

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 IPR2025-01040
U.S. Patent No. 9,512,025

DECLARATION OF DR. THOMAS R. KURFESS

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Corning Incorporated EX2012
Caihong Display Devices v. Corning
IPR2025-01040

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I, Dr. Thomas Kurfess, hereby declare as follows.

I. INTRODUCTION

1. I have been retained as an expert witness on behalf of Patent Owner Corning Incorporated (“Patent Owner”) for the above-captioned *inter partes* review (IPR). I am being compensated for my time in connection with this IPR at my standard consulting rate, which is \$750 per hour.

2. I understand that this Declaration accompanies a Patent Owner Preliminary Response involving U.S. Patent No. 9,512,025 (“the ’025 patent”) (EX1001). The ’025 patent, entitled “Methods and Apparatuses for Reducing Heat Loss from Edge Directors,” issued on December 6, 2016 to Chung et al. *See* EX1001, (54), (45), (72). It issued from U.S. Patent Application No. 14/278,582, filed on May 15, 2014. I understand that the effective priority date for the ’025 patent is no later than May 15, 2014. I refer to this date throughout for purposes of this declaration.

3. The claims of the ’025 patent are directed towards a heating apparatus that, when positioned at an angle in a glass-forming apparatus, reduces heat loss from edge directors to reduce devitrification of glass. In preparing this Declaration, I have reviewed the entirety of the ’025 patent, the Petition filed in the above-captioned *inter partes* review, and each of the documents cited herein, in light of general knowledge in the art as of May 15, 2014. In formulating my opinions, I

have relied upon my experience, education, and knowledge in the relevant art. In formulating my opinions, I have also considered the viewpoint of a person of ordinary skill in the art (“POSA”), as defined further below, in light of general knowledge in the art.

II. MY BACKGROUND AND QUALIFICATIONS

4. I received my Ph.D. in 1989 from Massachusetts Institute of Technology (“MIT”) in Mechanical Engineering. Prior to that, I received dual S.M. degrees in Electrical Engineering & Computer Science and Mechanical Engineering. I received my S.B. in Mechanical Engineering in 1986, also from MIT.

5. I serve as the Chief Manufacturing Officer of the Georgia Institute of Technology (“Georgia Tech”), as well as the Executive Director of the Georgia Tech Manufacturing Institute. I am also a Regents’ Professor of mechanical engineering and HUSCO/Ramirez Distinguished Chair in Fluid Power and Motion Control; I was recently promoted to Regents’ Professor.

6. I have extensive experience in academia, governmental organizations, and private industries. My primary research areas include Manufacturing and Automation & Mechatronics, advanced automation, precision manufacturing, metrology, and technology policy.

7. I focus on the design and development of advanced systems targeting complex production and optimization of products. My focus spans a wide array of technologies, including high precision manufacturing and metrology systems, as well as national and international manufacturing policy.

8. I have worked on a variety of mechatronic and robotic systems in my career that include components and machines that are used in producing materials for use in consumer products, including complex continuous processes such as continuous casting for steel, rolling steel and aluminum, polymer extrusion and injection molding, film blowing to make polymer tubes, and fiber drawing for fiber optics.

9. I have also authored several different book chapters and papers that discuss manufacturing and robotic systems and their implementation. I have taught engineering courses at both the undergraduate and graduate levels on the topics of mechanical design, control theory, robotics and advanced dynamics, manufacturing, and real-time signal processing and control, all of which are applicable to the manufacturing sector.

10. I began my academic career at Carnegie Mellon University where I rose to the rank of Associate Professor. In 1994, I moved to Georgia Tech and was appointed Professor in the George W. Woodruff School of Mechanical Engineering. In 2005, I was named Professor and BMW Chair of Manufacturing

in the Department of Mechanical Engineering at Clemson University's International Center for Automotive Research. In 2012, I returned to Georgia Tech as a Professor of Mechanical Engineering and the HUSCO/Ramirez Distinguished Chair in Fluid Power and Motion Control. From 2019 to 2022, I was on a three-year leave of absence to serve as the Chief Manufacturing Officer for Oak Ridge National Laboratory ("ORNL"). My responsibility at ORNL was to develop and execute a long-range plan for advanced manufacturing as it applies to ORNL, national laboratories, and the United States of America.

11. Between 2012 and 2013, I took leave to serve as the Assistant Director for Advanced Manufacturing at the Office of Science and Technology Policy in the Executive Office of the President of the United States of America. In this position, I was responsible for engaging the federal sector and the greater scientific community to identify possible areas for policy actions related to manufacturing. In this role, I also coordinated federal advanced manufacturing R&D, addressing issues related to technology commercialization, identifying gaps in current federal R&D in advanced manufacturing, and developing strategies to address these gaps.

12. Additionally, I have served as a special consultant of the United Nations to the Government of Malaysia in the area of applied mechatronics and

manufacturing, and as a participating guest at the Lawrence Livermore National Laboratory's Precision Engineering Program.

13. Currently, I serve on the Board of Directors for the National Center for Manufacturing Sciences ("NCMS") and the National Center for Defense Manufacturing and Machining, and on the Board of Trustees for the MT Connect Institute. I am the Chief Technical Officer of NCMS. I also served on the Board of Governors for the American Society of Mechanical Engineers and the Board of Directors for the Society of Manufacturing Engineers. I served as the President of the Society of Manufacturing Engineers in 2018 and as the President of the American Society of Mechanical Engineers in 2023-2024.

14. I have significant experience in advanced manufacturing system design and fabrication, as well as metrology systems, which I bring to bear in this case.

15. I have received several awards identified on my curriculum vitae (CV), which is attached as Exhibit 2013. I am a Fellow of the American Association for the Advancement of Science, the Society of Manufacturing Engineers, and the American Society of Mechanical Engineers, and an elected member of the U.S. National Academy of Engineering.

16. I am the author of numerous publications, all of which are listed on my CV. My CV also contains a list of other cases in which I have testified as an expert at trial or by deposition within the preceding four years.

III. LIST OF DOCUMENTS CONSIDERED

Exhibit No.	Description
EX1001	U.S. Patent No. 9,512,025 (“the ’025 Patent”) with certified Japanese translation
EX1002	Partial Prosecution History of the ’025 Patent with certified Japanese translation
EX1003	Declaration of Murakami Tsugunobu
EX1004	U.S. 2011/0209502 (“El Kahlout”) with certified Japanese translation
EX1005	CN102765869 (“CN ’869”) with certified English translation and certified Japanese translation
EX1006	U.S. 2012/0111060 (“Tsuda”) with certified Japanese translation
EX1007	<i>Curriculum Vitae</i> of Murakami Tsugunobu
EX2002	Display of the Year Award Archive, accessed at https://www.sid.org/Awards/Display-Industry-Awards/DIAAwardsArchive (last accessed Apr. 9, 2025)
EX2003	“Corning wins awards for EAGLE XG(TM),” accessed at: https://www.glassonline.com/corning-wins-awards-for-eagle-xgtm/ (last accessed Apr. 9, 2025) (May 23, 2007)
EX2004	Bocko, Peter L., “Handbook of Visual Display Technology,” Chapter 5.1.1: Glass Substrates for AMLCD, OLED and Emerging Display Platforms, pp. 599-623 (2012)
EX2005	Prosecution History of U.S. Patent Application No. 11/478,493 (now U.S. Patent No. 7,851,394)

IV. PERSON OF ORDINARY SKILL IN THE ART (“POSA”)

17. As an expert, I have offered opinions throughout this Declaration from the perspective of a POSA. I understand that a POSA is a hypothetical person

who is presumed to be aware of all pertinent art, who thinks along conventional wisdom in the art, and is a person of ordinary creativity.

18. I also understand that the following factors are pertinent to the determination of the level of ordinary skill: (1) educational level and any specialties of the inventor(s), (2) types of problems encountered in the art, (3) prior-art solutions to those problems, (4) rapidity with which innovations are made, (5) sophistication of the technology, (6) educational level of active workers in the field, and (7) nature of any testing described in the patent (and skills required of those doing such testing).

19. I also understand that for the purposes of its 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.

20. In my opinion, the precise definition of a POSA is not important at this juncture. I would meet the definition of a POSA under Petitioner's or any reasonable definition. I also do not see any reason why a difference in the precise definition of a POSA would change the outcome of the obviousness analysis presented in the Petition, or its failings.

V. LEGAL BASIS FOR MY ANALYSIS

21. In formulating my opinions set forth in this Declaration, I applied the following legal principles.

A. Claim Construction

22. I understand that in an IPR, patent claim terms are given their ordinary and customary meanings as understood by a POSA at the time of the invention, in view of the patent's specification and its prosecution history, unless the patent explicitly defines the claim term. I also understand that when a patent explicitly defines a claim term in the specification, the patent's definition controls.

23. I understand that a dependent claim contains all limitations of the claim from which it depends.

B. Obviousness

24. I understand that an obviousness analysis involves comparing a claim to the prior art to determine whether the claimed subject matter would have been obvious to a POSA in view of the prior art and general knowledge in the prior art at the time of the patent's priority date (here, May 15, 2014). I understand that obviousness must be assessed from the viewpoint of a POSA at the time of the invention. I further understand that to establish obviousness, a party must perform the following factual inquiries: (a) determining the scope and content of the prior art; (b) ascertaining the differences between the claimed invention and the prior art; and (c) resolving the level of skill in the art. I understand that, in determining the scope and content of the prior art and ascertaining the differences between the

claimed invention, a patent challenger must specify where each element of the claim is found in the prior art.

25. I understand that one way of establishing obviousness is by establishing that a POSA would have had both (i) a reason to modify or combine the teachings of the prior art to achieve the claimed invention and (ii) a reasonable expectation of success in doing so. I understand that the reason to combine prior-art references can come from a variety of sources, not just the prior art itself or the specific problem the patentee was trying to solve. And I understand that the references themselves need not provide a specific hint or suggestion of the alteration needed to arrive at the claimed invention; the analysis may include recourse to logic, judgment, and common sense available to a person of ordinary skill that does not need to be explicit in any reference.

26. I understand that a “reasonable expectation of success” is assessed in view of the prior art and general knowledge in the art from the viewpoint of a POSA at the time of the patent’s priority date, and it does not require an absolute certainty of success. Furthermore, I understand that determining whether the prior art would have suggested to those of ordinary skill in the art to carry out the claimed invention with a reasonable expectation of success must be done after determining that the claimed elements are present in the prior art.

27. I also understand that, before reaching a conclusion that the claimed invention would have been obvious, one must consider any objective evidence of non-obviousness if it is available. The objective evidence of non-obviousness can include evidence of commercial success attributable to the claimed invention, evidence of industry praise for the claimed invention, evidence of a long-felt need that was solved by the claimed subject matter, evidence that others copied the claimed subject matter, or evidence that the claimed subject matter achieved an unexpected, superior result relative to the closest prior art. I understand that such evidence must have a nexus, or causal relationship, to the claimed subject matter beyond what was available in the prior art, and must be commensurate in scope with the patent claim(s) at issue.

C. Anticipation

28. My understanding is that a patent claim is invalid as anticipated if each and every limitation of that claim: (1) is disclosed, either explicitly or inherently, in a single prior-art reference; (2) is already in practice in the industry in a single process or method; (3) is already in a single marketed product; or (4) is otherwise previously invented. For a step or limitation to be inherent in a reference, I understand that the step or limitation must necessarily always occur or be present when one follows the teachings of the reference. I am informed that for a reference to be considered as anticipating it must disclose the relevant technology in a

manner such that a person of ordinary skill in the art would be able to carry out or utilize the technology that the reference describes without having to undertake undue experimentation.

VI. THE PETITION DOES NOT SHOW UNPATENTABILITY OF ANY CLAIM.

29. Having carefully considered the materials listed above, it is my opinion that Ground 1 (the sole Ground presented) does not show every independent claim element in the cited art. It also does not provide any substantive analysis of motivation to modify and combine the cited art or a reasonable expectation of success in doing so.

A. The combination of El Kahlout, Tsuda, and CN '869 does not teach or suggest “a [replaceable] heating cartridge comprising an enclosure having a heat directing surface that is inclined ... less than about 90° with respect to a bottom surface of the enclosure” required by all claims.

30. The Petition does not cite art that teaches or suggests “a [replaceable] heating cartridge comprising **an enclosure** having a heat directing surface that is inclined ... less than about 90° with respect to a bottom surface of **the enclosure**,” (emphasis added) as found in claims 1, 8, and 15 of the '025 patent.

31. Petitioner cites CN '869, which discloses an angle α between an inclined heating surface and the horizontal plane. Pet., 20-21, 38-39, 51-52.

32. Petitioner does not, however, define what they are relying on to meet the claimed “an/the enclosure” (in either El Kahlout or CN ’869), and thus cannot meet the claimed angle “with respect to a bottom of **the enclosure**.” *Id.*

33. Furthermore, CN ’869 does not disclose a value for its angle α , although the claims recite “90°.” The Petition states that “the precise angle is simply optimizing the inclination depicted and described in CN ’869,” but does not provide further analysis. *Id.* Petitioner does not explain how a POSA would determine their alleged optimum angle, the criteria for that determination, or how a POSA would implement that optimization. Nor does the Petition explain why a POSA would recognize the need for optimization of the angle in the first place.

34. The Petition seems to rely on a combination of El Kahlout and CN ’869 to teach or suggest the “replaceable heating cartridge” claim limitation. *Id.*, 21, 39.¹ However, neither El Kahlout nor CN ’869, alone or in combination, teach the required **replaceable** heating cartridge. For example, El Kahlout generally teaches a heating apparatus as part of an edge director, EX1004, ¶35, while CN ’869 teaches a heating apparatus that is used to heat a glass-forming body during

¹ The Petition mentions Tsuda in passing when this limitation appears in claim 8, but *not* when it appears in claims 1 or 15. *Compare* Pet., 21, 39, *with* Pet., 52.

glass production, EX1005, ¶¶15-16. Neither of these references expressly discusses removing or replacing the heating cartridge for any reason.

35. Other sections of the Petition appear to change the argument when addressing claim limitations 15[e], 1[e], and 8[p], and rely on Tsuda to allegedly teach “a replaceable heating cartridge” feature. Pet., 17-19, 35-38, 48-51. Yet Tsuda is not mentioned in the later sections of the Petition purporting to identify the claimed replaceable heating cartridge limitation in the prior art. *Id.*, 20-21, 38-39, 51-52. Even if Petitioner meant to rely on Tsuda, this reference does not teach or suggest the claimed enclosure or the claimed heat-directing surface that is inclined less than about 90° with respect to the bottom of the enclosure. Thus, Tsuda cannot fill in the gaps of El Kahlout and CN ’869.

36. Petitioner’s arguments also lack any rationale to combine El Kahlout and CN ’869 to teach or suggest the claims. Petitioner does not identify a starting point (for example, a specific embodiment or example) in El Kahlout, the differences between that starting point and claims 1, 8, and 15, or the proposed modification of that starting point in view of CN ’869. Pet., 20-21, 38-39, 51-52. The analysis does not identify the relevant portions of El Kahlout. *Id.*, 21 (limitation 1[g]), 39 (limitation 1[f]), 52 (limitation 8[a]). Petitioner does not explain what is missing from El Kahlout, why one would look to the inclined heating surface taught by CN ’869, how or why one would modify or be motivated

to modify El Kahlout in view of CN '869, or why one would have an expectation of success in doing so. *Id.*, 20-21, 38-39, 51-52.

B. The combination of El Kahlout, Tsuda, and CN '869 does not teach or suggest the claimed “view factor from the heat directing surface” required by all claims.

37. The Petition does not cite art that teaches or suggests the relative view factors from the heat directing surface claimed in limitations 1[h], 8[d], and 15[i]. Petitioner's arguments cite the angled heating surfaces of CN '869 that are used for compensating the temperature of a flow guide plate. Pet., 22-23, 40-41, 54-55. Regarding limitations 15[i] and 1[h], Petitioner makes no attempt to establish the orientation of the heating surface with regards to the edge director or to define the relative view factors experienced by the edge director and plurality of edge rollers. Pet., 22-23, 40-41. In fact, Petitioner does not define an edge director or an edge roller in its analysis at all. *Id.* Those two structures are crucial aspects of the claimed apparatus and methods.

38. As described in the '025 patent, the term view factor “refers to the relative proportion of thermal radiation from the heat directing surface 122 which is incident on [a] specified surface.” EX1001, 8:14-18. The view factor is influenced by several factors, including the angle and shape of the heat directing surfaces and the position of the heating cartridge within the glass forming apparatus. *Id.*, 9:60-10:10. The novel shape and positioning of the heating cartridge

in the '025 patent results in a view factor that is greater at the edge director than the plurality of edge rollers and increases efficiency of a glass forming apparatus by reducing heat transfer from the edge directors to the cooled plurality of edge rollers. *Id.*

39. Without Petitioner providing a definition of the edge directors, plurality of edge rollers, and the heating cartridge's orientation with respect to the edge director and plurality of edge rollers, Petitioner does not provide any analysis how its POSA can determine the claimed relative view factors.

40. For limitation 8[d], Petitioner makes no attempt to define how the cited art teaches or suggests the enclosure or define the relative view factors above and below the bottom surface of the enclosure. Pet., 54-55. In fact, neither El Kahlout nor CN '869—the only references cited in the analysis for this limitation—describe an enclosure. El Kahlout describes possible heating devices, but does not define their structure, EX1004, ¶35, while CN '869 simply defines its heating apparatus as a “recessed shape,” EX1005, ¶7. But none of these teachings can meet the claimed relative view factors that depend on both the shape and materials of the enclosure and the angle of the heat directing surfaces. EX1001, 8:1-14.

41. For example, the claimed enclosure may comprise materials that act as a thermal shield, thereby leading to a lower view factor below the bottom

surface of the enclosure. *Id.*, 7:36-40. Because Petitioner does not define how the cited art teaches the enclosure and its bottom surface, one is left to guess how the angled heating apparatus proposed in the Petition provides a view factor that is greater above the bottom surface of the enclosure than below the bottom surface of the enclosure.

42. Petitioner does not provide a rationale for combining El Kahlout and CN '869 to teach or suggest this claimed limitation. Petitioner does not identify a starting point (for example, a specific embodiment or example) in El Kahlout, the differences between that starting point and claims 1, 8, and 15, or the proposed modification of that starting point in view of CN '869. Pet., 22-23, 40-41, 54-55. The analysis does not even identify the relevant portions of El Kahlout, and the motivation to combine El Kahlout and CN '869 is a single sentence. *Id.*, 23 (limitation 15[i]), 41 (limitation 1[h]), 54-55 (limitation 8[d]). Petitioner does not explain what is missing from El Kahlout, why one would look to the inclined heating surface taught by CN '869 to teach the relative view factors, or how the proposed references would be combined to result in the precise orientation claimed. *Id.*, 22-23, 40-41, 54-55.

43. Furthermore, Petitioner does not explain how or why one of skill in the art would modify or be motivated to modify El Kahlout in view of CN '869 to

meet the claim feature, or why one would have an expectation of success in doing so. *Id.*

44. The Petition provides a single sentence alleging that a POSA would expect the claimed view factors when CN’869’s inclined heating surface is employed in El Kahlout’s method. *Id.*, 23 (limitation 15[i]), 41 (limitation 1[h]), 54-55 (limitation 8[d]).

45. But saying that a POSA would expect a configuration does not provide why one would be motivated to adopt that configuration in the first place.

46. The cited portions of Petitioner’s expert declaration provide little further analysis and simply state that the results are predictable. EX1003, ¶¶77-79, 127, 163-165.

C. The combination of El Kahlout, Tsuda, and CN ’869 does not teach or suggest the claimed port in a housing as recited in claims 1 and 15.

47. The Petition does not cite art that teaches or suggests a “replaceable heating cartridge located *in a port in **the** housing*,” as found in independent claims 1 and 15 of the ’025 patent (emphasis added).

48. As a preliminary matter, the Petition never purports to actually define the claimed *housing* in any prior-art reference. The Petition’s ambiguous color coding (component names highlighted in orange) and underling/bold text, that

seem to identify the housing, are unclear as to their actual alleged boundaries. *See* Pet., 17-19, 35-38.

49. This failure is fatal because the boundaries of the housing are essential to determining whether the replaceable heating cartridge is located in the housing or not.

50. Compounding this problem, the Petition does not identify any “port” in the housing that receives the heating cartridge. *Id.*

51. Accordingly, the Petition presents no basis to find “a replaceable heating cartridge located in a port in the housing.” There is no identified port in which to locate the alleged replaceable heating cartridge, and no clearly identified housing in which to locate the unidentified port.

52. Even worse, the Petition nominally relies on Tsuda to disclose the claimed replaceable heating cartridge, when Tsuda’s heater is an *exterior* heater. EX1006, ¶90. Tsuda’s heater is therefore not located *in a port in the housing*—no matter how the port or housing might be defined.

53. Tsuda’s heater even appears to be outside what the *Petitioner* identifies as the alleged “housing.” *Compare* EX1006, FIG. 6, *with* Pet., 17-19, 35-38.

54. While there is another heater cited in Tsuda in paragraph 90, it does not appear to be replaceable. EX1006, ¶90. This limitation is therefore missing from the cited art combination in at least four ways.

55. Finally, in addition to failing to show how the prior art meets each element of the claims, Petitioner's arguments lack the required rationale to combine the prior art to teach or suggest the claimed replaceable heating cartridge located in a port in the housing limitation. For example, Petitioner does not identify a starting point (for example, a specific embodiment or example) in El Kahlout, the differences between that starting point and claims 1 and 15, or the proposed modification of that starting point in view of Tsuda. Pet., 17-19, 35-38. That failure is felt particularly acutely for this limitation where it is not clear what the prior-art housing is, where any port is in the prior art, what the prior-art heater is, which reference discloses the heater, or where any of these structures are located relative to each other in the references themselves or in the references as modified per the proposed combination.

D. The combination of El Kahlout, Tsuda, and CN '869 does not teach or suggest that “a lower edge of the heat directing surface and the bottom surface of the [replaceable] heating cartridge are at least partially positioned between the edge director and the plurality of edge rollers,” as recited in claims 1 and 15.

56. The Petition does not cite art that teaches or suggests “a lower edge of the heat directing surface and the bottom surface of the [replaceable] heating

cartridge are at least partially positioned between the edge director and the plurality of edge rollers.” EX1001, claims 1, 15.

57. The analysis in the Petition relies solely on CN ’869 for this “lower edge” limitation. For example, the Petition alleges CN ’869 teaches a heating apparatus that is placed at a lower end of a glass-forming body to heat the glass-forming body. Pet., 23-24, 41-42. The analysis in the Petition alleges where the heater is with respect to a glass forming body (lower portion), but does not relate this orientation back to the edge director and edge rollers mentioned in the “lower edge” claim limitation. *Id.* In fact, CN ’869 does not teach or suggest edge directors at all. While the Petition elsewhere relies on El Kahlout to teach the edge directors generally, El Kahlout is not mentioned in the analysis for this “lower edge” limitation. Pet., 23-24, 41-42.

58. Furthermore, neither El Kahlout nor CN ’869, alone or in combination, teach the claimed replaceable heating cartridge. While other sections of the Petition rely on Tsuda to allegedly teach the replaceable heating cartridge, the Petition does not mention Tsuda at all in discussing this “lower edge” limitation. *Compare* Pet., 17-19, 35-38, 47-51 (mentioning Tsuda in passing), *with* Pet., 23-24, 41-42 (omitting any mention of Tsuda). That is problematic because the claim limitation specifies that a lower edge of the heat-directing surface and the bottom surface of the replaceable heating cartridge are at least partially positioned

between the edge director and the plurality of rollers. If the Petition uses Tsuda to teach the replaceable heating cartridge, then it should explain how the teachings of Tsuda support a replaceable heating cartridge that has the claimed configuration vis-à-vis the lower edge of the heat-directing surface, the edge director, and the rollers. It does not.

59. Additionally, even if Petitioner's analysis accounted for the edge director and edge rollers taught by El Kahlout—which it does not—Petitioner does not explain how the heating apparatus of CN '869 would be combined with the edge director and plurality of edge rollers in El Kahlout (or Tsuda) to teach or suggest the positioning of the lower edge of the heat-directing surface with regards to the edge director and plurality of edge rollers. Pet., 23-24, 41-42. Petitioner does not identify a starting point (for example, a specific embodiment or example) in El Kahlout, the differences between that starting point and this feature of claims 1 and 15, or the proposed modification of that starting point in view of CN '869. *Id.* The analysis does not even identify the relevant portions of El Kahlout, let alone explain what is missing from El Kahlout and why one would look to the inclined heating surface taught by CN '869. *Id.*

60. Petitioner also makes no attempt to explain why one would be motivated to modify El Kahlout in view of CN '869 for at least this feature, or why one would have an expectation of success in doing so. *Id.*

61. The cited portions of Petitioner’s expert declaration merely repeat the Petition’s analysis and add a sentence implying that the thermal shielding portion of the limitation is predictable (but doesn’t address the positioning between the edge director and edge rollers). EX1003, ¶¶80-81, 128-129. Petitioner’s declaration therefore sheds no additional light on the specific obviousness analysis that purportedly applies to this “lower edge” claim limitation.

E. The combination of El Kahlout, Tsuda, and CN ’869 does not teach or suggest the claimed housing configurations recited in claims 1 and 8.

62. The Petition does not cite art that teaches or suggests the housing configurations found in claims 1 and 8 of the ’025 patent.

63. For claim 1, the cited art does not teach “a housing enclosing the forming wedge, edge director, and the plurality of edge rollers.” EX1001, claim 1 (limitation 1[d]). Instead, the Petition cites a “seal plate 136 [that] is configured to provide closure to an opening leading to the area housing [a] motor 138.” Pet., 34-35. Petitioner further cites Figure 2 as evidence that the edge rollers extend through seal plate 136 and into the area housing motor 138. *Id.*

64. However, the forming wedge 62 and edge director 80 disclosed by El Kahlout clearly reside outside of the housing cited in the Petition. *See* EX1004, FIG. 3 (annotated) (showing that the prior-art housing encloses a motor 138 rather than the forming wedge 62, edge director 80, and plurality of edge rollers 132).

65. Petitioner's expert merely restates the flawed analysis found in the Petition, and therefore does nothing to advance the argument. EX1003, ¶¶108-110.

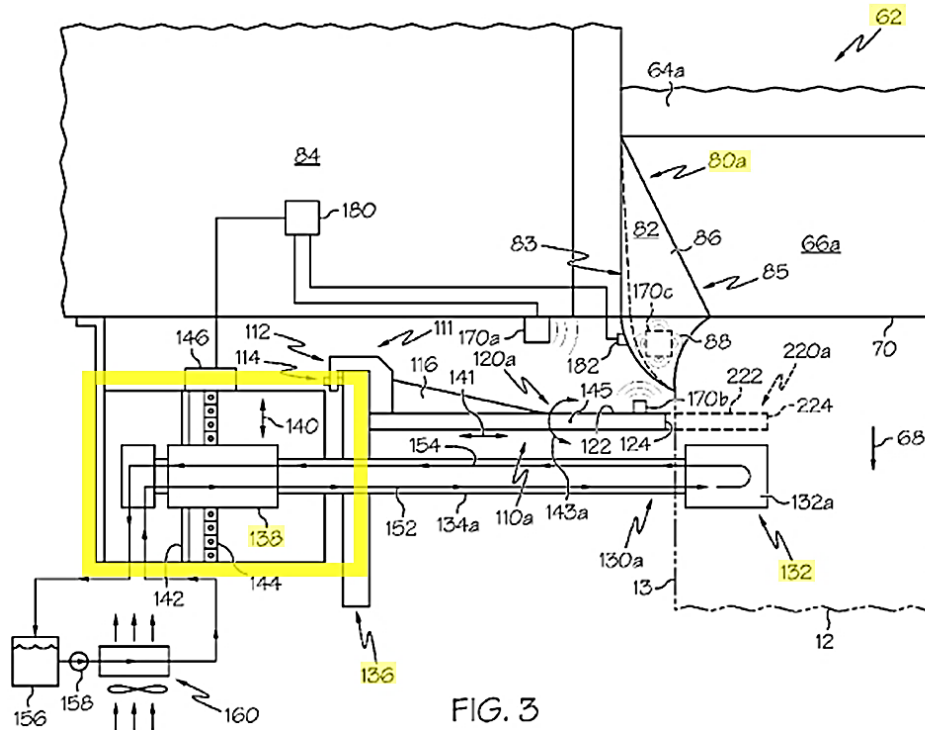


FIG. 3

EX1004, FIG. 3 (annotated).

66. Accordingly, the Petition does not identify “a housing enclosing the forming wedge, edge director and the plurality of edge rollers” in the prior art.

67. Regarding claim 8, the Petition does not cite art that teaches or suggests “refractory material positioned within the enclosure behind the heat directing surface.” EX1001, claim 8 (limitation 8[c]). The Petition simply cites a platinum heater and makes no attempt to identify the claimed refractory material, enclosure, or the heat-directing surface. Pet., 53-54.

68. Furthermore, CN '869, the only reference cited for this limitation, does not teach or suggest any material positioned behind a heat-directing surface. The Petition makes no attempt to fill the gap in the prior art for this claim limitation—it simply states that the limitation is present, provides no analysis, and cites a portion of the prior art that does not disclose the limitation. *Id.*

69. The cited portions of Petitioner's expert declaration simply restate the flawed arguments of the Petition. EX1003, ¶¶161-162.

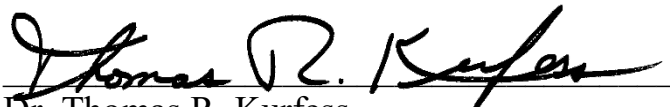
70. Finally, the Petition's analysis for limitation 8[c] does not tie CN '869 back to El Kahlout or Tsuda. It does not explain what is missing from El Kahlout or Tsuda, why one would look from the proposed combination of those references to the additional teachings of CN '869, and what the resulting three-way combination of references is supposed to be.

VII. CONCLUSION

71. In signing this declaration, I recognize that the declaration will be filed as evidence in an *inter partes* review before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross-examination in the case and that cross-examination will take place within the United States. If cross-examination is required, I will appear for cross-examination within the United States during the time allotted.

72. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Executed on this 16 day of September 2025, in Cambridge, UK.


Dr. Thomas R. Kurfess