

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VICOR CORPORATION
Requester

v.

SYNQOR, Inc.
Patent Owner and Appellant

Appeal 2014-007587
Reexamination Control 95/001,637¹
Patent No. US 7,272,021 B2²
Technology Center 3900

Before JAMES T. MOORE, STEPHEN C. SIU, and
DENISE M. POTHIER, *Administrative Patent Judges*.

MOORE, *Administrative Patent Judge*.

DECISION ON REHEARING

I. INTRODUCTION

On May 5, 2015 this Board issued a Decision (“Dec.”) which stated that it affirmed the decision of the Examiner rejecting claims 1, 9, 15, 16, 21–27, 29–31, 39, 45–47, 49, and 50. Dec. 1–2. Patent Owner SynQor, Inc.

¹ Filed by Vicor Corporation on May 31, 2011.

² Issued September 18, 2007 to Martin Schlecht and Richard Farrington, and assigned to SynQor, Inc. (the “’021 patent”). The ’021 patent issued from Application 11/407,699, filed November 23, 2006.

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(“Patent Owner”) filed a timely request for rehearing (“Reh’g Req.”). On July 6, 2015 Requester Vicor Corporation (“Requester”) filed comments on the request for rehearing (“Comments”).

The Request for Rehearing is granted-in-part.

We grant the Request to the extent that it seeks correction of the status of the claims. Reh’g Req. n.1, p. ii. It appears that claims 16 and 46 were erroneously listed in both the Right of Appeal Notice³ and Patent Owner’s Appeal Brief⁴ as rejected. While this error is not something the Board overlooked, it is an apparent error resulting from the Action Closing Prosecution. The claims which were rejected, and which rejections were affirmed, should read “1, 9, 15, 21–27, 29–31, 39, 45, 47, 49, and 50.” The Decision is so amended.

We further grant the Request insofar as we have reconsidered the decision, and specifically further reconsidered the evidence of secondary considerations as discussed below. However, we decline to change our ultimate determination that the Examiner did not err in rejecting the claims.

II. ISSUES ON REHEARING

A. The rejection of Claims 1, 9, 15, 21, 24, 26, 31, 39, 45, and 47 under 35 U.S.C. § 102(b) as being anticipated by Steigerwald '090.

1. Current and Power Flow

Independent claims 1, 31, and 47 of the ‘021 patent respectively recite the following element:

a control circuit which controls duty cycle of the primary winding circuit, *the duty cycle causing substantially*

³ “RAN” at coversheet.

⁴ “PO App. Br.” at 2.

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uninterrupted flow of power through the primary and secondary winding circuits during normal operation

‘021 Patent, 6:32–37 (emphasis added).

controlling duty cycle of the power to the primary winding, *the duty cycle causing substantially uninterrupted flow of power* through the primary and secondary windings during normal operation

Id. at 8:1–4 (emphasis added).

means for controlling duty cycle of the power to the primary winding, *the duty cycle causing substantially uninterrupted flow of power* through the primary and secondary windings during normal operation to provide an isolated output without regulation

Id. 8:50–54 (emphasis added).

The Examiner found that Steigerwald ’539⁵ described a two-stage power converter, having a regulation stage followed by an isolation stage. The isolation stage includes two transformers that operate in opposite phase, each at a complementary 50% duty cycle. As a consequence, “the energy-storage capacitor C_e is always transformer-coupled to the dc output.” Req. 2 (quoting Steigerwald ’539, 3:33–39); *see also* Req. 6–7. Thus, the Examiner concluded there was substantially uninterrupted power flow. *Id.*

In the Brief on Appeal, Patent Owner argued that the Steigerwald patents are specifically directed to radar applications, which are characterized by the typical pulsed load as illustrated in Steigerwald ’539 Figure 2. PO App. Br. 23.

⁵ The anticipation rejection incorporates the teachings of Steigerwald ’539. We refer to the incorporated disclosure as “Steigerwald ’090/’539.”

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We were not persuaded by this argument and affirmed the rejection. Decision 9–10.

The Patent Owner, in the Request for Rehearing, urges that “the PTAB’s conclusion [regarding substantially uninterrupted] is erroneous.” Reh’g Req. 2. As we understand the argument, Patent Owner asserts that (1) there is no description of current flow, and therefore of power; (2) the power flow in the Steigerwald ’090/’539 system is repeatedly interrupted; and (3) the degree of interruption of power flow in Steigerwald ’090/’539 system is indeterminable. Reh’g Req. 1, 3, 5, and 7. Consequently, it is urged, we erred in affirming the finding that Steigerwald ’090/’539 system anticipated claims 1, 9, 15, 21, 24, 26, 31, 39, 45, and 47.

“Substantially Continuous Power Flow”

The finding that there was substantially continuous power flow was adopted by the Examiner from the Reexamination Request filed May 31, 2011, page 13. RAN 4–5. Patent Owner then urged on appeal that the Steigerwald patents were silent on current flow, and that they did not teach that power flow is substantially uninterrupted. PO App. Br. 22–23. We were directed to A214, 13–16 and A215, 10–11 in support thereof. A214 (i.e., Appendix numbers 214 and 215 to the Appeal Brief) is a Response filed by the Patent Owner October 31, 2011, during prosecution, which Response contains three additional pages of argument concerning the flow of power in the Steigerwald ’090 patent.

Patent Owner urged in the October 31, 2011 response that Steigerwald ’090 does not describe uninterrupted power flow because “being coupled” does not inherently require that any power flows through the isolation stage.

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In other words, even when the capacitor C_e is connected, or coupled, to the load, this does not mean that power is flowing from C_e through the primary and secondary transformer windings and circuits of the capacitor-multiplying converter to the load. Ex. A 214, October 31, 2011 Response, page 13.

Patent Owner urged, by reference to Figure 2a of the Steigerwald '539 patent, that the power flowing through the capacitance-multiplying converter and to the radar application load is zero for a "great deal of the time." *Id.* Patent Owner then concluded that the Steigerwald patents do not show an isolation stage through which there is a "substantially uninterrupted flow of power" during normal operation, required in all of the '021 claims. *Id.* at 14. This argument relies principally on the pulsed nature of the primary load for which Steigerwald uses the circuitry.

Patent Owner further discounted the explicit description of "bias voltages" because "nothing expressly or inherently requires these voltages to have loads that draw a substantially uninterrupted power flow." *Id.* at 15. That argument relies upon the Schlecht Declaration at paragraph 26, which alleges that Steigerwald '090 suggests that, for the multiple output voltages, "all of them could be pulsed loads." Dr. Schlecht relies upon Steigerwald '090, column 3, lines 19–23.

We reproduce the cited portion of Steigerwald below:

As yet another advantage, pulse energy is stored in a high-voltage capacitor rather than at the substantially lower utilization voltages, thereby minimizing capacitor volume, allowing substantial energy storage to be in the module itself.

Steigerwald '090 3:19–23.

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To begin, we observe that the evidence of record reveals that Dr. Schlecht has misinterpreted the Steigerwald '090 description. The cited section applies to miniaturization — i.e. minimizing capacitor volume because a high voltage capacitor can store more energy in a smaller space than on the lower voltage utilization side. This descriptive section applies to the pulsed loads; we find that it does not suggest that the bias or control loads are also pulsed.

Also, we turn to Figure 2a of Steigerwald '539, brought more fully to our attention by Patent Owner (PO App. Br. 22 (citing PO App. Br., Evid. App'x, Ex. A214)) and reproduced below.

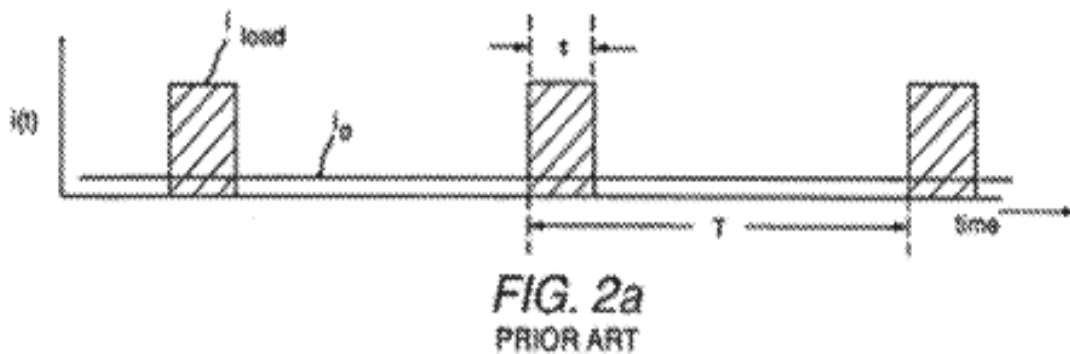


Figure 2a describing average and conventional power systems.

It is true that there is an intermittent full load for a time period “t” while the radar transmission occurs, as argued by the Patent Owner. However, in raising this issue, we observe that Patent Owner does not discuss the import of the line marked i_0 in Figure 2a. Steigerwald describes Figure 2a thusly:

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FIG. 2a graphically illustrates the *average* and load currents for the conventional power system of FIG. 1; Steigerwald '539 2:17–18 (emphasis added).

The power converter receives an input current in and supplies *average* current i_o to energy-storage capacitor C_{out} and the load. Steigerwald '539 2:55–57 (emphasis added).

In other words, it appears on this record that Steigerwald describes its embodiments include a continual average current without substantial interruption to run control circuitry.

Appendix Number A215 is a paper containing SynQor's Comments filed March 12, 2012. Pages 10 and 11 contain an argument that the capacitor charges from V_{in} but discharges in a short pulse. SynQor Comments March 12, 2012, 10. Patent Owner also urged that the duty cycle of the primary winding need not be the sole cause of the power flow, just a cause. *Id.* at 11.

We are unpersuaded by these positions for the reasons noted above concerning Figure 2a and the average power described therein.

On rehearing, Patent Owner also urges that the 50% duty cycle applies “only to the *diode* embodiment of Fig. 1 of Steigerwald '090 and the operation of the primary side transistors, Qa and Qb in that embodiment. The cited statements in *both* the Steigerwald '090 and the '539 say nothing about the duty cycle of the *synchronous rectifiers*.” Reh'g Req. 2.

We observe that the claim language requires the duty cycle of the *primary winding* to *cause* the uninterrupted power. This limitation appears to be what Steigerwald actually describes. Patent Owner's argument does

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not address this limitation adequately or persuasively and appears to be counter to the evidence of record in this proceeding.

Moreover, as noted above, “normal operation” of Steigerwald ’090 also appears always to have at least some power load, while charging the capacitor C_e , which is always connected to the output of the secondary winding circuit. Steigerwald ’090 2:53–56. Steigerwald ’539 observes that “[t]he power converter receives an input current in and supplies average current i_o to energy-storage capacitor C_{out} and the load.” Steigerwald ’539 2:55–57 (*italics in original*). Note line i_o in Figure 2a. As a consequence, we are not persuaded that Steigerwald ’539 does not describe a continuous power flow.

We have considered the attorney argument concerning interruption in the boundary between each half cycle (Req. Reh’g. 5–7) and the degree of interruption of power flow (Req. Reh’g 7–9). However, in view of the description of Steigerwald ’090 as noted above, including that describing average current, we are unpersuaded that we have overlooked or misapprehended any facts or arguments.

We remain unpersuaded by Patent Owner’s arguments.

B. The rejection of Claims 22, 23, 25, and 27–30 under 35 U.S.C. § 103(a) over Steigerwald ’090

Uninterrupted Power Flow

Patent Owner urges that the obviousness rejections should be reversed because the anticipation rejection should be reversed, and that “[n]either the PTAB nor Vicor have made any obviousness arguments based upon the ‘substantially uninterrupted power flow’ limitation.” Reh’g. Req. 9.

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As Patent Owner has not pointed to any further particular allegation of error, or fact or law we misapprehended or overlooked, we find this contention also to be unpersuasive.

Teaching Away and PTAB Prior Decisions

Patent Owner, relying on multiple decisions of this Board, states that “[t]he PTAB has consistently concluded that the use of synchronous rectifiers is contrary to the purpose of Fig. 1 of the Steigerwald ‘090 patent.” Reh’g Req. 10. Patent Owner lists several decisions indicating that there were technical difficulties, and urges that the alternative embodiment was not desirable. As a consequence, it is urged, we “failed to show that a person of ordinary skill in the art would have a reason to modify this [Figure 1] embodiment to arrive at the invention recited in the dependent claims at issue.” *Id.* at 12.

The panel did not overlook those decisions; those prior decisions were made prior to a March 13, 2015 Federal Circuit decision determining there was an embodiment in Steigerwald ’090 incorporating synchronous rectifiers in the conduction path. With the determination that Steigerwald ’090 described an alternative embodiment incorporating the description in Steigerwald ’539, the facts underpinning the understanding of the prior art have necessarily shifted.

We, therefore, are unpersuaded that the panel overlooked or misapprehended its other, prior decisions.

Claim 49

Claim 49 recites:

49. A power converter system as claimed in claim 1, wherein the regulation stages are switching regulators.

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Patent Owner urges that the Board overlooked that Steigerwald's statements, made during the prosecution of the Steigerwald '090 patent, are "legally binding clarifications of the embodiments disclosed in Steigerwald '090, including the Steigerwald '090/'539 alternative embodiment." Reh'g Req. 13. According to Patent Owner, a person of ordinary skill in the art reading the Steigerwald '090 patent and prosecution history would understand that none of the embodiments disclosed in Steigerwald '090 is permitted to have an inductor in the non-isolating regulation stages, including the use of switching regulators. *Id.*

We previously considered this argument in our Decision. The Examiner found that Pressman describes the use of switching regulators at the output stage. RAN 18. Motivation is said to be found in Pressman on page 81, where it is stated that "[i]f the larger component count of a switching postregulator (Sect.1.2) is acceptable, even higher efficiencies can be achieved." *Id.* at 20. *See also* Requester Comments November 20, 2011, pages 18–20, which were adopted.

Patent Owner states that we misapprehended the impact of the Federal Circuit's decision on this claim. Reh'g Req. 12. Specifically, it is urged that the Federal Circuit's decision only determined there was an embodiment which included a controlled rectifier. *Id.* One of ordinary skill in the art, therefore, would have been aware that regulation stages used linear regulators, instead of switching regulators, to minimize inductance. *Id.* at 13.

We have considered this argument in view of the evidence of record and the arguments now raised in the rehearing request. We have

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reconsidered our decision, but decline to change it based upon this argument. The express teaching in Pressman of enhanced efficiency, in our view, outweighs the undesirability of additional inductance, when considered in view of the Steigerwald alternative embodiment, as noted in our previous decision.

Claim 50

Claim 50 stands rejected under 35 U.S.C. § 103(a) over Steigerwald '090 (incorporating Steigerwald '539) in view of Pressman and Admitted Prior Art in U.S. Pat. No. 5,999,417. Requester November 30, 2011 Response, pp. 21–22.

Claim 50 reads as follows:

50. A power converter system as claimed in claim 1 wherein the regulation stages are switching regulators, wherein the DC power source provides a voltage within the range of 36 to 75 volts, and wherein the regulation stage output is of a voltage level to drive logic circuitry.

The Examiner found that these recited voltage levels were admitted prior art. Requester November 30, 2011 Response, pp. 21–22. In addition, the Examiner found that a person of ordinary skill could have combined the known elements and achieved the predictable results of input and output voltages. *Id.*

Patent Owner urges that the panel misapprehended the cited portion of SynQor's '417 patent. Specifically, Patent Owner urges that because the discussion of voltages is not in the Background section, it does not state such voltages were known in a two-stage power converter system having the characteristics of claim 50. Reh'g Req. 15–16.

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We are not persuaded by this argument. We observe that Patent Owner does not take the position that these voltage levels were not known in the prior art. Indeed, it would appear that they were well known, as the Specification observes that “[t]he nominal values and ranges of the input and output voltages, as well as the maximum power handling capability of the converter, depend on the application.” ’021 Patent 1:29–31. As the Requester notes, “[w]here a claim element is known in the art, and can be implemented as a matter of ordinary skill with predictable results, the claim is obvious.” Comments 23; *see also KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 416 (2007).

Accordingly, we have not misapprehended or overlooked these arguments, and find no error in the Examiner’s determination that the voltage levels are a predictable result of a selection of known elements and values.

Claims 29 and 30; Claims 22, 23, 25, 27 and 28

Patent Owner makes similar arguments for these claims as above for claim 50. We are unpersuaded that we misapprehended or overlooked any fact or conclusion as discussed previously. Patent Owner also urges that the Examiner erred in failing to consider voltage levels for radar applications, as opposed to those used to drive logic circuitry. Reh’g Req. 18, 19. This argument also fails to address the use of voltages in Steigerwald ’090 to drive control circuitry. Accordingly, we are unpersuaded of error.

C. Secondary Considerations

In 1966, the Supreme Court in *Graham v. John Deere Co.*, 383 U.S. 1, (1966) interpreted and applied section 103, stating:

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Under 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented.

383 U.S. 1, 17–18 (1966)

The Federal Circuit has determined that only after considering the four *Graham* criteria together can the decision maker make the legal determination of whether the invention is nonobvious. *Panduit v. Dennison Manufacturing Co.*, 810 F.2d 1561, 1570 (Fed. Cir. 1986), *cert denied*, 481 U.S. 1052 (1987). A long-felt need and post-invention commercial success can tip the balance in favor of non-obviousness, both in the courts and at the PTO. *Eibel Process Co. v. Minnesota & Ontario Paper Co.*, 261 U.S. 45 (1923); *Carnegie Steel Co. v. Cambria Iron Co.*, 185 U.S. 403 (1902); *The Barbed Wire Patent*, 143 U.S. 275 (1892); *Webster Loom v. Higgins*, 105 U.S. 580 (1881).

Patent Owner urges that the Board “wrongly concludes that the secondary considerations evidence of record relates principally to features of the independent claims rejected under anticipation, as opposed to the dependent claims rejected under obviousness. The PTAB erroneously concludes, according to the Patent Owner, that SynQor has not shown a ‘nexus’ to the ‘dependent claim features.’” Reh’g Req. 20.

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More specifically, Patent Owner urges that secondary considerations apply to claims 49, 50, 25, 29, and 30, as certain systems were found to infringe those claims specifically. Reh’g Req. 21.

We agree with Patent Owner that secondary considerations can apply with equal force to dependent claims. Reh’g Req. 19. Our prior decision is amended by deleting the earlier discussion concerning secondary considerations and replacing it with the following discussion, upon our renewed consideration of the evidence.

Patent Owner urges that the evidence of secondary considerations is commensurate in scope with the dependent claims at issue and it is legal error not to consider such evidence. Patent Owner further urges that the record establishes a nexus between the evidence of secondary considerations and the merits of the claimed invention; to wit, Patent Owner asserts (1) multiple infringing unregulated intermediate bus architecture (“UIBA”) systems fall within the scope of the dependent claims at issue; (2) the infringing UIBA systems enjoyed significant commercial success, fulfilled a long felt need and were praised by the industry; (3) there is a nexus between the secondary consideration evidence and the dependent claims; and (4) Vicor has not submitted any persuasive evidence rebutting SynQor’s evidence that the secondary consideration evidence is attributed to anything other than the merits of the claimed invention. Reh’g Req. 21.

Patent Owner asserts that the Jury Verdict Form from the related litigation, the product datasheets as well as expert testimony, establish that the unregulated intermediate bus architecture systems found to infringe

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claim 1 of the '021 patent also include switching regulators as the regulation stages and thereby also infringe claim 49 of the '021 patent. Reh'g Req. 22.

We accept the evidence that the twelve products listed in the Appendix of the Jury Verdict Form infringe claim 49 of the '021 patent as outlined in the Request for Rehearing pages 22–24. We accept the same for claim 50 (Reh'g Req. 24–25) and as stated for claims 25, 29, and 30 (*Id.* at 25).

We additionally accept that the evidence establishes that the infringing products were commercially successful, for the reasons set forth in pages 25 and 26 of the rehearing request.

We also accept that there was some evidence of industry praise and a need for the power converters, although this evidence is somewhat less persuasive than the commercial success evidence due to its lack of precision as to what constitutes unregulated intermediate bus architecture and the praise, versus the scope of the claims. Reh'g Req. 26–27.

We further accept the position that there is a nexus between the evidence of secondary considerations for these dependent claims where the claim limitations were infringed, and that the evidence is entitled to weight. Reh'g Req. 28–30.

We look to the differences between the claimed subject matter and the prior art.

Claims 1, 9, 15, 21, 24, 26, 31, 39, 45, and 47 are anticipated, and as a consequence this evidence is inapplicable to those claims.

The principal difference between claim 1 and claim 49 is the inclusion of a switching regulator for the regulation stage. However, as noted above,

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Pressman creates a strong incentive for improving efficiency by replacing the linear regulators with switching regulators. Pressman, 81.

The principal differences between claim 1 and claim 50 are (i) wherein the regulation stages are switching regulators; (ii) wherein the DC power source provides a voltage within the range of 36 to 75 volts; and (iii) wherein the regulation stage output is of a voltage level to drive logic circuitry. Again, as noted above, Pressman creates a strong incentive for improving efficiency by replacing the linear regulators with switching regulators. The voltage values are firstly known, and secondly, easily achievable with known components resulting in predictable results, as discussed above.

The principal difference between claim 1 and claim 25 is the regulation stage output is of a voltage level to drive logic circuitry. The voltage value is firstly known, and secondly, easily achievable with known components resulting in predictable results, as discussed above.

The principal difference between claim 1 and claim 29 is wherein the DC power source provides a voltage within the range of 36 to 75 volts. As discussed above, the voltage value is firstly known, and secondly, easily achievable with known components resulting in predictable results,.

The principal differences between claim 1 and claim 30 are (i) the DC power source provides a voltage within the range of 36 to 75 volts, and (ii) the regulation stage output is of a voltage level to drive logic circuitry. Again, the voltage values are firstly known, and secondly, easily achievable with known components resulting in predictable results.

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We balance the secondary considerations, which do tend to somewhat support a case of nonobviousness against this strong evidence of obviousness. We are aware of our previous decisions which found this evidence to be more persuasive, albeit against a different background. We are also aware that the evidence now asserted as secondary considerations does not utilize a linear regulator. Reh'g Req. 22. On balance, although the evidence has significant weight, we conclude it is insufficient to overcome the strong case of obviousness put forth by the Requester and adopted by the Examiner.

CONCLUSIONS

We have carefully reconsidered the evidence of record, including that of secondary considerations submitted by the Patent Owner. We also have reconsidered the evidence submitted by the Requester and the findings and conclusions of the Examiner. Finally, the most recent guidance from the Federal Circuit on the issue of the Steigerwald embodiments has been given substantial weight in our decision.

We GRANT the request and amend the decision as noted above related to correcting the claim status. We GRANT the request in that we have reconsidered the evidence of secondary considerations and modify our previous decision as noted above. However, we DENY the request in that we decline to alter our judgment.

GRANTED-IN-PART

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