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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* DAVID E. GAMACHE and JUSTIN SCURTE

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Appeal 2018-008753
Application 14/748,950
Technology Center 1700

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Before CATHERINE Q. TIMM, JEFFREY T. SMITH, and JAMES C. HOUSEL, *Administrative Patent Judges*.

HOUSEL, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the Examiner's decision to reject claims 1–23. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.[2]

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[1] We use the word "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as Veolia Water Technologies, Inc. Appeal Br. 2.

[2] Our Decision refers to the Specification ("Spec.") filed June 24, 2015, Appellant's Appeal Brief ("Appeal Br.") filed April 19, 2018, the

## STATEMENT OF THE CASE

The invention relates to processes for treating wastewater, particularly oil sands process water and other industrial wastewater, employing an evaporator. Spec. ¶ 1. Appellant discloses that an oil-water mixture is removed from an oil bearing formation and oil is separated from the mixture leaving produced water or oil sands process water, which typically includes suspended solids and dissolved solids that must be removed prior to generating steam in the evaporator. *Id*. ¶ 3. Alternatively, the oil sands process water could be tailings pond water resulting from surface mining of oil sands. *Id*. Appellant further discloses that many oil sands process waters and other industrial wastewaters include significant concentrations of alkalinity, as well as calcium hardness, which often leads to scaling due to calcium precipitation. *Id*. ¶ 4. Appellant inhibits such scaling by mixing magnesium oxide with the oil sands process water to precipitate magnesium hydroxide which acts as a seed for calcium compounds such as calcium carbonate to precipitate. *Id*. ¶ 8. Then Appellant mixes the oil sands process water with magnesium hydroxide and calcium-based crystals with a concentrated brine at the evaporator such that concentrated brine, with magnesium hydroxide and calcium-based crystals, are circulated through the evaporator. *Id*. In addition, at least some of this concentrated brine, with magnesium hydroxide and calcium-based crystals, is circulated back to the oil sands process water at a point upstream of the evaporator. *Id*.

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Examiner's Answer ("Ans.") dated July 10, 2018, and Appellant's Reply Brief ("Reply Br.") filed September 10, 2018.

Claim 1, reproduced below from the Claims Appendix to the Appeal Brief, is illustrative of the subject matter on appeal.

1. A method of treating oil sands process water (OSPW) having alkalinity and calcium hardness, comprising:

directing the OSPW having alkalinity and hardness to an evaporator;

evaporating the OSPW in the evaporator to produce steam and a concentrated brine;

condensing the steam produced by the evaporator to form a distillate;

inhibiting calcium carbonate scaling of the evaporator by:

i. upstream of the evaporator, mixing a magnesium source with the OSPW in one or more reactors which form magnesium hydroxide crystals and precipitating calcium carbonate from the OSPW;

ii. crystallizing the calcium carbonate to form calcium carbonate crystals in the OSPW;

iii. directing a mixed crystal slurry comprising the magnesium hydroxide and calcium carbonate crystals, along with the OSPW to the evaporator where the mixed crystal slurry is mixed with the concentrated brine;

iv. circulating the concentrated brine and mixed crystal slurry through the evaporator; and

v. circulating at least some of the concentrated brine and mixed crystal slurry therein to the one or more reactors or to a point upstream of the one or more reactors and mixing the concentrated brine and mixed crystal slurry with the OSPW.

Independent claim 10 recites a similar process for treating tailings pond water having alkalinity and hardness, except the tailings pond water is first directed to a membrane separation unit before being directed to the evaporator.

Independent claim 15 recites a similar process to claim 1 for treating industrial wastewater having alkalinity and calcium hardness.

## REJECTIONS

The Examiner maintains, and Appellant requests our review of, the following grounds of rejection:

1. Claims 1, 2, 5–9, 15–17, 19–21, and 23 under 35 U.S.C. § 102(a)(1) as anticipated by Minnich;[3]

2. Claims 3, 4, and 18 under 35 U.S.C. § 103 as unpatentable over Minnich in view of Polizzotti;[4] and

3. Claims 10–14 and 22 under 35 U.S.C. § 103 as unpatentable over Minnich in view of Polizzotti and Buchanan.[5]

## ANALYSIS

After review of the Examiner's and Appellant's opposing positions, the applied prior art, and Appellant's claims and Specification disclosures, we determine that Appellant's arguments are insufficient to identify reversible error in the Examiner's anticipation and obviousness rejections. *In re Jung*, 637 F.3d 1356, 1365 (Fed. Cir. 2011). Accordingly, we affirm the stated rejections for substantially the fact findings and the reasons set

[3] Minnich et al., US 2009/0056945 A1, published March 5, 2009 ("Minnich").
[4] Polizzotti et al., US 2010/0294719 A1, published November 25, 2010 ("Polizzotti").
[5] Buchanan et al., US 2011/0127217 A1, published June 2, 2011 ("Buchanan").

forth by the Examiner in the Examiner's Answer. We offer the following for emphasis only.

*Claims 1 and 15*

As stated above, the Examiner rejects claims 1, 2, 5–9, 15–17, 19–21, and 23 under 35 U.S.C. § 102(a)(1) as anticipated by Minnich and rejects claims 3, 4, and 18 under 35 U.S.C. § 103 as unpatentable over Minnich in view of Polizzotti. Appellant confines the arguments to the rejection of claims 1 and 15. Appeal Br. 4–14. We address these arguments below.

The Examiner finds that Minnich discloses a method of treating oil sands process water ("OSPW") as recited in claims 1 and 15. Ans. 3–4, 5–6. Of particular relevance to this appeal, the Examiner finds that although Minnich does not explicitly disclose that calcium from the OSPW precipitates to form calcium carbonate upon mixing with MgO, such a result is inherent because Minnich discloses the same type of compound (MgO) added to the same type of water feed (OSPW having alkalinity and hardness) as Appellant. *Id*. at 4, 6.

Appellant argues that Minnich does not inherently inhibit calcium carbonate scaling by the addition of MgO because calcium carbonate or calcium compounds are not necessarily precipitated and adsorbed onto the magnesium hydroxide crystals as a result of mixing MgO with Minnich's produced water. Appeal Br. 5–6. Appellant first notes that Minnich teaches a separate process that produces calcium carbonate crystals without adding MgO to the process water. *Id*. at 6, 8. Appellant next notes that Minnich focuses on the prevention of silica scaling on the evaporator by creating a sorption slurry on which silica is absorbed to crystals formed in the slurry.

*Id*. at 7. Appellant asserts that Minnich does not disclose that alkalinity and hardness are present in the produced water being treated using the addition of MgO. *Id*. at 8. Appellant urges that there must be sufficient amount of alkalinity and calcium hardness in the produced water to scale in the first place. *Id*. at 9. Without such alkalinity and hardness in the produced water, Appellant contends that one cannot conclude that calcium and carbonate are necessarily present in Minnich's produced water and, therefore, that calcium carbonate precipitates from such water. *Id*. at 8–9.

We disagree. "[A] prior art reference without express reference to a claim limitation may nonetheless anticipate by inherency." *In re Omeprazole Patent Litigation*, 483 F.3d 1364, 1373 (Fed. Cir. 2007). Past recognition of the inherent feature is not required. *Schering Corp. v. Geneva Pharm.*, 339 F.3d 1373, 1377 (Fed. Cir. 2003); *see also, e.g., Gen. Elec. Co. v. Jewel Incandescent Lamp Co.*, 326 U.S. 242, 249 (1945) ("It is not invention to perceive that the product which others had discovered had qualities they failed to detect."). What is required is that the inherent feature inevitably results from the disclosed steps; "[i]nherency ... may not be established by probabilities or possibilities." *In re Montgomery*, 677 F.3d 1375, 1380 (Fed. Cir. 2012).

In general, a limitation is inherent "if it is the 'natural result flowing from' the explicit disclosure of the prior art." *Schering Corp. v. Geneva Pharms*., 339 F.3d 1373, 1379 (Fed. Cir. 2003) (quoting *Eli Lilly & Co. v. Barr Labs., Inc.*, 251 F.3d 955, 970 (Fed. Cir. 2001)). "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." *MEHL/Biophile Int'l Corp. v. Milgraum*, 192 F.3d 1362, 1365 (Fed. Cir.

1999) (quoting *In re Oelrich*, 666 F.2d 578, 581 (CCPA 1981)). This is not to say that the precipitation of calcium carbonate from the produced water must *always* occur in *every embodiment* of Minnich's MgO method in order to be inherent; it is possible to establish inherency by establishing that Minnich taught treating produced water having alkalinity and hardness by the same process as Appellant.

Here, the Examiner has established that Minnich's MgO process would have been used to treat produced water having alkalinity and hardness. As the Examiner finds, Minnich discloses that produced water often includes significant amounts of calcium and magnesium which contribute to hardness. Ans. 12; Minnich ¶ 14. In addition, the Examiner finds that Minnich discloses produced water having alkalinity as $CaCO_3$ at 333 ppm.[6] Ans. 12; Minnich ¶ 49, Table 1. We note that although Appellant argues that there must be a sufficient amount of alkalinity and hardness in the produced water to scale in the first place, Appellant neither claims nor discloses any specific amount of alkalinity and hardness for the produced water. Further, Minnich's focus primarily on silica scaling does not detract from the inevitable precipitation of calcium carbonate from the produced water using the addition MgO. As the Examiner finds, the

[6] We note that Appellant focuses on Minnich's disclosure that calcium is present in the produced water at only 2 ppm when arguing that such a low level is insufficient to exceed the theoretical minimum solubility of calcium carbonate. Reply Br. 2–4. Because Appellant fails to address Minnich's teaching that the same produced water contains alkalinity in the form of $CaCO_3$ at 333 ppm, this argument is not persuasive that Minnich's process, using the same addition of MgO as Appellant, would not necessarily result in calcium carbonate precipitation.

addition of MgO raises the pH of the produced water to the range of 10.2–11.2, which lowers the solubility of calcium carbonate and results in calcium carbonate precipitation. Ans. 13; *compare* Minnich ¶¶ 14, 36 *with* Spec. ¶ 16.

Appellant next argues that the Examiner has failed to prove that Minnich's MgO process necessarily inhibits calcium carbonate or calcium compound scaling of the downstream evaporator. Appeal Br. 9. In this regard, Appellant contends that the claims require more than simply adding MgO to the produced water, but also require inhibiting calcium carbonate or calcium scaling of the evaporator. *Id.* at 10. To achieve this scaling inhibition, Appellant urges that the produced water must include both alkalinity and calcium hardness. *Id.* As argued previously, Appellant asserts that "[i]n no case does Minnich disclose that the produced water in the magnesium oxide cases include calcium, calcium hardness or alkalinity (carbonate)." *Id*. Appellant also argues that although Minnich teaches that produced water often includes significant amounts of calcium which contributes to hardness, there is no connection between this background disclosure and the inventive MgO processes taught by Minnich. *Id*.

This argument is not persuasive of reversible error in the Examiner's finding of anticipation. As discussed above, we have already determined that there is sufficient support for the Examiner's finding that the precipitation of calcium carbonate from the produced water by the addition of MgO as taught by Minnich is inherent because Minnich not only teaches that produced water often includes alkalinity and calcium hardness, Minnich performed the MgO process using produced water having significant alkalinity, e.g., 333 ppm, in the form of $CaCO_3$. Given that Minnich's

process steps are the same as recited in Appellant's claims using the same or similar produced water and reactants, it is reasonable to likewise find that Minnich's MgO process inherently reduces scaling caused not only by silica, but by calcium carbonate.

Appellant next argues that Minnich does not recycle calcium carbonate crystals or calcium compound. Appeal Br. 11. Appellant asserts that there is no evidence that calcium carbonate is precipitated and recycled in either of Minnich's Figure 1 or Figure 2 embodiments. *Id*. at 12. Appellant also urges that Minnich's background teaching that produced water often includes calcium hardness does not mean that Minnich's Figure 1 or Figure 2 embodiments necessarily recirculate calcium carbonate crystals to a point upstream of the crystallization reactor. *Id*.

This argument is also not persuasive. To the extent that this argument is premised on the position that Minnich does not inherently precipitate calcium carbonate from the produced water in the crystallization reactor where MgO is added to the water, our discussion above applies. Appellant does not dispute or otherwise address the Examiner's finding that Minnich circulates some of the mixed crystal slurry (which inherently contains calcium carbonate crystals) to a point upstream of the crystallization reactor for mixing with the OSPW. *See* Ans. 4; Minnich Fig. 2, line 140B.

Appellant next argues that the Examiner's anticipation finding improperly relies on the combined teachings of Minnich's Figure 1 and Figure 2 embodiments, which are separate embodiments for carrying out the MgO process. Appeal Br. 12. This argument is not persuasive. As the Examiner finds, Minnich's disclosure of Figure 2 relies on the prior description of the sorption slurry process illustrated in Figure 1. Ans. 14;

Minnich ¶ 39. Thus, though the Examiner's anticipation finding is based on Minnich's Figure 2 embodiment, the Examiner properly relied on descriptions of Minnich's Figure 1 embodiment, which are in common between these two embodiments, but described in more detail for the Figure 1 embodiment. Appellant has not shown that the rejection contains any improper combining of different, unrelated teachings or embodiments, which the reference never combined.

Appellant further argues that the Examiner failed to apply the correct inherency standard. Appeal Br. 13–14. For the reasons given above, we disagree. The Examiner is required to state a reasonable or sound basis for believing that a recited characteristic of the claimed invention that the prior art does not expressly teach is nonetheless necessarily or inherently present in the prior art. Moreover, a sound basis does not turn on absolute certainty; rather, a sound basis requires the Examiner to make sufficient factual findings, such that it can be reasonably inferred that the prior art process and that of claims at issue are the same. *Howmedica Osteonics Corp. v. Zimmer Inc.*, 640 Fed. Appx. 951, 958 (Fed. Cir. 2016). Here, the Examiner established a reasonable or sound basis for believing that the precipitation of calcium carbonate by Minnich's addition of MgO to the produced water by demonstrating that Minnich's process is otherwise the same as recited in Appellant's claims using the same or similar produced water having alkalinity and calcium hardness.

Appellant does not separately argue dependent claims 2, 5–9, 16, 17, 19–21, or 23. Nor does Appellant separately argue the separate obviousness rejection of claims 3, 4, and 18 over the combination of Minnich and

Polizzotti. Accordingly, for the reasons given above and in the Examiner's Answer, we sustain the Examiner's rejections of claims 1–9, 15–21, and 23.

*Claim 10*

As Appellant notes (Appeal Br. 14–15), claim 10 departs from claims 1 and 15 by "first directing the tailings pond water from a tailings pond to a membrane separation unit and producing a permeate and a concentrated tailings pond water having alkalinity and calcium hardness." The Examiner rejects claims 10–14 and 22 under 35 U.S.C. § 103 as unpatentable over the combination of Minnich, Polizzotti, and Buchanan.[7] The Examiner acknowledges that Minnich fails to include this initial membrane separation treatment, but finds Polizzotti teaches a process for treating produced water from heavy oil production comprising a membrane separation step producing a permeate which is used for steam production and a concentrated stream which is further treated in an evaporator. Ans. 9–10. The Examiner further finds that Polizzotti teaches that such membrane separation allows the diversion of 75% of the produced water away from the evaporator, thereby requiring a much smaller evaporator. *Id*. at 10. Therefore, the Examiner concludes that it would have been obvious to have provided a membrane separation unit in Minnich's MgO process to reduce the amount of produced water sent to the evaporator, thereby improving process efficiency. *Id.*

[7] Because Appellant does not dispute the Examiner's findings and conclusions regarding Buchanan, we need not further discuss this reference.

Appellant argues that a person of ordinary skill in the art would not find it obvious to employ a membrane separation unit upstream of Minnich's crystallization reactor because the problems of silica scaling, which Minnich addresses, in membrane separation systems are well known to those skilled in the art. Appeal Br. 14–16. Therefore, the person of ordinary skill in the art would not employ a membrane separator upstream of Minnich's crystallization process without first removing silica. *Id*. at 16. Appellant notes that Polizzotti contemplates this problem by removing silica prior to the membrane separation system. *Id*. According to Appellant, doing otherwise would not have had a reasonable expectation of success, and the Examiner's reasoning that there would be reduced energy consumption and process cost is unsupported. *Id*. at 17. Appellant also urges that Polizzotti discloses an improved deoiling process upstream of the membrane system that enables the use of the membrane system, yet the rejection does not include such an improved deoiling system be used in Minnich. *Id*.

These arguments are also not persuasive of reversible error. To begin, we note that claim 10 does not exclude a deoiling step and Minnich expressly teaches that the produced water is initially deoiled prior to the crystallization reactor. *See* Minnich Fig. 2. Appellant does not establish that Polizzotti's teaching of an improved deoiling system necessarily is tied to the use of the membrane separation unit and that Minnich's deoiling step would be insufficient in this regard. Further, as the Examiner finds, Polizzotti does not teach that silica is a problem for membrane separation systems such that its removal is necessarily required prior to the membrane separation system. Ans. 15. Instead, Polizzotti, like Minnich, teaches that silica is problematic when the produced water is used to make steam, i.e., in

a boiler or in an evaporator. *Id*. Further, as the Examiner finds, Polizzotti teaches that silica removal may be performed prior to the membrane separation system. *Id*. This teaching does not support Appellant's position that Polizzotti teaches that silica must be removed prior to the membrane separation. In this regard, even if the problem of silica scaling in membrane separation systems was well known to those skilled in the art, this fact alone does not necessitate silica removal prior to membrane separation. We find little support for Appellant's conclusion that Polizzotti's treater 215 must include silica removal, especially because Polizzotti teaches that the free water knock out 210 and treater 215 produce water separated from oil. Polizzotti ¶ 3. As for the Examiner's reasoning, Polizzotti specifically teaches that the use of a membrane separation system permits use of a smaller evaporator, resulting in significant cost and energy savings. Polizzotti ¶ 12. Therefore, the Examiner's reasoning in support of the obviousness conclusion finds sufficient foundation in Polizzotti.

Appellant does not separately argue dependent claims 11–14 or 22. Accordingly, for the reasons given above and in the Examiner's Answer, we sustain the Examiner's rejection of claims 10–14 and 22 over the combination of Minnich, Polizzotti, and Buchanan.

## 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)(1).

## CONCLUSION

In summary:

| Claims Rejected | Basis | Affirmed | Reversed |
|---|---|---|---|
| 1, 2, 5–9, 15–17, 19–21, 23 | § 102(a)(1); Minnich | 1, 2, 5–9, 15–17, 19–21, 23 | |
| 3, 4, 18 | § 103; Minnich and Polizzotti | 3, 4, 18 | |
| 10–14, 22 | § 103; Minnich, Polizzotti, and Buchanan | 10–14, 22 | |
| **Overall Outcome** | | 1–23 | |

AFFIRMED