

United States Court of Appeals for the Federal Circuit

IN RE: STEPAN COMPANY,
Appellant

2016-1811

Appeal from the United States Patent and Trademark
Office, Patent Trial and Appeal Board in No. 12/456,567.

Decided: August 25, 2017

THOMAS J. WIMBISCUS, McAndrews, Held & Malloy,
Ltd., Chicago, IL, argued for appellant. Also represented
by GEORGE WHEELER.

JEREMIAH HELM, Office of the Solicitor, United States
Patent and Trademark Office, Alexandria, VA, argued for
appellee Joseph Matal. Also represented by NATHAN K.
KELLEY, THOMAS W. KRAUSE, FRANCES LYNCH.

Before LOURIE, MOORE, and O'MALLEY, *Circuit Judges*.

Opinion for the court filed by *Circuit Judge* MOORE.

Dissenting opinion filed by *Circuit Judge* LOURIE.

MOORE, *Circuit Judge*.

Stepan Company (“Stepan”) appeals from a decision of
the Patent Trial and Appeal Board (“Board”) affirming the

examiner's rejection of claims 1–31 of U.S. Patent Application No. 12/456,567 (“the ’567 application”). For the reasons discussed below, we vacate and remand.

BACKGROUND

The ’567 application is directed to herbicidal formulations containing glyphosate salt with a surfactant system. Surfactants can enhance glyphosate’s effectiveness as an herbicide by providing better adherence to leaves, thereby enhancing penetration. According to the specification, “[t]he present invention is based on the unexpected discovery that surfactant systems comprising dialkoxylated alkylamine, water miscible solubilizer and amine oxide allow for formulation of ultra-high loaded (‘high-strength’) glyphosate salt concentrates possessing high or no cloud points.” J.A. 29 ¶ 13. A cloud point is the temperature at which a solution becomes cloudy due to the surfactants becoming insoluble and separating into layers. Cloudiness can be avoided if the cloud point is higher than the solution’s temperature or if the solution is cooled before adding the surfactant. The specification explains that because glyphosate salt is created at about 75°C, it is advantageous to formulate glyphosate with a surfactant system exhibiting a high cloud point to “obviate the necessity of waiting for the temperature of the glyphosate salt reaction product to cool down.” J.A. 27–28 ¶ 7. Surfactant systems with high cloud points or no cloud point, in which the solution never becomes cloudy, allow for quicker formulation of glyphosate concentrates and thus quicker delivery to the market. *Id.*

Claim 1 is the sole independent claim:

1. An ultra-high load, aqueous glyphosate salt-containing concentrate comprising:
 - a. water;
 - b. glyphosate salt in solution in the water in an amount greater than about 39

weight percent of acid equivalent, based on the weight of the concentrate, said glyphosate salt being selected from the group consisting of the isopropylamine salt of glyphosate, the potassium salt of glyphosate, mixtures of the isopropylamine salt and the potassium salt of glyphosate and mixtures of the potassium salt and the ammonium salt of glyphosate;

c. a surfactant system in an amount ranging from about 1 to about 20 weight percent, based on the weight of the concentrate, comprising:

i. from about 10 to about 60 weight percent, based on the weight of the surfactant system, of one or more dialkoxylated alkylamines;

ii. from about 5 to about 30 weight percent, based on the weight of the surfactant system, of one or more water miscible solubilizers; and

iii. from about 30 to about 75 weight percent, based on the weight of the surfactant system, of one or more amine oxides;

said concentrate having a cloud point above at least 70°C. or no cloud point when the concentrate is heated to its boiling point.

Several dependent claims further limit the surfactant system of claim 1. For example, claims 20–24 specify that the dialkoxylated alkylamine is diethoxylated tallow amine. Claim 26 specifies that the water miscible solubilizer is a polyalkylene glycol with a molecular weight from about 200 to about 1000, and claim 27 further limits the water miscible solubilizer to polyethylene glycol.

Claim 29 states the amine oxide is selected from a group of six amine oxides, among which includes lauryl dimethylamine oxide.

The examiner rejected claims 1–25 and 28–31 for obviousness over U.S. Pub. No. 2003/0087764, titled “Stable Liquid Pesticide Compositions” (“Pallas”). Pallas discloses highly-loaded glyphosate compositions containing surfactants having a cloud point of at least 50°C and ideally 60°C. Relevant to Stepan’s appeal, the examiner found Pallas teaches preferred surfactants “includ[ing] the amine oxide lauryl dimethylamine oxide (Chemoxide [L70]) and the dialkoxylated amine diethoxylated tallow amine (Ethomeen T).” J.A. 653 (citing J.A. 750–52 ¶¶ 115–16, 119–20). She found that Pallas teaches a surfactant component “may optionally contain glycols such as polypropylene glycol.” J.A. 653 (citing J.A. 757–58 ¶¶ 152–55). For the claimed ranges of the surfactants, she found “it is routine optimization to select and adjust the surfactants to this range since Pallas teaches the surfactant component comprises any combination of surfactants.” J.A. 653. The examiner found Pallas does not teach a cloud point above 70°C but that achieving this cloud point would be a matter of “optimizing the formulation” because Pallas teaches the ideal cloud point should be above 60°C. J.A. 653 (citing J.A. 735 ¶ 29).

The examiner rejected claims 26 and 27 over Pallas in view of U.S. Patent No. 5,843,866, titled “Pesticidal Compositions Comprising Solutions of Polyurea and/or Polyurethane” (“Parker”). The examiner found Pallas does not teach the specific water miscible solubilizer polyethylene glycol with a molecular weight from about 200 to about 1000, but Parker discloses polyethylene glycol 600 in a surfactant system mixed with tallow amine and used with glyphosate. She found a skilled artisan “would have been motivated to make the formulation because Parker et al. teach that surfactant systems for glyphosate were known to have polyethylene glycol 600

with tallow amine surfactants.” J.A. 656–57.

The Board adopted the examiner’s findings in support of rejection and agreed with her conclusion that claims 1–31 would have been obvious. It determined Stepan failed to rebut the examiner’s *prima facie* case of obviousness and affirmed the examiner’s rejections. Stepan appeals. We have jurisdiction pursuant to 28 U.S.C. § 1295(a)(4)(A).

DISCUSSION

We review the Board’s factual findings for substantial evidence and its legal determinations de novo. *In re Van Os*, 844 F.3d 1359, 1360 (Fed. Cir. 2017). Obviousness is a question of law based on subsidiary findings of fact. *Id.* An obviousness determination requires finding both “that a skilled artisan would have been motivated to combine the teachings of the prior art . . . and that the skilled artisan would have had a reasonable expectation of success in doing so.”¹ *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367–68 (Fed. Cir. 2016). Whether a person of ordinary skill in the art would have been motivated to modify or combine teachings in the prior art, and whether he would have had a reasonable expectation of success, are questions of fact. *Id.* at 1366.

¹ The dissent suggests the PTO need not establish a reasonable expectation of success where there is a single prior art reference. *See* Dissent at 3. We do not agree. Whether a rejection is based on combining disclosures from multiple references, combining multiple embodiments from a single reference, or selecting from large lists of elements in a single reference, there must be a motivation to make the combination and a reasonable expectation that such a combination would be successful, otherwise a skilled artisan would not arrive at the claimed combination.

The Board found Stepan failed to provide evidence that it would not have been routine optimization for a skilled artisan to select and adjust the claimed surfactants to achieve a cloud point above at least 70°C “since Pallas teaches the surfactant component comprises any combination of surfactants” and “teaches the ideal cloud point should be above 60[°C].” J.A. 8–9. It rejected evidence in Pallas that certain surfactant combinations failed the cloud point test at 60°C because it concluded that these failures did not involve the claimed surfactants. J.A. 9. It found Stepan failed to establish the criticality of its claimed range of surfactants, showing neither that a 70°C cloud point was unexpectedly good nor that the prior art was silent on the connection between optimizing surfactants and cloud point. J.A. 10. Because the Board failed to adequately articulate its reasoning, erroneously rejected relevant evidence of nonobviousness, and improperly shifted to Stepan the burden of proving patentability, we vacate the Board’s decision that claims 1–31 of the ’567 application would have been obvious.

The Board failed to explain why it would have been “routine optimization” to select and adjust the claimed surfactants and achieve a cloud point above at least 70°C. *See* J.A. 8–9. “The agency tribunal must make findings of relevant facts, and present its reasoning in sufficient detail that the court may conduct meaningful review of the agency action.” *In re Lee*, 277 F.3d 1338, 1346 (Fed. Cir. 2002). Stating that a person of ordinary skill in the art would have arrived at the claimed invention through routine optimization falls short of this standard. Missing from the Board’s analysis is an explanation as to *why* it would have been routine optimization to arrive at the claimed invention. Similar to cases in which the Board found claimed inventions would have been “intuitive” or “common sense,” the Board must provide some rational underpinning explaining why a person of ordinary skill in

the art would have arrived at the claimed invention through routine optimization. *See, e.g., Van Os*, 844 F.3d at 1361 (“Absent some articulated rationale, a finding that a combination of prior art would have been ‘common sense’ or ‘intuitive’ is no different than merely stating the combination ‘would have been obvious.’”); *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1362 (Fed. Cir. 2016) (“[R]eferences to ‘common sense’ . . . cannot be used as a wholesale substitute for reasoned analysis and evidentiary support . . .”). Absent some additional reasoning, the Board’s finding that a skilled artisan would have arrived at the claimed invention through routine optimization is insufficient to support a conclusion of obviousness.

The PTO argues substantial evidence supports the Board’s finding that formulating the claimed surfactant system with a cloud point above at least 70°C would have been a matter of routine experimentation. It argues the thousands of formulations screened by Pallas indicate the routine nature of combining the surfactants and testing their cloud point. PTO Br. 24 (citing generally J.A. 761–99 ¶¶ 194–386). It argues these tests can be easily conducted in a short period of time and would have been tested by a skilled artisan as a matter of course. Oral Arg. at 28:03–42. And it argues a skilled artisan would have selected the claimed surfactant system among those disclosed because Pallas teaches, *inter alia*, that amine oxides and dialkoxylated alkylamines are two of only four preferred surfactants. PTO Br. 21–22, 29 (citing J.A. 754 ¶ 130). This evidence could be relevant to whether there would have been a motivation to combine the claimed surfactants with a reasonable expectation of achieving a cloud point above at least 70°C. The Board, however, did not make any of these findings. We “may not accept appellate counsel’s *post hoc* rationalization for agency action.” *Lee*, 277 F.3d at 1345 (quoting *Burlington Truck Lines, Inc. v. United States*, 371 U.S. 156, 168 (1962)). We

leave it to the Board to assess these arguments on remand.

Nor did the Board articulate why a person of ordinary skill in the art would have had a reasonable expectation of success to formulate the claimed surfactant system with a cloud point above at least 70°C. The Board's purported explanation that "Pallas teaches the surfactant component comprises any combination of surfactants" and "teaches the ideal cloud point should be above 60[°C]" does not indicate whether a skilled artisan would have had a reasonable expectation of success. J.A. 8–9. "[T]o have a reasonable expectation of success, one must be motivated to do more than merely to vary all parameters or try each of numerous possible choices until one possibly arrived at a successful result." *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1365 (Fed. Cir. 2007) (quoting *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006)). Reciting Pallas' teachings that "any combination" of surfactants may be used and that a cloud point above 60°C is desired fails to illuminate why a skilled artisan would have selected the claimed combination of surfactants and reasonably expected a cloud point above at least 70°C.

Moreover, the Board undisputedly erred to the extent that it concluded the failures in Pallas did not involve the claimed surfactants. Stepan presented evidence demonstrating that none of the examples in Pallas include all three of the claimed surfactants and that the closest examples *failed* to achieve a cloud point above at least 70°C. It argued Pallas' Example 76 includes a dialkoxylated alkylamine and water miscible solubilizer, but not an amine oxide, and *failed* the cloud point test at 60°C. It argued Pallas' Example 127 includes a dialkoxylated alkylamine and amine oxide, but not a water miscible solubilizer, and *failed* the cloud point test at 60°C. The Board conflated Stepan's arguments regarding Examples 76 and 127 and held that *neither* example was rele-

vant because they “are not comparative with Pallas[] disclosed preferred amine oxide surfactants.” J.A. 9. The PTO does not dispute that Example 127 in fact contains an amine oxide, thus the Board’s basis for disregarding this evidence lacks support. In any event, because both examples contain two of the three claimed surfactants and were tested for cloud point, both examples are relevant to whether a skilled artisan would have had a reasonable expectation of success to achieve a cloud point above at least 70°C with the claimed surfactant systems.² We do not reach in the first instance what weight these examples ought to be afforded in the Board’s obviousness analysis, but instruct the Board to consider this evidence on remand.

Lastly, the Board erred when it shifted the burden of proving patentability to Stepan. The PTO bears the burden of establishing a *prima facie* case of obviousness. *In re Deuel*, 51 F.3d 1552, 1557 (Fed. Cir. 1995). “Only if this burden is met does the burden of coming forward with rebuttal argument or evidence shift to the applicant.” *Id.* In holding that Stepan had not met its burden, the Board cited case law in which the patentee claimed a range within the prior art and had to rebut a *prima facie* case of obviousness by showing criticality of its claimed range. *See* J.A. 10. This line of case law does not apply here for two reasons. First, for the reasons discussed above, the Board did not establish a *prima facie* case of

² We note that while claim 1 recites a surfactant system comprising a dialkoxylated alkylamine, water miscible solubilizer, and amine oxide, several of the ’567 application’s dependent claims recite specific compounds within those categories of surfactants. To the extent these dependent claims are separately argued, the Board’s reasonable expectation of success analysis must extend to these specific surfactant systems.

obviousness because it failed to adequately articulate its reasoning. See *In re Kahn*, 441 F.3d 977, 986 (Fed. Cir. 2006) (“[T]o establish a *prima facie* case of obviousness based on a combination of elements disclosed in the prior art, the Board must articulate the basis on which it concludes that it would have been obvious to make the claimed invention.”). Second, Stepan’s ’567 application does not merely claim a range of surfactants that is within or overlaps with the range of surfactant systems taught by Pallas. The claimed surfactant system contains four elements. The first three elements describe the surfactants, and their respective ranges, that comprise the surfactant system. The fourth element limits the combination of those surfactants to only those combinations that produce a cloud point above at least 70°C or no cloud point at all. The cloud point thus limits and defines the scope of what surfactant combinations satisfy the claimed composition. It therefore may be that not all compositions that contain the claimed combination and range of surfactants fall within the claims. As an element of the composition claims, it was the PTO’s—not Stepan’s—burden to show that achieving a cloud point above 70°C would have been obvious to a person of ordinary skill in the art. To the extent the Board shifted the burden to Stepan to show the criticality of the cloud point element, the Board erred.

CONCLUSION

We have considered Stepan’s remaining arguments for vacatur and do not disturb the Board’s decision on those bases. For the reasons discussed above, we vacate the Board’s decision holding claims 1–31 of the ’567 application would have been obvious and remand for further proceedings consistent with this opinion.

VACATED AND REMANDED

COSTS

Costs to Stepan.

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LOURIE, *Circuit Judge*, dissenting.

I respectfully dissent. While the opinion of the Patent Trial and Appeal Board (“the Board”) was not without flaw, its conclusion that the claims of U.S. Patent Application 12/456,567 (“the ’567 application”), particularly claim 1, were obvious, was not erroneous.

Claim 1 is directed to a composition comprising water and four other components described in broad terms. A particular cloud point is not one of those components. The primary reference relied on by the Board, U.S. Pub. 2003/0087764, entitled “Stable Liquid Pesticide Compositions” (“Pallas”), disclosed compositions composed of the same components as claim 1, described in similarly broad terms.

The majority focuses its decision on the 70°C cloud point and points to the failure of examples in Pallas to recite a cloud point above at least 70°C. But a 70°C cloud point is not a component of this composition claim; it is a result, or a property. While no composition in Pallas is

described as possessing a 70°C cloud point, there is nothing in the record indicating that all compositions satisfying the component limitations of claim 1 of the '567 application achieve that result either. Indeed, the reported examples in the application include compositions that contained the components of claim 1, but had cloud points below 70°C, J.A. 42 (Example 20), or for which the cloud point was not determined, *id.* (Examples 5–9, 21–25); J.A. 43 (Examples 26–37, 50). Thus, I believe the Board was correct in holding that the broad claims of the application claim an invention that was obvious over the similarly broad disclosure of Pallas.

In fact, Pallas almost anticipates claim 1. Each broad component limitation of claim 1 is met by a similar disclosure in Pallas. *Compare* J.A. 695 (claim 1), *with* J.A. 733 (“glyphosate potassium salt”), J.A. 754 (“Some preferred cationic surfactants include alkylamine ethoxylates (including etheramines and diamines) such as tallowamine ethoxylate . . . ; and amine oxides . . .”), *and* J.A. 758 (“Nonlimiting examples of water soluble solvents include acetates, c₁₋₆ alkanols, c₁₋₆ diols, c₁₋₆ alkyl ethers of alkylene glycols and polyalkylene glycols, and mixtures thereof.”). Pallas also teaches that “[i]deally the cloud point should be 60°C. *or more* . . .” J.A. 735 (emphasis added).

The situation would be different if the claim at issue narrowly defined each of the components of the composition. In that case it could be argued that the achievement of a 70°C cloud point was a special goal of the invention, which made its achievement nonobvious and important, where the claim recited a specific composition having a unique or surprising result. No such situation appears before us.

Claiming the 70°C or more cloud point result seems to be just a means of distinguishing this composition claim from the prior art. But discovery of a new property or

result does not make a claim to what is essentially disclosed by the prior art nonobvious. These are not narrowly drawn claims to, for example, a method of achieving a 70°C or more cloud point by means of specifically defined materials. These are shotgun claims argued to be patentable by a property or result that only some of the broadly disclosed compositions have been shown to possess. *See* J.A. 42–43 (reporting cloud points above 70°C for only half of the tested examples).

Moreover, the majority focuses on the lack of a reasonable expectation of success in making any modification to Pallas to achieve the invention of claim 1, including the 70°C or more cloud point result. Even if reasonable expectation of success is a proper test in such a situation, what is the success for which there must be a reasonable expectation? Where, as here, there is a single prior art reference, there does not need to be a finding of reasonable expectation of success for those skilled in a particular art to make conventional modifications to the prior art and look for improvements in some parameter. *See In re Ethicon, Inc.*, 844 F.3d 1344, 1351 (Fed. Cir. 2017) (“The normal desire of artisans to improve upon what is already generally known can provide the motivation to optimize variables such as the percentage of a known polymer for use in a known device.”). Such improvements may be nonobvious and patentable, but they must be claimed as such, constrained by what it takes to achieve that unexpected and desirable result. But that is not the situation here.

While the majority faults the Board for not explaining itself adequately, based on reasoning with which I do not disagree, the rejection of the claims based on a reference we can plainly see, and which nearly anticipates the claims, does not in my view justify overturning the Board.

I therefore would affirm the Board’s determination that claims 1–31 would have been obvious over Pallas.

Stepan did not argue the dependent claims, except for claims 26 and 27, separately. Claims 26 and 27 have a separate ground of rejection, which I would also have affirmed.