

UNITED STATES PATENT AND TRADEMARK OFFICE

---

BEFORE THE PATENT TRIAL AND APPEAL BOARD

---

CAIHONG DISPLAY DEVICES CO., LTD.,  
Petitioner

v.

CORNING INCORPORATED,  
Patent Owner

---

Case IPR2025-01137  
U.S. Patent No. 8,627,684

---

**PATENT OWNER'S PRELIMINARY RESPONSE**

***Mail Stop "PATENT BOARD"***  
Patent Trial and Appeal Board  
U.S. Patent and Trademark Office  
P.O. Box 1450  
Alexandria, VA 22313-1450

## TABLE OF CONTENTS

|      |                                                                                                                                                                                                                                                                                                                                                                                                                                                         |    |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| I.   | INTRODUCTION .....                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1  |
| II.  | FACTUAL BACKGROUND .....                                                                                                                                                                                                                                                                                                                                                                                                                                | 3  |
| III. | PERSON OF ORDINARY SKILL IN THE ART (“POSA”).....                                                                                                                                                                                                                                                                                                                                                                                                       | 4  |
| IV.  | CLAIM CONSTRUCTION .....                                                                                                                                                                                                                                                                                                                                                                                                                                | 4  |
| V.   | REASONS TO DENY INSTITUTION.....                                                                                                                                                                                                                                                                                                                                                                                                                        | 4  |
| A.   | The Petition is not supported by competent evidence.....                                                                                                                                                                                                                                                                                                                                                                                                | 6  |
| B.   | Both Grounds fail to present their challenges with the requisite particularity.....                                                                                                                                                                                                                                                                                                                                                                     | 8  |
| C.   | Ground 1 fails to show the “controlling the torque” limitation in the cited prior art.....                                                                                                                                                                                                                                                                                                                                                              | 10 |
| 1.   | The combination of JP ’826 and Butts does not teach or suggest “controlling the torque of at least one of the stub rolls in the first stub roll pair and the torque of at least one of the stub rolls in the second stub roll pair to be a predetermined percentage of the torque of the at least one pull roll,” as required by claims 1-6. ....                                                                                                       | 12 |
| 2.   | The combination of JP ’826, Butts, and Smids does not teach or suggest the claimed “controlling the torque of the at least one of the stub rolls in the first stub roll pair and at least one in the stub rolls of second stub roll pair to be a predetermined percentage of the torque of at least one of the stub rolls in the third stub roll pair and at least one of the stub rolls in the fourth stub roll pair,” as required by claims 7-14..... | 16 |
| D.   | Ground 2 fails to show the “controlling the torque” limitations in the cited prior art.....                                                                                                                                                                                                                                                                                                                                                             | 19 |
| 1.   | The combination of KR ’349 and Bogdahn does not teach or suggest “controlling the torque of at least one of the pull rolls in the pull roll pair,” as required by claims 1-6.....                                                                                                                                                                                                                                                                       | 21 |
| 2.   | The combination of KR ’349, Bogdahn, and JP ’027 does not teach or suggest “controlling the torque of at least one of the stub rolls in the first stub roll pair and the torque of at least one of the stub rolls in the second stub                                                                                                                                                                                                                    |    |

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                           |    |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
|     | roll pair to be a predetermined percentage of the torque of the at least one pull roll,” as required by claims 1-6.....                                                                                                                                                                                                                                                                                                                                   | 23 |
| 3.  | The combination of KR ’349 and Bogdahn does not teach or suggest “controlling the torque of at least one of the stub rolls in the third stub roll pair and at least one of the stub rolls in the fourth stub roll pair,” as required by claims 7-14. ....                                                                                                                                                                                                 | 26 |
| 4.  | The combination of KR ’349, Fredholm, Bogdahn, and JP ’027 does not teach or suggest “controlling the torque of the at least one of the stub rolls in the first stub roll pair and at least one in the stub rolls of second stub roll pair to be a predetermined percentage of the torque of at least one of the stub rolls in the third stub roll pair and at least one of the stub rolls in the fourth stub roll pair,” as required by claims 7-14..... | 29 |
| E.  | Both Grounds fail <i>Graham</i> factor four based on substantial objective indicia of non-obviousness. ....                                                                                                                                                                                                                                                                                                                                               | 31 |
| 1.  | Commercial Success .....                                                                                                                                                                                                                                                                                                                                                                                                                                  | 32 |
| 2.  | Nexus.....                                                                                                                                                                                                                                                                                                                                                                                                                                                | 33 |
| VI. | CONCLUSION .....                                                                                                                                                                                                                                                                                                                                                                                                                                          | 34 |

## TABLE OF AUTHORITIES

### Cases

|                                                                                                           |           |
|-----------------------------------------------------------------------------------------------------------|-----------|
| <i>Adaptics Ltd. v. Perfect Co.</i> ,<br>IPR2018-01596, Paper 20 (P.T.A.B. Mar. 6, 2019).....             | 1, 9, 10  |
| <i>Fox Factory, Inc. v. SRAM, LLC</i> ,<br>944 F.3d 1366 (Fed. Cir. 2019) .....                           | 31, 33    |
| <i>Graham v. John Deere Co.</i> ,<br>383 U.S. 1 (1966).....                                               | 5, 11, 31 |
| <i>Honeywell Int’l Inc. v. DSM IP Assets, B.V.</i> ,<br>IPR2024-00493, Paper 7 (PTAB Aug. 21, 2024) ..... | 11        |
| <i>Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.</i> ,<br>821 F.3d 1359 (Fed. Cir. 2016).....     | 8, 9, 11  |
| <i>iRhythm Techs. Inc. v. Welch Allyn, Inc.</i> ,<br>IPR2025-00363, Paper 10 (P.T.A.B. June 6, 2025)..... | 7         |
| <i>In re Magnum Oil Tools Int’l, Ltd.</i> ,<br>829 F.3d 1364 (Fed. Cir. 2016) .....                       | 6         |
| <i>NJOY, LLC v. JUUL Labs, Inc.</i> ,<br>IPR2024-00536, Paper 17 (PTAB Aug. 12, 2024) .....               | 11        |
| <i>Personal Web Techs., LLC v. Apple, Inc.</i> ,<br>848 F.3d 987 (Fed. Cir. 2017).....                    | 20        |
| <i>Regents of the Univ. of Cal. v. Broad Inst., Inc.</i> ,<br>903 F.3d 1286 (Fed. Cir. 2018) .....        | 11        |
| <i>Sirona Dental Sys. GmbH v. Institut Straumann AG</i> ,<br>892 F.3d 1349 (Fed. Cir. 2018).....          | 6         |
| <i>Virtek Vision Int’l ULC v. Assembly Guidance Sys., Inc.</i> ,<br>97 F.4th 882 (Fed. Cir. 2024).....    | 11        |
| <i>WBIP, LLC v. Kohler Co.</i> ,<br>829 F.3d 1317 (Fed. Cir. 2016) .....                                  | 32, 33    |

**Statutes**

|                                   |   |
|-----------------------------------|---|
| 35 U.S.C. § 312(a)(3).....        | 8 |
| 35 U.S.C. §§ 314(a), 316(e) ..... | 6 |

**Other Authorities**

|                               |               |
|-------------------------------|---------------|
| 37 C.F.R. § 42.104(b)(4)..... | <i>passim</i> |
|-------------------------------|---------------|

**PATENT OWNER'S EXHIBIT LIST**

| <b>Exhibit No.</b> | <b>Description</b>                                                                                                                                                                                                          |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2001               | ITC Scheduling Order (ITC-337-TA-1433)                                                                                                                                                                                      |
| 2002               | 2007 Display Component of the Year, accessed Apr. 9, 2025 at: <a href="https://www.sid.org/Awards/Display-Industry-Awards/DIAAwardsArchive">https://www.sid.org/Awards/Display-Industry-Awards/DIAAwardsArchive</a>         |
| 2003               | Corning wins awards for EAGLE XG(TM), May 23, 2007, accessed Apr. 9, 2025 at: <a href="https://www.glassonline.com/corning-wins-awards-for-eagle-xgtm/">https://www.glassonline.com/corning-wins-awards-for-eagle-xgtm/</a> |
| 2004               | In Handbook of Visual Display Technology, chapter 5.1.1 "Glass Substrates for AMLCD, OLED and Emerging Display Platforms," Peter L. Bocko, pp. 599-623 (2012)                                                               |
| 2005               | File History of U.S. Patent No. 8,627,684                                                                                                                                                                                   |
| 2006               | Declaration of Dr. Thomas R. Kurfess                                                                                                                                                                                        |
| 2007               | Curriculum Vitae of Dr. Thomas R. Kurfess                                                                                                                                                                                   |
| 2008               | Corning Eagle XG Glass Substrates                                                                                                                                                                                           |
| 2009               | The Story of Corning® EAGLE XG® Slim Glass Substrates                                                                                                                                                                       |
| 2010               | <i>Certain Glass Substrates for Liquid Crystal Displays, Products Containing the Same, and Methods for Manufacturing the Same</i> , Case No. 337-TA-1433, Ex. 147 – Corning® EAGLE XG® Glass substrates Innovation Timeline |
| 2011               | <i>Certain Glass Substrates for Liquid Crystal Displays, Products Containing the Same, and Methods for Manufacturing the Same</i> , Case No. 337-TA-1433, Ex. 152 – Claim Chart for U.S. Patent No. 8,627,684               |

## I. INTRODUCTION

U.S. Patent No. 8,627,684 (“the ’684 patent”) describes and claims an innovative apparatus and “pull roll” process for manufacturing large flat glass sheets for flat-screen electronic displays. The manufacturing process claimed in the ’684 patent led to the commercial success of a well-known and critically acclaimed product that has led the market for nearly a decade. The Petition attempts to piece together the claimed pull-roll apparatus from disparate teachings across four- to six-reference combinations of prior-art references, most of which were already considered and overcome during prosecution. It fails in multiple respects.

As a preliminary matter, the Petition fails to identify its challenge with particularity. Ground 1 alleges obviousness based on “JP ’826 in view of one or more of Butts, JP ’027, KR ’349, Ferngren and Smids.” Pet., 3, 8. Petitioner discusses these six references collectively and interchangeably throughout the argument sections of the Petition. *E.g.*, Pet., 16-22. Ground 1 thus does not identify a particular combination of references, instead presenting 31 possible combinations. Ground 2 similarly presents seven different combinations of “KR ’349 in view of one or more of Bogdahn, Ferngren and Fredholm.” Pet., 3, 8. This alone is a basis to deny institution on the merits, for failing to show with particularity and evidence why any claim is unpatentable. *See Adaptics Ltd. v. Perfect Co.*, IPR2018-01596, Paper 20 at 18-20 (P.T.A.B. Mar. 6, 2019).

Moreover, Petitioner’s obviousness arguments are largely conclusory and rely heavily on the say-so of Petitioner’s supporting expert declaration. *See* EX1003; EX 2006, ¶ 30. For instance, the Petition’s “Motivation to Combine” analysis consists of a single paragraph that merely repeats the legal standard and then improperly incorporates by reference over 150 paragraphs of its expert declaration. *See* Pet., 15-16 (citing EX1003, ¶¶75-232). Not only does the Petition use expert testimony to fill gaps in contravention of 37 C.F.R. § 42.104(b)(4), it does not even do so in a way that accurately cites the expert declaration or cited prior art.

As a result, the Petition fails to show multiple limitations of the challenged independent claims in the cited prior art. For instance, none of the cited prior art—alone or in the numerous combinations presented—teaches the various “controlling the torque” limitations of the independent claims. EX 2006, ¶ 31, 40, 47, 53, 58, 63. A key feature of the claimed invention is the control that the apparatus and method exert over the various pairs of vertically downtilted rollers arranged in two levels, and the way the torque of certain rollers is balanced against other rollers in the overall configuration of the machine and associated manufacturing process.

Indeed, that claimed configuration and control helps achieve the high-quality, flat, defect-free glass panels that distinguish Corning’s products over the prior art and over its current competition in the marketplace. To that end, even if

the Petition were to establish a prima facie case of obviousness—which it does not—it would still fail to carry its burden because there are strong objective indicia of non-obviousness. Accordingly, Petitioner fails to show any likelihood that that any claim is unpatentable. The Board should deny institution on the merits.

## **II. FACTUAL BACKGROUND**

The '684 patent is directed to manufacturing equipment and processes for making glasses that can be used for displays, such as LCDs. EX1001, Abstract, 1:12-2:21. The process allows for the production of high-quality glass that is superior to prior-art technology. The claimed apparatus and process recites a process that uses a pull roll apparatus to create tension in the molten glass in both transverse and longitudinal directions. EX1001, claims 1, 7. The process allows for tightly controlled and reproducible glass dimensions, and produces sheets that are flat, smooth, defect-free, and thermally and mechanically durable. EX1001, 4:24-41, 13:65-15:29.

The application that resulted in the '684 patent went through an extensive and substantive examination at the Office. A total of four office actions were issued. The Examiner cited Smids, Ferngren, and Butts in obviousness rejections that the Applicant overcame. JP '826 was also cited in an IDS on April 7, 2009 and considered by the Examiner on May 6, 2010. EX2005, 0083, 0131. In allowing the claims over the prior art, the Examiner noted “[t]he closest prior art of record,

Butts, ... is silent with regard to any second pair of rollers that are above or below a first pair of rolls and is silent with regard to any splitting or apportioning of the torque in different roll pairs that are located in.” *See* EX1011, 4.

Petitioner has not found any art closer than Butts, and instead relies upon largely the same references for the same limitations that the Office already found to be lacking. For instance, as discussed in detail below, none of the cited prior art discloses the specific roller configuration or the claimed apportionment of the torque in different roll pairs recited in the independent claims.

### **III. PERSON OF ORDINARY SKILL IN THE ART (“POSA”)**

Only for the purposes of this Preliminary Response, Patent Owner does not dispute Petitioner’s level of skill for a person of ordinary skill in the art (POSA) as articulated in the Petition.

### **IV. CLAIM CONSTRUCTION**

The Board need not construe any term in order to deny institution on the merits. Patent Owner reserves the right to contest Petitioner’s implicit or explicit constructions during any further proceedings.

### **V. REASONS TO DENY INSTITUTION**

There are numerous reasons to deny institution on the merits. As a preliminary matter, the Petition fails to support its obviousness theories with competent evidence, runs afoul of 37 C.F.R. § 42.104(b)(4), and fails to present a proper analysis of a POSA’s motivation to combine the cited prior art. Those

failures are particularly problematic here, where the Petition presents four- and six-reference Grounds that use “one or more” to rely on effectively 38 possible combinations. Indeed, the Petition’s failure to present its obviousness Grounds with particularity provides its own separate and independent reason to deny institution.

Additionally, both Grounds 1 and 2 have clearly missing claim limitations that Petitioner tries (and fails) to fill with mischaracterizations of the prior art and conjecture from the expert declaration. Specifically, none of the cited prior art teaches the various “controlling the torque” limitations of the independent claims. A key feature of the claimed invention is the control that the apparatus and method exert over the pairs of vertically down-tilted rollers arranged in two levels, and the way the torque of certain rollers is balanced against other rollers in the overall configuration of the machine. Again, this configuration and control helps achieve the high-quality, flat, defect-free glass panels that distinguish Corning’s products over the prior art and over its current competition in the marketplace.

Finally, both grounds of obviousness fail under *Graham* factor four because there are strong objective indicia of non-obviousness, including commercial success and industry praise that have a demonstrable nexus to the claimed invention. This objective evidence confirms that a POSA would not have

combined the numerous cited references according to the Petitioner's ambiguous proposals to arrive at the precise apparatus and methods of the claims.

**A. The Petition is not supported by competent evidence.**

The Petition relies heavily and incorrectly on its expert declaration to fill gaps in the prior art and the Petition's obviousness analysis. In an IPR, "the burden of proving a proposition of unpatentability" is borne by (and remains at all times with) the petitioner. 35 U.S.C. §§ 314(a), 316(e); *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1375 (Fed. Cir. 2016). Defects in establishing a ground of unpatentability in a petition are not curable during trial since the petition cannot be corrected or enhanced during trial. *See Sirona Dental Sys. GmbH v. Institut Straumann AG*, 892 F.3d 1349, 1356 (Fed. Cir. 2018).

The Board makes its determination regarding institution based on what the petition actually presents and not what it could have reasonably contained had it been drafted differently. *Magnum Oil*, 829 F.3d at 1381 (holding that the Board is not "free to adopt arguments on behalf of petitioners that could have been, but were not, raised by the petitioner during [a post-grant proceeding]"). The Board cannot "deviate from the grounds in the petition and raise its own" theories of invalidity. *Sirona Dental*, 892 F.3d at 1356.

First, Petitioner's obviousness arguments are largely conclusory and rely heavily on the say-so of Petitioner's supporting expert declaration. For instance,

the Petition’s “Motivation to Combine” analysis consists of a single paragraph that merely repeats the legal standard and then improperly incorporates by reference over 150 paragraphs of its expert declaration. *See* Pet., 15-16 (citing EX1003, ¶¶75-232). While the Petition says that motivation to combine and reasonable expectation of success will be “set forth below in more detail,” it never does. Pet., 15. The Petition never provides a more fulsome discussion or evidence. That is not a sufficient motivation-to-combine analysis to establish obviousness on the merits.

Second, the Petition uses the expert declaration to fill gaps in the prior art disclosure. *Cf. iRhythm Techs. Inc. v. Welch Allyn, Inc.*, IPR2025-00363, Paper 10 at 2-3 (P.T.A.B. June 6, 2025) (suggesting that identifying portions of expert testimony to fill gaps in the prior art weighs in favor of denial). For instance, Petitioner cannot point to a combination of references that discloses controlling the torque of one roller to be a predetermined percentage of the torque of another roller. *See, e.g.*, Pet., 21. Instead Petitioner uses a purported combination of JP ’826 and Butts—neither of which discloses controlling torque in any way. Petitioner reasons that Butts teaches setting the rollers to different rolling speeds—even though speed is different than torque—and cites nothing but its expert opinion that one of skill in the art would encounter no technical barrier in modifying Butts and JP ’826 to arrive at the claim limitation. Pet., 21 (citing EX1003, ¶¶96-98). This is improper under 37 C.F.R. § 42.104(b)(4).

Third, the Petition attributes technical discussion to the expert declaration that is not there. *See, e.g.*, Pet., 33 (citing EX1003, ¶¶136-139 for the proposition that “the torque control in Butts offers more benefits than speed control” and would have therefore motivated a POSA to modify the rollers in JP ’826). Paragraphs 136-139 of Exhibit 1003 do not characterize Butts as providing torque control. *Contra id.* Accordingly, not only does the Petition use expert testimony to fill gaps in contravention of 37 C.F.R. § 42.104(b)(4), it does not even do so in a way that accurately cites the expert declaration or cited prior art.

The collective effect of these deficiencies is a declaration that is conclusory on crucial limitations and lacks supporting evidence or analysis. The Petition therefore fails on the merits to present substantial evidence of unpatentability for any claim. Institution should be denied.

**B. Both Grounds fail to present their challenges with the requisite particularity.**

A petition must identify “with particularity, each claim challenged, the grounds on which the challenge to each claim is based, and the evidence that supports the grounds for the challenge to each claim.” 35 U.S.C. § 312(a)(3). “It is of the utmost importance that petitioners in the IPR proceedings adhere to the requirement that the initial petition identify with particularity the evidence that supports the grounds for the challenge to each claim.” *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016) (internal quotes

omitted). That is because “the expedited nature of IPRs bring with it an obligation for petitioners to make their case in their petition to institute.” *Id.*

The Petition here does not satisfy the particularity requirement because its use of “one or more of” multiple alternative secondary references results in an excessive, voluminous, and ambiguous number of obviousness combinations. *Compare* Pet., 3, 8, with *Adaptics*, IPR2018-01596, Paper 20 at 15-17 (informative) (citing § 312(a)(3)). Specifically, Ground 1 alleges obviousness based on “JP ’826 in view of one or more of Butts, JP ’027, KR ’349, Ferngren and Smids.” Pet., 3, 8. Petitioner discusses the one primary and five secondary references collectively and interchangeably throughout the argument sections of the Petition. *E.g.*, Pet., 16-72.

As a result, Ground 1 does not identify a particular combination of references, instead presenting 31 possible combinations. Such excessive alternative grounds thwarts “the interests of efficient administration of the Office” and “procedural fairness to Patent Owner.” *Adaptics*, IPR2018-01596, Paper 20 at 24 (citing 35 U.S.C. § 316(b)). *Adaptics* is highly instructive here. In *Adaptics*, the Board denied institution because the petition included “voluminous and excessive grounds” based on the use of “and/or,” yielding “hundreds of possible combinations.” *Adaptics*, IPR2018-01596, Paper 20 at 18-19. The Board characterized the petitioner’s grounds as “not reasonably bounded in scope.” *Id.* at

21. Even under a “conservative interpretation” that limited the petition’s grounds to “a total of seventeen possible combinations,” the Board determined that this number of grounds “yields an unduly burdensome number of combinations.” *Id.* at 19. The Petition here presents the exact same situation.

Not only does Ground 1 present 31 possible combinations, but Ground 2 uses the same tactic, presenting an additional seven possible combinations of “KR ’349 in view of one or more of Bogdahn, Ferngren and Fredholm.” Pet., 3, 8. Petitioner’s resulting 38 different prior-art combinations presented in a choose-your-own-adventure style discussion is even less bounded in scope than the 17 combinations that were denied institution in *Adaptics*. The same result should follow here.

**C. Ground 1 fails to show the “controlling the torque” limitation in the cited prior art.**

In addition to the evidentiary failures discussed above, Ground 1 is facially and fatally flawed on the merits. It fails to show every independent claim element in the cited art, in addition to failing to provide any substantive analysis of motivation to modify and combine the cited art or a reasonable expectation of success in doing so. EX 2006, ¶¶ 30, 31, 38. The challenged claims are not unpatentable in view of the three cited references. *Id.* at ¶ 32.

“An obviousness determination requires finding that [a Skilled Artisan] would have been motivated to combine or modify the teachings in the prior art *and*

would have had a reasonable expectation of success in doing so.” *Regents of the Univ. of Cal. v. Broad Inst., Inc.*, 903 F.3d 1286, 1291 (Fed. Cir. 2018); *Intelligent Bio-Sys.*, 821 F.3d at 1367–68; *see also, e.g., NJOY, LLC v. JUUL Labs, Inc.*, IPR2024-00536, Paper 17 (PTAB Aug. 12, 2024) (denying institution where petitioner did not show a reasonable expectation of success in combining the asserted references); *Honeywell Int’l Inc. v. DSM IP Assets, B.V.*, IPR2024-00493, Paper 7 (PTAB Aug. 21, 2024) (same). The Petition here does not show this.

Furthermore, in a properly formulated multi-reference obviousness ground, where a patent challenger identifies a primary reference that allegedly discloses some (but not all) limitations of the claims, the challenger must also identify which limitations are missing from the primary reference and where they can be found in the secondary reference. *See, e.g., Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966) (providing that identifying the differences between the prior art and the claims is a required step in the obviousness analysis). The challenger must also explain why a POSA would modify the primary reference to incorporate the teachings of the secondary reference. *See Virtek Vision Int’l ULC v. Assembly Guidance Sys., Inc.*, 97 F.4th 882, 888 (Fed. Cir. 2024) (emphasizing that the mere existence of the claim limitations in the prior art is not enough without a clear motivation to modify and combine). This requirement continues for each additional reference that is added to the purported combination, where the Petitioner must

identify what the combination of the primary and secondary reference is missing, and why a POSA would be motivated to look to third, fourth, and additional references to supply those missing limitations. Petitioner here does not do this. Indeed, Petitioner falls short of carrying its burden of establishing a reasonable likelihood of showing that any of the claims challenged in Ground 1 are unpatentable.

- 1. The combination of JP '826 and Butts does not teach or suggest “controlling the torque of at least one of the stub rolls in the first stub roll pair and the torque of at least one of the stub rolls in the second stub roll pair to be a predetermined percentage of the torque of the at least one pull roll,” as required by claims 1-6.**

Ground 1 fails to show obviousness of any of claims 1-6 because the Petition fails to cite art that teaches or suggests “controlling the torque of at least one of the stub rolls in the first stub roll pair and the torque of at least one of the stub rolls in the second stub roll pair to be a predetermined percentage of the torque of the at least one pull roll,” as found in independent claim 1 of the '684 patent. EX 2006, ¶ 31.

Indeed, despite citing six references in Ground 1, Petitioner cannot point to a single reference (or combination of references) that discloses controlling the torque of one roller to be a predetermined percentage of the torque of another roller, as recited in the independent claims. *See, e.g.*, Pet., 21; EX 2006, ¶ 32. Much less does the cited art disclose the claimed configuration of rollers such that a torque of

at least one of the stub rolls in an upper pair of rollers (the first and second stub roll pairs) is a predetermined percentage of the torque of a roll in a lower pair of rollers. *See* EX1001, claim 1; EX 2006, ¶ 32. Even worse, the Petition's purported quote of Butts (EX1004) for this limitation appears to be fabricated:

Butts teaches that “controlling torque rather than speed can allow for a speed difference between the rolls, enabling the surface speed of the glass sheet to match the speed of the rolls, thereby preventing the rolls from slipping relative to the glass plate.” [EX1004], ¶ [0021].

Pet., 21; EX 2006, ¶ 35. Butts contains no such quotation in paragraph 21 or elsewhere. *See generally* EX1004; EX 2006, ¶ 35. Indeed, as the Office has already found, “Butts is silent with regard to any second pair of rollers that are above or below a first pair of rolls and is silent with regard to any splitting or apportioning of the torque in different roll pairs that are located in.” *See* EX1011, 4; EX 2006, ¶ 33.

In fact, Butts only describes delivering equal and constant torque to the rolls 206 and 212 while allowing the rotational speeds of each of the rolls 206 and 212 to change with respect to one another based on the small but unavoidable difference between the radii of roll 206 and roll 212. EX1004, ¶21; EX 2006, ¶ 36. Thus, Butts expressly teaches only setting or allowing the speed (not the torque) of a roller to be different than another roller. EX1004, ¶21; EX 2006, ¶ 36. Butts does not teach controlling the torque of an upper roller based on the torque of another

roller. EX 2006, ¶ 36. Nor does the Petition cite any teaching in Butts for controlling or adjusting the torque of a roller; it cites only disclosures for controlling or adjusting the speed. EX 2006, ¶ 36.

Confusingly, other sections of the Petition appear to change the argument when addressing claim limitations 1[d]-1[g] and 7[d]-7[g], and rely on JP '826 to allegedly teach setting the rotational/peripheral speed of a cooling roller lower than the peripheral speed of a pulling roller feature. Pet., 19-20, 33, 39; EX 2006, ¶ 34. In these sections, Petition purports to rely on a combination of JP '826 and Butts to teach or suggest the “controlling the torque of at least one of the stub rolls in the first stub roll pair and the torque of at least one of the stub rolls in the second stub roll pair” claim limitation. Pet., 20-22; EX 2006, ¶ 34.

However, neither JP '826 nor Butts, alone or in combination, teach controlling the torque of one roller to be lower than, or to be a percentage of, the torque of another roller. EX 2006, ¶ 37. JP '826 generally teaches setting the peripheral speed of a cooling roller lower than the peripheral speed of a pulling roller, EX1002, ¶28, while Butts teaches delivering equal and constant torque to two rolls and allowing the angular velocity of each of the two rolls to change, EX1004, ¶21. EX 2006, ¶ 37. Neither of these references discusses controlling the torque of one roller to be lower than or to be a percentage of the torque of another roller for any reason. EX 2006, ¶ 37.

In addition to failing to cite each element of the claims, Petitioner's arguments lack the required rationale to combine JP '826 and Butts to teach or suggest the claims. EX 2006, ¶ 38. Petitioner fails to identify a starting point (for example, a specific embodiment or example) in JP '826, the differences between that starting point and claim 1, or the proposed modification of that starting point in view of Butts. Pet., 20-22; EX 2006, ¶ 38. Rather, the alleged motivation to combine JP '826 and Butts is a single sentence. Pet., 16-17 (limitation 1[a]), 21 (limitation 1[d]); EX 2006, ¶ 38. Petitioner does not explain why one would look to the controlling the torque of rollers taught by JP '826, how or why one would modify or be motivated to modify JP '826 in view of Butts, or why one would have an expectation of success in doing so. Pet., 20-22; EX 2006, ¶ 38.

Patent Owner and the Board are therefore left guessing as to what portions of the cited references are relevant, how they would be combined, and why the resulting combination satisfies the limitations of the claims. Even being as generous as possible to Petitioner—which is not the legal standard—the Petition still fails. All of the references in the Ground, each alone *and in each possible combination* fail to teach or suggest the claimed controlling the torque of at least one of stub rolls in a first stub roll pair to be a predetermined percentage of the torque of at least one pull roll, and the claimed controlling the torque of at least one of stub rolls in a second stub roll pair to be a predetermined percentage of the

torque of at least one pull roll. EX 2006, ¶ 39. Accordingly, this limitation is missing from the prior art in at least two ways.

2. **The combination of JP '826, Butts, and Smids does not teach or suggest the claimed “controlling the torque of the at least one of the stub rolls in the first stub roll pair and at least one in the stub rolls of second stub roll pair to be a predetermined percentage of the torque of at least one of the stub rolls in the third stub roll pair and at least one of the stub rolls in the fourth stub roll pair,” as required by claims 7-14.**

Ground 1 further fails to show obviousness of any of claims 7-14 because the Petition fails to cite art that teaches or suggests “controlling the torque of the at least one of the stub rolls in the first stub roll pair and at least one in the stub rolls of second stub roll pair to be a predetermined percentage of the torque of at least one of the stub rolls in the third stub roll pair and at least one of the stub rolls in the fourth stub roll pair,” as found in independent claim 7 of the '684 patent. EX 2006, ¶ 40. The Petition’s failings in disclosing these claims repeat all of the failures discussed above in Section V.C.1. Namely, Petitioner cites Butts for disclosing setting the rotational speed of the cooling rollers to a preset value that is lower than the rotational speed of the pulling rollers. Pet., 32; EX 2006, ¶ 41. Other sections of the Petition appear to change the argument when addressing claim limitations 1[d]-1[g] and 7[d]-7[g], and rely on JP '826 to allegedly teach setting the rotational/ peripheral speed of a cooling roller lower than the peripheral speed of a pulling roller feature. Pet., 19-20, 33, 39; EX 2006, ¶ 41.

Either way, Butts does not teach “controlling torque rather than speed can allow for a speed difference between the rolls, enabling the surface speed of the glass sheet to match the speed of the rolls, thereby preventing the rolls from slipping relative to the glass plate.” Pet., 33; EX 2006, ¶ 42. This excerpt does not exist in Butts. EX 2006, ¶ 42. The Petition strategically rephrases it and then misleadingly presents it as a quote. EX 2006, ¶ 42.

In fact, Butts only describes delivering equal and constant torque to the rolls 206 and 212 while allowing the rotational speeds of each of the rolls 206 and 212 to change with respect to one another based on the small but unavoidable difference between the radii of roll 206 and roll 212. EX1004, ¶21; EX 2006, ¶ 43. Thus, Butts expressly teaches only setting or allowing the speed (not the torque) of a roller to be different than another roller. EX1004, ¶21; EX 2006, ¶ 43. The Petition does not point to any teaching in Butts for controlling the torque of an upper roller based on the torque of another roller—it only cites disclosures for controlling or adjusting speed. EX 2006, ¶ 43.

To the extent the Petition relies on a combination of JP ’826, Butts, *and Smids* to teach or suggest claim 7’s “controlling the torque of the at least one of the stub rolls in the first stub roll pair and at least one in the stub rolls of second stub roll pair” claim limitation, it still fails. Pet., 32-33; EX 2006, ¶ 44. JP ’826, Butts, and Smids, either alone or in combination, do not teach controlling the torque of

one roller to be lower than, or to be a percentage of, the torque of another roller at the same elevation. EX 2006, ¶ 44. For example, JP '826 generally teaches setting the peripheral speed of a cooling roller lower than the peripheral speed of a pulling roller, EX1002, ¶28, while Butts teaches delivering equal and constant torque to two rolls and allowing the angular velocity of each of the two rolls to change, EX1004, ¶21. EX 2006, ¶ 45. The Petition does not point to anything particular in Smids to teach the torque-controlling feature and fails to teach controlling the torque of any roller. Pet., 32-34; EX 2006, ¶ 45. There is nothing to point to as Smids does not control the torque of one roller to be lower than, or to be a percentage of, the torque of another roller for any reason. EX 2006, ¶ 45.

In addition to failing to cite each element of the claims, Petitioner's arguments lack the required rationale to combine JP '826, Butts, and Smids to teach or suggest the claims. EX 2006, ¶ 46. Petitioner fails to identify a starting point (for example, a specific embodiment or example) in JP '826, the differences between that starting point and claim 7, or the proposed modification of that starting point in view of Butts. Pet., 32-34; EX 2006, ¶ 46. Rather, the alleged motivation to combine JP '826, Butts, and Smids is a single sentence. Pet., 33 (limitation 7[d]-[g]); EX 2006, ¶ 46. Petitioner does not explain why one would look to the controlling the torque of rollers taught by JP '826, how or why one would modify or be motivated to modify JP '826 (as modified by Smids) in view

of Butts, or why one would have an expectation of success in doing so. Pet., 32-34; EX 2006, ¶ 46. Accordingly, all of the references in Ground 1, each alone *and in each possible combination*, fail to teach or suggest the claimed controlling the torque limitation. EX 2006, ¶ 46.

**D. Ground 2 fails to show the “controlling the torque” limitations in the cited prior art.**

Ground 2 acknowledges that the primary reference, KR '349, does not teach (1) monitoring and controlling the torque of each roll, or (2) the ratio of the torque of the short roll to the long roll is a preset value. Pet., 49. Petitioner appears to rely on Bogdahn alone for teaching these limitations. Pet., 48-49 (stating Bogdahn teaches “reduc[ing] or prevent[ing] gearing differences between the individual rolling bodies [and the resulting damage to the glass surface] by coordinating the torques” (citing EX1008, ¶¶21, 37)); EX 2006, ¶ 47.

But Bogdahn teaches the benefits of coordinating torques among entirely differently situated rollers in forming cylindrical glass—not flat glass sheets. EX1008, Abstract, ¶1, FIG. 1, claims 1, 12, 19; EX 2006, ¶ 48. The entire apparatus and relative positions and motions of the rollers are configured differently. *Id.* The purpose of the torque control in the '684 patent is to coordinate the rollers pulling on the perpendicular edges of the flat glass sheet to control cross-draw and down-draw tension of the glass sheet (i.e., in two dimensions). *See* EX1001, 7:66-8:35; EX 2006, ¶ 48. This coordination enables control of tension of

the glass sheet in two dimensions – cross-draw and down-draw. *See* EX1001, Abstract; EX 2006, ¶ 48. Cylindrical glass tubes do not have perpendicular edges and are drawn in a single, longitudinal dimension. EX 2006, ¶ 48. No disclosure in Bogdahn teaches how or why one would coordinate the torque ratios of the kind of rollers claimed in the '684 patent. EX 2006, ¶ 48.

The Petition states in conclusory fashion that a POSA “would understand” how to implement extensive modifications to KR '349 to control the torque of its rollers. Pet., 48; EX 2006, ¶ 51. It cites nothing in the prior art for that proposition. Pet., 48; *see also Personal Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 994 (Fed. Cir. 2017) (“[A] clear, evidence-supported account of the contemplated workings of the combination is a prerequisite to adequately explaining and supporting a conclusion that a relevant skilled artisan would have been motivated to make the combination ... .”); 37 C.F.R. § 42.104(b)(4) (requiring that evidence essential to disclose a claim limitation be found in the prior art, as opposed to expert conjecture or alleged knowledge of a POSA).

These failings are discussed in more detail below, accounting for the slightly different analyses that would follow depending on which combination of references one assumes from Petitioner’s ambiguous “one or more of” rationale. Notwithstanding the different combinations, the failings are largely the same.

**1. The combination of KR '349 and Bogdahn does not teach or suggest “controlling the torque of at least one of the pull rolls in the pull roll pair,” as required by claims 1-6.**

Ground 2 fails to show obviousness of any of claims 1-6 because the Petition fails to cite art that teaches or suggests “controlling the torque of at least one of the pull rolls in the pull roll pair,” as found in independent claim 1 of the '684 patent. EX 2006, ¶ 47. At a high level, Petitioner appears to rely on Bogdahn alone for this limitation, despite presenting Bogdahn in various combinations of one to three other references. EX 2006, ¶ 47. Bogdahn discloses a method and device for manufacturing cylindrical glass bodies, and specifically teaches “reduc[ing] or prevent[ing] gearing differences between the individual rolling bodies [and the resulting damage to the glass surface] by coordinating the torques.” Pet., 47-49 (citing EX1008, ¶¶21, 37); EX 2006, ¶ 47.

The fatal disconnect, however, is that Bogdahn teaches the benefits of coordinating torques among entirely differently situated rollers in forming *cylindrical* glass—not flat glass sheets. EX1008, Abstract, ¶1, FIG. 1, claims 1, 12, 19; EX 2006, ¶ 48. The entire apparatus, and relative positions and motions of the rollers, are configured differently from the '684 patent. *Id.* The purpose of the torque control in the '684 patent is to coordinate the rollers pulling on the perpendicular edges of the flat glass sheet. *See* EX1001, 7:66-8:35; EX 2006, ¶ 48. Cylindrical glass tubes do not have perpendicular edges. EX 2006, ¶ 48. No

disclosure in Bogdahn teaches how or why one would coordinate the torque ratios of the kind of perpendicularly arranged rollers claimed in the '684 patent. EX 2006, ¶ 48.

The Petition further argues that the combination of KR '349 and Bogdahn suggests the “controlling the torque of at least one of the pull rolls in the pull roll pair” claim limitation. Pet., 47-49; EX 2006, ¶ 49. However, neither KR '349 nor Bogdahn, alone or in combination, teaches controlling the torque of at least one of the pull rolls in the pull roll pair for manufacturing glass sheet. EX 2006, ¶ 49. For example, KR '349 generally teaches an apparatus for manufacturing sheet glass using the downdraw method, Pet., 45 (citing EX1006, Title), while Bogdahn teaches “reduc[ing] or prevent[ing] gearing differences between the individual rolling bodies [and the resulting damage to the glass surface] by coordinating the torques” for manufacturing cylindrical glass bodies, Pet., 47-49 (citing EX1008, ¶¶21, 37). EX 2006, ¶ 50. Neither of these references discusses controlling the torque of at least one of the pull rolls in the pull roll pair for manufacturing glass sheet for any reason. EX 2006, ¶ 50.

In addition to failing to cite each element of the claims, Petitioner's arguments lack the required rationale to combine KR '349 and Bogdahn to teach or suggest the claims. EX 2006, ¶ 51. Petitioner fails to identify a starting point (for example, a specific embodiment or example) in KR '349, the differences between

that starting point and claim 1, or the proposed modification of that starting point in view of Bogdahn. Pet., 47-49; EX 2006, ¶ 51. Rather, the alleged motivation to combine KR '349 and Bogdahn is, in conclusory fashion, that a POSA “would understand” how to implement extensive modifications to KR '349 to control the torque of its rollers. Pet., 48; EX 2006, ¶ 51. Petitioner does not explain why one would look to the controlling the torque of rollers taught by KR '349, how or why one would modify or be motivated to modify KR '349 in view of Bogdahn, or why one would have an expectation of success in doing so. Pet., 47-49; EX 2006, ¶ 51.

Patent Owner and the Board are therefore left guessing as to what portions of the cited references are relevant, how they would be combined, and why the resulting combination satisfies the limitations of the claims. Even being as generous as possible to Petitioner—which is not the legal standard—the Petition still fails. Accordingly, the references in Ground 2, each alone *and in each possible combination* fail to teach or suggest the claimed controlling the torque of at least one of the pull rolls in the pull roll pair. EX 2006, ¶ 52.

- 2. The combination of KR '349, Bogdahn, and JP '027 does not teach or suggest “controlling the torque of at least one of the stub rolls in the first stub roll pair and the torque of at least one of the stub rolls in the second stub roll pair to be a predetermined percentage of the torque of the at least one pull roll,” as required by claims 1-6.**

Ground 2 fails to show obviousness of any of claims 1-6 because the Petition fails to cite art that teaches or suggests “controlling the torque of at least one of the

stub rolls in the first stub roll pair and the torque of at least one of the stub rolls in the second stub roll pair to be a predetermined percentage of the torque of the at least one pull roll,” as found in independent claim 1 of the ’684 patent. EX 2006, ¶ 53. In purported support for this limitation, Petitioner cites JP ’027, which teaches setting the cooling rollers and pulling rollers to different speeds. Pet., 50; EX 2006, ¶ 53.

But JP ’027’s disclosure of controlling the *speed* of a roller is not equivalent to controlling the torque of it. EX 2006, ¶ 54. Petitioner alleges that “[a]lthough JP ’027 does not explicitly refer to the controlling the *torque* of the rollers, a POSITA would understand that circumferential speed is directly proportional to rotational speed, and that both circumferential speed and rotational speed are inversely related to torque in most cases (*e.g.*, assuming power is constant).” Pet., 50; EX 2006, ¶ 54. But neither circumferential nor rotational speed is equivalent to torque, nor in the context of glass making is the conversion straight forward, and the assumption of power being constant is baseless. EX 2006, ¶ 54.

To the extent the Petition relies on a combination of KR ’349, Bogdahn, and JP ’027 to teach or suggest the “controlling the torque of at least one of the stub rolls in the first stub roll pair and the torque of at least one of the stub rolls in the second stub roll pair” claim limitation, it fails. Pet., 50-51; EX 2006, ¶ 55. The reasons that KR ’349 and Bogdahn do not teach or suggest this limitation are the

same as discussed in Section V.D.1, above. JP '027 generally teaches setting the cooling rollers and pulling rollers to different speeds. Pet., 50; EX 2006, ¶ 55.

None of these references discusses controlling the torque of at least one of the stub rolls in the first stub roll pair and the torque of at least one of the stub rolls in the second stub roll pair, much less controlling the torque of one of those stub rolls to be a predetermined percentage of the torque of the at least one pull roll. EX 2006, ¶ 55.

In addition to failing to cite each element of the claims, Petitioner's arguments lack the required rationale to combine KR '349, Bogdahn, and JP '027 to teach or suggest the claims. EX 2006, ¶ 56. Petitioner fails to identify a starting point (for example, a specific embodiment or example) in KR '349, the differences between that starting point and claim 1, or the proposed modification of that starting point in view of Bogdahn and JP '027. Pet., 50-51; EX 2006, ¶ 56. Rather, Petitioner states in conclusory fashion that a POSA "would understand" how to implement extensive modifications to KR '349 to control the torque of its rollers to be a predetermined percentage of the torque of another roller. Pet., 51; EX 2006, ¶ 56. Petitioner does not explain why one would look to the controlling the torque of rollers to be a predetermined percentage of the torque of other rollers taught by KR '349, how or why one would modify or be motivated to modify KR '349 in view of

Bogdahn and JP '027, or why one would have an expectation of success in doing so. Pet., 50-51; EX 2006, ¶ 56.

Patent Owner and the Board are therefore left guessing as to what portions of the cited references are relevant, how they would be combined, and why the resulting combination satisfies the limitations of the claims. Even being as generous as possible to Petitioner—which is not the legal standard—the Petition still fails. All of the references in the Ground, each alone *and in each possible combination*, fail to teach or suggest the claimed controlling the torque of at least one of the stub rolls in the first stub roll pair and the torque of at least one of the stub rolls in the second stub roll pair to be a predetermined percentage of the torque of the at least one pull roll. EX 2006, ¶ 57.

**3. The combination of KR '349 and Bogdahn does not teach or suggest “controlling the torque of at least one of the stub rolls in the third stub roll pair and at least one of the stub rolls in the fourth stub roll pair,” as required by claims 7-14.**

Ground 2 fails to show obviousness of any of claims 7-14 because the Petition fails to cite art that teaches or suggests “controlling the torque of at least one of the stub rolls in the third stub roll pair and at least one of the stub rolls in the fourth stub roll pair,” as found in independent claim 7 of the '684 patent. EX 2006, ¶ 58. As discussed above, Bogdahn discloses a method and device for manufacturing *cylindrical* glass bodies with a focus on gearing differences

between rolling bodies configured specifically for cylindrical configurations.

EX1008, Abstract, ¶1, FIG. 1, claims 1, 12, 19; EX 2006, ¶ 58. The Petition's reliance on Bogdahn is therefore misplaced. Pet., 58-59 (citing EX1008, ¶¶21, 37); EX 2006, ¶ 58.

The purpose of the torque control in the '684 patent is to coordinate the rollers pulling on the perpendicular edges of the glass sheet. *See* EX1001, 7:66-8:35; EX 2006, ¶ 59. Cylindrical glass tubes do not have perpendicular edges. EX 2006, ¶ 59. No disclosure in Bogdahn teaches how or why one would coordinate the torque ratios of the kind of rollers claimed in the '684 patent. EX 2006, ¶ 59.

To the extent the Petition relies on a combination of KR '349 and Bogdahn to teach or suggest the “controlling the torque of at least one of the stub rolls in the third stub roll pair and at least one of the stub rolls in the fourth stub roll pair” claim limitation, it still fails. Pet., 58-60; EX 2006, ¶ 60. Neither KR '349 nor Bogdahn, alone or in combination, teach controlling the torque of at least one of the stub rolls in the stub roll pair for manufacturing a flat glass sheet. EX 2006, ¶ 60. KR '349 generally teaches an apparatus for manufacturing sheet glass using the downdraw method, Pet., 55 (citing EX1006, Title), but does not teach the torque control concept. EX 2006, ¶ 60. Bogdahn teaches torque control as a concept, but not in the context of flat glass sheets, which requires perpendicular coordination. EX 2006, ¶ 60.

Compounding these individual failures, Petitioner's arguments lack the required rationale to combine KR '349 and Bogdahn to teach or suggest the claims. EX 2006, ¶ 61. Petitioner fails to identify a starting point in KR '349, the differences between that starting point and claim 7, or the proposed modification in view of Bogdahn. Pet., 58-60; EX 2006, ¶ 61. Rather, the alleged motivation to combine KR '349 and Bogdahn is, in conclusory fashion, that a POSA "would understand" how to implement extensive modifications to KR '349 to control the torque of its rollers. Pet., 59-60; EX 2006, ¶ 61. Petitioner does not explain why one would look to the controlling the torque of the rollers taught by KR '349, how or why one would modify or be motivated to modify KR '349 in view of Bogdahn, or why one would have an expectation of success in doing so. Pet., 58-60; EX 2006, ¶ 61.

Patent Owner and the Board are therefore left guessing as to what portions of the cited references are relevant, how they would be combined, and why the resulting combination satisfies the limitations of the claims. Even being as generous as possible to Petitioner—which is not the legal standard—the Petition still fails. All of the references in Ground 2, each alone *and in each possible combination* fail to teach or suggest the claimed controlling the torque of at least one of the stub rolls in the third stub roll pair and at least one of the stub rolls in the fourth stub roll pair. EX 2006, ¶ 62.

4. **The combination of KR '349, Fredholm, Bogdahn, and JP '027 does not teach or suggest “controlling the torque of the at least one of the stub rolls in the first stub roll pair and at least one in the stub rolls of second stub roll pair to be a predetermined percentage of the torque of at least one of the stub rolls in the third stub roll pair and at least one of the stub rolls in the fourth stub roll pair,” as required by claims 7-14.**

Ground 2 fails to show obviousness of any of claims 7-14 because the Petition fails to cite art that teaches or suggests “controlling the torque of the at least one of the stub rolls in the first stub roll pair and at least one in the stub rolls of second stub roll pair to be a predetermined percentage of the torque of at least one of the stub rolls in the third stub roll pair and at least one of the stub rolls in the fourth stub roll pair,” as found in independent claim 7 of the '684 patent. EX 2006, ¶ 63. Petitioner appears to cite JP '027 for teaching the concept of setting the cooling rollers and pulling rollers to different speeds. Pet., 61; EX 2006, ¶ 63. Petitioner is mistaken. EX 2006, ¶ 63.

JP '027 controlling the *speed* of a roller is not the same as controlling the *torque* of it. EX 2006, ¶ 64. Petitioner alleges that “[a]lthough JP '027 does not explicitly refer to the controlling the torque of the rollers, a POSITA would understand that circumferential speed is directly proportional to rotational speed, and that both circumferential speed and rotational speed are inversely related to torque in most cases (*e.g.*, assuming power is constant).” Pet., 62; EX 2006, ¶ 64. But neither circumferential nor rotational speed is equivalent to torque, nor in the

context of glass making is the conversion straight forward, and the assumption of power being constant is baseless. EX 2006, ¶ 64.

To the extent the Petition relies on a combination of KR '349, Fredholm, Bogdahn, and JP '027 to teach or suggest the limitation, it still fails. Pet., 61-63; EX 2006, ¶ 65. KR '349, Fredholm, Bogdahn, and JP '027, alone or in combination, fails to teach controlling the torque of a stub roll for manufacturing glass sheet. EX 2006, ¶ 65. The reasons regarding KR '349 and Bogdahn are the same as discussed in Sections V.D.1 or V.D.3 above. Fredholm generally teaches cantilevered auxiliary rollers. Pet., 57-58; EX 2006, ¶ 65. JP '027 generally teaches setting the cooling rollers and pulling rollers to different speeds. Pet., 50; EX 2006, ¶ 65. None of these references discusses controlling the torque of at least one of the stub rolls in the first stub roll pair and the torque of at least one of the stub rolls in the second stub roll pair, much less controlling the torque of one of those stub rolls to be a predetermined percentage of the torque of the at least other stub roll. EX 2006, ¶ 65.

In addition to failing to cite each element of the claims, Petitioner's arguments lack the required rationale to combine KR '349, Fredholm, Bogdahn, and JP '027. EX 2006, ¶ 66. Petitioner fails to identify a starting point in KR '349, the differences between that starting point and claim 7, or the proposed modification of that starting point in view of Fredholm, Bogdahn, and JP '027.

Pet., 60-63; EX 2006, ¶ 66. Rather, the Petition states in conclusory fashion that a POSA “would understand” how to implement extensive modifications to KR ’349 to control the torque of its rollers to be a predetermined percentage of the torque of another roller. Pet., 62; EX 2006, ¶ 66. Petitioner does not explain why one would look to the controlling the torque of rollers to be a predetermined percentage of the torque of other rollers taught by KR ’349, how or why one would modify or be motivated to modify KR ’349 in view of Fredholm, Bogdahn, and JP ’027, or why one would have an expectation of success in doing so. Pet., 60-63; EX 2006, ¶ 66. It fails for the same reasons as the combinations discussed above. EX 2006, ¶ 66.

**E. Both Grounds fail *Graham* factor four based on substantial objective indicia of non-obviousness.**

Even if Grounds 1 and 2 presented a prima facie case of obviousness—which they do not for all the reasons discussed above—they would still fail to carry Petitioner’s burden due to objective indicia of non-obviousness.

Obviousness is a question of law based on underlying findings of fact. *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1372 (Fed. Cir. 2019) (quoting *In re Gartside*, 203 F.3d 1305, 1316 (Fed. Cir. 2000)) Those underlying findings of fact include: (1) the scope and content of the prior art, (2) differences between the prior art and the claims at issue, (3) the level of ordinary skill in the pertinent art, and (4) the presence of evidence of secondary considerations, such as commercial success, long felt but unsolved needs, failure of others, and unexpected results. *Id.*

“The objective indicia of non-obviousness play an important role as a guard against the statutorily proscribed hindsight reasoning in the obviousness analysis.” *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1328 (Fed. Cir. 2016). Indeed, as noted by the court in *WBIP*, “evidence of secondary considerations may often be the most probative and cogent evidence in the record.” *Id.* (citing *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1538 (Fed. Cir. 1983)).

Guarding against hindsight bias is especially important here, where the Petition cherry-picks teachings from four- to six-reference combinations vaguely using “one or more of” in a choose-your-own-adventure analysis. Here, objective indicia of non-obviousness includes evidence of at least commercial success. *WBIP*, 829 F.3d at 1337 (“Demonstrating that an invention has commercial value, that it is commercially successful, weighs in favor of its non-obviousness.”).

### **1. Commercial Success**

The claimed manufacturing process, including the invention claimed in the ’684 patent, was critical in producing larger, thinner glass substrates with the quality required by LCD panel manufacturers (e.g., thickness uniformity, low warp). This pull roll technology therefore allowed Corning to bring its revolutionary EAGLE XG glass to a range of advanced applications requiring thinner glass. EX2008; EX2009. Corning has produced more than 25 billion square feet of EAGLE XG Glass—enough to pave the Great Wall of China 25 times, or

cover nearly 390,000 football fields—as it meets the changing needs of its customers as their technology advances. EX2010. That is why Corning has spent decades and invested approximately one billion dollars in developing the fusion-draw glassmaking process discussed in the '684 patent (and other Corning patents). Corning has also spent decades developing glass compositions designed to be manufactured using the pull roll process recited in the '684 patent. That investment was necessary to bring Corning the commercial success that flowed from the pull roller innovation described and claimed in the '684 patent.

## 2. Nexus

To accord substantial weight to secondary considerations, “the evidence of secondary considerations must have a ‘nexus’ to the claims, *i.e.*, there must be ‘a legally and factually sufficient connection’ between the evidence and the patented invention.” *Fox Factory*, 944 F. 3d at 1373 (*quoting Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1332 (Fed. Cir. 2019)). A patentee is entitled to a presumption of nexus for objective considerations when the patentee shows that the asserted objective evidence is tied to a specific product and that product is the invention disclosed and claimed in the patent. *See WBIP*, 829 F. 3d at 1329.

In the present case, Corning sells EAGLE XG Glass manufactured using the method and apparatus claimed in the '684 patent. *See generally* EX2011. This is a specific commercial product that is the invention, because it embodies the larger,

thinner glass substrates with the quality required by LCD panel manufacturers, that results from the specific pull roll technology claimed. There is therefore a nexus between the claimed pull roll manufacturing technology and the commercial success of EAGLE XG Glass in next-generation LCD displays. EX2008; EX2009.

## **VI. CONCLUSION**

The Board should deny institution of the Petition for *inter partes* review of the '684 patent.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX PLLC

/Jason D. Eisenberg/

Jason D. Eisenberg (Reg. No. 43,447)  
Kristina Caggiano Kelly (Reg. No. 58,164)  
Tiaotiao Anchondo (Reg. No. 75,455)  
*Counsel for Patent Owner*

Date: October 2, 2025

1101 K Street, NW, 10th Floor  
Washington, DC 20005  
(202) 371-2600

**CERTIFICATE OF WORD COUNT (37 C.F.R. § 42.24(d))**

1. This Patent Owner Preliminary Response complies with the type-volume limitation of 14,000 words, comprising 8,684 words, excluding the parts exempted by 37 C.F.R. § 42.24(a)(1).

2. This Patent Owner Preliminary Response complies with the general format requirements of 37 C.F.R. § 42.6(a) and has been prepared using Microsoft® Word 2016 in 14-point Times New Roman font.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX PLLC

/Jason D. Eisenberg/

Jason D. Eisenberg (Reg. No. 43,447)  
*Counsel for Patent Owner*

Date: October 2, 2025

1101 K Street, NW, 10th Floor  
Washington, DC 20005  
(202) 371-2600

**CERTIFICATE OF SERVICE (37 C.F.R. § 42.6(e))**

I certify that the above-captioned **PATENT OWNER PRELIMINARY  
RESPONSE** and associated Exhibits 2006-2011 were served in their entirety on  
October 2, 2025, upon the following parties via electronic mail:

Daniel J. Pereira (Lead Counsel) [dpereira@merchantgould.com](mailto:dpereira@merchantgould.com)  
Donald McPhail (Back-Up Counsel) [dmcphail@merchantgould.com](mailto:dmcphail@merchantgould.com)  
John F. Presper (Back-Up Counsel) [jpresper@merchantgould.com](mailto:jpresper@merchantgould.com)  
MERCHANT AND GOULD PC

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX PLLC

/Jason D. Eisenberg/

Jason D. Eisenberg (Reg. No. 43,447)  
*Counsel for Patent Owner*

Date: October 2, 2025

1101 K Street, NW, 10th Floor  
Washington, DC 20005  
(202) 371-2600