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Paper 24
Entered: June 17, 2016

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BLACK & DECKER (U.S.) INC. and
STANLEY BLACK & DECKER, INC.,
Petitioner,

v.

CHRISTY, INC.,
Patent Owner.

Case IPR2015-00468
Patent 7,082,640 B2

Before MICHAEL W. KIM, DONNA M. PRAISS, and KRISTINA M. KALAN, *Administrative Patent Judges.*

PRAISS, *Administrative Patent Judge.*

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. BACKGROUND

Black & Decker (U.S.) Inc. and Stanley Black & Decker, Inc. (collectively, "Petitioner") filed a Petition to institute an *inter partes* review of claims 1–18 (the "challenged claims") of U.S. Patent No. 7,082,640 B2 (Ex. 1001, "the '640 patent") pursuant to 35 U.S.C. §§ 311–319. Paper 1 ("Pet."). A Preliminary Response was filed by Christy, Inc. ("Patent Owner"). Paper 12 ("Prelim. Resp."). The Board granted the Petition as to certain grounds and instituted trial. Paper 13 ("Dec. on Inst."). Although Petitioner proposed fourteen grounds of unpatentability, the panel instituted trial only on the following five grounds:[1]

(1) Claims 1 and 10 as anticipated by Hayden;

(2) Claims 1, 4–6, 10, and 13–15 as obvious over Hayden and Wellan;

(3) Claims 7–9 and 16–18 as obvious over Hayden, DE219, and Howeth;

(4) Claims 9 and 18 as obvious over Hayden, DE219, Howeth, and Wellan; and

(5) Claims 2, 3, 11, and 12 as obvious over Hayden and von Stackelberg.

[1] US Patent No. 5,108,473, Apr. 28, 1992 (Ex. 1003) ("Hayden"); US Patent No. 3,680,285, Aug. 1, 1972 (Ex. 1004) ("Wellan"); DE 101 01 219 A1, July 25, 2002 (Ex. 1006; Ex. 1008 (translation)) ("DE219") (citations herein are to the translation, Ex. 1008); US Patent No. 4,465,497, Aug. 14, 1984 (Ex. 1007) ("Howeth"); and US Patent No. 6,767,380 B2, July 27, 2004 (Ex. 1010) ("von Stackelberg").

Id. at 22.[2]

During trial, Patent Owner filed a Patent Owner Response.[3] Paper 16 ("PO Resp."). Petitioner filed a Reply to Patent Owner's Response relying on the Declaration of Jeffrey P. Grant (Ex. 1013) and the Second Declaration of Jeffrey P. Grant (Ex. 1015). Paper 17 ("Pet. Reply"). An oral hearing was held on March 22, 2016, and a transcript of the hearing is included in the record. Paper 23 ("Tr.").

We have jurisdiction under 35 U.S.C. § 6(c). This final written decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, we determine that Petitioner has met its burden to prove by a preponderance of the evidence that claims 1–18 of the '640 patent are unpatentable.

A. Related Proceedings

The '640 patent is the subject of *CDC Larue Indus., Inc. v. Black & Decker Corp.*, Civil Action No. 4:14-cv-00286 (N.D. Okla.). Pet. 1; Paper

[2] The Decision on Institution contains a typographical error on page 21. We instituted trial only on claims 9 and 18 over Hayden, DE219, Howeth, and Wellan, and we did not institute trial on all of claims 7–9 and 16–18 over Hayden, DE219, Howeth, and Wellan. *Compare* Dec. on Inst. 6–7, *with id*. at 22.

[3] Patent Owner includes the Declaration of David L. McCutchen (Ex. 2001) in a list of exhibits on page iii of Patent Owner's Response without citing or relying on it in Patent Owner's Response. *See generally* PO Resp. Incorporation of arguments from one document into another document by reference is not permitted; arguments not raised in the response itself are deemed waived. 37 C.F.R. § 42.6(a)(3); Paper 14 (Scheduling Order), 3. Therefore, we give no weight to the Declaration of David L. McCutchen for purposes of this Decision.

10, 2. It is also the subject of concurrently-filed *inter partes* review proceeding IPR2015-00472.

B. The '640 Patent (Ex. 1001)

The '640 patent, titled "Ambient Air Backflushed Filter Vacuum," is directed to a filtered vacuum system in which dust is cleaned from the filters with backflushed ambient air. Ex. 1001, 1:6–8. The device comprises a canister[4] having at least two filters, an inlet port, and at least two outlet ports that are in pneumatic communication with each of the filters. *Id*. at Abstr. At least two valves are disposed outside of the canister, each in pneumatic communication between a vacuum source and an outlet port so as to permit air to be drawn through the filters. *Id*. The valves are operated by a controller which switches "the filters from the vacuum source to ambient air so as to permit ambient air to be sequentially intermittently drawn through corresponding valves and filters." *Id*. Figure 1 below is a block diagram of the ambient air backflushed filter vacuum system. *Id*. at 3:1–2.

[4] The '640 patent uses the spelling "cannister." *See* Ex. 1001, *passim*. We use the common spelling "canister" for purposes of this decision.

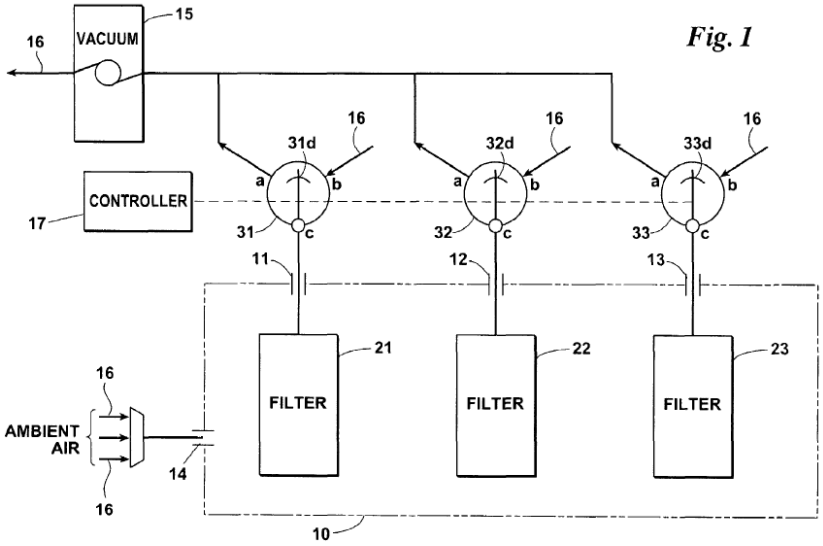

Figure 1 shows multiple filters 21, 22, 23 in canister 10 having inlet port 14 through which ambient air 16 flows, and outlet ports 11, 12, 13 through which the filters are in pneumatic communication with vacuum source 15. *Id.* at 3:29–31, 46–48. Controller 17 causes valves 31, 32, 33 disposed outside of canister 10 to switch between an open position "a" to vacuum source 15 and a closed position "b" that draws in ambient air 16 to filters 21, 22, 23. *Id*. at 3:28–48.

Figure 2 below is a side elevation of the ambient air backflushed filter vacuum. *Id*. at 3:3–4.

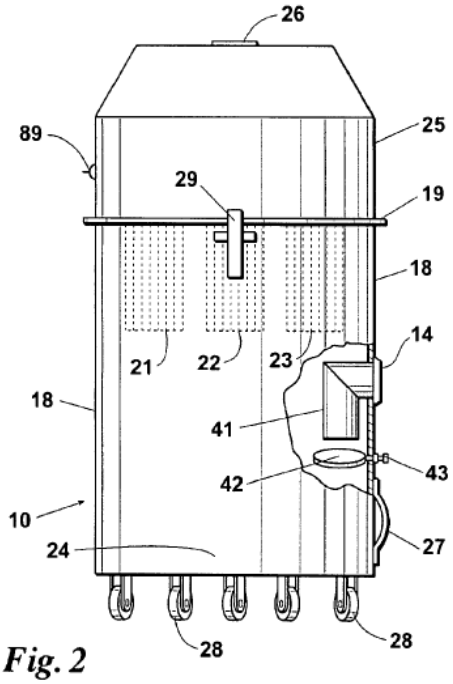

Fig. 2

Figure 2 shows cylindrical canister 10 topped with plate 19. Filters 21, 22, 23 are mounted to the bottom of plate 19 and pneumatically communicate through outlet ports in plate 19 to vacuum source 15 (not shown) mounted above plate 19. Vacuum source 15 is protected by cover 25 seated on plate 19 and secured with latches 29. *Id*. at 4:13–34. Opening 26 in cover 25 exhausts air discharged from vacuum source 15. *Id*. at 4:26–27. Inlet port 14 is shown with duct 41 extending below filters 21, 22, 23. Baffle 42 is positioned below the outlet end of duct 41 to redirect air flow such that (1) there is little turbulence below baffle 42 and (2) particles that settle to bottom 24 of canister 10 are less likely to be recycled through filters 21, 22, 23. *Id*. at 4:35–54.

C. Illustrative Claim

Claims 1 and 10 of the ’640 patent are the only independent claims at issue. Claim 1, reproduced below, is illustrative of the claimed subject matter:

> 1. A vacuum cleaning machine comprising
>
> a cannister having an inlet port and at least two outlet ports,
>
> at least two filters disposed inside of said cannister, one in pneumatic communication through a corresponding one of each of said outlet ports,
>
> a vacuum source,
>
> at least two valves disposed outside of said cannister, each said valve being in pneumatic communication between said vacuum source and a corresponding one of each of said outlet ports and permitting air to be drawn by said vacuum source from said inlet port simultaneously through corresponding ones of said filters and
>
> means for sequentially operating said valves to switch said filters from connection to said vacuum source to connection to ambient air and permitting ambient air to be drawn through corresponding ones of said valves and said filters which are connected to ambient air by said vacuum via corresponding ones of said valves and filters which are connected to said vacuum.

Ex. 1001, 8:4–20 (paragraphing added).

II. ANALYSIS

A. Person of Ordinary Skill in the Art

Petitioner asserts that the field of the invention is "vacuum cleaning machines" and "[t]he ordinary artisan in the field would typically have a bachelor's level degree in mechanical engineering (or gained such knowledge by equivalent experience), and experience developing vacuum machines that filter air." Pet. 26 (citing Ex. 1001, 1:6–9; Ex. 1013 ¶ 8). Patent Owner does not dispute Petitioner's definition of a person of ordinary skill in the art or provide an alternative definition in response.

For purposes of this Decision, we consider the cited prior art as representative of the level of ordinary skill in the art. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (finding the absence of specific findings on "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'" (quoting *Litton Indus. Prods., Inc. v. Solid State Sys. Corp.*, 755 F.2d 158, 163 (Fed. Cir. 1985))). To the extent that we need to consider the parties' positions on the issue, we adopt Petitioner's position.

B. Claim Interpretation

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); *see also In re Cuozzo Speed Techs., LLC*, No. 778 F.3d 1271, 1278 (Fed. Cir. 2015) ("We conclude that Congress implicitly adopted the broadest reasonable interpretation standard in enacting the AIA."), *cert. granted sub nom. Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 890 (mem.) (2016). Under that standard, claim terms are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). Also, care is taken not to read a particular embodiment appearing in the written description into the claim if the claim language is broader than the embodiment. *See In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993) ("limitations are not to be read into the claims from the specification").

In the Decision on Institution, we interpreted various claim terms of the '640 patent as shown in the following two tables:

Table 1. Claim Terms

Term	Interpretation
"ambient air"	"air surrounding the canister"
"drawn"	"pulled in by negative pressure"
"a piston reciprocally disposed between said two ports"	"a piston located between the claimed ports of the valve housing, and that moves back and forth between the claimed ports"

Dec. on Inst. 7–9.

Table 2. Means-Plus-Function Claim Terms

Term	Function	Structure
Means for sequentially operating	Switching the filters from connection to said vacuum source to connection to ambient air	Solenoid for each valve
Means for setting said intermittent time	Actuating the solenoid after a length of time to switch the valve to ambient air	Cam motor or backflush timer in controller
Means for setting a cycle time	Actuating the solenoid after a length of time to switch the valve to ambient air	Cam motor or delay timer in controller
Means biasing said piston	Acts to bias the piston	Coil spring
Means for over–coming said bias	Overcoming spring bias when sequentially operating the valves	Solenoid for each valve
Means for energizing . . . de–energizing	Opening or closing or actuation of switches to energize solenoids	Switches
Means cooperable with said inlet port	Divides canister into an upper zone of high velocity vortex air flow and a lower zone of reduced velocity air flow	Duct and baffle

Id. at 9–10.

Patent Owner does not raise any claim construction issues in its Response. *See* PO Resp. 4. Petitioner challenges only our construction of the term "ambient air." *See* Pet. Reply 14–15. Neither party requested construction of the claim terms "canister" and "pneumatic communication." Because the parties dispute whether the evidence shows a "canister" and "pneumatic communication" as claimed, however, we include claim constructions for these terms. Our analysis of the terms "ambient air," "canister," and "pneumatic communication" follows. Regarding the remaining terms for which a claim construction was requested, after reconsidering everything anew, we adopt the constructions as stated in Tables 1 and 2 for the reasons stated in our Decision on Institution. Dec. on Inst. 7–10.

Ambient Air

Petitioner proposes "ambient air" means "air from the area surrounding the outside of the vacuum cleaning machine that has not been forced or compressed." Pet. 13. Petitioner asserts this construction is consistent with the Specification, which confirms ambient air is outside the vacuum machine, and that Patent Owner disavowed forced or compressed air from being ambient air during prosecution. *Id*. at 13–14.

The district court found the meaning of "ambient air" was not limited by clear and unmistakable evidence to either (1) air surrounding the outside of the vacuum cleaning machine or (2) air that is not forced or compressed. Opinion and Order, Ex. 2004, 6–14. In our Decision on Institution, we agreed with the district court's construction and analysis, which is broader than Petitioner's proposed construction, and found it consistent with the Specification. Dec. on Inst. 8. Specifically, Figure 2 of the '640 patent

shows cover 25 "seated on" plate 19 to protect the valves, the operating mechanisms, the controller, and the vacuum source, which are all "mounted above" plate 19. Ex. 1001, 4:22–25. Thus, ambient air coming through the valves may come from the vacuum head under the cover; it need not come exclusively from outside the vacuum machine as Petitioner asserts. There is no evidence in the record whether the ambient air under the cover necessarily would have a particular pressure, including whether it is under atmospheric pressure. *See* Tr. 43:13–44:2 (Patent Owner describing ambient air as being "in comparison to what is inside of the cannister").

Petitioner contends that its proposed construction should be adopted because (1) it is not dependent upon what constitutes the canister and (2) the '640 patent is ambiguous or silent regarding "whether the ducts drawing in the ambient air receive re-circulated air from under the cover 25" or "whether they lead outside the cover 25 to the exterior of the machine." Pet. Reply 14. Petitioner asserts that "intrinsic evidence shed[s] light on that ambiguity" because prior art was distinguished during prosecution on the basis of forced air being recirculated inside the prior art apparatus. *Id*. at 14–15 (citing Ex. 1002, 35–36, 59–60).

During prosecution, Patent Owner distinguished a pulse back cleaning system for multiple reasons, including the reason that the claimed invention "does not flip-flop between vacuuming and blowing." File Wrapper of U.S. Patent No. 7,082,640 B2, Ex. 1002, 36. Patent Owner also distinguished other prior art for the reason that it "cannot function without a second centrifugal fan and associated components and limitation (e.g., transverse duct and array of parallel ducts)" whereas the invention was described as "valve 31 and filter 21 are not connected to any other fan, compressor or

vacuum source." *Id*. at 59. We agree with the district court that the intrinsic evidence does not present a clear and unmistakable disavowal of the source of ambient air. *Thorner v. Sony Comput. Entm't Am. LLC*, 669 F.3d 1362, 1366 (Fed. Cir. 2012) (the standard for disavowal of claim scope is "exacting"). Figures 2–5 of the '640 patent show three ambient air ducts 36 under cover 25. Ex. 1001, Figs. 2–5, 3:1–9, 4:22–27, 5:15–17. As the district court found, "[i]t is not clear from the drawing where that duct terminates, and the detailed description states only that '[t]he ambient air duct 36 extends from the ambient air port 31b into the source of ambient air 16.'" Ex. 2004, 12. Similarly, the district court found that the statements in the prosecution history regarding the ambient air also "do not exclude the possibility that 'ambient air' could come from inside—or both inside and outside—the vacuum head during backflushing." *Id*. at 13. Moreover, the distinctions over the prior art included "differences unrelated to the source of the air used for backflushing." *Id*. Based on the complete trial record, including the prosecution history, we agree with the district court's construction of "air surrounding the canister" as the broadest reasonable interpretation of the term "ambient air." *See Microsoft Corp. v. Proxyconn, Inc.*, 789 F.3d 1292, 1298 (Fed. Cir. 2015) ("The PTO should also consult the patent's prosecution history in proceedings in which the patent has been brought back to the agency for a second review."). Accordingly, we maintain our construction of "ambient air" to mean "air surrounding the canister."

Canister

A dictionary definition of "canister" is "[a] small box or case for holding tea, coffee, etc." WEBSTER'S NEW COLLEGIATE DICTIONARY, 121

(2d ed. 1951) (Ex. 3001). The canister component of the vacuum cleaning machine described in the '640 patent holds filters and particles filtered by the filters that may settle to the bottom of the canister. Ex. 1001, 3:30–31, 4:50–54. At oral hearing, Patent Owner stated "I believe we chose the word cannister because we are talking about a small unit," but added "[a]nd I'm not saying this is a distinction." Tr. 42:12–13, 16. According to Patent Owner, the term is "a common word for this now" as opposed to being uniquely defined by the Specification. *Id*. at 42:24–25. Patent Owner summarized the generic manner in which the term is used in the '640 patent as: "We are saying, okay, it doesn't matter. It's cannister, a cabinet, a compartment. They are all some form of container." Tr. 42:25–43:2.

Petitioner implicitly construes this term as a "chamber" and not limited to a particular configuration. Pet. Reply 2–5. Petitioner asserts that there is no disavowal in the Specification of configurations for the canister. *Id*. at 3. In further support of its position, Petitioner quotes the testimony of Mr. Grant describing the prior art wherein he states "[t]he canister of the vacuum is the part where the filters reside and dust is separated from the incoming vacuumed air and collected." *Id*. (quoting Ex. 1013 ¶ 10).

Based on the entire record, we determine that the ordinary and customary meaning of the term "canister," as would be understood by one of ordinary skill in the art in the context of the entire disclosure, is "a container." *See Translogic*, 504 F.3d at 1257.

Pneumatic Communication

The term "pneumatic communication" is recited in claims 1 and 10 to describe the relationship between one filter and "a corresponding one of each of said outlet ports, a vacuum source, . . . valves disposed outside of

said cannister." Ex. 1001, 8:6–9, 8:62–65. It is also recited in claims 1 and 10 to describe the relationship between "each valve" and the "vacuum source and a corresponding one of each of said outlet ports." *Id*. at 8:9–11, 8:65–67. Each claim further recites "permitting air to be drawn by said vacuum source from said inlet port simultaneously through corresponding ones of said filters." *Id*. at 8:11–13, 8:67–9:2. As construed above, the term "drawn" means "pulled in by negative pressure." *See supra* Section II.B. Through their assertions concerning the applicability of the prior art, Patent Owner asserts that a particular structure, such as a duct, is required to achieve air being pulled in by negative pressure through a filter by a vacuum source. There is no evidence presented to us in this record that supports Patent Owner's assertion. Both the context of the claims and the Specification suggest that "pneumatic communication" is used broadly to refer to the relative positioning of the vacuum source, filters, and ports such that the air is drawn through the filters. Neither the claims nor the Specification use the term "duct" or any particular connective structure when describing air flow as "pneumatic communication." *See*, *e.g*., Ex. 1001, 1:62–2:8. In comparison, a "duct" is identified in the Specification as redirecting air flow from the inlet port to reduce recycling particles through the filters. *See*, *e.g.*, Ex. 1001, 2:52–61. Therefore, we construe the term "pneumatic communication" as not limited to a "duct."

C. Patentability of Claims

To prevail in its challenges to the patentability of claims, the Petitioner must establish facts supporting its challenges by a preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). A claim is anticipated, and, thus, unpatentable, if a single prior art reference discloses

each and every element of the claimed invention. *See Schering Corp. v. Geneva Pharm.*, 339 F.3d 1373, 1377 (Fed. Cir. 2003). A claim is obvious, and, thus, unpatentable, if 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. 35 U.S.C. § 103(a).

We analyze the instituted grounds of unpatentability in accordance with the above-stated principles.

D. Anticipation of Claims 1 and 10 by Hayden

With respect to the alleged ground of unpatentability based on anticipation by Hayden, we have reviewed the Petition, the Patent Owner Response, and Petitioner's Reply, as well as the relevant evidence discussed in each of those papers. We are persuaded, by a preponderance of the evidence, that claims 1 and 10 are anticipated by Hayden under 35 U.S.C. § 102(b).

1. Overview of Hayden (Ex. 1003)

Hayden describes a dust collector that filters dirty air and periodically backflushes the filtration elements by sucking atmospheric air backwards through the filtration elements. Ex. 1003, Abstr. A diverter valve switches between normal usage and the backflush. *Id*. Figure 1 below is a perspective view of the dust collector of Hayden with the cabinet cut away to show diverter valve 11 (with air inlet port 13) on the left and separator plate 8, on the right, that separates clean air chamber 10 from the dirty air below. *Id*. at 2:64–67; 3:32–45; 3:52–55.

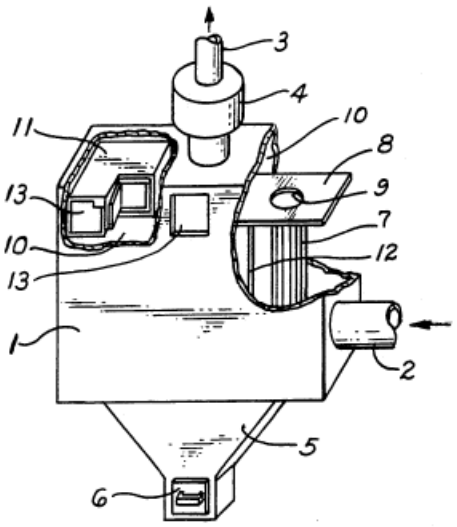

Fig. 1

Figure 1 above also shows outlet holes 9 in plate 8 for each filter 7 and that diverter valve 11 rests on separator plate 8. *Id*. at 3:40–45. The Hayden reference was considered the closest prior art to the '640 patent claims by the Examiner during prosecution. Ex. 1002, 17. However, the Examiner did not reject any of the claims based on Hayden. As stated in the Reasons for Allowance, the Examiner found that "Hayden has the valves located inside the canister and the canister has only a single outlet." *Id*.

2. Comparison of Hayden with Claims 1 and 10

Referring to Figure 1 of Hayden and claim 1 of the '640 patent, Petitioner identifies the presence of every claim limitation in Hayden's vacuum cleaning machine. Pet. 26–36. According to Petitioner, the canister required by claim 1 corresponds to Hayden's "dirty air chamber below plate 8 in which the filters 7 are located." *Id*. at 26 (citing Ex. 1003, 3:34–37). Petitioner further identifies on Hayden's canister portion inlet port 2 and multiple outlet ports 9 (one for each of the plurality of filters 7). *Id*. at 26–27 (citing Ex. 1003, 3:34–37, 3:43–49). Petitioner asserts Hayden discloses at least two filters 7 disposed inside the canister, each one in pneumatic

communication through a corresponding outlet hole or port 9. *Id*. at 27 (citing Ex. 1003, 3:43–49, 4:67–5:23). Petitioner contends the required vacuum source corresponds to suction blower 4 of Hayden "which sucks dirty air from the source and causes the flow through filter 7." *Id*. (quoting Ex. 1003, 55–58). The required valves disposed outside of the canister correspond to each "diverter valve 11 [which] rests on divider plate 8 directly over filter outlet hole Item 9." *Id*. (quoting Ex. 1003, 3:40–45).

Regarding each valve "being in pneumatic communication between said vacuum source and a corresponding one of each of said outlet ports," as recited in claim 1, Petitioner quotes Hayden's disclosure that the valve chamber is "open on the bottom to receive clean filtered air from filter outlet hole 9 over which the diverter valve 11 sits. Valve chambers 31 [not numbered in Figure 1] thus lie in the air flow path between the dirty air chamber and clean air chamber 10." *Id*. at 27–28 (quoting Ex. 1003, 4:26–31). The recited "means for sequentially operating said valves to switch said filters from connection to said vacuum source to connection to ambient air" in claim 1 is identified in Hayden by Petitioner as the comparison between Hayden's Figures 4 and 6, as well as Hayden's disclosures of a backflushing operation, which switches the valve between an open and a closed position that effectively alternates between ports and a backflushing and a non-backflushing position. *Id*. at 28–29 (citing Ex. 1003, Figs. 4, 6, 2:28–51, 4:32–66, 5:12–15, 6:1–6). As shown by Petitioner, the backflushing position of the valve "block[s] communication between valve chamber 31 and the clean air chamber 10, and open[s] valve chamber 31 to the ambient air port 13." *Id*. at 32 (citing Ex. 1003, Figs. 3, 4, 6; Ex. 1013 ¶¶ 18, 19).

As for the additional structural limitations recited in claim 10, namely "three outlet ports," "three filters, and "three valves," Petitioner identifies Hayden's disclosure of a "dozen or so" filters as encompassing at least three filters and further states that each filter in Hayden is associated with an outlet port 9 through filter plate 8 and into valve chamber 31 and diverter valve 11. *Id*. at 30 (citing Ex. 1003, Fig. 1, 2:52–56, 3:43–49).

Patent Owner challenges the evidence of anticipation of claims 1 and 10 by Hayden on the basis that Hayden's "canister" is not "the dirty air chamber" as identified by Petitioner. PO Resp. 3. Instead, Patent Owner asserts that Hayden's "canister" is "divided by a plate into an upper negative pressure clean air chamber and a lower dirty air chamber." *Id*. As such, Patent Owner argues that Hayden's valves 11 are inside the canister instead of outside the canister as required by claims 1 and 10. *Id.* at 3–4, 12–13. Patent Owner points to the prosecution history of the '640 patent in support of its argument, in which the Examiner determined that Hayden has its valves 11 inside the canister, instead of outside the canister as required by claim 1 and 10. *Id*. at 20 n.7 (citing Ex. 1002, 17).

Patent Owner argues that its claimed canister "has only a single chamber" and therefore "do[es] not correspond" to "Hayden's two chamber canister." *Id*. at 21–22. Patent Owner further distinguishes Hayden from the claimed invention on the basis that "Hayden's ports 9 open into valves 11 which are inside the negative pressure clean air chamber 10 while Patent Owner's outlet ports 11, 12, 13 open into valves 31, 32, 33 which are in ambient air 16." *Id*. at 22 (emphasis omitted). Patent Owner asserts that because Hayden draws atmospheric air from outside of chamber 10 into

valve 11, Hayden's valves are "not in ambient air outside of the canister." *Id*. at 24.

Patent Owner also argues that Hayden's valves 11 are not in pneumatic communication between the vacuum source 4 and outlet ports 9 because "Hayden's common negative pressure chamber 10 is common to all of Hayden's valves 11 and access to the suction blower 4 is had only by communication through the common negative pressure clean air chamber 10." *Id*. at 23. Patent Owner asserts the claimed invention "has no clean air chamber and Patent Owner's vacuum source 15 is always connected to the valves 31, 32, 33." *Id*. at 24.

Based on the preponderance of the evidence in this record, we are persuaded the '640 patent claims read on Hayden's embodiment shown in Figure 1. We find the scope of the '640 patent claims is broader than the distinctions Patent Owner argues to differentiate the teachings of Hayden. Patent Owner's arguments focus on particular embodiments disclosed in the '640 patent, but the '640 patent claims are not so limited. For example, Patent Owner contends that Hayden's dirty air chamber cannot correspond to a canister because "in order to access ambient air, Hayden must extend a duct from each of the valves 11 through the negative pressure clean air chamber 10 to ambient air outside of the chamber 10." *Id*. at 21. Patent Owner concludes that because the canister depicted in the '640 patent as item 10 and 19 has a single chamber, "Hayden's two chamber canister and Patent Owner's single chamber canister 10, 19 do not correspond." *Id*. at 21–22 (emphasis omitted). We are not persuaded.

Similarly, Patent Owner contends that Hayden's diverter valves 11 do not correspond to the claimed valves because they are situated differently

from valves 31, 32, and 33 in the '640 patent. Specifically, Patent Owner contends that "Patent Owner's vacuum source 15 is connected to each valve 31, 32, 33, not to a negative pressure chamber 10" while "Hayden's clean air chamber 10 is a negative pressure chamber common to and encasing all the 'outlet' ports 9 and valves 11." *Id*. at 22 (emphasis omitted). Patent Owner's arguments are unpersuasive because limitations not appearing in the claims cannot be relied upon for patentability. *In re Self*, 671 F.2d 1344, 1348 (CCPA 1982).

We are not persuaded by Patent Owner's arguments because neither the '640 patent claims nor the teachings of Hayden preclude reading the term "canister," as construed herein, on Hayden's "dirty air chamber below plate 8 in which the filters 7 are located." *See* Pet. 26 (citing Ex. 1003, Fig. 1). The '640 patent itself describes such an embodiment in which the canister component is located under a plate. Ex. 1001, 4:59–61 ("A central housing 44 is preferably concentrically located on top of the circular plate 19 covering the cannister 10."). In other words, Patent Owner's plate 19 covers canister 10 just as Hayden's plate 8 covers Hayden's canister. As such, we find that Hayden discloses "at least two valves disposed outside of said cannister" and "three valves disposed outside of said cannister" as recited in claims 1 and 10, respectively.

We also find no limitation in the '640 patent claims that would preclude a common chamber between the valves and the vacuum source. No specific connective structure between the valves and the vacuum source is required by "each said valve being in pneumatic communication between said vacuum source and a corresponding one of each of said outlet ports and permitting air to be drawn by said vacuum source from said inlet port

simultaneously through corresponding ones of said filters," as recited in claims 1 and 10. Referring to Figure 1 of Hayden, correspondence exists between each valve 11, outlet port 9, and filter 7. Ex. 1003, Fig. 1, 3:40–45. In addition, there is pneumatic communication between these elements of Hayden due to an "air flow path between the dirty air chamber and clean air chamber 10" in which valve chamber 31 lies. *Id*. at 4:26–31. Furthermore, independent claims 1 and 10 each use the term "comprising," signaling an open-ended structure, allowing for the inclusion of a common chamber.

Regarding the prosecution history, we are persuaded by Petitioner that the Examiner overlooked Hayden's description of divider plate 8 separating the dust collector into a dirty air chamber (not numbered) and a clean air chamber 10. *See* Pet. 35. We are unpersuaded by Patent Owner that Hayden does not disclose the claimed "cannister," the claimed "valves disposed out of said cannister," and the claimed "connection to ambient air" recited in claims 1 and 10. The broadest reasonable interpretations of "cannister" and "ambient air" do not require the sort of structural connections between the vacuum and the valves and between the valves and the ambient air that Patent Owner proposes we read into the claims from Figures 1 and 2 in the '640 patent showing canister 10, 19 and valves 31, 32, and 33. Indeed, Figures 1 and 2 of the '640 patent omit any particular ducts by which ambient air is carried, including in the region above plate 19 and under cover 25 shown in Figure 2.

Nor do we incorporate any particular structural connections between the components of the claimed vacuum cleaning machine through the term "pneumatic communication" recited in claims 1 and 10. When asked about "pneumatic communication" at oral hearing, Patent Owner stated that it

refers to the pattern of flow dictated by how the claim tells you to put the parts together to create a backflow situation in a vacuum cleaning machine. *See* Tr. 32:14–33:4. Patent Owner asserts that the flow patterns are different between the claimed machine and Hayden, and illustrates this difference in diagrams. PO Resp. 5–21 (citing Ex. 2005 (’640 patent diagrams), Ex. 2006 (Hayden diagrams)). Any differences in the flow patterns drawn as colored arrows by Patent Owner in Exhibits 2005 and 2006, however, are not due to the omission of an element recited in claim 1 or 10. *Compare* Ex. 2005, diagrams 5 and 6, *with* Ex. 2006, diagrams 9 and 12.

Patent Owner does not dispute that the Hayden device creates a backflow situation. Nor does Patent Owner dispute that gas flow in Hayden’s device is through Hayden’s valve between a vacuum source and an outlet port to draw air through a corresponding filter. Patent Owner also does not dispute that Hayden’s valve is switched from the vacuum source to air from outside of the machine such that the air flows through the valve and filters to create a backflush situation. In Exhibit 2006, Patent Owner draws a box to indicate Hayden’s clean air chamber 10 is above the unnumbered dirty air chamber contained by divider plate 8, and omits from Exhibit 2005 any reference to the ’640 patent’s disclosure of cover 25 above canister 10, 19. The only difference between the arrows drawn by Patent Owner in Exhibits 2005 and 2006 is with respect to the regions above plates 19 (of the ’640 patent) and 8 (of Hayden) outside of their filter-containing compartments. Patent Owner shows the gas drawn through the valves by a negative pressure vacuum source as coming together either in what appears to be a common duct for the invention (Ex. 2005, diagram 5) or clean air chamber 10 of Hayden (Ex. 2006, diagram 9). During the backflush

operation, Patent Owner shows the switch to ambient air being pulled through the valves as coming from outside of the machine in both the invention and Hayden. Ex. 2005, diagram 6; Ex. 2006, diagram 12. Thus, the only difference between the invention and Hayden's machine suggested by Patent Owner's diagrams is in the suggested ductwork above the plates and valves. Claims 1 and 10 do not require any particular ductwork, connector, or path (1) for the negative pressure vacuum source after it draws air through the valve or (2) for the ambient air source to reach the valves. Therefore, we do not find persuasive Patent Owner's attorney arguments presented as diagrams in Exhibits 2005 and 2006.

The preponderance of the evidence on the complete record after trial shows that Hayden's dust collector with atmospheric backflush anticipates claims 1 and 10 for the reasons provided by Petitioner and as articulated herein. Pet. 26–36; Pet. Reply 1–17.

E. Obviousness of Claims 1, 4–6, 10, and 13–15 Over Hayden and Wellan

Regarding claims 1 and 10, Petitioner asserts that, to the extent that the term "means for sequentially operating" also requires timing features from a controller, rather than just the solenoids controlled by the controller, Wellan's controller is equivalent to the structure in the '640 patent's electronic embodiment. Pet. 39. Wellan's electronic controller includes a timer that has inputs for adjusting the frequency and length of time at which a stepping switch moves between connections to the various individual solenoids for valves 38. *Id*. at 41 (citing Ex. 1004, Fig. 7; 5:52–60; 7:42–47; 7:58–61). Petitioner's rationale for selecting Wellan's controller, for Hayden's device, is based on Hayden's disclosure that its cleaning cycle

controller provides for automatic, periodic cleaning cycles to keep the dust-making equipment in continuous operation and "[i]t is considered within the capacity of those skilled in the art to construct cleaning cycle controller 25." *Id*. at 40 (quoting Ex. 1003, 4:60–66). Therefore, Petitioner asserts that one of ordinary skill in the art, looking for an appropriate controller with which to construct the Hayden device, would have included the known controller that Wellan discloses for actuating solenoids in a vacuum cleaning machine. *Id*.

Regarding claims 4–6 and 13–15, Petitioner asserts that the electronic controller of Wellan is equivalent to the electronic controller of the '640 patent, and that Wellan's electronic controller sets the intermittent time that the valve is switched to ambient air in the same manner as the backflush timer 103 in the '640 patent. *Id*. at 44 (citing Ex. 1001, 6:40–50; 7:1–6; Ex. 1004, 5:52–59; 7:42–47). Similarly, Petitioner asserts that Wellan's electronic controller is equivalent to the controller of the '640 patent, because both controllers turn the solenoid valves on and off individually, and therefore set a cycle time of periods when the solenoids are energized (on) and de-energized (off). *Id*. at 46–47 (citing Ex. 1001, 6:8–11, 6:17–33; Ex. 1004, 5:55–59). Accordingly, Petitioner asserts that the combination of Wellan's controller with Hayden's device meets the "means for setting said intermittent time" recited in claims 5, 6, 14, and 15 and the "means for setting a cycle time" recited in claims 4, 6, 13, and 15. *Id*. at 45–46, 47–48.

Patent Owner asserts that obviousness over the combination of Hayden and Wellan is moot because Hayden does not disclose every element of claims 1 and 10 for the reasons discussed above. PO Resp. 30–31.

For the reasons provided in the Petition and above, we are persuaded that Hayden discloses the elements recited in claims 1 and 10. Based on the trial record, Hayden suggests the use of known controllers, such as that disclosed in Wellan, for sequentially operating valves in vacuum cleaning devices. Petitioner also has shown adequately how the controller in Wellan is equivalent to the controller in the '640 patent to meet the "means for setting a cycle time" and the "means for setting said intermittent time" limitations required by dependent claims 4–6 and 13–15. Therefore, the preponderance of the evidence demonstrates that substituting controller 25 in Hayden's device with Wellan's controller would have been obvious as a predictable variation in the same field. Accordingly, claims 1, 4–6, 10, and 13–15 would have been obvious in view of Hayden and Wellan for the reasons provided by Petitioner. *See* Pet. 39–48; Pet. Reply 17.

F. Obviousness of Claims 7–9 and 16–18 Over Hayden, DE219, and Howeth

After considering Petitioner's and Patent Owner's positions as to claims 7–9 and 16–18, as well as their supporting evidence, we determine that Petitioner has shown by a preponderance of the evidence that those claims are unpatentable under 35 U.S.C. § 103(a) as obvious over the combination of Hayden, DE219, and Howeth, and, for claims 9 and 18, further in view of Wellan.

Petitioner asserts that DE219 teaches a piston reciprocally disposed between two ports, as required by claims 7 and 16, and that such a valve is interchangeable with other valve arrangements, including the flap valve type taught by Hayden. Pet. 50 (citing Ex. 1008, Figs. 1, 2, ¶¶ 16, 20–45). Petitioner asserts that the valve arrangement in DE219 includes rods that

move linearly back and forth under the control of electromagnets, as in a solenoid. *Id*. Petitioner asserts further that the recited "means biasing said piston" to simultaneously (1) close one of said two ports and (2) open another of said two ports, corresponds to a spring in the '640 patent. Petitioner asserts additionally that Howeth teaches such a spring in the context of an ambient air backflushed vacuum device. *Id*. at 51 (citing Ex. 1007, Figs. 9, 10, 13:39–16:37, 14:14). Regarding claims 8 and 17, which depend from claims 1 and 16, respectively, Petitioner asserts that the required "means for overcoming said bias" corresponds to a solenoid for each valve in the '640 patent, and that a solenoid is present in Hayden. *Id*. at 52.

Claims 9 and 18 depend from claims 8 and 17, respectively, and require "said bias overcoming means comprising at least two solenoids, one corresponding to each said valve, and means for energizing said solenoids to switch said valves to connect said filters to ambient air and for de-energizing said solenoids to switch said valves to connect said filters to said vacuum source." Petitioner cites portions of Hayden, which apply electricity to actuate its electrical solenoids, as corresponding to these claim limitations. *Id*. at 52–53. To the extent that the claims require an actual switch to actuate each solenoid, Petitioner further asserts that Wellan teaches that such switches for energizing and de-energizing solenoids would have been predictable and obvious in a vacuum device. *Id*. at 54 (citing Ex. 1004, Fig. 7; Ex. 1013 ¶¶ 25, 36–37).

Patent Owner asserts that Petitioner's obviousness challenges over the combination of Hayden, DE219, and Howeth (and further in view of

Wellan) all are moot because Hayden does not disclose every element of claims 1 and 10 for the reasons discussed above. PO Resp. 31–32.

Based on the trial record, we are persuaded that the combination of DE219, Howeth, and Wellan teach the interchangeability with a flap valve of a piston reciprocally disposed between two ports, and the known, predictable use of a spring for biasing a piston and a switch for energizing and de-energizing an electrical solenoid. We also are persuaded that use of the combination of an alternate valve arrangement and alternate solenoid is nothing "more than the predictable use of prior art elements according to their established functions." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007). Therefore, for the reasons provided in the Petition and for the reasons articulated herein, claims 7–9 and 16–18 would have been obvious over Hayden, DE219, and Howeth. Pet. 49–54. For the same reasons, we also are persuaded that the preponderance of the evidence demonstrates that claims 9 and 18 would have been obvious over Hayden, DE219, and Howeth in further view of Wellan. *See id*. at 54.

G. Obviousness of Claims 2, 3, 11, and 12 Over Hayden and Von Stackelberg

With respect to the asserted obviousness over the combination of Hayden and von Stackelberg, we have reviewed the Petition, the Patent Owner Response, and Petitioner's Reply, as well as the relevant evidence discussed in each of those papers. We are persuaded that the preponderance of the evidence demonstrates that claims 2, 3, 11, and 12 would have been obvious over Hayden in view of von Stackelberg under § 103(a).

Petitioner asserts that von Stackelberg teaches a hose and conduit that directs air downward from an inlet port, as well as a baffle to modify air

flow "to prevent filters and outlets from becoming clogged from foreign particulates." Pet. 58 (citing Ex. 1010, Fig. 2, 4:35–54). Petitioner contends that one of ordinary skill in the art would have combined von Stackelberg's conduit and baffle with Hayden's canister, because the references teach "the benefits of preventing filters and outlets from becoming clogged from foreign particulates," and the proffered combination would "maximize the efficacy of the vacuum" and "minimize the debris on a vacuum's filter." *Id*. at 58–59. Petitioner further contends that the combination meets the requirements of dependent claims 2 and 11, which require a duct and baffle or equivalents thereof as the "means cooperable with said inlet port" (*id*. at 57–58; Ex. 1001, 8:22, 9:11), and also meets the requirements of dependent claims 3 and 12, which additionally recite that the inlet be positioned "below said filter and above a bottom of said cannister" (Pet. 59; Ex. 1001, 8:26–27, 9:15–16).

Patent Owner argues that the combination of Hayden and von Stackelberg is improper because the purpose of von Stackelberg's duct and baffle is "preventing filters and outlets from becoming clogged from foreign particles" whereas the purpose of Patent Owner's duct and baffle "is to allow particles backflushed from the filters 21, 22, 23 to settle to the bottom 24 of canister 10 so as to prevent recycling of the backflushed particles." PO Resp. 33. Patent Owner further argues that the combination of Hayden, in view of von Stackelberg, is improper because the inlet taught by von Stackelberg comes in from the top, not the side, such that it does not create an upper high velocity zone and a lower low velocity zone, and it also does not teach a filter. *Id*. at 34–35. Patent Owner also argues that Hayden requires shields; therefore the location and purpose of von Stackelberg's

structure would be "inconsistent with and destructive of the flow paths Hayden seeks to achieve." *Id.* at 34.

We are unpersuaded by Patent Owner's arguments, because the trial record establishes that the duct and baffle arrangement in both the combination and the challenged claims would allow particles to settle to the bottom of the canister and minimize entrainment of particles in an upper portion of the canister, where the air exits through the filters. *See* Pet. 58–59 (citing Ex. 1010, 4:35–65); Ex. 1010, 5:13–14 (providing "passage and release of debris into the drum"), 4:64–65 (inlet port "less likely to be blocked by bulky debris"); Ex. 1001, 4:52–53 ("the particles settle to the bottom of the cannister"); Ex. 1015 ¶¶ 14–16. In addition, Hayden teaches a dust collector having an inlet on the side and filters within a canister. *See* Pet. Reply 21–22; Ex. 1003, Fig. 1. Therefore, Petitioner has provided an adequate rationale for modifying the air inlet in Hayden's canister with von Stackelberg's duct and baffle structure. We also agree with Petitioner that Hayden's disclosure of shields is an optional preferred embodiment and does not preclude modification of the inlet port with von Stackelberg's duct and baffle. *See* Pet. Reply 20–21 (citing Ex. 1003, 2:20–25). As such, we find the combination is proper and that claims 2, 3, 11, and 12 would have been obvious over the combination of Hayden and von Stackelberg for the reasons provided by Petitioner and as discussed herein. *See* Pet. 20–21; Pet. Reply 17–24.

III. CONCLUSION

Petitioner has demonstrated by a preponderance of the evidence that (1) claims 1 and 10 are anticipated by Hayden; (2) claims 1, 4–6, 10, and

13–15 would have been obvious over Hayden and Wellan; (3) claims 7–9 and 16–18 would have been obvious over Hayden, D219, and Howeth; (4) claims 9 and 18 would have been obvious over Hayden, D219, Howeth, and Wellan; and (5) claims 2, 3, 11, and 12 would have been obvious over Hayden and von Stackelberg.

This is a final written decision of the Board under 35 U.S.C. § 318(a). Parties to the proceeding seeking judicial review of this decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

IV. ORDER

Accordingly, it is hereby:

ORDERED that, as set forth in Section III above, claims 1–18 of the ’640 patent have been shown to be unpatentable.

FURTHER ORDERED that the parties to the proceeding seeking judicial review of this Final Written Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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