

NOTE: This disposition is nonprecedential.

**United States Court of Appeals
for the Federal Circuit**

**KNAUF INSULATION, INC., FORMERLY KNAUF
INSULATION LLC, KNAUF INSULATION, SPRL,**
Appellants

v.

ROCKWOOL INTERNATIONAL A/S,
Appellee

2016-1184

Appeal from the United States Patent and Trademark
Office, Patent Trial and Appeal Board in No. 95/000,674.

Decided: February 27, 2017

JOSHUA PAUL LARSEN, Barnes & Thornburg LLP, In-
dianapolis, IN, argued for appellants.

DAVID CLAY HOLLOWAY, Kilpatrick Townsend &
Stockton LLP, Atlanta, GA, argued for appellee. Also
represented by COURTNEY DABBIERE, DEAN W. RUSSELL,
TIFFANY L. WILLIAMS.

Before REYNA, TARANTO, and HUGHES, *Circuit Judges*.

REYNA, *Circuit Judge*.

Knauf Insulation, Inc. (“Knauf”) appeals from the decision of the United States Patent Trial and Appeal Board (“Board”) affirming the rejection of claims 21–26 of U.S. Patent No. 7,854,980 (“980 patent”) as obvious under 35 U.S.C. § 103. The Board determined that claims 21–26 are inherent in the prior art. Because the Board’s decision is supported by substantial evidence, we *affirm*.

BACKGROUND

1. The ’980 Patent

The ’980 patent relates to certain packaged mineral fiber insulating material. J.A. 30. Fiber insulation requires a binder component to hold its fibers together. The ’980 patent states that, prior to 2010, the industry standard for fiber insulation binding was based on phenol formaldehyde. ’980 patent, col. 1 ll. 18–20. Although formaldehyde provided some desirable qualities in insulation, the industry began to look to other binding agents in light of formaldehyde’s environmental effects. *Id.* col. 1 ll. 20–24. One potential replacement for formaldehyde was polyester, but it proved not to be sufficiently strong, particularly when exposed to moisture. *Id.* col. 1 ll. 25–29.

Another potential alternative is melanoidins. The ’980 patent discloses “a packaged mineral fiber insulating material” that allegedly improved on the prior art by using melanoidins instead of formaldehyde to bind the mineral fibers. According to the ’980 patent, melanoidins provide the necessary binder strength for use on an industrial scale—a quality previously not thought possible without using formaldehyde. J.A. 30.

Knauf is the assignee of the '980 patent, which issued in 2010 with claims 1–20. J.A. 26. Claim 1 was representative of the original '980 patent:

1. A mineral fiber insulating material comprising mineral fibers and less than about 15% by weight of an organic binder, wherein

a) the organic binder is a formaldehyde free product of curing an aqueous solution having a pH of greater than 5 when applied to the mineral fibers,

b) the mineral fiber insulating material has a recovered thickness of at least about 95% as determined according to Annex A of British standard BS EN 823: 1995,

c) the mineral fiber insulating material having an ordinary parting strength of at least about 95 g/g,

d) the mineral fiber insulating material having a weathered parting strength of at least about 75 g/g, and

e) the mineral fiber insulating material is packaged.

'980 patent, col. 6, ll. 42–55.

Rockwool International A/S (“Rockwool”) competes with Knauf in manufacturing insulation materials. In 2012, Rockwool requested *inter partes* reexamination of the '980 patent from the United States Patent and Trademark Office (“PTO”). After the PTO granted Rockwool’s request, Knauf sought to amend the patent by adding claims 21–29. Claim 26 is representative of Knauf’s proposed amendment:

26. A mineral fiber insulating material, comprising: mineral fibers and less than about 15% by

weight of an organic thermoset binder disposed upon the mineral fibers, wherein:

(a) the organic thermoset binder is a formaldehyde free product of curing an aqueous solution, consisting essentially of dextrose and ammonium salt of citric acid wherein (i) the solution has a pH of greater than 5 when applied to the fibers and (ii) *the binder includes melanoidins produced by a Maillard reaction* which occurs during curing,

(b) the mineral fiber insulating material has recovered thickness of at least about 95% as determined according to Annex A of British standard BS EN 823 1995,

(c) the mineral fiber insulation material has an ordinary parting strength of at least about 95 g/g.

(d) the mineral fiber insulating material has a weather parting strength of at least about 75 g/g, and

(e) the mineral fiber insulating material is packaged.

J.A. 1472 (emphasis added).

This case centers on the Maillard reaction described in claim 26(a), which occurs when a reducing sugar, an amine, and a polycarboxylic acid combine to produce melanoidins. A Maillard reaction is distinct from a separate chemical process called esterification. Knauf argues that the prior art discloses a mixture of components that will result in esterification to the exclusion of a Maillard reaction. Rockwell responds that esterification, even if it occurs, will not preclude a Maillard reaction.

2. Examiner Decision and Prior Art

The PTO Examiner upheld original claims 1–20 but rejected as obvious amended claims 21–29. Specifically, the Examiner found these claims obvious over two prior art references that disclosed melanoidins formed by a Maillard reaction: U.S. Patent No. 6,878,800 (“Husemoen”); and WIPO Publication No. 2006/044302 (“Helbing”).

A. Husemoen

The Husemoen patent is entitled, “Binder for Mineral Wool Products.” J.A. 877. Although it is undisputed that Husemoen does not explicitly disclose melanoidin production, the Examiner determined that Husemoen discloses a binder of an amine, a polycarboxylic acid, and a reducing sugar sufficient to cause a Maillard reaction. J.A. 1653 (“The binder taught by HUSEMOEN is formed by similar reactants: amine, citric acid and glucose syrup; therefore, it would form a reaction product that includes melanoidin products cross-linked with the polycarboxylic acid (citric acid).”) (citations omitted). Husemoen teaches that its additives “may be mono-, di-, and polysaccharides, such as” glucose syrup and twelve other possibilities. Glucose syrup is one of two sugars among Husemoen’s non-exhaustive list. The Examiner found that because Husemoen discloses glucose syrup, Husemoen inherently discloses the production of melanoidins.

B. Helbing

Helbing is a WIPO publication dated April 27, 2006 and entitled, “Polyester Binding Compositions.” It discloses “formaldehyde-free, thermally-curable, alkaline, aqueous binder compositions.” J.A. 783. Like Husemoen, Helbing does not expressly disclose melanoidin production. Instead, it teaches insulating material comprised of a binder produced by curing and drying an aqueous solution. The solution, in turn, consists of a carbohydrate,

an amine, and a polycarboxylic acid. Thus, the Examiner found that Helbing's disclosure of the solution describes the three reactants necessary for a Maillard reaction.

3. Board Decision

On the basis of its conclusions on the Husemoen and Helbing references, the Examiner upheld claims 1–20 and rejected claims 21–29. Knauf cancelled claims 27–29. Both parties then appealed to the Board.

In reviewing the Examiner's rejection of claims 21–26, the Board noted that “the rejection is based on ‘inherency,’ a theory invoked when a publication does not expressly describe a limitation in a claim, but the claim limitation would necessarily result by following the guidance in the publication.” J.A. 11.

The Board affirmed the Examiner's finding of inherency, writing, “Husemoen describes mixing all three of the claimed reactants together and then curing the mixture on fibers, the same steps as described in the '980 patent. Based on the identity between the reactants and process steps, it is reasonable to conclude that at least some melanoidin would be formed.” J.A. 16 (citation omitted). The Board faulted Knauf for “not point[ing] to any specific conditions or amounts of reactants disclosed in the '980 patent which would enable melanoidin formation and which would distinguish the reaction that would proceed in Husemoen.” *Id.* The Board also rejected Knauf's assertion that the chemical process of esterification would prevent a Maillard reaction, noting that Knauf failed to prove that esterification “would interfere with or hinder a Maillard reaction, or affect the resulting melanoidin.” *Id.* at 16–17.

Turning to Helbing, the Board found that:

A preponderance of the evidence establishes that all three reactants present in a Maillard reaction—a carbohydrate (He11), an amine which is

ammonia (He5, He12), and a polycarboxylic acid (He4, He5, He10) are described by Helbing as present in a reaction mixture. The reactants are mixed and then cured (He14) as required by claims 21–26. Because of the identity of reactants and process steps, there is factual basis and reason to believe that Helbing 302’s binder product would contain melanoidins as required by the claims.

Id. at 21. The Board also rejected Knauf’s argument that Helbing’s components would result in esterification and thus prevent a Maillard reaction from occurring. *Id.* at 22. It noted that even if Helbing’s components increased the likelihood of esterification, the sugar would still react with the amine to produce melanoidins. *Id.*

The Board also affirmed the Examiner’s allowance of claims 1–20 on grounds not relevant here. Knauf timely appeals the rejection of claims 21–26. We have jurisdiction under 35 U.S.C. § 141 and 28 U.S.C. § 1295(a)(4)(A).

DISCUSSION

1. Standard of Review

The ultimate legal conclusion of whether a claim would have been obvious pursuant to 35 U.S.C. § 103 is based on underlying factual determinations. *Rambus Inc. v. Rea*, 731 F.3d 1248, 1251–52 (Fed. Cir. 2013). “The factual determinations include (1) the scope and content of the prior art; (2) the differences between the claims and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness.” *Id.* at 1252 (citing *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966)).

We review the legal conclusion of obviousness de novo, but we uphold the Board’s factual findings as long as they are supported by substantial evidence. *Id.* at 1251. Substantial evidence “means such relevant evidence as a

reasonable mind might accept as adequate to support a conclusion.” *In re Mouttet*, 686 F.3d 1322, 1331 (Fed. Cir. 2012) (citations omitted).

“[I]nherency may supply a missing claim limitation in an obviousness analysis.” *PAR Pharm., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1194–95 (Fed. Cir. 2014). But “the use of inherency, a doctrine originally rooted in anticipation, must be carefully circumscribed in the context of obviousness.” *Id.* at 1195. Inherency “may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.” *In re Oelrich*, 666 F.2d 578, 581 (C.C.P.A. 1981).

A party must, therefore, meet a high standard in order to rely on inherency to establish the existence of a claim limitation in the prior art in an obviousness analysis—the limitation at issue necessarily must be present, or the natural result of the combination of elements explicitly disclosed by the prior art.

PAR Pharm., 773 F.3d at 1195–96.

2. Analysis

The Board agreed with the Examiner that claims 21–26 of the ’980 patent were inherent in both Husemoen and Helbing and therefore would have been obvious under 35 U.S.C. § 103.

The Board found that Helbing inherently discloses a Maillard reaction. According to the Board, Helbing discloses the three necessary reactants for a Maillard reaction, and any esterification would not preclude a Maillard reaction. J.A. 21–22. Specifically, it first noted the “identity of reactants and process steps” between Helbing and the ’980 patent. J.A. 21. It then rejected Knauf’s argument that a higher likelihood of esterification precludes the possibility of a Maillard reaction.

Knauf argues that the Board erred because Helbing teaches only a “mere possibility” of a Maillard reaction. Knauf Br. at 21. Knauf concedes that Helbing discloses the three reactants necessary for a Maillard reaction. *See id.* at 22; J.A. 1486 (acknowledging that “HELHING teaches the inclusion of citric acid, ammonia and corn syrup in the formation of the formaldehyde free binder, which are known Maillard reactants and therefore result in at least one Maillard reaction product”). However, it argues that the process of esterification is “far more likely to occur” than a Maillard reaction. Knauf Br. at 23. Knauf further argues, without citation, that esterification “may proceed to the exclusion of” a Maillard reaction. *Id.* And it emphasizes that Helbing discloses additional reactants beyond Maillard reactants. Thus, according to Knauf, the Examiner’s finding that Helbing and the ’980 patent share “identity between the reactants and process steps” is not supported by substantial evidence. *Id.* at 25. We disagree.

Substantial evidence supports the Board’s conclusion. As the Board found, Helbing discloses an amine, a polycarboxylic acid, and a reducing sugar capable of forming a Maillard reaction. *See, e.g.,* J.A. 796 (Helbing Example 4); J.A. 19–21 (describing Helbing’s disclosure of an amine, acid, and sugar); J.A. 21 (noting the “identity of reactants and process steps” between Helbing and the ’980 patent). Knauf admitted as much before the Board. J.A. 1486. In light of this admission, Knauf presented no evidence that Helbing’s additional reactants would prevent a Maillard reaction.

There is no dispute that Helbing discloses esterification. J.A. 2491. But the record evidence does not show that esterification would necessarily prevent a Maillard reaction. In fact, Helbing discloses a Maillard reaction in competition with esterification. *See* J.A. 883 (col. 12 ll. 13–15). The Board concluded that even a high probability of esterification would not foreclose a Maillard

reaction, noting that the sugar “will still react with an amine or ammonia because the reactants are present.” J.A. 22. In other words, not only does Helbing contain the three components of a Maillard reaction, it discloses a Maillard reaction, and Knauf did not demonstrate that esterification forecloses a Maillard reaction. As a result, substantial evidence supports the Board’s conclusion that a Maillard reaction is a natural result of Helbing.¹

Knauf also argues on appeal that the Board improperly shifted the burden from Rockwool to Knauf without requiring Rockwool to show a prima facie case of inherency. Assuming, without deciding, that the Board recited the wrong legal standard, we find any possible error to be harmless and accordingly do not address this argument.

CONCLUSION

Because substantial evidence supports the Board’s factual findings that claims 21–26 are inherent in Helbing, we *affirm* the Board’s decision.

AFFIRMED

COSTS

No costs.

¹ Because substantial evidence supports the Board’s finding of inherency as to Helbing, we need not address the Board’s finding that Husemoen inherently discloses a Maillard reaction.