

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CURRENT LIGHTING SOLUTIONS, LLC
D/B/A GE CURRENT,
Petitioner,

v.

JIAXING SUPER LIGHTING ELECTRIC APPLIANCE CO., LTD,
Patent Owner.

IPR2023-00272
Patent 10,830,397 B2

Before BRIAN J. McNAMARA, NEIL T. POWELL, and
JULIET MITCHELL DIRBA, *Administrative Patent Judges*.

McNAMARA, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Current Lighting Solutions, LLC d/b/a GE Current (“Petitioner”) filed a petition, Paper 1 (“Petition” or “Pet.”), to institute an *inter partes* review (“IPR”) of claims 1-6, 8-12, and 14-18 (the “challenged claims”) of U.S. Patent No. 10,830,397 B2 (“the ’397 patent”). 35 U.S.C. § 311. Jiaxing Super Lighting Electric Appliance Co., Ltd., (“Patent Owner”) filed a Preliminary Response, Paper 9 (“Prelim. Resp.”), contending that the Petition should be denied as to all challenged claims. We authorized Petitioner to submit a Preliminary Rely. Paper 11 (“Reply”). Although authorized, Patent Owner did not file a Preliminary Sur-reply.

We have jurisdiction under 35 U.S.C. § 314, which provides that an *inter partes* review may not be instituted unless the information presented in the Petition “shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” A decision to institute under § 314 may not institute on fewer than all claims challenged in the petition. *SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1359–60 (2018). In addition, per Board practice, if the Board institutes trial, it will institute “on all of the challenged claims and on all grounds of unpatentability asserted for each claim.” See 37 C.F.R. § 42.108(a).

Having considered the arguments and the associated evidence currently of record, for the reasons described below, we institute *inter partes* review.

II. REAL PARTIES IN INTEREST

Petitioner identifies itself (Current Lighting Solutions, LLC d/b/a GE Current) as its real party-in-interest. Pet. 1. Patent Owner identifies itself (Jiaxing Super Lighting Electric Appliance Co., Ltd.) as its real party-in-

interest. Paper 4, 2. In addition, Patent Owner identifies Obert, Inc. and Zhejiang Super Lighting Electric Appliance Co. Ltd. as real parties-in-interest “[o]ut of an abundance of caution.” *Id*

III. RELATED MATTERS

Both parties identify the following litigation (“the parallel proceeding”) as relevant to the ’397 patent: *Jiaxing Super Lighting Electric Appliance Co., Ltd. et al. v. Current Lighting Solutions, LLC d/b/a GE Current*, No. 6:22-cv-00534-ADA (W.D. Tex. 2022). Pet. 2; Paper 4, 2.

IV. EXERCISE OF DISCRETION

A. Discretion Under 35 U.S.C. § 314(a)- *Fintiv*

In the Preliminary Response, Patent Owner contends that we should exercise our discretion to deny the Petition in favor of the parallel proceeding. Prelim. Resp. 22–28. The Board has held that the advanced state of a parallel district court action is a factor that may weigh in favor of denying a petition under § 314(a). *See NHK Spring Co. v. Intri-Plex Techs., Inc.*, IPR2018-00752, Paper 8 at 20 (PTAB Sept. 12, 2018) (precedential); Patent Trial and Appeal Board Consolidated Trial Practice Guide 64 (Nov. 2019)¹, 58 & n.2. We consider the following factors to assess “whether efficiency, fairness, and the merits support the exercise of authority to deny institution in view of an earlier trial date in the parallel proceeding”:

1. whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted;
2. proximity of the court’s trial date to the Board’s projected statutory deadline for a final written decision;
3. investment in the parallel proceeding by the court and the parties;

¹ Available at <https://www.uspto.gov/sites/default/files/documents/tpgnovpdf>.

4. overlap between issues raised in the petition and in the parallel proceeding;
5. whether the petitioner and the defendant in the parallel proceeding are the same party; and
6. other circumstances that impact the Board's exercise of discretion, including the merits.

Apple Inc. v. Fintiv, Inc., IPR2020-00019, Paper 11 at 5–6 (PTAB Mar. 20, 2020) (precedential) (“*Fintiv*”). In evaluating these factors, we “take[] a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review.” *Id.* at 6. We consider each of these factors below.

On June 21, 2022, the Director of the USPTO issued several clarifications concerning the application of the *Fintiv* Factors. *See Interim Procedure For Discretionary Denials In AIA Post-Grant Proceedings With Parallel District Court Litigation*, issued June 21, 2022 (“Guidance Memo”).² The Director’s memo states

[c]onsistent with *Sotera Wireless, Inc.*, the PTAB will not discretionarily deny institution in view of parallel district court litigation where a petitioner presents a stipulation not to pursue in a parallel proceeding the same grounds or any grounds that could have reasonably been raised before the PTAB.

Guidance Memo 3. *See Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 (PTAB Dec. 1, 2020) (precedential as to § II.A).

Petitioner has offered to submit a *Sotera* stipulation in the parallel proceeding. *See* Ex. 1009. In addition, on July 17, 2023 the parties filed a Joint Motion to Stay All Deadlines and Notice of Settlement in the Current Action. *See* Current Action, Paper 96. The district court granted the motion

² Available at https://www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621_.pdf.

and stayed the Current Action for 30 days. *Id.* The district court also cancelled a Markman hearing scheduled for July 19, 2023. The parties have not moved to terminate this pending *inter partes* review. In view of the circumstances, we decline to exercise discretion to deny institution.

V. THE '397 PATENT

The '397 patent concerns LED tube lamps. Ex. 1001 (code 54). The '397 patent describes typical LED tube lamps as having a lamp tube, a circuit board disposed inside the lamp tube with LED light sources mounted thereon, and end caps accompanying a power supply at two ends of the lamp transmitting power to the light source through the circuit board. *Id.* at 2:16–22. The '397 patent states that it addresses three problems: (1) rigid printed circuit boards in the tube giving the false impression that a broken lamp is still useable, (2) easily damaged wire bonds between connecting end caps of the lamp with the printed circuit board, and (3) insufficient heat dissipation reducing the life span of the tube. *Id.* at 2:23–42. The '397 patent also notes that LED light sources are point sources emitting concentrated light rays not easily distributed evenly. *Id.* at 2:42–44.

The '397 patent discloses a lamp in which an LED light strip with LED light sources is bonded or affixed to an inner side of the lamp tube via an adhesive sheet, an end cap is affixed to the end portion of the light tube, and the LED light sources and the power supply are connected by the light strip. *Id.* at 14:22–33. A roughened inner surface of the glass tube spreads transmitted light uniformly (*id.* at 11:13–18), diffusion films and coatings diffuse transmitted light (*id.* at 12:10–14), and reflective films reflect light from the LED sources in desired directions (*id.* at 11:55–57).

VI. ILLUSTRATIVE CLAIM[S]

Claim 1, reproduced below with paragraph designations used in the Petition is illustrative of the subject matter of the '397 patent.

1. [p] An LED tube lamp, comprising:
 - [a] a glass lamp tube, wherein at least a portion of an inner surface of the glass lamp tube is covered by a rough surface and the roughness of the rough surface is higher than that of the outer surface of the glass lamp tube;
 - [b] two end caps, each of the two end caps coupled to a respective end of the glass lamp tube;
 - [c] an LED light strip disposed on an inner surface of the glass lamp tube with a plurality of LED light sources mounted on the LED light strip;
 - [d] a power supply disposed at one end or two ends of the glass lamp tube, the power supply electrically connected to the plurality of LED light sources; and
 - [e] a reflective film disposed on a portion of the inner surface of the glass lamp tube,
 - [f] wherein the glass lamp tube comprises a main body region and two rear end regions, each of the two rear end regions coupled to a respective end of the main body region and each of the two end caps coupled to a respective rear end region, and
 - [g] further wherein a length of the light strip is longer than a length of the main body region of the glass lamp tube.

VII. ASSERTED GROUNDS

Petitioner asserts that claims 1–6, 8–12, and 14–18 would have been unpatentable on the following grounds:

Claim(s) Challenged	35 U.S.C. §	Reference(s)
1–3, 8, 9, 14, 15	103	Jing, ³ Huang ⁴
1–3, 8, 9, 14, 15	103	Jing, Halliwell ⁵
4	103	Jing, Huang, Foo ⁶
4	103	Jing, Halliwell, Foo
10, 16	103	Jing, Huang, Zhao ⁷
10, 16	103	Jing, Halliwell, Zhao
5, 6	103	Jing, Huang, Foo, Deng ⁸
5, 6	103	Jing, Halliwell, Foo, Deng
11, 12, 17, 18	103	Jing, Huang, Zhao, Deng
11, 12, 17, 18	103	Jing, Halliwell, Zhao, Deng

Petitioner also relies upon the direct testimony in the Declaration Dr. Michael Lebby (“Lebby Decl.”), Ex. 1004.

VIII. LEVEL OF ORDINARY SKILL IN THE ART

Petitioner describes a person of ordinary skill in the art (“POSITA” or “ordinarily skilled artisan”) at the time of the ’397 patent’s earliest claimed priority date as having “a Bachelor’s degree in electrical engineering, or an equivalent field, as well as at least 1-2 years of academic or industry experience in lighting design, including knowledge of light emitting diodes (LEDs) and related technology for driving LEDs.” Pet. 5 (citing Ex. 1004 ¶ 24). Petitioner also notes that “[a] person of ordinary skill in the art with a higher level of education may have fewer years of academic or industry

³ Chinese Patent No. CN203036295U to Jing (Certified Translation) (Ex. 1002).

⁴ US Patent No. 9,151,475 B2 (Ex. 1003).

⁵ US Patent No. 9,206,970 B2 (Ex. 1008).

⁶ PCT Publication No. WO2013/152485 A1 (Ex. 1005).

⁷ US Patent No. 9,970,640 B2 (Ex. 1007).

⁸ Chinese Patent No. CN203797412U to Deng (Certified Translation) Ex. 1006.

experience, or vice versa.” *Id.* Patent Owner does not comment on the level of ordinary skill. *See generally*, Prelim. Resp.

The level of ordinary skill in the art usually is evidenced by the references themselves. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995); *In re Oelrich*, 579 F.2d 86, 91 (CCPA 1978). As Petitioner’s description of an ordinarily skilled artisan appears to be commensurate with the subject matter of the ’397 patent and the references, we apply it for purposes of this Decision.

IX. CLAIM CONSTRUCTION

We interpret claim terms using “the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b).” 37 C.F.R. § 42.100(b) (2019). In this context, claim terms “are generally given their ordinary and customary meaning” as understood by a person of ordinary skill in the art in question at the time of the invention. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (citations omitted) (en banc). “In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17). Extrinsic evidence is “less significant than the intrinsic record in determining ‘the legally operative meaning of claim language.’” *Phillips*, 415 F.3d at 1317 (citations omitted).

Any special definition for a claim term must be set forth in the specification with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).

Patent Owner does not address claim construction. The Petition discusses the construction of two terms, as discussed below. Pet. 13–15.

A. Disposed on

Petitioner asserts that the term “disposed on” does not require explicit construction, but contends that the term “should be understood to include the possibility of an intervening structure, such as an adhesive.” *Id.* at 13.

Petitioner notes that the Specification describes an embodiment in which the LED strip is described as disposed on an inner surface of the light tube and an embodiment in which a diffusion film is coated on an inner surface of the lamp tube, the LED light strip is disposed on an inner surface of the lamp tube, and a reflective film is described as disposed on an inner surface of the lamp tube. *Id.*; Ex. 1001, 4:30–31, 4:37–44, 12:21–25 (diffusion covering but not in contact with LED sources), Figs. 30–31.

Petitioner’s unopposed construction is consistent with the use of the term “disposed on” in the Specification. For purposes of this Decision, we apply the construction proposed by Petitioner.

B. Electrically connected

Petitioner asserts that the Specification of the ’397 patent expressly indicates the term “electrically connected” covers both direct and indirect connections. Pet. 15 (citing Ex. 1001, 14:31–33; Ex. 1004, Leiby Decl. ¶ 95). Petitioner’s unopposed construction is consistent with the use of the term “electrically connected” in the Specification. For purposes of this Decision, we apply the construction proposed by Petitioner.

X. ANALYSIS

A. Legal Standards

“In an [inter partes review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is

unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring inter partes review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). This burden of persuasion never shifts to Patent Owner. See *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burden of proof in *inter partes* review).

The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

Additionally, the obviousness inquiry typically requires an analysis of “whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (requiring “articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”)); see *In re Warsaw Orthopedic, Inc.*, 832 F.3d 1327, 1333 (Fed. Cir. 2016) (citing *DyStar Textilfarben GmbH & Co. Deutschland KG v. C. H. Patrick Co.*, 464 F.3d 1356, 1360 (Fed. Cir. 2006)).

An obviousness analysis “need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *KSR*, 550 U.S. at 418; accord *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1259 (Fed. Cir. 2007). Petitioner cannot satisfy its burden of proving obviousness by employing “mere conclusory

statements.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016). Instead, Petitioner must articulate a reason why a person of ordinary skill in the art would have combined the prior art references. *In re NuVasive*, 842 F.3d 1376, 1382 (Fed. Cir. 2016).

A reason to combine or modify the prior art may be found explicitly or implicitly in market forces; design incentives; the “interrelated teachings of multiple patents”; “any need or problem known in the field of endeavor at the time of invention and addressed by the patent”; and the background knowledge, creativity, and common sense of the person of ordinary skill. *Perfect Web Techs., Inc. v. InfoUSA, Inc.*, 587 F.3d 1324, 1328–29 (Fed. Cir. 2009) (quoting *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418–21 (2007)).

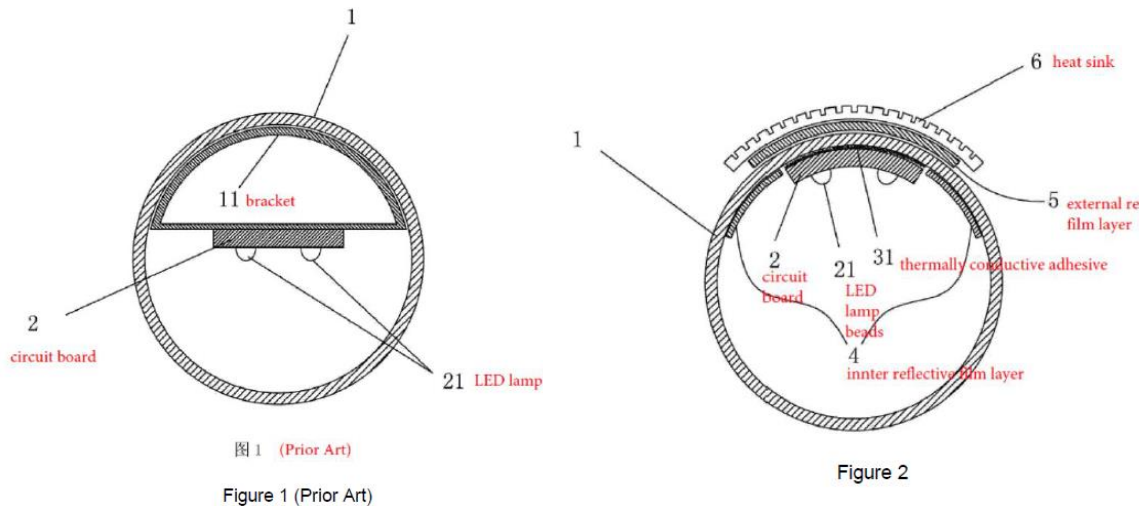
In determining whether a claim is obvious in light of the prior art, when in evidence, we consider any relevant objective evidence of non-obviousness. *See Graham*, 383 U.S. at 17. Notwithstanding what the teachings of the prior art would have suggested to one of ordinary skill in the art at the time of the invention, the totality of the evidence submitted, including objective evidence of non-obviousness, may lead to a conclusion that the challenged claims would not have been obvious to one of ordinary skill. *In re Piasecki*, 745 F.2d 1468, 1471–72 (Fed. Cir. 1984). At this stage of the proceeding Patent Owner does not present evidence of such objective considerations.

We analyze the asserted grounds of unpatentability in accordance with these principles to determine whether Petitioner has met its burden to establish a reasonable likelihood of success at trial.

B. Petitioner's Contentions That Claims 1–3, 8, 9, 14, and 15 Are Obvious Over Jing and Huang

1. *Jing (Ex. 1002)*

Jing discloses an LED fluorescent lamp. Ex. 1004 ¶ 1. Petitioner's annotated version of Figures 1 and 2 of Jing are reproduced below, with annotated Figure 1 on the left and annotated Figure 2 on the right.



Id. at 9. Figure 1 of Jing illustrates an earlier version of a fluorescent LED in which circuit board 2 with LED lamps beads 21 is attached to bracket 11. *Id.* ¶ 3. Bracket 11, which extends from one end to the other end of tube 1, has a cross section shaped like an arch, with the arc of the arch connected with the inner wall of lamp tube 1 and the chord portion facing the center of tube 1. *Id.* Bracket 11 helps to draw heat from LED lamp beads 21 through circuit board 2 to the glass walls of tube 1 and into space. *Id.* ¶ 5.

Jing reduces manufacturing costs by replacing bracket 11 with a thermally conductive adhesive layer 31 e.g., a layer of silicone or epoxy resin, that affixes circuit board 2 to the inner wall of tube 1. *Id.* ¶¶ 8–11, 27–29. Circuit board 2 is made of aluminum-based printed circuit board (PCB) or glass fiber PCB that can be made into an arc shape. *Id.* ¶¶ 27–28. Figure

2 also shows inner reflective film layer 4, that can be continuous or discontinuous, external reflective layer 5 and heat sink 6. *Id.* Fig. 2; ¶¶ 32–37. Jing also includes a plug with a driver circuit connected to an external power supply at the end of the tube. *Id.* ¶ 27, Fig. 6. The inner wall of tube 1 can have a smooth or rough surface. *Id.* ¶ 27.

2. *Huang (Ex. 1003)*

Huang discloses an LED tube light with improved structural durability and lower breakage probability. Ex. 1003, 1:19–21. Huang’s LED tube light assembly includes a glass tube, a base, a light emitting unit, and two lateral cover assemblies. *Id.* at 1:22–23. The base may be hollow or solid and is thermally conductive. *Id.* at 2:44–48. The length of the base exceeds the length of the glass tube. *Id.* at 1:22–23, 2:48–58. The ends of the glass tube and end portions of the base are fixed to the lateral cover assemblies at the ends of the lamp. *See id.* at 6:24–58. As the length of the base is longer than the length of the glass tube, force is transferred from the lateral cover assemblies to the glass tube via the base, such that force is uniformly dispersed across the glass tube, thereby preventing concentration of the force at a specific point and reducing the chance of glass tube breakage. *Id.* at 6:59–67.

3. *Motivation to Combine Teachings of Jung and Huang*

Petitioner cites Jing as disclosing an LED lamp with an inner reflective film layer, but submits that an ordinarily skilled artisan would have recognized that Jing’s replacement of the bracket with thermally conductive adhesive to adhere the flexible PCB to the inner surface of the tube could compromise the lamp’s structure and reduce reliability. Pet. 21–23. Petitioner cites Huang’s disclosure of extending the length of a

supporting base longer than the length of the glass tube into the area of the end caps to improve structural stability. *Id.* at 23–25.

Patent Owner argues that Petitioner’s reliance on Huang merely replaces Jing’s bracket with another base structure. Prelim. Resp. 5–12. According to Patent Owner, “[w]here, as here, the central teaching of one reference is to eliminate the structure the second reference treats as critical, a POSITA would not be motivated to combine the references.” Prelim. Resp. 9–10 (citing *Tec Air, Inc. v. Denso Mfg. Mich. Inc.*, 192 F.3d 1353, 1360 (Fed. Cir. 1999)).

Patent Owner further argues that, even if an ordinarily skilled artisan were motivated to combine the references, neither reference suggests that a relatively thin arc shaped aluminum circuit board by itself would provide rigidity and structural integrity comparable to Huang’s base 2. *Id.* at 10–11.

Patent Owner misapprehends Petitioner’s basis for combining the teaching of the references. Based on Jung and Huang, Petitioner asserts that an ordinarily skilled artisan would have known that an aluminum PC board provides rigidity and force dispersion, but Petitioner does not rely on Jing as teaching a circuit board by itself would provide rigidity comparable to Huang’s base. Pet. 24–25. Petitioner also does not rely on Huang for its teaching of a base. Petitioner “[c]ombin[es] the LED fluorescent lamp of Jing with the circuit board length taught by Huang.” Pet. 25. Petitioner cites Huang as teaching that extending the structural support member longer than the length of the tube provides the desired strength and rigidity. *Id.* According to Petitioner, “a POSITA would have found it obvious to lengthen the circuit board of Jing to achieve the reliability benefits disclosed by Huang.” Pet. 25 (citing Ex. 1004, Lebby Decl. ¶ 104). To the extent Patent Owner contends that an ordinarily skilled artisan would not have been

motivated to use an arc shaped aluminum circuit board to provide rigidity and structural integrity, this argument is best addressed at trial with the benefit of a full record. We invite Patent Owner to provide evidence and analysis to support its contention in this regard.

4. *Independent Claim 1*

a) *Preamble and Limitation 1.a*

The preamble of claim 1 recites an LED tube lamp. Petitioner cites Jing and Huang as disclosing LED tube lamps. Pet. 27–30.

Petitioner designates as claim limitation 1.a the recitation “a glass lamp tube, wherein at least a portion of an inner surface of the glass lamp tube is covered by a rough surface and the roughness of the rough surface is higher than that of the outer surface of the glass lamp tube.” Pet. v. Petitioner cites the combined teachings of Jing and Huang as disclosing a glass lamp with an inner surface covered by a rough surface, whose roughness is higher than that of the outer surface. Pet. 30. Petitioner notes that both Jing and Huang disclose an LED fluorescent lamp with a circular section of glass material, i.e. an LED glass tube light. *Id.* (citing Ex. 1002, ¶¶ 8, 11, 12, 14, 18–24, 27, Figs. 2, 4; Ex. 1003 1:6–7, 1:19–52, 7:1–48, Figs. 1–3). Petitioner further notes that Jing discloses that all or part of the inner wall of the lamp tube can have a rough surface treatment (a sanding or a frosted layer) to make light emitted by the lamp diffuse evenly and softly. *Id.* at 31 (citing Ex. 1002 ¶ 27). Noting that no sanding layer is applied to the outer surface of the lamp tube, Petitioner asserts that a person of ordinary skill would understand that the inner surface of the glass lamp has a roughness that is higher than that of the outer surface of the glass lamp. *Id.* at 31–32.

Patent Owner does not respond to Petitioner's assertions concerning the preamble of claim 1 or claim limitation 1.a. We are persuaded for purposes of this Decision that Petitioner has cited sufficient evidence to demonstrate that a person of ordinary skill would have been motivated to combine the teachings of Jing and Huang and that in combination, they teach the preamble and limitation 1.a.

b) Limitation 1.b

Petitioner designates as claim limitation 1.b the recitation "two end caps, each of the two end caps coupled to a respective end of the glass lamp tube." Pet. v. Petitioner cites Jing as disclosing a plug with the driver arranged on both ends of the lamp tube. Pet. 33 (citing Ex. 1002 ¶¶ 3, 27). Petitioner cites Huang as disclosing an LED tube light that includes a glass tube and two lateral cover assemblies that constitute end caps coupled to respective ends of the glass tube. *Id.* (citing e.g., Ex. 1003, 2:27–32, Figs. 1, 2).

Patent Owner does not respond to Petitioner's assertions concerning claim limitation 1.b. We are persuaded for purposes of this Decision that Petitioner has cited sufficient evidence to demonstrate that a person of ordinary skill would have been motivated to combine the teachings of Jing and Huang and that in combination, they teach the features recited in limitation 1.b.

c) Limitation 1.c

Petitioner designates as claim limitation 1.c the recitation "an LED light strip disposed on an inner surface of the glass lamp tube with a plurality of LED light sources mounted on the LED light strip." Pet. v. Petitioner cites Jing as disclosing a circuit board that extends from one end of lamp tube to the other end and has rows of light strips composed of LED

lamp beads thereon. *Id.* at 35 (citing Ex. 1002 ¶¶ 27–28). Petitioner further cites Jing as disclosing that the circuit board is made of flexible printed circuit board (PCB) and is fixedly connected with the inner wall of the lamp tube through a fixing layer. *Id.* (citing Ex. 1002 ¶ 28). Petitioner notes that Jing discloses this structure can fix the circuit board onto the inner wall of the lamp tube without using a tube bracket, thereby reducing manufacturing cost. *Id.* (citing Ex. 1002 ¶ 28). Petitioner cites the embodiment in Figure 2 of Jing as illustrating an embodiment in which the circuit board is disposed on the lamp tube itself and the embodiment in Figure 4 of Jing as showing the circuit board disposed on the lamp tube via an inner reflective film layer. Pet. 35–37.

Petitioner cites Huang as disclosing an LED tube light in which a circular arc surface of a connecting portion is adhered to the inner surface of the glass tube by glue, e.g., silica gel. Pet. 37 (citing Ex. 1003, 3:64–67). A cross-sectional view of Huang’s LED tube lamp, shown in Figure 3A of Huang, is reproduced below.

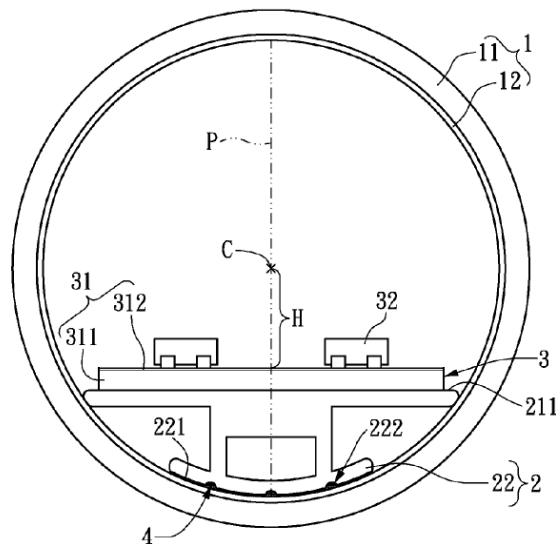


FIG. 3A

Referring to Figure 3A of Huang, Petitioner states that an ordinarily skilled artisan “would understand that light emitting unit 3 of Huang discloses an LED light strip disposed (e.g., via base 2 and glue 4) on an inner surface of glass tube 1 with a plurality of LED light sources (LEDs 32) mounted on the LED light strip.” *Id.* at 38 (citing Ex. 1003, Fig. 2; Ex. 1004, Lebbly Decl. ¶ 122).

Patent Owner does not respond to Petitioner’s assertions concerning claim limitation 1.c. We are persuaded for purposes of this Decision that Petitioner has cited sufficient evidence to demonstrate that a person of ordinary skill would have been motivated to combine the teachings of Jing and Huang and that in combination, they teach the features recited in limitation 1.c.

d) Limitation 1.d

Petitioner designates as claim limitation 1.d the recitation “a power supply disposed at one end or two ends of the glass lamp tube, the power supply electrically connected to the plurality of LED light sources.” Pet. v. Petitioner’s annotated version of Figure 6 of Jing is reproduced below.

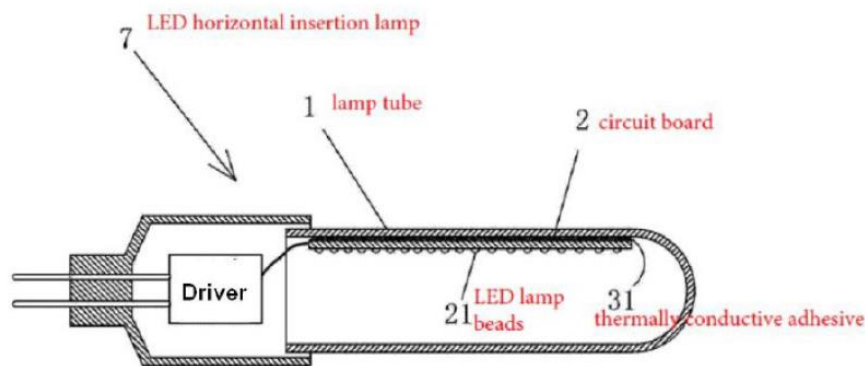


Figure 6

Id. at 39. Petitioner cites Jing as disclosing a plug with the driver arranged at both ends of the lamp tube 1 and electrically connecting the circuit board

2 with the external power supply. *Id.* at 38 (citing Ex. 1002 ¶¶ 3, 8, 27). Petitioner further cites Jing as disclosing that the circuit board is installed into the lamp tube through an open end of the horizontal insertion lamp 7 and the plug with the driver is electrically connected to the external power supply. *Id.* Petitioner also cites Jing as disclosing a plug with the driver arranged on both ends of the lamp tube. *Id.* at 39 (citing Ex. 1002 ¶¶ 3, 27). According to Petitioner, a person of ordinary skill would have understood that the external power supply of Jing is an electricity source providing electricity to the driver of the plug and the driver performs rectification filtering functions to provide electricity to circuit board 2 and LED lamp beads 21. *Id.* at 40 (citing Ex. 1002 ¶ 27; Ex. 1004, Lebbly Decl. ¶ 124).

Petitioner cites Huang as teaching “two conductive terminals installed to one of the lateral cover assemblies,” the circuit board module having a socket connector, and “an electronic unit mounted on the circuit board and arranged between the conductive terminals and the LEDs, . . . wherein the socket connector is electrically connected to the LEDs by the circuit board and the terminals by at least one wire.” *Id.* (citing Ex. 1003, 3:33–35, 3:50–55, 8:33–36, Figs. 2, 4A).

Patent Owner contends that Jing does not disclose a power supply disposed at either end of the glass tube, but instead discloses a driver located within a plug that is connected to an end of the glass tube 1. Prelim. Resp. 12. According to Patent Owner, the disclosure Petitioner cites from Jing states that the plug is located at the end of the lamp tube, not that the driver contained somewhere within the plug is located at the end of the lamp tube. *Id.* at 13 (citing Pet. 39).

Claim limitation 1.d recites only that the power supply is disposed at one or two ends of the glass lamp tube. Claim limitation 1.d does not recite

any additional requirements for the relationship between the glass tube and the power supply. That the power supply is located in a plug that is disposed at the end of the glass tube does not change the fact that the power supply itself is also disposed at the end of the glass tube, as claimed. We also note the structure cited by Petitioner is similar to that of Figure 1 of the '397 patent, where power supply 5 is provided inside end cap 3. Ex. 1001, 7:58–66; Fig. 1. As light strip 2 is longer than the glass tube 1, the power supply in the '397 patent disposed at the end of the tube is located somewhere in the end cap plug, and Jing teaches a substantially similar arrangement.

In view of the foregoing, we are persuaded for purposes of this Decision that Petitioner has cited sufficient evidence to demonstrate that a person of ordinary skill would have been motivated to combine the teachings of Jing and Huang and that in combination, they teach the features recited in limitation 1.d.

e) Limitation 1.e

Petitioner designates as claim limitation 1.e the recitation “a reflective film disposed on a portion of the inner surface of the glass lamp tube.” Pet. v. Petitioner cites Jing as disclosing embodiments with both continuous and discontinuous reflective film layers on an inner wall of the lamp tube. Pet. 40–41 (citing Ex. 1002 ¶¶ 12, 16; Ex. 1004, Lebbby Decl. ¶¶ 126–127).

Patent Owner does not respond to Petitioner’s assertions concerning claim limitation 1.e. We are persuaded for purposes of this Decision that Petitioner has cited sufficient evidence to demonstrate that a person of ordinary skill would have been motivated to combine the teachings of Jing and Huang and that in combination, they teach the features recited in limitation 1.e.

f) Limitation 1.f

Petitioner designates as claim limitation 1.f the recitation “wherein the glass lamp tube comprises a main body region and two rear end regions, each of the two rear end regions coupled to a respective end of the main body region and each of the two end caps coupled to a respective rear end region.” Pet. v. Petitioner contends that a person of ordinary skill would understand that the ends of Jing’s lamp tube 1 covered by the end caps of Jing are “two rear end regions” and that the portion of lamp tube 1 between the ends of lamp tube 1 or a “main body region” of lamp tube 1. Pet. 42. Similarly, Petitioner contends that a person of ordinary skill would understand that glass tube 1 of Huang includes two end portions, covered by two lateral cover assemblies 5 and a main body region. *Id.* (citing, e.g., Ex. 1003, 1:24–28, 2:27–32; Ex. 1004, Lebbly Decl. ¶ 129). According to Petitioner, an ordinarily skilled artisan would understand that “two end portions of the glass tube” of Huang disclose the claimed two rear end regions and the portion of the glass tube between these two end portions discloses the claimed main body region. *Id.* at 42–43.

Patent Owner does not respond to Petitioner’s assertions concerning claim limitation 1.f. We are persuaded for purposes of this Decision that Petitioner has cited sufficient evidence to demonstrate that a person of ordinary skill would have been motivated to combine the teachings of Jing and Huang and that in combination, they teach the features recited in limitation 1.f.

g) Limitation 1.g

Petitioner designates as claim limitation 1.g the recitation “and further wherein a length of the light strip is longer than a length of the main body region of the glass lamp tube.” Pet. v. Petitioner cites the combined

disclosures of Jing and Huang as teaching claim limitation 1.g. Petitioner cites Huang as disclosing the length of light emitting unit 3 exceeds the length of the main body of glass tube 1. Pet. 44 (citing Exhibit 1003, Figs. 2–3, 2:44–58); *see also*, Ex. 1003, 1:24–28 (disclosing that the base has a length larger than the length of the glass tube). Petitioner points out that a person of ordinary skill would understand that light emitting unit 3, mounted on base 2 is longer than the entirety of glass tube 1 and therefore is longer than the portion of the glass tube between the two end portions of the glass tube, i.e., the claimed main body region.

Patent Owner does not respond to Petitioner’s assertions concerning claim limitation 1.g. We are persuaded for purposes of this Decision that Petitioner has cited sufficient evidence to demonstrate that a person of ordinary skill would have been motivated to combine the teachings of Jing and Huang and that in combination, they teach the features recited in limitation 1.g.

h) Claim 1 Conclusion

In view of the foregoing we are persuaded that, for purposes of this Decision to Institute, Petitioner has demonstrated that a person of ordinary skill would have had reason to combine the teachings of Jing and Huang and that in combination these references teach all of the limitations recited in claim 1.

5. Claim 2

Claim 2 depends from claim 1 and further recites “a portion of the inner surface of the glass lamp tube is covered by the rough surface and another portion of the inner surface of the glass lamp tube is covered by the reflective film.” Petitioner cites Jing as disclosing the inner surface of the tube has a rough surface layer frosted layer 12, also referred to a sanding

layer 12, and the claimed reflective film, i.e., reflective film layer 4. Pet. 46 (citing Ex. 1002 ¶¶ 12, 13, 16, 18, 26, 32, 34, 35, Figs. 4, 5). Petitioner notes that a person of ordinary skill would understand that a portion of the inner surface of lamp tube 1 of Jing includes sanding layer 12 and another portion of the inner surface of lamp tube 1 is covered by inner reflective film layer 4. *Id.* at 46–47.

Patent Owner does not respond to Petitioner’s assertions concerning claim 2. We are persuaded for purposes of this Decision that Petitioner has cited sufficient evidence to demonstrate that a person of ordinary skill would have been motivated to combine the teachings of Jing and Huang and that in combination, they teach the features recited in claim 2.

6. *Independent Claim 8*

Independent claim 8 is similar to independent claim 1. Petitioner cites its discussion of the limitations of claim 1 as corresponding to the limitations of claim 8 as follows:

Claim 8 Element	Corresponding Claim 1 Element
Preamble 8.p	Preamble 1.p
Limitation 8.a	Limitation 1.a
Limitation 8.c	Limitation 1.c
Limitation 8.d	Limitation 1.e
Limitation 8.e	Limitation 1.b
Limitation 8.f	Limitation 1.d
Limitation 8.i	Limitation 1.f
Limitation 8.j	Limitation 1.g

Below we address the differences between claims 1 and 8 discussed in the Petition.

a) Claim Limitation 8.b

Claim limitation 8.b recites “a diffusion film coated on an inner surface of the glass lamp tube.” Pet. vi. Petitioner cites Jing as disclosing that all or part of the inner wall of lamp tube 1 may have a rough surface treatment, known as a sanding layer that will make light emitted by the lamp diffuse evenly and softly. Pet. 49 (citing Ex. 1002, ¶¶ 13, 26, 27, 35 claim 6; Ex. 1004, Lebbly Decl. ¶ 138).

Patent Owner does not respond to Petitioner’s assertions concerning claim limitation 8.b. We are persuaded for purposes of this Decision that Petitioner has cited sufficient evidence to demonstrate that a person of ordinary skill would have been motivated to combine the teachings of Jing and Huang and that in combination, they teach the features recited in limitation 8.b.

b) Claim limitation 8.g

Claim limitation 8.g recites “the diffusion film has a rough surface, the roughness of the rough surface is higher than that of an outer surface of the glass lamp tube.” Pet. vi. In addition to citing its discussion of claim limitations 1.a and 8.b, Petitioner cites sanding layer 12 of Jing as disclosing the claimed diffusion film and notes that a person of ordinary skill would understand that sanding layer 12 on the inner surface of the lamp would have a surface that is rougher than the surface on the outside of the lamp tube. *Id.* at 50 (citing Ex. 1004, Lebbly Decl. ¶ 143).

Patent Owner does not respond to Petitioner’s assertions concerning claim limitation 8.g. We are persuaded for purposes of this Decision that Petitioner has cited sufficient evidence to demonstrate that a person of

ordinary skill would have been motivated to combine the teachings of Jing and Huang and that in combination, they teach the features recited in limitation 8.g

c) Claim Limitation 8.h

Claim limitation 8.h recites “a portion of the inner surface of the glass lamp tube is covered by the rough surface and a portion of the inner surface of the glass lamp tube is covered by the reflective film.” Pet. vi. As claim limitation 8.h is similar to the subject matter recited in claim 2, Petitioner cites its discussion of claim 2. Pet. 51.

Patent Owner does not respond to Petitioner’s assertions concerning claim limitation 8.h. We are persuaded for purposes of this Decision that Petitioner has cited sufficient evidence to demonstrate that a person of ordinary skill would have been motivated to combine the teachings of Jing and Huang and that in combination, they teach the features recited in limitation 8.h.

d) Claim 8 Conclusion

In view of the foregoing we are persuaded that, for purposes of this Decision to Institute, Petitioner has demonstrated that a person of ordinary skill would have had reason to combine the teachings of Jing and Huang and that in combination these references teach all of the limitations recited in claim 8.

7. Independent claim 14

Independent claim 14 is similar to independent claim 1. Petitioner cites its discussion of the limitations of claim 1 as corresponding to the limitations of claim 14 as follows:

Claim 14 Element	Corresponding Claim 1 Element
Preamble 14.p	Preamble 1.p
Limitation 14.a	Limitation 1.a
Limitation 14.b	Limitation 1.c
Limitation 14.c	Limitation 1.b
Limitation 14.d	Limitation 1.d
Limitation 14.f	Limitation 1,f
Limitation 14.g	Limitation 1.g

Below we address the differences between claims 1 and 14 discussed in the Petition.

a) Claim Limitation 14.e

Claim limitation 14.e recites “the inner surface of the glass lamp tube is covered by a reflective layer and a rough layer, the roughness of the rough layer is higher than that of an outer surface of the glass lamp tube.” Pet. viii. Petitioner cites its discussion of claim limitation 1.a concerning sanding layer 12 of Jing. Pet. 52. Petitioner also references its discussion of claim limitation 1.e and claim 2 as demonstrating Jing discloses a reflective layer on an inner portion of the glass tube. *Id.*

Patent Owner does not respond to Petitioner’s assertions concerning claim limitation 14.e. We are persuaded for purposes of this Decision that Petitioner has cited sufficient evidence to demonstrate that a person of ordinary skill would have been motivated to combine the teachings of Jing and Huang and that in combination, they teach the features recited in limitation 14.e.

b) Claim 14 Conclusion

In view of the foregoing we are persuaded that, for purposes of this Decision to Institute, Petitioner has demonstrated that a person of ordinary skill would have had reason to combine the teachings of Jing and Huang and that in combination these references teach all of the limitations recited in claim 14.

8. Claims 3, 9, and 15

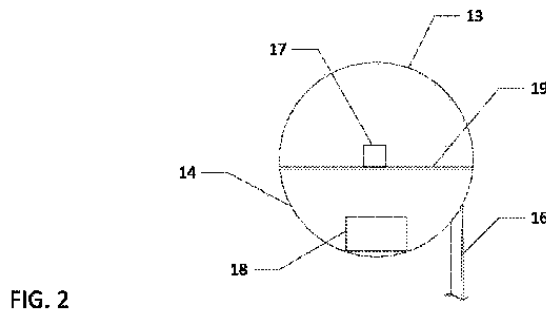
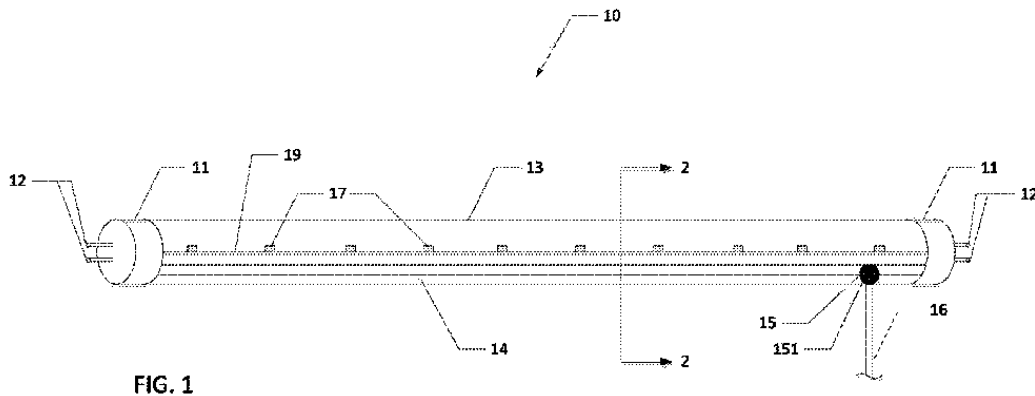
Claims 3, 9, and 15 depend from claims 2, 8, and 14, respectively, and recite “a portion of the inner surface of the glass lamp tube not covered by the reflective film is covered by the rough surface.” Petitioner notes that Jing discloses frosted layer 12 and a reflective film, i.e. inner reflective film layer 4, and states that on the inner wall, the area without reflective film layer 4 can be a frosted layer. Pet. 47 (citing Exhibit 1002 ¶¶ 13, 35).

Patent Owner does not respond to Petitioner’s assertions concerning claims 3, 9, and 15. We are persuaded for purposes of this Decision that Petitioner has cited sufficient evidence to demonstrate that a person of ordinary skill would have been motivated to combine the teachings of Jing and Huang and that in combination, they teach the features recited in claims 3, 9, and 15.

C. Petitioner's Contention That Claims 1–3, 8, 9, 14, and 15 Are Obvious Over Jing and Halliwell

1. *Halliwell (Ex. 1008)*

Halliwell discloses an LED lamp tube configured to replace a fluorescent lamp tube. Ex. 1008, 1:60–62. Figures 1 and 2 of Halliwell are reproduced below.⁹



Id. Figs. 1, 2. Figure 1 is side view and is shown above the cross-sectional view of Figure 2. The body of Halliwell's LED lamp tube 10 includes lens 13, back cover 14, and at least one end cap 11, that enclose electrical circuitry and LEDs 17 within an internally defined cavity. *Id.* at 4:60–5:3. In some embodiments, end caps 11 are secured by screws to reflective plate 19 via screws or some other securing mechanism. *Id.* at 8:54–60. Back cover 14

⁹ The contrast in the Figures has been enhanced to improve readability over published Figures 1 and 2 of Halliwell.

may dissipate waste heat emitted by LEDs 17 and/or driver circuitry 18. *See id.* at 7:47–60. Driver circuitry 18 may include circuitry to convert AC voltage to DC voltage to be applied to the LEDs and is disposed within the body of LED lamp tube 10. *See, id.* at 12:11–29. Driver circuit 18 may be disposed in the chamber between back cover 14 and reflective plate 19, mounted on reflective plate 19, or mounted in an end cap 11. *Id.* at 12:30–40. Components of driver circuitry 18 may also be mounted on back cover 14. *Id.* at 12:39–40. Driver circuitry 18 can be located near passage 15 that connecting wires 16 can pass through. *Id.* at 12:40–45.

2. *Motivation to Combine Teachings of Jing and Halliwell and claim limitation 1(g)*

As Petitioner’s basis for combining the teachings of Jing and Halliwell and the subject matter recited in claim limitation 1.(g)¹⁰ are closely related we discuss them together in the following analysis.

Noting that Jing documents heat resistance as a problem for LED lamps, Petitioner contends that a person of ordinary skill would have looked to Halliwell’s LED lamp as disclosing a more efficient method of dissipating heat. Pet. 56–57. Petitioner cites Halliwell’s teaching of extending reflective back plate 19 into end caps 11. *Id.* at 53–56 (citing Ex. 1008, Figs. 7–9, 16, 17, 12:11–66, 13:25–33, 13:44–61). Petitioner further notes that Halliwell discloses an internal component of an LED lamp, i.e., back cover 14, can be configured to dissipate heat more efficiently. *Id.* at 57 (citing Ex. 1008, 7:45–60; Ex. 1004, Lebbby Decl. ¶ 158). Based on Halliwell’s disclosure, Petitioner contends that a person of ordinary skill

¹⁰ Limitation 1.g and corresponding independent claim limitations 8.j and 14.g recite that the length of the light strip exceeds the length of the main body region of the glass lamp tube.

would have understood that increasing the length of Jing's circuit board 2 would result in additional surface area, permitting components to be placed further apart, thereby enhancing heat dissipation. *Id.* at 57–58 (citing Ex. 1004, Lebby Decl. ¶ 159).

Patent Owner argues that Petitioner fails to demonstrate a person of ordinary skill would have had reason to combine the teachings of Jing and Halliwell. Prelim. Resp. 14–21. At this stage, we are preliminarily persuaded by Patent Owner's argument. Patent Owner observes that Jing's disclosure of mounting the flexible circuit board to the inner portion of the tube with thermally conductive adhesive already address the heat dissipation problem. *Id.* at 15. As Patent Owner also emphasizes, Petitioner does not argue a person of ordinary skill would have been motivated to modify Jing's LED lamp to include Halliwell's heat dissipating back cover 14. *Id.* at 14. We also note that neither Jing nor Halliwell discusses spacing components in such a way as to reduce heat dissipation, as suggested by Petitioner. As Patent Owner points out, Petitioner does not address whether a person of ordinary skill would be discouraged from increasing the spacing between LEDs because of the effect on light distribution. *Id.* at 14–15. Patent Owner also notes that Halliwell is silent about lengthening reflective back plate 19 and does not address doing so to achieve improved heat dissipation or any of the other benefits Petitioner discusses. *Id.* at 14. At this stage, we determine these arguments have merit, and consequently, we preliminarily agree with Patent Owner that Petitioner has not demonstrated sufficiently that a person of ordinary skill would have had reason to combine the teachings of Jing and Halliwell to address heat dissipation.

Even if we agreed with Petitioner concerning the reasons to combine the teachings of Jing and Halliwell, in a related argument, Patent Owner

contends that Halliwell does not disclose lengthening reflective back plate 19 beyond the length of the glass tube, as recited in claim limitation 1.g, 8.j, and 14.g, and that Petitioner does not argue that it does. *Id.* at 16 (citing Pet. 54–56). Noting that Halliwell discloses the tube formed by lens 13 (and optionally back cover 14) that surrounds the backplate also extends into end caps 11, Patent Owner states that Halliwell explains the diameter of the end cap is configured to fit over the tube. *Id.* (citing Ex. 1008, 8:25–52). Patent Owner emphasizes the figures of Halliwell that Petitioner cites show end caps with a step profile, and none of the figures actually shows reflective plate 19 extending into the smaller-diameter portion of the end caps that would not surround the end of the tube. *Id.* As Patent Owner points out, because Halliwell discloses both reflective back plane and the tube extending into the end caps, Petitioner has not demonstrated a person of ordinary skill would have understood the references to teach that reflective back plate 19 is longer than the main body region of the tube lamp. *Id.* at 19–21. At this stage, we are preliminarily persuaded by Patent Owner’s argument; however, we invite the parties to address this issue at trial.

3. *Conclusion*

In view of the foregoing, at this stage we are not persuaded that Petitioner has sufficiently demonstrated that a person of ordinary skill would have had reason to combine the teachings of Jing and Halliwell as proposed by Petitioner. We further are not persuaded that, even if the teachings of the references were combined, that Petitioner has demonstrated that in combination they teach independent claim limitations 1.g, 8.j, and 14.g. In view of our determination, we do not address Petitioner’s arguments concerning dependent claims under this ground. We are also not persuaded that Petitioner has shown any of the references (Foo, Zhao, and Deng) cited

in Petitioner's other Halliwell based grounds (grounds 4, 6, 8, 10) provide sufficient reasons to combine the teachings of Jing and Halliwell or provide the disclosure lacking in the combination of Jing and Halliwell.

D. Petitioner's Contention That Claim 4 Is Obvious Over Jing, Huang and Foo

Claim 4 depends from claim 3 and recites that "the roughness of the rough surface ranges from 0.1 to 40 μm ." Petitioner cites Foo as disclosing an LED light tube that includes a casing, a plurality of light sources and two end caps. Pet. 71 (citing Ex. 1005 6:10–22). Petitioner further cites Foo as disclosing that an inner surface of the casing may be constructed to have a roughness smaller than 0.8 μm to enhance the reflectance of the light. *Id.* (citing Ex. 1005, 10:18–20). Petitioner asserts that a person of ordinary skill would have understood incorporating Foo's material with specific roughness characteristics into Jing and Huang is an application of a known technology. *Id.* at 70–71.

Patent Owner does not respond to Petitioner's assertions concerning claim 4. We are persuaded for purposes of this Decision that Petitioner has cited sufficient evidence to demonstrate that a person of ordinary skill would have been motivated to combine the teachings of Jing, Huang and Foo and that in combination, they teach the features recited in claim 4.

E. Petitioner's Contention That Claims 10 And 16 Are Obvious Over Jing, Huang, and Zhao

Claim 10 depends from claim 9, which depends from claim 8. Claim 16 depends from claim 15, which depends from claim 14. Claims 10 and 16 recite the following subject matter (i) a portion of the inner surface of the glass lamp tube not covered by the reflective film is covered by the rough surface and (ii) the glass lamp tube and the two end caps are secured by a

gel, and the gel is disposed between an inner surface of each of the two end caps and an outer surface of each of the two rear end regions.

Petitioner cites Zhao as disclosing an LED lamp in which both ends of the lamp tube body are enclosed with end caps using adhesive. Pet. 72 (citing Ex. 1007, 6:36–42, 8:42–50). Noting that Huang discloses securing components with to a glass tube with glue, Petitioner contends that a person of ordinary skill would have recognized the importance of securing components reliably, would have been familiar with using glue to secure components to the glass tube and reasonably would have expected securing the end caps of Jing and Huang with an adhesive gel, as taught by Zhao, would have been a successful and cost effective approach. *Id.* at 72–76.

Patent Owner does not respond to Petitioner’s assertions concerning claims 10 and 16. We are persuaded for purposes of this Decision that Petitioner has cited sufficient evidence to demonstrate that a person of ordinary skill would have been motivated to combine the teachings of Jing, Huang and Zhao and that in combination, they teach the features recited in claims 10 and 16.

F. Petitioner’s Contentions That (i) Claims 5 and 6 Are Obvious Over Jing, Huang, Foo and Deng (ii) Claims 11, 12, 17, and 18 Obvious Over Jing, Huang, Zhao and Deng

Claim 5 depends from claim 4 and further recites “each of the two end caps comprises an insulating end wall, two conductive pins and at least one opening, the insulating end wall is substantially perpendicular to an axial direction of the glass lamp tube, and the two conductive pins and the opening are arranged on the insulating end wall.” Claims 11 and 17 depend from claims 10 and 16 and further recite subject matter similar to that recited in claim 5.

Claim 6 depends from claim 5 and recites that “each of the two end caps sleeves with a respective rear end region, and wherein an outer diameter of each of the end cap is substantially the same as the outer diameter of the main body region.” Claims 12 and 17 depend from claims 10 and 16, respectively and recite subject matter similar to that recited in claim 6.

Petitioner cites Deng as disclosing an LED tube with end covers made of insulating material to prevent electric leakage. Pet. 78 (citing Ex. 1006 ¶ 36). Petitioner also cites Deng’s disclosure that copper pins arranged on the end faces of the end covers connect to external power and run through the end covers to connect with a driver in the tube body. *Id.* Petitioner also cites Deng as disclosing multiple air vents in each end cap that would provide heat dissipation over and above that achieved by Jing and Huang’s extended length. *Id.* at 79–80. Petitioner asserts that a person of ordinary skill would have had understood that venting for air flow is a well-known and straightforward technique to improve heat dissipation. Petitioner further notes that a person of ordinary skill would have understood that, when used in place of metal end caps, plastic end caps reduce manufacturing costs and reduce the overall all resistance of the end tube to electrical leakage. *Id.* at 80–81 (citing Ex. 1004 ¶ 199; Ex. 1006 ¶¶ 15, 36).

As to claim 5, Petitioner notes that Deng’s end faces of the end covers are substantially perpendicular to the axial direction of the hollow tube body and that the pins and air vents are arranged on the end faces of the covers. *Id.* at 83 (citing Ex. 1006 ¶ 37, Fig. 1; Ex. 1004, Lebbby Decl. ¶ 203).

As to claim 6, Petitioner notes that Deng discloses end covers that cover the ends of the tube body, have cross sections that match the cross section of the tube body, and an inner diameter that is close to the outer

diameter of the tube body. *Id.* at 84–85 (citing Ex. 1006 ¶ 27; Ex. 1004, Lebbby Decl. ¶ 206).

Patent Owner does not respond to Petitioner’s assertions concerning claims 5, 6, 11, 12, 17 and 18. As to claims 5 and 6, we are persuaded for purposes of this Decision that Petitioner has cited sufficient evidence to demonstrate that a person of ordinary skill would have been motivated to combine the teachings of Deng with those of Jing, Huang, Foo, and, in combination, the references teach the features recited in claims 5 and 6. As to claims, 11, 12, 17 and 18, we are persuaded that Petitioner has cited sufficient evidence to demonstrate that a person of ordinary skill would have been motivated to combine the teachings of Deng with those of Jing, Huang, Zhao, and that in combination the references teach the features recited in claims 11, 12, 17, and 18.

XI. CONCLUSION

For the reasons discussed above, we are persuaded that Petitioner has demonstrated a reasonable likelihood that it will succeed on its challenges to claim the following challenges to patentability:

Claims 1–3, 8, 9, 14, and 15 as obvious over Jing and Huang;

Claim 4 as obvious over Jing, Hunag, and Foo

Claims 10 and 16 as obvious over Jing, Huang, and Zhao

Claims 5 and 6 as obvious over Jing, Huang, Foo, and Deng; and

Claims 11, 12, 17, and 18 as obvious over Jing, Huang, Zhao and Deng.

The factual findings and conclusions of law in this Decision are preliminary and based on the current record. They are made for the sole purpose of determining whether Petitioner meets the threshold for initiating review. Our final decision as to the patentability of challenged claims will

be based on the full record developed during trial, including any response timely filed by Patent Owner. Any arguments not raised by Patent Owner in such a response may be deemed waived.

XII. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314(a) an *inter partes* review of the '397 patent is hereby instituted, commencing on the entry date of this Order, and pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial;

FURTHER ORDERED that the trial is authorized on all grounds set forth in the Petition; and

FURTHER ORDERED that the trial will be conducted in accordance with a corresponding separately issued Scheduling Order.

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Patent 10,830,397 B2

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