdust-based substrate (Mushroom Growers’, 88) or “wood chips and saw dust cereal-bran mixtures. . . in glass bottles/ polypropylene bags” (Rai, 391).

“A claim to a manufacture or composition of matter made from a natural product is not directed to the natural product where it has different characteristics and ‘the potential for significant utility.’” *Natural Alternatives Int’l, Inc. v. Creative Compounds, LLC*, 918 F.3d 1338, 1348 (Fed. Cir. 2019) (quoting *Diamond v. Chakrabarty*, 447 U.S. 303, 310 (1980)). In the present case, the Examiner has not established that the wood chips and other substrates taught by Stamets, Mushroom Growers’, and Rai are natural products. To the contrary, it would appear that the referenced “truckloads of woodchips,” supplemented sawdust-based substrates, “cereal-bran mixtures” etc., are the result of human activity. Likewise, the Examiner does not address whether the referenced materials have the potential for significant utility. Here, for example, it would appear that Stamets’ reference to wood chips layered onto gravelly sandy soil has utility in “adding structural resilience to the road’s subsurface,” (Stamets 85), whereas “wood chips stuffed in burlap bags” (Stamets 291) and the various supplemented media set forth in Mushroom Growers’ and Rai find utility in the cultivation of edible mushrooms. *See* Reply Br. 4 (arguing that “a road subsurface is not a natural product but is instead a man-made material).

Further, claims 1, 6, and 7, are not directed to substrate particles alone, but to a self-supporting composite material comprising substrate

particles and fungal mycelia in a particular arrangement. Here, the Examiner does not adequately explain how, for example, a road subsurface comprises a self-supporting composite material, or how the various particular substrates and fungal cultures form “a network of interconnected mycelia cells extending through and around all of said discrete particles to fully colonize said substrate and bond said discrete particles together,” as required by independent claim 1. Likewise, to the extent the Examiner cites passages referencing a “mycelial mat” (Stamets, 56), a “cellular net,” and “microfiltration membranes” (Stamets 58), the Examiner provides insufficient analysis as to how those terms or passages correspond to the elements of rejected claims, and such relationships are not self-evident from the portions of Stamets of record. *See, e.g.*, OA, 3–4. Thus, the Examiner’s citation to pages 56 and 58 of Stamets also fail to satisfy the Office’s burden of showing unpatentability.

For the reasons set forth above, the Examiner has not established that claims 1, 6, and 7 are drawn to unpatentable subject matter under 35 U.S.C § 101, and we decline to make such a determination on the present record. Accordingly, we reverse the rejection.

SUMMARY

“The PTO carries its procedural burden of establishing a prima facie case when its rejection satisfies 35 U.S.C. § 132, in ‘notify[ing] the applicant . . . [by] stating the reasons for [its] rejection, or objection or requirement, together with such information and references as may be useful in judging of the propriety of continuing the prosecution of [the] application.’” *In re Jung*, 637 F.3d 1356, 1362 (Fed. Cir. 2011). On the record before us, and for the reasons set forth above, the Examiner has not satisfied the burden to

show that the challenged claims are unpatentable by a preponderance of the evidence.

DECISION SUMMARY

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1, 6	102(a)	Mushroom Growers', universaloilfield.org		1, 6
1, 6, 7, 12, 13	102(a)	Stamets		1, 6, 7, 12, 13
1, 6, 12	102(a)	Rai		1, 6, 12
1, 6, 7	101	Eligibility		1, 6, 7
Overall Outcome				1, 6, 7, 12, 13 ⁹

REVERSED

⁹ As noted above, we do not address the provisional rejection of claim 1 on grounds of nonstatutory double patenting.