

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

EVAPCO DRY COOLING, INC.,
Petitioner,

v.

SPG DRY COOLING USA LLC,
Patent Owner.

IPR2021-00809
Patent 9,551,532 B2

Before NEIL T. POWELL, GEORGE R. HOSKINS, and
SEAN P. O'HANLON, *Administrative Patent Judges*.

HOSKINS, *Administrative Patent Judge*.

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

I. INTRODUCTION

Evapco Dry Cooling, Inc. (“Petitioner”) filed a Petition (Paper 2, “Pet.”) pursuant to 35 U.S.C. §§ 311–319 to institute an *inter partes* review of all eleven claims of U.S. Patent No. 9,551,532 B2 (“the ’532 patent”).

SPG Dry Cooling USA LLC (“Patent Owner”) filed a Preliminary Response (Paper 6, “Prelim. Resp.”) opposing institution of review. Patent Owner asserts in part that the Petition rehashes positions taken by the Examiner during prosecution of the ’532 patent, which were overcome by the applicant, thereby meriting denial under 35 U.S.C. § 325(d).

We authorized additional briefing to address Patent Owner’s § 325(d) argument. *See* Ex. 1021. Accordingly, Petitioner filed a Preliminary Reply (Paper 7, “Reply”) to the Preliminary Response, and Patent Owner filed a Preliminary Sur-reply (Paper 8, “Sur-reply”) to the Reply.

Institution of *inter partes* review requires Petitioner to demonstrate a reasonable likelihood that Petitioner would prevail with respect to at least one challenged claim. *See* 35 U.S.C. § 314(a). For reasons provided below, we conclude on behalf of the Director (37 C.F.R. § 42.4(a)) that Petitioner has not done that here. We, therefore, deny institution of review on the merits, and we do not reach the § 325(d) issues presented by Patent Owner.

II. BACKGROUND

A. *Real Parties in Interest and Related Matters*

Petitioner identifies itself and Evapco, Inc. as the real parties in interest for Petitioner. Pet. 106. Patent Owner identifies itself as the sole real party in interest for Patent Owner. Paper 3, 2.

The parties identify *SPG Dry Cooling USA LLC v. Evapco Dry Cooling, Inc.*, Case No. 3:20-cv-20131 (D.N.J.), as related to the '532 patent. See Pet. 106; Paper 3, 2.

The parties also identify two earlier-filed IPR proceedings as related to the present proceeding. See Pet. 106–07; Paper 3, 2. They are IPR2021-00687 and IPR2021-00688, challenging two patents that issued as continuations of the '532 patent.

B. The '532 Patent

The '532 patent discloses “a mechanical draft cooling tower that utilizes air cooled condenser modules.” Ex. 1001, 1:4–7. Figures 1 and 4 illustrate one condenser module, and are reproduced below.

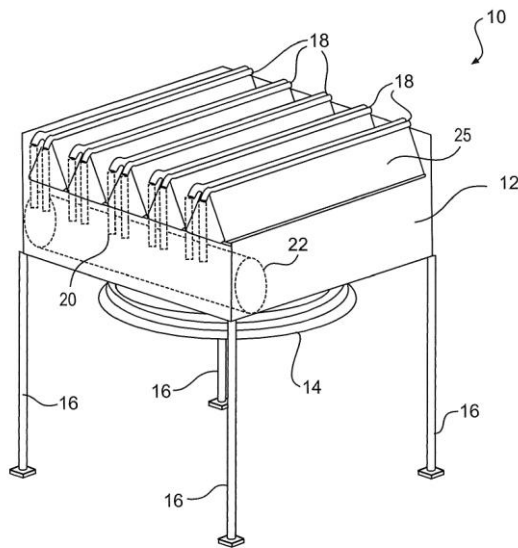


FIG. 1

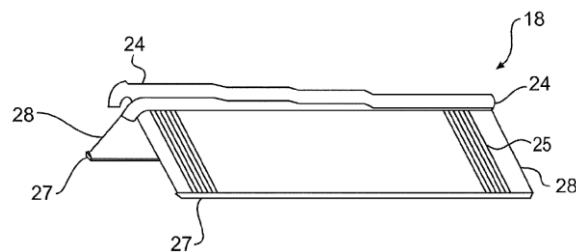


FIG. 4

Exhibit 1001 — The '532 Patent, Figures 1 and 4.

Figure 1 is a perspective view of air cooled condenser module 10 including five A-type geometry deltas 18, and Figure 4 is a perspective view of one delta 18. *Id.* at 3:59–61, 4:1–3, 4:29–36. Each delta 18 comprises two tube bundle assemblies 28, with each assembly 28 including a series of finned

tubes 25 extending between a steam manifold 24 at the top and a condensate header 27 at the bottom. *Id.* at 4:36–38, 4:50–5:1. Module 10 also includes a fan disposed within shroud 14. *Id.* at 4:30–33.

Steam to be condensed within deltas 18 flows in through main steam duct 22 and risers 20 to enter steam manifolds 24. *Id.* at 4:40–49. The fan blows air across deltas 18 to cool the steam as it passes through tubes 25 and thereby becomes condensate (i.e., water). *Id.* at 4:30–38, 4:50–53, 5:7–13, 5:30–40. Although not shown in the '532 patent, the condensate is then conveyed from condensate headers 27 to another location where it is heated by an industrial process to become steam, and the steam is then conveyed back to module 10 to be condensed again to water, in a recirculating fashion.¹ *See id.* at 1:16–22, 2:4–15.

C. The Claims of the '532 Patent

The '532 patent contains eleven claims. Ex. 1001, 6:46–8:50.

Claim 1 recites, with our emphases added:

1. *A method for assembling a modular air cooled condenser extending along a vertical axis away from horizontal, comprising:*
assembling a first condenser bundle having a first set of tubes having first and second ends, a steam manifold connected to the first ends of the tubes, and a condensate header connected to the second ends of the tubes, wherein the first condenser bundle includes a length and a width and a longitudinal axis running along the length of the first condenser bundle, the length of the first condenser bundle being about six times longer than the width of the first condenser bundle, the steam

¹ Other evidence of record contains pictures of real-world air cooled condensers with A-type geometry deltas, which reflect the size of these modules in actual use. *See, e.g.*, Ex. 1013, 31 (Fig. 1.2.7), 33 (Fig. 1.2.10).

manifold extending the length of the first condenser bundle along a first side, the condensate header extending the length of the first condenser bundle along a second side, each tube of the first set of tubes extending perpendicularly across the longitudinal axis of the first condenser bundle and straight from the steam manifold to the condensate header;

assembling a second condenser bundle having a second set of tubes having first and second ends, a steam manifold connected to the first ends of the tubes, and a condensate header connected to the second ends of the tubes;

placing the first and second condenser bundles in to a container;

transporting the container to a location upon which the modular air cooled condenser will be assembled;

assembling a heat exchange delta by using^[2] the first condenser bundle and the second condenser bundle; and

positioning the heat exchange delta on a modular tower frame.

Id. at 6:47–7:12. Claims 2–10 each depend directly or indirectly from claim 1. *Id.* at 7:13–8:14.

Claim 11 is an independent claim, and recites similar subject matter to claim 1, with a few important differences discussed below. *Id.* at 8:15–49.

D. Prior Art and Asserted Grounds of Unpatentability

Petitioner relies on the following seven prior art references. *See* Pet. 1–2.

² Claim 1 of the '532 patent was amended via a Certificate of Correction to delete the term “placing” between “delta by” and “using.” *See* Ex. 1001, pg. 12. Claims 8 and 11 were amended similarly. *See id.*

Name	Reference	Date	Exhibit
Elder	US 2,401,918	June 11, 1946	1005
Schulenberg	US 3,073,575	Jan. 15, 1963	1004
Schaefer	US 2005/0167093 A1	Aug. 4, 2005	1006
Schabosky	US 2009/0178279 A1	July 16, 2009	1010
Nobel	US 2010/0263840 A1	Oct. 21, 2010	1007
O’Kane	CA 2,444,475	Feb. 16, 2010	1009
Kröger	Detlev G. Kröger, <i>Air-Cooled Heat Exchangers and Cooling Towers: Thermal-Flow Performance Evaluation and Design</i> , Vol. 1 (PennWell Corp. ©2004)	2004	1013

Petitioner contends each reference qualifies as prior art to the ’532 patent under 35 U.S.C. § 102(b). See Pet. 1–2. The Preliminary Response does not dispute this contention.

Petitioner asserts the following seven grounds of unpatentability. See Pet. 1.

Ground	Claim(s) Challenged	35 U.S.C. §	References
1A	1–7	103(a) ³	Elder, Schabosky, O’Kane

³ The application resulting in the ’532 patent was filed prior to the effective date of the amendments to 35 U.S.C. § 103 in the Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112–29, 125 Stat. 284 (2011). Thus, we refer to the pre-AIA version of section 103.

Ground	Claim(s) Challenged	35 U.S.C. §	References
1B	8–10	103(a)	Elder, Schulenberg, Schabosky, O’Kane
2A	1–7	103(a)	Elder, Nobel, Schabosky, O’Kane
2B	8–10	103(a)	Elder, Nobel, Schulenberg, Schabosky, O’Kane
3	1–11	103(a)	Schulenberg, Schaefer, Schabosky, O’Kane
4	1–11	103(a)	Schulenberg, Nobel, Schaefer, Schabosky, O’Kane
5	11	103(a)	Nobel, Kröger, Schabosky, O’Kane

E. Testimonial Evidence

Petitioner relies on the declaration testimony of Anthony M. Jacobi, Ph.D. (Exhibit 1003). The Preliminary Response does not rely on opposing witness testimony.

III. PETITIONER’S GROUNDS OF UNPATENTABILITY

A. Law of Obviousness

A patent claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406

(2007). 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, if made available in the record.⁴ *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. Level of Ordinary Skill in the Art

The level of ordinary skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). The person of ordinary skill in the art is a hypothetical person presumed to have known the relevant art at the time of the invention. *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). In determining the level of ordinary skill in the art, we may consider certain factors, including the “type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” *Id.* (internal quotation marks and citation omitted).

Petitioner contends a person having ordinary skill in the art pertaining to the ’532 patent at the time of the invention (“POSITA”) “would have had at least a Bachelor’s degree in an academic area emphasizing chemical engineering, mechanical engineering, or a similar discipline, and at least two years of experience in the field working with heat exchangers.” Pet. 4 (citing Ex. 1003 ¶¶ 12–13).

⁴ The parties have not directed us to any such objective evidence.

Patent Owner does not contest Petitioner's proposed definition or offer one of its own. *See generally* Prelim. Resp.

We find Petitioner's description to be consistent with the problems and solutions disclosed in the '532 patent and the prior art of record, and adopt it as our own for purposes of this Decision. *See, e.g., GPAC*, 57 F.3d at 1579 (approving the determination of the level of ordinary skill in the art by appeal to the references of record).

C. Claim Construction

We interpret the claims of the '532 patent "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). This "includ[es] construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent." *Id.*

The present record raises two claim construction issues.

1. *Whether the '532 Patent Claims Are Product-By-Process Claims*

The Petition initially states "no express constructions are required to institute review and find [claims 1–11] unpatentable." Pet. 4. However, the Petition later states claims 1–11 "may be treated as product-by-process claims whose scope should not be limited to particular manipulations of the recited steps but rather by the final end product." *Id.* at 9 (citing *In re Thorpe*, 777 F.2d 695, 698 (Fed. Cir. 1985)). Petitioner does not offer any analysis in support of this claim construction position. *See id.*

Patent Owner argues in opposition that claims 1–11 are not product-by-process claims, as is demonstrated by the prosecution history of

the '532 patent. See Prelim. Resp. 14–15 & n.5 (citing Ex. 1002, 89, 125–26, 234, 259).

We agree with Patent Owner. First, the claims are directed to “[a] method for assembling a modular air cooled condenser,” which is a process, not a product. Ex. 1001, 6:47–49 (claim 1), 8:16–18 (claim 11) (emphasis added); see also *id.* at 7:13–8:15 (claims 2–10 are each directed to “[t]he method according to” a prior claim). The bodies of independent claims 1 and 11 are both organized into several clauses, each of which begins by specifying an action that must be taken as part of the claimed process. Specifically, these claims recite “assembling” first and second condenser bundles; “placing” the bundles into a container; “transporting the container”; “assembling a heat exchange delta”; and “positioning the heat exchange delta.” Ex. 1001, 6:47–7:12, 8:15–49. Therefore, the plain language of the claims is directed to a process for assembling a condenser product, not to the condenser product that results from the process.

This plain claim language distinguishes the '532 patent claims from the *Thorpe* decision cited by Petitioner. In *Thorpe*, the claim at issue recited: “*The product of the process of*” a parent *process* claim. *Thorpe*, 777 F.2d at 696 (emphasis added). Thus, the rationale behind the *Thorpe* decision that “[t]he patentability of a product does not depend on its method of production” does not apply here. *Id.* at 697 (emphasis added, citations omitted).

This understanding of the claims is supported by the '532 patent specification. It discusses how prior art condenser towers were “typically very labor intensive in their assembly at the job site” and “therefore [could] be costly.” Ex. 1001, 1:61–67. One of the aims of the '532 patent's

invention, therefore, was to increase efficiency by assembling portions of the condenser tower “at the manufacturing plant or facility, prior to shipping it to the installation site.” *Id.* at 1:67–2:3, 2:9–19; *see also id.* at 5:41–6:31 (describing how Figures 5 and 6 illustrate a method of assembling a condenser tower providing “a high ‘pre-fabrication’ level which equates to reduced installation cost and reduced installation time”). Thus, the ’532 patent underscores the importance of how condenser towers may be advantageously assembled partially at a manufacturing plant or facility, and then shipped to the installation site, which is the kind of process recited in claims 1–11.

Finally, the prosecution history of the ’532 patent also supports this construction. Claim 1 of the application that issued as claim 1 in the ’532 patent is representative. As originally filed, claim 1 included the plain language discussed above: “A method for assembling a modular air cooled condenser” comprising the steps of “assembling” first and second condenser bundles, “placing” the bundles into a container, “transporting the container,” “assembling a heat exchange delta,” and “positioning the heat exchange delta.” Ex. 1002, 18.

The Examiner initially took the position that claim 1 was a product-by-process claim, so the Examiner’s burden was limited to showing the prior art included a product that was substantially identical to the claimed product, without regard to the recited method steps. *See id.* at 89, 125–26, 130–31 (citing *Thorpe* and MPEP § 2113). The applicant disagreed, and argued claim 1 was a “process” claim “and not [a] product by process” claim, and eventually filed an appeal to the Board that relied in part on this argument. *Id.* at 113, 234.

In response to the appeal brief, the Examiner allowed the claims. *See id.* at 258. The allowance did not expressly address the product-by-process claim construction issue. However, the Examiner provided the following statement of reasons for allowance: “The prior art . . . does not show *a method of assembling* a modular air cooled condenser, *assembling* two condenser bundles, *placing* said bundles in a container, *transporting* said container, *then assembling* a heat exchange delta with the two condenser bundles and *then placing* said delta on a modular tower frame.” *Id.* at 259 (emphases added). Further: “The closest prior art of record . . . teaches a modular air cooled condenser but *fails to teach the specific method of assembling*” and “fails to [either] anticipate [or] render obvious *the applicants’ invention.*” *Id.* (emphases added). Thus, the reasons for allowance indicate the Examiner ultimately concluded claim 1 is a process claim, not a product-by-process claim, and the prior art of record failed to anticipate or render obvious the claimed process.⁵

For the foregoing reasons, we conclude claims 1–11 of the ’532 patent are process claims, not product-by-process claims. Therefore, Petitioner’s “[a]lternative[.]” theory of obviousness (Pet. 9) relies on an overly broad claim construction. As part of supporting the asserted unpatentability of claims 1–11, Petitioner bears the burden to establish that the claimed process steps are either disclosed by the prior art, or rendered obvious to a POSITA in light of the prior art.

⁵ This understanding is bolstered by the contemporaneous cancellation of claims 18–20, which were directed to a “condenser,” rather than a “method for assembling” a condenser as in the allowed claims. *See* Ex. 1002, 22–23 (claims 18–20), 55 (restriction requirement), 259 (Examiner’s Amendment cancelling claims 18–20).

2. *Assembling Condenser Bundles Before Placing Them into a Container and Transporting the Container*

a. *Claims 1–10*

Patent Owner contends claim 1 requires the first and second condenser bundles to be “pre-assembled”—that is, assembled to have the respective ends of the tubes connected to the steam manifold and to the condensate header *before* the condenser bundles are placed into the container and transported. *See, e.g.*, Prelim. Resp. 2 (arguing “Schabosky **does not** pre-assemble the bundles to have a steam manifold” and instead “Schabosky explicitly discloses the opposite: connecting at least the steam manifold to the tube bundle **after** transport” (emphases by Patent Owner)); *id.* at 2–3 (arguing claim 1 requires a “pre-assembled condenser bundle [having] a connected steam manifold [and] condensate header prior to transporting that bundle in a container”); *id.* at 22 (contending “the plain claim language” requires “‘condenser bundles’ are assembled to have attached steam manifolds 24 and condensate headers 27, and then placed in a transport container 30”).

We agree with Patent Owner’s construction of claim 1. It is, first, supported by the plain language of the claim. Claim 1 recites: “assembling a first condenser bundle having a first set of tubes having first and second ends, a steam manifold connected to the first ends of the tubes, and a condensate header connected to the second ends of the tubes.” Ex. 1001, 6:50–53. The second condenser bundle is assembled in the same fashion.

See id. at 6:66–7:3.⁶ Thus, claim 1 defines the term “condenser bundle” as having tubes connected to a steam manifold and a condensate header; there is no “condenser bundle” until at least those three components are connected (i.e., bundled) together as specified in the claim. Claim 1 then requires “placing *the first and second condenser bundles* in to a container” and “transporting the container to a location upon which the modular air cooled condenser will be assembled.” *Id.* at 7:4–7 (emphasis added). Thus, claim 1 requires the condenser bundles to be assembled before being placed into a container for transport.

This understanding of the claim language is supported by the ’532 patent specification. The ’532 patent indicates one “drawback to the current air cooled condenser towers is that they are typically very labor intensive in their assembly at the job site . . . requiring a large amount of time and therefore can be costly.” Ex. 1001, 1:61–67. One aim of the ’532 patent, therefore, was to provide a “more efficient” assembly process including “assembl[ing] as much of the tower structure at the manufacturing plant or facility, prior to shipping it to the installation site.” *Id.* at 1:67–2:19. The specification identifies the invention of claim 1 as providing one such assembly process. *Id.* at 2:26–43.

As one example, when describing Figure 4 (reproduced above), the ’532 patent states: “Each of the bundle assemblies 28 are *assembled prior to shipping* wherein *each comprises* a riser to header transition piece 26, steam

⁶ Claim 1 as originally filed in the application that issued as the ’532 patent recited assembling the first and second condenser bundles in an identical fashion. *See* Ex. 1002, 18. The applicant later amended the first condenser bundle assembly step to include additional requirements, in an attempt to overcome a rejection. *See id.* at 108–09, 113–14.

manifold 24, finned tubes 25, and steam condensate headers 27.” *Id.* at 4:65–5:1 (emphasis added). This is illustrated in Figure 5 of the ’532 patent, which is reproduced below.

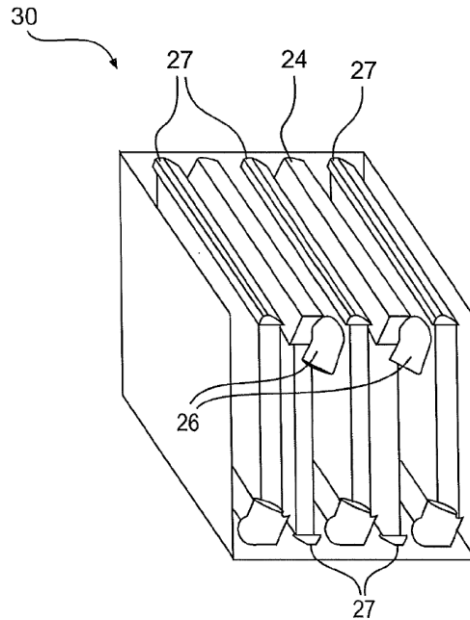


FIG. 5

Exhibit 1001 — The ’532 Patent, Figure 5.

Figure 5 illustrates five condenser bundles 28, each including several tubes that inter-connect a steam manifold 24 and a steam condensate header 27, placed into transport container 30 “for shipping,” that is, “to transport the bundles 28, from the factory to the job site.” *Id.* at 4:4–6, 5:41–50.

Also, Figure 6 of the ’532 patent is a flow chart illustrating one method of assembling an air cooled condenser. *Id.* at 4:7–9, 5:64–66. Figure 6 is reproduced below.

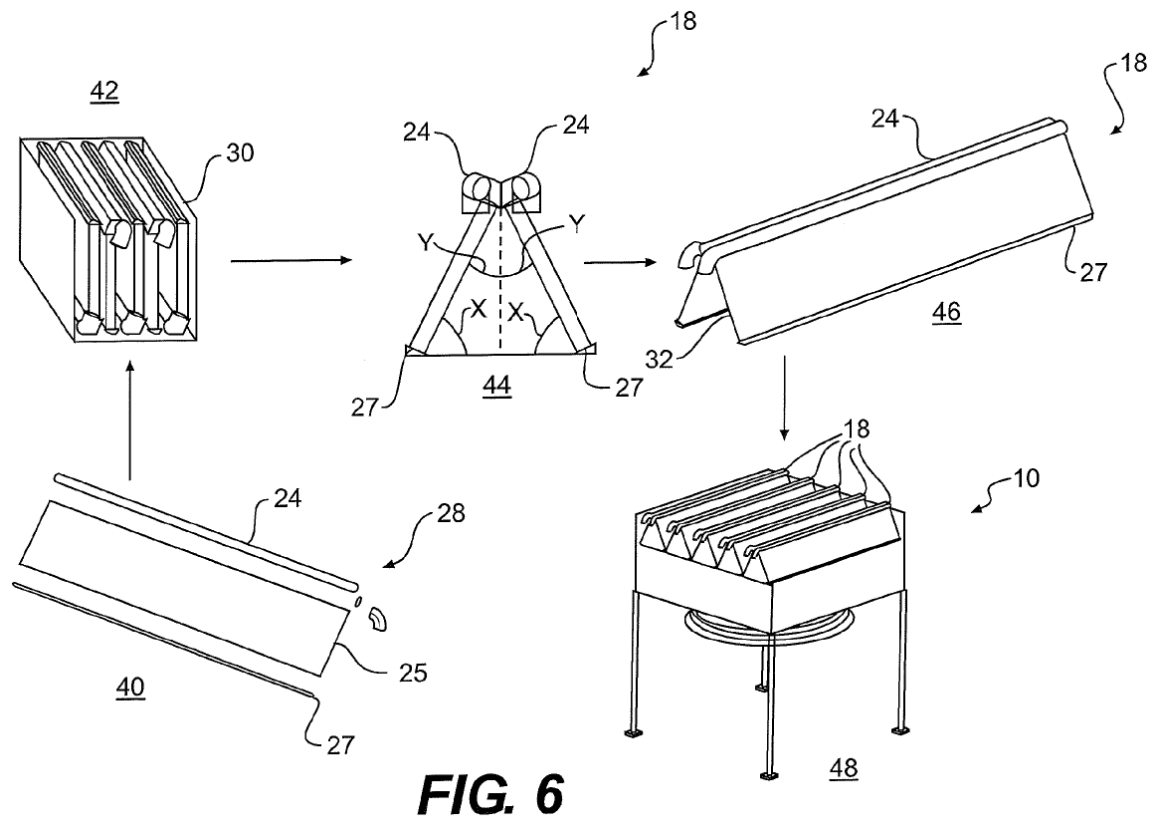


Exhibit 1001 — The '532 Patent, Figure 6.

Figure 6 illustrates how “individual tube bundles 28 are *assembled prior to shipment to the job site*, as referenced by numeral 40.” *Id.* at 5:66–6:1 (emphasis added). In particular, “[e]ach individual bundle assembly 28 includes a plurality of finned tubes 25 along with a steam manifold 24 and steam condensate header 27,” and the assemblies 28 “are pre-manufactured at the factory prior to placing the individual bundle assemblies 28 in the shipping container 30 as identified by numeral 42” prior to transporting container 30 “to the erection field site.” *Id.* at 6:1–9. This provides “a high ‘pre-fabrication’ level which equates to reduced installation cost and reduced installation time.” *Id.* at 6:28–29.

We acknowledge that the '532 patent also states: “The progression of processing steps described is an example; however, the sequence of steps is

not limited to that set forth herein and may be changed as is known in the art, with the exception of steps necessarily occurring in a certain order.” *Id.* at 4:24–28. However, this generic disclosure as to the progressive ordering of steps cannot overcome the plain language of claim 1, and the repeated and specific discussion of the importance of assembling the tubes, the steam manifold, and the condensate header into condenser bundles *prior to* placing the condenser bundles into a container for transport, as discussed above.

Finally, in the statement of reasons for allowance of the ’532 patent during prosecution, the Examiner appears to have applied the same construction of claim 1 that we apply here. *See* Ex. 1002, 259 (referring to “the combination set forth in the independent claims” as including “a method of assembling a modular air cooled condenser, *assembling two condenser bundles*, placing *said bundles* in a container, transporting said container . . . ” (emphases added)).

Petitioner does not express a clear position as to the meaning of claim 1 in this regard. *See, e.g.*, Pet. 4 (stating “no express constructions are required to institute review and find [claim 1] unpatentable”). Petitioner states Schabosky discloses “pre-manufactured pipe bundles 2, 3, (*i.e.*, condenser bundles).” *Id.* at 5–6, 7. To the extent Petitioner contends here that the “condenser bundles” of claim 1 can be satisfied by a set of tubes, without those tubes being connected to a steam manifold and a condensate header, Petitioner’s contention is not supported by the claim language and other intrinsic evidence.

Thus, in light of the foregoing, we construe claim 1 to require that the two condenser bundles are assembled to include tubes connected at one end to a steam manifold, and connected at the other end to a condensate header,

before the condenser bundles are placed into a container for transport. Claims 2–10 contain the same requirement because they each depend directly or indirectly from claim 1. We will refer to this requirement as “the condenser bundle preassembly limitation.”

b. Claim 11

Patent Owner contends claim 11 should be construed in the same fashion as claim 1, discussed above. *See, e.g.*, Prelim. Resp. 1–3 (discussing the scope of “all claims” without differentiating between claim 1 and claim 11); *id.* at 22, 26, 28 (discussing the scope of “[t]he claims” and discussing claim 1 as representative). For the following reasons, we agree in part, and we disagree in part.

Claim 11 pertinently recites:

11. A method for assembling a modular air cooled condenser extending along a vertical axis away from horizontal, comprising:
 - assembling a first condenser bundle having a first set of tubes having first and second ends and a condensate header connected to the second end of the tubes;
 - assembling a second condenser bundle having a second set of tubes having first and second ends, and a condensate header connected to the second end of the tubes;
 - attaching a steam manifold to the first ends of the . . . first and second sets of tubes, wherein the steam manifold provides steam to the first condenser bundle and the second condenser bundle . . . ;
 - placing the first and second condenser bundles in to a container;
 - transporting the container to a location upon which the modular air cooled condenser will be assembled

Id. at 8:15–49.

The '532 patent specification describes the method of claim 11 as “another embodiment of the present invention,” alternative to the method of claim 1. *Id.* at 3:8–23, 5:51. The specification explains that, in this alternative embodiment, the “bundles *may not include a [steam] manifold prior to shipping.*” *Id.* at 5:51–57 (emphasis added). Thus, “the tube bundles 28 may be assembled in field to form the A-type configuration,” but “instead of employing two steam manifolds, this alternative embodiment may employ a single steam manifold.” *Id.* at 5:57–63.

Claim 11 further specifies that *one* steam manifold feeds *both* of the first and second condenser bundles. *See* Ex. 1001, 8:26–29 (claim 11 recites “the steam manifold provides steam to the first condenser bundle and the second condenser bundle”), 5:59–63 (“instead of employing two steam manifolds, this alternative embodiment may employ a single steam manifold”).

Thus, we construe claim 11 to require that: (a) the two condenser bundles are assembled to include tubes connected at one end to a condensate header, but *not* connected to a steam manifold at the other end, before the condenser bundles are placed into a container for transport; and (b) one steam manifold feeds both of the first and second condenser bundles when the condenser is assembled on a modular tower frame.

3. *Remaining Claim Terms*

We determine no further explicit construction of any claim term is needed to resolve the issues presented by the arguments and evidence presently of record. *See, e.g.,* Pet. 4; *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co. Ltd.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (per

curiam) (claim terms need to be construed “only to the extent necessary to resolve the controversy”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

D. Ground 1A—Obviousness over Elder, Schabosky, and O’Kane

Petitioner contends claims 1–7 of the ’532 patent are unpatentable under 35 U.S.C. § 103(a) as having been obvious over Elder, Schabosky, and O’Kane. See Pet. 1, 5–30; Ex. 1003 ¶¶ 35, 39, 40, 43–77. Patent Owner opposes the merits of this contention. See Prelim. Resp. 1–3, 20–26.

We first discuss Petitioner’s burden at the present institution stage, then we summarize the pertinent disclosures of Elder, Schabosky, and O’Kane, and finally we consider the parties’ competing contentions.

1. Petitioner’s Burden at the Institution Stage

A petition for *inter partes* review must “identif[y] . . . with particularity . . . the grounds on which the challenge to each claim is based.” 35 U.S.C. § 312(a)(3). Therefore, a petition must include a detailed explanation of the significance of the evidence. 37 C.F.R. § 42.22(a)(2). A petition also must specify where each element of the claim is found in the prior art patents or printed publications relied upon. *Id.* § 42.104(b)(4). Additionally, a petition must identify “the relevance of the evidence to the challenge raised,” including “identifying specific portions of the evidence that support the challenge.” *Id.* § 42.104(b)(5).

2. Elder

Elder discloses an air cooled heat exchanger. See Ex. 1005, Title, 1:1–4. Figures 6 and 7 of Elder are reproduced below.

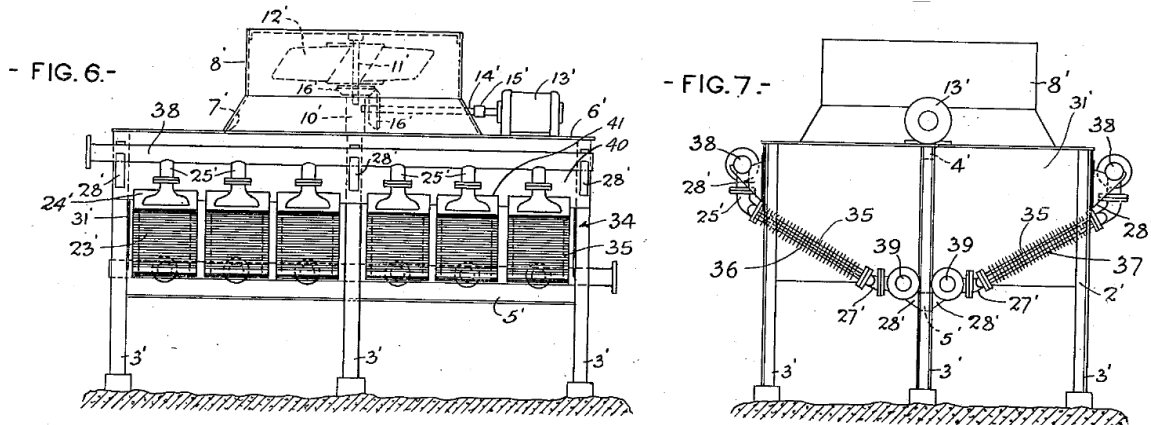


Exhibit 1005 — Elder, Figures 6 and 7.

Figure 6 is a front view, and Figure 7 is an end view, of heat exchanger apparatus 24. *Id.* at 1:36–40, 3:20–21. A fluid to be cooled is conveyed by inlet headers 38 to front core unit 36 and to rear core unit 37, and is then conveyed away from apparatus 24 by outlet headers 39. *See id.* at 3:20–30, 3:49–52. Figure 6 shows that each core unit 36 or 37 includes six inclined cores, and Figures 6–9 together show that each core has several fin-tubes 35 to enhance cooling of the fluid conveyed within apparatus 24, with the aid of an air flow generated by fan 12'. *See id.* at 2:27–29, 3:23–28, 3:52–4:8.

As Petitioner and Dr. Jacobi recognize, “Elder does not explicitly spell out how its condenser bundles are assembled, placed, transported, and/or positioned.” Pet. 7; Ex. 1003 ¶ 43.

3. Schabosky

Schabosky discloses a “[m]ethod for setting up a condenser plant.” Ex. 1010, code (57), ¶ 1. Figures 1 and 2 of Schabosky are reproduced below.

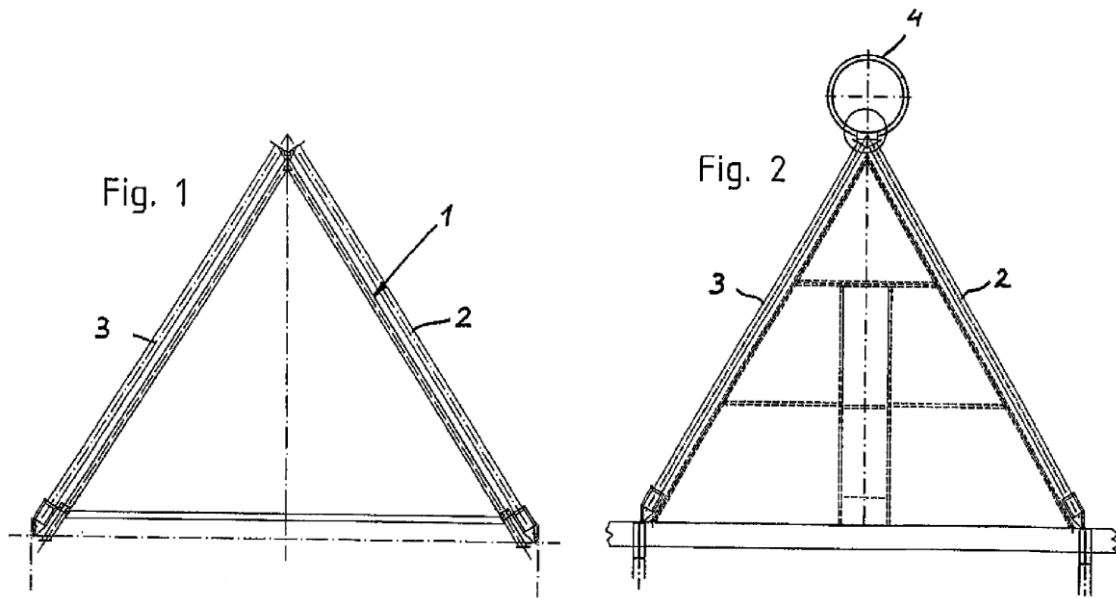


Exhibit 1010 — Schabosky, Figures 1 and 2.⁷

Figure 1 shows two tube bundles 2 and 3 placed on roof-shaped preassembly frame 1 and welded to each other at an apex of frame 1. *See id.* at code (57), ¶¶ 2, 7–9. Figure 2 “shows a heat exchanger delta in the installation position,” “welded to the steam distribution line 4 on [a] roof ridge.” *Id.* ¶¶ 21, 25.

This preassembly of tube bundles 2 and 3 on frame 1, according to Schabosky, advantageously permits the bundles to be “welded together by means of a root seam, before the preassembled roof-shaped tube bundle delta” created by this welding “is lifted from the preassembly frame and moved into the installation position” on a roof with a crane. *Id.* at code (57), ¶¶ 9–12, 17, 25. In particular, this “preassembly of the pipe bundles” 2 and 3 to join them with a root weld is “much less time-consuming than the previously used approach,” which “is important, because setup of the pipe

⁷ We have modified these figures by rearranging the designations “Fig. 1” and “Fig. 2” to magnify the illustrations.

bundle deltas requires a crane” and “[t]he expenses for cranes are typically very high.” *Id.* ¶ 17.

4. *O’Kane*

O’Kane discloses a method for transporting a set of large longitudinal items, such as wind turbine vanes and towers. Ex. 1009, codes (54) and (57). Petitioner and Dr. Jacobi rely principally on the following disclosure in O’Kane:

Until now, transport of large longitudinal items such as wind turbine blades and wind turbine towers primarily takes place either by ship or by truck, alternatively by railway. Often, transport of these items takes place utilising two or more of these transportation means successively. Accordingly, during transport the items will initially be loaded from the manufacturing plant onto one kind of said transportation means. Subsequently, the items may be reloaded onto other means of transportation. This puts forward a demand for the package, which the items are transported in, to be adaptable to different kinds of transport means. Therefore, *the most convenient package means will be standard containers* which may be transported at least by truck, by railway and by ship without having to change from one kind of package means to another. Alternatively only one kind of transportation means will be selected, which may raise the costs of transportation.

Id. at 1:24–34 (emphasis added); see Pet. 6–9; Ex. 1003 ¶¶ 40, 43–46.

Petitioner and Dr. Jacobi also cite O’Kane’s disclosure that “a standard freight container” has a length of 40 feet, a width of 8 feet, and a height of 8 feet, so the transport package should fit within that spatial envelope.

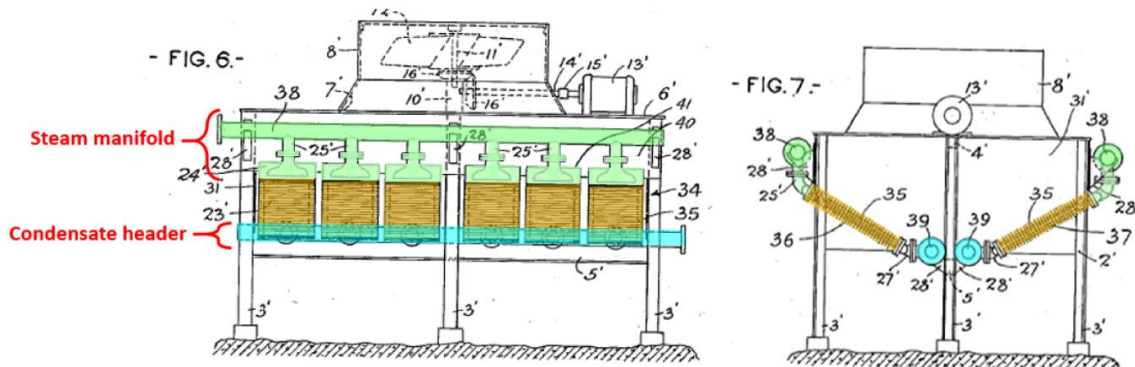
Pet. 6–7 (citing Ex. 1009, 9:5–18); Ex. 1003 ¶¶ 40, 43–46.

5. *Claim 1*

Petitioner provides arguments and evidence in support of contending claim 1 is unpatentable as having been obvious over Elder, Schabosky, and O’Kane. *See* Pet. 5–20; Ex. 1003 ¶¶ 35, 39, 40, 43–63. The Preliminary Response presents arguments in opposition. *See* Prelim. Resp. 1–3, 20–26. Upon consideration of these arguments and evidence, we conclude Petitioner has not demonstrated a reasonable likelihood of prevailing with respect to this challenge to claim 1, for the following reasons.

a. *Petitioner’s Contentions*

Petitioner cites Elder as disclosing a modular air cooled condenser structure comprising the components recited in claim 1, with the components being connected to each other in the fashion recited in claim 1. *See* Pet. 5, 7, 9–20; Ex. 1003 ¶¶ 35, 43–63. To illustrate this contention, Petitioner annotates Elder’s Figures 6 and 7, as reproduced below:



Petition (pg. 13) — Annotating Elder’s Figures 6 and 7.

Figure 6 is a front view, and Figure 7 is an end view, of Elder’s heat exchanger apparatus 24. Ex. 1005, 1:36–40, 3:20–21. According to Petitioner, Elder discloses the “first condenser bundle” of claim 1 as front core unit 36 with *tubes* 35 (orange) connected: (a) at their top ends to a

steam manifold (green) comprising inlet header 38, header member 24', and nozzle 25'; and (b) at their bottom ends to a *condensate header* (blue) comprising outlet header 39. *See* Pet. 10–13; Ex. 1003 ¶¶ 48–51. Petitioner contends Elder discloses the “second condenser bundle” of claim 1 as a similar collection of components associated with rear core unit 37. *See* Pet. 17–18; Ex. 1003 ¶ 58. Patent Owner does not challenge these contentions, and for purposes of the present decision, we assume they are supported by the evidence of record.

Petitioner states “Elder does not explicitly spell out how its condenser bundles are assembled, placed, transported, and/or positioned.” Pet. 7; Ex. 1003 ¶ 43. Petitioner then contends “a POSITA would have recognized and/or found it obvious that the process of manufacturing ACC [air cooled condenser] components, such as those found in Elder, in a factory and then finishing assembly at the final job site is an exceedingly well-known and well-established manufacturing method.” Pet. 7; Ex. 1003 ¶ 43. Petitioner cites Schabosky, O’Kane, and Modine⁸ as establishing that “typically for large systems such as ACC systems, parts of the system are manufactured at the factory, transported to the job site (*e.g.*, in shipping containers), and then finally assembled/installed.” Pet. 7 (citing Ex. 1010 ¶¶ 2, 25; Ex. 1009, 1:24–34; Ex. 1008, 3:3–7); Ex. 1003 ¶ 43. Petitioner therefore concludes the “steps of assembling/placing/transporting/positioning the ACC structure” recited in claim 1 would have been obvious to implement in erecting Elder’s ACC “in view of Schabosky and O’Kane.” Pet. 7; Ex. 1003 ¶ 44.

⁸ Ex. 1008 (US 3,707,185, iss. Dec. 26, 1972).

Petitioner cites Schabosky as “teach[ing] assembling two, *pre-manufactured pipe bundles 2, 3, (i.e., condenser bundles)* into ‘a heat exchanger delta’ at the job site by using a preassembly frame 1,” and then lifting the delta by a crane and moving it to the installation position. Pet. 7–8 (emphasis added) (citing Ex. 1010, Figs. 1–2, ¶ 25); *id.* at 5–6 (further citing Ex. 1010, Abstract, ¶¶ 25–28, claim 5); Ex. 1003 ¶ 44. Petitioner concludes “Schabosky explicitly describes a manner of assembling and positioning the heat exchanger delta in *a manner similar to*” claim 1. Pet. 8 (emphasis added) (citing Ex. 1010, Figs. 1–2, ¶ 25); Ex. 1003 ¶ 44.

Further according to Petitioner: “A POSITA would have also found it obvious that the *pre-assembled components as in Elder and Schabosky*, which can be quite large in the order of several meters or more, would have been transported to the installation site using industry-standard shipping methods.” Pet. 8 (emphasis added); Ex. 1003 ¶ 45. Dr. Jacobi cites Modine in support of this contention, where Modine states “modular units may be fabricated in the factory with dimensional limits so that the units can be easily shipped by rail to any part of the United States.” Ex. 1008, 3:3–7; Ex. 1003 ¶ 45; Pet. 8. Dr. Jacobi also cites O’Kane as teaching “that ‘the most convenient package means’ for transporting large items ‘will be standard containers which may be transported at least by truck, by railway and by ship without having to change from one kind of package means to another.’” Ex. 1009, 1:24–34; Ex. 1003 ¶ 45; Pet. 8. In Dr. Jacobi’s view, O’Kane thereby “*explicitly discloses* the concept of placing large items, such as *pre-manufactured condenser bundles*, into a container and transporting them.” Ex. 1003 ¶ 45 (emphases added); Pet. 8.

Petitioner next asserts: “A POSITA would have understood that *Schabosky’s assembling/positioning disclosure . . .* as well as *O’Kane’s placing/transporting disclosure . . .* would be equally applicable to Elder’s ACC system as all three references are directed to the assembly of large ACC systems at the installation site using smaller (but still relatively large) pre-manufactured components.” Pet. 8–9; Ex. 1003 ¶¶ 45–46. In particular, according to Petitioner, it would have been obvious “to transport the first and second condenser bundles of Elder, which are large longitudinal items, by placing them into a container for ease of shipping to a job site,” “where the modular air cooled condenser will be assembled” by combining Elder’s first and second condenser bundles to form a heat exchange delta. Pet. 18–20; *id.* at 20 (annotating Elder’s Figure 7 to identify the heat exchange delta in red); Ex. 1003 ¶¶ 60–63.

b. Patent Owner’s Contentions

Patent Owner argues in opposition that Petitioner’s contentions ignore the condenser bundle preassembly limitation of claim 1. *See* Prelim. Resp. 22; *supra* § III.C.2.a (claim construction). According to Patent Owner, Petitioner “never addresses how” Elder, Schabosky, and O’Kane combine to lead to the condenser bundle preassembly limitation, and the Petition “[a]t best . . . glosses over” this limitation, which is a “fatal defect.” Prelim. Resp. 22; *see also id.* at 1–3, 22–26 (argument in support of contention). Patent Owner particularly argues Petitioner errs in relying on Schabosky in relation to this limitation, because “Schabosky **does not** pre-assemble the bundles to have a steam manifold before transport” and instead “Schabosky explicitly discloses the opposite: connecting at least the

steam manifold to the tube bundle **after** transport.” *Id.* at 2–3, 23–24 (emphases by Patent Owner, citing Ex. 2010 ¶ 25).

c. Analysis and Conclusion

Upon review of the foregoing, we conclude Petitioner has not demonstrated a reasonable likelihood of prevailing in the challenge to claim 1 as having been obvious over Elder, Schabosky, and O’Kane. We focus here on the condenser bundle preassembly limitation of claim 1. This limitation requires that two condenser bundles are assembled to include tubes connected at one end to a steam manifold, and connected at the other end to a condensate header, before the condenser bundles are placed into a container for transport. *See supra* § III.C.2.a (claim construction).

We initially conclude Petitioner has demonstrated sufficiently for institution that Elder discloses an installed condenser apparatus 24 having first and second condenser bundles, with each bundle comprising tubes, a steam manifold, and a condensate header. *See, e.g.*, Pet. 13 (annotating Elder’s Figures 6 and 7 to identify the tubes in orange, the steam manifolds in green, and the condensate headers in blue); Ex. 1003 ¶ 51. However, as Petitioner acknowledges, Elder is silent concerning the process of how the various components of condenser apparatus 24 are manufactured, transported to the installation site, and then assembled into the completed apparatus at the installation site—including, most importantly, the two condenser bundles. *See, e.g.*, Pet. 7 (“Elder does not explicitly spell out how its condenser bundles are assembled, placed, transported, and/or positioned.”); Ex. 1003 ¶ 43. Thus, Elder’s express disclosure does not aid Petitioner in attempting to establish the obviousness of implementing the

condenser bundle preassembly limitation of claim 1 as part of assembling Elder's completed apparatus 24. And, Dr. Jacobi does not explain how Elder's express disclosure might support reaching a conclusion of such obviousness, apart from the fact that Elder's apparatus includes two condenser bundles comprising tubes, a steam manifold, and a condensate header. *See* Ex. 1003 ¶¶ 35, 43–46, 60–63.

Next, we largely agree with Patent Owner that Petitioner overstates the relevance of Schabosky's disclosure to the condenser bundle preassembly limitation of claim 1. First, Schabosky is silent concerning the process of how the various components of Schabosky's condenser apparatus are manufactured and transported to the installation site. Schabosky does discuss the advantages of preassembling tube bundles 2 and 3 into a delta configuration. *See* Ex. 1010, code (57), ¶¶ 2, 7–9, 17, 25. However, this delta preassembly is performed entirely *at the installation site*—it is a preassembly in the sense that tube bundles 2 and 3 are welded together into a delta *before* they are lifted up onto a roof by a crane, rather than *after* such lifting, which reduces the amount of time that the crane must be used. *See id.* By contrast, the condenser bundle preassembly limitation of claim 1 requires that the two condenser bundles are assembled before being placed into a container for transport to the installation site. *See supra* § III.C.2.a (claim construction).

Second, Schabosky does not disclose any sort of preassembly of “condenser bundles,” as that term is defined in claim 1, whether before or after transport to the installation site. Specifically, the condenser bundles of claim 1 must include tubes, a steam manifold, and a condensate header, with the respective ends of the tubes being connected to the steam manifold and

the condensate header. *See supra* § III.C.2.a (claim construction). Thus, Petitioner errs in relying on Schabosky’s tube bundles 2 and 3, without any steam manifold or condensate header, as corresponding to the condenser bundles of claim 1. *See, e.g.*, Pet. 5–6 (referring to Schabosky’s “pipe bundles 2, 3 (i.e., condenser bundles)”), 7 (same); Ex. 1003 ¶¶ 39, 44. Petitioner does not cite any disclosure in Schabosky that might suggest tube bundles 2 and 3 are connected to a steam manifold and to a condensate header prior to those structures being gathered together on the roof installation site. *See* Pet. 5–6, 7–9; Ex. 1003 ¶¶ 39, 43–46. Indeed, Schabosky appears to disclose the steam manifold connection is made *after* the tubes and the steam manifold are gathered together on the roof installation site. *See, e.g.*, Ex. 1010, Figs. 1–2, ¶¶ 20–21, 25 (“*In the installation position*, the preassembled heat exchanger delta is welded to the steam distribution line 4 on roof ridge.” (emphasis added)). Concerning the condensate header connection, Schabosky appears to be entirely silent as to the structure(s) that gather the steam condensate that forms in tube bundles 2 and 3; instead, Schabosky focuses on how the tube bundles are welded together at their apex where the steam manifold is located.

Next, O’Kane addresses the packaging and transport of wind turbine vanes and towers, rather than condenser components such as are recited in claim 1. *See* Ex. 1009, codes (54) and (57), 1:24–25. Petitioner errs in asserting that “O’Kane *explicitly discloses* the concept of placing large items, *such as pre-manufactured condenser bundles*, into a container and transporting them.” Pet. 8 (emphases added, citing Ex. 1009, 1:24–34); Ex. 1003 ¶ 45. No doubt, condensers and condenser bundles can be large items, as are wind turbine vanes and towers. *See, e.g.*, Ex. 1013, 31

(Fig. 1.2.7), 33 (Fig. 1.2.10). But, O’Kane—like Schabosky—does not disclose any sort of preassembly of “condenser bundles,” as that term is defined in claim 1 to include tubes, a steam manifold, and a condensate header, with the respective ends of the tubes being connected to the steam manifold and the condensate header.

Further, the O’Kane disclosures cited by Petitioner do not discuss the preassembly of smaller structures (e.g., the vanes or tower of a wind turbine) into sub-assemblies to be packed and transported to an installation site for final assembly into a larger structure (e.g., a wind turbine). See Ex. 1009, 1:24–34, 9:5–18; Pet. 6–9; Ex. 1003 ¶¶ 40, 43–46. These disclosures instead are directed to the “transport of large items” by multiple means of transportation such as ship, truck and railway, using “standard” containers “without having to change from one kind of package means to another.” Ex. 1009, 1:24–34, 9:5–18. There is a brief reference to “a first package” and “a second package” (*id.* at 9:5–7), but there is no discussion in the cited disclosures to indicate these two packages contain smaller sub-assembly structures to be transported separately to an installation site for final assembly into a larger structure.

Turning then to Modine, Petitioner cites this reference in support of broad assertions that “the process of *manufacturing ACC components*, such as those found in Elder, in a factory *and then finishing assembly at the final job site* is an exceedingly well-known and well-established manufacturing method” and “[a] POSITA would have also found it obvious that the pre-assembled components as in Elder and Schabosky . . . would have been transported to the installation site using industry-standard shipping methods.” Pet. 7, 8 (emphases added, citing Ex. 1008, 3:3–7). However,

these broad assertions are unaccompanied by any meaningful discussion of how Modine might support the assertions, from either Petitioner or Dr. Jacobi. *See id.*; Ex. 1003 ¶¶ 43, 45.

Moreover, Modine does not disclose, as Petitioner would have it, manufacturing ACC components in a factory and then finishing assembly at the final job site. Petitioner here cites one sentence from Modine, which states: “Another very important advantage of the condenser apparatus of this invention is that the modular units may be fabricated in the factory with dimensional limits so that the units can be easily shipped by rail” via “a standard railroad flatcar.” Ex. 1008, 3:2–11; Pet. 8; Ex. 1003 ¶ 45. This sentence does not state that the “modular units” are ACC components that are manufactured in a factory and then finally assembled at the job site. Indeed, the referenced “modular units” appear to correspond to Modine’s modular units 39, which are *completely assembled* condenser units comprising: two condenser cores 17 arranged in a V-shaped configuration on top of an inlet / outlet steam manifold 10 (Ex. 1008, 1:45–1:62, 2:39–56, Figs. 3 and 4); a fan and its motor (*id.* at 1:63–2:7); and a rigid frame (*id.* at 2:8–31).

Petitioner’s cited art (Elder, Schabosky, O’Kane, and Modine) taken as a whole establishes, at best, two factual points. First, Elder establishes that air cooled condensers can include condenser bundles including tubes, a steam manifold, and a condensate header, with the respective ends of the tubes being connected to the steam manifold and the condensate header. Second, Schabosky, O’Kane, and Modine together might be sufficient to establish that air cooled condensers can be large structures that are assembled in portions leading up to a final assembly of the portions into a

completed structure (Schabosky), and a POSITA would have known that cost and efficiency benefits can be achieved by pre-assembling portions of such a large structure in a factory setting, and then separately packaging and shipping the pre-assembled portions to the installation site for final assembly there (O’Kane and Modine).

Nonetheless, claim 1 is much more specific than that. The condenser bundle preassembly limitation specifically requires that two condenser bundles are assembled to include tubes connected at one end to a steam manifold, and connected at the other end to a condensate header, before the condenser bundles are placed into a container for transport. *See supra* § III.C.2.a (claim construction). The fact that the cited prior art would have allowed for the claimed invention, or possibly could be combined to reach the claimed invention, is not a sufficient reasoning to support obviousness. *Personal Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 991–92 & 993–94 (Fed. Cir. 2017) (obviousness requires “a motivation to pick out those two references and combine them to arrive at the claimed invention,” and “the amount of explanation needed will vary from case to case, depending on the complexity of the matter and the issues raised in the record” (citations omitted)); *InTouch Techs., Inc. v. VGo Comms., Inc.*, 751 F.3d 1327, 1351–52 (Fed. Cir. 2014).

Petitioner’s obviousness analysis and Dr. Jacobi’s testimony in support fall short in the requisite explanation to establish a motivation for combining Elder, Schabosky, O’Kane, and Modine with regard to the condenser bundle preassembly limitation of claim 1. As discussed in detail above, only Schabosky contains an express disclosure concerning preassembling components of a condenser structure as part of an overall

assembly of the condenser structure. Schabosky falls well short of the claimed process because Schabosky preassembles the components at the installation site (whereas claim 1 requires preassembly before placement into a container for transport to the installation site), and because Schabosky preassembles only tubes (whereas claim 1 requires preassembly of condenser bundles comprising tubes, a steam manifold, and a condenser header connected to each other). Petitioner and Dr. Jacobi do not explain how or why the additional consideration of O’Kane and Modine would have led a POSITA to the specific invention of claim 1, without the benefit of hindsight.

There is no explanation for why a POSITA would have been motivated to preassemble Elder’s *condenser bundles*—that is, tubes connected at one end to a steam manifold, and connected at the other end to a condensate header—before the condenser bundles are placed into a container for transport. See Pet. 5–9, 18–20; Ex. 1003 ¶¶ 39–40, 43–46, 60–63. We therefore determine Petitioner’s case for obviousness in this regard is tainted by a hindsight desire to reach the invention of claim 1. See, e.g., *InTouch*, 751 F.3d at 1348–49 (“Dr. Yanco’s testimony was nothing more than impermissible hindsight; she opined that all of the elements of the claims disparately existed in the prior art, but failed to provide the glue to combine these references.”).

For the foregoing reasons, we conclude Petitioner has not demonstrated a reasonable likelihood of prevailing in the challenge to claim 1 as having been obvious over Elder, Schabosky, and O’Kane.

6. *Claims 2–7*

Petitioner provides argument and evidence in support of contending claims 2–7, each of which depends directly or indirectly from claim 1, are unpatentable as having been obvious over Elder, Schabosky, and O’Kane. *See* Pet. 21–30; Ex. 1003 ¶¶ 64–78. The Preliminary Response does not address these contentions, apart from arguments raised in the context of claim 1, which we have considered above.

For the reasons provided above in Section III.D.5, Petitioner’s case for the obviousness of the parent claim 1 is deficient. We, therefore, conclude Petitioner has not demonstrated a reasonable likelihood of prevailing in the challenge to claims 2–7 as having been obvious over Elder, Schabosky, and O’Kane.

E. Ground 1B—Obviousness over Elder, Schulenberg, Schabosky, and O’Kane

In Ground 1B, Petitioner contends claims 8–10 of the ’532 patent, each of which depends directly or indirectly from claim 1, are unpatentable under 35 U.S.C. § 103(a) as having been obvious over Elder, Schulenberg, Schabosky, and O’Kane. *See* Pet. 1, 30–39; Ex. 1003 ¶¶ 79–94. Ground 1B differs from Ground 1A in only two ways. First, Ground 1B cites Schulenberg as disclosing “multiple heat exchange deltas arranged in parallel rows” to establish the obviousness of using “additional heat exchange deltas/rows” with Elder’s single row of deltas, to support the obviousness of claim 8. Pet. 31–34. Second, Ground 1B cites Schulenberg as disclosing “a single plenum that surrounds the multiple deltas/rows,” to support the obviousness of claim 9. *Id.* at 34–38. This reliance on Schulenberg does not cure the deficiency of Petitioner’s reliance on

Schabosky and O’Kane for the obviousness of claim 1, discussed above in Section III.D.5. Therefore, we conclude Petitioner has not demonstrated a reasonable likelihood of prevailing with Ground 1B.

F. Ground 2A—Obviousness over Elder, Nobel, Schabosky, and O’Kane

In Ground 2A, Petitioner contends claims 1–7 of the ’532 patent are unpatentable under 35 U.S.C. § 103(a) as having been obvious over Elder, Nobel, Schabosky, and O’Kane. See Pet. 1, 39–42; Ex. 1003 ¶¶ 95–96. Ground 2A differs from Ground 1A only in citing Nobel for the obviousness of modifying Elder’s tubes 35 to extend “*straight from* the steam manifold to the condensate header,” in the event Elder’s tubes 35 are found not to satisfy this requirement of claim 1. Ex. 1001, 6:62–65 (emphasis added); see Pet. 39–42. This reliance on Nobel does not cure the deficiency of Petitioner’s reliance on Schabosky and O’Kane for the obviousness of claim 1, discussed above in Section III.D.5. Therefore, we conclude Petitioner has not demonstrated a reasonable likelihood of prevailing with Ground 2A.

G. Ground 2B—Obviousness over Elder, Nobel, Schulenberg, Schabosky, and O’Kane

In Ground 2B, Petitioner contends claims 8–10 of the ’532 patent are unpatentable under 35 U.S.C. § 103(a) as having been obvious over Elder, Nobel, Schulenberg, Schabosky, and O’Kane. See Pet. 1, 43; Ex. 1003 ¶ 97. Ground 2B is a combination of Ground 1B (relying on Schulenberg for multiple heat exchange deltas arranged in parallel rows and for a single plenum surrounding the deltas) and Ground 2A (relying on Nobel for straight tubes). See Pet. 43. This reliance on Schulenberg and Nobel does

not cure the deficiency of Petitioner’s reliance on Schabosky and O’Kane for the obviousness of claim 1, discussed above in Section III.D.5. Therefore, we conclude Petitioner has not demonstrated a reasonable likelihood of prevailing with Ground 2B.

H. Ground 3—Obviousness over Schulenberg, Schaefer, Schabosky, and O’Kane

Petitioner contends claims 1–11 of the ’532 patent are unpatentable under 35 U.S.C. § 103(a) as having been obvious over Schulenberg, Schaefer, Schabosky, and O’Kane. *See* Pet. 1, 43–85; Ex. 1003 ¶¶ 36, 42, 98–160. Patent Owner opposes the merits of this contention. *See* Prelim. Resp. 1–3, 26–28.

We summarize the pertinent disclosures of Schulenberg and Schaefer, then we consider the parties' competing contentions.

1. Schulenberg

Schulenberg discloses an air cooled surface condenser. Ex. 1004, 1:9–17. Figure 3 of Schulenberg is reproduced below.

Fig. 3

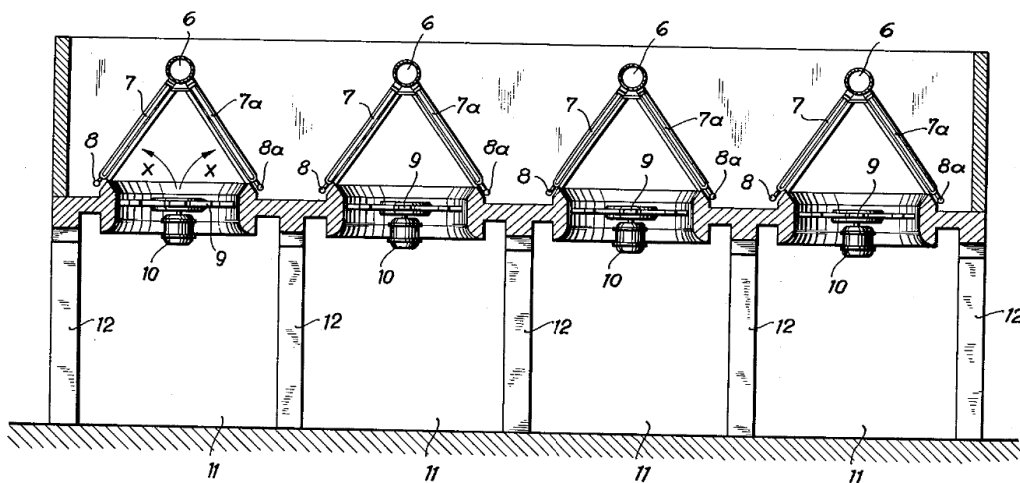


Exhibit 1004 — Schulenberg, Figure 3.

Figure 3 is a vertical section view of the condenser. *Id.* at 3:29–30. Steam from an electric generator enters the condenser via steam distribution conduits 6 and passes into the upper ends of condenser elements 7 and 7a, each of which is composed of several ribbed tubes. *Id.* at 3:49–67 (Fig. 1), 4:43–51 (Figs. 4–5). The lower ends of condenser elements 7 and 7a are connected to respective condenser collecting conduits 8 and 8a. *Id.* at 3:68–74. Blowers 9 generate an air flow to aid cooling of the steam in condenser elements 7 and 7a. *See id.* at 4:22–27.

2. Schaefer

Schaefer discloses a steam condenser. Ex. 1006, code (57). Figures 1 and 2 of Schaefer are reproduced below.

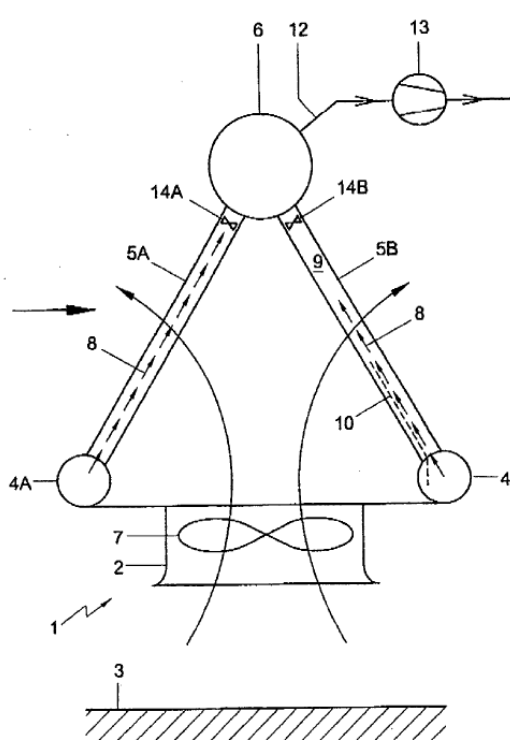


Fig. 1

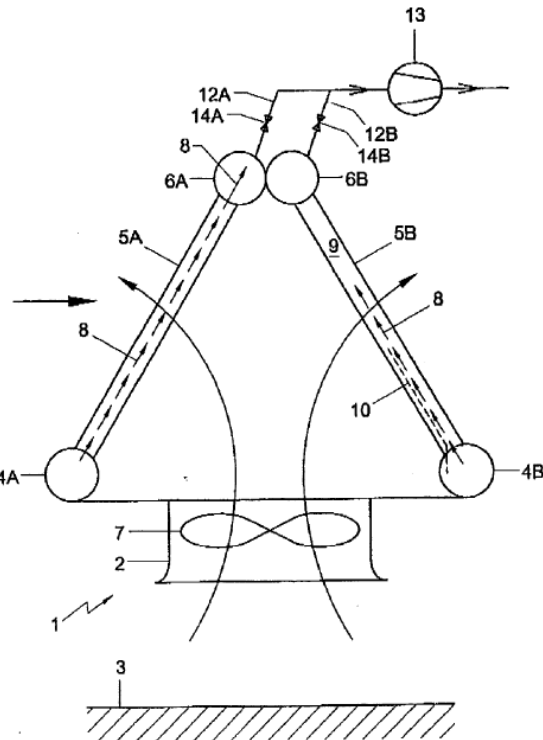


Fig. 2

Exhibit 1006 — Schaefer, Figures 1 and 2.

Figures 1 and 2 illustrate two variants of steam condenser 1. *Id.* ¶¶ 14–15, 18, 24. Both variants include two steam inlets 4A and 4B leading to respective sets of cooling tubes 5A and 5B. *Id.* ¶ 18. The Figure 1 variant has a single exhaust chamber 6 for both sets of tubes and leading to pump 13, whereas the Figure 2 variant has separate steam exhaust chambers 6A and 6B for the respective sets of tubes. *Id.* ¶¶ 9–10, 18–19, 22, 24. Fan(s) 7 generate an air flow to aid cooling of the steam in tubes 5A and 5B. *Id.* ¶ 18. Steam condensate 10 flows down the tubes to be discharged from the lowermost point of the condenser. *Id.* ¶¶ 3, 18.

3. *Claims 1–10*

In relation to claim 1, Petitioner contends Schulenberg and Schaefer combine to disclose a modular air cooled condenser structure comprising the claimed components being connected to each other in the fashion claimed. *See* Pet. 44–65; Ex. 1003 ¶¶ 98–119. In particular, according to Petitioner, Schulenberg’s Figure 3 discloses a condenser comprising most of this structure. *See* Pet. 49–61; Ex. 1003 ¶¶ 104–113. For example, Petitioner asserts Schulenberg’s condenser has a first condenser bundle composed of the tubes of condenser element 7, steam distribution conduit 6, and condenser collecting conduit 8. *See* Pet. 44–45, 49–52, 58–59; Ex. 1003 ¶¶ 98, 104–106, 112. Petitioner asserts Schulenberg also discloses a second condenser bundle composed of the tubes of opposing condenser element 7a, the same steam distribution conduit 6 as the first condenser bundle, and condenser collecting conduit 8a. *See* Pet. 60–61; Ex. 1003 ¶ 113. Petitioner then asserts it would have been obvious, in view of Schaefer, to modify Schulenberg to include *separate* steam distribution conduits for each

condenser element 7 and 7a, if claim 1 is construed to require separate steam manifolds for the two condenser bundles. *See* Pet. 44–48; *id.* at 48 (modifying Schulenberg’s Figure 3 to replace the single conduit 6 with two separate conduits); Ex. 1003 ¶¶ 98–102.

Petitioner then relies on Schabosky and O’Kane to assert that it would have been obvious to assemble the condenser of Schulenberg and Schaefer according to the method recited in claim 1. *See* Pet. 48–49, 61–65; Ex. 1003 ¶¶ 103, 114–119. Petitioner does not cite any disclosure in Schulenberg or Schaefer as relating to the obviousness of the claimed assembling steps, including the condenser bundle preassembly limitation. Thus, Ground 3 in relation to claim 1 suffers from the same deficiency identified above in Section III.D.5 in relation to Ground 1A and claim 1. *See, e.g.*, Prelim. Resp. 1–3, 26–28. We conclude Petitioner has not demonstrated a reasonable likelihood of prevailing with Ground 3 as to claim 1 and its dependent claims 2–10.

4. Claim 11

As discussed above in Section III.C.2.b (claim construction), claim 11 differs from claim 1 in requiring that: (a) the two condenser bundles are assembled to include tubes connected at one end to a condensate header, but *not* connected to a steam manifold at the other end, before the condenser bundles are placed into a container for transport; and (b) one steam manifold feeds both of the first and second condenser bundles when the condenser is assembled on a modular tower frame.

Petitioner recognizes difference (b), and correspondingly contends in relation to claim 11 that “Schulenberg discloses attaching first ends of both

the first and [second] sets of tubes [7 and 7a] (condenser bundles) to a single, shared steam manifold [6].” Pet. 82–84 (annotating Schulenberg’s Figure 3 to illustrate Petitioner’s contention); Ex. 1003 ¶¶ 150–151.

Therefore, in relation to claim 11, Petitioner need not rely on Schaefer to modify Schulenberg to include separate steam distribution conduits for each condenser element 7 and 7a.

Petitioner does not expressly address difference (a). Nor does Patent Owner. *See, e.g.*, Prelim. Resp. 1–3, 26–28. For example, the Preliminary Response’s focus on Schabosky as failing to disclose connecting tubes to a *steam manifold* before being packaged for transport in a container is not a persuasive reason to deny the Petition’s challenge to claim 11. *See id.*

Nonetheless, Petitioner here relies on the same analysis of Schabosky and O’Kane, discussed in Section III.D.5 above in Ground 1A in connection with claim 1, to assert that it would have been obvious to assemble the condenser of Schulenberg according to the method recited in claim 11. *See* Pet. 48–49, 61–65, 84–85; Ex. 1003 ¶¶ 103, 114–119, 157–160. Petitioner does not cite any disclosure in Schulenberg or Schaefer as relating to the obviousness of the claimed assembling steps. Thus, Ground 3 in relation to claim 11 suffers from a similar deficiency as identified above in Section III.D.5 concerning Ground 1A in connection with claim 1. Specifically, Petitioner and Dr. Jacobi do not explain why a POSITA would have been motivated to preassemble Schulenberg’s *condenser bundles*—that is, in claim 11, tubes connected at one end to a condensate header—before the condenser bundles are placed into a container for transport. *See* Pet. 48–49, 61–65, 84–85; Ex. 1003 ¶¶ 103, 114–119, 157–160. We therefore determine Petitioner’s case for obviousness in this regard is tainted

by a hindsight desire to reach the invention of claim 11. *See, e.g., InTouch*, 751 F.3d at 1348–49.

We conclude Petitioner has not demonstrated a reasonable likelihood of prevailing with Ground 3 as to claim 11.

I. Ground 4—Obviousness over Schulenberg, Nobel, Schaefer, Schabosky, and O’Kane

In Ground 4, Petitioner contends claims 1–11 of the ’532 patent are unpatentable under 35 U.S.C. § 103(a) as having been obvious over Schulenberg, Nobel, Schaefer, Schabosky, and O’Kane. *See* Pet. 1, 85–87; Ex. 1003 ¶¶ 161–162. Ground 4 differs from Ground 3 only in citing Nobel for the obviousness of modifying the tubes of Schulenberg’s condenser elements 7 and 7a to extend “*straight from* the steam manifold to the condensate header,” in the event Schulenberg’s tubes are found not to exhibit this requirement of claims 1 and 11. Ex. 1001, 6:62–65, 8:37–41 (emphasis added); *see* Pet. 85–87. This reliance on Nobel does not cure the deficiency of Petitioner’s reliance on Schabosky and O’Kane for the obviousness of claims 1 and 11, as discussed above in Section III.H. Therefore, we conclude Petitioner has not demonstrated a reasonable likelihood of prevailing with Ground 4.

J. Ground 5—Obviousness over Nobel, Kröger, Schabosky, and O’Kane

Petitioner contends claim 11 of the ’532 patent is unpatentable under 35 U.S.C. § 103(a) as having been obvious over Nobel, Kröger, Schabosky, and O’Kane. *See* Pet. 1, 87–103; Ex. 1003 ¶¶ 37–38, 41, 163–179. Patent Owner opposes the merits of this contention. *See* Prelim. Resp. 1–3, 28–30.

We summarize the pertinent disclosures of Nobel and Kröger, then we consider the parties' competing contentions.

1. Nobel

Nobel discloses an air cooled steam condenser. Ex. 1007, code (57). Figure 1 of Nobel is reproduced below.

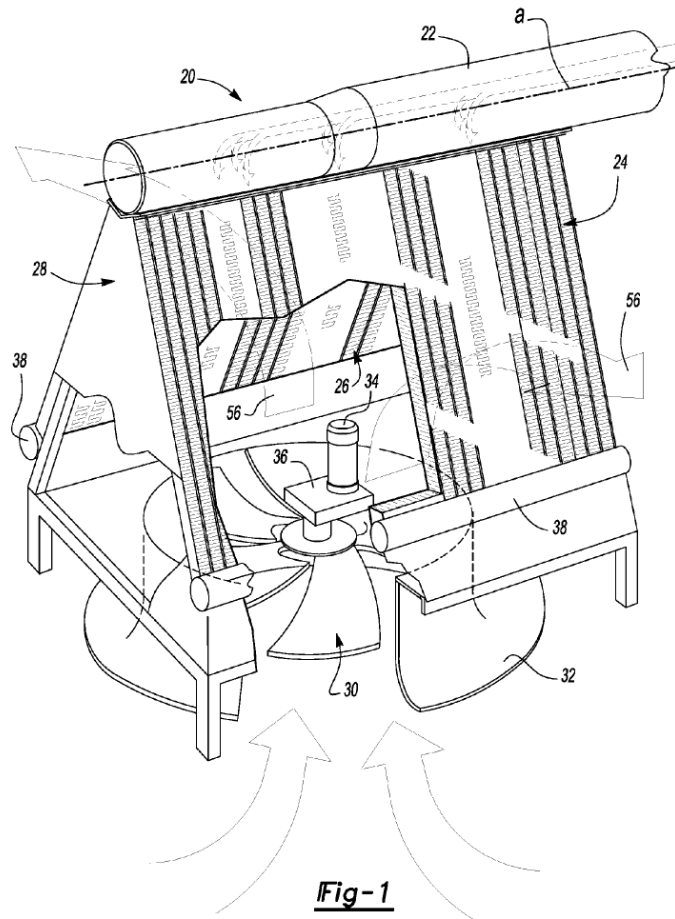


Exhibit 1007 — Nobel, Figure 1.

Figure 1 is a side elevation view of condenser 20. *Id.* ¶¶ 10, 14.

Condenser 20 includes steam delivery manifold 22 connected to the top ends of two sets of condenser tubes 24 and 26. *Id.* ¶ 14. The bottom ends of tubes 24 are connected to one condensate collection manifold 38, and the bottom ends of tubes 26 are connected to another condensate collection

manifold 38. *Id.* Fan 30 generates an air flow to aid cooling of the steam in tubes 24 and 26. *Id.*

2. *Kröger*

Kröger is a handbook intended “to provide modern analytical and empirical tools for evaluation of the thermal-flow performance or design of air-cooled heat exchangers and cooling towers.” Ex. 1013, 10. Petitioner particularly cites various diagrams and photographs of condenser systems provided in Kröger. *See* Pet. 92 (annotating Kröger’s Figures 1.2.7 and 1.2.9 to identify the relative dimensions of air cooled condensers shown therein); Ex. 1013, 31 (Fig. 1.2.7), 32 (Fig. 1.2.9).

3. *Claim 11*

Petitioner contends Nobel and Kröger combine to disclose a modular air cooled condenser structure comprising the claimed components being connected to each other in the fashion recited in claim 11. *See* Pet. 90–103; Ex. 1003 ¶¶ 163–179. In particular, according to Petitioner, Nobel’s Figure 1 discloses a condenser comprising most of this structure. *See* Pet. 40, 94–101; Ex. 1003 ¶¶ 41, 168–175. For example, Petitioner asserts Nobel’s condenser has a first condenser bundle composed of tubes 24 and their associated condensate collection manifold 38. *See* Pet. 94–95; Ex. 1003 ¶ 169. Petitioner asserts Nobel also discloses a second condenser bundle composed of tubes 26 and their associated condensate collection manifold 38. *See* Pet. 96–97; Ex. 1003 ¶ 170. Petitioner then asserts it would have been obvious, in view of Kröger, to modify Nobel so that the length of the first condenser bundle is “about six times longer than” its

width, as recited in claim 11. Ex. 1001, 8:28–33; *see* Pet. 90–93, 99; Ex. 1003 ¶¶ 163–166, 173.

Petitioner relies on Schabosky and O’Kane to assert that it would have been obvious to assemble the condenser of Nobel and Kröger according to the method recited in claim 11. *See* Pet. 93, 101–03; Ex. 1003 ¶¶ 167, 176–179. Petitioner does not cite any disclosure in Nobel or Kröger as relating to the obviousness of the claimed assembling steps. Thus, Ground 5 suffers from a similar deficiency as identified above in Section III.H.4 concerning Ground 3. Specifically, Petitioner and Dr. Jacobi do not explain why a POSITA would have been motivated to preassemble Nobel’s *condenser bundles*—that is, in claim 11, tubes connected at one end to a condensate header—before the condenser bundles are placed into a container for transport. *See* Pet. 93, 101–03; Ex. 1003 ¶¶ 167, 176–179. We therefore determine Petitioner’s case for obviousness in this regard is tainted by a hindsight desire to reach the invention of claim 11. *See, e.g., InTouch*, 751 F.3d at 1348–49.

We conclude Petitioner has not demonstrated a reasonable likelihood of prevailing with Ground 5.

IV. POTENTIAL DISCRETIONARY DENIAL UNDER 35 U.S.C. § 325(d)

Patent Owner urges us to exercise our discretion under 35 U.S.C. § 325(d) to deny institution of review, on the basis that the arguments presented in the Petition are substantially the same as arguments considered and then rejected by the Examiner during prosecution of the ’532 patent. *See* Prelim. Resp. 1, 7–20; Sur-reply. Petitioner provides opposing arguments. *See* Reply.

We have determined that the Petition falls short on the merits. *See supra* Section III. Therefore, we do not reach the § 325(d) issues presented by Patent Owner.

V. CONCLUSION

For the above reasons, we determine Petitioner has not established a reasonable likelihood that Petitioner would prevail with respect to at least one challenged claim of the '532 patent. Therefore, we deny institution of review on the merits. *See* 35 U.S.C. § 314(a). We do not reach the § 325(d) issues presented by Patent Owner.

VI. ORDER

In consideration of the foregoing, it is hereby:

ORDERED, pursuant to 35 U.S.C. § 314(a), that institution of *inter partes* review of the '532 patent is denied.

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