UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SHENZHEN TUOZHU TECHNOLOGY CO., LTD.,

Petitioner

v.

STRATASYS, INC.

Patent Owner.

PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 11,886,774

Case No. IPR2025-00611

DECLARATION OF DR. DENIS R. CORMIER

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2. The *Hamilton-Evans* combination (with or without KISSlicer) does not teach or suggest claim elements [1.2] and [1.3] 50

3. The *Hamilton-Evans* combination (with or without KISSlicer) does not teach or suggest claim element [1.4] 55

4. The *Hamilton-Evans* combination (with or without KISSlicer) does not teach or suggest claim element [1.5] 57

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EXHIBIT LIST

Exhibit No.	Description
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I. INTRODUCTION

1. My name is Denis R. Cormier, and I declare as follows:

2. I am a citizen of the United States and am over 18 years of age. I have personal knowledge of the matters stated in this declaration.

3. I have been asked to provide technical assistance in the *inter partes* review of U.S. Patent No. 11,886,774 which I may abbreviate as "the '774 Patent" or refer to as the "Challenged Patent." I understand that this patent is owned by Stratasys, Inc. ("Stratasys"). This declaration is a statement of my opinions on issues related to the patentability of claims of the Challenged Patent.

A. Qualifications and Experience

4. I am the Earl W. Brinkman Endowed Professor of Advanced Machine Tools at the Rochester Institute of Technology (RIT), where I have been since 2009.

5. Prior to joining RIT, I was a faculty member at North Carolina State University for 15 years, from 1994 to 2009.

6. Over the past 30 years, my primary teaching, research, and service focus has been additive manufacturing and three-dimensional printing (3D printing). As part of this work, I have operated dozens of different 3D printers.

7. I earned a Bachelor of Science in Systems Engineering from the University of Pennsylvania in 1989, a Master of Science degree in Industrial

Engineering from State University of New York at Buffalo in 1991, and a Ph.D. in Industrial Engineering from North Carolina State University in 1995.

8. I am an inventor on 10 patents and have published well over 100 papers related to aspects of additive manufacturing and 3D printing.

9. Over the course of my career, I have been the principal investigator for over $30 million in research grants and contracts related to additive manufacturing and 3D printing. My funding has come from dozens of companies, such as Boeing, General Electric, Xerox, Ford, and Intel, as well as from government agencies such as NASA, the Departments of Defense (Air Force, Navy, Army), and the National Science Foundation.

10. I have received numerous awards over the course of my career. I am the 2024 recipient of the International FAME award that recognizes career achievements in additive manufacturing and 3D printing research and development. I understand that only 17 individuals worldwide have received this prestigious award since its inception in 2009. In 2020, I was named by Smart Manufacturing Magazine on its 20 Most Influential Faculty in Smart Manufacturing list.

11. I frequently speak on topics related to additive manufacturing and 3D printing. I have given invited talks at conferences in France, Canada, Portugal, Germany, England, Ireland, China, Japan, and the U.S. Also, I serve on the Editorial

Advisory Board for two of the most prominent additive manufacturing / 3D printing research journals – *Additive Manufacturing*, and the *Rapid Prototyping Journal*.

12. I have also taught classes in additive manufacturing / 3D printing. Approximately 25 years ago, I was among the first faculty members worldwide to develop and teach a course dedicated to additive manufacturing / 3D printing. Since then, I have developed numerous additional additive manufacturing / 3D printing courses pertaining to topics such as 3D printing of metallic components, and 3D printed medical devices.

13. In addition to teaching additive manufacturing / 3D printing classes, I have taught computer-aided design (CAD) and computer-aided manufacturing (CAM) classes over the past 30 years. My teaching experience with machining processes, including computer numerically controlled (CNC) machining dates to the early 1990s.

14. My academic and professional background and qualifications are further elaborated in my curriculum vitae (Appendix A).

B. Compensation

15. I am being compensated at my normal rate of $300 per hour for my analysis, plus reimbursement for expenses. My compensation does not depend on the content of my opinions or the outcome of this proceeding.

C. Scope of Work and Materials Considered

16. This declaration is based on my education, personal knowledge, and professional and academic experience in the area of three-dimensional printing.

17. I have been asked to review the Challenged Patent and its prosecution history, to provide an understanding of the technology relevant to the Challenged Patent, to review certain prior-art references, and to analyze whether or not those references disclose or teach limitations of claims from the Challenged Patent.

18. The opinions stated in this declaration are from the perspective of a Person of Skill in the Art (POSITA) as of December, 2014 whose qualifications and abilities are described below. I understand that Petitioner and Patent Owner may have a dispute as to whether the claims of the Challenged Patent are entitled to a priority date of at least December 31, 2014. Unless otherwise noted, my opinions expressed in this report remain unchanged regardless of the date used.

19. In forming my opinions, I have reviewed the Challenged Patent, its prosecution history, the materials cited in the List of Exhibits, and the materials cited throughout my declaration. I have also relied on my academic and professional experience in reaching the opinions expressed in this declaration.

II. THE CHALLENGED CLAIMS OF THE '774 PATENT

20. I understand that Petitioner has challenged claims 1-10, 12-13, and 19-20 of the '774 Patent (the "Challenged Claims"). The Challenged Claims are set forth below, with some claim elements further sub-divided for ease of reference:

Claim Element	Claim Language from '774 Patent
[1.pre]	A method comprising:
[1.1]	receiving a request to fabricate an object from a three-dimensional model;
[1.2]	determining a target printer to fabricate the object;
[1.3]	querying the target printer for configuration information of the target printer relevant to creation of a printable model for fabrication of the object on the target printer;
[1.4]	receiving, from the target printer, a dictionary of configuration information containing one or more properties from the target printer that affect fabrication capabilities of the target printer;
[1.5]	creating a fabrication profile based on the one or more properties;
[1.6]	and generating a machine-ready representation of the three-dimensional model executable by the target printer to fabricate the object.
[2]	The method of claim 1 further comprising transmitting the machine-ready representation to the target printer for fabrication.

Claim Element	Claim Language from ’774 Patent
[3]	The method of claim 1 further comprising fabricating the object with the target printer.
[4]	The method of claim 1 wherein the one or more properties include a hardware configuration of the target printer.
[5]	The method of claim 4 wherein the hardware configuration includes one or more of an extruder type, an extruder nozzle diameter, a build volume, a build platform type, a hardware version number, a top speed for linear movement of a tool, a step size for movement of the tool, a minimum z-axis size, a gantry type, and a build material type.
[6]	The method of claim 4 wherein the hardware configuration includes an automatically detected hardware reconfiguration.
[7]	The method of claim 4 wherein the hardware configuration includes a manually specified hardware reconfiguration.
[8]	The method of claim 1 wherein the one or more properties include a firmware configuration of the target printer.
[9]	The method of claim 1 wherein the one or more properties include one or more user settings on the target printer.
[10]	The method of claim 9 wherein the one or more user settings include user setting from a previous fabrication process.
[12]	The method of claim 1 wherein the one or more properties include a build material in the target printer.
[13]	The method of claim 1 wherein generating the machine-ready representation includes processing the three-dimensional model according to the fabrication profile.
[19]	The method of claim 1 further comprising generating descriptive metadata to accompany the machine-ready representation, the descriptive metadata specifying one or more properties for comparison to properties of printers selected for fabricating the model.
[20]	The method of claim 1, wherein determining a target printer to fabricate the object comprises determining a geographic location of the target printer.

III. LEVEL OF ORDINARY SKILL IN THE ART

21. When interpreting a patent, I understand that it is important to identify the relevant art pertaining to the Challenged Patent as well as the level of ordinary skill in that art at the time of the claimed invention. The "art" is the field of technology to which the patent is related.

22. I have been instructed by counsel that the person of ordinary skill in the art (**"POSITA"**) is a hypothetical person who is presumed to know the relevant prior art. I understand that the actual inventor's skill is not determinative of the level of ordinary skill. I further understand that a person of ordinary skill in the art is determined by looking at (1) the type of problems encountered in the art; (2) the prior-art solutions to those problems; (3) the rapidity with which innovations are made; (4) the sophistication of the technology; and (5) the educational level of active workers in the field.

23. In my opinion, a person of ordinary skill in the art with respect to the '774 Patent is someone with bachelor's degree in Mechanical Engineering, Computer Engineering, Electrical Engineering, Chemical Engineering, Materials Science, or a comparable field and at least two years of experience related to 3D printing, with additional experience potentially being a substitute for a formal degree or training (and vice versa).

24. As I mentioned, I have degrees in Systems Engineering and Industrial Engineering, which are in a comparable field to Mechanical Engineering, Chemical Engineering, and Materials Science. Among other things, I had been developing courses for additive manufacturing and 3D printing for many years prior to 2010, and I was listed as an inventor on patents related to 3D printing well before 2010.

25. In rendering my opinions in this declaration, I have viewed the ’774 Patent from the perspective of a POSITA under my definition. This definition mirrors that of Petitioner and Petitioner’s expert. As I discussed above, my education, experience and knowledge, and technical expertise show that I meet the qualifications of a POSITA under either my definition or Dr. Hickner’s’s definition.

IV. LEGAL STANDARDS

26. I am not a legal expert. In presenting my opinions, I have applied the legal standards provided to me by counsel in arriving at the opinions set forth in this declaration.

27. I understand that in this *inter partes* review proceeding, the Petitioner has the burden of proving that the claims of a Challenged Patent are unpatentable in light of the prior art by a preponderance of the evidence. I understand that a preponderance of the evidence is evidence sufficient to show that a fact is more likely true than not true.

A. Legal Standard for Claim Construction

28. I understand that the first step in determining whether a patent claim would have been anticipated or obvious is to ascertain how a POSITA would have understood the claim terms.

29. I have been instructed by counsel on the law regarding claim construction and patent claims. I understand that a patent may include two types of claims: independent claims and dependent claims. An independent claim stands alone and includes only the limitations it recites. A dependent claim can depend from an independent claim, or it can further depend from another dependent claim. I understand that a dependent claim includes all the limitations that it recites, as well as all the limitations recited in the claim(s) from which it depends.

30. It is my understanding that in proceedings before the PTAB, the claims of a patent are to be construed under what is referred to as the "*Phillips* standard." I understand that this means that claim terms of a patent are given the meaning the terms would have to a POSITA, in view of the description provided in the patent itself and the patent's file history.

31. I understand that to determine how a person of ordinary skill would understand a claim term, one should look to those sources available that show what a person of skill in the art would have understood the disputed claim language to mean. These sources include the words of the claims themselves, the rest of the

patent's description, the prosecution history of the patent (all of which considered "intrinsic" evidence), and "extrinsic" evidence concerning relevant scientific principles, the meaning of technical terms, the technical literature on established and emerging relevant technologies, and the state of the art at the time of the invention.

32. I understand that, in construing a claim term, one looks primarily to the intrinsic evidence, including the words of the claims themselves, the remainder of the patent, and the patent's prosecution history.

33. I understand that extrinsic evidence, which is evidence external to the patent and the prosecution history, may also be useful in interpreting patent claims when the intrinsic evidence itself is insufficient.

34. I understand that words or terms should be given their ordinary and accepted meaning unless it appears that the inventors were using them to mean something else. In making this determination, the claims, the remainder of the patent, and the prosecution history are of principal importance. Additionally, the patent and its prosecution history must be consulted to confirm whether the patentee has acted as its own lexicographer (i.e., provided its own special meaning to any disputed terms), or intentionally disclaimed, disavowed, or surrendered any claim scope.

35. I understand that the claims of a patent define the scope of the rights conferred by the patent. The claims particularly point out and distinctly claim the subject matter which the patentee regards as his invention. Because the patentee is

required to define precisely what he claims his invention to be, it is not proper to construe claims in a manner different from the plain import of the terms as used in the patent. Accordingly, a claim construction analysis must begin and remain centered on the claim language itself. Additionally, the context in which a term is used in the asserted claim can be highly instructive. Likewise, other claims of the patent in question, both challenged and un-challenged, can inform the meaning of a claim term. For example, because claim terms are normally used consistently throughout the patent, the usage of a term in one claim can often illuminate the meaning of the same term in other claims. Differences among claims can also be a useful guide in understanding the meaning of particular claim terms.

36. I understand that a person of ordinary skill in the art is deemed to read a claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the remaining text and figures. For this reason, the words of the claim must be interpreted in view of the entirety of the patent specification (i.e., the claims, remaining text, and figures). The written description (figures and remaining text) is the primary basis for construing the claims and provides a safeguard such that correct constructions closely align with the patent.

37. In addition to consulting the patent itself, I understand that one should also consider the patent's prosecution history. The prosecution history provides

evidence of how both the Patent Office and the inventors understood the terms of the patent, particularly in light of what was known in the prior art.

38. I understand that while intrinsic evidence is of primary importance, extrinsic evidence, e.g., all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises, can also be considered. Extrinsic evidence should not be considered, however, divorced from the context of the intrinsic evidence. Furthermore, while extrinsic evidence can shed useful light on the relevant art, it is less significant than the intrinsic record in determining the legally operative meaning of claim language.

B. Legal Standard for Prior Art

39. I understand that a patent or other publication must first qualify as prior art before it can be used to invalidate a patent claim.

40. I understand that to qualify as prior art, a reference must contain an enabling disclosure that allows one of ordinary skill to practice the claims of the Challenged Patent without undue experimentation. I understand that a patent issued by the United States Patent and Trademark Office is presumed to provide an enabling disclosure. Factors to consider in determining whether undue experimentation is needed are: (1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of

those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims.

41. I understand that for a prior-art reference to be considered for obviousness, the reference must be "analogous." I understand that the comparison for purposes of determining "analogous" is between the asserted prior-art reference and the Challenged Patent. I have been further informed that for a prior-art reference to be considered "analogous" to the Challenged Patent and thus available as prior art for obviousness, if (1) the reference is from the same field of endeavor as the Challenged Patent, even if it addresses a different problem; or (2) the reference is reasonably pertinent to the particular problem the Challenged Patent is concerned with, even if it is not within the same field of endeavor.

C. Legal Standard for Patentability

42. I understand that for an invention claimed in a patent to be found patentable, it must be (among other things) new and not obvious based on what was known before the invention was made.

43. I understand that, once the claims of a patent have been properly construed, the second step in determining patentability of a patent claim requires a comparison of the properly construed claim language to the prior art on a limitation-by-limitation basis.

44. I understand that for purposes of this declaration, there are two ways to demonstrate that a patent claim is not patentable. A patent claim can be anticipated, or a patent claim can be obvious. I address each of these below.

1. Anticipation and Inherency

45. I understand that prior art can "anticipate" the claims of an asserted patent. It is my understanding that in order for a claim to be anticipated by the prior art, every element of that claim must be found, explicitly or inherently, in a single prior art reference. In other words, to determine whether a single prior art reference anticipates a patent claim, one should consider not only what is expressly disclosed in that reference, but also what inherently occurred as a natural result of the practice of the system or method disclosed in that prior art reference.

46. It is further my understanding that to establish such inherency, the missing descriptive matter must be necessarily present in the item of prior art and that it would be so recognized by persons of ordinary skill in the art. It is also my understanding that such inherency may be shown through extrinsic evidence.

2. Obviousness

47. I understand that the prior art may render a patent claim "obvious." I understand that two or more prior art references (e.g., prior art articles, patents, or publications) that each disclose fewer than all elements of a patent claim may nevertheless be combined to render a patent claim obvious if the combination of the

prior art collectively discloses all elements of the claim and one of ordinary skill in the art at the time would have been motivated to combine the prior art in such a way with a reasonable expectation of success.

48. I understand that this motivation to combine need not be explicit in any of the prior art, but it may be inferred from the knowledge of one of ordinary skill in the art at the time the patent was filed. I also understand that one of ordinary skill in the art is not an automaton but is a person having ordinary creativity. I further understand that an obviousness analysis recognizes that market demand often drives innovation, and that a motivation to combine references may be supplied by the direction of the marketplace. I further understand that one or more prior art references, articles, patents or publications that disclose fewer than all of the elements of a patent claim may render a patent claim obvious if including the missing element would have been obvious to one of skill in the art (e.g., the missing element represents only an insubstantial difference over the prior art or a reconfiguration of a known system).

49. I understand that a person of ordinary skill in the art provides a reference point from which the prior art and claimed invention should be viewed. This reference point prevents a person of ordinary skill from using hindsight in deciding whether a claim is obvious.

50. I also understand that an obviousness determination includes the consideration of various factors such as (1) the scope and content of the prior art, (2) the differences between the prior art and the challenged claims, (3) the level of ordinary skill in the pertinent art, and (4) when in evidence, the existence of secondary considerations (such as commercial success, long-felt but unresolved needs, failure of others, etc.) to the extent they exist and have a nexus to the claimed invention.

51. I am informed that secondary indicia of non-obviousness (also known as secondary considerations) may include (1) a long felt but unmet need in the prior art that was satisfied by the invention of the patent; (2) commercial success or lack of commercial success of processes covered by the patent; (3) unexpected results achieved by the invention; (4) praise of the invention by others skilled in the art; (5) taking of licenses under the patent by others; and (6) deliberate copying of the invention. I also understand that there must be a relationship between any such secondary indicia and the invention. I further understand that contemporaneous and independent invention by others is a secondary consideration supporting an obviousness determination. I also understand that secondary considerations are given less weight when the alleged invention represents a relatively small advance in a crowded field with predictable results. I further understand that the patentee has the burden of coming forward with evidence of the relationship between any

secondary consideration of non-obviousness and the claimed invention (also known as the "nexus").

52. It is also my understanding that there are additional considerations that may be used as further guidance as to when the above factors will result in a finding that a claim is obvious, including the following:

- the claimed subject matter is simply a combination of prior art elements according to known methods to yield predictable results;
- the claimed subject matter is a simple substitution of one known element for another to obtain predictable results;
- the claimed subject matter uses known techniques to improve similar devices or methods in the same way;
- the claimed subject matter applies a known technique to a known device or method that is ready for improvement to yield predictable results;
- there is known work in one field of endeavor that may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to a POSITA;
- there existed at the time of the invention a known problem for which there was an obvious solution encompassed by the patent's claims; and
- there is some teaching, suggestion, or motivation in the prior art that would have led a POSITA to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed subject matter.

53. I understand that a particular combination may be proven obvious by showing that it was obvious to try the combination. For example, when there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue

the known options within his or her technical grasp because the result is likely the product not of innovation but of ordinary skill and common sense.

54. I further understand that a claim may be deemed invalid for obviousness in light of a single prior art reference, without the need to combine references, if the elements of the claim that are not found in the reference can be supplied by the knowledge or common sense of one of ordinary skill in the relevant art.

55. I also understand that practical and common-sense considerations should guide a proper obviousness analysis, because familiar items may have obvious uses beyond their primary purposes. I further understand that a person of ordinary skill in the art looking to overcome a problem will often be able to fit the teachings of multiple publications together like pieces of a puzzle, although the prior art need not be like two puzzle pieces that must fit perfectly together. I understand that an obviousness analysis therefore considers the inferences and creative steps that a person of ordinary skill in the art would employ under the circumstances.

56. I understand that a person of ordinary skill could have combined two pieces of prior art or substituted one prior art element for another if the substitution can be made with predictable results, even if the swapped-in element is different from the swapped-out element. I understand that the relevant question is whether prior art techniques are interoperable with respect to one another, such that a person

of skill would view them as a design choice, or whether a person of skill could apply prior art techniques into a new combined system.

57. In sum, my understanding is that prior art teachings are properly combined where a person of ordinary skill in the art having the understanding and knowledge reflected in the prior art and motivated by the general problem facing the inventor, would have been led to make the combination of elements recited in the claims. Under this analysis, the prior art references themselves, or any need or problem known in the field of endeavor at the time of the invention, can provide a reason for combining the elements of multiple prior art references in the claimed manner.

V. THE '774 PATENT AND THE CHALLENGED CLAIMS

A. Summary of the '774 Patent (EX1001)

58. I have reviewed the '744 Patent, which relates to "three-dimensional printer[s]" and the "use of configuration information . . . to select suitable machine-ready models." EX1001 at 1:18-20. As the patent explains, three-dimensional printers generally "execute machine-ready representations of three-dimensional models for fabricating objects." *Id.* at 1:24-26. The models are "typically dependent on the configuration or properties of the three-dimensional printers," such as "the hardware configuration, software configuration, user settings, firmware version(s)." *Id.* at 1:26-29. "While a three-dimensional printer may know its own hardware and

software configuration, a service providing machine-ready models may not." *Id.* at 1:30-32. Thus, there is "a need for providing machine-ready models based on a three-dimensional printer's configuration, and for improved matching of models to printers." *Id.* at 1:32-35.

59. The '744 Patent discloses that "hardware and software properties of a three-dimensional printer can be queried and applied" for selecting "suitable directly printable models for the printer" or identifying "situations where a new machine-ready model must be generated." *Id.* at 1:39-43. These properties may include "physical properties of the printer, printer firmware, user settings, [and] hardware configurations." *Id.* at 1:43-45. A three-dimensional printer may respond to configuration queries "with a dictionary of capabilities or properties" that may be used to "select suitable models" or "determine when a new model must be created." *Id.* at 1:46-49. When a "printable model is sent to the printer, metadata for the printable model may be compared to printer properties in the dictionary to ensure that the model can be fabricated by the printer." *Id.* at 1:49-52.

60. Figures 3A and 3B of the '774 Patent show a flowchart of a method for providing machine-ready models based on printer configuration.

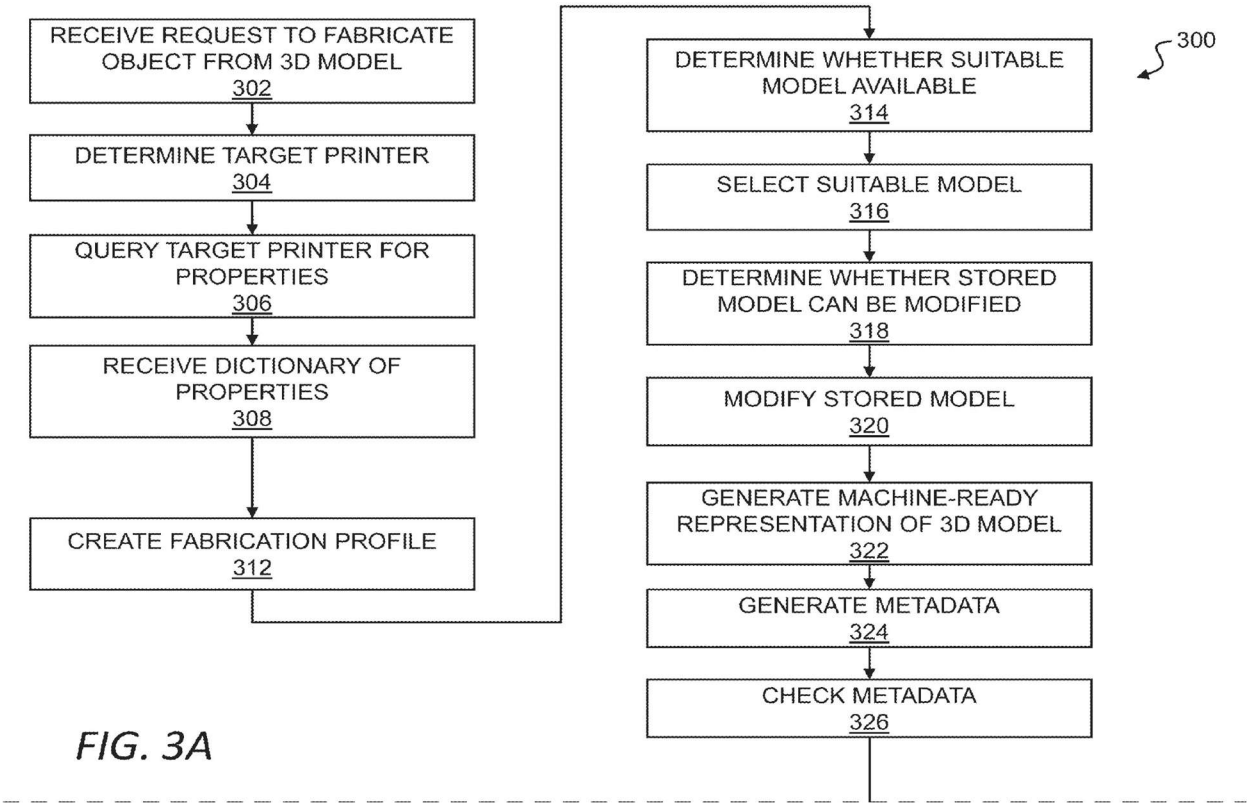
RECEIVE REQUEST TO FABRICATE OBJECT FROM 3D MODEL
302
DETERMINE TARGET PRINTER
304
QUERY TARGET PRINTER FOR PROPERTIES
306
RECEIVE DICTIONARY OF PROPERTIES
308
CREATE FABRICATION PROFILE
312
DETERMINE WHETHER SUITABLE MODEL AVAILABLE
314
SELECT SUITABLE MODEL
316
DETERMINE WHETHER STORED MODEL CAN BE MODIFIED
318
MODIFY STORED MODEL
320
GENERATE MACHINE-READY REPRESENTATION OF 3D MODEL
322
GENERATE METADATA
324
CHECK METADATA
326
300

FIG. 3A

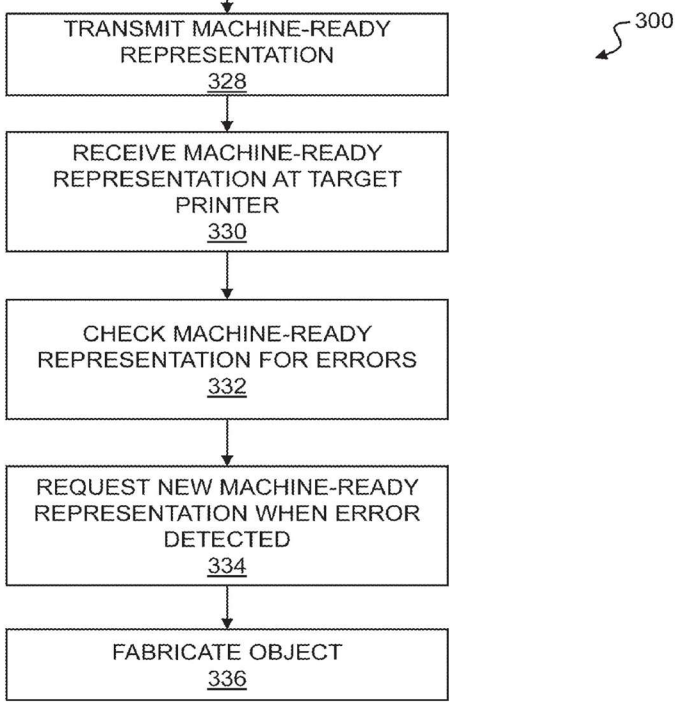
TRANSMIT MACHINE-READY REPRESENTATION
328
RECEIVE MACHINE-READY REPRESENTATION AT TARGET PRINTER
330
CHECK MACHINE-READY REPRESENTATION FOR ERRORS
332
REQUEST NEW MACHINE-READY REPRESENTATION WHEN ERROR DETECTED
334
FABRICATE OBJECT
336
300

FIG. 3B

Id. at Figs. 3A-3B, 17:21-22. At step 302, a request to fabricate an object from a three-dimensional model is received. *See id.* at 17:54-56. At step 304, a target printer to fabricate the object is determined. *See id.* at 18:42-43. The selection criteria may include information related to "the three-dimensional model," "the object to be fabricated," "a print queue, a prioritization, a location of the printer or requester, a timeline, [or] printer attributes." *Id.* at 18:57-64. At step 306, the target printer is queried for one or more properties relevant to fabrication of the object. *Id.* at 19:1-3. The query may request specific properties of the target printer or properties or information relevant to fabrication of an object on the target printer. *Id.* at 19:5-8. The properties may include "a hardware configuration of the target printer, a software configuration, a user setting or preference, or a firmware configuration of the target printer." *Id.* at 19:22-25. At step 308, a dictionary of one or more properties is received from the target printer. *Id.* at 21:19-21. At step 312, a fabrication profile is created based on the one or more properties. *See id.* at 23:32-34. Thereafter, a suitable model available for the fabrication profile is selected and a machine-ready representation of the 3-D model is generated (*see* steps 314 to 322). *See id.* at 24:23-26:22. The machine-ready representation may be transmitted to be received at the target printer, which fabricates the object based on the machine-ready representation (steps 328 to 336). *See id.* at 27:7-28:7.

61. Figure 4 of the ’774 Patent shows a sequence diagram of a system to provide machine-ready models based on printer configuration.

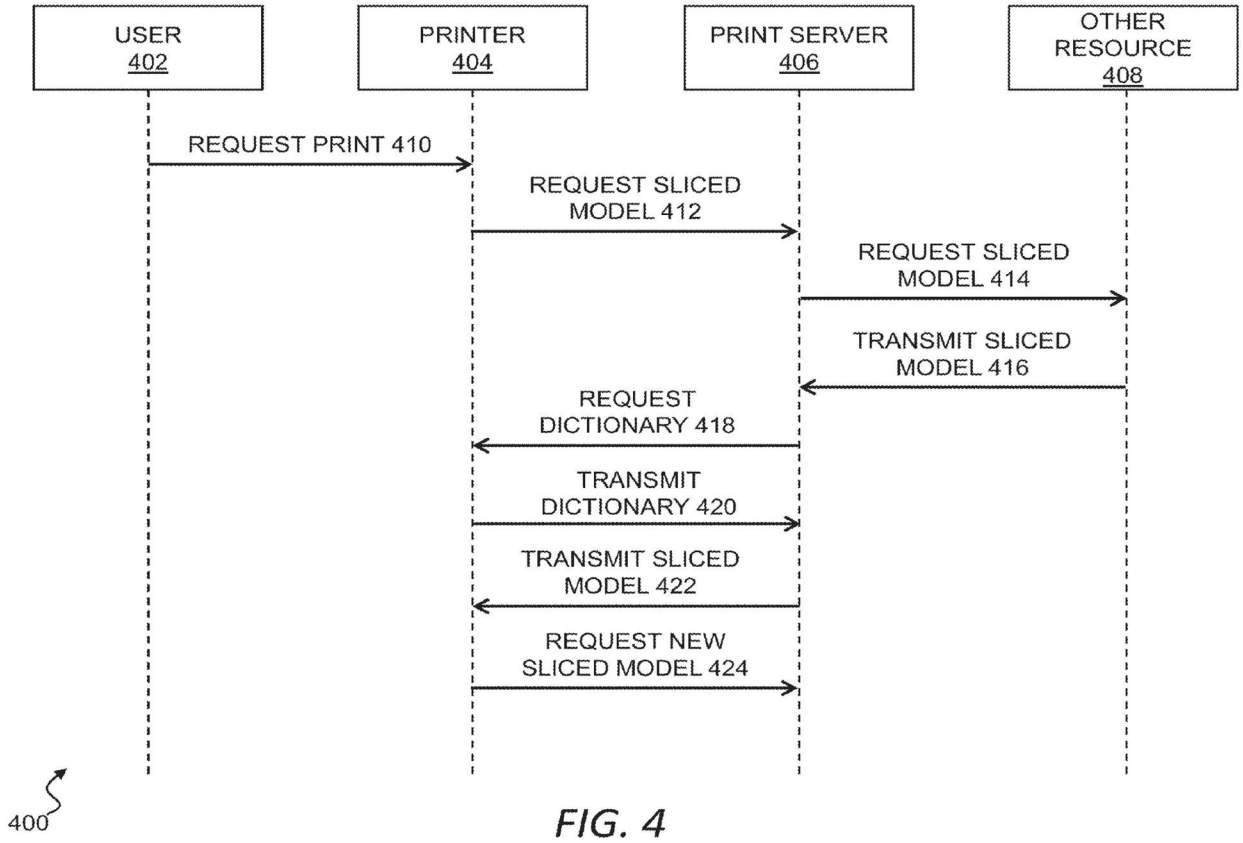

FIG. 4

Id. at Fig. 4, 28:27-28. As shown, Figure 4 provides an example of the communications in the system. Arrow 410 shows that user 402 may send a request to printer 404 or another component or device that controls printer 404 to print an object. *See id.* at 28:63-66. Arrow 412 shows that printer 404 may request a sliced model from a printer server 406, which may request and receive a sliced model from another resource 408. *Id.* at 29:3-25. Arrow 418 shows that print server 406 may request a dictionary of one or more properties from printer 404, which may transmit the dictionary (arrow 420). *Id.* at 28:26-52. Print server 406 may transmit a sliced

model (arrow 422) and if there are errors with the model, printer 404 may request a new sliced model (arrow 424). *Id.* at 28:53-29:6.

62. Numerous claims embody these solutions, including independent claim 1. For instance, claim 1 recites "receiving a request to fabricate an object from a three-dimensional model;" "determining a target printer to fabricate the object;" "querying the target printer for configuration information of the target printer relevant to creation of a printable model for fabrication of the object on the target printer;" "receiving, from the target printer, a dictionary of configuration information containing one or more properties from the target printer that affect fabrication capabilities of the target printer;" "creating a fabrication profile based on the one or more properties;" and "generating a machine-ready representation of the three-dimensional model executable by the target printer to fabricate the object." *Id.* at 35:19-32.

63. As explained below, the asserted grounds fail to teach the elements of claim 1. Because claims 2-10, 12-13, and 19-20 depend from claim 1, the asserted grounds also fail to teach the elements of dependent claims 2-10, 12-13, and 19-20 for at least the same reasons.

VI. SUMMARY OF THE PURPORTED PRIOR ART

64. I have reviewed the references listed below, which I understand Petitioner has cited in support of Grounds 1A-2E of their Petition:

Ground	Claims	References Cited
1A	1–5, 9, 10, 12, 13, 20	Douglas (US 2014/0117585 A1; EX1005); Mark (USP 9,694,544; EX1006)
1B	6, 7, 9, 10	Douglas; Mark; Dahlin (EP 1087862B1; EX1008)
1C	8	Douglas; Mark; Batchelder (US 2014/0127524 A1; EX1007)
1D	19	Douglas; Mark; Pax (WO 2014/039825 A2; EX1013)
2A	1-5, 9, 10, 12, 13	Hamilton (US 2014/0236774; EX1010); Evans (EX1011); KISSlicer (EX1012)
2B	6, 7, 19	Hamilton; Evans; Pax; KISSlicer
2C	19	Hamilton; Evans; Pax; Pettis (US 2013/0329258 A1; EX1009); KISSlicer
2D	8	Hamilton; Evans; Batchelder; KISSlicer;
2E	20	Hamilton; Evans; Wang (USP 9,862,149 B2; EX1014); KISSlicer

A. Overview of *Douglas* (EX1005)

65. *Douglas* discloses a tagged build material for three-dimensional printing that provides information from the tag to determine how to use the build material. *See* EX1005 at Title, Abstract.

B. Overview of *Mark* (EX1006)

66. *Mark* discloses methods for fiber reinforced additive manufacturing that generate an anisotropic fill tool path for controlling a three-dimensional printer to deposit a substantially anisotropic fill material defining at least part of an interior of a layer. *See* EX1006 at Title, Abstract.

C. Overview of *Hamilton* (EX1010)

67. *Hamilton* is a U.S. Patent Publication. *Hamilton* discloses a product delivery system and methods that are based on a 3D printer. *See* EX1010 at Title. The system delivers a virtual product that is manufactured locally using a 3D printer. *See id.* at Abstract, Fig. 1.

D. Overview of *Evans* (EX1011)

68. *Evans* is a book about the science and art of three-dimensional printing. *See generally* EX1011. Petitioner has not, however, presented any argument that *Evans* is prior art in the Petition.

E. Overview of *KISSlicer* (EX1012)

69. *KISSlicer* is a short "Quick-Start Guide" for creating a "first print file." EX1012 at 1. The guide describes an overview of settings (*id.* at 2-6), loading a file and viewing and positioning a part (*id.* at 6-8), setting printer parameters (*id.* at 8-9), and a parameter quick reference guide (*id.* at 9-11). Petitioner has not, however, presented any argument that *KISSlicer* is a printed publication with a publication date of "Jan-2012." *See* Pet. at 2. Instead, Petitioner cites a single time to a declaration that discusses *KISSlicer* (EX1015), without reference to or argument regarding any content of that declaration. *Id.* at 58. The Petition makes no other reference to this exhibit.

F. Overview of *Dahlin* (EX1008)

70. *Dahlin* is a European Patent that discloses a "filament spool, and a filament supplied rapid prototyping system that comprises a circuit for monitoring data concerning the filament on the filament spool." EX1008, ¶[0007].

G. Overview of *Pax* (EX1013)

71. *Pax* is an International Patent Publication. *Pax* discloses a 3D printer capable of using multiple colors of build material. EX1013, ¶¶[0064]-[0067], Fig. 3A.

H. Overview of *Batchelder* (EX1007)

72. *Batchelder* discloses "marked consumable material" for use in an "additive manufacturing system." EX1007, Abstract, ¶¶[0008]-[0010], [0049]-[0055].

I. Overview of *Pettis* (EX1009)

73. *Pettis* is a U.S. Patent Publication. *Pettis* discloses a "networked three-dimensional printing environment." EX1009, ¶[0024], Fig. 2. *Pettis* is disclosed on the face of the '774 Patent. EX1001 at (56). During prosecution of the '774 Patent, the examiner explained that *Pettis* and the other references of record, did not teach the invention of the '774 Patent. EX1002 at 16.

J. Overview of *Wang* (EX1014)

74. *Wang* is a U.S. Patent that relates to "techniques for providing 3D printing services." EX1014, 2:19-20.

VII. GROUND 1A: CLAIMS 1-5, 9-10, 12-13, AND 20 WOULD NOT HAVE BEEN OBVIOUS OVER GROUND 1A (COMBINATION OF DOUGLAS AND MARK

75. In Ground 1A of the Petition, Petitioner asserts that claims 1-5, 9, 10, 12, 13, and 20 are obvious over the combination of *Douglas* and *Mark*. *See* Pet. at 1, 4-29. I have reviewed Petitioner's challenges in Ground 1A, and it is my opinion that Ground 1A fails to teach or suggest all elements of claims 1-5, 9, 10, 12, 13, and 20. I explain my opinions below in detail.

A. Claim 1

76. Claim 1 of the '774 Patent recites the following:

[1.pre]	A method comprising:
[1.1]	receiving a request to fabricate an object from a three-dimensional model;
[1.2]	determining a target printer to fabricate the object;
[1.3]	querying the target printer for configuration information of the target printer relevant to creation of a printable model for fabrication of the object on the target printer;
[1.4]	receiving, from the target printer, a dictionary of configuration information containing one or more properties from the target printer that affect fabrication capabilities of the target printer;
[1.5]	creating a fabrication profile based on the one or more properties;

[1.6]	and generating a machine-ready representation of the three-dimensional model executable by the target printer to fabricate the object.

EX1001 at 35:18-32.

77. I understand that when claim language logically or grammatically requires steps be performed in the order in which they are recited, the steps must be performed in that order. The language of claim 1 of the ’774 Patent requires an order, both logically and grammatically. Claim element [1.3] relies on “querying the target printer for configuration information of the target printer relevant to creation of a printable model for fabrication of the object on the target printer.” *See* EX1001 at 35:22-24. In order to query specifically the target printer, the target printer must have been determined. While the ’774 Patent’s specification describes that queries may be used to select a target printer (EX1001 at 19:8-14), it does not follow that the ’774 Patent claims those embodiments. One such embodiment refers to querying multiple printers, which is not reflected in claim 1, which only claims querying the target printer of the ’774 Patent. EX1001 at 19:8-10. The query of the other described embodiment is expressly “sent to a printer that is not necessarily the target printer as described herein.” EX1001 at 19:11-14. But again, claim 1 only claims querying the target printer. Therefore, claim element [1.2] “determining a target printer to fabricate the object” must be performed prior to claim element [1.3]. *See* EX1001 at

35:21-24. Claim element [1.4] recites "receiving, from the target printer, a dictionary of configuration information," logically a response to "querying the target printer for configuration information of the target printer" as performed in claim element [1.3]. *See* EX1001 at 35:22-28. Claim element [1.5] requires "creating a fabrication profile based on the one or more properties," and those properties are part of the dictionary of configuration information received in claim element [1.4]. *See* EX1001 at 35:25-32. Therefore, to create the fabrication profile, those properties must have already been received by performing the step of claim element [1.4] in advance of the step of claim element [1.5]. Claim element [1.6] requires performance of previous claim elements, as the "machine-ready representation" must be "of the three-dimensional model." *See* EX1001 at 35:30-32. Thus, the method steps of claim 1 must be performed in order.

78. As explained below, Petitioner has failed to show that the *Douglas-Mark* combination teaches all elements of claim 1.

1. The *Douglas-Mark* combination does not teach or suggest claim elements [1.2] and [1.3]

79. The Petition fails to show that the combination in Ground 1A teaches claim elements [1.2] ("determining a target printer to fabricate the object;") and [1.3] ("querying the target printer for configuration information of the target printer relevant to creation of a printable model for fabrication of the object on the target printer;"). In particular, Petitioner has not shown that the combination determines a

target printer to fabricate the object and then queries the target printer for configuration information of the target printer.

80. Petitioner argues that *Douglas* discloses a print server that automatically selects a printer for a job. Pet. at 12. Petitioner also argues that *Douglas* discloses that the print server can request the printer to transmit tag data that includes configuration information of the target printer. *See id.* at 13-14. However, Petitioner fails to explain how the print server determines a target printer to fabricate the object first and then requests from the target printer configuration information of the target printer. *See id.* at 13. Contrary to Petitioner's conclusory assertion that the print server's request for information is for the target printer, *Douglas* discloses that a print server may request information from a printer to be used "as an input to a process on the print server for allocating print requests to various three-dimensional printers." EX1005, ¶[0074]. Thus, *Douglas'* print server determines the target printer ("allocating [a] print request[]") *after* requesting information.

81. To the extent Petitioner relies on the disclosure of *Douglas* that "a remote client device **206** may request an object **314** be printed on the network connected three-dimensional printer **306**" (EX1005, ¶[0073]) as disclosure of selecting a target printer prior to querying the target printer, this disclosure also fails to teach performing the steps of claim 1. If a received request already identifies the

printer, there is no need for "determining a target printer" as recited in claim element [1.2]. Further, Petitioner argues that it is the "print server **208**" or "printer server **208**" of *Douglas* that performs steps of claim 1, such as determining a target printer and querying the target printer for configuration information. *See, e.g.*, Pet. at 13-13, *see also id.* at 21. The disclosure of paragraph 73 of *Douglas* is explicitly that "remote client device **206**" performs the actions described in that paragraph. EX1005, ¶[0073]. The petition never refers to such a "remote client device," and thus presents no argument regarding its capabilities. Additionally, neither paragraph [0060] or [0073] discloses that "remote client device **206**" *receives* a request, as it is the remote client device that *performs* the requesting. *Id.* at ¶¶[0060], [0073].

82. Thus, Petitioner fails to show that the combination teaches determining a target printer to fabricate the object and then querying *the target printer* for configuration information of the target printer. As discussed, the '774 Patent requires performing the claim limitations of claim 1 in the order which they are recited, and therefore, Ground 1A fails to teach claim elements [1.2] and [1.3].

2. The *Douglas-Mark* combination does not teach or suggest claim element [1.4]

83. The Petition also fails to show that the combination in Ground 1A teaches claim element [1.4] ("receiving, from the target printer, a dictionary of configuration information containing one or more properties from the target printer that affect fabrication capabilities of the target printer;"). Petitioner argues that

"Douglas' accumulated data tag 304 data received from the printer constitutes a dictionary of configuration information because it similarly includes a collection of 'information on characteristics of the build material 312' . . . which 'may include at least one of a material identification number, a build material type, a build material diameter…a build material color…or other characteristic information.'" Pet. at 14; *see also* Pet. at 15. However, Petitioner fails to explain why the data sent from the target printer is a collection of configuration information (which is what Petitioner asserts as disclosing "a dictionary of configuration information"). *See* Pet. at 14-15.

84. *Douglas* simply discloses, for example, that "data concerning a type of build material" can be provided to a controller without explaining how the data is provided. EX1005, ¶[0063]; *see also id.* at ¶[0064]. In fact, Petitioner's expert admits that *Douglas* does not talk about "*any*, well, way to – method to transmit that information." EX2015 at 21:9-12 (emphasis added). Thus, *Douglas* does not teach how its data is provided from the printer and received by the print server and thus does not teach receiving a dictionary of configuration information containing one or more properties from the target printer that affect fabrication capabilities of the target printer. In addition, even if a "dictionary" is simply a collection of properties, *Douglas* does not disclose *any* organization or collection of properties in order to transmit said properties. Petitioner refers to "Douglas' accumulated data tag 304 data," but nowhere does Petitioner actually identify such accumulation of data in

Douglas, and *Douglas* does not describe accumulation. Pet. at 14. To the extent Petitioner would rely on the "data tag 304" *itself* (rather than the data it may hold) as an accumulation, *Douglas* still fails to teach claim element [1.4] because the data tag itself is not transmitted.

85. Further, as explained above, there is no teaching of determining a target printer to fabricate the object and then querying *the target printer* for configuration information of the target printer. *Supra* § VII.A.1. Thus, the information received under claim element [1.4] is not "from the target printer" because the target printer has not been determined.

86. For each of these reasons, Petitioner has failed to show that the combination in Ground 1A teaches claim element [1.4].

3. The *Douglas*-*Mark* combination does not teach or suggest claim element [1.5]

87. The Petition also fails to show that the combination in Ground 1A teaches claim element [1.5] ("creating a fabrication profile based on the one or more properties"). Petitioner asserts that *Douglas* creates a fabrication profile and also that it would have been obvious "that determining operational parameters for fabrication of the object would have been 'creating a fabrication profile' as these operational parameters are used 'for a fabrication process using the build material 312' and 'for the fabrication of the object 314.'" Pet. at 15. Petitioner also asserts that a POSITA would have found obvious "that the accumulation of operational parameters

constitutes a 'profile,' or that a 'profile' would have been created based on Douglas' operational parameter(s) . . . for better data transmission and printing efficiency" because a variety of operational parameters "would be transmitted to the 3D printer." *Id.* at 16-17. Further, relying on the teachings of *Mark*, Petitioner asserts it would have been obvious "to organize Douglas' operational parameters into a 'profile'" because it "facilitates the use of these parameters for the generation of toolpaths/G-code," "provide[s] better storage and computational efficiency, and "allow[s] easier rendering of such operational parameters for [a] user [to] view." *See id.* at 17-19.

88. Petitioner's assertions ignore the teachings of *Douglas*, lack supporting evidence, and/or are driven by hindsight. For those reasons, I disagree with Petitioner. First, Petitioner tacitly admits that *Douglas* does not teach creating a fabrication profile by relying on obviousness and *Mark's* teachings to argue that a fabrication profile is created. *See* Pet. at 16-17, 17-19. But each of Petitioner's theories is flawed, as discussed below.

89. Second, Petitioner's assertions that Douglas teaches creating a fabrication profile lack supporting evidence and are driven by hindsight. Petitioner fails to explain why the use of operational parameters in a fabrication process teaches creating a fabrication profile. *See, e.g.*, Pet. at 15. There is no evidence cited or explanation provided that using operational parameters in a fabrication process creates a fabrication profile. In fact, Petitioner's rationales that are based on "better

data transmission and printing efficiency" and "data compilation, organization, and storage and improve [sic] user experience" lack any supporting evidence in *Douglas*. Petitioner cites to paragraphs 73, 97, and 99 of *Douglas* but none of those paragraphs discuss "better data transmission and printing efficiency" or "data compilation, organization, and storage and improve [sic] user experience." *See* EX1005, ¶¶[0073], [0097], [0099]. Petitioner's expert also admits that, in relation to paragraph 73, he "didn't perform that analysis of better or more efficient data transmission." EX2015 at 27:5-8. Thus, Petitioner fails to provide any source for this rationale, which appears to have been created by Petitioner itself with hindsight and without any guidance from the prior art.

90. Third, Petitioner's assertions that the combination teaches creating a fabrication profile ignores the teachings of the references themselves. *See* Pet. at 17-19. Petitioner asserts that organizing "Douglas' operational parameters into a 'profile'" would "facilitate[] the use of these parameters for the generation of toolpaths/G-code." Pet. at 19. But Petitioner ignores the teachings of *Douglas* that Petitioner relies upon in which the operational parameters are sent to the printer rather than being used to generate toolpaths, so there would be no need to "facilitate[] the use of these parameters for the generation of toolpaths/G-code," as Petitioner asserts. *See* EX1005, ¶[0073] ("transmit the operational parameters back to the three-dimensional printer 306 for fabrication of the object 314") (cited by Pet. at 15,

17). There is no explanation of why a profile would be created using the parameters if the parameters are sent to the printer. Petitioner, for example, does not argue that the *printer* uses the parameters for the generation of toolpaths, whereas a fabrication profile would be used for that purpose.

91. Petitioner also asserts that organizing "Douglas' operational parameters into a 'profile'" would provide "better storage and computational efficiency." *See* Pet. at 19. But like Petitioner's assertions about "better data transmission and printing efficiency" and "data compilation, organization, and storage and improve [sic] user experience" that are discussed above, Petitioner's rationales lack any supporting evidence and thus are guided by impermissible hindsight. Neither *Douglas* or *Mark* discuss storage or computational efficiency. Instead, Petitioner uses the hindsight provided by the '774 Patent to create this justification. *See* Pet. at 19 (citing EX1005, ¶¶[0065]-[0066] and EX1006, 11:33-65, 13:4-19, 17:34-44, 53-58, FIGS. 5-7, 9-10, 21-22, which do not discuss better storage and computational efficiency).

92. Petitioner further asserts that organizing "Douglas' operational parameters into a 'profile'" would "allow easier rendering of such operational parameters for user view in a user interface." Pet. at 19. But Petitioner ignores the teachings of the references themselves. As discussed above, *Douglas* sends the operational parameters to the printer for the printer to use them; there is no need for

rendering the operational parameters. *See* EX1005, ¶[0073] (cited by Pet. at 15, 17). And as shown in Figure 5 of *Mark* (reproduced below), the printer simply receives GCODE (1102) and is not involved with the generation of such GCODE.

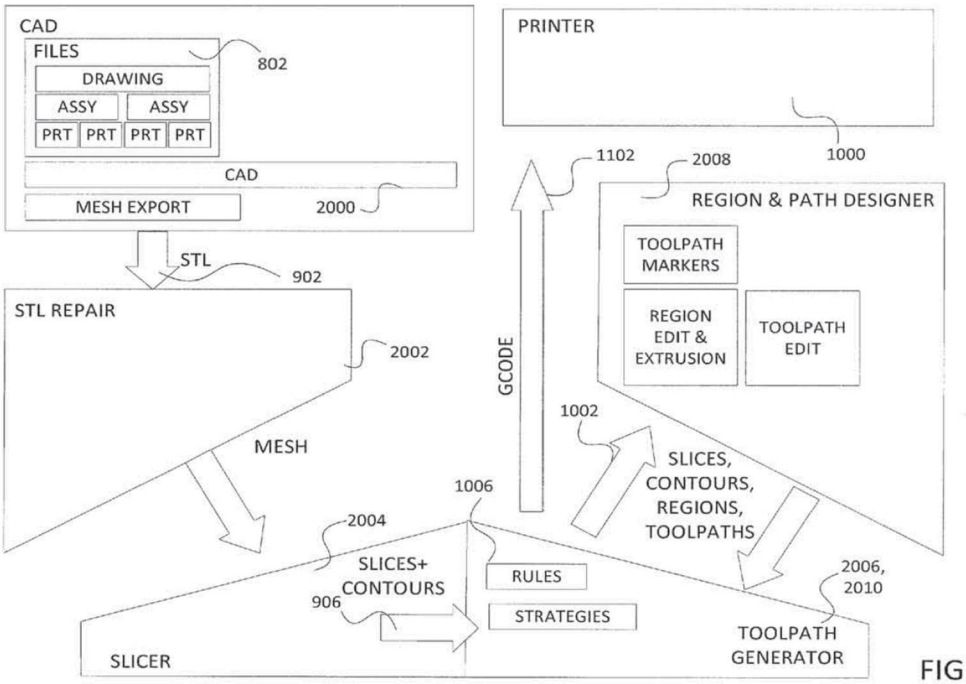

FIG. 5

EX1006 at Fig. 5. Thus, the rule/parameter database in *Mark* is not a "fabrication profile based on the one or more properties" which are "from the target printer" and "that affect fabrication capabilities of the target printer" (*see* claim element [1.4]). *See id.* at Fig. 5 (Rules 1006); *see also id.* at Fig. 20 (RULE/PARAMETER DATABASE). Nor does *Mark* teach that its rule/parameter database would be appropriate to send to the printer, unlike the operational parameters that *Douglas* sends to its printer. For those reasons, *Mark* fails to provide an example fabrication profile for use with the system of *Douglas*, as substantial modifications would need

to be made to that system. Accordingly, any parameters viewed according to *Mark* are not and do not correspond to one or more properties that are from the target printer and that affect fabrication capabilities of the target printer, and any parameters according to *Douglas* are not viewed but rather are sent to the printer. Thus, the combination does not support Petitioner's conclusion that organizing "Douglas' operational parameters into a 'profile'" would "allow easier rendering of such operational parameters for user view in a user interface." *See* Pet. at 19.

93. For each of these reasons, Petitioner has failed to show that the combination teaches claim element [1.5].

B. Dependent Claims

94. For the reasons described above, the *Douglas-Mark* combination fails to teach or suggest claim 1 of the '774 Patent. Thus, Ground 1A additionally fails to teach or suggest claims 2-5, 9-10, 12-13, and 20 of the '774 Patent. Ground 1 further fails to teach or suggest dependent claims of the '774 Patent for the following reasons.

1. Claims 9 and 10

95. Claim 9 of the '774 Patent recites "The method of claim 1 wherein the one or more properties include one or more user settings on the target printer." EX1001, at 36:4-6. Claim 10, which depends upon claim 9, recites "The method of claim 9 wherein the one or more user settings include user setting from a previous

fabrication process." EX1001, at 36:7-9. Ground 1A fails to teach or suggest these claims.

96. The Petition cites the disclosure of *Douglas* but fails to directly identify any such "user setting" present in that reference. Pet. at 26. Instead, Petitioner makes the convoluted argument that it would be obvious that data tag data would have been "one or more user settings on the target printer" simply because "the material is chosen and installed into the printer by the user and the printer is set to reflect the material (e.g., *by the data tag*)." *See id*. (emphasis added). Petitioner illustrates why this does not disclose a user setting, as petitioner admits that the setting is changed "by the data tag," rather than the user. *See id.* Therefore, Petitioner fails to show that claim 9 is unpatentable, and, by extension, fails to show that claim 10 is unpatentable.

VIII. GROUNDS 1B-1D: CHALLENGED CLAIMS WOULD NOT HAVE BEEN OBVIOUS

97. I understand that Petitioner has asserted several grounds, Grounds 1B-1D, that do not separately challenge independent claim 1. *See* Pet. at 1; *see also* Pet. at 29-42. Instead, each of Grounds 1B-1D challenges claims dependent on claim 1.

Ground	Claims	References Cited
1A	1–5, 9, 10, 12, 13, 20	Douglas (US 2014/0117585 A1; EX1005); Mark (USP 9,694,544; EX1006)
1B	6, 7, 9, 10	Douglas; Mark; Dahlin (EP 1087862B1; EX1008)
1C	8	Douglas; Mark; Batchelder (US 2014/0127524 A1; EX1007)

Ground	Claims	References Cited
1D	19	Douglas; Mark; Pax (WO 2014/039825 A2; EX1013)

Thus, it is my opinion that Grounds 1B-1D fail to teach their respective challenged dependent claims for at least the reasons I provided above for Ground 1A with respect to independent claim 1. *Supra* Section VII.A (Claim 1). Ground 1B-1D further fail to teach their respective challenged claims for the reasons below.

A. Ground 1B

98. Ground 1B combines *Douglas* and *Mark* with *Dahlin* (EX1008). *See* Pet. at 1; *see also* Pet. at 30. *Dahlin* discloses a "filament spool, and a filament supplied rapid prototyping system that comprises a circuit for monitoring data concerning the filament on the filament spool." *See* EX1008, ¶[0007]. Ground 1B solely addresses dependent claims 6-7 and 9-10 and thus has the same defects as Ground 1A with respect to independent claim 1, upon which all other claims of the '774 Patent depend. Ground 1B also has the following additional defects.

1. Claim 6

99. Claim 6 recites "[t]he method of claim 4 wherein the hardware configuration includes an automatically detected hardware reconfiguration." EX1001 at 35:47-49. Claim 4, upon which claim 7 depends, recites "[t]he method of claim 1 wherein the one or more properties include a hardware configuration of

the target printer." EX1001 at 35:38-40. Ground 1B fails to teach or suggest claim 6.

100. The disclosure of *Dahlin*, as cited by Petitioner, is limited to monitoring characteristics of a filament spool. *See* Pet. at 32-33; EX1008, ¶[0022]-[0023]. *Dahlin* does not disclose creating or modifying any fabrication profile in response to a detected change, nor does it disclose regenerating print instructions after a spool is replaced. Instead, *Dahlin* merely pauses the process and allows a user to manually intervene by replacing the filament, after which printing continues using preexisting instructions. EX1008, ¶¶[0022]-[0023]. *Douglas* and *Mark* do not cure this deficiency: neither reference discloses automatically detecting a hardware reconfiguration and then incorporating that detection into the profile-based generation of a machine-ready representation.

101. The filament monitoring of *Dahlin* is incompatible with the requirements of claim elements [1.5] and [1.6], which recite "creating a fabrication profile based on the one or more properties." *Dahlin* explains explicitly that the filament monitoring is used to "calculate whether a spool 42 or 56 contains enough filament to complete the job" and verify "that the modeling filament material on the spool is the same material specified in object data." EX1008, ¶¶[0022]-[0023]. These determinations logically require that print settings and a machine-ready representation have already been set and generated, respectively. This is particularly

clear for checking if the material on the spool matches the material specified in object data, as that object data must already exist. Thus, *Dahlin* does not disclose "creating a fabrication profile based on the one or more properties," which in the case of claim 6 are alleged by Petitioner to be "the automatically detected new or replacement material." *See* Pet. at 33. Therefore, Ground 1B fails to teach claim 6.

2. Claim 7

102. Claim 7 recites "[t]he method of claim 4 wherein the hardware configuration includes a manually specified hardware reconfiguration." EX1001 at 35:50-52. Ground 1B fails to teach or suggest this claim.

103. As Petitioner explains, *Dahlin* discloses notifying a user to replace materials. Pet. at 33; EX1008, ¶¶[0022]-[0023]. However, while Petitioner suggests that these materials are "chosen and loaded by the user," the disclosure Petitioner cites does not establish that as the case or mention the user choosing materials at all. *See* Pet. at 33; EX1008, ¶¶[0022]-[0023]. Instead, *Dahlin* suggests that the user *should not* choose the filament, as *Dahlin* seeks to ensure alignment between the loaded material and the "material specified in object data." EX1008, ¶[0023]. Similarly, the language of claim 7 requires that the hardware reconfiguration be "manually *specified,*" not just manually performed. In *Dahlin*, it is the system that specifies, and, as Petitioner argues regarding claim 6, this is automatic, rather than manual. Pet. at 32-33; EX1008, ¶[0023].

104. Further, even if the materials *were* "chosen and loaded by the user," it does not follow that *Dahlin* discloses "a manually specified hardware reconfiguration" as required by claim 7. In arguing regarding claim 7, the sole disclosure Petitioner relies on from *Dahlin* is "notifying a user to replace materials." *See* EX1008, ¶¶[0022]-[0023].

105. Additionally, as described regarding claim 6, *Dahlin* makes no suggestion of generating a fabrication profile or machine-ready representation, and is not compatible with such a process. *Dahlin* instead teaches the system confirming that material is suitable for already existing "object data." EX1009, ¶[0023]. For the reasons described, Ground 1B fails to teach or suggest claim 7.

3. Claims 9 and 10

106. Claim 9 of the '774 Patent recites "The method of claim 1 wherein the one or more properties include one or more user settings on the target printer." EX1001, at 36:4-6. Claim 10, which depends upon claim 9, recites "The method of claim 9 wherein the one or more user settings include user setting from a previous fabrication process." EX1001, at 36:7-9. Ground 1B fails to teach or suggest these claims.

107. Claims 9 and 10 are not taught by Ground 1B, as Petitioner solely relies on the conclusory statement that "a user loads the type of material in the printer, which is 'one or more user settings on the target printer.'" *See* Pet. at 34. Petitioner

presents no argument regarding why this would be "one or more user settings on the target printer." *See id.* The '774 Patent states that "user settings may be *inputted* directly onto the printer…or by using a GUI or the like on the printer or on a device in communication with the printer." EX1001 at 20:66-21:3. Loading the material is not inputting a setting. Therefore, Ground 1B fails to teach that "one or more properties include one or more user settings on the target printer." Claims 9 and 10 are additionally not taught because the filament monitoring of *Dahlin* is incompatible with the system of the '774 Patent, as described regarding claim 6.

B. Ground 1C

108. Ground 1C combines *Douglas* and *Mark* with *Batchelder* (EX1007). *See* Pet. at 1, *see also* Pet. at 35. *Batchelder* discloses "marked consumable material" for use in an "additive manufacturing system." EX1007, Abstract, ¶¶[0008]-[0010], [0049]-[0055]. Like Ground 1B, Ground 1C does not address independent claim 1, and is therefore deficient as it relates to that claim in the same fashion as Ground 1A.

1. Claim 8

109. Claim 8 recites "[t]he method of claim 1 wherein the one or more properties include a firmware configuration of the target printer." EX1001 at 36:1-3. Ground 1C fails to teach or suggest this claim.

110. Petitioner relies on *Batchelder*'s disclosure of "encoded markings" that may include "firmware updates." EX1007, ¶[0054]. But, a "firmware update" is distinct from a "firmware configuration," and providing a firmware update does not provide a firmware configuration. Instead of conveying information regarding the configuration of firmware, firmware updates *change* that configuration. Petitioner's expert agrees, noting that "firmware updates are *updating* the firmware configuration." EX2015 at 66:14-15. Thus, rather than providing information regarding a firmware configuration, the "firmware updates" of *Batchelder* modify that configuration.

111. Petitioner's expert additionally admits that using "*Batchelder*'s encoded markings," which in his view only "*might* give an indication of what software and firmware are most suitable for printing that specific material" is "an example that [he] just came up with." EX2015 at 68:19-69:1. He further admitted that the example was "based on [his] understanding of how this *might* work or a POSITA's understanding of how this *might* work, that *might* be one example where *Batchelder could* be used." EX2015 at 69:5-11. (emphasis added). I understand a reference that merely *could* be modified to perform a method is not sufficient to make that method obvious. Instead, Petitioner must show that a POSITA *would* have made the modification. For the above reasons, Ground 1C fails to teach or suggest claim 8.

C. Ground 1D

112. Ground 1D combines *Douglas* and *Mark* with *Pax* (EX1013), which discloses a 3D printer capable of using multiple colors of build material. EX1013, ¶¶[0064]-[0067], Fig. 3A. Ground 1D also does not address claim 1 and thus is deficient for the same reasons as Ground 1A.

1. Claim 19

113. Claim 19 recites "[t]he method of claim 1 further comprising generating descriptive metadata to accompany the machine-ready representation, the descriptive metadata specifying one or more properties for comparison to properties of printers selected for fabricating the model." EX1001 at 36:44-48. Ground 1D fails to teach or suggest this claim.

114. The sole disclosure of "metadata" in *Pax* referred to by Petitioner is that "color and material requirements for fabricating an object…may be contained in metadata of the object model, fabrication instructions, or a related file." Pet. 40-41; EX1013, ¶[0097]. But claim 19 requires *generating* metadata, and that the metadata "specify one or more properties for comparison to properties of printers." *Pax* does not disclose such generation, as instead *Pax* teaches *identifying* requirements, which therefore must already exist (as must the metadata they are contained in). EX1013, ¶[0097]. Thus, Ground 1D does not teach or suggest claim 19.

115. Petitioner also cites *Douglas*'s disclosure of "metadata concerning print jobs." Pet. 40; EX1005, ¶¶[0040]-[0041]. However, Petitioner makes no attempt to argue that this metadata is generated or that it "specif[ies] one or more properties for comparison to properties of printers selected for fabricating the model" as required by claim 19. *See* Pet. at 40. Therefore, Ground 1D still fails to teach claim 19.

IX. GROUND 2A: CLAIMS 1-5, 9-10, AND 12-13 WOULD NOT HAVE BEEN OBVIOUS OVER GROUND 2A (COMBINATION OF HAMILTON AND EVANS, WITH OR WITHOUT KISSLICER)

116. In Ground 2A of the Petition, Petitioner asserts that claims 1-5, 9-10, and 12-13 are obvious over the combination of *Hamilton* and *Evans*, with or without *KISSlicer*. *See* Pet. at 1, 42-69.

117. I have reviewed Petitioner's challenges in Ground 2A, and it is my opinion that Ground 2A fails to teach or suggest all elements of claims 1-5, 9-10, and 12-13. I explain my opinion below in detail.

A. Claim 1

118. Claim 1 of the '774 Patent recites the following:

1.pre	A method comprising:
1.1	receiving a request to fabricate an object from a three-dimensional model;
1.2	determining a target printer to fabricate the object;
1.3	querying the target printer for configuration information of the target printer relevant to creation of a printable model for fabrication of the object on the target printer;

1.4	receiving, from the target printer, a dictionary of configuration information containing one or more properties from the target printer that affect fabrication capabilities of the target printer;
1.5	creating a fabrication profile based on the one or more properties;
1.6	and generating a machine-ready representation of the three-dimensional model executable by the target printer to fabricate the object.

EX1001 at EX1001 at 35:18-32.

119. As explained below, Petitioner has failed to show that the *Hamilton-Evans* combination, with or without *KISSlicer*, teaches all elements of claim 1.

1. The *Hamilton-Evans* combination (with or without KISSlicer) does not teach or suggest claim element [1.1]

120. The Petition fails to show that the combination in Ground 2A teaches claim element [1.1] ("receiving a request to fabricate an object from a three-dimensional model;"). Petitioner asserts *Hamilton* discloses receiving a request to fabricate an object from a three-dimensional model because *Hamilton's* process in Figure 3 begins with "a request for a design" and his process in Figure 4 includes a step to "[r]eceive [d]esigns and assembly instructions." *See* Pet. at 51-53.

121. However, *Hamilton* does not support Petitioner's conclusion that a request for a design would have been a request to fabricate an object from a three-

dimensional model. *Hamilton* does not mention the term "model" and defines what the "designs" of his printer consist of: "the necessary printer requirements for the design, information on the materials required, instructions for the 3 D printer, separately numbered individual parts, and instructions for assembly of the product for the user." EX1010, ¶[0019]. *Hamilton's* designs includes instructions for the printer, but Petitioner's expert acknowledges that "It's not clear, everything that's included in instructions for the 3D printer in Hamilton." EX2015 at 51:6-8. Further, Petitioner's expert admits that *Hamilton* does not discuss slicing or G-code. EX2015 at 50:15-16, 53:17. Because the process of *Hamilton* does not include slicing or generation of G-code, there is no motivation to alter the process to include a model. In particular, the reason to include a model in the process would have been to slice the model and use the resulting instructions to fabricate an object. *Hamilton*'s request for a design is a request for requirements, information on the materials, and instructions, but not a request to fabricate an object from a three-dimensional model.

2. The *Hamilton-Evans* combination (with or without KISSlicer) does not teach or suggest claim elements [1.2] and [1.3]

122. The Petition fails to show that the combination in Ground 2A teaches claim elements [1.2] ("determining a target printer to fabricate the object;") and [1.3] ("querying the target printer for configuration information of the target printer relevant to creation of a printable model for fabrication of the object on the target printer;"). For claim element [1.2], Petitioner asserts that "the user's 3D printer" in

Hamilton would be a target printer to fabricate the object because the user requests a product and the system waits for a response from the user to ensure that the printer is attached and ready (purported target printer). *See* Pet. at 54. Petitioner also asserts that the target printer would have been determined before querying the printer for its accuracy and material abilities. *See id.* For claim element [1.3], Petitioner asserts that per [1.2], *Hamilton's* process of 3D printing performs a "query" of the printer to be used that includes the printer's "accuracy and material capabilities." Pet. at 54. According to Petitioner, *Hamilton's* system compares the capabilities of the printer to design requirements to determine whether to send the design file to the printer. *See* Pet. at 54-55.

123. But Petitioner's assertions are contrary to the teachings of *Hamilton* that query the printer for information and then use that information to determine if the printer is appropriate for the design (i.e., determine a target printer to fabricate the object corresponding to the design). Figure 3 of *Hamilton* shows a flow chart for a method from the perspective of the supplier of designs:

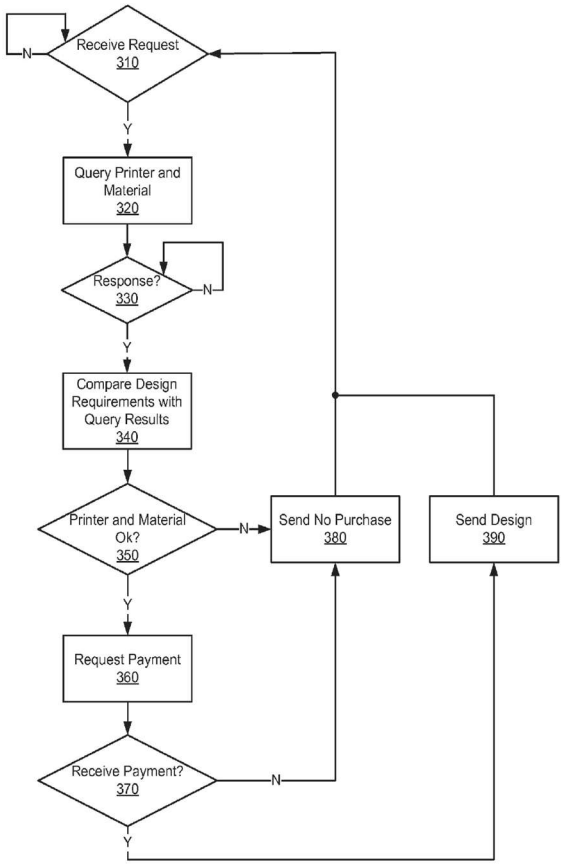

Fig. 3

EX1010 at Fig. 3. As shown, step 320 queries the printer and material, and step 330 receives a response from the printer. Step 320 is performed *before* step 340, which compares the design requirements with the query results, and step 350, which determines if the printer and material are okay. If the printer and material are okay and the supplier of designs receives payment (at step 370), the supplier will send the design (at step 390). *See id.* Thus, a target printer to fabricate the object corresponding to the design is not determined until the supplier determines if the printer and material are okay at step 350.

124. Petitioner's assertion that the "attached printer would have been the target printer," because the system waits for the user to ensure the printer is attached and ready (*see* Pet. at 54), fails to explain why confirming that the printer is attached teaches "determining a target printer to fabricate the object." Indeed, the user in Hamilton does not know the requirements of the object to be fabricated when it responds to the system to ensure the printer is attached and ready. *See* EX1010 at Fig. 2 (steps 240 and 260).

125. As shown below in Figure 2 of *Hamilton*, which shows a flow chart for a method from the perspective of the user, the printer in *Hamilton* is not a target printer to fabricate the object until the print material is okay at step 260.

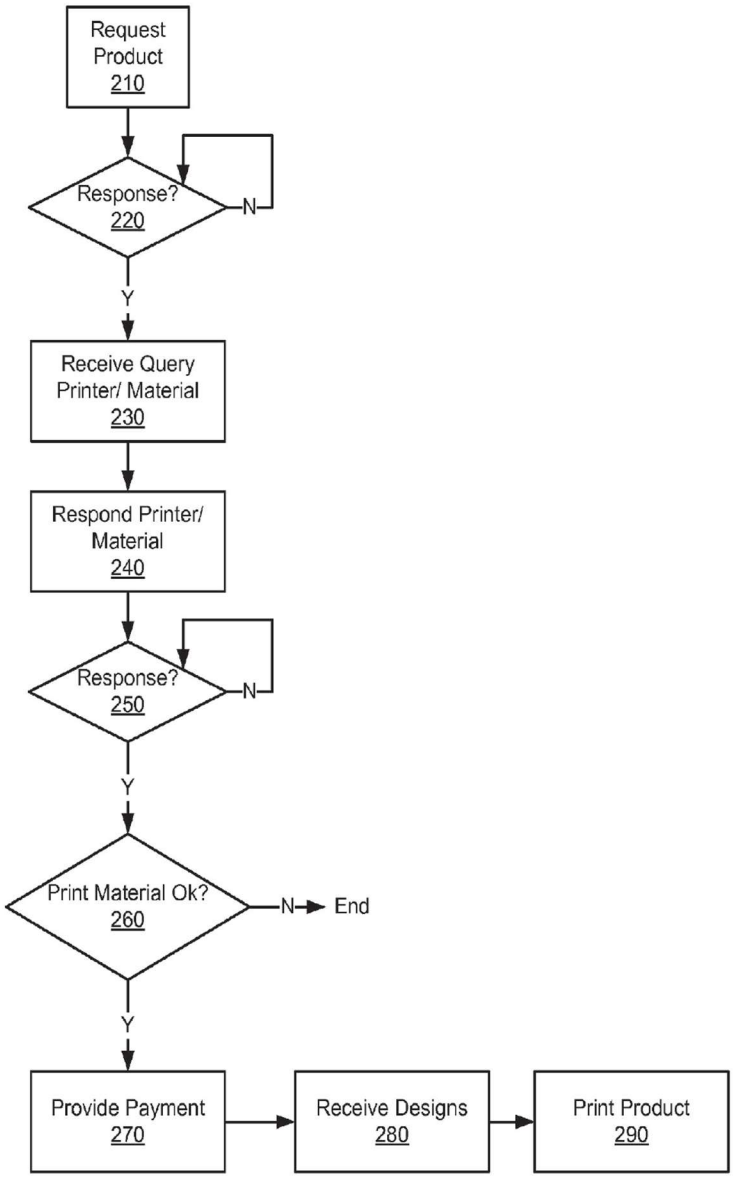

Fig. 2

EX1010 at Fig. 2, ¶[0020] ("If the material available matches the design requirements 260 and the accuracy of the printer is correct it then proceeds to allow the user to provide payment for the design 270."). If the print material is okay and payment is provided, the user will receive the design for fabrication at step 280. Thus, the printer in *Hamilton* is not a target printer until after querying the printer

because the user in *Hamilton* does not know the requirements of the design, which are compared to the query results by the supplier. *See id.* at Figs. 2-3. Accordingly, there is no teaching in *Hamilton* of determining a target printer to fabricate the object such that the target printer is then queried for configuration information.

3. The *Hamilton-Evans* combination (with or without KISSlicer) does not teach or suggest claim element [1.4]

126. The Petition also fails to show that the combination in Ground 2A teaches claim element [1.4] ("receiving, from the target printer, a dictionary of configuration information containing one or more properties from the target printer that affect fabrication capabilities of the target printer"). Petitioner asserts that the printer in *Hamilton* responding with its accuracy and material capabilities amounts to receiving, from the target printer, a dictionary of configuration information, because the information in *Hamilton* is a collection of properties and defines the printer capabilities. Pet. at 56. However, like *Douglas* in Ground 1A, Petitioner fails to explain why the accuracy and material capabilities in *Hamilton* that are sent from the printer is a collection of properties (which is what Petitioner asserts as disclosing "a dictionary of configuration information").

127. *Hamilton* merely discloses that the printer sends its accuracy and material capabilities. *See, e.g.*, EX1010, ¶[0021] ("The user's 3D printer will then respond with its accuracy and material capabilities."). It does not teach whether those capabilities are sent and received as a collection of information. *See id.*

128. Further, Petitioner tacitly admits to other deficiencies in *Hamilton* by relying upon *Evans* in the combination to assert that *Hamilton's* accuracy and material capabilities would include "additional information" (filament diameter, extruder nozzle size, layer height) as disclosed by *Evans*. *See* Pet. at 57. But *Evans* does not teach receiving its "additional information" from the target printer. In fact, Petitioner's expert admits that "Evans doesn't dive into printer software communication or other things like that." EX2015 at 61:6-10. Rather, a user manually measures and enters those measurements into the software. *See* EX1011 at 67-68 (explaining how to "work[] out" the "nozzle and filament diameters" so that "you can enter these measurements" into the slicer application), 66 (explaining that the "layer height" is based on the "nozzle's diameter"). Thus, there is no support for the rationale that adds *Evan's* "additional information" to *Hamilton's* accuracy and material capabilities.

129. Further, as explained above, because the supplier in *Hamilton* uses the requested information received from the printer to determine if the design requirements are met by the printer, the information received under claim element [1.4] is not "from the target printer" because the target printer has not been determined.

130. For each of these reasons, Petitioner has failed to show that the combination in Ground 2A teaches claim element [1.4].

4. The *Hamilton-Evans* combination (with or without KISSlicer) does not teach or suggest claim element [1.5]

131. The Petition also fails to show that the combination in Ground 2A teaches claim element [1.5] ("creating a fabrication profile based on the one or more properties"). Petitioner asserts it would have been obvious that, in the *Hamilton-Evans* combination, upon receiving the printer properties from the printer, a slicer application would have created a fabrication profile. *See* Pet. at 57-58. Petitioner also asserts that *KISSlicer*, a slicer application, would have created a fabrication profile. *See id.* at 59.

132. However, Petitioner ignores the teachings of *Hamilton* in reaching its conclusions. In particular, *Hamilton* teaches that there is no need for a slicer application at all because his designs already include "instructions for the 3 D printer." EX1010, ¶[0019]. As *Hamilton* explains, the supplier "compare[s] the capabilities of the printer to the requirements of the design." *Id.* at ¶[0021]. If "the requirements are met by the user's 3D printer" and if "payment is received," "a design is sent." *Id.* When "the design is sent [] by the supplier," the system "will then proceed to print the first piece of the design" followed by any additional pieces until "all parts of the design are printed and finished." *Id.* at ¶[0022], Fig. 4. Thus, no slicer application is run in *Hamilton's* solution to generate machine-ready code because instructions for the 3-D printer are already included in *Hamilton's* designs, which are only sent by the supplier of the designs if the requirements of the design

are met by the user's 3D printer. Thus, there is no motivation for using a slicer application for *Hamilton*'s solution, as *Evans* and *KISSlicer* purportedly disclose.

133. Further, *Evans* and *KISSlicer* do not teach creating a fabrication profile based on one or more properties from the target printer. *Evans* teaches that the user must manually measure the nozzle and filament diameters and enter them along with the layer height into the software, and *KISSlicer* simply shows a dialog for the user to enter material settings. EX1011 at 66-68; EX1012, 3. Thus, there is no disclosure that a fabrication profile is created based on one or more properties *from the target printer*.

134. For each of these reasons, Petitioner has failed to show that the combination in Ground 2A teaches claim element [1.5].

5. The *Hamilton-Evans* combination (with or without *KISSlicer*) does not teach or suggest claim element [1.6]

135. The Petition further fails to show that the combination in Ground 2A teaches claim element [1.6] ("generating a machine-ready representation of the three-dimensional model executable by the target printer to fabricate the object"). Petitioner asserts that *Evans* discloses, via the "process of slicing the model," generating the "machine-ready representation of the three-dimensional model" of claim element [1.6]. Pet. at 60. However, like with claim elements [1.1] and [1.5], petitioner ignores the teachings of Hamilton. Hamilton explains that its designs already include printer instructions. These designs exist before the printer is

identified or queried, and thus bear no relation to the fabrication profile of element [1.5]. There is therefore no need for a slicer or slicing. Additionally, Petitioner's expert admits that Hamilton has *no* discussion of G-code or of slicing. EX2015 at 50:15, 53:17. Further still, as described regarding claim element [1.1], the *Hamilton-Evans* combination fails to teach the existence of a model, as would be necessary to "generate a machine-ready representation" of said model.

B. Dependent Claims

136. For the reasons described above, the *Hamitlon-Evans* combination, with or without KISSlicer, fails to teach or suggest claim 1. Thus, Ground 2A additionally fails to teach or suggest claims 2-5, 9-10, and 12-13 of the '774 Patent.

X. GROUNDS 2B-2E: CHALLENGED CLAIMS WOULD NOT HAVE BEEN OBVIOUS

137. I understand that Petitioner has asserted several grounds, Ground 2B-2E that do not separately challenge independent claim 1. *See* Petition at 1-2; *see also* Petition at 42-88. Instead, each of Grounds 2B-2E challenges claims dependent on claim 1.

Ground	Claims	References Cited
2A	1-5, 9, 10, 12, 13	Hamilton (US 2014/0236774; EX1010); Evans (EX1011); KISSlicer (EX1012)
2B	6, 7, 19	Hamilton; Evans; Pax; KISSlicer
2C	19	Hamilton; Evans; Pax; Pettis (US 2013/0329258 A1; EX1009); KISSlicer
2D	8	Hamilton; Evans; Batchelder; KISSlicer;

Ground	Claims	References Cited
2E	20	Hamilton; Evans; Wang (USP 9,862,149 B2; EX1014); KISSlicer

Thus, it is my opinion that Grounds 2B-2E fail to teach their respective challenged dependent claims for at least the reasons I provided above for Ground 2A with respect to independent claim 1. Further, Ground 2D fails to teach claim 8, for the additional reasons described below.

A. Ground 2D

138. Ground 2D adds *Batchelder* (which also appears in Ground 1C) to the combination of *Hamilton* and *Evans* (with or without *KISSlicer*). Pet. at 1, 80-84. Ground 2D does not address claim 1 and is thus deficient for the same reasons as Ground 2A.

1. Claim 8

139. Claim 8 of the ’774 Patent recites “The method of claim 1 wherein the one or more properties include a firmware configuration of the target printer.” EX1001, at 36:1-3. Ground 2D fails to teach or suggest this claim.

140. Petitioner relies solely on its expert’s opinion to argue the proposition that “a 3D printer’s firmware was typically detected when setting up or sending jobs to a 3D printer.” Pet. at 82. *Evans* is additionally cited, but *Evans* does not disclose querying or receiving a printer’s firmware configuration. *See* Pet. at 82-83; EX1011, 35, 41-43, 76-80. The addition of *Batchelder* to Ground 2B fails to remedy the failure

to teach or suggest this claim for the same reasons *Batchelder* was insufficient in Ground 1C to teach or suggest this claim. *Supra* § VIII.B.1.

XI. CONCLUSION

141. For the reasons set forth above, it is my opinion that claims 1-10, 12-13, and 19-20 of U.S. Patent No. 11,886,774 would not have been obvious to a person of ordinary skill in the art at the relevant time.

142. In signing this Declaration, I understand it will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I understand I may be subject to cross-examination in this case, and that any cross-examination will take place in the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

143. I declare that all statements made herein of my 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 knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001.

144. I declare under penalty of perjury under the laws of the United States that the forgoing is true and correct.

Executed on this 14th day of January, 2025.

Denis Cormier

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Dr. Denis R. Cormier