

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

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**RAI STRATEGIC HOLDINGS, INC.,**  
*Appellant*

v.

**PHILIP MORRIS PRODUCTS S.A.,**  
*Appellee*

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2022-1862

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Appeal from the United States Patent and Trademark  
Office, Patent Trial and Appeal Board in No. PGR2020-  
00071.

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Decided: February 9, 2024

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argued for appellant. Also represented by AMELIA A.  
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Before CHEN, STOLL, and CUNNINGHAM, *Circuit Judges*.

STOLL, *Circuit Judge*.

RAI Strategic Holdings, Inc. appeals the Patent Trial and Appeal Board's final written decision in a post-grant review (PGR) holding certain claims of U.S. Patent No. 10,492,542 unpatentable as obvious or lacking written description. We affirm-in-part, vacate-in-part, and remand. Specifically, we hold that substantial evidence supports the Board's obviousness finding but does not support the Board's finding that certain claims lack written description support under 35 U.S.C. § 112.

#### BACKGROUND

RAI owns the '542 patent, which is directed to electrically powered smoking articles that provide an inhalable substance in vapor or aerosol form by heating tobacco or other substances without significant combustion. '542 patent col. 1 ll. 18–27.

Claim 1 is a representative independent claim and recites:

1. A smoking article for receiving a disposable aerosol forming substance, the smoking article comprising:

a housing having a proximal end for receiving the disposable aerosol forming substance and an opposite distal end;

a power source arranged within the housing adjacent to the distal end;

a receiving chamber formed at the proximal end of the housing and having an opening for receiving the disposable aerosol forming substance;

a heating projection extending at least partially in the receiving chamber towards the proximal end of the housing and

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terminating at a free end which is configured to be inserted into the disposable aerosol forming substance for heating the disposable aerosol forming substance, the heating projection comprising:

a heating member comprising an electrically resistive metal which is configured to heat the disposable aerosol forming substance;

an electrical connector for providing a flow of electricity to the heating member for heating the heating member; and

a control circuit positioned within the housing between the power source and the heating projection and connecting the heating member of the heating projection to the power source.

*Id.* at col. 42 ll. 12–37.

Philip Morris Products, S.A. filed a petition to institute a PGR of claims 1–30 of the '542 patent. In particular, Philip Morris asserted that these claims were invalid for lack of written-description support and, alternatively, obvious over Robinson<sup>1</sup> in view of Greim<sup>2</sup>, either alone or in combination with Wang<sup>3</sup> or Adams<sup>4</sup>. After the PGR was instituted, RAI disclaimed claims 13–17.

Among other things, Philip Morris argued that dependent claims 10 and 27, which recite a heating member with “a length of about 75% to about 85% of a length of the

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<sup>1</sup> U.S. Patent No. 7,726,320.

<sup>2</sup> WO 2011/050964 A1.

<sup>3</sup> WO 2008/139411 A2.

<sup>4</sup> U.S. Patent App. Pub. No. 2007/0102013.

disposable aerosol forming substance,” are not supported by written description because “the claimed range is different from and substantially narrower than the ranges disclosed in the specification.” *Philip Morris Prods., S.A. v. RAI Strategic Holdings, Inc.*, 2022 WL 129099, at \*15 (P.T.A.B. Jan. 10, 2022) (*Decision*). Specifically, Philip Morris asserted that while the specification describes ranges such as 75% to 125%, 80% to 120%, 85% to 115%, and 90% to 110%, it does not disclose a heater length range with an upper limit of 85%. RAI countered that the specification provides written description support because it teaches heating length embodiments at both ends of the claim range, pointing to the 75% to 125% and 85% to the 110% ranges. The Board found that the claims lack written description support because no range contains an upper limit of about 85% making it “less clear’ that the inventors contemplated a range of ‘about 75% to about 85%’ as part of the invention.” *Id.* (citation omitted).

In its final written decision, the Board held claims 1–9, 11, 12, 18–26, and 28–30 unpatentable as obvious and claims 10 and 27 unpatentable for lack of adequate written description. *Id.* at \*16.

RAI appealed. We have jurisdiction under 28 U.S.C. § 1295(a)(4)(A).

## DISCUSSION

RAI raises two issues on appeal. First, RAI argues that the Board erred in finding that claims 10 and 27 lack adequate written description support. Second, RAI argues that the Board erred in finding that claims 1–9, 11, 12, 19–26, and 28–30 would have been obvious in view of Robinson as modified by Greim. We address each issue in turn.

### I

We begin with RAI’s written description argument. Specifically, RAI challenges the Board’s finding that claims 10 and 27, which require that “the heating member is

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present on the heating projection along a segment having a length of about 75% to about 85% of a length of the disposable aerosol forming substance,” lack written description support under 35 U.S.C. § 112.

The written description requirement is met when the disclosure relied on for support “reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.” *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc) (citation omitted). “[T]he level of detail required to satisfy the written description requirement varies depending on the nature and scope of the claims and on the complexity and predictability of the relevant technology.” *Id.* The test for written description requires an “objective inquiry into the four corners of the specification from the perspective of a person of ordinary skill in the art.” *Id.* This inquiry is a question of fact that we review for substantial evidence. *See id.*; *Gen. Hosp. Corp. v. Sienna Biopharms., Inc.*, 888 F.3d 1368, 1371 (Fed. Cir. 2018).

Some background discussion of our precedent on written description support for range claims is helpful. In *In re Wertheim*, our predecessor court held that a set of claims that recited a narrower claimed range than the range specified in the specification had written description support. 541 F.2d 257, 264–65 (C.C.P.A. 1976). The case was an appeal from an interference proceeding, and the dispositive issue on appeal was whether certain claims of a patent application had written description support and therefore should be entitled to the filing date of the parent application and the applicant’s earlier Swiss application. The claims at issue related to a process for making freeze-dried instant coffee and required the solids content of the concentrated coffee extract to be “between 35% and 60%” (claims 2, 4, 37, and 38). *Id.* at 261–62. The specification disclosed a broader solids content range of 25% to 60% and provided

examples of specific embodiments with solid contents of 36% or 50%. *Id.* at 262.

The *Wertheim* court explained that in determining whether the written description requirement is met, “[m]ere comparison of ranges is not enough,” and that instead, “we must decide whether the invention appellants seek to protect by their claims is part of the invention that appellants have described as theirs in the specification.” *Id.* at 263. And “[w]here it is clear, for instance, that the broad described range pertains to a different invention than the narrower (and subsumed) claimed range, then the broader range does not describe the narrower range” and the written description requirement would not be satisfied. *Id.* at 265. Ultimately, the court disagreed with the Board that the narrower claimed range of “between 35% and 60%” lacked written description support because that limitation was “within the described broad range of 25% to 60%” and “there [was] no evidence . . . that there [was] . . . any distinction . . . between the claimed lower limit of solids content and that disclosed in the Swiss application.” *Id.* at 264.

As in *Wertheim*, the issue in *In re Blaser* was whether the claims had adequate written description support to be entitled to the filing date of a great-grandparent application. 556 F.2d 534, 536–37 (C.C.P.A. 1977). Our predecessor court held that the claims at issue that recited a narrower range than what was disclosed in the specification had adequate written description support. *Id.* at 538. Specifically, the claims in question were directed to a process for preparing acylation products of phosphorous acid and required heating a mixture to 80° to 200° C. *Id.* at 535–36. The court stated that “*Wertheim* is controlling” and that the specification, which disclosed heating the mixture to temperatures between 60° and 200° C, “adequately support[ed] the limitation ‘80° to 200° C.’” *Id.* at 538.

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In *Kolmes v. World Fibers Corp.*, we followed a similar line of analysis. 107 F.3d 1534 (Fed. Cir. 1997). The claims at issue related to cut-resistant yarn and required two strands to spirally wrap the core “at the rate of 8–12 turns per inch.” *Id.* at 1537–38. The specification stated a broader range of wrappings formed “at the rate of 4–12 turns per inch, with 8 turns per inch being preferred.” *Id.* at 1539. We found that the claims were “well supported by the specification” and accordingly, affirmed the district court’s finding that the claims were entitled to the parent application’s effective filing date. *Id.* at 1538–39.

In contrast, in *In re Baird*, cited by the Board in its decision in this case, our predecessor court held that a claimed range that was narrower than the disclosed range lacked sufficient disclosure. 348 F.2d 974 (C.C.P.A. 1965). The case stemmed from an interference proceeding in which a patent application had copied certain claims from an issued patent; the issue on appeal was whether these claims had sufficient disclosure within the application’s specification. The claims in question were directed to a method of creating stretch-orienting polypropylene and required a quench bath temperature range of “from about 40 degrees F. to at least as low as about 60 degrees F.” *Id.* at 981–82. The issued patent explained the specific claimed range is preferred because the material would curl above 60° F and would be too brittle below 40° F. *Id.* at 982. The application, however, only disclosed that the quenching temperature may be between 32° F and 176° F, without providing any further guidance. Accordingly, the court found that the application’s claims lacked written description support because “the copied claims ‘are drawn to an invention different from that disclosed in the specification.’” *Id.*

We similarly held that a claimed range lacked written description support in *Indivior UK Ltd. v. Dr. Reddy’s Laboratories S.A.*, also cited by the Board in its decision in this case. 18 F.4th 1323 (Fed. Cir. 2021). The patent

application at issue in *Indivior* related to orally dissolvable films containing therapeutic agents and certain claims required a water-soluble polymeric matrix of “about 40 wt % to about 60 wt %” (claim 1) or “about 48.2 wt % to about 58.6 wt %” (claims 7 and 12). *Id.* at 1325–26. By contrast, the application’s specification alternatively disclosed a “film forming polymer in an amount of at least 25% by weight of the composition,” a polymer content of “at least 50%,” or that “film may contain any desired level of . . . polymer.” *Id.* at 1326–27, 1329. The specification also included tables that disclosed formulations with 48.2 wt % and 58.6 wt % polymer. *Id.* at 1326–28. We held that the range “about 40 wt % to about 60 wt %” lacked written description support because (1) neither the range nor the end values were disclosed in the specification; and (2) the inconsistent statements regarding the desired amount of polymer in the specification made it “even less clear that an invention of ‘about 40 wt % to about 60 wt %’ was contemplated as an aspect of the invention.” *Id.* at 1328–29. We also held that the range “about 48.2 wt % to about 58.6 wt %” lacked written description because although the end points were disclosed in the tables within the specification, there was a lack of persuasive evidence that a skilled artisan would have understood the application as disclosing an invention with the range between these endpoints. *Id.* at 1329.

With this background in mind, we turn to the issue before us: whether the specification of the ’542 patent provides written description support for a heating member with “a length of about 75% to about 85% of a length of the disposable aerosol forming substance” as required by the claims. ’542 patent col. 42 ll. 61–64 (claim 10), col. 44 ll. 35–38 (claim 27). The ’542 patent specification discloses a broader range than that which is claimed. Specifically, the specification states that the electrical heating member present on the heating projection may have a length of “about 75% to about 125% the length of the inhalable



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substance medium,” or “about 80% to about 120%, about 85% to about 115%, or about 90% to about 110% the length of the inhalable substance medium.” *See id.* at col. 39 ll. 41–48. The question thus is whether the disclosure of a length of about 75% to about 125%, about 80% to about 120%, about 85% to about 115%, or about 90% to about 110% “reasonably conveys to those skilled in the art that the inventor had possession” of the claimed length of “about 75% to about 85%.” *Ariad Pharms., Inc.*, 598 F.3d at 1351 (citation omitted). Among other things, we consider whether “the broad described range pertains to a different invention than the narrower (and subsumed) claimed range,” in which case the specification does not provide written description support for the narrower claimed range. *Wertheim*, 541 F.2d at 265.

The specification need not expressly recite the claimed range to provide written description support. *See id.* (“[T]he invention claimed does not have to be described in *ipsis verbis* in order to satisfy the description requirement of § 112 . . . .” (citation omitted)). While the ’542 patent specification does not disclose the claimed range itself, it does expressly disclose both endpoints by providing that the length of the heating member may be “about 75% to about 125%” or “about 85% to about 115%.” *See* ’542 patent col. 39 ll. 41–48 (emphases added). In addition to considering what the specification expressly discloses, we also consider the context of the technology at issue and the knowledge gained by a person of ordinary skill in the art reading the specification. Given the predictability of electro-mechanical inventions such as the one at issue here, and the lack of complexity of the particular claim limitation at issue—*i.e.*, reciting the length of a heating member—“a lower level of detail is required to satisfy the written description requirement than for unpredictable arts.” *See Hologic, Inc. v. Smith & Nephew, Inc.*, 884 F.3d 1357, 1361 (Fed. Cir. 2018). Further, nothing in the specification indicates that changing the length of the heating member

changes the invention, whether as to operability, effectiveness, or any other parameter.

Thus, we see no evidence suggesting that the broad described ranges of “about 75% to about 125%,” “about 80% to about 120%, about 85% to about 115%, or about 90% to about 110% the length of the inhalable substance medium” disclose a different invention than the claimed range of “about 75% to about 85%.” In other words, under the facts of this particular case, there is no evidence that the claimed subrange results in a different invention than the invention disclosed in the specification. Accordingly, for all of the above reasons, we conclude that no reasonable fact finder could find that the claimed subrange is not within the appellant’s invention. In so holding, we note that our determination is highly factual and dependent on “the nature of the invention and the amount of knowledge imparted to those skilled in the art by the disclosure.” *Wertheim*, 541 F.2d at 262. As we have recognized, “[b]roadly articulated rules are particularly inappropriate in this area.” *Indivior*, 18 F.4th at 1329–30 (alteration in original) (quoting *Wertheim*, 541 F.2d at 263).

Though the Board relied on *Indivior* and *Baird* in its decision, the facts in this case align more closely with those in *Wertheim*, *Blaser*, and *Kolmes*, where the broader disclosed ranges did not constitute a separate invention from the narrower claimed ranges. Unlike the specification in *Indivior*, the ’542 patent specification discloses the end points of the claimed range and there are no inconsistent statements regarding the range. Rather, the ’542 patent states a broader range for the length of the heating member and then states narrower ranges which are subsumed within that broader range. In contrast, the specification in *Indivior* stated two ranges for polymer content but then also stated that the polymer content could be *any* value. *Id.* at 1326–27, 1329. We also note that, unlike *Indivior*, the invention at issue here falls within the predictable arts.

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*Baird* is likewise distinguishable from the facts here. In *Baird*, the claimed range was advantageous over the broad disclosed ranges because values falling outside of the claimed temperature range (and within the broader disclosed range) caused the material to curl or be too brittle, and the specification did not provide any guidance to a person of skill in the art to reach the claimed range. *See Baird*, 348 F.2d at 982. Thus, the court in *Baird* found that the claimed range and the disclosed range were directed to different inventions. *Id.* Here, by contrast, there is no evidence that the '542 patent's disclosed range of about 75% to about 125% for the length of the heating member behaves any differently than the claimed range of about 75% to about 85%.

Philip Morris nonetheless argues that substantial evidence supports the Board's fact finding, relying on the specification and its expert, Dr. Seetharama Deevi. Specifically, Dr. Deevi testified that "[t]he described ranges for bulk heating are all centered on the full length (100%) of the inhalable substance medium," while the claimed range "is not centered on 100%, but 80% (the midpoint between about 75% and about 85%)" and, as such, "[t]here is nothing in the patent that would lead a [skilled artisan] to conclude that the inventors possessed a range that went no higher than 85% for bulk heating." J.A. 2660–61 ¶¶ 124–125. In light of our case law and the other evidence of record, we do not view the expert's testimony as evidence that a reasonable mind could accept as adequate to support the Board's finding that a skilled artisan would not think that the inventor possessed a smoking article with a heating member with a length that is about 75% to about 85% the length of the inhalable substance medium.

While it is true that the specification discloses ranges with values over 100% and the "about 75% to about 85%" range does not, our legal precedent holds that "[m]ere comparison of ranges is not enough, nor are mechanical rules a substitute for an analysis of each case on its facts to

determine whether an application conveys to those skilled in the art the information that the applicant invented the subject matter of the claims.” *Wertheim*, 541 F.2d at 263. Considering the nature of this particular smoking article invention and the disclosure of a wide range of lengths for the heating element including above and below 100%, as well as the lack of any explanation for why a length above or below 100% matters with respect to operation of the invention, skilled artisans would undoubtedly consider lengths that are under 100% to be part of the invention.

Accordingly, based on the unique facts of this case, we find that substantial evidence does not support the Board’s finding that claims 10 and 27 reciting a heating member “present on the heating projection along a segment having a length of about 75% to about 85% of a length of the disposable aerosol forming substance” lack written description support under § 112. We therefore vacate the Board’s decision on this issue and remand for further consideration consistent with this opinion.

## II

We now turn to RAI’s argument that the Board erred in holding that claims 1–9, 11, 12, 19–26 and 28–30 would have been obvious over Robinson and Greim. In particular, RAI challenges the Board’s fact finding that a person of skill in the art would have had a motivation to combine Robinson and Greim.

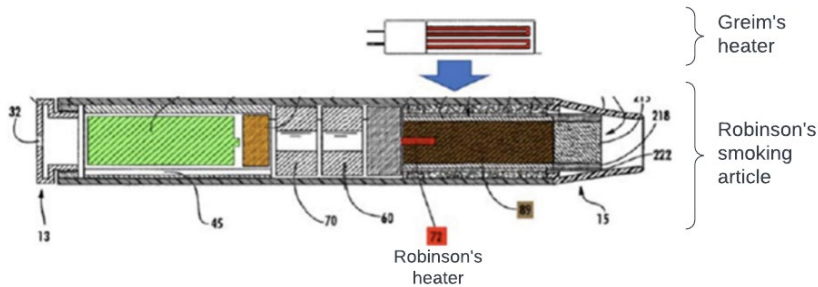
We review the Board’s obviousness determination de novo and its underlying factual determinations for substantial evidence. *TQ Delta, LLC v. Cisco Sys., Inc.*, 942 F.3d 1352, 1357 (Fed. Cir. 2019). Whether a person of ordinary skill would have been motivated to combine prior art references is a question of fact. *In re Gartside*, 203 F.3d 1305, 1316 (Fed. Cir. 2000). On substantial evidence review, we ask whether a reasonable fact finder could have arrived at the agency’s decision. *Personal Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 991 (Fed. Cir. 2017).

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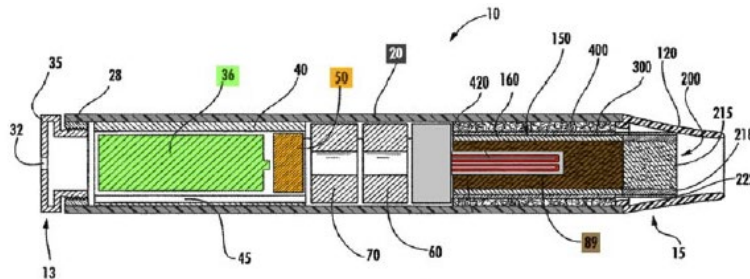
The parties agree that claim 1 is illustrative and requires a “heating projection comprising . . . an electrical connector for providing a flow of electricity to the heating member for heating the heating member.” ’542 patent col. 42 ll. 22–33. In its petition, Philip Morris argued that the combination of Robinson and Greim discloses all the limitations of claim 1 and specifically relied on Greim to disclose a heater with an “electrical connector.”

Philip Morris asserted that a person of ordinary skill in the art would have been motivated to replace the heating element 72 in the smoking device of Robinson with Greim’s heater and depicted its proposed combination as shown below:



J.A. 160 (annotations added). The figure above shows Greim’s heater alongside a cross-sectional view of Robinson’s smoking article. Robinson’s smoking article contains heating element 72 extending into the tobacco segment 89. See Robinson, col. 27 ll. 31–39, Fig. 3.

The following figure shows Philip Morris’s proposed combination in which the heater in Robinson’s smoking article is replaced with Greim’s heater:



J.A. 160.

Philip Morris argued to the Board that a skilled artisan would have been motivated to use Greim’s heater with Robinson’s smoking article because (1) Robinson discloses that “the size and shape of [its] heating element 72 can be altered” and that the “[s]election of the power source and resistance heating elements can be a matter of design choice, and will be readily apparent to one skilled in the art,” J.A. 163–64 (quoting Robinson, col. 27 ll. 30–39, col. 28 ll. 41–45); and (2) Greim teaches that its heater configuration with “the necessary electronics, wiring and connections . . . incorporated on the same electrically insulating substrate as the heater” has many potential advantages over other heaters, including being “manufactured more straightforwardly and cost effectively,” “requir[ing] fewer components in its construction,” “allowing size reduction,” allowing “different portions [of the aerosol-forming/tobacco substrate] to be heated for different durations,” and “at different temperatures,” to “enhance the smoking experience,” J.A. 165, 167–68 (second alteration in original) (quoting Greim, 1–4).

The Board agreed that the language in Robinson “would have invited a person of ordinary skill in the art to apply their knowledge and skill with regard to selecting a resistance heating element that could be used with Robinson’s housing” and thus, “a person of ordinary skill in the art would have had reason to look to Greim for a heater.” *See Decision*, 2022 WL 129099, at \*10–11. Additionally, the Board acknowledged that “a person of ordinary skill in the art would have appreciated that Greim’s heaters provide certain advantages, including flexibility in their design.” *Id.* at \*11.

On appeal, RAI argues that contrary to the Board’s finding, a person of skill in the art would not have been motivated to combine Robinson and Greim. Specifically, RAI asserts that Robinson’s statements that “[o]ptionally

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the size and shape of the second resistance heating element . . . can be altered” and that “[s]election of the power source and resistance heating elements can be a matter of design choice” do not invite a skilled artisan to look beyond Robinson to Greim. Robinson, col. 27 ll. 31–39, col. 28 ll. 26–44. Instead, RAI maintains that these statements refer to alternate designs presented within Robinson itself. We are not persuaded.

Substantial evidence supports the Board’s finding that a skilled artisan would have been motivated to replace Robinson’s heater with Greim’s heater. In light of Robinson’s statements about altering the heating element and the potential for design choices, the Board’s finding that Robinson invites a person of skill in the art to look at other heating elements outside of Robinson is reasonable. Even if we were to agree with RAI’s interpretation of Robinson, the Board’s determination is further supported by Greim and expert testimony. The Board relied on the teachings of Greim, which expressly disclose advantages of its heater design including that it “provides flexibility in the design to give desired heat distribution and to heat different portions of the tobacco for different durations, at different times, and at different temperatures.” *See Decision*, 2022 WL 129099, at \*11. Additionally, the Board credited the testimony of Philip Morris’s expert, Dr. Deevi, who opined that Greim’s heater design “would facilitate more efficient heating of the tobacco and make it easier for a [person of ordinary skill in the art] to optimize the heater design.” *See id.* (alteration in original) (quoting J.A. 2678–79 ¶ 167).

Further, the Board credited the testimony of RAI’s expert, Mr. Charles Clemens, who opined that a skilled artisan would have “appreciated ‘flexibility in their [heater] design’” and also suggested that “implementing Greim’s heater in Robinson’s housing would not have been beyond the skill of a person of ordinary skill in the art.” *Id.* at \*11–12 (quoting J.A. 3677–78 (Clemens Depo. 25:19–26:6))

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(citing Clemens Depo. 78:5–83:21). As such, we conclude that substantial evidence supports the Board’s finding that a person of ordinary skill in the art would have been motivated to replace Robinson’s heating element with the heating element taught by Greim.

CONCLUSION

For the foregoing reasons, we affirm the Board’s holding that claims 1–9, 11, 12, 19–26 and 28–30 are unpatentable as obvious. We vacate the Board’s finding that claims 10 and 27 lack written-description support and remand for further proceedings consistent with this opinion.

**AFFIRMED-IN-PART, VACATED-IN-PART, AND  
REMANDED**

COSTS

No costs.