IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the Inter Partes Review of:
U.S. Patent No. 7,082,640

Trial Number: To Be Assigned

Filed: July 18, 2003

Issued: August 1, 2006

Attorney Docket No.: 61366/0000055

Inventor(s): McCutchen, David L.

Assignee: Christy, Inc.

Title: AMBIENT AIR BACKFLUSHED FILTER VACUUM

Panel: To Be Assigned

Mail Stop Patent Board
Patent Trial and Appeal Board
P.O. Box 1450
Alexandria, VA 22313-1450

PETITION FOR INTER PARTES REVIEW UNDER 37 C.F.R. § 42.100

Table of Contents

Inter Partes review is respectfully requested for claims 1-18 of U.S. Patent No. 7,082,640 ("the '640 Patent") (**Exh. 1001**).

I. MANDATORY NOTICES UNDER 37 C.F.R. §42.8(a)(1)

A. Real Party In Interest 37 C.F.R. §42.8(b)(1)

Black & Decker (U.S.) Inc. and Stanley Black & Decker, Inc.

B. Related Matters 37 C.F.R. §42.8(b)(2)

The '640 Patent is the subject matter of a litigation entitled *CDC Larue Industries, Inc. et al. v. Black & Decker Corp. et al.*, 4:2014-cv-00286 (N.D. Okla.), filed June 2, 2014. That case is pending, with discovery yet to begin. An Amended Complaint was filed on September 12, 2014, changing the named defendant to Black & Decker (U.S.) Inc.

C. Lead Counsel and Back-Up Counsel 37 C.F.R. §42.8(b)(2)

Lead Counsel	Back-Up Counsel
Jack S. Barufka (Reg. No. 37,087) PILLSBURY WINTHROP SHAW PITTMAN LLP Postal and Hand Delivery Address 1650 Tysons Boulevard McLean, Virginia 22102 Telephone: 703.770.7900 Facsimile: 703.770.7901 Email: jack.barufka@pillsburylaw.com	Bryan P. Collins (Reg. No. 43,560) PILLSBURY WINTHROP SHAW PITTMAN LLP Postal and Hand Delivery Address 1650 Tysons Boulevard McLean, Virginia 22102 Telephone: 703.770.7900 Facsimile: 703.770.7901 Email: bryan.collins@pillsburylaw.com

D. Service Information 37 C.F.R. §42.8(b)(4)

Service of any documents by hand-delivery may be made at the postal mailing address of the respective lead or back-up counsel designated above with courtesy email copies to the email addresses and docket_ip@pillsburylaw.com.

II. PAYMENT OF FEES UNDER 37 C.F.R. §42.103

The undersigned authorizes the Office to charge $23,000 to Deposit Account 033975 for the fee set forth in 37 C.F.R §42.15(a) for this Petition. The undersigned further authorizes payment for any additional fees due in connection with this Petition to be charged to the above-referenced Deposit Account.

III. SUMMARY OF THE '640 PATENT

A. Description of the Alleged Invention of the '640 Patent

The '640 Patent relates to "a vacuum cleaner having filters backflushed with ambient air." **Exhibit 1001** at 1:7-8. It is well known that when particles are suctioned into a vacuum, the filter may become clogged, leading to a drop in vacuum performance and necessitating cleaning of the filter. The'640 Patent's Background describes several prior art approaches to cleaning vacuum filters without removing them. Specifically, the '640 Patent describes using "shaker, percussion, forced air or compressed air systems" for cleaning vacuum filters. *Id.* at 1:9-13. These systems apply "mechanical or pneumatic forces to dislodge particles collected on the intake surfaces of the filters." *Id.* at 1: 11-13.

Rather than rely on these prior art approaches, the '640 Patent states that "[i]t is, therefore, an object of the invention to provide a backflushed filter vacuum which uses ambient air to backflush the filters." *Id.* at 1:38-40. Another object is to avoid the "use of a secondary shaker, percussion, forced air or compressed air system." *Id.* at 1: 41-43. Thus, the '640 Patent cleans its vacuum filters by backflushing only with ambient air while avoiding use of forced/compressed air.

Figure 2 of the '640 Patent shows the general structure of the claimed vacuum. The independent claims recite a vacuum cleaning machine including a "cannister" [sic] at 10. The canister 10 is the vessel that houses the filters and collects the dust or other particles, and includes a plate 19 that closes its top opening. A cover 25 sits atop the canister 10 and plate 19, and houses the vacuum source 15 (Fig. 1). The canister 10 includes an inlet port 14, which is where the vacuumed or suctioned "dirty" air is drawn in.

Figure 1 is a schematic diagram showing air flow through the vacuum machine of the '640 Patent. Adjacent is an annotated version of Figure 1, filed by the applicant during prosecution, **Exhibit 1002** at 62, showing the flow of air in the vacuum machine during normal operation, i.e. with no backflushing. The heavy lines and arrows were added by the applicant to show the flow of air. A vacuum source is shown at 15. An inlet is shown at 14, and draws in ambient air 16, i.e., air outside the vacuum machine. This air enters the canister 10, passing through a series of filters 21, 22, 23, each of which is connected to an outlet port 11, 12, 13. A valve 31, 32, 33 is connected to each outlet port 11, 12, 13. Each valve 31, 32, 33 has ports 31a, 32a, 33a that communicate with the vacuum source 15, and ports 31b, 32b, 33b

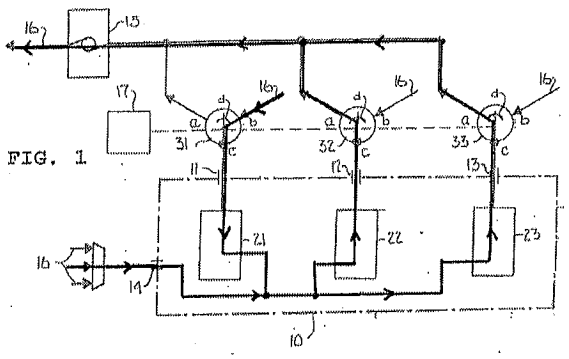
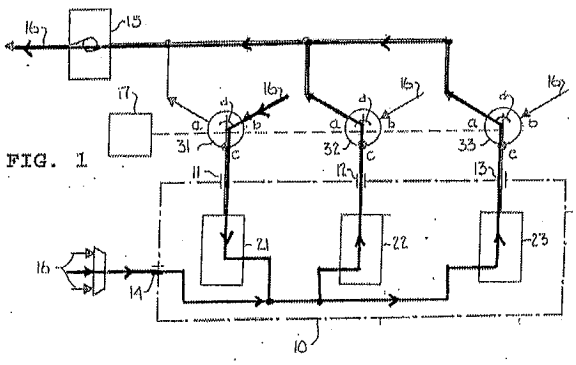


FIG. 1

that communicate with ambient air 16 outside the vacuum machine for sequentially backflushing the filters, as discussed below. **Exhibit 1001** at 3:41-44.

In this normal, non-backflushing mode, all the valves 31, 32, 33 are connected to ports 31a, 32a, 33a so the vacuum source 15 can draw ambient air 16 into the canister 10, via inlet port 14, and through the filters 21, 22, 23. *Id.* at 1:49-52. The vacuum source 15 ultimately exhausts the clean air back to ambient air 16 outside the vacuum machine through exhaust 26. The arrows show that flow.

Another annotated version of Figure 1 included here, filed by the applicant during prosecution, shows how the vacuum is operated to backflush the filters. **Exhibit 1002** at 63. In this drawing, valve 31 is in the backflush mode to clean filter 21. The backflush modes are cycled for each filter, so the same explanation applies for backflushing filters 22 or 23.



In the backflushing mode, valve 31 has been shifted to communicate with the ambient air via port 31b, while "the other valves 32 and 33 continue in the vacuum mode through their respective vacuum ports 'a'. The suction through the filters 22 and 23 draws ambient air through the valve port 31'b' and into the filter 21, reversing the flow of air through the filter 21 and causing particles that have

collected on the outer wall of filter 21 to be dislodged to drop to the bottom of the cannister[sic] 10." **Exhibit 1001** at 3:55-62. In other words, the negative pressure of the vacuum source 15 causes ambient air 16 to be drawn from outside the device not only through inlet port 14 via filters 22 and 23, but also in the opposite direction through filter 21 via port 31b. The reverse airflow through filter 21 cleans it without using forced or compressed air.

This backflushing operation is repeated for each filter, so that each filter experiences the period of backflushing described with respect to filter 21. *Id.* at 3:65-4:9.

Solenoids are used for sequentially operating the valves 31, 32, 33 to switch to the backflush modes. The disclosed solenoid 61[1] for valve 31, depicted in Figs. 4 and 5, moves a shaft 62. The shaft 62 has a set of plates 65, 71 with gaskets 64, 72 to define a reciprocating piston for opening/closing the vacuum port 31a

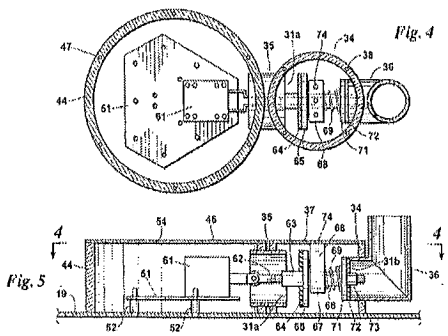


Fig. 4

Fig. 5

---

[1] Solenoid 61 is the only one shown in detail. Solenoids 62 and 63 for valves 32 and 33 are shown schematically in the circuit diagrams in Figs. 7 and 8.

communicated to the vacuum source and the ambient air port 31b communicated to ambient air 16. Coil spring 69 biases the piston against the solenoid 61 to move the piston to normally close the ambient air port 31b and open the vacuum port 31a. The solenoid 61 is operated to do the reverse, i.e., open the ambient air port 31b and close the vacuum port 31a. *Id.* at 5:5-6:2.

Two embodiments of a controller 17 are provided for controlling the timing of the solenoids. The first is an "electro-mechanical" approach, shown at Figs. 6 and 7. *Id.* at 6:3. That electro-mechanical approach uses a central cam 84 that rotates to engage switches 81, 82, 83 to trigger the solenoid of each valve. *Id.* at 6:3-33. The second is an "electronic" approach, shown at Figs. 8 and 9. *Id.* at 6:34. That electronic approach uses a first timer 102 that "establishes the delay between the activation of the solenoids 61, 62, 63." *Id.* at 6:38-40. A second timer 103 "establishes the 'on' time for each of the solenoids 61, 62 and 63 and an 'off' time before the next solenoid 61, 62 or 63 is energized." *Id.* at 6:40-42. In other words, the first timer 102 determines the time between the cycles for backflushing the valves and filters, and the second timer 103 determines both the "on" and "off" time for each solenoid 61, 62, 63 during a cycle. *Id.* at 6:60-7:17.

B. Prosecution History of the '640 Patent

The original application was filed July 18, 2003, and contained claims 1-20. **Exhibit 1002**, Prosecution History at 85-124. The application was rejected in a first Office Action dated January 10, 2005. Claims 2-9 and 11-18 were found

allowable if rewritten in independent form, and claims 19-20 were allowed. Claims 1 and 10, however, were rejected over U.S. Patent No. 4,618,352 to Nelson. *Id.* at 69-73. A response was filed on April 15, 2005, making no amendments to the claims. The response explained how the valves 31, 32, 33 in the specification are switched to use "ambient air" for backflushing, using the annotated versions of Fig. 1 included above. *Id.* at 58-59.[2] The response further argued that Nelson includes a "second centrifugal fan" for providing a reverse air flow, thus differentiating Nelson from the use of "ambient air" in claims 1 and 10:

> Nelson does not teach Applicant's claimed connection of components and, therefore, cannot function without a second centrifugal fan and associated components and limitations (e.g., transverse duct and array of parallel ducts).
>
> Nelson would require Applicants valve ports 31b, 32b and 33b to be connected, not to ambient air, but to a second fan (or compressor or vacuum as in the prior art) with parallel ducts contiguous to a transverse duct. Therefore, applicant respectfully submits that the

---

[2] The "red coded version" and "green coded version" in those arguments refers to the annotated versions of Figure 1 included at **Exhibit 1002** at 62-63, respectively. These are the same drawings included above in Section III.A at pgs. 4 and 5, respectively. The copies on PAIR are in black and white.

invention defined in applicant's claims 1 and 10 is distinguished over Nelson and requests that claims 1 and 10 be allowed.

Id. at 59-60.

The Examiner then issued another Office Action—this time rejecting claims 1 and 10 as being anticipated by U.S. Patent Publication No. 2003/0041729A1 to Finigan. *Id.* at 39-43. The applicant responded with an Amendment filed on October 14, 2005. *Id.* at 28-36. That Amendment made changes to the last parts of claims 1 and 10 to emphasize that the "ambient air" is "drawn" through the valves and filters "connected to said ambient air by said vacuum via corresponding ones of said valves and filters which are connected to said vacuum." *Id.* at 36. The applicant explained:

> Applicant has amended claims 1 and 10 to clarify that the claimed pulse back path uses the vacuum sucking through the normally operating filters so the ambient air is also sucked by vacuum through the pulse back operating filter. This is precisely what Finigan is trying to avoid and it cannot be said that Finigan renders obvious the very thing Finigan is teaching against.

Id.

The Examiner thereafter issued a Notice of Allowance dated March 2, 2006. *Id.* at 13-18. The Examiner's Reasons for Allowance discussed U.S. Patent No. 5,108,473 to Hayden as being the closest reference, because of its use of "ambient air" for backflushing. However, the Examiner stated that Hayden's valves were

inside the canister and its canister had one outlet, rather than the claimed valves outside the canister and multiple outlets. *Id.* at 17. With respect to obviousness, the Examiner commented that, in his opinion, Hayden could not be combined with the other art of which he was then aware, namely vacuums using "forced air filter cleaning only." *Id.* at 18. As discussed below, the Examiner was incorrect in his understanding of Hayden.

IV. REQUIREMENTS FOR INTER PARTES REVIEW UNDER 37 C.F.R. §42.104

A. Grounds for Standing Under 37 C.F.R. §42.104(a)

Petitioner hereby certifies that the '640 Patent is available for *inter partes* review and that the Petitioner is not barred or estopped from requesting this *inter partes* review. More particularly, Petitioner hereby certifies that: (1) Petitioner is not the owner of the '640 Patent; (2) Petition has not filed a civil action challenging the validity of a claim of the '640 Patent; (3) this Petition is filed less than one year after the date on which the Petitioner, the Petitioner's real-party-interest, or a privy of the Petitioner was served with a complaint alleging infringement of the '640 Patent; (4) the estoppel provisions of 35 U.S.C. §315(e)(1) do not prohibit this *inter partes* review; and (5) this Petition is filed later than nine months after the date of grant of the '640 Patent, or the date of termination of any post-grant review thereof.

B. Identification of Challenge Under 37 C.F.R. §42.104(b) and Relief Requested

The precise relief requested is that claims 1-18 are found unpatentable.

1. Claims for Which Inter Partes Review Is Requested (37 C.F.R. §42.104(b)(1)

Inter partes review of claims 1-18 is requested.

2. The Specific Art and Statutory Ground(s) on Which the Challenge Is Based Under 37 C.F.R. §42.104(b)(2)

Inter partes review is requested in view of the following references:

Patent/Application Number And Inventor Name	**Date of Publication/Issue**	**Exhibit Number**
U.S. 5,108,473 ("Hayden")	April 28, 1992	**1003**
U.S. 3,680,285 ("Wellan")	August 1, 1972	**1004**
U.S. 3,224,172 ("Eiben")	December 21, 1965	**1005**
DE10101219A1 ("DE219")	July 25, 2002	**1006** (Translation at **1008)**
U.S. 4,465,497 ("Howeth")	August 14, 1984	**1007**
U.S. 6,767,380 ("von Stackelberg")	July 27, 2004 (102(e) date = November 7, 2002)	**1010**

Each of these references qualifies as prior art under §102(pre-AIA). None were cited during the prosecution of the '640 Patent, except Hayden and Howeth.

The following specific grounds of rejection are asserted under §§102 and 103:

Ground 1	Claims 1 and 10 are anticipated by Hayden
Ground 2	Claims 1 and 10 are obvious in view of Hayden and Eiben
Ground 3	Claims 1, 4-6, 10 and 13-15 are obvious in view of Hayden and Wellan
Ground 4	Claims 1, 4-6, 10 and 13-15 are obvious in view of Hayden, Eiben and Wellan
Ground 5	Claims 7-9 and 16-18 are obvious over Hayden, DE219, Howeth
Ground 6	Claims 9 and 18 are obvious over Hayden, DE219, Howeth and Wellan
Ground 7	Claims 7-9 and 16-18 are obvious over Hayden, Wellan, DE219 and

	Howeth
Ground 8	Claims 7-9 and 16-18 are obvious over Hayden, Eiben, DE219 and Howeth
Ground 9	Claims 7-9 and 16-18 are obvious over Hayden, Eiben, DE219 and Howeth, and Wellan
Ground 10	Claims 7-9 and 16-18 are obvious over Hayden, Eiben, Wellan, DE219 and Howeth
Ground 11	Claims 2-3 and 11-12 are obvious over Hayden and von Stackelberg
Ground 12	Claims 2-3 and 11-12 Are Obvious In View of Hayden, Eiben and von Stackelberg
Ground 13	Claims 2-3 and 11-12 are obvious over Hayden, Wellan and von Stackelberg
Ground 14	Claims 2-3 and 11-12 are obvious over Hayden, Eiben, Wellan and von Stackelberg

3. How the Challenged Claims Are to be Construed (37 C.F.R. §42.104(b)(3))

Set forth below are the terms that Petitioner believes warrant specific construction, with the remainder not mentioned herein understood as having their plain and ordinary meaning. The claim terms "ambient air" and "drawn" are related and should be construed together.[3]

[3] In the litigation, the remaining terms have agreed-upon constructions. **Exh. 1011**. However, claim constructions are offered herein in the event the parties have a difference under the PTAB's broadest reasonable interpretation standard.

a. "Ambient Air"

Each of the independent claims require that "ambient air" be drawn through one of the filters during backflushing. More specifically, claim 1 recites that the filters are switched "from connection to said vacuum source 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." Similarly, claim 10 recites the function of switching "said filters from connection to said vacuum source to connection to ambient air, whereby ambient air is drawn sequentially through corresponding ones of said valves and said filters which are connected to ambient air by said vacuum by corresponding ones of said valves and filters which are connected to said vacuum." Likewise, claim 19 recites that its valve has a "third port in communication with a source of ambient air," and that this third port (31b, 32b, 33b) can "be opened in a backflush mode" with "means for operating said valves to sequentially switch said filter from communicating with said vacuum source to communication with ambient air for a preset time."

All these claims require that "ambient air" is the source of air that is used for backflushing – thus begging the question: What is "ambient air"? Air by itself is a known term. **Exhibit 1009** at 3.

Clearly, the '640 Patent denounces the use of forced or compressed "air" for purposes of backflushing filters. **Exhibit 1001** at 1:9-13. So, no novelty resides in

the fact that "air" per se is used. Instead, the only way to differentiate "ambient air" from forced or compressed "air" used in the prior art is to focus on the meaning of the term "ambient." "Ambient" has its own plain and ordinary meaning, specifically "existing or present on all sides: encompassing." **Exhibit 1009** at 4.

In the context of the '640 Patent, it is clear "ambient air" can mean one and only one thing: "air from the area surrounding the outside of the vacuum cleaning machine that has not been forced or compressed." The entire specification and prosecution history is focused on differentiating between air that is "ambient" and air that is delivered by a forced or compressed means. **Exhibit 1001** at 1:9-18, 40-43; *e.g.*, **Exhibit 1002** at 36 and 58-60. It is implausible that the '640 Patent can cover any use of "air" for backflushing, since its opening lines denigrate forced or compressed "air." **Exhibit 1001** at 1:9-18, 40-43. Moreover, the specification clearly denotes that all air regarded as "ambient" is "drawn" in from outside the vacuum at 16. *Id.* at 1:38-43; 3:45-4:12; 5:16-17. Indeed, the same reference number 16 is used consistently to denote the ambient air outside the vacuum machine (a) that is drawn in at inlet 14, (b) to which the vacuum 15 exhaust via opening 26, and (c) that is drawn in through the valves' ambient air ports 31b, 32b, 33b. Thus, in all instances, the specification confirms that ambient air 16 is outside the vacuum machine. *Id.* at Fig. 1; 3:49-52; 3:54-62; 4:25-27. Furthermore, the

applicant repeatedly argued during prosecution that backflushing the filters with "ambient air" excluded forced air, such as the air forced by a second fan (as in Nelson) or air re-circulated within the vacuum cleaning machine and "packed" from the single main vacuum fan in Finigan. **Exh. 1002** at 35-36 and 59-60. Such statements clearly disavow forced or compressed air from being "ambient air." *In re Abbott Diabetes Care, Inc.*, 696 F.3d 1142, 1149-50 (Fed. Cir. 2012); *Computer Docking Station Corp. v. Dell*, 519 F.3d 1366, 1374-79 (Fed. Cir. 2008).

b. "Drawn"

The term "drawn" goes hand-in-hand with "ambient" and each confirms the other's meaning. "Drawn" should be construed to mean "pulled in by negative pressure only." Because the "ambient air" is from outside the claimed vacuum and not forced or compressed (i.e. delivered by positive pressure), it must be "drawn" in by the vacuum's negative pressure only. This is consistent with the most relevant dictionary definitions for "draw." **Exhibit 1009** at 5 ("~ *vi* . . . 2 *a* **:** to move something by pulling <[*drawing*] at the well> . . . 4 *a* **:** to produce a draft <the chimney [*draw*]*s* well> <[*draw*] on a cigar>")). This is likewise consistent with the arguments made by the applicant during prosecution:

> Looking at the red coded version [**Exhibit 1002** at 62], all of the filters are being used to clean a room. The vacuum 15 is directly connected by the duct work through valves 31, 32, 33 to their filters 21, 22, or 23 in the canister 19 in three discrete defined pressure paths. In this operation, air is <u>drawn</u> from <u>ambient air</u> through the inport port

14 so that the air from the room to be cleaned is circulated in the canister to each of the filters 21, 22 and 23 and through their respective valves and directly to the vacuum source 15. On the other hand, looking at the green coded version [*Id.* at 63], the sequential operating means 17 intermittently switches the valves 31, 32, or 33 from direct connection to the vacuum 15 to direct connection to ambient air 16. As shown in the green coded version, the sequential operating means 17 has put the valve 31 in the ambient air position 31b. The other valves remain in the vacuum positions 32a and 33a. The valve 21 and filter 31 have been cut off from all direct connection to the vacuum 15. The valve 21 and filter 31 are not connected to any other fan, compressor or vacuum source. Since the vacuum is directly connected to the valves 32 and 33 and therefore to the filters 22 and 23, ambient air 16 is pulled through the input port 14 and through the valve ports 32a and 33a by the vacuum 15. Ambient air is also pulled through the valve ambient air port 31b and the filter by the vacuum 15 but in the opposite direction so as to clean the filter 21 without the need for a second fan or compressor or vacuum source and without the filter being directly connected to anything other than ambient air through the valve 31.

Exhibit 1002 at 59 (underlining added); *see also id.* at 35-36 (arguing over Finigan's re-circulated air "packed" into a filter also subject to negative pressure).

Thus, the '640 Patent and its prosecution history clearly equates "drawn" only with the act of pulling air in by negative vacuum pressure, and excludes forced or compressed air delivered by positive pressure. Accordingly, "drawn"

should be construed in the context of the '640 Patent to mean "pulled in by negative pressure only."[4]

c. "Means for Sequentially Operating"

The term "means for sequentially operating said valves to switch said filters from connection to said vacuum source to connection to ambient air" in claims 1 and 10 is a means plus function clause. The claim language contains no specific structure to avoid interpretation as a "means" clause. The recited function relates to the switching of the filters "from connection to said vacuum source to connection to ambient air." That is, the switching is the movement of the valve that disconnects it from the vacuum's negative pressure (i.e., suction of the vacuum) and connects it to "ambient air," so the "ambient air" can be drawn into the filter in a reverse direction for backflushing, as discussed above.

---

[4] Patent Owner offered broader interpretations in litigation, namely asserting that "ambient air" means "air surrounding the cannister" and "drawn" means "pulled." **Exhibit 1012** at 11, 15 and 17. Even if these positions were adopted in this proceeding, the analysis and outcome would be the same because Patent Owner's constructions are broader, i.e., "ambient air" outside the vacuum machine and "drawn" by pulling only, as Petitioner contends, would still be "surrounding the cannister" and at least "pulled."

The structure disclosed in the '640 patent specification that operates the valves 31, 32, 33 to perform the claimed switching is the solenoids 61, 62, 63 provided for each valve 31, 32, 33. Figs. 4 and 5 show "[t]he *operating* mechanism 31d for the valve 31," *id.* at 5:20-22, and the specification expressly describes that as including a solenoid. *Id.* at 5:22. The structure of the valves 31, 32, 33 (i.e. elements 31a, 31b, 64, 65, 67, 68, 71, 72) themselves are not part of the "means for sequentially operating said valves," because those are parts of the valves that *are operated* as opposed to the structures that is responsible *for operating* the valves. The solenoids are the only structure that physically operate the valves to "switch said filters from connection to said vacuum source to connection ambient air," as claimed, and thus the solenoids are the structure corresponding to the "means for sequentially operating."

The controller 17 that controls the operation of the solenoids 61, 62, 63 is also not part of the "means for sequentially operating said valves." Rather, the controller 17 corresponds to the separately claimed "means for setting a cycle time" and "means for setting said intermittent time," recited in claims 4-6 and 13-15 and discussed below. The controller 17 should not be regarded as corresponding to or limiting the "means for sequentially operating" because the manner in which the solenoid energizations are timed is claimed as a separate function (*id.* at claims 4-6, 9, 13-15, 18-20) from the function of operating the

valves 31, 32, 33 to switch between communication with the vacuum and communication with ambient air. Indeed, the specification states that it is the valves' operating mechanisms 31d, 32d, 33d (of which the solenoids 61, 62, 63 are part) which "sequentially operate to switch the filters 21, 22, and 23 from pneumatic communication with the vacuum source 15 to pneumatic communication with ambient air 16." *Id.* at 3:45-48. The "controller 17" is simply concerned with when and for how long the operating mechanisms 31d, 32d, 33d function, rather than the way in which the operating mechanisms function to operate the valves and switch the filters. Hence, only the solenoids 61, 62, 63 function to operate the valves "to switch said filters from connection to said vacuum source to connection ambient air," as claimed.

Therefore, the term "means for sequentially operating said valves to switch said filters from connection to said vacuum source to connection to ambient air" should be interpreted as being a solenoid for each valve or the equivalent thereof that performs the claimed function. This aligns with the parties' agreed upon interpretation in the co-pending litigation. **Exhibit 1011** at 1.

d. "Means for Setting Said Intermittent Time"

This term is clearly a "means plus function" clause subject to interpretation under §112(f), reciting no structure and only function. The "intermittent time of connection to ambient air" refers to the length of time the solenoid is actuated to switch the valve to ambient air. *See, e.g.*, **Exhibit 1001** at 6:40-50 and 7:1-6

(discussing the "on" time for the solenoids and ranges). In the "electro-mechanical" controller embodiment, this is established by the mechanical relation between the cam 84 and the contact elements of switches 81, 82, 83 that actuate the solenoids 61, 62, 63. *Id.* at 6:28-32. In the "electronic" controller embodiment, the "intermittent time" is established by backflush timer 103. *Id.* at 6:40-53.

Under §112(f), this term is thus limited to either the (a) the cam motor, cam 84, circumferentially arranged switches 81, 82, 83, and the "relation of the cam [84] to the contact elements of the switches 81, 82, 83" ('640 patent at 6:31-32) in the "electro-mechanical" embodiment of the controller 17, or (b) the backflush timer 103 in the "electronic" embodiment of controller 17, each of which is disclosed in the patent specification as the corresponding structure for setting the intermittent time, or equivalents thereof. *See also* **Exhibit 1011** at 3.

e. "Means for Setting a Cycle Time"

This term is also clearly a "means plus function" clause subject to interpretation under §112(f), reciting no structure and only function. In the '640 Patent, cycle time is the time between the first solenoid energization commencing each cycle. In the "electromechanical" controller embodiment, there is no express disclosure of how the cycle time is "set." There is merely a statement that the cycle time "is not adjustable without a change of structural components, such as selection of a motor with a different rpm." **Exhibit 1001** at 6:9-11. This suggests the "cycle time" is "set" by the motor RPM, and for the purposes of this Petition

Petitioner accepts the agreed litigation position on this point (as the cam approach is not material to the rejections discussed herein).

In the "electronic" controller embodiment, the total cycle time includes the sum of the solenoid "on" and "off" times for timer 103 plus the longer solenoid "off" time set by delay timer 102 between the last energization of a solenoid in one cycle and the first solenoid energization of the next cycle. *Id.* at 6:53-59.

Under §112(f), this term is thus limited to either the (a) the cam motor, cam 84, circumferentially arranged switches 81, 82, 83, and the "relation of the cam [84] to the contact elements of the switches 81, 82, 83" ('640 patent at 6:31-32) in the "electro-mechanical" embodiment of the controller 17, or (b) the delay timer 102 in the "electronic" embodiment of controller 17 that adds a longer off period between the on/off times for backflushing set by backflush timer 103, which is disclosed in the patent specification as the corresponding structure for setting the cycle time, or equivalents thereof. *See also* **Exhibit 1011** at 2.

f. "A Piston Reciprocally Disposed Between Said Two Ports"

Claims 7 and 16 recite "a piston reciprocally disposed between said two ports." The use of the term "disposed" in this claim language specifically requires the location of the piston to be *between* the two ports. These ports are opened and closed by the piston's reciprocating movement, as described in the specification. When the piston moves linearly to the right, as shown in Fig. 5, ambient air port

31b is closed and the vacuum port 31a is opened for normal operation. When the piston moves linearly to the left, the reverse happens, and vacuum port 31a is closed and ambient air port 31a is opened for reverse backflushing flow by ambient air. This is consistent with the linear movement nature of a piston, and the fact that it is attached to a solenoid – which also moves linearly. And this is also consistent with the remaining language in claims 7 and 16 requiring simultaneous opening of one port and closing of the other.

A proper construction of that language thus requires that "the piston is located between the claimed ports of the valve housing, and moves back and forth between the claimed ports." *See also* **Exhibit 1011** at 3.

g. "Means Biasing Said Piston"

This term in claims 7 and 16 is also a "means" clause subject to interpretation under §112(f). In the '640 Patent, the corresponding structure is a coil spring 69, which acts to bias the piston. Thus, the claim is limited to a spring or equivalents thereof. *See also* **Exhibit 1011** at 3.

h. "Means for Overcoming Said Bias"

This term in claims 8 and 17 is also clearly a "means plus function" clause subject to interpretation under §112(f). In the '640 Patent, the solenoids 61, 62, 63 are the structures that act against the spring 69.

It should be noted that claim differentiation does not apply to identification of corresponding structure under §112(f). *Laitram Corp. v. Rexnord, Inc.*, 939

F.2d 1533, 1538 (Fed. Cir. 1991). Thus, the statutory requirement of identifying the corresponding structure can lead to the same structure for two means clauses.[5] That is the case here because the solenoids in the '640 patent overcome the spring bias when sequentially operating the valves.

Thus, the "means for overcoming said bias" is limited to a solenoid for each valve or equivalents thereof. *See also* **Exhibit 1011** at 4.

i. "Means for Energizing . . . De-Energizing"

This term in claims 9 and 18 is also clearly a "means plus function" clause subject to interpretation under §112(f). In the '640 Patent, the corresponding structure that energizes and de-energizes is the switches 81, 82, 83. **Exhibit 1001** at 6:19-28 (describing that the switches are opened and closed to de-energize and energize the solenoids) and 6:64-7:18 (describing how switches are actuated to energize the solenoids). Thus, the "means for energizing . . . and de-energizing" is

---

[5] This is different from differentiating between two separately claimed functions which are performed by separate structures in the specification. Hence, the above-discussed function of the "means for sequentially operating" to switch the valves is performed by solenoids, while the functions of setting the "intermittent time" and the "cycle time" are performed by different timer parts in the controller 17. However, the same solenoids also overcome the bias of spring 69.

limited to switches as used in either embodiment or equivalents thereof. *See also* **Exhibit 1011** at 4.

j. "Means cooperable with said inlet port . . ."

This term in claims 2 and 11 is also a "means plus function" clause subject to interpretation under §112(f), reciting no structure and only function. In the '640 Patent, the only corresponding structure disclosed that divides the "cannister" into an upper zone of high velocity vortex air flow and a lower zone of reduced velocity air flow is duct 41 and baffle 42. **Exhibit 1001** at 2:52-61 and 4:37-49 (describing that the duct and baffle configuration); *id.* at Fig. 2. Thus, the "means cooperable with said inlet port" is limited to a duct and baffle or equivalents thereof. *See also* **Exhibit 1011** at 4.

4. How the Construed Claims Are Unpatentable (37 C.F.R. §42.104(b)(4))

An explanation of how the construed claims 1-18 are unpatentable under the statutory grounds identified above is provided in Section VI below.

5. Supporting Evidence (37 C.F.R. §42.104(b)(5))

The exhibit numbers of the supporting evidence relied upon to support the challenge and the relevance of the evidence to the challenge raised, including identifying specific portions of the evidence that support the challenge, are provided in Section VI below. A List of Exhibits is also attached.

V. BRIEF DESCRIPTION OF THE PRIOR ART RELIED UPON

The following is a brief summary of the general relevance of each reference, and specific details of how each reference supports the specific grounds of rejection is provided below in Section VI.

A. Hayden (Exh. 1003)

Hayden discloses a vacuum cleaning machine that includes filters 7 through which dirty air is drawn, and from which clean air is exhausted. Hayden's device includes valves 11 outside its collecting chamber that normally communicate the filters with the vacuum 4. The valves 11 can be switched to enable ambient air to be drawn in a reverse flow for backflushing the filters. Hayden also discloses that controllers for controlling the solenoids that actuate backflushing valves are required and within the level of ordinary skill in the art. **Exhibit 1003** at 4:60-66.

B. Wellan (Exh. 1004)

Wellan discloses a vacuum machine in which filters are backflushed to dislodge particles using forced air. Wellan teaches the details of an electronic controller for operating solenoids that control the valves for backflushing, like the device in Hayden.

C. Eiben (Exh. 1005)

Eiben discloses a vacuum cleaning machine that includes filters, defined by sets of bags 18, through which dirty air is drawn, and from which clean air is exhausted. Eiben's device includes valves 32 on its outside that normally place the filters in communication with the vacuum blower 38. The valves 32 can be

sequentially switched to enable ambient air to be drawn in a reverse flow for backflushing the filters. The valves 32 may be actuated by different devices, including solenoids. **Exhibit 1003** at 3:69-73.

D. DE219 (Exhibit 1006)

DE219 teaches a vacuum device with a filter, which draws in ambient air for backflushing its filters. DE219 specifically discloses the type of reciprocating piston recited in the '640 patent's dependent claims 7 and 16, operated by an electromagnet similarly to a solenoid, which also includes an electromagnet.

E. Howeth (Exhibit 1007)

Howeth teaches a vacuum machine that operates basically the same as Hayden's by opening/closing valves to permit ambient air to be drawn in a reverse direction through filters for backflushing. **Exhibit 1007** at Fig. 9 (showing ambient air backflush operation like Hayden's); 13:39-16:37 (describing normal and backflushing operations like Hayden's). Howeth teaches the use of a spring to bias its actuator. *Id.* at 14:14 (referring to cylinder as having "spring return") and Fig. 10 (showing coil springs inside cylinders that actuate the valves).

F. Von Stackelberg

Von Stackelberg teaches a drum lid in a vacuum system that operates by redirecting airflow laterally by placing a direction plate beneath the inlet port. **Exhibit 1010** at 4:35-5:24; Fig. 2 (showing a flow modifying structure 20 and

baffle 24 that redirects air flow). The flow modifying structure and baffle "sweeps" the air stream laterally in a circular drum. **Exhibit 1010** at 4:42-5:54.

VI. DETAILED EXPLANATION OF PERTINENCE AND MANNER OF APPLYING THE CITED PRIOR ART TO EVERY CLAIM FOR WHICH REVIEW IS REQUESTED UNDER 37 C.F.R. §42.104(b)

A. Field of the Art and the Level of Ordinary Skill

The field of the claimed invention is clearly directed to vacuum cleaning machines. **Exh. 1001** at 1:6-9 (Field of the Invention). The 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. **Exhibit 1013** at ¶8. The prior art references discussed herein also reflect the appropriate level of skill at the relevant time in the vacuum cleaning machine art. *Chore-Time Equipment Inc. v. Cumberland Corp.*, 713 F.2d 774, 779 n.2 (Fed. Cir. 1983).

B. Ground 1: Claims 1 and 10 are Anticipated By Hayden

Below is a claim chart showing the elements of claims 1 and 10 are found in Hayden. More detailed arguments on specific limitations follow that claim chart.

Element	The '640 Patent	Presence of Each Limitation in Hayden
1[a]	**1.** A vacuum cleaning machine comprising	*See* **Exhibit 1003**, *passim.*
1[b]	a cannister having an inlet port and at least two outlet ports,	The "cannister" is the dirty air chamber below plate 8 in which the filters 7 are located. "Inlet 2 opens directly into the interior of dust collector 1 which is one large open chamber below divider plate Item 8 and comprises the dirty air chamber

Element	The '640 Patent	Presence of Each Limitation in Hayden
		(not numbered)." *Id.* at 3:34-37. The outlet holes 9 are the "outlet ports" for that chamber, i.e., the "cannister." And there is one for each of the plurality of filters 7 that opens into the valve chamber 31 of the valve 11 above the chamber.. *Id.* at 3:43-49. Inlet 2 is the "inlet port."
1[c]	at least two filters disposed inside of said cannister,	Filters 7 are present in the "cannister," i.e., the chamber below divider plate 8 There can be many filters, and the specification mentions that a large dust collector can have "a dozen or so." *Id.* Figs. 1, 8 and 9; 3:43-49. 4:67-5:23.
1[d]	one in pneumatic communication through a corresponding one of each of said outlet ports,	Each filter is pneumatically communicated through its corresponding outlet hole 9 (i.e., the "outlet port."). *Id.* at 3:43-49. 4:67-5:23.
1[e]	a vacuum source,	"Item 4 (FIG. 1) is the suction blower which sucks dirty air from the source and causes the flow through filter 7 which removes the direct and renders the exhaust gasses clean." *Id.* at 3:55-58.
1[f]	at least two valves disposed outside of said cannister,	"[T]he bottom of diverter valve 11 rests on divider plate 8 directly over filter outlet hole Item 9 (as shown in Fig. 2). Filter outlet hole 9 is where the filter opens into valve chamber 31. There are a number of filters Item 7 with outlet holes 9 each covered with its own diverter valve 11 in dust collector 1." *Id.* at 3:40-45.
1[g]	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	"[T]he bottom of diverter valve 11 rests on divider plate 8 directly over filter outlet hole Item 9 (as shown in Fig. 2). Filter outlet hole 9 is where the filter opens into valve chamber 31. There are a number of filters Item 7 with outlet holes 9 each covered with its own diverter valve 11 in dust collector 1." *Id.* at 3:40-45.

Element	The '640 Patent	Presence of Each Limitation in Hayden
	from said inlet port simultaneously through corresponding ones of said filters and	"Fig. 3 shows a horizontal cross-section of diverter valve 11 in the non-flushing position." *Id.* at 4:4-5. "In Figs. 3, 4 and 6, item 31 represents the valve chamber, which has the shape of a rectangular box open on the bottom to receive clean filtered air from filter outlet hole 9 over which the diverter valve 11 sits. Valve chambers 31 thus lie in the air flow path between the dirty air chamber and clean air chamber 10." *Id.* at 4:26-31. During "normal operation" no current is applied to solenoids 22, and the valves are in their non-flushing position. *Id.* at 4:38-43. Thus, dirty air is drawn in via inlet 2 and flows simultaneously through all the filters 7, outlet ports 9, through valve chambers 31 of valves 11 into clean air chamber 10, and out the exhaust 3. *See also id.* at 2:52-56.
1[h]	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.	*Compare* Figs. 4 and 6. Fig. 6 shows the valve in its backflushing position to open valve chamber 31 to atmosphere via port 13 and close communication to clean air chamber 10. *Id.* at 2:28-51 (explaining that valve has one port to the filter and switches between the two other ports to atmosphere and the clean-air chamber/plenum). *Id.* at 4:32-66; 5:12-15; 6:1-6 (describing controller, backflushing results, and claiming individual backflushing and disclosure). Solenoid 22 operates each valve 11, and specifically its valve plate 16, to switch the valves 11 from

Element	The '640 Patent	Presence of Each Limitation in Hayden
		connection to the vacuum source and ambient air.
10[a]	10. A vacuum cleaning machine comprising	See analysis above for claim element 1[a].
10[b]	a cannister having an inlet port and three outlet ports,	See analysis above for claim element 1[b].
10[c]	three filters disposed inside of said cannister,	See analysis above for claim element 1[c].
10[d]	one in pneumatic communication through a corresponding one of each of said outlet ports,	See analysis above for claim element 1[d].
10[e]	a vacuum source,	See analysis above for claim element 1[e].
10[f]	three valves disposed outside of said cannister,	See analysis above for claim element 1[f].
10[g]	each said valve being in pneumatic communication between said vacuum source and a corresponding one 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	See analysis above for claim element 1[g].
10[h]	means for sequentially operating said valves to switch said filters from connection to said vacuum source to connection to ambient air whereby ambient air is drawn sequentially through corresponding ones of said valves and said filters which are connected to ambient air by said vacuum via corresponding	See analysis above for claim element 1[h].

Element	The '640 Patent	Presence of Each Limitation in Hayden
	ones of said valves and filters which are connected to said vacuum.	

Hayden is a "vacuum cleaning machine," as recited in claim elements 1[a] and 10[a]. Its "dirty air chamber" defined below divider plate 8 corresponds to the "cannister" in claim elements 1[b] and 10[b] because it houses the filters 7 and receives the dust collected thereon. Inlet 2 is the "inlet port" of that "cannister" because that is where dirty air flows in. The port 9 for each filter 7 is open through an "outlet port" because air cleaned by the filter 7 flows therethrough into the valve chamber 31 of valve 11, and into the clean air chamber 10 for exhaust via the vacuum 4 and exhaust 3. *Id.* at Figs. 1, 8 and 9; 2:52-56; 3:43-49. 4:67-5:23.

The filters 7 are "disposed inside said cannister" as required by claim elements 1[c] and 10[c] because they are in the "dirty air chamber." Because a number of filters are used, possibly a "dozen or so," there are "at least two filters," as required by claim 1, and indeed "three," as required by claim 10. Each filter 7 in Hayden is also in "pneumatic communication through a corresponding one of said outlet ports," as required by claim elements 1[d] and 10[d] because the air flowing up through the filters 7 flows through outlet holes 9 up through the filter plate 8 and into the valve chambers 31 in diverter valves 11. Hayden also has a "vacuum source," as required by claim elements 1[e] and 10[e], in the form of suction blower 4. *Id.* at 3:55-58.

Diverter valves 11 correspond to the claimed "valves disposed outside said cannister" in claim elements 1[f] and 10[f]. These valves mount to the upper surface of divider plate 8, and thus are "outside" the "dirty air chamber" (i.e., the claimed "cannister"). *Id.* at 3:40-45. **Exhibit 1013** at ¶17. This point is discussed further below, explaining how the Examiner overlooked this aspect of Hayden.

Claim elements 1[g] and 10[g] are also met. Each of Hayden's diverter valves 11 is "in pneumatic communication between said vacuum source [suction blower 4] and a corresponding one of said outlet ports [item 9]" because each valve 11 is mounted to the dividing plate 8 over and in communication with outlet hole 9 so the "filter opens into valve chamber 31." **Exhibit 1003** at 3:40-43 and 4:26-31. The valve chambers 31 are described as the parts of the valves 11 that "lie in the airflow path between the dirty air chamber and clean air chamber 10." *Id.* at 4:30-31. "There are a number of filters Item 7 with outlet holes 9 each covered with its own diverter valve 11 in dust collector 1." *Id.* at 3:43-45. This permits "air to be drawn by said vacuum source from said inlet port [2] simultaneously through corresponding ones of said filters [7]," as recited in claim elements 1[g] and 10[g].

Elements 1[h] and 10[h] concern the use of the valves permitting intake of "ambient air" for backflushing the filter in each compartment. As mentioned above, these claim elements are expressed as "means" clauses, i.e., "means for

sequentially operating." For anticipation, this requires Hayden to both perform the same function as the "means for sequentially operating," and to have the same or equivalent structure for performing that function. *Regents of the Univ. of Minn. v. AGA Med. Corp.*, 717 F.3d 929, 940 (Fed. Cir. 2013).

1. The Function of the "Means for Sequentially Operating"

Hayden discloses performing the claimed function of "sequentially operating said valves to switch said filters from connection to said vacuum source to connection to ambient air." As shown in Hayden's Fig. 3 and the claim chart, each valve 11 can be switched ninety degrees counterclockwise from the normal "non-flushing" position shown in Fig. 3 to a backflushing position. In the normal position in Figs. 3 and 6, valve plate 16 closes off communication to port 13 leading to atmospheric "ambient air" and opens the valve chamber 31 to the clean air chamber 10. This enables air flowing up through the corresponding filter to enter the valve chamber 31 and flow into the clean air chamber 10, and out through the suction blower 4 and exhaust 3 as discussed above. **Exhibit 1013** at ¶18.

In its backflushing position, as shown in Fig. 4, the valve plate 16 instead is pivoted to a position to block communication between valve chamber 31 and the clean air chamber 10, and open the valve chamber 31 to the ambient air port 13. This permits air to flow into the valve chamber 31 from the ambient air outside the device, which in turn leads the air down into its corresponding filter 7 via outlet hole 9 in a reverse direction. **Exhibit 1013** at ¶19.

The fact the both the valve port leading to the clean air chamber 10 and the valve port 13 leading to atmospheric air communicate with the same filter outlet is confirmed by the Summary of the Invention section. **Exhibit 1003** at 2:28-51.

Because the clean air chamber 10 is always connected to the suction blower 4, when the valve 11 for one filter 7 is moved to the backflushing position, the negative pressure/suction applied by the suction blower 4 draws air upwardly through the other filters via their valves 11 in the normal position, and draws air in the reverse direction downwardly through the filter 7 with its valve 11 in the backflushed position. The atmospheric air pulled downward through the filter 7 with its valve 11 in the backflushed position causes particles to come off that filter 7 as a "dense cloud." *Id.* at 5:12-15. Claim 1 of Hayden confirms its invention as "backflushing one filter," *id.* at 6:1-2, and claim 2 confirms that the timing and duration for backflushing is controlled for each "individual" filter. *Id.* at 6:3-6. *See also* **Exhibit 1013** at ¶20.

This is exactly what happens in claims 1 and 10 of the '640 patent. *Id.* at ¶21. The valve 11 of Hayden's backflushed filter is operated "to switch said filters [i.e., the backflushed filters] from connection to said vacuum source [i.e., by valve plate 16 blocking communication to clean air chamber 10 and blower 4] to connection to ambient air [i.e, by opening port 13] 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 [i.e., the other filters that are still connected to clean air chamber 10 and the blower 4 by the valves 11 in their normal position]."

2. The §112(f) Structure Of The "Means for Sequentially Operating"

Hayden also discloses the structure in the '640 Patent corresponding to the claimed means for sequentially operating the valves. Hayden discloses that each valve 11, and specifically its valve plate 16, is operated by solenoid 22. **Exhibit 1003** at 4:36-38. As discussed above in Section IV.B.3.c, a solenoid for each valve is exactly the corresponding structure disclosed in the '640 Patent specification for operating the claimed valves to switch their filters from the vacuum source to ambient air. **Exhibit 1013** at ¶22. Thus, the identical structure is used in Hayden, and that satisfies claim 1 and 10's "means for sequentially operating."[6]

3. The Examiner Misunderstood Hayden's Valve Location

---

[6] There is no need to make a structural equivalency comparison in this case, where the claimed function is performed by the identical structure that corresponds to the "means" clause. *See* 35 U.S.C. § 112(f); *see also Odetics Inc. v. Storage Technology Corp.*, 185 F.3d 1259, 1267 (Fed. Cir. 1999).

During prosecution, the Examiner found (correctly) that Hayden met almost every limitation of claims 1 and 10, including the limitations relating to the "means for sequentially operating." **Exhibit 1002** at 17-18. The only alleged distinction the Examiner found (incorrectly) is that Hayden allegedly has its valves 11 "inside" the "cannister," and that it would not be obvious to locate Hayden's valves outside the canister. because the other prior art of record used "forced air filter cleaning only." *Id.* However, the Examiner was wrong on this point.

The Examiner apparently overlooked the part of Hayden stating: "Inlet 2 opens directly into the interior of dust collector 1 which is one large open chamber below divider plate Item 8 and comprises the dirty air chamber (not numbered)." **Exhibit 1003** at 3:34-37 (underlining added). The dirty air chamber itself is a "cannister" because it is separate from the clean air chamber 10 above the plate 8, and it contains the filters 7 and any dust collected. Indeed, the '640 Patent uses the same approach because plate 19 closes off the "cannister" 10 where the filters are located, just like Hayden's plate 8 closes off the dirty air chamber. Hayden's valves 11 are indisputably on the "outside" of that dirty air chamber, because they are mounted to the upper surface of plate 8. The fact that the Examiner overlooked this teaching resulted in an incorrect analysis, and shows that claims 1 and 10 should have been found anticipated by Hayden.

There is no claim language excluding the "cannister" from being a chamber that is created by a dividing plate, or limiting the "cannister" to being some outermost or unitary structure like the housing enclosing both Hayden's dirty and clean air chambers 9, 10. If there were, then the claims would not even read on the disclosed embodiment of the '640 patent because the valves 31, 32, 33 are mounted atop a plate 19 dividing an upper chamber under cover 25 that receives clean air leaving the filters 21, 22, 23 from a lower chamber housing the filters and receiving dirty air *just like Hayden*. The claims simply require the "cannister" be present, the filters be in "inside" it (claim elements 1[c] and 10[c]), and the "valves" be "outside" it (claim elements 1[f] and 10[f]). That is clearly true of Hayden, and thus the Board should correct the Examiner's error by finding claims 1 and 10 anticipated.

C. Ground 2: Claims 1 and 10 Are Obvious Over Hayden and Eiben

To the extent the Petitioner argues that the Examiner was correct that Hayden does not have its valves "disposed outside of said cannister," as required by claim elements 1[f] and 10[f], Eiben provides that teaching. Eiben is exactly the same type of vacuum cleaning machine, and also uses solenoid-actuated valves 32 that open to ambient air. **Exhibit 1013** at ¶¶11-16.

Specifically, Eiben has a series of compartments 10, 12, 14, 16 (together corresponding to the "cannister") each with a filter using bags 18. An intake duct 28 permits air to be drawn into these compartments. Valves 32 are provided in an

exhaust duct 30 connected between each compartment 10, 12, 14, 16 and an outlet duct 36, which in turn is connected to suction blower 38. The suction blower 38 applies negative pressure to normally draw air into the intake duct 28, through the filters in each compartment, out through the outlet duct 30 and valve 32, and into the outlet duct 36. **Exhibit 1005** at 2:42-68, 3:10-4:49; **Exhibit 1013** at ¶12.

Each valve 32 can be moved to the position shown in dashed-lines of Eiben's Fig. 6. This permits ambient air to flow in a reverse direction to backflush the filter in the associated compartment 10, 12, 14, 16. The valve actuator may be a solenoid. **Exhibit 1005** at 3:69-73; **Exhibit 1013** at ¶13-16. Thus, Eiben functions essentially the same as Hayden.

Eiben's valves 32 are shown as being mounted to the outside of its compartments, i.e. its "cannister," and communicated by a manifold/exhaust pipe 36 with the vacuum source/blower 38. It would be a simple and predictable modification to include the same structure in Hayden for the same purpose, and Eiben shows that it is easily within the skill in the art to do so. Eiben teaches that Hayden's diverter valves 11, instead of being inside a distinct "clean air chamber 10" could be on the outside of the Hayden device and connected together to the vacuum source 4 by an exhaust manifold like that in Eiben. Indeed, clean air chamber 10 in Hayden is effectively acting as a manifold by collecting all the air leaving the valves 11 in their non-flushing positions, and directing that air to the

vacuum 4 for exhausting. There is no functional difference between the two and thus the art teaches them to be interchangeable. In fact, such a modification provides the benefit of not having to form openings 13 in the clean air chamber wall and aligning/sealing Hayden's diverter valves to them to permit communication with the atmosphere, because Hayden's valves 11 would be on the outside and can directly communicate with the atmosphere. This is exactly type of predictable approach *KSR* holds is obvious.

The Examiner's reasons for allowing claims 1 and 10 over Hayden, besides being incorrect and not binding on the Board, also do not apply to a combination with Eiben (which the Examiner did not consider). The Examiner stated that Hayden could not be combined with the other art of which he was then aware, namely vacuums using "forced air filter cleaning only," to teach locating Hayden's valves on the "cannister's" outside. **Exhibit 1002** at 18. However, Eiben uses "ambient air" rather than "forced air," and has its valves 32 on the outside. Thus, the Examiner could not have relied on that reason for allowance had he considered Eiben during examination. Irrespective of what weight the Board may accord the Examiner's reasons for allowance with respect to Hayden alone, those reasons are not true and do not apply with respect to Eiben. Thus, claims 1 and 10 would have been obvious over Hayden in view of Eiben.

D. Grounds 3 and 4 Using Wellan For Controller Features

To the extent the "means for sequentially operating" (claim elements 1[h] and 10[h]) are not met by Hayden or Hayden/Eiben, Wellan satisfies that limitation. In addition, Wellan also meets the "means for setting a cycle time" and the "means for setting said intermittent time" in claims 4-6 and 13-15 regardless of which way the "means for sequentially operating" in claims 1 and 10 is construed.

1. Ground 3: Claims 1, 4-6, 10 and 13-15 Are Obvious Over Hayden and Wellan

a. Claims 1 and 10

With respect to claims 1 and 10, the Petitioner offers an alternative basis for finding claim 1 unpatentable in the event the corresponding structure for the "means for sequentially operating" is interpreted to also include timing features from the either of the two controller 17 embodiments in the '640 Patent specification, rather than just the solenoids controlled by those controllers 17. Specifically, even if Hayden does not anticipate claims 1 and 10 under this narrower interpretation, it would be obvious to use the electronic controller of Wellan in the Hayden's vacuum machine to perform the "means for sequentially operating['s]" function, and Wellan's controller is equivalent under ¶112(f) to the corresponding structure in the '640 Patent's "electronic embodiment."

Hayden already discloses the function of the "means for sequentially operating," as discussed above, because its solenoids or other actuators are triggered to switch each valve 11 individually to permit the reverse flow of ambient air to enter and backflush its filter therein. *Supra* at Section VI.B.1.

Although Hayden does not disclose a particular type of controller for triggering the solenoids, it expressly states that "[i]n a complete working dust filtration system, some provision for automatic, periodic cleaning cycles needs to be made to keep the dust-making equipment in continuous operation. Cleaning cycle controller Item 25, shown in Fig. 4, provides this function. It is considered within the capacity of those skilled in the art to construct cleaning cycle controller 25." **Exhibit 1003** at 4:60-66. This provides a direct, unequivocal reason to include a known controller in the Hayden device. *See also* **Exhibit 1013** at ¶¶23 and 26.

Wellan discloses such a controller used to actuate solenoids in a similar type of vacuum cleaning machine. Wellan discloses a vacuum cleaning machine having a housing 1 divided into an upper clean air section 11 and lower dusty air section containing a plurality of filter bags 13. Each filter bag 13 is in communication with a pilot valve 38. The pilot valves 38 are sequentially actuated to sequentially backflush the filter bags 38 with air. Timing and actuation of the pilot valves 38 is controlled by a timing control system. **Exhibit 1004** at 7:35-47.

Wellan's controller uses an entirely electronic approach just like the "electronic" controller 17 embodiment of the '640 Patent. **Exhibit 1013** at ¶27. The controller in Wellan is designed to trigger solenoid-actuated pilot valves 38 in order to permit air to enter individual filters defined by sets of bags 13 in a reverse flow/cleaning direction, **Exhibit 1004** at 7:35-47, just as Eiben's solenoid or other

actuator is triggered to switch valve 32 for the same purpose. *See also id.* at 5:8-59 (discussing reverse flow for cleaning filters); **Exhibit 1013** at ¶28.

Like the '640 Patent, Wellan's controller includes a "solid state timer."[7] **Exhibit 1013** at ¶29. Wellan's solid state timer is coupled to a "stepping switch," which is shown as moving between connections to the various individual solenoids for valves 38. **Exhibit 1004** at Fig, 7. Wellan's timer also has inputs for adjusting the frequency at which the stepping switch is operated, and the length for which it is operated. *Id.* at 7:43-47 and Fig. 7. In Fig. 7, one input is labelled "Pulse On-Time," referring to the length of time each solenoid is actuated to open a valve and deliver a pulse of air for filter cleaning, and the other input is labelled "Adjust. Seq. Rate," which matches up to the frequency (i.e., rate) of the valve operations discussed in the specification. *Id.* at 5:52-60; 7:42-47, 58-61. This enables the user to separately input the time period for the backflush pulse duration, and the time period between them. **Exhibit 1013** at ¶30.

---

[7] "Solid state" refers to the fact the electronic device includes semiconductor circuitry. **Exhibit 1009** at 6. **Exhibit 1001** at 7:7-14.

Thus, Wellan has a controller that performs the same function in substantially the same way as the "electronic" controller embodiment[8] in the '640 Patent specification to achieve substantially the same result. *Regents of the Univ. of Minn. v. AGA Med. Corp.*, 717 F.3d 929, 941 (Fed. Cir. 2013). Each operates in substantially the same way by determining both the order and time between the actuation of each individual solenoid that operates a valve, and the length of time those valves are operated to enable backflushing. The result is substantially the same because each provides a controller that manages the individual operation of the valves in an organized manner, and establishes predetermined settings for those time periods that govern the valve operation. Indeed, each embodiment is electronic in nature, with solid state circuitry and also permits user adjustment via potentiometers to change the various time periods. **Exhibit 1013** at ¶31.

Not only do they operate in substantially the same way to achieve substantially the same result, Wellan itself recognizes that such controllers are well-known ("more-or-less conventional") and Hayden itself says they are needed

---

[8] Since the prior art uses an electronic approach similar to the '640 Patent's "electronic" controller embodiment, there is no need to compare the prior art to the '640 Patent's "electro-mechanical" controller embodiment.

and also well-known. **Exhibit 1004** at 7:35-41; **Exhibit 1003** at 4:60-66. This shows that such controllers are known in the art to be interchangeable. *Lockheed Aircraft Corp. v. U.S.*, 193 USPQ 449, 461 (Ct.Cl. 1977); *Chiuminatta Concrete Concepts, Inc. v. Cardinal Indus., Inc.*, 145 F.3d 1303, 1309 (Fed. Cir. 1998). *See also* **Exhibit 1013** at ¶35.

Given that Hayden teaches all the components of a vacuum cleaning machine in which solenoids are actuated to operate valves individually for backflushing their respective filters, and Wellan provides such a controller for that purpose, it would be obvious to use the electronic controller of Wellan in the device of Hayden. Indeed, Hayden expressly states such a controller is needed and within the skill of the art. **Exhibit 1003** at 4:60-66. This provides a direct, unequivocal reason to include a known §112(f) equivalent controller like that shown in Wellan in the Hayden device. This is nothing but the "predictable use of prior art elements according to their established functions" that renders the claims obvious. *KSR International, Inc. v. Teleflex, Inc.*, 550 U.S. 398, 417 (2007). This therefore satisfies each and every limitation of claims 1 and 10 in the alternative to those claims being anticipated by Hayden alone.

b. Claims 4-6 and 13-15

While the "means for setting a cycle time" appears in claims 4, 6, 13 and 15 before the "means for setting said intermittent time" in claims 5, 6, 14 and 15, it

makes logical sense to address the former after the latter because the length of the "intermittent time" is included within the "cycle time," as discussed below.

i. "Means for Setting Said Intermittent Time"

Claims 5, 6, 14 and 15 recite "means for setting said intermittent time of connection to ambient air for each filter." As discussed above in the claim construction section, the "intermittent time of connection to ambient air" refers to the length of time the solenoid is actuated to switch the valve to ambient air. *See, e.g.*, **Exhibit 1001** at 6:40-50 and 7:1-6 (discussing the "on" time for the solenoids and ranges). The relevant corresponding structure in the '640 Patent's "electronic" controller embodiment performing that function is the backflush timer 103.

Wellan's electronic controller also sets the intermittent time just like the backflush timer 103 in the '640 Patent. **Exhibit 1013** at ¶32. As discussed above, Wellan's timer is a solid state timer and it includes an input for setting the "duration of the pulse of energy sent to a respective pilot-valve solenoid," i.e., the "intermittent time of connection" for flushing the related filter. **Exhibit 1004** at 5:52-59; 7:42-47. Similarly, the '640 Patent also uses a solid state timer because the circuitry of timer 103 includes solid state chips, with an optional potentiometer input for setting the "intermittent time."

Wellan's use of solid state circuitry with a feature for setting the intermittent time thus performs the claimed function of the "means for setting said intermittent time" and is insubstantially different from the '640 Patent's solid state circuity as

the corresponding structure for doing the same. They each control the amount of time a solenoid is energized, thus performing the claimed function in substantially the same way, and result in the solenoids being able to operate the valves to permit filter backflushing in a timer controlled manner, thus achieving substantially the same result. **Exhibit 1013** at ¶32. Moreover, one of ordinary skill in the art would readily recognize them as interchangeable because they both use electrical circuits to actuate solenoids in an ordered sequence and set each filter's backflushing time.

Therefore, the "means for setting said intermittent time" in claims 5, 6, 14, and 15 are satisfied by Wellan. For the same reasons it would be obvious to combine the electronic controller of Wellan with the device of Hayden to arrive at claims 1 and 10 to provide the Hayden device with a control mechanism for governing the solenoid/valve timing,[9] it would likewise be obvious to use Wellan's

---

[9] This applies under either interpretation the "means for sequentially operating" in claims 1 and 10. Even if the "means for sequentially operating" has a broader scope anticipated by Hayden alone, it would still be obvious to use the electronic controller of Wellan for the same reasons as discussed in Section VI.D.a to control Hayden's valve solenoids. The resultant combination would also include the features of Wellan satisfying the "means for setting the intermittent time."

solid state circuity to set the "intermittent time for connection to ambient air [of each of Hayden's] filters."

ii. "Means for Setting a Cycle Time"

Claims 4, 6, 13 and 15 recite the "means for setting a cycle time of said sequential valve operation." In the '640 Patent, the relevant corresponding structure in the "electronic" controller 17 embodiment is the delay timer 102, which adds a longer delay/off period to the on/off periods of the backflush timer 103. As mentioned above in the claim construction section, this is because the specification discloses that the total cycle time includes the sum of the solenoid "on" and "off" times controlled by timer 103 plus the longer solenoid "off" time set by delay timer 102 between the last energization of a solenoid in one cycle and the first solenoid energization of the next cycle.

In Wellan, the "cycle" time is also described as the sum of solenoid on/off times. Wellan states that the solenoid-actuated pilot valves 38 are operated "so that every row of filter bags [i.e., a filter] will be flushed at sixty second intervals, each discharge of the reservoir 28 occurring about every 6 or 7 second for the module shown. Thus, every bag will be cleaned once a minute." **Exhibit 1004** at 5:55-59. In the terms of the '640 Patent claims, each "cycle" in Wellan is a minute. Simple math confirm this: the cycle length is the sum of the timer periods for the 9 valves in Figure 7 that open every "6 or 7 seconds," which adds up to just about one minute (6 2/3 secs per valve equals a 1 minute cycle for 9 valves).

Wellan's structure therefore is equivalent to the structure in the '640 Patent corresponding to the "means for setting a cycle time." In both approaches, the sum total of time periods during which the solenoids are energized ("on") and de-energized ("off") equals the total cycle time. The use of a "delay timer 102" in the '640 Patent is an insubstantial difference, because it simply makes one of the "off" periods of de-energization longer, rather than having all the off periods of de-energization of the same length. But this is not a meaningful difference. **Exhibit 1013** at ¶¶33-34. The way and result are still substantially the same, because each is still controlled in the same way using solid state circuitry to turn the solenoids on and off individually, and the result is that the entire cycle time is set by the total sum of on/off times collectively. *Id.* This is also consistent with in the '640 Patent's "electromechanical" embodiment where the cycle time is set by the rotational speed of the cam 84 and all the "off" periods have the same length, like Wellan's controller. One rotation or "cycle" of the cam 84 also equals the sum total of the solenoid on/off times. **Exhibit 1001** at 6:8-11, 17-33.

Thus, the "means for setting a cycle time" in claims 4, 6, 13, and 15 are also satisfied by Wellan. For the same reasons it would be obvious to combine the electronic controller of Wellan with the device of Hayden to arrive at claims 1 and 10 to provide the Hayden device with a control mechanism for governing the

solenoid/valve timing,[10] it would likewise be obvious to use Hayden's solid state circuity to set the "cycle time of said sequential valve operation."

iii. Claims 6 and 15

The fact that claims 6 and 15 recite the "means for setting said intermittent time" and the "means for setting a cycle time" together does not change the result of obviousness. The obvious combination of adding Wellan's electronic controller to Hayden's machine to control the actuation timing of Hayden's solenoids for operating the valves results in both these limitations being met, even in combined form. That is, the resultant, obvious combination would incorporate the solid-state circuit in Wellan that sets the "intermittent time" at which the solenoids are actuated, and also the collective total of the "intermittent time[s]" for each solenoid actuation and the time periods between such actuations as the claimed "cycle time." Therefore, claims 6 and 15 are also obvious over Hayden and Wellan.

2. Ground 4: Claims 1, 4-6, 10, and 13-15 Are Obvious Over Hayden, Eiben and Wellan

Here, the analysis for combining Wellan with Hayden and Eiben is the same as in Section VI.D.1.a for combining Wellan with Hayden alone. Eiben simply

---

[10] This also applies under either interpretation for the "means for sequentially operating" in claims 1 and 10 for the same reasons as stated in footnote 9.

adds (in the alternative) the valve to the outside of Hayden's "cannister," and thus the rationale for adding the Wellan controller to Hayden (as modified by Eiben) remains exactly the same. The resulting combination thus renders claims 1 and 10 obvious to the extent they are not already obvious over just Hayden and Eiben.

Similarly, the same rationale teaches that the "means for setting said intermittent time" and the "means for setting a cycle time" present in Wellan's controller, as discussed above in Section VI.D.1.b, would also be applied to the Hayden/Eiben combination. This applies irrespective of whether the "means for sequentially operating" is interpreted more broadly (such that claims 1-10 are unpatentable over just Hayden and Eiben), or more narrowly (such that claims 1-10 are unpatentable over Hayden, Eiben and Wellan). This also establishes the obviousness of claims 4-6 and 13-15.

E. Grounds 5-10 Adding DE219 And Howeth

Grounds 5-10 build on the prior art against claims 1 and 10 in Grounds 1-4, adding DE219 and Howeth to meet the claimed "piston" and "means biasing said piston" in claims 7 and 16 (and thus included in dependent claims 8-9 and 17-18).

1. Ground 5: Claims 7-9 and 16-18 Are Obvious Over Hayden, DE219 and Howeth

a. Claims 7 and 16

Claims 7 and 16 recite the same subject matter, namely "each said valve comprising a housing having a continuously open port and two reciprocally opened

and closed ports therethrough, a piston reciprocally disposed between said two ports and means biasing said piston to simultaneously close one of said two ports and open another of said two ports."

Hayden already has a housing for its diverter valve 11 with a "continuously open port" and "two reciprocally opened and closed ports therethrough." The "continuously open port" is the port open to the filter 7 via opening 9. The "reciprocally opened and closed ports therethrough" are the ports leading to the clean air chamber 10 (and ultimately the vacuum 4) and the one marked 13 that leads to the ambient air. **Exhibit 1003** at Figs. 4 and 6; **Exhibit 1013** at ¶39.

Hayden does not expressly disclose "a piston reciprocally disposed between said two ports," which means that "the piston is located between the claimed ports of the valve housing, and moves back and forth between the claimed ports." *Supra* Section IV.B.3.f. However, DE219 teaches that feature. In each valve of DE219, the piston includes rods 28, 29 that move linearly back and forth under control of electromagnets 26, 27 (just like a solenoid) to move valve discs 30, 30a, 34, 34a to open and close two ports. **Exhibit 1006** at Figs. 1 and 2; **Exhibit 1008** at 2-3 ([0020]-[0045]); *see* **Exhibit 1013** at ¶40.

DE219 teaches that this type of arrangement is also interchangeable with "other valve arrangements." **Exhibit 1008** at 2 ([0016]). Those other valve arrangements include "flap valves," just as is shown in Hayden. In fact, DE219

uses the word "obviously" to describe this interchangeability. *Id.* Therefore, it would be obvious to use the known type of reciprocating piston valve in place of the flap or hinged valve taught in Hayden. Hayden would require little modification, except to locate the ports closed by a piston directly opposite one another, as opposed to 90 degrees. But that is a simple change well within the skill of anyone having ordinary skill in the art. There are no unexpected results or other meaningful differences, as the '640 patent itself admits that the specific type of valve used does not make a difference, as long as it works as intended. **Exhibit 1001** at 7:48-59. *See also* **Exhibit 1013** at ¶41.

The "means biasing said piston" corresponds to spring 69 in the '640 patent specification. The inclusion of a spring to bias a piston back to its normal, unactuated position is an extremely well-known and simple mechanical feature that would be obvious to include. *Id.* at ¶42. Howeth provides an example of a spring being used to bias a piston back to its normal position in the context of an ambient air backflushed vacuum machine constructed just like Hayden. **Exhibit 1007** at Fig. 9 (showing ambient air backflush operation like Hayden's); 13:39-16:37 (describing normal and backflushing operations like Hayden's); 14:14 (referring to cylinder as having "spring return") and Fig. 10 (showing coil springs inside cylinders that actuate the valves). More particularly, the piston in Howeth's valve is actuated to move a flap for closing off communication between a filter and a

vacuum source and permitting ambient air to enter through that valve into its filter in a reverse direction in the same manner as Hayden. **Exhibit 1013** at ¶43. This teaches one of ordinary skill in the art to use a spring for that purpose in the exact same type of device, and it would therefore be obvious to use a spring for biasing the DE219 type of piston in that manner when incorporated into Hayden's device.

b. Claims 8 and 17

Claims 8 and 17 recite "said operating means further comprising means for overcoming said bias to move said piston to simultaneously open said one of said two ports and close said another of said two ports." As discussed above in Section IV.B.3.h, the corresponding structure for the "means for overcoming said bias" is a solenoid for each valve. It has already been established above that Hayden teaches the use of an electric solenoid for each valve 11. *Supra* at Section VI.B.2. That analysis applies equally here. A reason to combine is already present (or better yet not even needed) because Hayden already uses a solenoid from the outset. The solenoid in Hayden, and thus in the combination of Hayden, DE219 and Howeth, meets claims 8 and 17 because its movement opens one of the two ports and closes the other, as claimed.

c. Claims 9 and 18

Claims 9 and 18 depend from claims 8 and 17, respectively, and recite "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."

Hayden already has the "at least two solenoids, one corresponding to each valve" as discussed above, so the recitation of the solenoids in claims 9 and 18 adds nothing further of relevance to the scope of claims 1, 8, 10, and 17. The only difference is that this language narrows the claim scope to just the solenoids, as opposed to §112(f) equivalents thereof – which does not effect the analysis here because Hayden has solenoids anyways.

Hayden expressly includes a device for applying electricity to its electrical solenoids for actuating the same. Indeed, Hayden teaches that its solenoids 22 are conventional and use electrical current, and that a controller like that shown at 25 is "needed" and "within the capacity of one skilled in the art." **Exhibit 1003** at 4:36-43, 60-66. One of ordinary skill in the art would be well aware that electrical switches, as shown in the '640 Patent are well known and commonplace features used for actuating solenoids. **Exhibit 1013** at ¶¶23 and 36-37. And thus, it would be obvious to include a switch for each solenoid to actuate the same for connecting/disconnecting an electrical signal to/from (i.e., energizing/de-energizing) the solenoid as claimed.

2. Ground 6: Claims 9 and 18 Are Obvious Over Hayden, DE219, Howeth and Wellan

To the extent it is contended an express disclosure of an actual switch for energizing/de-energizing the solenoids is required in claims 9 and 18, Wellan provides express disclosure of such switches. **Exhibit 1004** at Fig. 7. It is completely predictable and obvious to use electrical switches for purposes of actuating electrical solenoids because they require such a feature to control flow of electricity thereto. **Exhibit 1013** at ¶¶25 and 36-37.

3. Ground 7: Claims 7-9 and 16-18 Are Obvious Over Hayden, Wellan, DE219 and Howeth

This proposed rejection is similar to Grounds 5 and 6 (Sections VI.E.1 and VI.E.2), but starts with the combination in Section VI.D.1 of Hayden/Wellan rendering claims 1 and 10 obvious in the alternative to anticipation by Hayden.

The features of claims 7 and 16 are provided by Hayden (the valve housing and its ports), DE219 (the reciprocating piston), and Howeth (the "means for biasing"), as described above in Section VI.E.1.a. Likewise, the subject matter of claims 8 and 17 is also provided by Hayden (because it already includes a solenoid that matches the corresponding solenoids in the '640 patent specification), as described above in Section VI.E.1.b. The analyses in Section VI.E.1.a and VI.E.1.b apply equally here to claims 7-8 and 16-17 because the addition of a controller from Wellan to Hayden's device would not alter the valve configuration features taught by Hayden, DE219, and Howeth or the fact that Hayden already has a solenoid. Thus, claims 7-8 and 16-17 are obvious for the same reasons.

With respect to claims 9 and 18, Wellan is already in this combination. The "means for energizing . . . and de-energizing" corresponding to switches of claims 9 and 18 are also already readily recognized by one of ordinary skill as being obvious to use in Hayden, as described above in Section VI.E.1.c, and are expressly taught by Wellan, as discussed in Section VI.E.2. That analysis applies equally here as well. Thus, claims 9 and 18 are obvious for the same reasons.

4. Ground 8: Claims 7-9 and 16-18 Are Obvious Over Hayden, Eiben, DE219 and Howeth

This ground of rejection is also similar to Ground 5 (Section VI.E.1), but starts with the combination in Section VI.C of Hayden/Eiben rendering claims 1 and 10 obvious in the alternative to being anticipated by Hayden alone.

The features of claims 7 and 16 are provided by Hayden (the valve housing and its ports), DE219 (the reciprocating piston), and Howeth (the "means for biasing"), as described in Section VI.E.1.a. Likewise, the subject matter of claims 8 and 17 is also provided by Hayden (because it already includes a solenoid that matches the corresponding solenoids in the '640 patent specification), as described above in Section VI.E.1.b. The analyses in Sections VI.E.1.a and VI.E.1.b apply equally here, as the re-location of the valve to the "cannister" outside, as taught by Eiben, *supra* Section VI.C, would not alter the valve configuration resultant from the Hayden, DE219 and Howeth combination or the fact that Hayden already has a solenoid. Thus, claims 7-8 and 16-17 are obvious for the same reasons.

With respect to claims 9 and 18, the same applies. The "means for energizing . . . and de-energizing" corresponding to switches of claims 9 and 18 readily recognized by one of ordinary skill as being obvious to use in Hayden, as described above in Section VI.E.1.c, would likewise be used when Hayden is modified by Eiben to have its valves on the "cannister" outside. That analysis applies equally here as well. Thus, claims 9 and 18 are obvious for the same reasons as discussed in Section VI.E.1.c.

5. Ground 9: Claims 9 and 18 Are Obvious Over Hayden, Eiben, DE219, Howeth and Wellan

This ground of rejection is similar to Ground 8 (Section VI.E.4), except Wellan is being added to the prior art in Ground 8 to include an express disclosure of an actual switch for energizing/de-energizing the solenoids (**Exhibit 1004** at Fig. 7) to meet claims 9 and 18, just like it was done above in Ground 6 (Section VI.E.2) as an alternative to Ground 5 (Section VI.E.1.c). As discussed in those Sections, it is completely predicatable and obvious to use electrical switches for purposes of actuating electrical solenoids because they require such a feature to control flow of electricity thereto.

6. Ground 10: Claims 7-9 and 16-18 Are Obvious Over Hayden, Eiben, Wellan, DE219 and Howeth

This proposed rejection is the same as in Ground 7 (Section VI.E.3), except the modification is being made to the combination of Hayden, Eiben, and Wellan as set forth in Section VI.D.2, instead of just Hayden/Wellan. As discussed above

in Section VI.E.3, the analyses in Sections VI.E.1 and VI.E.2 for claims 7-8 and 16-17 apply equally here, as the addition of a controller from Wellan to Hayden as modified by Eiben to have valves on the outside would not alter the valve features taught by Hayden, DE219 and Howeth or the fact that Hayden already has a solenoid. Thus, claims 7-8 and 16-17 are obvious for the same reasons.

With respect to claims 9 and 18, Wellan is already in the combination, as is also the case with Ground in Section VI.E.3. The "means for energizing . . . and de-energizing" corresponding to switches of claims 9 and 18 are also already readily recognized by one of ordinary skill as being obvious to use in Hayden, as described above in Section VI.E.1.c, and are expressly taught by Wellan, as discussed in Section VI.E.2. That analysis applies equally here as well. Thus, claims 9 and 18 are obvious for the same reasons.

F. Ground 11-14 Adding Von Stackelberg's Duct/Baffle

Grounds 11-14 build on the prior art against claims 1 and 10 in Grounds 1-4, adding von Stackelberg to meet the "means for dividing" and its corresponding duct/baffle in claims 2-3 and 11-12.

1. Ground 11: Claims 2-3 and 11-12 Are Obvious In View of Hayden and Von Stackelberg

a. Claims 2 and 11

As explained in Section VI.B, claims 1 and 10 are anticipated by Hayden. Claims 2 and 11 are dependent on claims 1 and 10, respectively, and recite the same additional subject matter: "means cooperable with said inlet port to divide

said cannister into an upper zone of high velocity vortex air flow and a lower zone of reduced velocity air flow." As discussed above in Section IV.B.3.j, the corresponding structure for the "means cooperable with said inlet port . . ." is a duct (41) and baffle (42) or equivalents thereof.

Von Stackelberg teaches using a hose and conduit (11, 12) attached to an inlet port that directs air in the downward direction. **Exhibit 1010** at Fig. 2, 4:35-54. This conduit is the "duct (41)" disclosed in the '640 patent. **Exhibit 1001** at 4:37-39. Von Stackelberg also teaches using a "flow modifying structure 20" that redirects influent. **Exhibit 1010** at 4:42-43. The "flow modifying structure 20" is comprised of a "horizontal baffle 24" that "interrupts and re-directs the airstream 30 substantially laterally within the drum." *Id.* at 4:48-50; Fig. 2. This flow modifying structure and baffle in von Stackelberg comprise the baffle (42) disclosed in the '640 patent. The conduit and flow modifying structure have the effect of creating a horizontal airstream sweep directed at the wall of the drum. *Id.* at 4:51-52. This sweep creates a vortex as the air moves laterally and downward around the circumference of the circular drum. *Id.*; *see also id.* at 4:55-65.

One of ordinary skill in the art would combine the teachings of Hayden and von Stackelberg as both references teach the benefits of preventing filters and outlets from becoming clogged from foreign particulates. Both references demonstrate that it is desirable to keep outlets and filters clean from debris. An

ordinary artisan would recognize that by combining these teachings, one could minimize the debris on a vacuum's filter and maximize the efficacy of the vacuum.

b. Claims 3 and 12

Claims 3 and 12 are dependent on claims 2 and 11, respectively, and recite the same additional subject matter, namely: "said inlet port being disposed below said filter and above a bottom of said cannister and said cooperable means comprising a duct directing air flow downwardly in said cannister from said inlet port and a baffle redirecting said downward flow to a circumferential flow." The difference between claims 3 and 12 and claims 2 and 11 is that the language in claims 3 and 12 specifically limits the claim scope to the positioning of the inlet port as well as expressly reciting the use of a duct and baffle.

Here, this new limitation does not affect the prior analysis in Section VI.F.1.a because Hayden already uses an inlet port below disposed below the filter and above the bottom of a "cannister," **Exhibit 1003** at Fig. 1, 3:55-62 (disclosing an inlet port 2 below the filter 7 and above the bottom of the "cannister" 1), and von Stackelberg already uses a duct and baffle to redirect downward flow to a circumferential flow. Thus, claims 3 and 12 are obvious for the same reasons.

2. Ground 12: Claims 2-3 and 11-12 Are Obvious In View of Hayden, Eiben and Von Stackelberg

This proposed rejection is the same as in Section VI.F.1, except the modification is being made to the combination of Hayden/Eiben as set forth in Section VI.C. The analyses in Section VI.F.1 apply equally here to add Von

Stackelberg's duct and baffle to Hayden's inlet port disposed below the filters and above the bottom of a "cannister" to meet claims 2-3 and 11-12.

3. Ground 13: Claims 2-3 and 11-12 Are Obvious In View of Hayden, Wellan and Von Stackelberg

This proposed rejection is the same as in Section VI.F.1, except the modification is being made to the combination of Hayden/Wellan as set forth in Section VI.D.1. The analyses in Section VI.F.1 apply equally here to add Von Stackelberg's duct and baffle to Hayden's inlet port disposed below the filters and above the bottom of a "cannister" to meet claims 2-3 and 11-12.

4. Ground 14: Claims 2-3 and 11-12 Are Obvious In View of Hayden, Eiben, Wellan and Von Stackelberg

This proposed rejection is the same as in Section VI.F.1, except the modification is being made to the combination of Hayden, Eiben and Wellan as set forth in Section VI.D.2. The analyses in Section VI.F.1 apply equally here to add Von Stackelberg's duct and baffle to Hayden's inlet port disposed below the filters and above the bottom of a "cannister" to meet claims 2-3 and 11-12.

VII. CONCLUSION

Based on the foregoing, it is clear that claims 1-18 are unpatentable.

PILLSBURY WINTHROP SHAW PITTMAN LLP
/Bryan P. Collins/
Bryan P. Collins, Reg. No. 43,560
Jack. S Barufka, Reg. No. 37,087

CERTIFICATE OF SERVICE

I hereby certify that a true copy of the PETITION FOR *INTER PARTES* REVIEW UNDER 37 C.F.R. § 42.100 and all exhibits/attachments thereto (Exhs. 1001-1013) were served in their entirety by EXPRESS MAIL® this 19th day of December, 2014 on the attorney of record for the subject patent, as indicated below:

Frank J Catalano
FRANK J CATALANO, P.C.
100 West 5th St., 10th Floor
Tulsa, OK 74103-4990

PILLSBURY WINTHROP SHAW PITTMAN LLP

Bryan P. Collins
Reg. No. 43,560
Tel. No. 703.770.7538
Fax No. 703.770.7901

P.O. Box 10500
McLean, VA 22102
(703) 770-7900