

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SOUTH-TEK SYSTEMS, LLC AND POTTER ELECTRIC CO, LLC,
Petitioners,

v.

ENGINEERED CORROSION SOLUTIONS, LLC,
Patent Owner.

IPR2016-00136
Patent 9,144,700 B2

Before WILLIAM V. SAINDON, BARRY L. GROSSMAN, and
JEREMY M. PLENZLER, *Administrative Patent Judges*.

GROSSMAN, *Administrative Patent Judge*.

FINAL WRITTEN DECISION

Incorporating Decision on
Patent Owner's Motion to Exclude Evidence
35 U.S.C. § 318(a); 37 C.F.R. § 42.73

I. INTRODUCTION

A. Background

South-Tek Systems, LLC and Potter Electric Co, LLC (“Petitioners”) filed a Petition requesting *inter partes* review of claims 1–9 of U.S. Patent No. 8,474,700 (Ex. 1001, “the ’700 patent”) pursuant to 35 U.S.C. §§ 311–319. Paper 3 (“Pet.”). Engineered Corrosion Solutions, LLC (“Patent Owner”) filed a Preliminary Response to the Petition. Paper 7 (“Prelim. Resp.”). We instituted review on two of the four grounds asserted in the Petition. Paper 8 (“Dec. Inst.”). The two grounds on which we instituted trial were: (1) whether claims 1, 2, and 5–9 of the ’700 patent would have been obvious under 35 U.S.C. § 103¹ in view of Viking², AAPA³, and Wood⁴; and (2) whether claims 3 and 4 of the ’700 patent would have been obvious under 35 U.S.C. § 103 in view of Viking, AAPA, Wood, and Wagner⁵.

Patent Owner requested rehearing of our Decision to Institute an *inter partes* review (Paper 10), which we denied (Paper 25, Dec. Reh’g.).

Patent Owner filed a Response to the Petition (Paper 27, “PO Resp.”), and Petitioners filed their Reply (Paper 30, “Pet. Reply”).

¹ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 296–07 (2011), took effect on September 16, 2012. Because the application for the patent at issue in this proceeding has an effective filing date before that date, we refer to the pre-AIA versions of the statute.

² Viking Corp. Technical Data, Dry Pipe Sprinkler System (dated Mar. 2, 2007) (Ex. 1008).

³ Applicant Admitted Prior Art. The only admitted prior art relied on in the Petition is the reference to manufacturers of suitable nitrogen generators at column 10, lines 55–62 of the ’700 patent.

⁴ U.S. Patent No. 6,540,028 (issued Apr. 1, 2003) (Ex. 1009).

⁵ U.S. Patent No. 7,717,776 (issued May 18, 2010) (Ex. 1010).

Petitioners submitted 21 exhibits (Ex. 1001–1021). Patent Owner submitted 93 exhibits (Ex. 2001–2093).

A hearing was held February 6, 2017. Paper 51 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6. We enter this Final Written Decision pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73.

We also address herein Patent Owner’s Motion to Exclude Evidence (Paper 43 (“Mot. Excl.”)); Petitioners’ Response thereto (Paper 45 (“Resp. Mot. Excl.”)); and Patent Owner’s Reply (Paper 47 (“Reply Mot. Excl.”)).

Petitioners have the burden of proving a proposition of unpatentability by a preponderance of the evidence. 35 U.S.C. § 316(e). As described below, we determine that Petitioners have not met their burden to establish that claims 1–9 are unpatentable.

B. Related Proceedings

Petitioners state they “are not aware of any other judicial or administrative matter that would affect, or be affected by, a decision” in this proceeding. Pet. 4.

Patent Owner states “[t]his *inter partes* review may affect or be affected by” U.S. Patent No. 9,186,533 and four pending patent applications. Paper 6, 2.

C. The ’700 Patent (Ex. 1001)

The ’700 patent relates to a fire protection system, such as those typically found in hotels, offices, and other commercial buildings. A basic fire protection system includes a water supply to provide adequate pressure and water flow to a water distribution piping system, where the water is discharged via sprinklers or nozzles. Ex. 1001, 1:8–12.

One of the problems of these fire protection systems is corrosion, which can severely compromise the performance of the system. *Id.* at 1:22–37. The ’700 patent discloses a water-based fire protection system that is intended to reduce corrosion within the system. *Id.* at 2:19–22.

Rather than fill the distribution piping with pressurized air, the fire protection system disclosed in the ’700 patent fills the distribution piping with pressurized nitrogen, from a nitrogen generator. *Id.* at 2:26–37. Oxygen dissolved in water or otherwise present within the fire protection system is displaced by the nitrogen in order to reduce or eliminate effects of oxidative corrosion of ferrous and cuprous components and to deprive aerobic microbiological organisms the opportunity to grow within the system. *Id.* at 4:38–45. The displaced oxygen exits the system through a vent. *Id.* at 2:66–3:3.

The patent discloses both “dry pipe” and “wet pipe” systems. *Id.* at 2:53–54. In the ready or stand-by mode, a “dry pipe” system is filled with pressurized gas. *Id.* at 5:15–16; 13:54–57. A “wet pipe system” is filled with pressurized water. *Id.* at 16:39–41. The Specification states that a dry pipe system is used primarily to protect unheated structures or areas where the system is subject to freezing temperatures. *Id.* at 5:4–9; 13:63–64. The Specification also states that in conventional dry pipe sprinkler systems, pools of residual water often are left from initial hydrostatic testing, from periodic flow testing, or from condensation of moist air that is used to maintain system pressure. *Id.* at 5:11–15.

The disclosed dry pipe system is illustrated in Figure 1 of the ’700 patent, reproduced below with annotations to identify specific components.

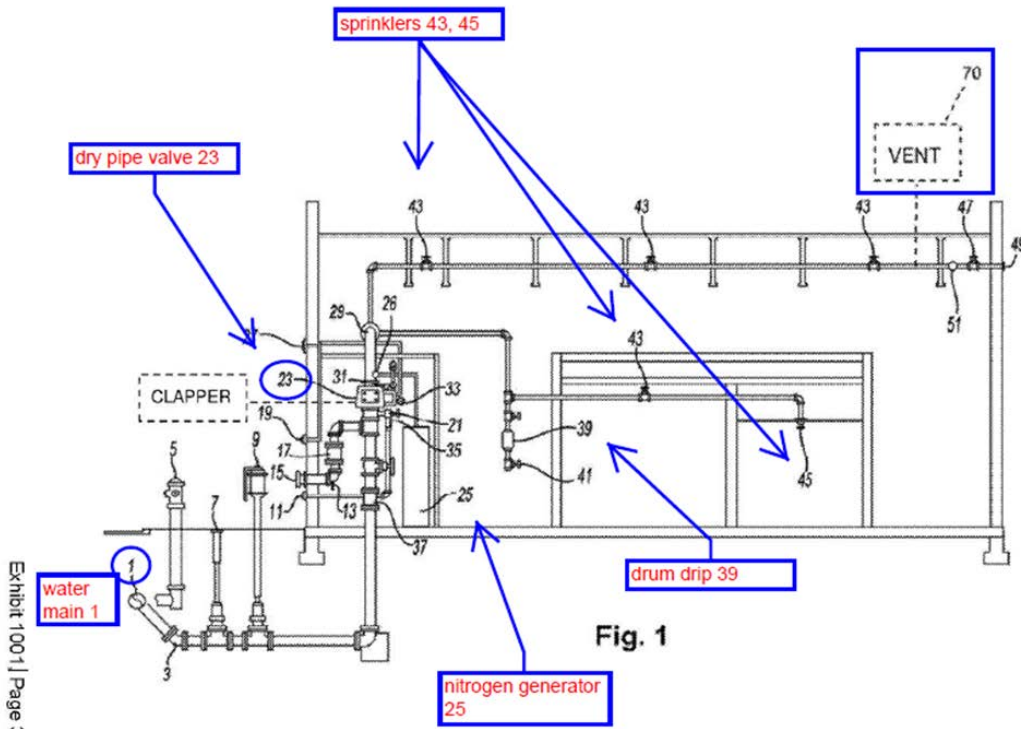


Figure 1 from the '136 patent showing the disclosed dry pipe sprinkler system, annotated to highlight selected components.

In operation, a dry pipe sprinkler system may be configured to continuously supply pressurized nitrogen into a piping network using nitrogen generator 25. Ex. 1001, 11:10–13. The nitrogen generator provides a steady stream of pressurized nitrogen into the sprinkler system to keep dry pipe valve 23 closed. *Id.* at 11:13–15. As explained in the Specification,

To prevent over-pressurization, the system may include *a vent, such as a relief valve*, in order to control or limit the pressure in the system. *The relief valve* allows pressurized nitrogen to escape at a preset or adjustable limit to prevent over-pressurization while maintaining enough pressure within the system to prevent the dry pipe valve from opening.

Id. at 11:15–23 (emphases added). Continuous venting of the system using one or more vents or valves facilitates removal of any oxygen within the system while maintaining the required system pressure of nitrogen to keep the dry pipe valve closed. *Id.* at 11:29–32.

As shown in Figure 1, the “vent” is illustrated in Figure 1 simply as a box labeled “vent” using reference numeral 70. *See id.* at Figure 1, upper right corner. With respect to the vent in a dry pipe system, the Specification states further only that “[o]ne or more oxygen sensors 51 are positioned near the inspector’s test valve 47 and inspector’s test drain 49, adjacent to system vents 70.” *Id.* at 16:20–23. Thus, concerning the claimed “vent,” the only structure disclosed is *a relief valve* that functions to control or limit the pressure in the system.

Drum drip 39 and drain valve and plug 41 are positioned in the piping network. A drum drip is a condensate drain. Reply 12–13. In the event the fire protection system is actuated, due to a fire or for testing, sprinklers 43, 45 open, pressure within the piping network is lost through the open sprinklers faster than the nitrogen generator can replace it, even when continuously applying pressurized nitrogen, thereby allowing the dry pipe valve to open and pressurized water to enter the piping network and exit through sprinklers 43, 45.

The ’700 patent also discloses a wet pipe sprinkler system, which it states is used in structures not subject to freezing. The claims of the patent, however, specifically recite a “dry pipe sprinkler system.”

D. Illustrative Claim

The sole independent claim, claim 1, reproduced below, is illustrative of the claims in the ’700 patent.

1. A water-based fire protection system comprising:

a dry pipe sprinkler system comprising at least one fusible sprinkler, a source of pressurized water, a piping network connected to the at least one fusible sprinkler, one or more drains, and a dry pipe valve coupling the source of pressurized water to the piping network, the dry pipe valve having a clapper, the piping network pitched toward the one or more drains, and *the one or more drains including a drum drip*;

a nitrogen generator coupled to the piping network, the nitrogen generator operable to pressurize the piping network with nitrogen and maintain the clapper of the dry pipe valve in a closed position until the water-based fire protection system is actuated; and

at least one vent positioned within the piping network, the at least one vent operable to allow gas including oxygen displaced by the nitrogen to exit the piping network at a preset or adjustable limit while maintaining enough pressure within the system to prevent the clapper of the dry pipe valve from opening until the water-based fire protection system is actuated to thereby increase the concentration of nitrogen and decrease the concentration of oxygen in the piping network to reduce or eliminate the rate of corrosion in the piping network. (Emphasis added).

II. PATENT OWNER'S MOTION TO EXCLUDE

Before addressing the merits of this proceeding, we consider Patent Owner's motion to exclude evidence.

Patent Owner moves to exclude paragraphs 5, 11, 13–22, 24–29 and 33 of the Declaration of J. Scott Friesen (Exhibit 1013) and Exhibits 1014 and 1019, submitted with Petitioners' Reply, as well as portions of Mr. Friesen's deposition testimony (Exhibit 2093). Mot. Excl. 1.

A. Exhibit 1013

Exhibit 1013 is an expert Declaration of Mr. J. Scott Friesen. It was submitted with Petitioners' Reply. It is not cited in the Petition. Patent

Owner seeks to exclude Mr. Friesen's Declaration in its entirety as untimely. Mot. Excl. 2, 7. Patent Owner also moves to exclude portions of Mr. Friesen's Declaration testimony that: (1) raise irrelevant new arguments (*id.* at 1, 2); (2) were not cited in the Reply and thus are irrelevant (*id.* at 1, 3–5); (3) lack foundation (*id.* at 1, 5); and (4) do not support the proposition for which they are cited and thus are irrelevant (*id.* at 1, 6).

A motion to strike or a motion to exclude is not the proper mechanism for raising the issue of whether a reply or reply evidence is beyond the proper scope. *FLIR Systems, Inc. v. Leak Surveys, Inc.*, slip op. 10–12, IPR2014-00411 (PTAB September 3, 2015) (Paper 113). The Board acts as both the gatekeeper of evidence and as the weigher of evidence. Rather than excluding evidence that is allegedly confusing, misleading, untimely, and/or irrelevant, we will simply not rely on it or give it little weight, as appropriate, in our analysis. Similar to a district court in a bench trial, the Board, sitting as a non-jury tribunal with administrative expertise, is well positioned to determine and assign appropriate weight to evidence presented, including giving it no weight. *See, e.g., Donnelly Garment Co. v. NLRB*, 123 F.2d 215, 224 (8th Cir. 1941) (“One who is capable of ruling accurately upon the admissibility of evidence is equally capable of sifting it accurately after it has been received . . .”).

Thus, in this *inter partes* review, the better course is to have a complete record of the evidence to facilitate public access as well as appellate review. Also, we are encouraged to consider all evidence of record that is probative of the background knowledge of a person of ordinary skill in the relevant technology. *Randall Mfg. v. Rea*, 733 F.3d 1355, 1362–63 (Fed. Cir. 2013).

Accordingly, we deny the motion to exclude Exhibit 1013 or portions of it.

B. Exhibit 1014

Exhibit 1014 is U.S. Patent No. 6,102,066. We have not cited or relied on this exhibit in reaching our decision in this proceeding. Based on the analysis above, we deny the motion to exclude Exhibit 1014.

C. Exhibit 1019

Exhibit 1019 is an 11 page document titled “Practical Guide to Diagnosis & Mitigation of Microbiologically Influenced Corrosion (MIC) in Fire Protection Systems.” It was distributed by BTI Products, LLC. We have not cited or relied on this exhibit in reaching our decision in this proceeding. Based on the analysis above, we deny the motion to exclude Exhibit 1019.

D. Exhibit 2093

Exhibit 2093 is the deposition testimony of Mr. Scott Friesen, Petitioners’ declarant. The testimony Patent Owner seeks to exclude relates to Mr. Friesen’s prior use of nitrogen gas. We have not cited or relied on this exhibit in reaching our decision in this proceeding. Based on the analysis above, we deny the motion to exclude selected testimony from Exhibit 2093.

III. ANALYSIS

A. Claim Construction

In an *inter partes* review, claim terms in an unexpired patent are interpreted according to their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016). Under

that standard, and absent any special definitions, we give claim terms their ordinary and customary meaning, as would be understood by one of ordinary skill in the art at the time of the invention. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). Any special definitions for claim terms must be set forth with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). Only terms that are in controversy need to be construed, and then only to the extent necessary to resolve the controversy. *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

Petitioners propose a specific construction for the phrase “drum drip.” Pet. 6–7. Patent Owner does not propose any specific constructions in its Response. In our Decision to Institute, we determined that an explicit construction of the claim term “drum drip,” or any other claim term, was not necessary for the purposes of our Decision to Institute. Dec. Inst. 7. We maintain this determination for this Final Decision – specific construction of the claims is not necessary to resolve this *inter partes* review proceeding.

B. Grounds of Unpatentability

1. Claims 1, 2 and 5–9

Obviousness Based on Viking, Wood, and AAPA

Section 103(a) forbids issuance of a patent when “the differences between the subject matter sought to be patented 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) when available, secondary considerations, such as commercial success, long felt but unsolved needs, and failure of others. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966); see *KSR*, 550 U.S. at 407 (“While the sequence of these questions might be reordered in any particular case, the [Graham] factors continue to define the inquiry that controls.”). The Court in *Graham* explained that these factual inquiries promote “uniformity and definiteness,” for “[w]hat is obvious is not a question upon which there is likely to be uniformity of thought in every given factual context.” 383 U.S. at 18.

The Supreme Court made clear that we apply “an expansive and flexible approach” to the question of obviousness. *KSR*, 550 U.S. at 415. Whether a patent claiming the combination of prior art elements would have been obvious is determined by whether the improvement is more than the predictable use of prior art elements according to their established functions. *Id.* at 417. To reach this conclusion, however, it is not enough to show merely that the prior art includes separate references covering each separate limitation in a challenged claim. *Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360 (Fed. Cir. 2011). Rather, obviousness additionally requires that a person of ordinary skill at the time of the invention “would have selected and combined those prior art elements in the normal course of research and development to yield the claimed invention.” *Id.*

Moreover, in determining the differences between the prior art and the claims, the question under 35 U.S.C. § 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. *Litton Indus. Prods., Inc. v. Solid State*

Sys. Corp., 755 F. 2d 158, 164 (Fed. Cir. 1985) (“It is elementary that the claimed invention must be considered as a whole in deciding the question of obviousness.”) (citation omitted); *see also Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1537 (Fed. Cir. 1983) (“[T]he question under 35 U.S.C. § 103 is not whether the differences themselves would have been obvious. Consideration of differences, like each of the findings set forth in *Graham*, is but an aid in reaching the ultimate determination of whether the claimed invention as a whole would have been obvious.”) (Citation omitted).

“A reference must be considered for everything it teaches by way of technology and is not limited to the particular invention it is describing and attempting to protect.” *EWP Corp. v. Reliance Universal Inc.*, 755 F.2d 898, 907 (Fed. Cir. 1985).

As a factfinder, we also must be aware “of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning.” *KSR*, 550 U.S. at 421. This does not deny us, however, “recourse to common sense” or to that which the prior art teaches. *Id.*

Against this general background, we consider the references, other evidence, and arguments on which the parties rely.

a. Scope and Content of the Prior Art

i. Viking (Ex. 1008)

Viking is a six page document titled “[T]echnical Data [–] ‘Dry Pipe Sprinkler System.’” It describes the components, applications, operation, and maintenance of a dry pipe sprinkler system. Ex. 1008, 1–6. As stated in Viking, “[w]hen a fire occurs, the heat produced will operate a sprinkler causing the air pressure in the piping system to escape. When the pressure

trip-point is reached (directly or through the accelerator), the dry-pipe valve opens allowing water to flow through the system.” Ex. 1008, 3.

Viking discloses “[t]he system piping from the Dry Pipe Valve to the fusible sprinklers is filled with *pressurized air or nitrogen*.” Ex. 1008, 1 (emphasis added). Viking discloses a “[c]ompressed *air* supply (automatic or manual)” (*id.* (emphasis added)) but does not refer to a supply or source of pressurized nitrogen. It is clear however, that Viking discloses that pressurized nitrogen can be used as an alternative to pressurized air. When pressurized nitrogen is used, there must, of course, be a source of the pressurized nitrogen. Viking does not address why, or under what specific conditions, pressurized nitrogen would be used or preferred rather than pressurized air.

Viking refers to venting outlet pressure to the atmosphere, but only in the context of an optional “accelerator.” Ex. 1008, 3, Sec. 4(B), (“On a pneumatic release system, the outlet pressure is vented to atmosphere, speeding the release system operation.”). As explained in Viking, “[a] dry pipe valve equipped with an accelerator will trip more rapidly and at a higher air-pressure differential.” Ex. 1008, 3, Sec. 4. An “accelerator” is disclosed in the ’700 patent (*e.g.*, Ex. 1001 15:13–19) but is not claimed in the ’700 patent.

The dry pipe system disclosed in Viking is substantially similar to the dry pipe system disclosed and claimed in the ’700 patent. *See* Pet. 8–9; *see also* Dec. Reh’g. 7–10 (comparing figures and text in Viking and the ’700 patent). The significant differences, as discussed below, are a specific recitation of a “nitrogen generator” and “vent” in the challenged claims.

ii. *Wood (Ex. 1009)*

Wood discloses a condensate drain for a dry pipe sprinkler system. Ex. 1009, 1:10–12. As disclosed in Wood, “[d]ry-pipe systems tend to collect condensate inside the piping system that must be periodically drained. If the condensate is not drained, freezing temperatures will cause ice to form in the piping system, causing the pipe and pipe fittings to burst.” *Id.* at 1:42–46. Wood refers to a typical prior art two-valve, manually operated, condensate drain. *Id.* at 1:49–53. The manually operated, two-valve prior art condensate drain disclosed in Wood is referred to as a “two-valve drum drip” in Viking and is shown at reference numeral 24 in the figure on page 2 of Viking. Ex. 1008, 2.

The Wood device improves on this *manually* operated prior art device by providing for the discharge of condensate *automatically*. Ex. 1009, 1:59–60. Automatic condensate drain 32, shown in Figure 2 of Wood, includes a pressure operated control valve 40. *Id.* at 2:43–46. Wood’s automatic condensate drain is intended to automatically drain condensed water from piping systems, or other containers which normally are free of water and filled with pressurized air or gas. *Id.* at 3:13–17. In normal conditions, condensed water, *or air when water is not present*, is discharged through the discharge nozzle until the air pressure drops to a predetermined level. *Id.* at 3:17–19. As explained in Wood, the basic purpose of condensate drain 32 is to eliminate “the need to manually drain small amounts of condensed water from piping systems or other containers.” *Id.* at 3:20–22.

The automatic condensate drain disclosed in Wood uses a pressure operated control valve to shut the device off if the air pressure drops below a desired limit. When sufficient air pressure is restored to the system the

device will reset and automatically start operating. Ex. 1009, 3:26–30; *see id.* at 3:42–58 (disclosing specific examples of the variable pressures at which Wood’s condensate drain operates). Petitioners acknowledge that there is no functional difference between Wood’s condensate drain and a drum drip drain. Tr. 13, ll. 1–3 (“I don’t think there’s a functional difference between Wood’s drain and the drum drip drain.”); *see also id.* at 18, ll. 18–25 (stating a typical drum drip drain “is functionally identical to Wood’s – what Wood calls a condensate drain”).

iii. Wagner (Ex. 1010)

Wagner discloses the use of oxygen sensors 7 to measure and control the oxygen level in a room for the purpose of fire suppression. Ex. 1010, 12:4–12. As disclosed in Wagner, in order to effectively reduce the risk of a fire developing in a protected area, the so-called “inert-gas technique” is applied to reduce the oxygen concentration by injecting into the protected area an inert gas, such as nitrogen. *Id.* at 1:22–26. Wagner refers to this technique as “permanent inertization of the protected area.” *Id.* at 1:33. According to Wagner, “permanent inertization” effectively minimizes the risk of a fire developing in the protected area. *Id.* at 1:33–37. An inert gas generator and/or inert gas reservoir is provided for supplying an inert gas, for instance an air-nitrogen mixture. To ensure the correct mixture, oxygen sensors and oxygen measuring units are used. *Id.* at 12:1–12.

b. Differences Between the Prior Art and the Challenged Claims

The principal differences between the prior art and the challenged claims relate to the claimed nitrogen generator and the claimed vent.

In determining the differences between the prior art and the claims, the question under 35 U.S.C. § 103, however, is not whether the differences

themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. *Litton Indus.*, 755 F.2d at 164 (“It is elementary that the claimed invention must be considered as a whole in deciding the question of obviousness.”); *see also Stratoflex*, 713 F.2d at 1537 (“the question under 35 U.S.C. § 103 is not whether the differences themselves would have been obvious. Consideration of differences, like each of the findings set forth in *Graham*, is but an aid in reaching the ultimate determination of whether the claimed invention as a whole would have been obvious.”).

c. Level of Skill

Neither Petitioners nor Patent Owner proposes a level of skill in the relevant technology.

The level of 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 absence of an express finding about the level of skill in the art “does not give rise to reversible error ‘where the prior art itself reflects an appropriate level and a need for testimony is not shown.’” *Id.* For purposes of this Decision we determine that the prior art itself reflects an appropriate skill level.

d. Discussion – Claims 1, 2 and 5–9

Petitioners summarize in claim charts where the cited references disclose each element of the claims challenged. Pet. 13–18. Petitioners rely on AAPA for the recited nitrogen generator in claim 1. *Id.* at 10, 14. Petitioners rely on Wood for the recited “vent” in claim 1. *Id.* at 12, 15.

Patent Owner admits that Viking discloses the basic elements of a dry pipe sprinkler recited in the challenged claims. PO Resp. 3 (“Viking

discloses a dry pipe sprinkler system having, among other things, fusible sprinklers, a source of pressurized water, a piping network filled with pressurized air or nitrogen and pitched toward one or more drains including a drum drip, and a dry pipe valve having a clapper.”). As of the filing date of the ’700 patent, Patent Owner also admits that nitrogen generators had been used in the sprinkler industry. PO Resp. 14.

i. The Nitrogen Generator

Petitioners acknowledge that “[a]lthough the Viking reference teaches the use of compressed nitrogen to keep the dry pipe valve clapper closed until a fire opens a fusible sprinkler, it does not teach obtaining the nitrogen from a nitrogen generator.” Pet. 9. Petitioners assert, correctly, that the ’700 Specification discloses that nitrogen generators were well known and available commercially at the time the ’700 patent application was filed. *Id.* (citing Ex. 1001, 10:55–62). The ’700 Specification describes the general, basic function of a nitrogen generator: “[i]n the case of a dry pipe sprinkler system, the nitrogen generator may be used to purge or recharge the pressurized piping network with nitrogen.” Ex. 1001, 10:63–65. This is similar to the basic function of the compressed air supply disclosed in Viking. *E.g.*, Ex. 1008, 3 (“Pressurize dry-pipe system with air pressure”).

Petitioners assert correctly that Viking discloses the use of nitrogen as a pressurized gas in a dry pipe sprinkler system. Pet. 12; *see* Ex. 1008, 1 (“The system piping from the Dry Pipe Valve to the fusible sprinklers is filled with pressurized air or nitrogen.”). Petitioners conclude that “[i]t would have been obvious to one of ordinary skill in the art at the time of filing the ’700 patent application to modify Viking by adding a nitrogen generator, which the ’700 patent specification admits is prior art.” Pet. 12.

Patent Owner acknowledges that such generators were known and used in the sprinkler industry. PO Resp. 14; Tr. 36:1–9, 36:22–37:3.

We are persuaded, however, that the references themselves, Viking combined with AAPA, provide both the reason to use a nitrogen generator and the reason why it would have been obvious to do so. As stated in AAPA, there were a number of commercially available “suitable” nitrogen generators for supplying the pressurized nitrogen that Viking discloses is used in the Viking sprinkler system. Based on this evidence, we are persuaded that a person of ordinary skill and creativity would have chosen suitable equipment for the task at hand. *See also* Dec. Inst. 12–13 (concluding that use of a nitrogen generator in the Viking system “appears to be well within the skill and creativity of a person of ordinary skill”).

ii. *The Vent*

In the Petition, Petitioners assert that Wood discloses the pressure-based, adjustable, “vent positioned within the piping network,” as recited in claim 1 of the ’700 patent. Pet. 11. Petitioners conclude that “[i]t would also have been *obvious to add a vent* operative to vent displaced oxygen while maintaining system pressure, as taught by Wood,” to the modified Viking system discussed above. *Id.* at 12 (emphasis added).

Our Decision to Institute was based on our understanding of the evidence and arguments that because Viking disclosed a “vent” in the *optional* accelerator, it was reasonably likely that a person of ordinary skill would have considered it obvious also to use a vent in the basic fire protection system. Having considered the additional arguments and evidence submitted post-institution, we determine Petitioners assertion that

the challenged claims would have been obvious is not supported by a preponderance of the evidence.

An “accelerator” is an element used on the dry pipe valve, such as dry pipe valve 23 in the ’136 patent, to allow the valve to open more quickly. *See* Ex. 1008, 3, Sec. 4. The dry pipe valve controls the flow of pressurized water into the distribution piping. The faster the dry pipe valve opens, the faster water flows through the pipes and out the sprinklers. The “accelerator” disclosed in Viking is a “pneumatic release system,” where outlet pressure is vented to the atmosphere, allowing the dry pipe valve to open more quickly. *Id.* at 3, Sec. 4(B). As explained in Viking, “[a] dry pipe valve equipped with an accelerator will trip more rapidly and at a higher air-pressure differential.” *Id.* at 3, Sec. 4; *see also* Dec. Inst. 11 (referring to Viking’s disclosure that if an accelerator is used, it may be necessary to loosen the air gauge to vent trapped air pressure (citing Ex. 1008, 3)). We are persuaded, based on the record as a whole including Viking and the Declaration testimony of Mr. O’Neill (Ex. 2019, ¶¶ 59–61), that Viking does not suggest the use of a vent operable to allow gas to exit the piping network at a preset or adjustable limit while maintaining enough pressure within the system *to prevent the clapper of the dry pipe valve from opening*, as required by claim 1. Indeed, the vent disclosed in Viking *accelerates* opening of the dry pipe valve.

We also have been provided further evidence, such as Mr. O’Neill’s Declaration testimony (Ex. 2019) opining on the Wood disclosure from the perspective of a person of ordinary skill in the art. Accordingly, we have modified our analysis of Wood based on the complete record. In the Decision to Institute, we considered Wood’s condensate drain to be a “vent.”

E.g., Dec. Inst. 13. As explained above, considering the complete record, including the testimony of Mr. O’Neill (Ex. 2019 ¶¶ 55–58), we determine that Wood’s automatic condensate drain is intended to drain condensed water from piping systems. Ex. 1009, 3:13–23. The disclosure that Wood’s drain will exhaust air when water is not present (*Id.* at 3:17–19) does not establish that Wood’s drain is a vent operable to allow gas to exit the piping network at a preset or adjustable limit while maintaining enough pressure within the system to prevent the clapper of the dry pipe valve from opening, as required by claim 1.

The proposed combination, as asserted in the Petition, adds a new component to Viking. Petitioners did not assert in the Petition that Wood’s automatic condensate drain would replace the manual condensate drain, or drum drip 24, in Viking, or any other drain in Viking. Thus, Petitioners’ proposed modification results in two condensate drains in Viking, one a manual drain (drum drip 24) and one an automatic drain, without a persuasive explanation as to why a person of ordinary skill would make this change.

Patent Owner argues “Wood lacks any suggestion of repurposing the automatic condensate drain device as a gas vent, to vent gas from a system rather than drain fluids.” PO Resp. 7. Patent Owner also asserts, correctly, that in the Petition, “Petitioners’ assertion that it would have been obvious to use Wood’s automatic condensate drain device, as a gas vent rather than a condensate drain, in Viking’s dry pipe system is supported only by conclusory statements and arguments of counsel.” PO Resp. 28.

Petitioners offer no persuasive evidence that Wood’s condensate drain is operable to allow gas to exit the piping network at a preset or adjustable

limit while maintaining enough pressure within the system to prevent the clapper of the dry pipe valve from opening, as required by claim 1. In their Reply, Petitioners rely on the testimony of Mr. Friesen to establish that Wood's condensate drain "vents water and gas." Reply 8 (citing Ex. 1013 ¶ 17). Mr. Friesen fails to address, however, that Wood discloses that its fundamental objective is to drain condensed water. See Ex. 1009, 3:20–22. Wood discloses that air is discharged only "when water is not present." *Id.* In the challenged claims, the claimed "drum drip" functions to drain condensed water. The claimed vent functions to balance pressures. There is no persuasive evidence that the incidental escape of air from the Wood drain balances pressures as required by the vent in claim 1.

Mr. Friesen also does not support his stated opinion in paragraph 17 of his Declaration with the underlying facts or data on which the opinion is based. Conclusory opinions are entitled to little or no weight. 37 C.F.R. § 42.65.

What also is missing from Petitioners' analysis is persuasive evidence establishing "why" a person of ordinary skill would have *added* the automatic condensate drain of Wood to the Viking system to obtain the vent recited in claim 1. Claim 1 recites both a vent and a condensate drain (drum drip). As explained above, Wood eliminates the need to manually drain small amounts of condensed water from piping systems or other containers. Ex. 1009, 3:20–22. Thus, using Wood in the Viking system may eliminate the need for drum drip 24 in Viking. It does not add a vent operable to allow gas displaced by the nitrogen to exit the piping network at a preset or adjustable limit *while maintaining enough pressure within the system to prevent the clapper of the dry pipe valve from opening*, as recited in claim 1.

Wood discloses that some pressurized gas may escape the system, but any such escaping gas is incidental to the objective of Wood, which is to drain condensed water from the piping system. There is no disclosure or suggestion in Wood that condensate drain 32 regulates the pressure of gas in the piping system. Petitioners assert that the claimed pressure regulation of the vent would be inherent in the proposed combination (Pet. 12), but provide no persuasive evidence to support this argument.

In determining whether there would have been a motivation to combine prior art references to arrive at the claimed invention, it is insufficient to simply conclude the combination would have been obvious without identifying any reason why a person of skill in the art would have made the combination. *Metalcraft of Mayville, Inc. v. The Toro Co.*, 848 F.3d 1358, 1366 (Fed. Cir. 2017). Petitioners provide no explanation or reasoning for concluding that one of skill in the art would have combined these particular references to produce the claimed invention.

In their Reply, Petitioners state that adding Wood's condensate drain to Viking's system would have been "common sense." Reply 7. "Common sense" is a conclusory label. It is the final step in a reasoned analysis based on the evidence. References to "common sense"—whether to supply a motivation to combine or a missing limitation—cannot be used as a wholesale substitute for reasoned analysis and evidentiary support, especially when dealing with a limitation missing from the prior art references specified. *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1362 (Fed. Cir. 2016), *cert. denied sub nom. Google Inc. v. Arendi S. A. R. L.*, No. 16-626, 2017 WL 1040877 (U.S. Mar. 20, 2017). Petitioners' failure to explain the "common sense" on which it relied is problematic. *Id.*

In general, taken out of a specific context, providing a “vent” in the Viking system may seem like a simple, common sense modification that would have been obvious to a person of ordinary skill and creativity. We do not abandon our common sense in considering obviousness of claimed inventions. *KSR*, 550 U.S. at 421. Our decision is based on the evidence and arguments before us. The evidence on which Petitioners rely does not disclose or suggest the “vent” as recited in the challenged claims.

In the highly developed field of sprinkler systems, small differences may produce a nonobvious advance. *See Outside the Box Innovations, LLC v. Travel Caddy, Inc.*, 695 F.3d 1285, 1298 (Fed. Cir. 2012); *see also Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360–61 (Fed.Cir.2011) (providing that the inquiry under § 103 is not whether the claimed invention is “sufficiently simple to appear obvious to judges after the discovery is finally made”). “The emphasis on nonobviousness is one of inquiry, not quality” of the advance. *Graham*, 383 U.S. at 17.

While “the common sense of those skilled in the art demonstrates why some combinations would have been obvious where others would not,” (*Leapfrog Enters., Inc. v. Fisher–Price, Inc.*, 485 F.3d 1157, 1161 (Fed. Cir. 2007)), the determination is made not after observing what the inventor actually did, but in light of the state of the art before the invention was made. *Outside the Box Innovations*, 695 F.3d at 1298.

In its Reply, Petitioners assert a new motivation. Petitioners assert that a person of ordinary skill would “substitute” Wood’s drain for one of the drains in Viking. Reply 11–15. We find this new argument and the evidence on which it relies equally unpersuasive for the same reasons as stated above, i.e., it does not explain why a person of ordinary skill in the art

would have substituted Wood's condensate drain for any one of the various drains in Viking, which include test drain 6, water motor alarm drain 10, drum drip 24, and Inspector's test drain 29. As we explained above, even if such a substitution were made, the resulting structure would not serve as the claimed "vent," operable to allow gas to exit the piping network at a preset or adjustable limit while maintaining enough pressure within the system to prevent the clapper of the dry pipe valve from opening, as required by claim 1.

*2. Conclusion Regarding Claims 1, 2 and 5–9
Obviousness Based on Viking, Wood, and AAPA*

Based on the evidence and the analysis above, we determine that Petitioners have failed to carry their burden to establish unpatentability of claims 1, 2, and 5–9 by a preponderance of the evidence.

*3. Claims 3 and 4
Obviousness Based on Viking, Wood, AAPA, and Wagner*

Petitioners also provide summary claim charts for their asserted Ground 2, challenging claims 3–4. *Id.* at 19–20. Claim 3 depends from claim 1 and recites an oxygen sensor coupled to the dry pipe sprinkler system. Claim 4 depends from claim 3 and recites that the nitrogen generator is configured to provide nitrogen to the piping network automatically in response to an oxygen level measured by the oxygen sensor. Petitioners assert that Wagner teaches the use of an oxygen sensor in conjunction with a nitrogen generator to measure and control the oxygen level in a room for the purpose of fire suppression. *Id.* at 18.

Wagner fails to cure the deficiencies of the prior art identified above with respect to independent claim 1. Accordingly, Petitioners have failed to

carry their burden to establish unpatentability of claims 3 and 4 by a preponderance of the evidence.

III. CONCLUSION

Based on the analysis above, we determine that Petitioners have not established by a preponderance of the evidence that claims 1–9 of the '700 patent would have been obvious based on the cited references. Based on this determination, we need not address the objective evidence in support of patentability on which Patent Owner relies.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that Petitioner has not established that claims 1–9 are unpatentable; and

FURTHER ORDERED that this is a Final Written Decision under 35 U.S.C. § 318(a), and that parties to the proceeding seeking judicial review of the decision under 35 U.S.C. § 319 must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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