

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 IPR2015-00472
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 (Paper 1, “Pet.”) to institute an *inter partes* review of claims 1, 4–10, and 13–18 (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 11 (“Prelim. Resp.”). The Board granted the Petition as to certain grounds and instituted trial. Paper 12 (“Dec. on Inst.”). Although Petitioner proposed seven grounds of unpatentability, the panel instituted trial only on the following four grounds:¹

- (1) Claims 1 and 10 as anticipated under 35 U.S.C. § 102(b) by Eiben;
- (2) Claims 1, 4–6, 10, and 13–15 as obvious under 35 U.S.C. § 103(a) over Eiben and Wellan;
- (3) Claims 7–9 and 16–18 as obvious under 35 U.S.C. § 103(a) over Eiben, DE219, and Howeth; and
- (4) Claims 9 and 18 as obvious under 35 U.S.C. § 103(a) over Eiben, DE219, Howeth, and Wellan.

Id. at 19–20.

¹ US Patent No. 3,224,172, Dec. 21, 1965 (Ex. 1003) (“Eiben”); 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); and US Patent No. 4,465,497, Aug. 14, 1984 (Ex. 1007) (“Howeth”).

During trial, Patent Owner filed a Patent Owner Response.² Paper 15 (“PO Resp.”). Petitioner filed a Reply to Patent Owner’s Response relying on the Declaration of Jeffrey P. Grant (Ex. 1010). Paper 16 (“Pet. Reply”).

An oral hearing was held on March 22, 2016, and a transcript of the hearing is included in the record. Paper 22 (“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, 4–10, and 13–18 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. 4:2014-cv-00286 (N.D. Okla.). Pet. 1; Paper 10, 2. It is also the subject of concurrently-filed *inter partes* review proceeding IPR2015-00468.

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

² Patent Owner lists the Declaration of David L. McCutchen (Ex. 2001) in the 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 13 (Scheduling Order), 3. Therefore, we give no weight to the Declaration of David L. McCutchen for purposes of this Decision.

canister³ 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.

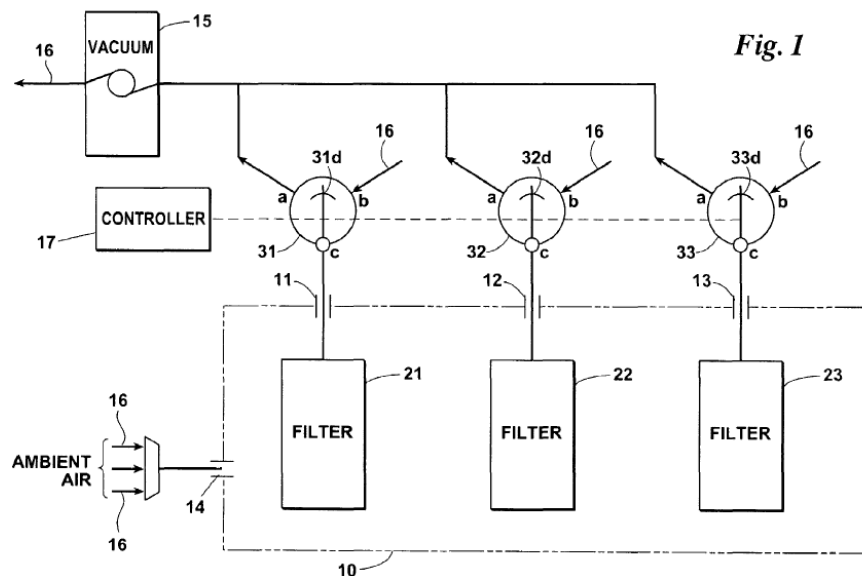


Figure 1 shows multiple filters 21, 22, 23 in canister 10 having inlet port 14 through which ambient air 16 flows, and outlet ports 11, 12, 13 through which the filters are in pneumatic communication with vacuum source 15. *Id.* at 3:29–31, 46–48. Controller 17 causes valves 31, 32, 33 disposed outside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

³ The '640 patent uses the spelling “cannister.” See Ex. 1001, *passim*. We use the common spelling “canister” for purposes of this decision.

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.

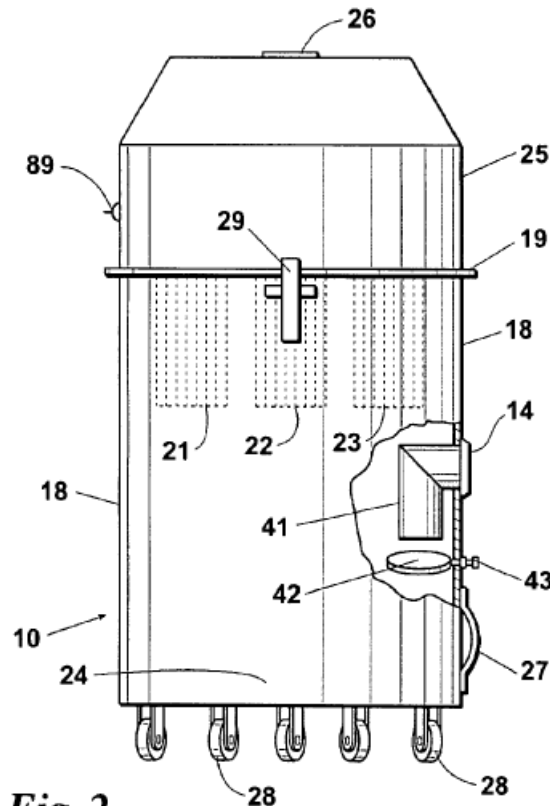


Fig. 2

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 that 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. 25 (citing Ex. 1001, 1:6–9; Ex. 1010 ¶ 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. However, Patent Owner characterizes the field of art for the invention as “the art of portable vacuums” while characterizing the field of art for Eiben as “bag house art.” PO Resp. 29.

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. We find Patent Owner does not indicate why the field of art should be limited to portable vacuums other than by reference to casters 28 in Figure 2 of the ’640 patent which are said to “allow the cannister 10 to be freely rolled in any direction.” *Id.* at 28 (citing Ex. 1001, Fig. 2, 4:22–23).⁴ We also find the ’640 patent describes the invention as broadly relating “generally to vacuum cleaning equipment and more particularly concerns a vacuum cleaner having filters backflushed with ambient air.” Ex. 1001, 1:6–9; Pet. 25.

⁴ We understand Patent Owner’s citation to column 4, lines 22 through 23 of the ’640 patent to be a typographical error that should be referencing the description of casters at column 4, lines 29 through 31 instead.

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, 1281 (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”
“piston reciprocally disposed between two said ports”	“piston [] located between the claimed ports of the valve housing, and [that] moves back and forth between the claimed ports”

Dec. on Inst. 6–9.

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 of 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 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 for the term “ambient air.” *See* Pet. Reply 19–20. Since “the construction of that term does not appear to have any material impact on this particular proceeding,” Petitioner notes its disagreement “to preserve its rights on this point in the related proceeding” IPR2015-00468. *Id.*

Because we construed “ambient air” in related case number IPR2015-00468 and in our Decision on Institution, and because our construction of the term “ambient air” incorporates the term “canister,” we include a claim construction analysis of the terms “ambient air” and “canister” below. We

also include below a claim construction for the term “pneumatic communication” because the parties dispute whether this element of the claims is present in the cited prior art. 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. 6–10.

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. 7–8. 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”).

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 structure "where the filters reside and dust is separated from the incoming vacuumed air and collected" and not limited to a particular configuration. Pet. Reply 4–5 (quoting Ex. 1010 ¶ 10) (emphasis omitted). Petitioner asserts that there is

no disavowal in the Specification of configurations for the canister and “[n]othing in the claim language [that] limits the claim scope to a ‘unitary’ or ‘one part’ ‘cannister,’ or excludes a multiple part ‘cannister.’” *Id.* at 4. 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.* at 3(quoted 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*.

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 generally 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 Eiben

With respect to the alleged ground of unpatentability based on anticipation by Eiben, 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 Eiben under 35 U.S.C. § 102(b).

1. *Overview of Eiben (Ex. 1003)*

Eiben describes a dust collector that filters dirty air through a plurality of vertically oriented filter bags 18 contained in filtering compartments 10, 12, 14, 16. Ex. 1003, 2:42–45. Air is drawn through the walls of bags 18 in each compartment 10, 12, 14, 16 and through exhaust ductwork 30 from the side of each compartment 10, 12, 14, 16 to clean air pipe 36 through valve mechanism 32. *Id.* at 2:60–68. Figures 1 and 3, below, are side views of the dust collecting apparatus of Eiben.

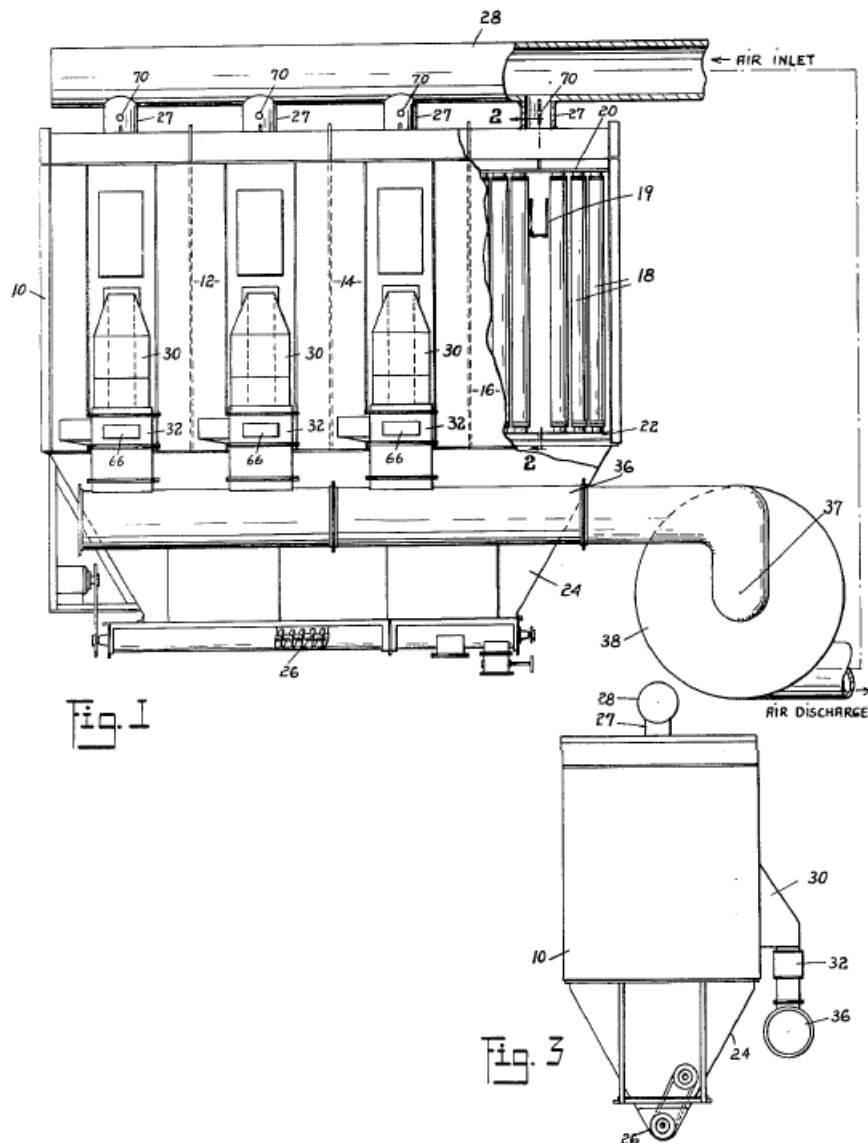


Figure 3 is a side view taken from a left-hand end of Figure 1.

When it is desired to clean filter bags 18 in a particular compartment or chamber of the device, air reversal valve 32 is actuated, which moves baffle plate 60 to a closed position and opens door 66 to admit atmospheric or reverse air to flow through bags 18 in a compartment. That actuation causes bags 18 to collapse, thereby loosening dust on the inner surfaces of bags 18 and aiding in the removal of trapped dust from bags 18. *Id.* at 4:35–56. Figure 6 below is a sectional view of the air reversal valve.

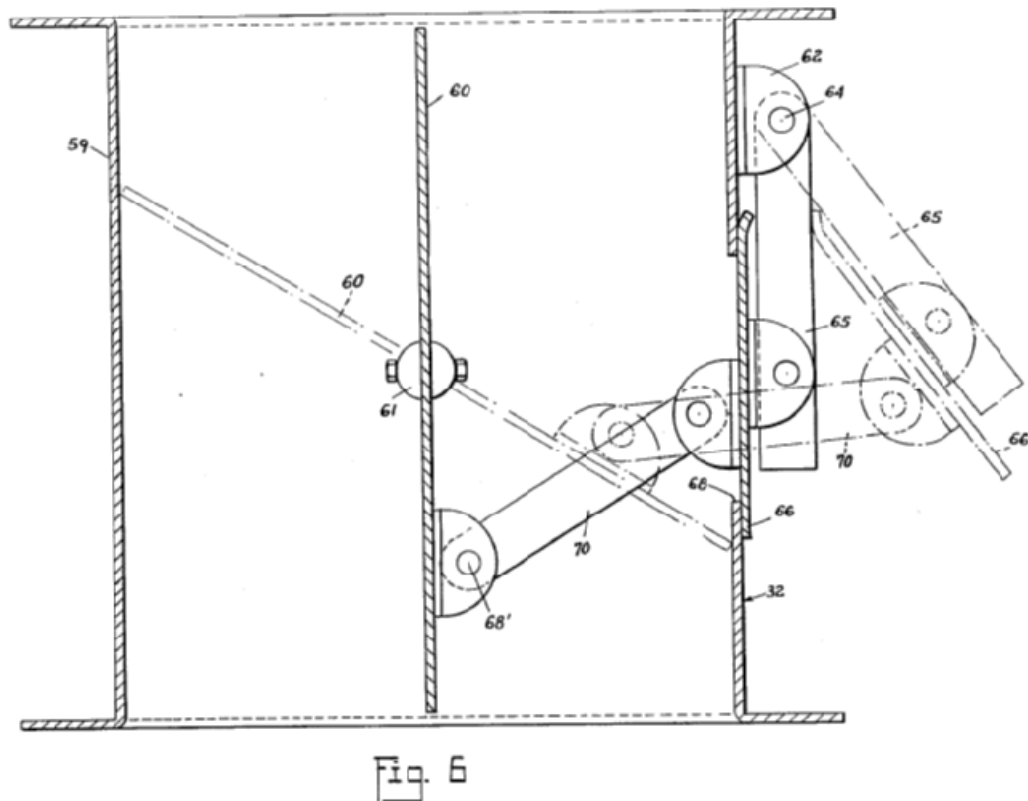


Figure 6 illustrates the completely closed position of baffle plate 60 in dot-dash outline of the structure, while the normal open position of baffle plate 60 is the vertical position. *Id.* at 4:21–24.

2. *Comparison of Eiben and Claims 1 and 10*

Concerning the elements of independent claims 1 and 10, we agree with Petitioner’s identification of every claim limitation in Eiben’s disclosure of a vacuum cleaning machine. Pet. 26–36. The claimed canister corresponds to “compartment units 10, 12, 14, and 16 [that] are assembled together and mounted atop a hopper 24.” *Id.* at 26 (citing Ex. 1003, 2:42–68). Referring to Figure 1, the canister has inlet port 28, and four outlet ports 30 are also shown (encompassing “at least two outlet ports” recited in claim 1 and “three outlet ports” recited in claim 10). *Id.* (citing Ex. 1003, Fig. 1, 2:60–68, 4:25–35). The “at least two filters” recited in claim 1 and

“three filters” recited in claim 10 are shown inside of the canister, where each filter is a set of filter bags 18 in each compartment 10, 12, 14, and 16. *Id.* (citing Ex. 1003, Fig. 1, 2:44–45, 3:10–66). Each filter (set of filter bags 18) is in pneumatic communication through a corresponding one of each outlet port 30. *Id.* at 26–27 (citing Ex. 1003, 2:60–68, 4:25–35). There is vacuum source 38 and valve 32 for each compartment unit 10, 12, 14, 16 disposed outside of the canister, thus “at least two valves” and “three valves” as recited in claims 1 and 10, respectively. *Id.* at 27 (citing Ex. 1003, Figs. 1, 3–6, 2:60–68, 3:67–4:24, 4:35–43). Each valve 32 is in pneumatic communication between vacuum source 38 and a corresponding one of each outlet ports 30 and each valve permits air to be drawn by the vacuum source from inlet port 28 simultaneously through corresponding ones of the filters (one filter is a set of filter bags 18). *Id.* at 27 (citing Ex. 1003, Figs. 1, 3–6, 2:60–65, 3:67–4:35). The valve in its open position is connected to the vacuum source and, in its closed position, air inlet door 66 is open to permit ambient air to enter while plate 60 “seals off the exhaust duct 36 from the interior of the associated collecting unit or chamber.” *Id.* at 27–28 (quoting Ex. 1003, 4:14–15).

Eiben has a “means for sequentially operating” the valve because “the drawings depict a motor unit 50’ for operating each valve 32, [and] the specification also discloses that each valve 32 may instead be operated by an ‘electric solenoid.’” *Id.* at 28 (citing Ex. 1003, 3:69–73). Specifically, the “means for sequentially operating” operates valves 32 to switch the filters (one filter is a set of filter bags 18) from connection to vacuum source 38 to connection to ambient air (via air inlet door 66) and permits ambient air to be drawn through corresponding valves and filters to create a reverse flow

for cleaning the filter. *Id.* at 27–28 (citing Ex. 1003, Fig. 6, 3:67–4:24, 4:35–49).

Patent Owner challenges the evidence of anticipation of claims 1 and 10 by Eiben by arguing that the canister in Eiben is either (1) an isolated compartment 10, 12, 14, 16, in which case the canister only has inlet port 27 and single outlet port 30 and does not meet the claim limitation “a cannister having . . . at least two outlet ports” or (2) the canister is collectively compartments 10, 12, 14, 16, in which case the canister has multiple inlet ports 27 and multiple outlet ports 30 and does not meet the claim limitation “a cannister having an inlet port.” PO Resp. 18–24.

Patent Owner also argues that Eiben’s vacuum cleaning machine does not anticipate the challenged claims because dirty air is on the inside of the filter in Eiben’s machine, rather than the outside of the filter as depicted in the ’640 patent. *Id.* at 24–27. Stated another way, Patent Owner argues that its arrangement of filters in its canister partitions the dirty air/clean air on the outside/inside of the filter, respectively, whereas Eiben’s arrangement partitions the dirty air/clean air on the inside/outside of the filter, respectively. *Id.* at 5–17 (citing Ex. 1001; Ex. 1003; Ex. 2005; Ex. 2006).

We find Patent Owner’s arguments unpersuasive because the ’640 patent claims are sufficiently broad so as to encompass the distinctions drawn between the figures in the ’640 patent and Eiben. While claims 1 and 10 read on Patent Owner’s embodiment shown in Figures 1–5, the claims also read on Eiben’s embodiment shown in Figures 1 and 3–6. See Ex. 1001, 3:28–4:56 (describing the vacuum shown in Figure 1); Ex. 1003, 3:67–4:57 (describing the vacuum shown in Figures 1, 3–6). Based on the evidence presented, we find nothing in the claim language that precludes

Eiben’s “compartment units 10, 12, 14, and 16 [that] are assembled together and mounted atop a hopper 24,” from being a canister with inlet port 28 and at least two outlet ports 30 as required by claims 1 and 10. Pet. 26; *id.* at 29–31. Claims 1 and 10 both signal an open-ended structure with the transition term “comprising,” allowing for (1) the inclusion of walls or compartments within the canister, including a hopper compartment at the bottom, and (2) inlet port 28 to include ducts 27.

Similarly, we find nothing in claims 1 and 10 that precludes a bag filter as used in Eiben, because the claims do not recite a dirty air/clean air arrangement relative to the outside/inside of the filters. Patent Owner’s arguments regarding the ’640 patent having the dirty air/clean air on the outside/inside of the filters are not tied to claim limitations. See PO Resp. 18–27; Pet. Reply 6–8. Claims 1 and 10 merely require that air be drawn “through” the filters. Ex. 1001, 8:13, 17, 9:2, 5. Eiben describes air passing through the walls of its filter bags. Ex. 1003, 4:30–31 (“the air passes transversely through the bags’ walls”), 4:48 (“reverse air flow through the bags”). Therefore, the type of filter used in the ’640 patent is not a patentable difference over Eiben.

Patent Owner’s further distinctions, based on Eiben’s filters not being “connected” to the valves, vacuum source, or exhaust ducts, also are not tied to claim limitations because we do not construe “pneumatic communication” as requiring any particular structure or duct to connect these components. See *supra*; PO Resp. 19 (“arrangement of parts and resulting flow patterns are not at all the same”), 22 (“Patent Owner’s vacuum source 15 is connected through valves 31, 32, 33 to corresponding filters 21, 22, 23”), 23 (“Eiben’s valves 32 are not connected between the filter bags 18 and the

blower 38”), 24 (Eiben’s filters are “not connected to their corresponding exhaust ducts 30”).

Patent Owner’s diagrams in Exhibits 2005 and 2006 do not illustrate any patentable distinctions over the ’640 patent claims for the additional reason that Patent Owner depicts Eiben’s compartment units 10, 12, 14, and 16 as individual canisters rather than assembled together as shown in Figure 1 of Eiben and argued by Petitioner. Based on the preponderance of the evidence, Eiben’s canister is “compartment units 10, 12, 14, and 16 [that] are assembled together and mounted atop a hopper 24,” where the canister has an inlet port (28) and at least two outlet ports (30). Pet. 26; *id.* at 29–31; Ex. 1003, Figs. 1, 3.

In sum, the preponderance of the evidence on the complete record after trial shows that Eiben’s dust collecting apparatus with reverse air flow operation anticipates claims 1 and 10 for the reasons provided by Petitioner. Pet. 26–36; Pet. Reply 1–16.

E. Obviousness of Claims 1, 4–6, 10, and 13–18

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 as described in the ’640 patent embodiments, Wellan’s controller is equivalent to the structure in the ’640 patent’s electronic embodiment. Pet. 37–38. Petitioner’s rationale for combining Wellan’s controller with Eiben’s electronic solenoid operated valves is based on Eiben already disclosing the functional language of the “means for sequentially operating,” because “its solenoids or other actuators are triggered to switch each valve 32 individually to permit the reverse flow of ambient air to enter its filter

compartment and backflush the filter therein.” *Id.* at 38. Petitioner contends that Wellan, like Eiben, teaches the use of a controller to actuate solenoids in a vacuum cleaning machine, similar to Eiben’s, that has a dusty air section containing a plurality of filter bags that are backflushed with air. *Id.*

According to Petitioner, 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 39–40 (citing Ex. 1004, Fig. 7, 5:52–60, 7:42–47, 7:58–61). Wellan characterizes such controllers as “more-or-less conventional” and therefore, Petitioner argues, the use of Wellan’s controller to electronically control the timing of the valves in Eiben’s vacuum machine would be the “predictable use of prior art elements according to their established functions” rendering the claims obvious. *Id.* at 41 (quoting *KSR Int’l Inc. v. Teleflex, Inc.*, 550 U.S. 398, 417 (2007)).

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 42–43 (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 44–46 (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 Eiben’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 42–43, 44–46.

Patent Owner argues in response that the combination of Eiben with any of the secondary references cited by Petitioner is improper because “Eiben’s dust collecting apparatus is a bag house with separate compartments 10, 12, 14, 16, each large enough to contain an operator walkway 19, as is shown by Eiben in Figure 1” and

[a] person of ordinary skill in the art of portable vacuums would not combine bag house art collecting dirt inside of compartmentalized filters with art relied upon for its valve control systems to arrive at the structure and air flow paths of a portable, single canister, backflush vacuum cleaner.

PO Resp. 28, 29. Patent Owner also contends that the combination of Eiben and Wellan “is moot in view of Eiben’s failure to disclose each and every element of claims 1 and 10 for which Petitioner relies on Eiben.” *Id.* at 29.

For the reasons provided in the Petition and above, we are persuaded that Eiben discloses the elements recited in claims 1 and 10. Based on the trial record, claims 1 and 10 encompass a backflush vacuum cleaner with bag house filters in a canister. We do not read into the claims any specific structures from a particular embodiment appearing in the specification of the ’640 patent where the claim language is broader than the embodiment. *See Van Geuns*, 988 F.2d at 1184 (“limitations are not to be read into the claims from the specification”). Nor do we find claims 1 and 10 to be limited in size to “a portable, single canister, backflush vacuum cleaner” as asserted by Patent Owner in its Response. Patent Owner acknowledged at the oral hearing that size was not a patentable distinction over the prior art. *See Tr.* 42:12–18. Petitioner has shown by a preponderance of the evidence that Eiben describes the use of electronic solenoids, such as those 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 the controller in Eiben’s device with Wellan’s controller would have been obvious as a predictable variation in the same field. Accordingly, we are persuaded, by a preponderance of the evidence, that claims 1, 4–6, and 13–15 would have been obvious in view of Eiben and Wellan for the reasons provided by Petitioner and the reasons articulated herein. *See* Pet. 37–47; Pet. Reply 1–19.

F. Obviousness of Claims 7–9 and 16–18

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 Eiben, 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 Eiben. Pet. 49–50 (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,⁵ 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 50–51 (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 Eiben. *Id.* at 51.

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 Eiben, which apply electricity to actuate its electrical solenoids, as corresponding to these claim limitations. *Id.* at 52. 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 53 (citing Ex. 1004, Fig. 7; Ex. 1013 ¶¶ 25, 36–37).

Patent Owner argues that Petitioner’s obviousness challenges over the combination of Eiben, DE219, and Howeth (and further in view of Wellan)

⁵ We understand Petitioner to refer to this means-plus-function term recited in claims 7 and 16 when it refers to “means for biasing” on page 50 of the Petition.

all are moot because Eiben does not disclose every element of claims 1 and 10 for the reasons discussed above. PO Resp. 30–31. Patent Owner also asserts that the combination of Eiben with any of the cited secondary references is improper because Eiben relates to “bag house art” rather than “a portable, single canister, backflush vacuum cleaner.” *Id.* at 29. We determine that Patent Owner’s arguments are misplaced because a proper analogous arts comparison is between the claimed invention and the prior art reference, and not between prior art references. Using that standard, we determine that Patent Owner’s assertions are unpersuasive because the field of the claimed invention relates generally to “vacuum cleaning equipment,” which we find is in the same field as Eiben’s “devices known as dust collectors” (Ex. 1001, 1:9–11), and in any case, Eiben discloses each of the elements of independent claims 1 and 10 as discussed above.⁶

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*, 550 U.S. at 417. Therefore, for the reasons provided in the Petition and for the reasons articulated herein, claims

⁶ We find that DE219 (“[t]he invention relates to a vacuum cleaner” Ex. 1008 ¶ 1) and Howeth (“timing actuator adapted for use in conjunction with a pneumatic cleaning system for impingement type dust collector/filter units” (Ex. 1007, 1:23-26)) are each analogous art to the claimed invention.

7–9 and 16–18 would have been obvious over Eiben, DE219, and Howeth. *See* Pet. 49–53; Pet. Reply 1–19. 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 Eiben, DE219, and Howeth in further view of Wellan. *See* Pet. 53; Pet. Reply 1–19.

III. CONCLUSION

Petitioner has demonstrated by a preponderance of the evidence that (1) claims 1 and 10 are anticipated by Eiben, (2) claims 1, 4–6, 10, and 13–15 would have been obvious over Eiben and Wellan; (3) claims 7–9 and 16–18 would have been obvious over Eiben, DE219, and Howeth; and (4) claims 9 and 18 would have been obvious over Eiben, DE219, Howeth, and Wellan. 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, 4–10, and 13–18 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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