

Petition for *Inter Partes* Review of U.S. Patent No. 8,607,407

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DYSON TECHNOLOGY LIMITED AND DYSON, INC.,
Petitioners,

v.

OMACHRON INTELLECTUAL PROPERTY INC.,
Patent Owner.

Case No. IPR2024-00670

U.S. PATENT NO. 8,607,407

PETITION FOR *INTER PARTES* REVIEW

TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	STANDING (§42.104(a)).....	4
III.	RELIEF REQUESTED (§42.104(b))	5
IV.	OVERVIEW OF THE '407Patent.....	6
A.	The Specification.....	6
B.	The Prosecution History	6
V.	OVERVIEW OF PRIOR ART.....	8
A.	Martelliere	8
B.	Butler	8
C.	IPVG.....	9
D.	Conrad335	10
E.	Jianan.....	10
F.	Khalil.....	11
VI.	LEVEL OF ORDINARY SKILL IN THE ART	12
VII.	CLAIM CONSTRUCTION.....	12
VIII.	THE CHALLENGED CLAIMS ARE UNPATENTABLE.....	13
A.	Ground 1: Martelliere Anticipates Claims 23-24.....	13
1.	[23]/[24]	13
B.	Ground 2: Butler Anticipates Claims 23-24.....	18
1.	[23]/[24]	18
C.	Ground 3: IPVG in Combination with Conrad335 Renders Claims 1-25 Obvious.....	25

1.	Motivation to Combine IPVG and Conrad335	25
2.	[1]/[23]/[24]/[25].....	38
3.	[2]	50
4.	[3]/[4]	52
5.	[5]	53
6.	[6]	56
7.	[7]	57
8.	[8]	59
9.	[9]	60
10.	[10]	61
11.	[11]	61
12.	[12]	63
13.	[13]	64
14.	[14]	65
15.	[15]	66
16.	[16]	67
17.	[17]/[18]	67
18.	[19]	68
19.	[20]	70
20.	[21]	71
21.	[22]	72
D.	Ground 4: Martelliere in Combination with IPVG Renders Claims 23-24 Obvious.....	73

1.	Motivation to Combine Martelliere and IPVG	73
2.	Martelliere and IPVG Render Obvious a Hand Vacuum Cleaner (Limitations [23pre]/[24pre])	76
3.	Martelliere and IPVG Render Obvious the Door Limitations (Limitations [23d]/[24d]/[23f])	76
E.	Ground 5: Jianan in Combination with Khalil Renders Claims 1-25 Obvious	77
1.	Motivation to Combine Jianan and Khalil	77
2.	[1]/[23]/[24]/[25]	82
3.	[2]	90
4.	[3]/[4]	92
5.	[5]	92
6.	[6]	95
7.	[7]	96
8.	[8]	97
9.	[9]	98
10.	[10]	100
11.	[11]	101
12.	[12]	101
13.	[13]	102
14.	[14]	103
15.	[15]	104
16.	[16]	107
17.	[17]/[18]	108

18.	[19]	108
19.	[20]	109
20.	[21]	111
21.	[22]	113
IX.	DISCRETIONARY FACTORS FAVOR INSTITUTION	113
A.	§314(a).....	113
B.	§325(d)	116
X.	SECONDARY CONSIDERATIONS	117
XI.	MANDATORY NOTICES UNDER 37 C.F.R. §42.8.....	117
A.	Real Parties-in-Interest	117
B.	Related Matters.....	117
C.	Lead and Backup Counsel, Service, and Power of Attorney	117
XII.	PAYMENT OF FEES UNDER 37 C.F.R. §42.103	118

TABLE OF AUTHORITIES

	Page(s)
Cases	
<i>Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH,</i> IPR2019-01469, Paper 6 (PTAB Feb. 13, 2020).....	117
<i>Apple Inc. v. Fintiv, Inc.,</i> IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020)	114
<i>Apple Inc., v. Fintiv, Inc.,</i> IPR2020-00019, Paper No. 11 (PTAB Mar. 20, 2020)	116
<i>Dish Network v. Broadband iTV,</i> IPR2020-01280, Paper 17 (PTAB Feb. 4, 2021).....	115
<i>Fusion Orthopedics, LLC v. Extremity Medical, LLC,</i> IPR2023-00894 Paper 15 (PTAB Nov. 17, 2023).....	117
<i>General Plastics Indus. Co., Ltd. v. Canon Kabushiki Kaisha,</i> IPR2016-01357, Paper 19 (PTAB Sept. 6, 2017).....	117
<i>Google LLC v. Valtrus Innovations Ltd.,</i> IPR2022-01197, Paper 12 (PTAB Mar. 29, 2023)	118
<i>iRobot Corp. v. SharkNinja Operating LLC et al.,</i> 19-cv-12125 (D. Mass.).....	116
<i>Samsung Electronics Co., Ltd. et al v. Staton Techiya, LLC,</i> IPR2022-00302, Paper 13	116
<i>SharkNinja Operating LLC v. Dyson, Inc.,</i> No. 1:23-cv-12372 (D. Mass.).....	<i>passim</i>
<i>TSMC Ltd. v. Alidouble, Inc.,</i> IPR2023-00372, Paper 7 (PTAB July 13, 2023).....	115
Other Authorities	
37 C.F.R. §42.10(b)	119

Petition for *Inter Partes* Review of U.S. Patent No. 8,607,407

37 C.F.R. §42.103	120
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LIST OF EXHIBITS

Exhibit No.	Description
Ex1001	U.S. Patent No. 8,607,407 (“407Patent”)
Ex1002	Declaration of Robert Giachetti
Ex1003	<i>Curriculum Vitae</i> of Robert Giachetti
Ex1004	File History of U.S. 8,607,407 (App. No. 12/720,484)
Ex1005	U.S. Patent Publication No. 2007/0209335 to Conrad (“Conrad335”)
Ex1006	U.K. Patent Publication No. GB283,179 to Inventia Patent-Verwertungs-Gesellschaft (“IPVG”)
Ex1007	French Patent No. 497,856 to Aktiebolaget Lux (“Lux”)
Ex1008	U.S. Patent No. 2,149,135 to Eriksson-Jons (“Eriksson-Jons”)
Ex1009	French Patent No. 1,094,603 to Martelliere (“Martelliere”)
Ex1010	Certified English translation of French Patent No. 1,094,603 to Martelliere (“Martelliere”)
Ex1011	Canadian Patent No. 161,428 to Robinson (“Robinson”)
Ex1012	Chinese Patent Publication No. 101,061,932 to Jianan (“Jianan”)
Ex1013	Certified English translation of Chinese Patent Publication No. 101,061,932 to Jianan (“Jianan”)
Ex1014	U.S. Patent Publication No. 2006/0156508 to Khalil (“Khalil”)
Ex1015	U.S. Publication No. 2008/0040883 (“Beskow”)
Ex1016	International Publication No. WO 02/067753 to Vuijk (“Vuijk”)
Ex1017	Ex. C-1 to Plaintiffs’ Infringement Contentions in <i>SharkNinja Operating LLC v. Dyson, Inc.</i> , No. 1:23-cv-12372 (D. Mass.)
Ex1018	Swiss Patent No. CH203,675 to Peter (“Peter”)

Petition for *Inter Partes* Review of U.S. Patent No. 8,607,407

Ex1019	Certified English translation of Swiss Patent No. CH203,675 to Peter (“Peter”)
Ex1020	PCT Publication No. 2007/084543 to Butler et al. (“Butler”)
Ex1021	Plaintiffs’ Infringement Contentions in <i>SharkNinja Operating LLC v. Dyson, Inc.</i> , No. 1:23-cv-12372 (D. Mass.)
Ex1022	The Parties’ Revised Proposed Schedule in <i>SharkNinja Operating LLC v. Dyson, Inc.</i> , No. 1:23-cv-12372 (D. Mass.)
Ex1023	https://www.uscourts.gov/sites/default/files/data_tables/fcms_na_distprofile1231.2023.pdf
Ex1024	Petitioners’ Stipulation

LIST OF CHALLENGED CLAIMS

Reference Number	Claim Limitation
Claim 1	
[1pre]	A hand vacuum cleaner comprising:
[1a]	a) a front end having a front wall and a rear end;
[1b]	b) an air flow passage extending from a dirty air inlet to a clean air outlet;
[1c]	c) a first cyclone unit positioned in the air flow passage, the first cyclone unit comprising at least one cyclone and at least one dirt collection chamber external to the cyclone chamber;
[1d]	d) the cyclone and the dirt collection chamber having an openable door, the front wall comprising the openable door, whereby, when the door is in an open position, both the cyclone and the dirt collection chamber are opened; and,
[1e]	e) a suction motor positioned in the air flow passage.
Claim 2	
[2]	The hand vacuum cleaner of claim 1 wherein the at least one cyclone has a cyclone front end, a cyclone rear end, a cyclone air inlet and a cyclone air outlet and the cyclone front end is at the front end of the hand vacuum cleaner.
Claim 3	
[3]	The hand vacuum cleaner of claim 2 wherein the cyclone air inlet and the cyclone air outlet are at the same end.
Claim 4	
[4]	The hand vacuum cleaner of claim 3 wherein the cyclone air inlet and the cyclone air outlet are at the cyclone rear end.
Claim 5	
[5]	The hand vacuum cleaner of claim 1 wherein the cyclone front end has a dirt outlet and a separation plate is mounted in facing relation to the dirt outlet.
Claim 6	
[6]	The hand vacuum cleaner of claim 5 wherein the separation plate is mounted to the door.
Claim 7	
[7]	The hand vacuum cleaner of claim 1 wherein the at least one cyclone has a cyclone axis extending longitudinally through the at least one cyclone, the hand vacuum cleaner has an axis extending

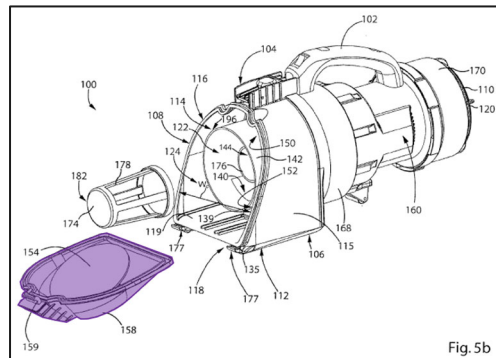
Reference Number	Claim Limitation
	from the front end to the rear end and the cyclone axis is generally parallel to the axis of the hand vacuum cleaner.
Claim 8	
[8]	The hand vacuum cleaner of claim 1 wherein the first cyclone unit is positioned forward of the suction motor.
Claim 9	
[9]	The hand vacuum cleaner of claim 1 wherein the door is removable.
Claim 10	
[10]	The hand vacuum cleaner of claim 1 wherein the door is pivotally mounted to the hand vacuum cleaner.
Claim 11	
[11]	The hand vacuum cleaner of claim 1 wherein the dirt collection chamber is removable from the hand vacuum cleaner.
Claim 12	
[12]	The hand vacuum cleaner of claim 1 wherein the dirt collection chamber is removable from the surface cleaning apparatus as a sealed unit for emptying.
Claim 13	
[13]	The hand vacuum cleaner of claim 12 wherein the first cyclone unit is sealed when removed from the hand vacuum cleaner other than fluid flow passages leading to and from the first cyclone unit.
Claim 14	
[14]	The hand vacuum cleaner of claim 1 wherein the dirt collection chamber is removable from the hand vacuum cleaner with the first cyclone unit.
Claim 15	
[15]	The hand vacuum cleaner of claim 1 wherein the first cyclone unit has a single cyclone and a single dirt collection chamber.
Claim 16	
[16]	The hand vacuum cleaner of claim 15 wherein the single dirt collection chamber is positioned exterior to the single cyclone.
Claim 17	
[17]	The hand vacuum cleaner of claim 16 wherein the single cyclone and the single dirt collection chamber comprise a one-piece assembly.
Claim 18	

Reference Number	Claim Limitation
[18]	The hand vacuum cleaner of claim 17 wherein the single cyclone and the single dirt collection chamber are integrally formed.
Claim 19	
[19]	The hand vacuum cleaner of claim 1 wherein the hand vacuum cleaner further comprises a suction motor housing, the suction motor is positioned in the suction motor housing and the first cyclone unit is removably mounted to the suction motor housing.
Claim 20	
[20]	The hand vacuum cleaner of claim 1 further comprising a second cyclone unit downstream from the first cyclone unit.
Claim 21	
[21]	The hand vacuum cleaner of claim 1 wherein the at least one cyclone has a cyclone axis extending longitudinally through the at least one cyclone and the dirt collection chamber has a perimeter at the front end and the openable door has a perimeter that is generally the same as the perimeter of the dirt collection chamber.
Claim 22	
[22]	The hand vacuum cleaner of claim 1 wherein the front wall is the openable door.
Claim 23	
[23pre]	A hand vacuum cleaner comprising:
[23a]	a) a front end having a front wall and a rear end;
[23b]	b) an air flow passage extending from a dirty air inlet to a clean air outlet;
[23c]	c) a first cyclone unit positioned in the air flow passage, the first cyclone unit comprising at least one cyclone and at least one dirt collection chamber;
[23d]	d) the dirt collection chamber having an openable door, the front wall comprising the openable door; and,
[23e]	e) a suction motor positioned in the air flow passage
[23f]	wherein the door is openable when the dirt collection chamber is mounted to the hand vacuum cleaner.
Claim 24	
[24pre]	A hand vacuum cleaner comprising:
[24a]	a) a front end having a front wall and a rear end;
[24b]	b) an air flow passage extending from a dirty air inlet to a clean air outlet;

Reference Number	Claim Limitation
[24c]	c) a first cyclone unit positioned in the air flow passage, the first cyclone unit comprising at least one cyclone and at least one dirt collection chamber;
[24d]	d) the dirt collection chamber having an openable door, the front wall comprising the openable door; and,
[24e]	e) a suction motor positioned in the air flow passage
[24f]	wherein the openable door covers an end of the dirt collection chamber.
Claim 25	
[25pre]	A hand vacuum cleaner comprising:
[25a]	a) a front end having a front wall and a rear end;
[25b]	b) an air flow passage extending from a dirty air inlet to a clean air outlet;
[25c]	c) a first cyclone unit positioned in the air flow passage, the first cyclone unit comprising at least one cyclone and at least one dirt collection chamber;
[25d]	d) the dirt collection chamber having an openable door, the front wall comprising the openable door; and,
[25e]	e) a suction motor positioned in the air flow passage
[25f]	wherein the dirt collection chamber has a rear end and the rear end is non-removably mounted to the first cyclone unit.

I. INTRODUCTION

The '407 Patent describes vacuums with “an openable door.” Ex1001, 1:14-16. It acknowledges that cyclonic handvacs with openable doors existed, *id.*, 1:23-35, but claims to improve them by “locat[ing]” the **openable door** “towards the front” to facilitate bin emptying:

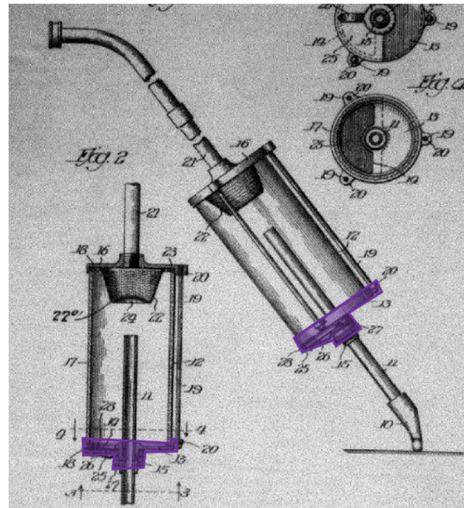


Id., 1:50-53, Fig. 5b.¹

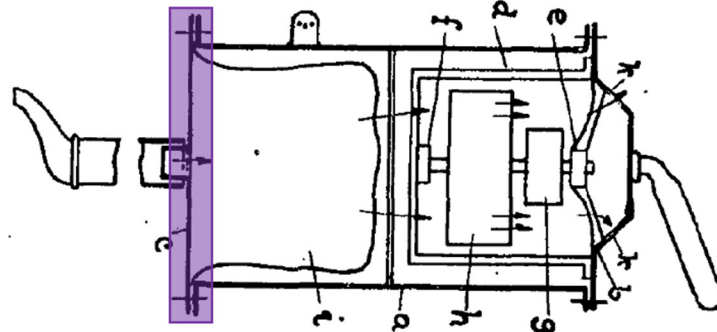
However, vacuums with **openable front doors** are over a century old:

¹ All annotations added unless otherwise noted.

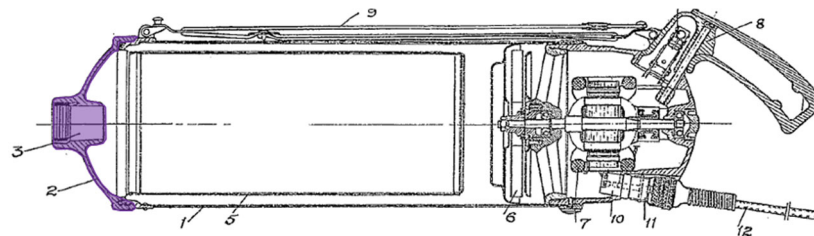
Ex1011: 03/03/1915



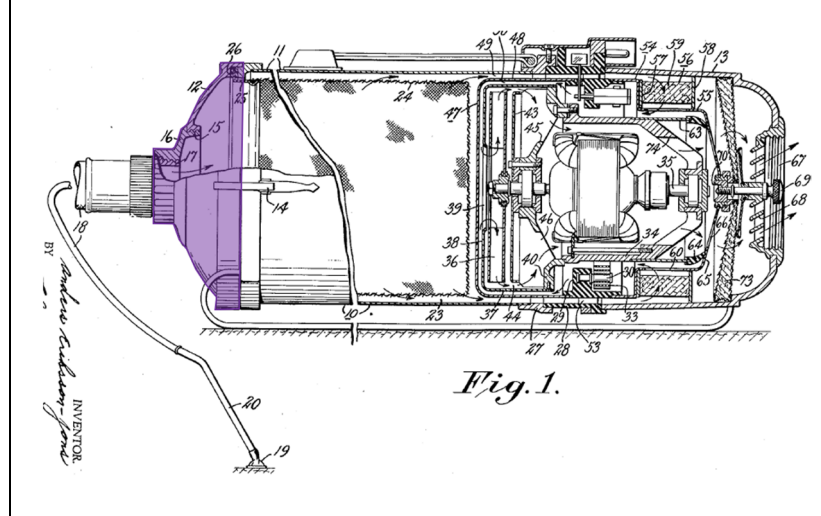
Ex1007: 04/05/1919



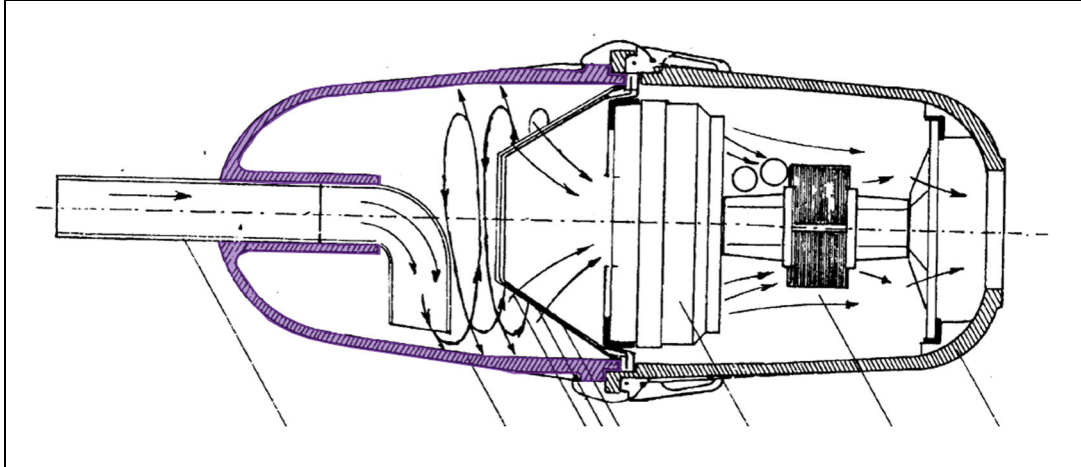
Ex1006: 08/09/1928

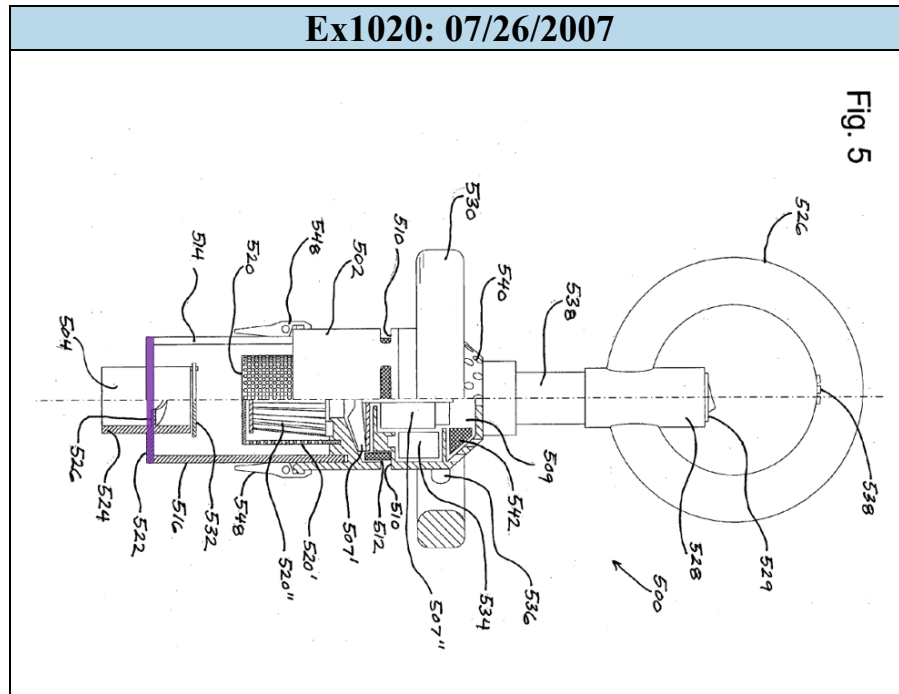


Ex1008: 02/28/1939



Ex1009: 05/23/1955





The '407 Patent's claims' remaining elements concern similarly well-known features (e.g., suction motors, dirt-collection chambers, and cyclones). The prior art relied on here—none of which was before the Examiner—anticipates and/or renders obvious all claims.

II. STANDING (§42.104(A))

Petitioners certify that the '407 Patent is available for IPR, and that Petitioners are not barred or estopped from requesting IPR to challenge the claims on the grounds herein.

III. RELIEF REQUESTED (§42.104(B))

Petitioners respectfully request review and cancellation under 35 U.S.C. §311 of claims 1-25 as follows²:

Prior Art	Publication	Basis
French Patent 1,094,603 (“Martelliere”)	05/23/1955	pre-AIA 102(b)
PCT Publication 2007/084543 (“Butler”)	07/26/2007	
U.K. Publication GB283,179 (“IPVG”)	08/09/1928	
U.S. Publication 2007/0209335 (“Conrad335”)	09/13/2007	
Chinese Publication 101,061,932 (“Jianan”)	10/31/2007	
U.S. Publication 2006/0156508 (“Khalil”)	07/20/2006	

Grounds	Claims	Basis
1	23-24	§102; Martelliere
2	23-24	§102; Butler
3	1-25	§103; IPVG and Conrad335
4	23-24	§103; Martelliere and IPVG
5	1-25	§103; Jianan and Khalil

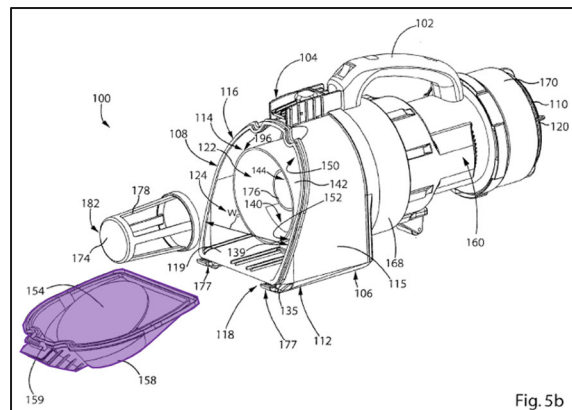
² Petitioners do not concede that any claims satisfy other requirements for patentability that cannot be raised in IPR, including §§101 and 112.

IV. OVERVIEW OF THE '407PATENT

The '407 Patent issued from U.S. Application No. 12/720,484, filed 03/09/2010, and claims priority to 03/11/2009. Ex1001, Cover.

A. The Specification

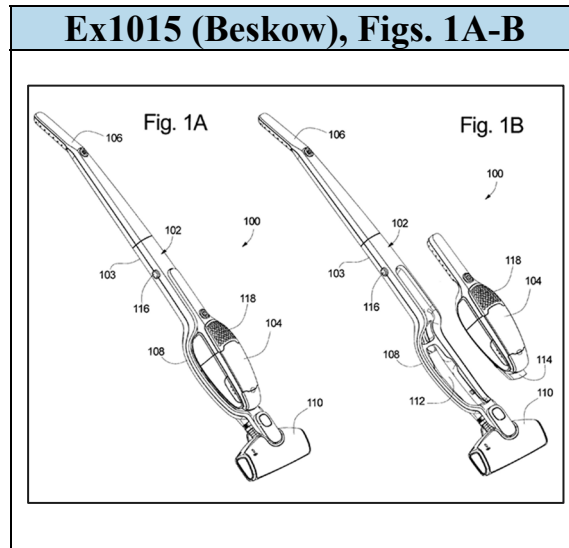
The '407Patent “relates to cyclonic hand vacuum cleaners having an openable door.” Ex1001, 1:14-16. The '407Patent distinguishes its alleged invention from prior art hand vacuums by “locat[ing]” its “openable and preferably, ... removably mounted” **door** “towards the front”:



Id., 1:50-53, Fig. 5b. This purportedly allows emptying with “no impediment to the door being opened,” and without “the dirt leaving the vacuum cleaner ... contact[ing] any portion of the vacuum cleaner when it is poured.” *Id.*, 1:53-62.

B. The Prosecution History

The Examiner rejected claims over U.S. Publication 2008/0040883 (“Beskow”), alone or in combination with U.S. Publication 2008/0190080 (“Oh”):



Ex1004, 116-19. Applicant argued that Beskow teaches an “openable removable door 1012 [that] is positioned on a *sidewall* of unit 1006 and ***not on the front wall***,” and amended the claims to require the front door be at the “front wall,” among other limitations. Ex1004, 138-45 (quote at 143)³, 163-72; Ex1015, Fig. 10. The Examiner agreed Beskow “does not disclose the door positioned at the front wall of the front end,” Ex1004, 150-54 (quote at 152), and allowed the claims, finding that the prior art of record failed to teach or render obvious “the front wall comprising the openable door,” in combination with the independent claims’ other elements, *id.*, 217-220 (quote at 218).

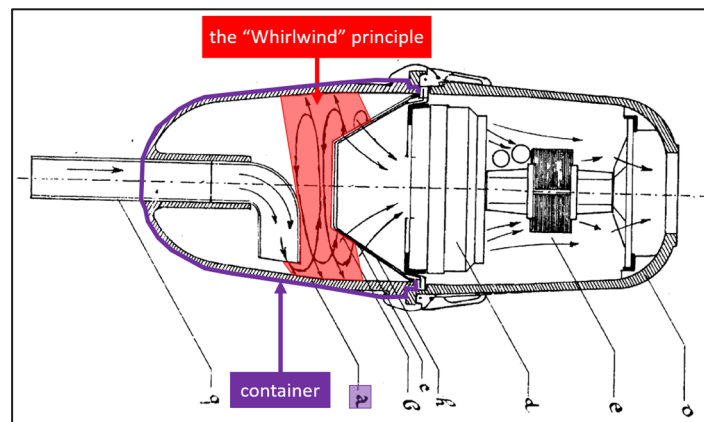
This front door configuration was well-known in art—but was not before the Examiner.

³ All emphasis added unless otherwise noted.

V. OVERVIEW OF PRIOR ART

A. Martelliere⁴

Martelliere is a 1955 French patent for a cyclonic vacuum, which uses “tangential[.]” airflow to separate dust using “the ‘Whirlwind’ principle.” Ex1010, 1, Fig. 1; Ex1002 ¶¶57–58. Martelliere’s cleaner has a dust-collection “**container**” that is “very easily detachable”:

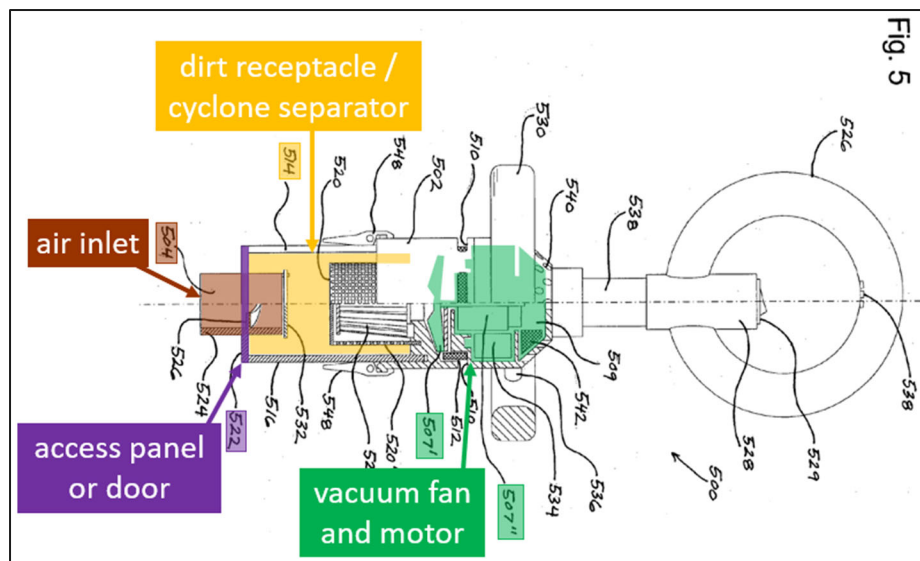


Ex1010, Fig. 1; Ex1002 ¶¶57–58.

B. Butler

Butler is a 2007 PCT publication for a vacuum with an “**air inlet**,” a “**dirt receptacle**” compris[ing] a **cyclone separator**” with “an **access panel or door**” to “facilitate the chamber’s emptying,” and a “**vacuum fan and a motor**”:

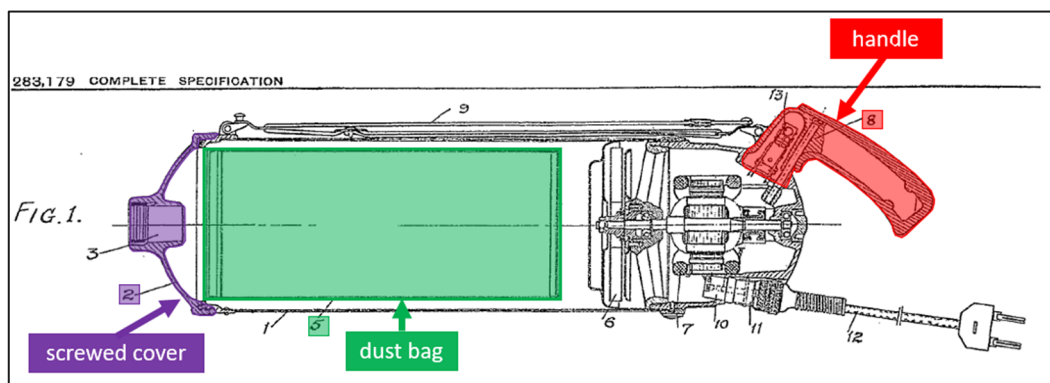
⁴ Citations are by page, as the English translation does not include column or line numbers.



Ex1020, 3:20-25, 18:26-30, Claim 11, Fig. 5; Ex1002 ¶60.

C. IPVG

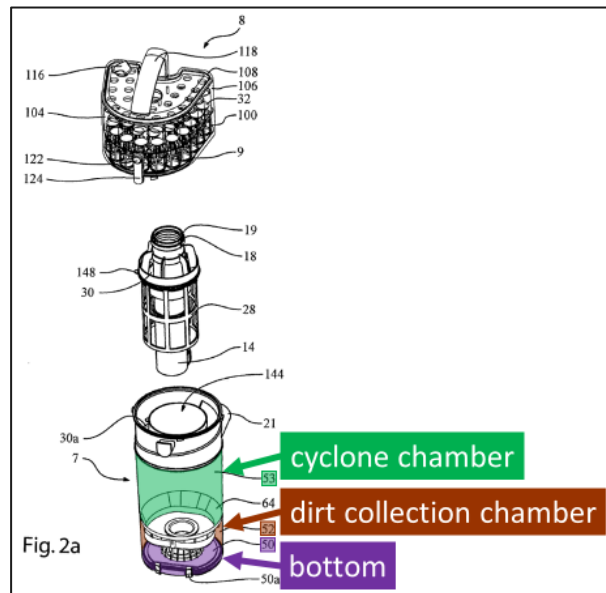
IPVG is a 1928 U.K. publication for a “portable dust suction apparatus,” with “a dust bag [5] or like member,” “screwed cover 2,” and a “handle [8]”:



Ex1006, 1:10-12, 1:22-33, Fig. 1; Ex1002 ¶62.

D. Conrad335

Conrad335 is a 2007 U.S. publication for a vacuum with “a cyclone separator having ... a **cyclone chamber** and a **dirt collection chamber**,” which “has a **bottom** that is openable”:

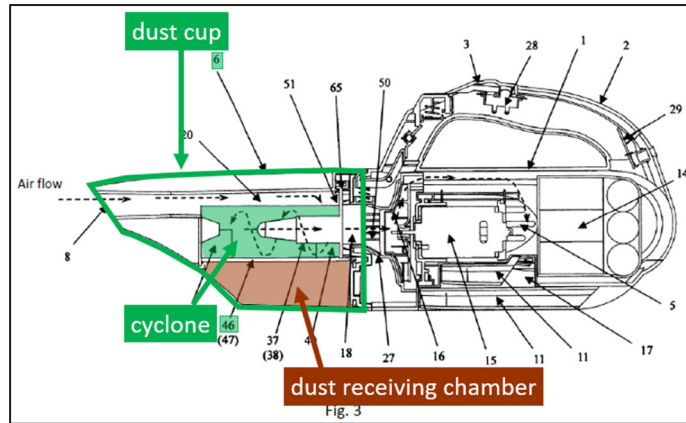


Id., Abstract, ¶23, Fig. 2a; Ex1002 ¶64. Conrad335’s “cyclonic embodiments ... may be used ... to create a ... hand vacuum.” Ex1005 ¶375-376.

E. Jianan⁵

Jianan is a 2007 Chinese publication for a “handheld vacuum” with a “detachable **dust cup**” with “two parallel **cyclones** and separate **dust receiving chambers**”:

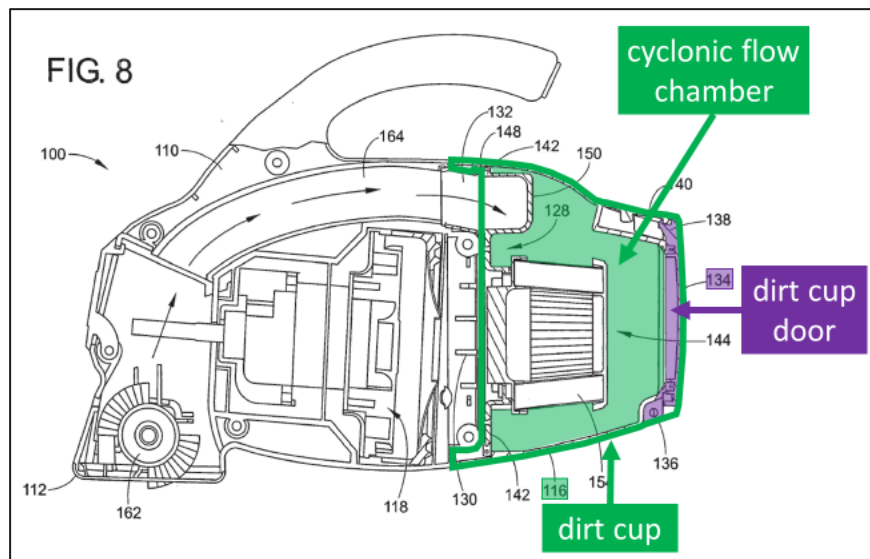
⁵ Citations are by page, as the English translation does not include column or line numbers.



Ex1013, Abstract, 4, Fig. 3; Ex1002 ¶67. Jianan’s “dust collection chamber has at least one opening for emptying dirt,” including an “opening and closing device such as a door,” “making cleaning the dust collection chamber 9 a more convenient and hygienic process.” Ex1013, 10, claim 3.

F. Khalil

Khalil is a 2006 U.S. publication for a “hand-held vacuum” with a “**dirt cup**,” a “**dirt cup door**,” and a “**cyclonic flow chamber**”:



Ex1014, Abstract, Fig. 8; Ex1002 ¶70. The “**dirt cup door 134** ... pivot[s] downward about the hinge 136” to “provid[e] a convenient method of emptying the dirt cup 116.” Ex1014 ¶¶27, 29.

VI. LEVEL OF ORDINARY SKILL IN THE ART

A Person of Ordinary Skill in the Art (“POSA”) would have had a bachelor’s degree in mechanical engineering or a similar field and 2-3 years of experience in machine design, including machines that include fluid dynamics or fluid paths, such as vacuum cleaners. Additional education could offset less experience and vice versa, and a POSA could have also obtained similar knowledge and experience through other means.

VII. CLAIM CONSTRUCTION

Petitioners are unaware of any “prior claim construction determination” related to the ’407Patent. 37 C.F.R. §42.100(b). “[C]laim terms need only be construed to the extent necessary to resolve the controversy.” *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011). Petitioners do not believe that any claim construction is necessary to resolve the parties’ controversy

in this Petition, and the claims should be given their plain and ordinary meaning for purposes of this IPR.⁶

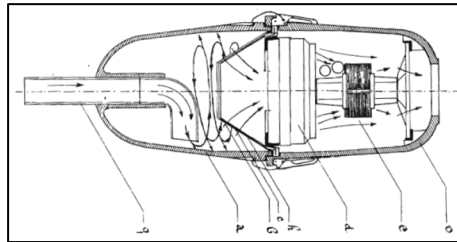
VIII. THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. Ground 1: Martelliere Anticipates Claims 23-24

1. [23]/[24]⁷

a. [23pre]/[24pre]

To the extent the preambles are limiting, Martelliere teaches them. Ex1002 ¶¶78–80. Martelleire teaches a compact-sized, “vacuum cleaner” that is “held vertically or slightly inclined,” which is a hand vacuum cleaner:



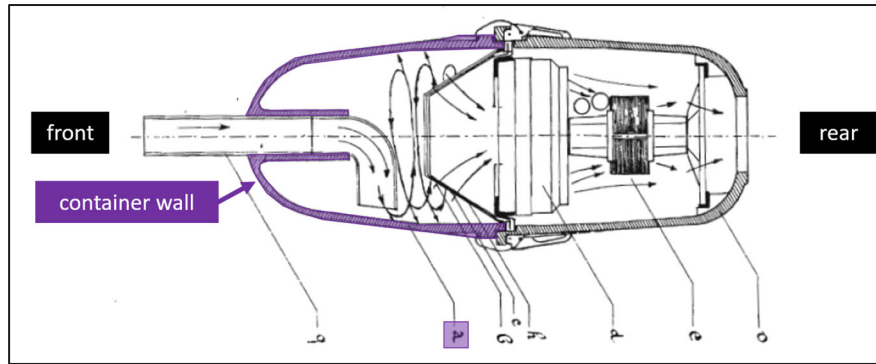
Ex1010, 1, Fig. 1; Ex1002 ¶¶78–80.

b. [23a]/[24a]

Martelliere’s “**container a**” has a “**wall**” at the **front end** where air enters, and a **rear end** where air exits:

⁶ Petitioners reserve all rights to raise claim construction arguments and other arguments in litigation.

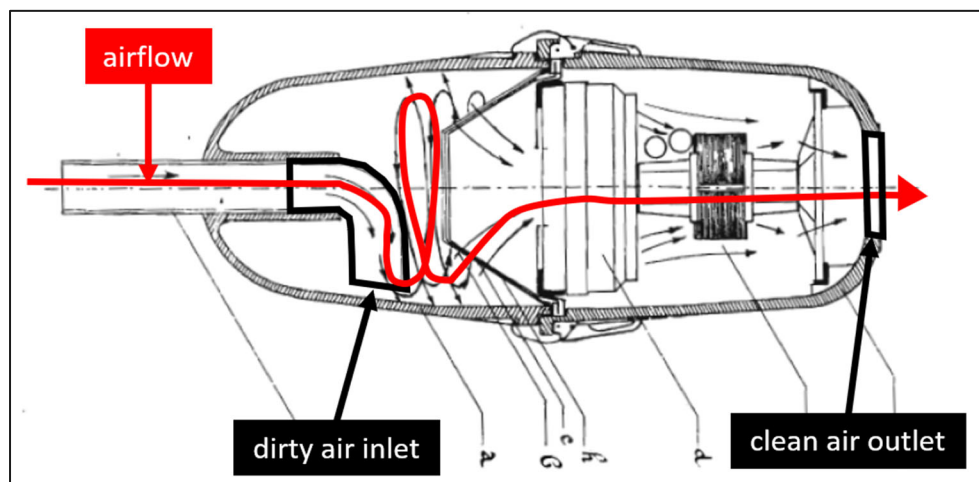
⁷ See LIST OF CHALLENGED CLAIMS.

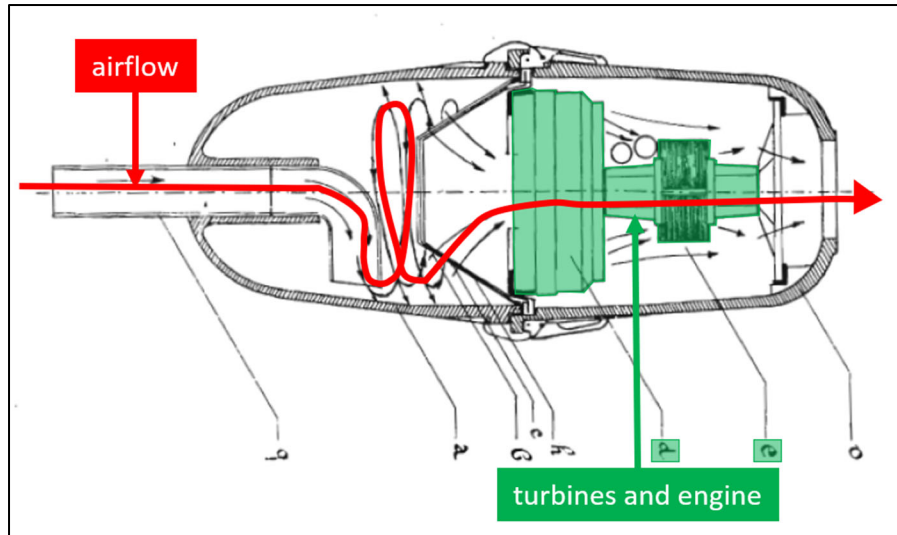


Ex1010, 1, Fig. 1; Ex1002 ¶¶81–84.

c. [23b]/[24b]/[23e]/[24e]

In Martelliere, “**air** [is] sucked tangentially to the interior wall of the transparent container” (through what a POSA would have understood is a **dirty air inlet**), then cleaned by “the ‘Whirlwind’ principle,” which “separate[s]” dust from air, “before it passes through the filter screen,” and then, “perfectly filtered, the **air** can then pass through the **turbines d** and into the **engine e** which is energetically cooled” and out the cleaner (through what a POSA would have understood is a **clean air outlet**):

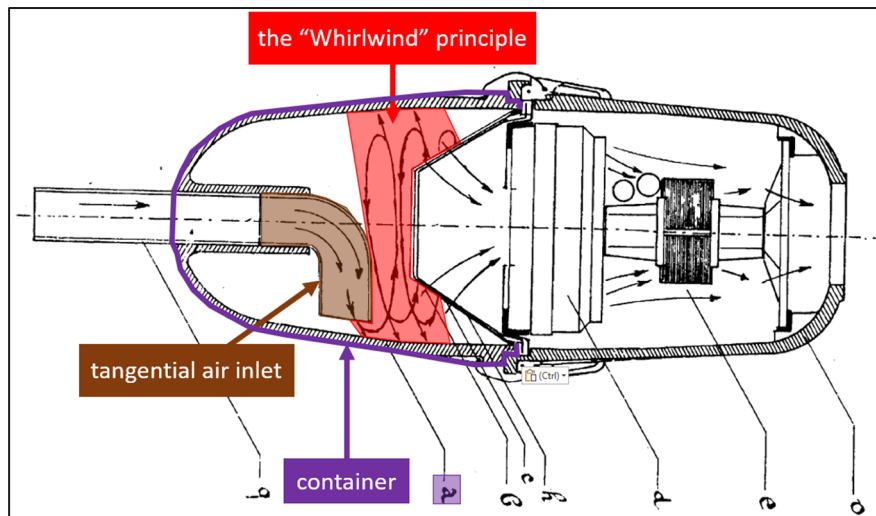




Ex1010, 1, Fig. 1; Ex1002 ¶¶85–89. A POSA would have understood “**engine e**” individually or together with “**turbines d**” is a suction motor. Ex1010, 1; Ex1002 ¶89.

d. [23c]/[24c]

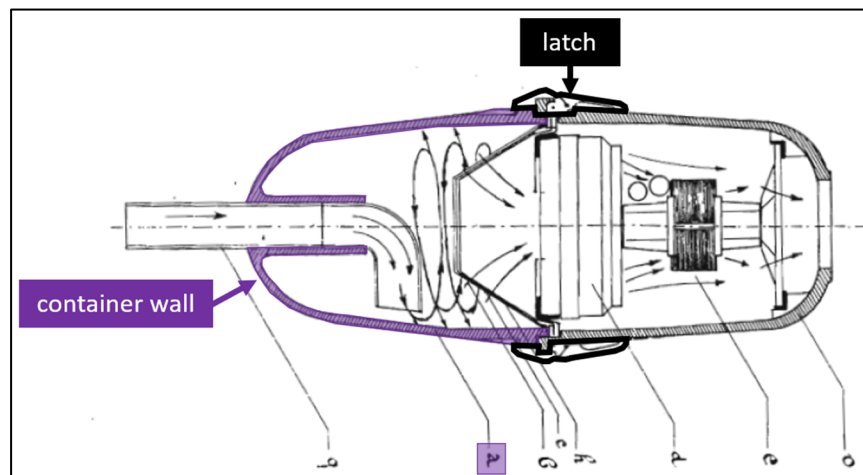
Martelliere’s “**container**” (first cyclone unit) includes a “**tangential[]**” **air inlet**, that creates a “**Whirlwind**” to cyclonically separate air from dirt (at least one cyclone) that deposits “in the bottom of the container” (at least one dirt collection chamber):



Ex1010, 1, Fig. 1; Ex1002 ¶¶90–93.

e. [23d]/[24d]

Martelliere’s “**container**” is very easily detachable” using Martelliere’s depicted **latches**:

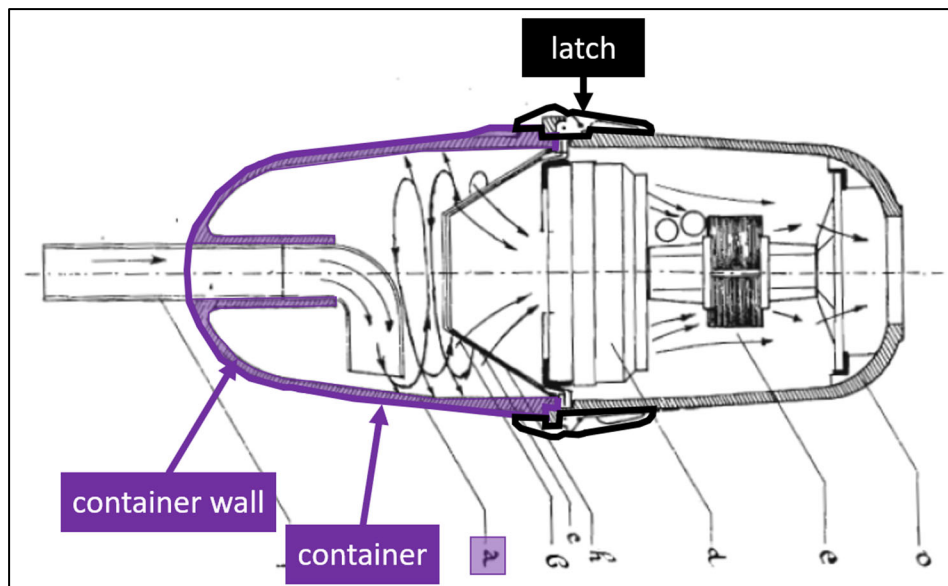


Ex1010, 1, Fig. 1; Ex1002 ¶¶94–99. Further, Martelliere’s “container” is pivotable—unlatching one latch allows the “container” to pivot open. Ex1002 ¶98. A POSA would have understood Martelliere’s “**container**”’s detachable (and

pivotable) front wall is an openable door. Ex1002 ¶99; Ground 1, [23a]/[24a], [23c]/[24c].

f. [23f]

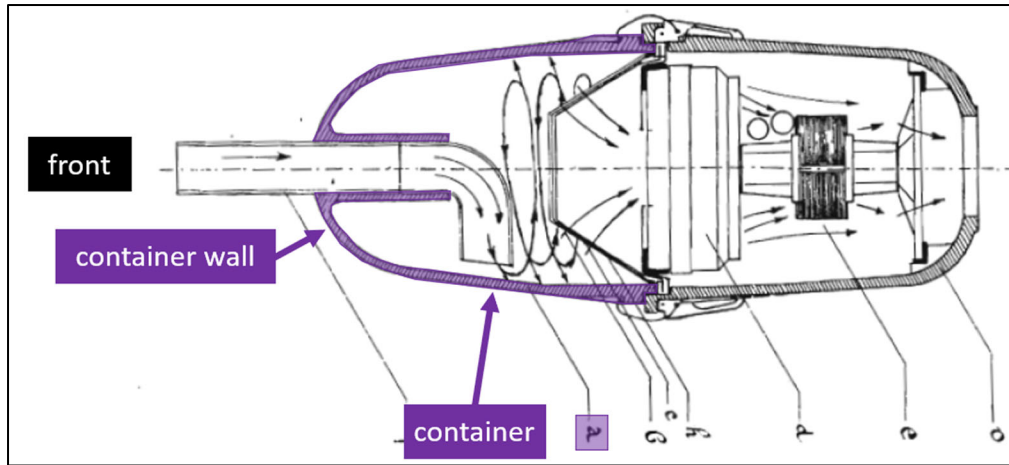
A POSA would have understood a user could unlatch one of Martelliere's two **latches** to pivot open Martelliere's "**container**" "**wall**" while the dirt collection chamber ("**container a**") remains mounted to the hand vacuum cleaner via the other **latch**:



Ex1010, 1, Fig. 1; Ex1002 ¶¶100–101.

g. [24f]

Martelliere's "**container**" "**wall**" (the openable door) covers the front end of "**container a**" (the dirt collection chamber):



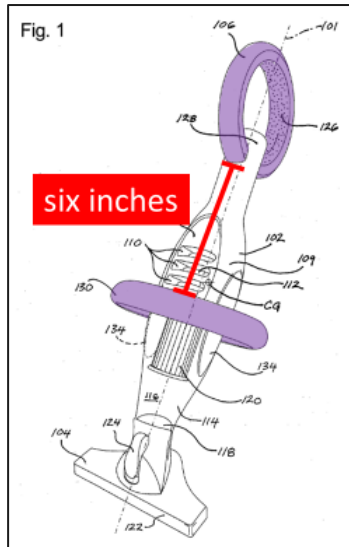
Ex1010, 1, Fig. 1; Ex1002 ¶¶102–03.

B. Ground 2: Butler Anticipates Claims 23-24

1. [23]/[24]

a. [23pre]/[24pre]

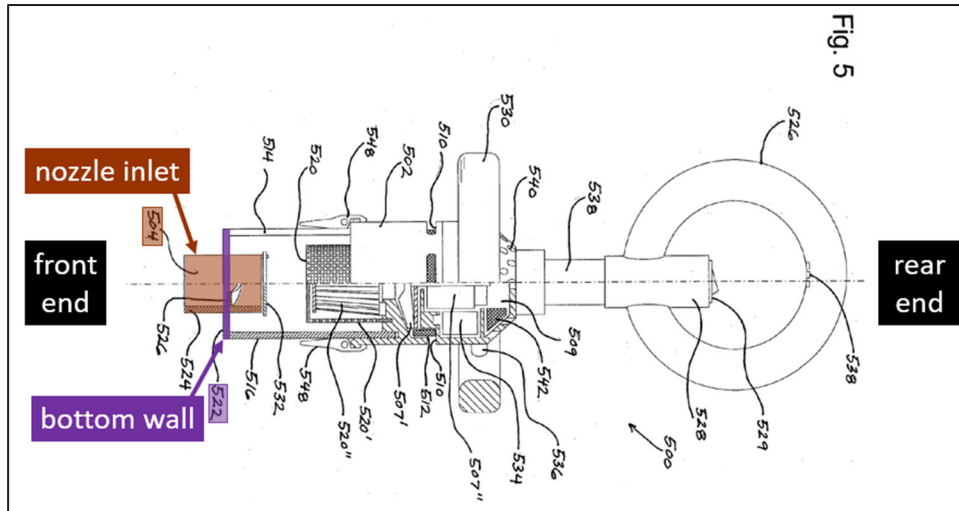
To the extent the preambles are limiting, Butler teaches a hand vacuum cleaner. Ex1002 ¶¶105–09. Butler’s “vacuum cleaner” is used by hand. Ex1020, Title, Fig. 1. It includes a “**rear grip**” and “one or more **foregrips**,” and has a “compact” size, including a “**six inch**[]” distance between foregrip and rear grip, and an eighteen-inch overall length:



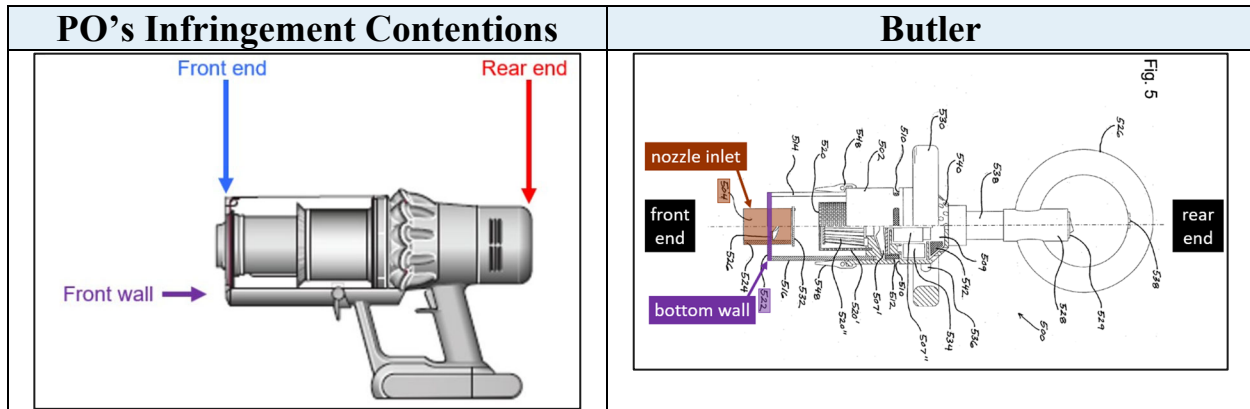
Ex1020, 15:5-6, 26:1-10, Fig. 1; Ex1002 ¶107. It is “adapted for cleaning ... stairwells and other confined spaces,” and has telescoping handgrip members and extension tubes to reach the floor, an optimal “center of gravity” and “remov[es] excess weight,” which further support that it is a hand vacuum cleaner. Ex1020, Abstract, 1:2-3, 13:1-19, 15:12-18, 26:1-5, 27:12-29. Ex1002 ¶¶108–09.

b. [23a]/[24a]

Butler teaches a front wall (“**bottom wall 522**”) located at the **front end** where air enters the cleaner (via “**nozzle inlet 504**”), opposite the **rear end**:



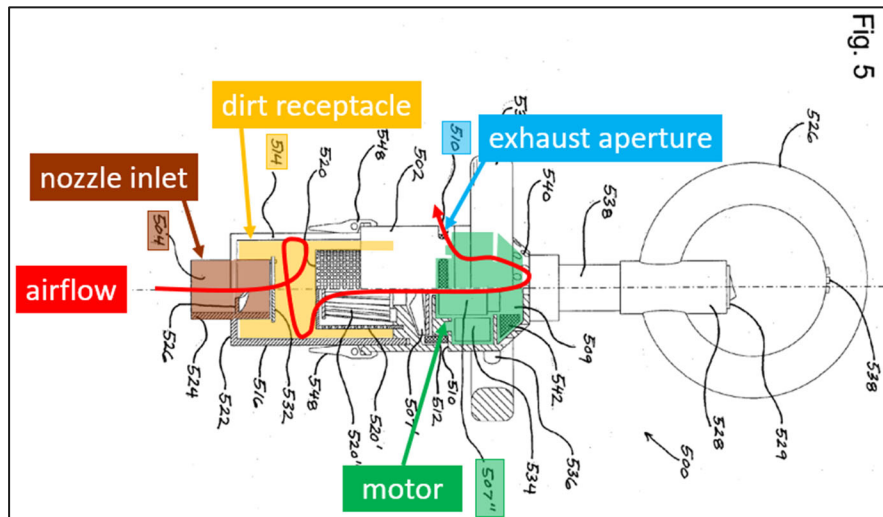
Ex1020, 21:19-23, 22:5-6; Fig. 5; Ex1002 ¶¶110–16. A POSA would have understood the **front and rear ends** of Butler’s vacuum are oriented as shown above, and that Butler’s “**bottom wall 522**” is a front wall located at Butler’s **front end**, because this orientation tracks Butler’s airflow, because “**bottom wall 522**” is at the end opposite Butler’s “rear grip 506,” i.e., the **front end**, because Butler’s **front end** is the forward-most part of the vacuum relative to the user, and because at least when Butler’s vacuum is oriented for “vertical cleaning” and “cleaning vertical surfaces,” the “**bottom wall 522**” is at Butler’s **front end**. Ex1020, 13:31-14:3, 29:1-5; Ex1002 ¶¶111–15. Further, this is at least as much disclosure of these limitations in Butler as PO has accused of infringement in the related litigation:



Ex1017, 3–4, 11 (PO's annotations); Ex1020, Fig. 5; Ex1002 ¶116.

c. [23b]/[24b]/[23e]/[24e]

In Butler, dirty air enters “**nozzle inlet 504**,” is cleaned by “a cyclonic airflow pattern within the **dirt receptacle 514**,” after which the “working **airflow**” “cool[s] the **motor 507**” and exits via “**exhaust apertures 510**”:

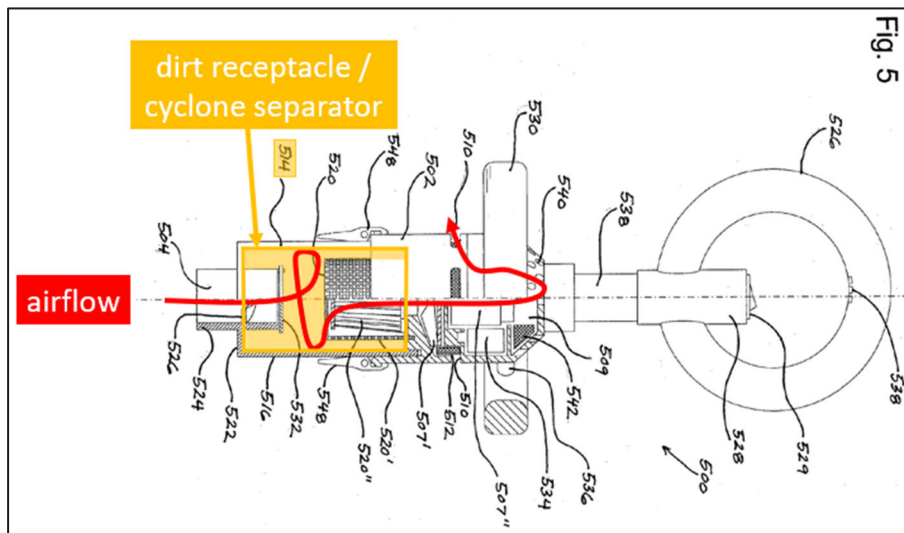


Ex1020, 20:14-26, 22:5-6, 22:20-22, Fig. 5; Ex1002 ¶¶117–22. Butler's “**nozzle inlet 504**” is a dirty air inlet, Butler's “**exhaust apertures 510**” are clean air outlets,

and Butler's "**airflow**" passage extends between them and includes Butler's "**motor 507**." Ex1002 ¶¶120–22.

d. [23c]/[24c]

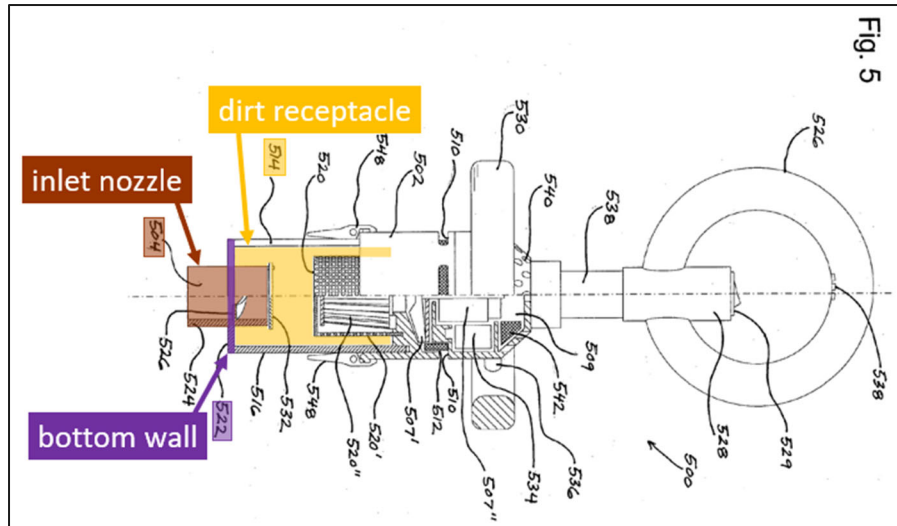
Butler's "**dirt receptacle** compris[ing] a **cyclone separator**" is positioned in the air flow passage:



Ex1020, Claim 11, Fig. 5; Ex1002 ¶¶123–26; *see also* Ex1020, 22:14-22 (initiating cyclonic airflow in dirt receptacle 514). Butler's "**dirt receptacle** compris[ing] a **cyclone separator**" is a first cyclone unit comprising a cyclone and a dirt collection chamber. Ex1002 ¶126.

e. [23d]/[24d]

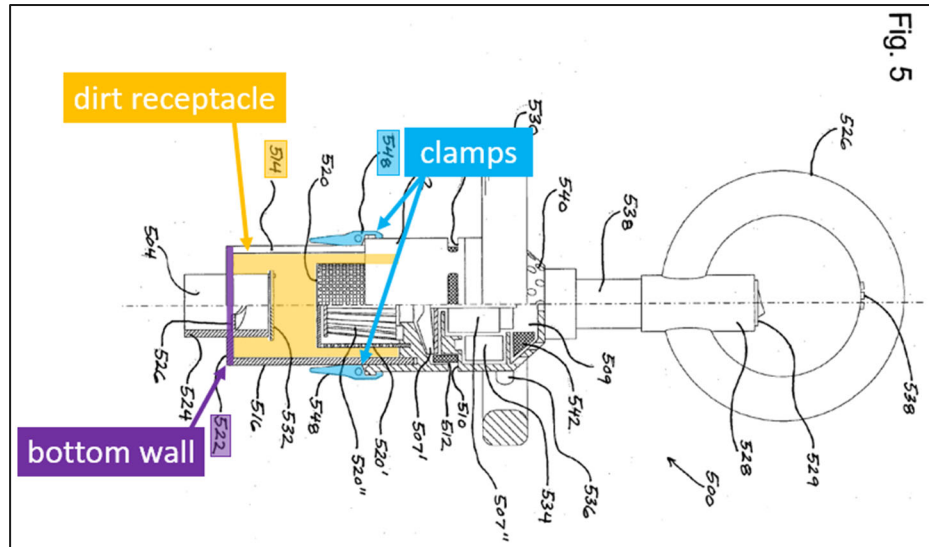
Butler's "dirt receptacle 214 may be covered by an access panel or door" to "facilitate the chamber's emptying," and the "bottom end" of "**dirt receptacle 514**," i.e., "**bottom wall 522**," is "removable from the device, along with the **inlet nozzle 504**":



Ex1020, 18:26-30, 21:19-21, Fig. 5; Ex1002 ¶¶127–30. A POSA would have understood the “removable” front wall (“**bottom wall 522**”) of Butler’s “**dirt receptacle 514**” is an openable door. Ex1002 ¶130; Ground 2, [23a]/[24a], [23c]/[24c].

f. [23f]

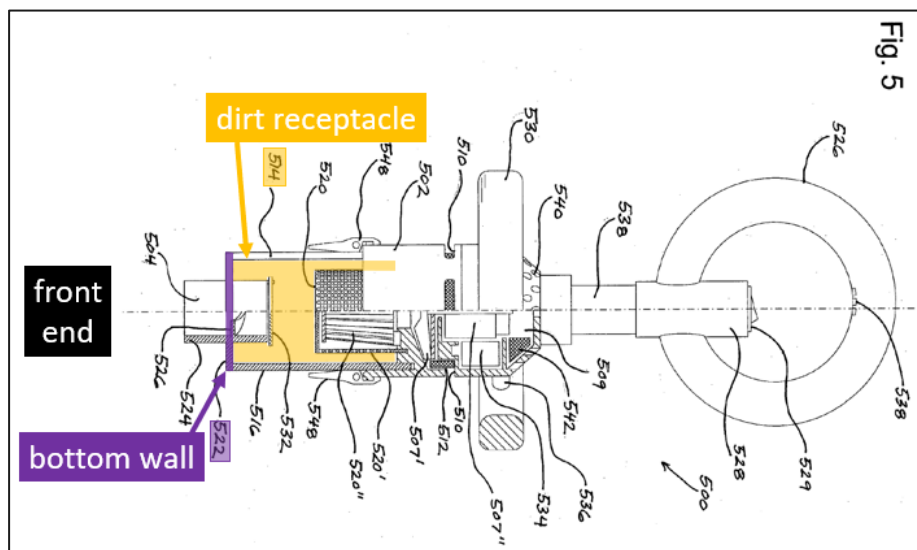
A POSA would have understood a user can remove or open Butler’s “**bottom wall 522**” (the openable door) while Butler’s “**dirt receptacle 514**” (the dirt collection chamber) is “permanently attached to the housing 502” (mounted to the hand vacuum cleaner), for example, by “**clamps 548**,” which “hold the **dirt receptacle 514** and housing 502 together”:



Ex1020, 21:13-15, 21:19-23, Fig. 5; Ex1002 ¶¶131–33.

g. [24f]

Butler’s “**bottom wall 522**” (the openable door) covers the front end of “**dirt receptacle 514**” (the dirt collection chamber):



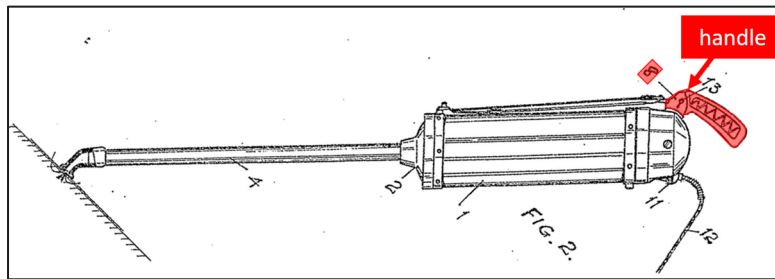
Ex1020, 21:19-23, Fig. 5; Ex1002 ¶¶134–35.

C. Ground 3: IPVG in Combination with Conrad335 Renders Claims 1-25 Obvious

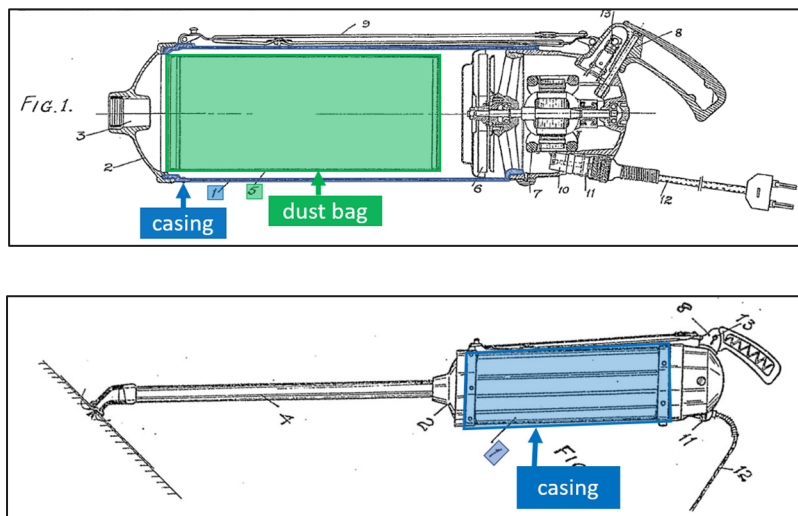
1. Motivation to Combine IPVG and Conrad335

a. Scope and Content of Prior Art

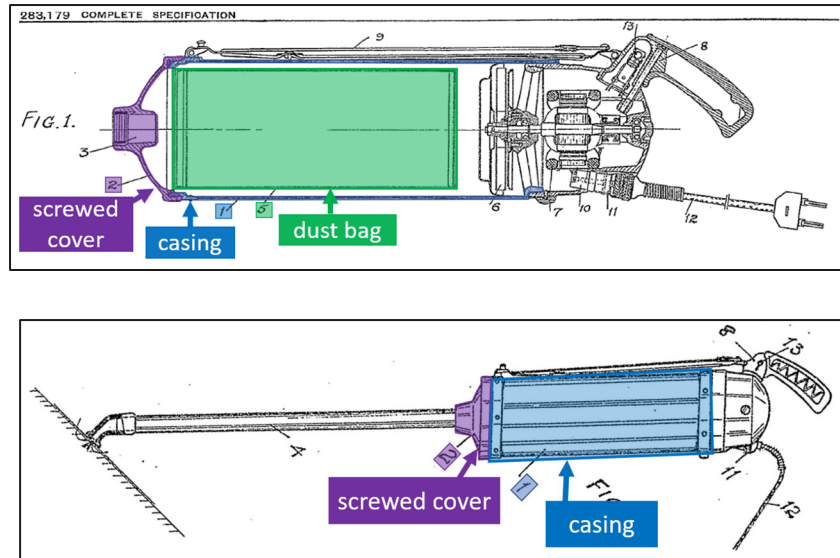
IPVG teaches a hand/stick cleaner with “a **handle [8]**”:



Ex1006, 1:22-33, Fig. 2; Ex1002 ¶137. IPVG’s cleaner uses “**dust bag or like member [5]**,” stored in “**casing 1**,” to filter dust:

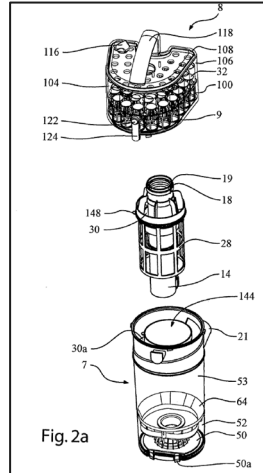


Ex1006, 1:51-57, 2:9-20, Figs. 1-2; Ex1002 ¶138. IPVG’s cleaner is emptied by removing “**screwed cover 2**” (which “close[s]” “**casing 1** ... at the front end”) and removing “**dust bag 5**”:

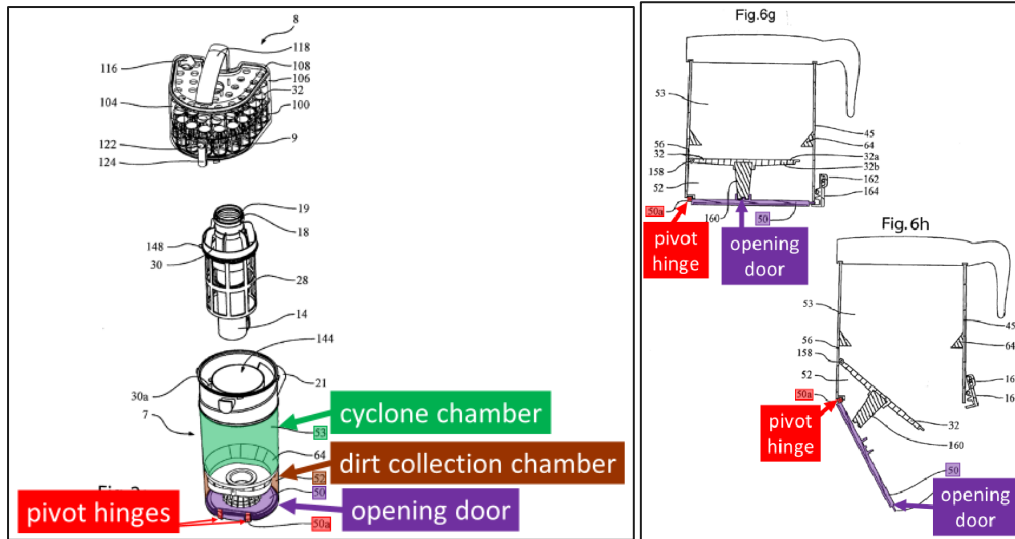


Ex1006, 1:51-57, Figs. 1-2; Ex1002 ¶¶139-40.

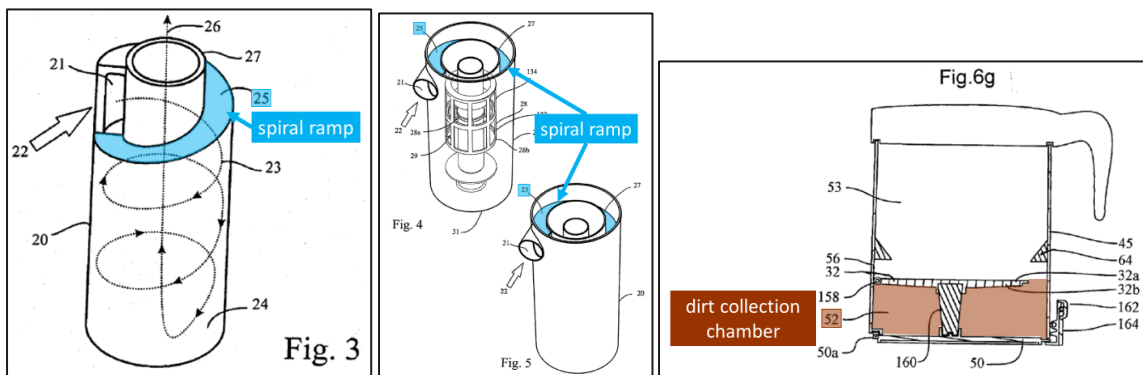
Conrad335 teaches a “cyclone separator” for vacuums, including a “stick” or “hand vacuum”:



Ex1005, Abstract, ¶376; Figs. 1-2a. Conrad335’s “cyclone separator” has “a cyclone chamber [53] and a dirt collection chamber [52],” that is sealed by “opening door 50,” with “pivot hinges 50a” for emptying collected dirt:



Ex1005, Abstract, ¶¶23, 339, Figs. 2a, 6g-6h; Ex1002 ¶¶141–42. “[S]piral ramp 25 ... create[s] cyclonic circulation 23 in cyclone separator 20,” causing “particles ... to be disentrained from the fluid flow stream and accumulate within the lower region,” which Conrad335 calls the “**dirt collection chamber [52]**”:



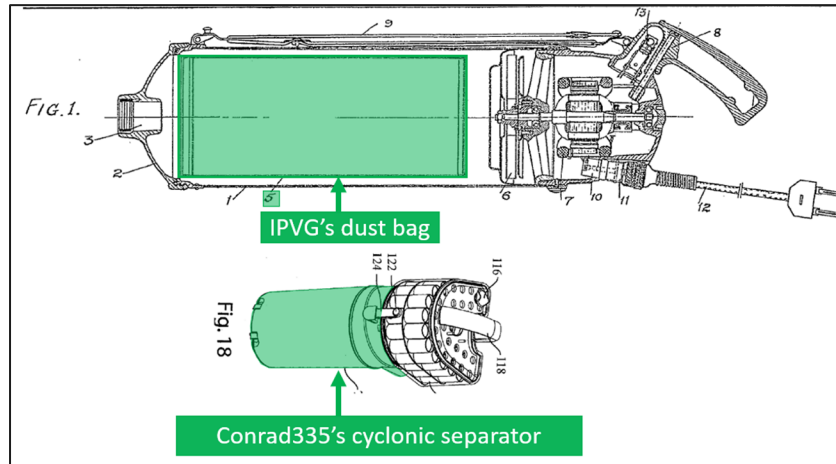
Ex1005, Abstract, ¶¶283-84, Figs. 3-6g; Ex1002 ¶143.

b. Motivation to Combine

A POSA reading IPVG would have been motivated to modify it to achieve the benefits of Conrad335’s cyclonic-separation system and hinged door, including bagless filtration and quicker bin emptying. Ex1006, 1:51-57; Ex1002 ¶¶144–56.

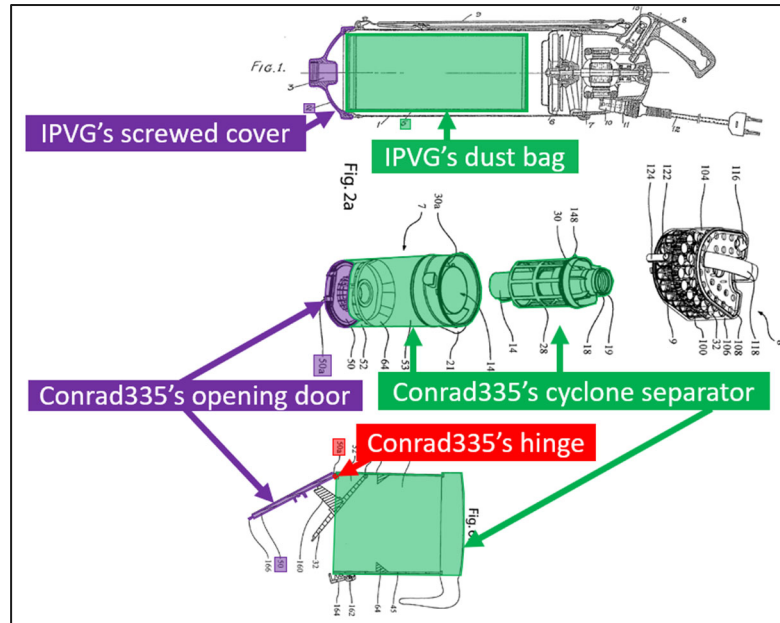
Conversely, a POSA reading Conrad335—including its teaching that “[its] cyclonic embodiments ... may be used in conjunction with ... a hand vacuum” (Ex1005 ¶376)—would have been motivated to incorporate Conrad335’s cyclonic-separation unit into hand vacuums such as IPVG’s. Ex1002 ¶144. Specifically, a POSA would have been motivated to combine the teachings of IPVG and Conrad335 as follows:

First, a POSA would have modified IPVG’s dust-separation unit (“**dust bag 5**”) to use a cyclonic-filtration unit, such as Conrad335’s “**cyclone separator**”:



Ex1006, Fig. 1; Ex1005, Fig. 18; Ex1002 ¶145.

Second, a POSA would have modified IPVG’s screwed-open door (“**screwed cover 2**”) to use a pivot-open door, such as Conrad335’s “**opening door 50**” with “**pivot hinges 50a**”:



Ex1005, Abstract, ¶¶23, 339, Figs. 2a, 6h; Ex1006, Fig. 1; Ex1002 ¶146.

A POSA would have been motivated to combine IPVG and Conrad335 as described. Ex1002 ¶¶147–56. *First*, IPVG and Conrad335 are analogous art. Ex1002 ¶148. Like IPVG, which teaches a “portable dust suction apparatus” that uses an air-filtration unit (“dust bag or like member [5]”) contained within a cylindrical chamber (“casing 1”) that is sealed at one end by an openable door (“casing 1 [is] closed at the front end by a screwed cover 2”), Ex1006, 1:10-12, 1:51-57, 2:9-20, Conrad335 teaches a “portable vacuum cleaner” that uses an air-filtration unit (a “cyclone separator”) that is sealed at one end by an openable door (“opening door 50”), Ex1005, Abstract, ¶¶ 23, 84, 339.

Second, Conrad335 and IPVG each provide motivations for this combination.

Ex1002 ¶¶149–53. Conrad335 teaches that its cyclonic-separator “may be used ...

to create ... a stick” or “hand vacuum.” Ex1005 ¶376. A POSA would have looked for hand/stick vacuum references that could use Conrad335’s cyclonic-filtration teachings, including IPVG’s. Likewise, IPVG teaches that its air-filtration unit is “a dust bag or like member through which the air stream passes.” Ex1006, 1:22-33, claim 1. A POSA would have looked for “like members” for filtering air, including cyclonic air-filtration. Ex1002 ¶¶149–53. A POSA would have understood that cyclonic filtration had certain advantages over dust-bag filtration, including (1) no bag needs to be replaced, reducing recurring costs; (2) unlike cyclonic cleaners, dust-bag cleaners lose suction as they fill; and (3) cyclonic cleaners give the user a visual indication of how full the container is and when to empty. Ex1002 ¶¶150–53.

Martelliere taught these advantages in 1955: “By application of the ‘Whirlwind’ principle,” i.e., cyclonic filtration, “the materials are deposited in the bottom of the container, after having separated from the air, before it passes through the filter screen,” which “prevent[s] clogging” and creates “stable suction,” and by using a transparent cyclonic chamber, “the user is able, when stopped, to see where the filling of the container is” and “can therefore better judge when it must be emptied.” Ex1010, 1. As another example, in 2002, WO02/067753 to Vuijk explained that “so-called bagless vacuum cleaners,” or “cyclonic” cleaners, “are becoming increasingly popular” because they “avoid[ed] the use of a filter bag as the primary form of separation” and thus “maintain a consistently high level of

suction, even as the collecting chamber fills with dirt.” Ex1016, 1:5-10. As Conrad335 itself teaches, “[c]yclonic vacuum cleaners are known in the art,” and one “advantage” of Conrad335’s design is that its chamber is transparent so, “when the dirt collection bin is full, a user ... will have a visual signal to empty the cyclonic stage.” Ex1005 ¶¶2, 112.

Third, a POSA would have known that Conrad335’s hinged “opening door 50” had certain advantages over IPVG’s “screwed cover 2,” including ease of opening for cleaner emptying, and would have been motivated to incorporate Conrad335’s hinged-door teachings into IPVG. Ex1002 ¶154. Unlike IPVG’s emptying process, which involves a user unscrewing “screwed cover 2,” removing “dust bag 5,” and carrying the dirty dust bag to the trashcan, a cleaner having Conrad335’s “opening door 50” may be emptied by simply holding the cleaner over a trashcan and pivoting the door open “such as by pushing [a] button.” Ex1006, 1; Ex1005 ¶339. By contrast to IPVG’s “screwed cover 2,” a POSA would have understood Conrad335’s “opening door 50” can empty dirt more quickly, conveniently, and hygienically. Ex1002 ¶154.

Fourth, this combination would have involved a simple substitution of known elements for others to obtain predictable results. Ex1002 ¶155. IPVG teaches a cleaner having a dust-separation unit with a door covering one end that opens with a screw. Ex1006, Fig. 1. Conrad335 teaches a separation unit with door covering

one end that opens with a hinge. Ex1005, Fig. 2a. A POSA would have understood the simple substitution of these separation units and openable doors would achieve the predictable results of filtering air and permitting one end of the dust-separation unit to be opened for emptying. Ex1002 ¶155. Further, as depicted above, IPVG and Conrad335 are directed to hand/stick vacuums having a similar orientation of separation unit relative to door. Ex1006, Fig. 1; Ex1005, Figs. 2a, 6h; Ex1002 ¶155.

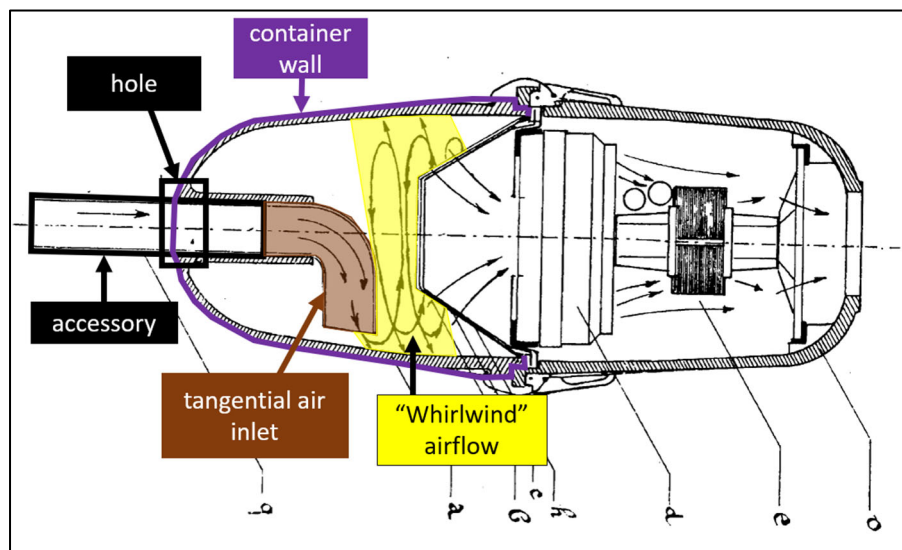
Fifth, it would have been at least obvious to try this combination. Ex1002 ¶156. A POSA would have understood there are a finite number of identified dust-separation solutions, including dust bags (as IPVG teaches) and cyclonic separators (as Conrad335 teaches). Ex1002 ¶156. And, a POSA would have understood there are a finite number of identified openable-door solutions, including screwed doors (as IPVG teaches) and hinged doors (as Conrad335 teaches), and it would have been obvious to try to achieve the known benefits described above. Ex1002 ¶156.

c. Reasonable Expectation of Success

A POSA would have reasonably expected success combining IPVG's and Conrad335's teachings as described. Ex1002 ¶¶157–66. A POSA would have understood that these two separation units could be used interchangeably, and these two openable doors could be used interchangeably, and would have further expected success for the reasons stated above, including because such modification involves a simple substitution of known elements that perform similar functions in similar

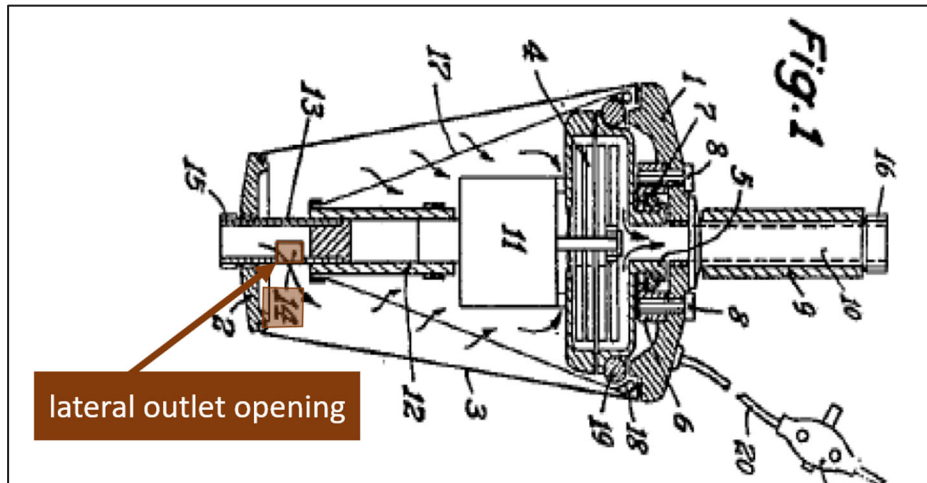
ways, and because of the express motivations found in Conrad335 and IPVG to perform such substitution. Ex1002 ¶¶157–58.

Further, a POSA would have reasonably expected success incorporating Conrad335’s cyclonic-separation teachings into IPVG because it was well-known that front-located air inlets (such as IPVG’s) create cyclonic separation by using a tangential opening. As Conrad335 explains, “a spiral or tangential inlet” can create a cyclone. Ex1005 ¶224. Further, front-located tangential air inlets have been used for cyclonic cleaners since well before the ’407Patent. In 1955, Martelliere taught a “**tangential[]**” **air inlet** and removable **accessory** attached thereto through a **hole** in the “detachable” front “**wall of the ... container**” that created cyclonic airflow (“the ‘Whirlwind’ principle”):



Ex1010, 1, Fig. 1; Ex1002 ¶¶159–60.

In 1938, Peter disclosed a cleaner with a front-mounted accessory and air inlet, which contained “**lateral outlet opening 14**” that a POSA would have understood created cyclonic airflow:

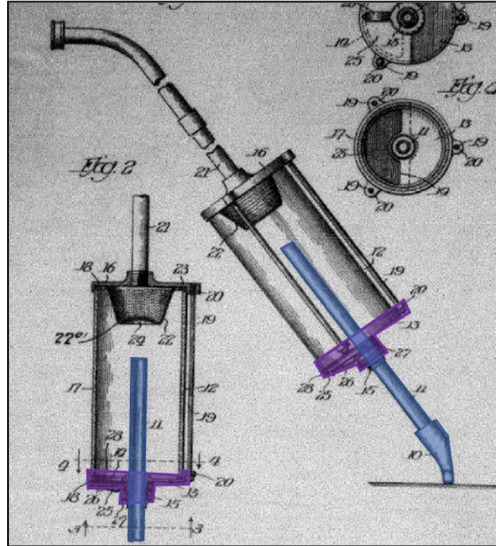


Ex1019, 2, Fig. 1⁸; Ex1002 ¶161.

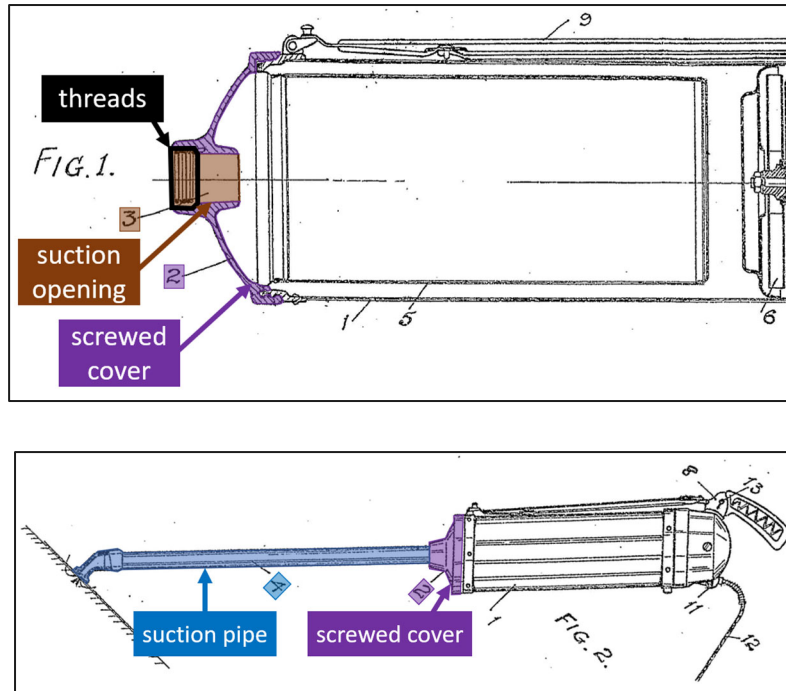
A POSA would have understood that the same configuration would create cyclonic airflow in the combined teachings of IPVG and Conrad335 by simply incorporating a tangential cyclone air inlet, such as Conrad335’s “inlet 21” (Ex1005 ¶283), and that such a pipe would connect IPVG’s air inlet with Conrad335’s tangential “inlet 21.” Ex1002 ¶162.

⁸ Ex1019 is a certified English translation of Ex1018, originally published in German. Citations to Ex1019 are by page, as the English translation does not include column or line numbers.

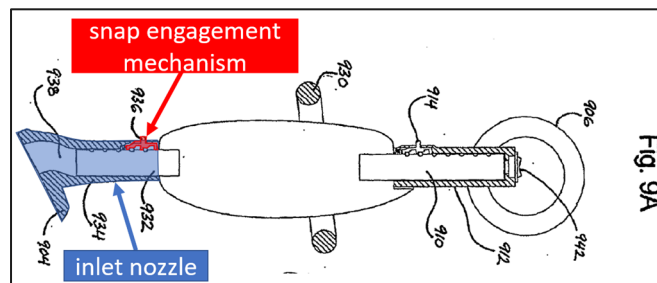
Further, **accessories** projecting through **openable front doors** in cleaners have existed for over a century:

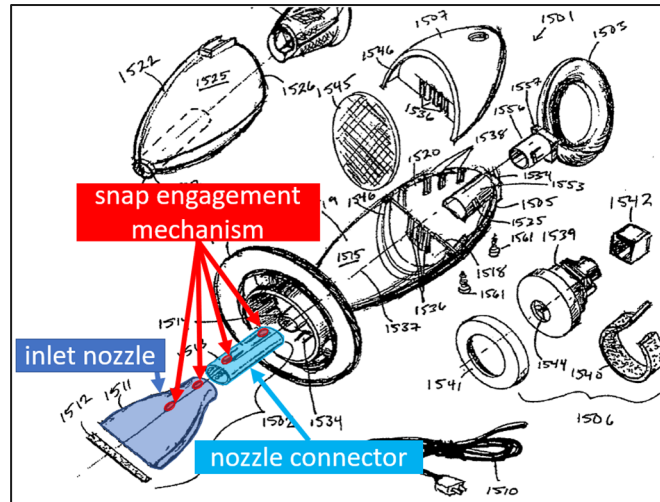


Ex1011, Figs. 1-2 (1915); Ex1002 ¶163. Conrad335's cyclone-separator teachings “may be used ... with ... a stick” or a “hand vacuum,” for which front-mounted accessories were common. Ex1005 ¶376; Ex1002 ¶164. A POSA would have understood that front-mounted accessories would be detachable to allow Conrad335's door to pivot, including as taught by IPVG. Ex1002 ¶164. For example, IPVG teaches a **threaded “suction opening 3”** to which “a **suction pipe 4**” with corresponding mating threads can be attached for use and detached to allow “**screwed cover 2**” to be removed for emptying the cleaner:



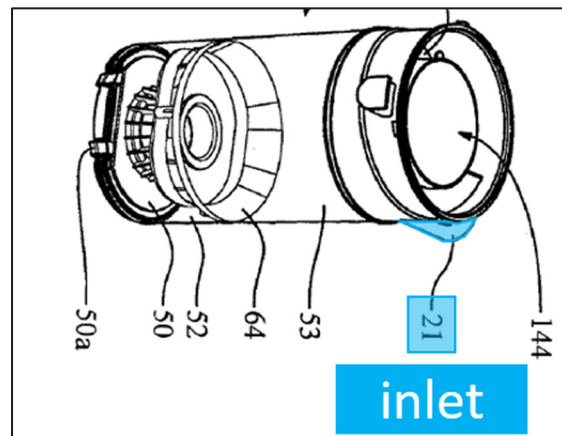
Ex1006, 1:51-57, Figs. 1-2; Ex1002 ¶164. Butler also teaches a hand vacuum with removable accessories, such as an “inlet nozzle” and/or “nozzle connector,” that are removably “attached to the housing ... by snap engagement” for easy attachment and removal:





Ex1020, 27:12, 34:28-30, 35:8-11, Figs. 9A, 15; *see also id.*, 10:28-11:2, 37:16-18, 38:25-39:1; Ex1002 ¶165.

A POSA would further understand IPVG’s “suction pipe 4” could alternatively attach to a cyclone air inlet positioned on the outside of the dirt separation unit, such as Conrad335’s “inlet 21”:



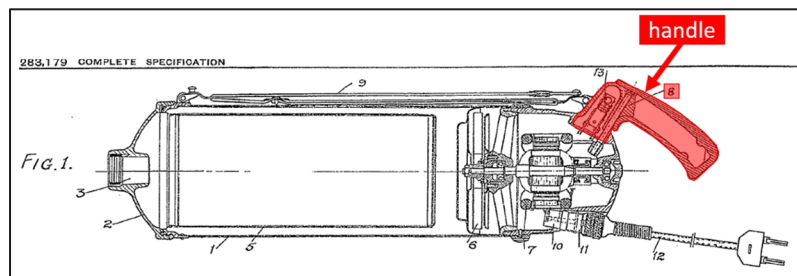
Ex1005, Fig. 2a; Ex1002 ¶166.

2. [1]/[23]/[24]/[25]

a. [1pre]/[23pre]/[24pre]/[25pre]

To the extent the preambles are limiting, IPVG teaches them. Ex1002 ¶¶167–70.

IPVG teaches a “portable dust suction apparatus” having “a **handle [8]**” that the operator holds “during manipulation of the apparatus”:



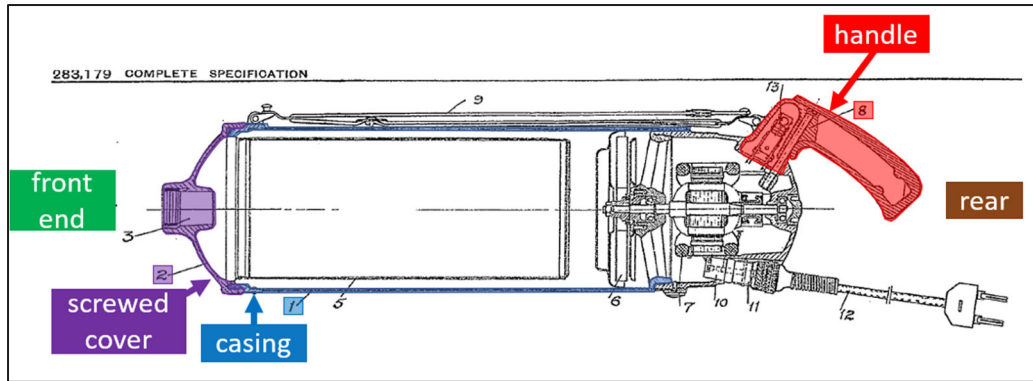
Ex1006, 1:10-21. This is a hand vacuum cleaner. Ex1002 ¶¶168–69.

Likewise, Conrad335 teaches a “hand vacuum.” Ex1005 ¶¶1, 376.

b. [1a]/[23a]/[24a]/[25a]

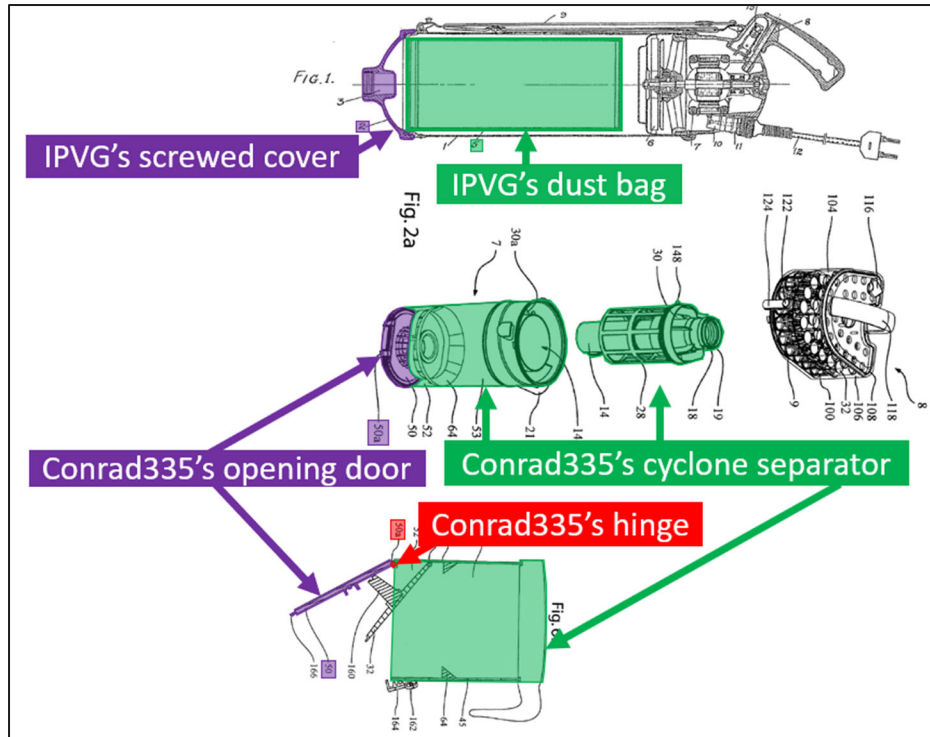
IPVG teaches and the combination of IPVG and Conrad335 teaches these limitations. Ex1002 ¶¶171–75.

IPVG’s cleaner includes “**casing 1** closed at the **front end** by a **screw cover 2**” and a “**handle 8**” located at the “**rear**”:



Ex1006, 1:10-12, 1:51-57, 1:92-2:2, claim 3, Fig. 1; Ex1002 ¶172; *see also* Ex1006, 1:97-101, Fig. 3. IPVG’s “**screwed cover 2**” is a front wall at the “**front end.**” Ex1002 ¶¶173–74.

Further, a POSA would have been motivated to modify IPVG’s “**screwed cover 2**” with Conrad335’s “**opening door 50**” and would have reasonably expected success. Ground 3, §1. When so combined, Conrad’s “**opening door 50**” is a front wall:

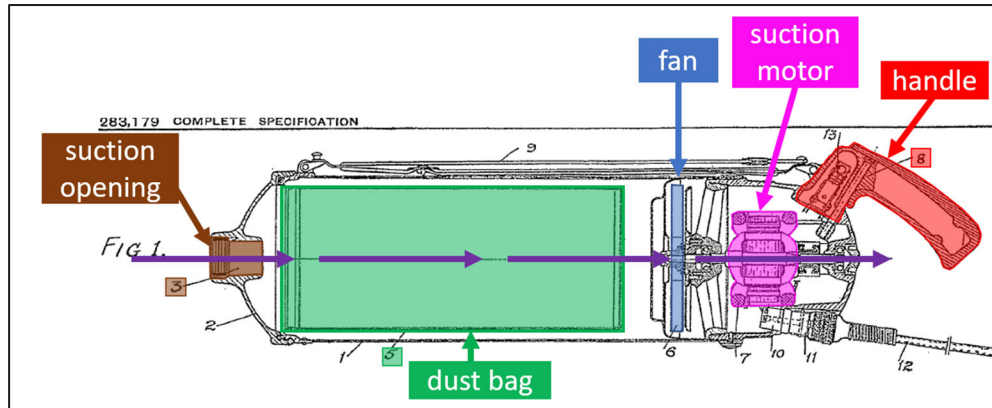


Ex1006, Fig. 1; Ex1005, Figs. 2a, 6h; Ex1002 ¶175. The combined teachings therefore also teach these limitations. Ex1002 ¶175.

c. [1b]/[23b]/[24b]/[25b]/[1e]/[23e]/[24e]/[25e]

IPVG teaches and the combination of IPVG and Conrad335 teaches these limitations. Ex1002 ¶¶176–85.

In IPVG, **air flows** in “**suction opening 3**,” through “**dust bag 5**, and a **fan 6** driven by an **electric motor 7**,” and out “the exhaust or blowing end of the casing,” which is on the end where “**handle 8**” “is mounted”:



Ex1006, 1:51-62, Fig. 1; Ex1002 ¶178. IPVG’s “**suction opening 3**” is a dirty air inlet, and IPVG’s “exhaust or blowing end of the casing” is a clean air outlet. Ex1002 ¶¶178–79. Further, IPVG’s “**handle**” is mounted to the “exhaust or blowing end of the casing” and IPVG’s “**motor**” is between the “exhaust or blowing end” and the “**suction opening.**” Ex1006, 1:51-62. IPVG’s “**motor**” individually or together with its “**fan**” is a suction motor positioned in the airflow passage. Ex1002 ¶182.

Likewise, Conrad335 teaches these limitations. Ex1002 ¶¶180–81. Conrad335 has a “dirty air inlet” and undergoes cyclonic separation that cleans the air that then “travels ... to a fluid flow motor that is preferably a suction motor 15 prior to exiting vacuum cleaner 1.” Ex1005 ¶274.

A POSA would have been motivated to combine the teachings of IPVG and Conrad335 and would have reasonably expected success, Ground 3, §1, and would have been motivated to use an airflow passage from a dirty air inlet to a clean air outlet and including a suction motor for improved motor efficiency and reliability

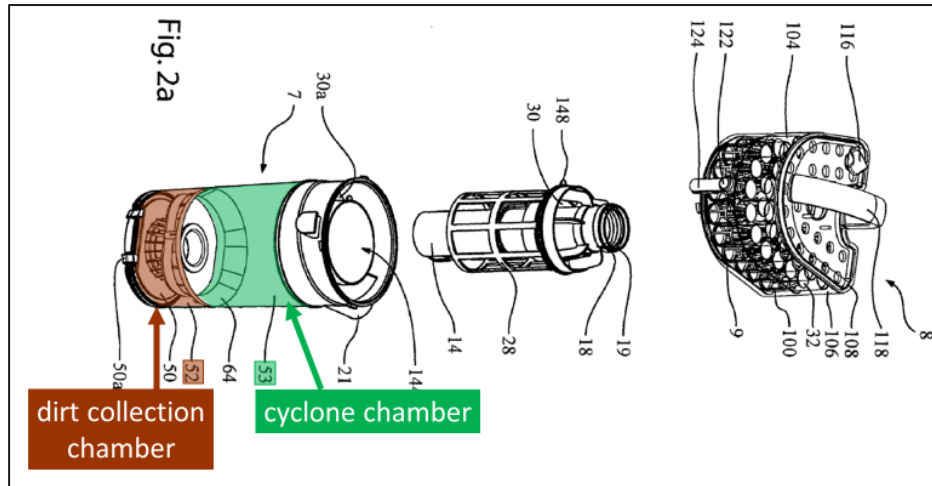
(by cooling the motor using the airflow) and for improved suction. Ex1002 ¶¶184–85. The combined teachings likewise meet these limitations because the air flows from a dirty air inlet, such as IPVG’s “suction opening 3” (when modified to create cyclonic airflow), through a suction motor, to a clean air outlet, such as IPVG’s “exhaust.” Ex1002 ¶¶183–85.

d. [1c]/[23c]/[24c]/[25c]

IPVG in combination with Conrad335 teaches these limitations. Ex1002 ¶¶186–93.

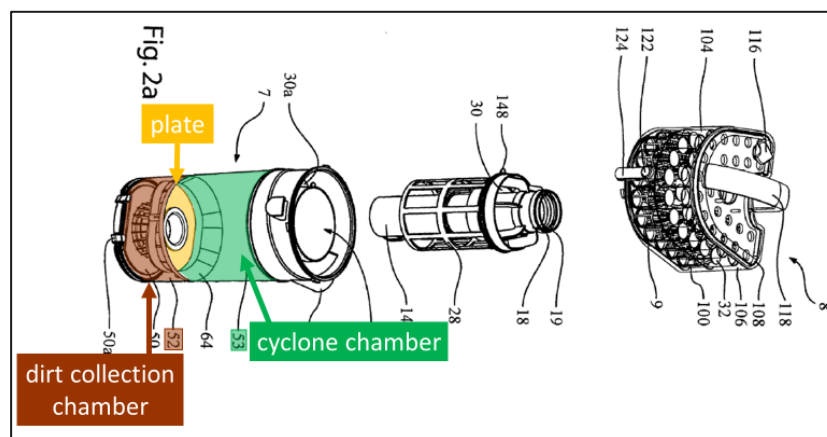
IPVG teaches a “dust bag 5” “through which the suction air stream passes,” which is an air-filtration and dirt-collection unit positioned in the airflow passage. Ex1006, 1:51-57, claim 1; Ex1002 ¶187.

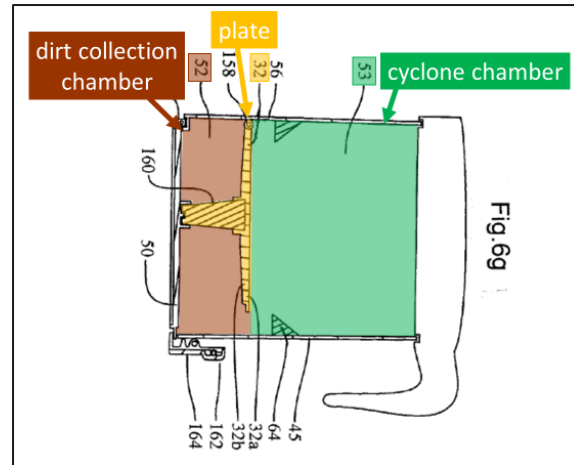
Conrad335 teaches a first cyclone unit positioned in the airflow passage, the first cyclone unit comprising at least one cyclone and at least one dirt-collection chamber. Ex1002 ¶188. Conrad335 teaches “cyclone separator 20,” which includes “a cyclonic region or **cyclone chamber 53** and a **dirt collection region or chamber [52]**”:



Ex1005 ¶318, Fig. 2a; Ex1002 ¶188. Conrad335’s “cyclone separator 20” is a first cyclone unit in the airflow passage and includes a cyclone in “cyclone chamber 53” and a dirt-collection chamber, “dirt collection region or chamber [52].” Ex1002 ¶¶156–90; *see also* Ex1005 ¶¶283-84, 318.

Regarding [1c], Conrad335 teaches that the at least one dirt-collection chamber is external to the cyclone chamber. Ex1002 ¶¶191–92. In Conrad335, “**plate 32** ... divide[s] the interior of a cyclone separator 20 into a cyclonic region or **cyclone chamber 53** and a **dirt collection region or chamber**”:





Ex1005 ¶318, Figs. 2a, 6g, Ex1002 ¶¶191–92. Conrad335’s “dirt collection region or chamber [52]” is external to the cyclone chamber because they are separated by “plate 32.” Ex1002 ¶192.

A POSA would have been motivated to modify IPVG’s “dust bag 5” with Conrad335’s cyclone-separator teachings and would have reasonably expected success. Ground 3, §1.

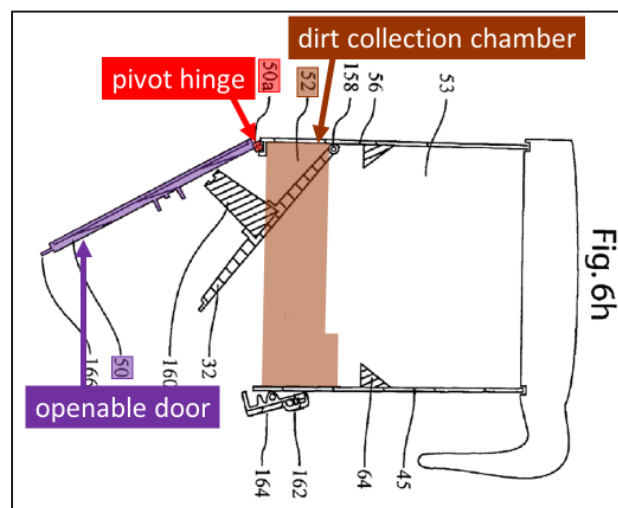
e. [1d]/[23d]/[24d]/[25d]

IPVG in combination with Conrad335 teaches these limitations. Ex1002 ¶¶194–203.

IPVG teaches the dirt-collection chamber having an openable door, the front wall comprising the openable door, as claimed in [23d]/[24d]/[25d]. Ground 3, [1a]; Ex1002 ¶165. A POSA would have understood IPVG’s “screwed cover 2” is a front wall comprising an openable door because it “close[s] ... the front end” of IPVG’s “chamber 1” and it is opened by removing the screws to empty IPVG’s dust bag.

Ex1002 ¶196. For [1d], IPVG further teaches that its dust-separation unit, “dust bag 5,” has an openable door, whereby, when the door is in an open position, “dust bag 5,” which is both a dust-separation unit and a dirt-collection chamber, is opened. Ex1006, 1:51-57, Fig. 1; Ex1002 ¶197.

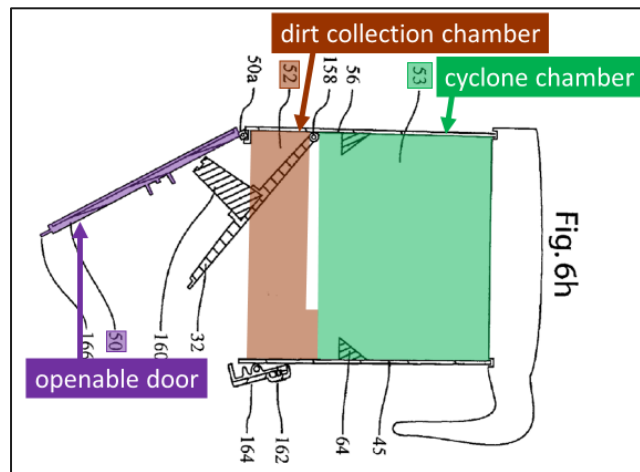
Conrad335 teaches that the cyclone and the dirt-collection chamber have an openable door, the front wall comprising the openable door, whereby, when the door is in an open position, both the cyclone and the dirt-collection chamber are opened. Ex1002 ¶¶198–99. Conrad335’s “**openable door [50]**” can be “pivoted open about, e.g. **pivot hinges 50a**,” and Conrad335 depicts the “**dirt collection chamber 52**” in an opened position when “**openable door [50]**” is pivoted open:



Ex1005 ¶¶147, 338-39, Fig. 6h; Ex1002 ¶198. Conrad335’s “dirt collection chamber has a bottom that is openable,” and when “[c]yclonic [cleaning] stage 7” is full, it “may then be emptied, e.g., by opening a bottom pivoting door 50.” Ex1005 ¶¶23, 350. When Conrad335’s teachings of its “cyclone separator 20” are

incorporated into IPVG, Conrad335’s “openable door [50]” is a front wall comprising the openable door. Ground 3, [1a]/[23a]/[24a]/[25a]; Ex1002 ¶200.

Regarding [1d], Conrad335’s “**openable door [50]**” is an openable door to both Conrad335’s “**dirt collection chamber 52**” and Conrad335’s “**cyclone chamber 53**”:



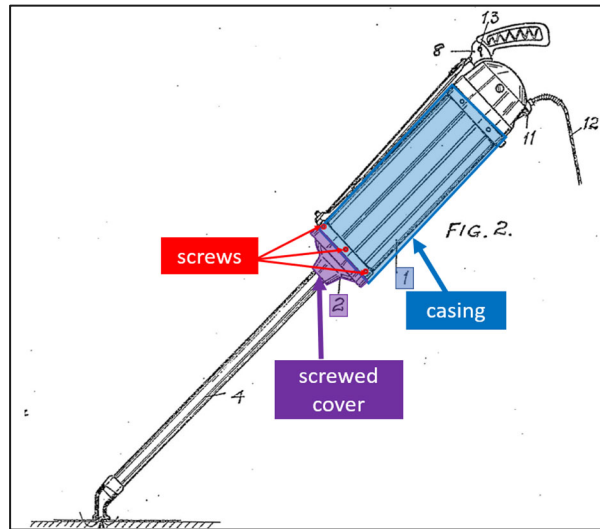
Ex1005 ¶¶147, 338-39, Fig. 6h; Ex1002 ¶¶201–02; *see also* Ex1005, claim 13 (Conrad335’s design “permit[s] dirt ... in the cyclone chamber and the dirt collection chamber to be removed concurrently”).

A POSA would have been motivated to modify IPVG’s “dust bag 5” with Conrad335’s cyclone-separator teachings and would have reasonably expected success. Ground 3, §1.

f. [23f]

IPVG and the IPVG in combination with Conrad335 teaches this limitation. Ex1002 ¶¶204–07.

IPVG's openable door, “**screwed cover 2**,” is opened by removing the **screws**, which can be performed when “**casing 1**,” in which IPVG's “dust bag 5” is housed, is mounted to the rest of the hand vacuum cleaner:



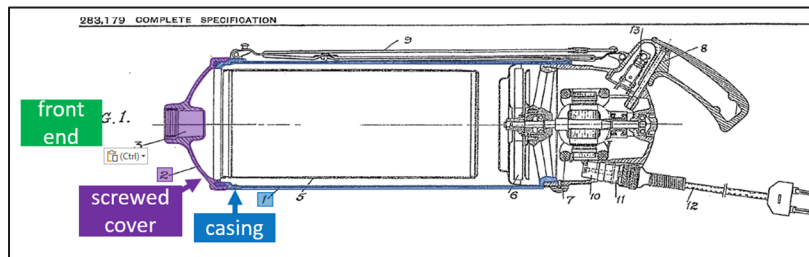
Ex1006, Fig. 2; Ex1002 ¶205. IPVG's “casing 1,” individually, or together with IPVG's “dust bag 5,” is a dirt-collection chamber. Ground 3, [23c], [23d]; Ex1002 ¶206.

A POSA would have been motivated to modify IPVG's “screwed cover 2” with Conrad335's openable-door teachings and would have reasonably expected success. Ground 3, §1. The combined teachings likewise meet these limitations because Conrad335's “opening door 50,” when substituted for IPVG's “screwed cover 2,” is openable when the dirt-separation unit is mounted to IPVG's hand vacuum cleaner, as it is not blocked from pivoting open when no accessory is attached. Ex1002 ¶207.

g. [24f]

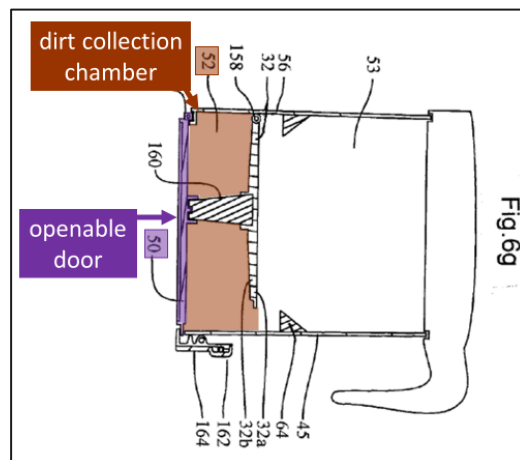
IPVG teaches this limitation. Ex1002 ¶¶208–13.

In IPVG, “the apparatus comprises a **casing 1** closed at the **front end** by a **screwed cover 2**”:



Ex1006, 1:51-57, Fig. 1; Ex1002 ¶209. IPVG’s “**screwed cover 2**” is an openable door, and it covers an end of IPVG’s “**casing 1**,” which individually, or together with IPVG’s “dust bag 5,” is a dirt-collection chamber. Ground 3, [24c], [24d]; Ex1002 ¶210.

Likewise, Conrad’s “**openable door [50]**” covers an end of the “**dirt collection chamber 52**”:



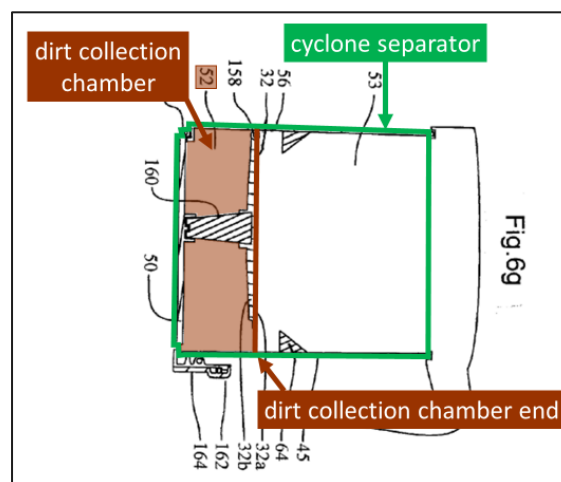
Ex1005, Fig. 6g; Ex1002 ¶¶211–12; *see also* Ex1005 ¶23 (“In another embodiment, the **dirt collection chamber** has a **bottom** that is openable”).

A POSA would have been motivated to modify IPVG’s “screwed cover 2” with Conrad335’s openable-door teachings and to modify IPVG’s “dust bag 5” with Conrad335’s cyclone-separator teachings and would have reasonably expected success. Ground 3, §1. The combined teachings likewise meet these limitations because Conrad335’s “opening door 50” would cover an end of the dirt collection chamber. Ex1002 ¶213.

h. [25f]

IPVG in combination with Conrad335 teaches this limitation. Ex1002 ¶¶214–17.

Conrad335’s “**dirt collection chamber 52**” has a rear **end** that is non-removably mounted to Conrad335’s “**cyclone separator 20**”:



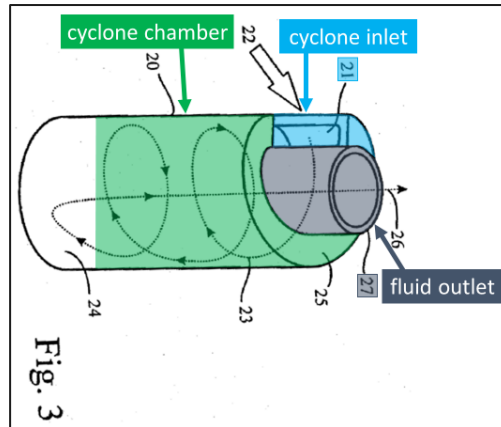
Ex1005, Fig. 6g; Ex1002 ¶215. A POSA would have understood the rear end of Conrad335’s “dirt collection chamber 52” is non-removably mounted to Conrad335’s “cyclone separator 20” (which is a first cyclone unit, Ground 3, [25c]), including because Conrad335 explains that “[e]ach cyclone and associated dirt collection chamber is *integrally molded* from transparent plastic.” Ex1005 ¶134; Ex1002 ¶216.

A POSA would have been motivated to modify IPVG’s “dust bag 5” with Conrad335’s cyclone-separator teachings and would have reasonably expected success. Ground 3, §1. The combined teachings meet these limitations because Conrad335’s dirt-collection chamber end would remain non-removably mounted to the first cyclone and would be located at the rear. Ex1002 ¶217.

3. [2]

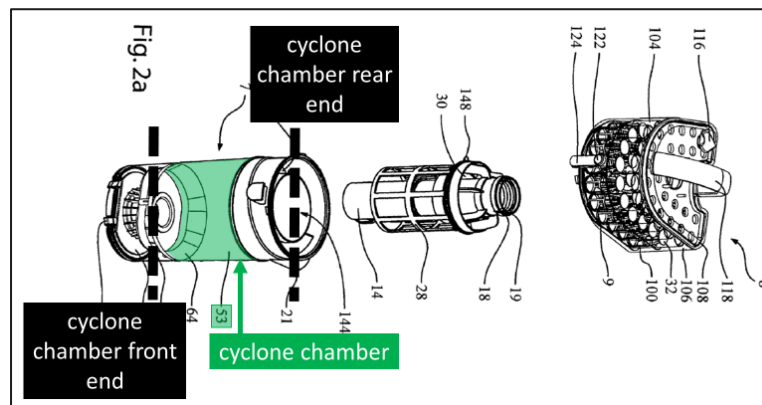
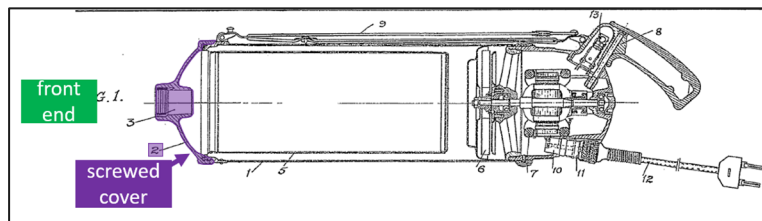
IPVG in combination with Conrad335 teaches claim 1 and the remaining limitations of this claim. Ex1002 ¶¶218–21.

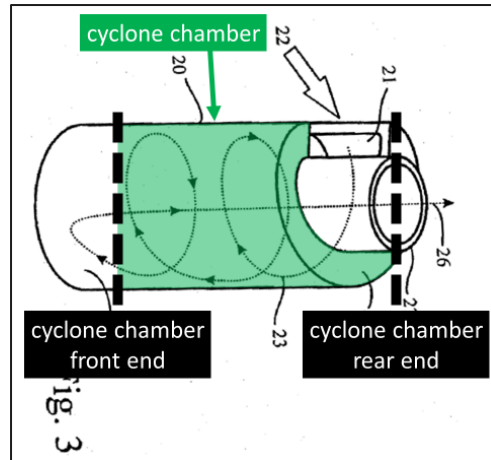
Conrad335 teaches that the at least one cyclone has a cyclone front end, a cyclone rear end, a cyclone air inlet and a cyclone air outlet. Ex1002 ¶219. Conrad335’s “**cyclone chamber 53**” includes a first cyclone. Ground 3, [1c]. Conrad335’s “**cyclone chamber 53**” has “**cyclone inlet 21**,” which is a cyclone air inlet, and “**fluid outlet 27**,” which is a cyclone air outlet:



Ex1005 ¶¶284, 324, Fig. 3; Ex1002 ¶219.

When Conrad335’s “cyclone separator 20,” including “**cyclone chamber 53**,” is incorporated into IPVG’s cleaner, Conrad335’s first cyclone has its front end at IPVG’s “front end” (near “**screwed cover 2**”), which is at the cleaner front end, and has its rear end at the opposite end:





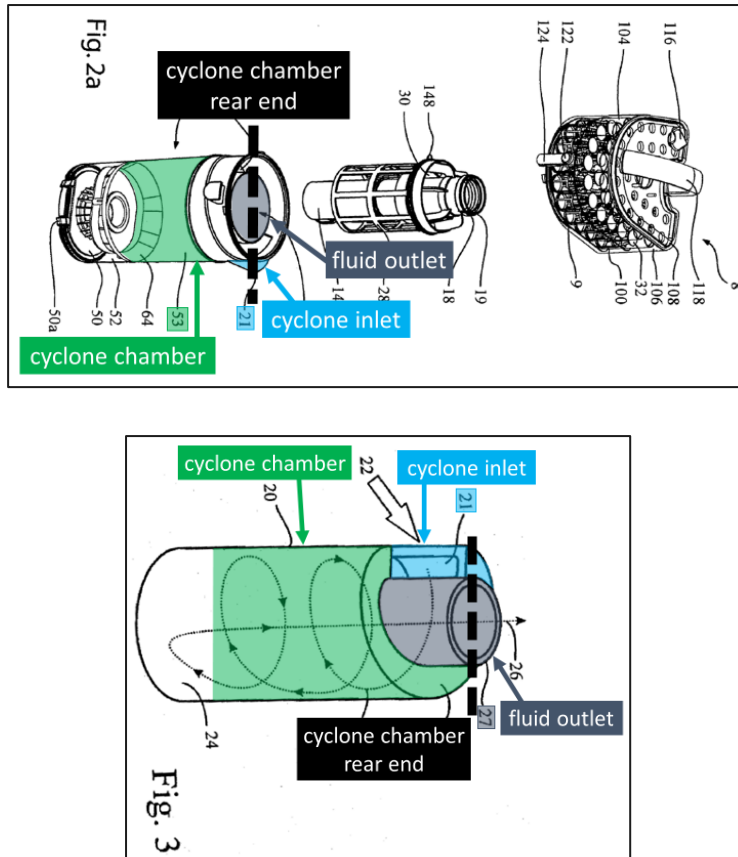
Ex1006, Fig. 1; Ex1005, Figs. 2a, 3; Ex1002 ¶220.

A POSA would have been motivated to modify IPVG’s “dust bag 5” with Conrad335’s cyclone-separator teachings and would have reasonably expected success. Ground 3, §1. The combined teachings meet these limitations because they incorporate Conrad335’s cyclone-separator teachings. Ex1002 ¶221.

4. [3]/[4]

IPVG in combination with Conrad335 teaches claim 2 and the remaining limitations of these claims. Ex1002 ¶¶222–25.

Conrad335’s “**cyclone inlet 21**” and “**fluid outlet 27**” are at the same end—the “**cyclone chamber 53**” **rear end**, which a POSA would have understood is also Conrad335’s first cyclone’s rear end:



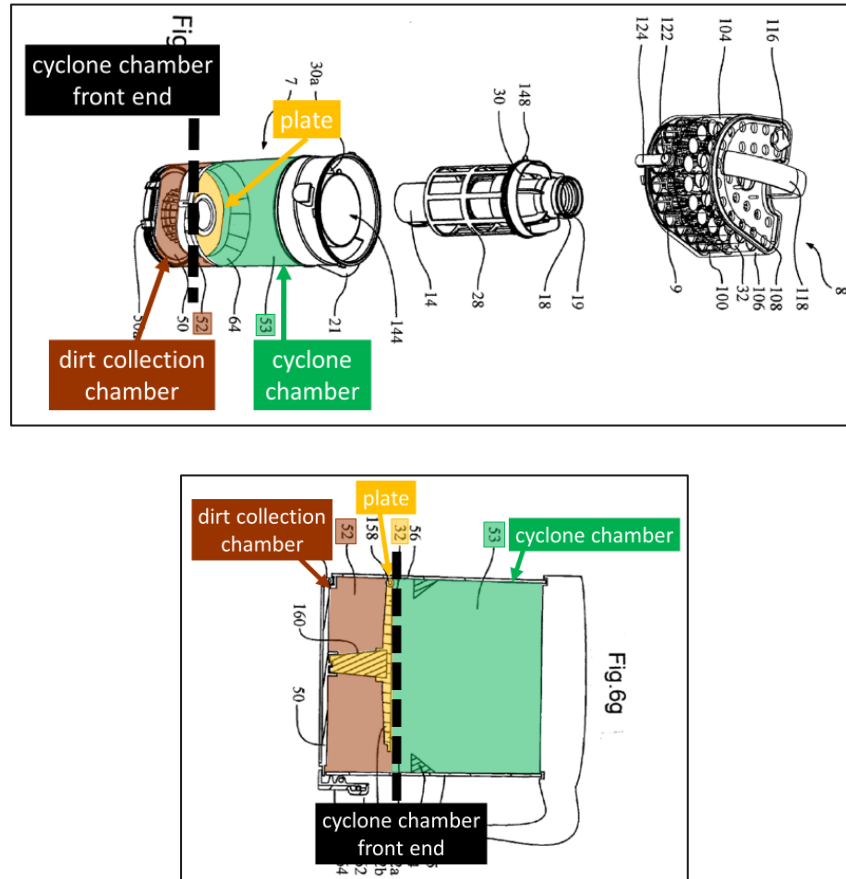
Ex1005, Figs. 2a, 3; Ex1002 ¶¶223–24.

A POSA would have been motivated to modify IPVG’s “dust bag 5” with Conrad335’s cyclone-separator teachings and would have reasonably expected success. Ground 3, §1. The combined teachings meet these limitations because a POSA would route air from IPVG’s floor tool, “suction pipe 4,” to Conrad335’s “cyclone inlet 21,” either through the center of Conrad335’s cyclone separator, or along its side. Ground 3, §1; Ex1002 ¶225.

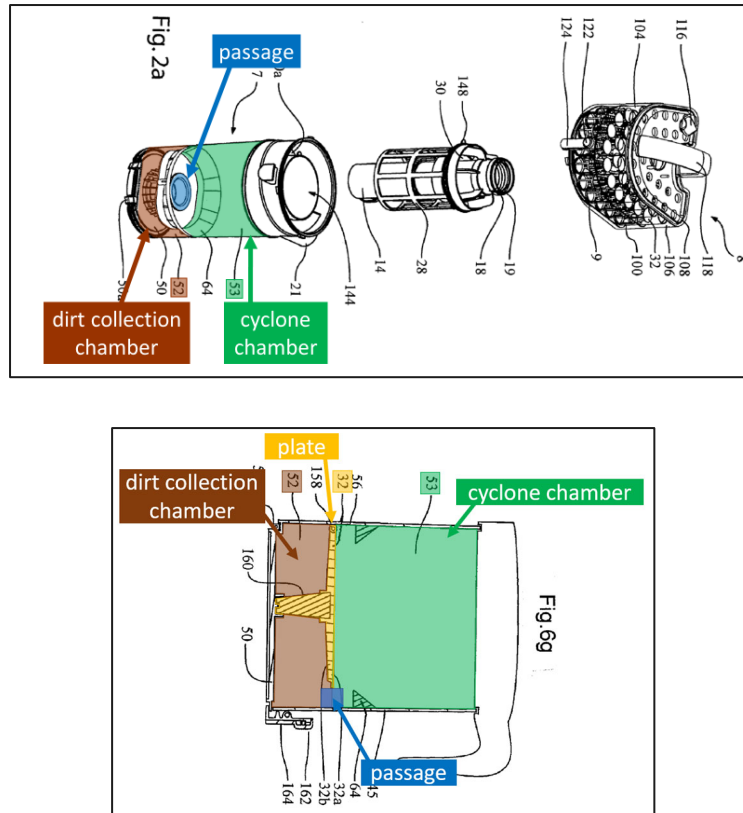
5. [5]

IPVG in combination with Conrad335 teaches claim 1 and the remaining limitations of this claim. Ex1002¶¶226–31.

Conrad335 teaches that the cyclone front end has a dirt outlet. Ex1002 ¶227. When Conrad335’s “cyclone separator 20” is incorporated with IPVG, the **front end** of Conrad335’s “**cyclone chamber 53**” is the cyclone front end, and “**plate 32**” containing a “passage” is located at that **front end**:



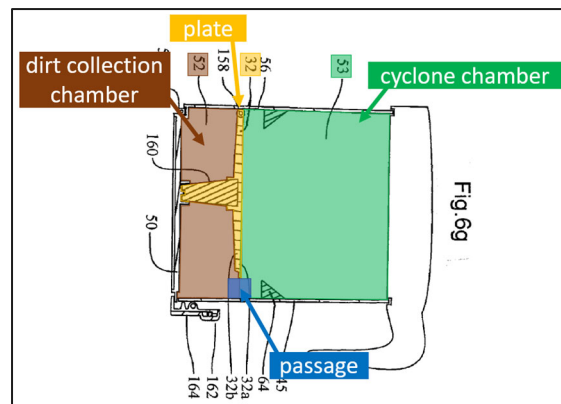
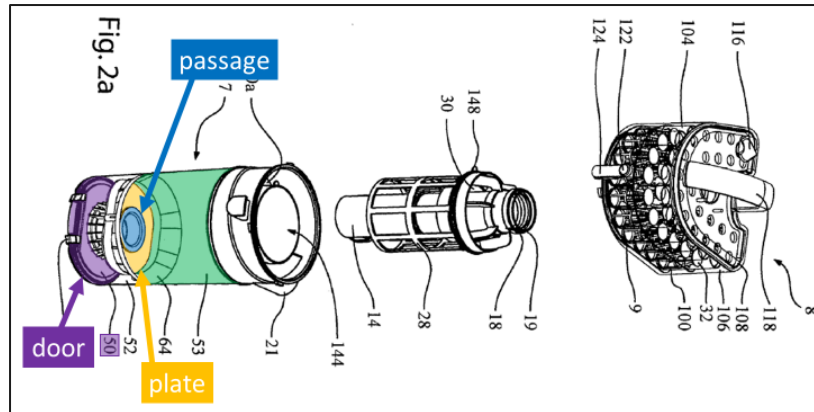
Ex1005 ¶318, Figs. 2a, 6g; Ex1002 ¶227. This “**passage**” “connect[s] the **cyclone chamber 53** in communication with the **dirt collection chamber 52**,” and may be located at a radial center of the separation plate or near a perimeter:



Ex1005 ¶324, Figs. 2a, 6g; *see also id.* ¶¶325, 327, Fig. 7b; Ex1002 ¶228.

Conrad335’s “passage that connects the cyclone chamber and the dirt collection chamber” is a cyclone dirt outlet. Ex1002 ¶229.

Conrad335 teaches a separation plate that is mounted in facing relation to the dirt outlet. Ex1002 ¶230. Conrad335’s “[p]late 32” is mounted in facing relation to the dirt outlet, as the plate faces the “passage” where dirt exits:



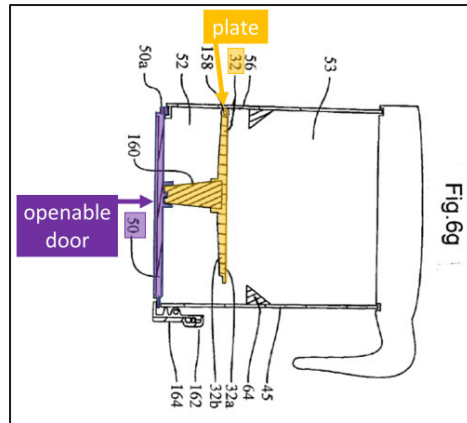
Ex1005 ¶339, Figs. 2a, 6g; *see also id.* ¶¶325, 327, Fig. 7b; Ex1002 ¶230.

A POSA would have been motivated to modify IPVG’s “screwed cover 2” with Conrad335’s openable-door teachings, including “plate 32,” and would have reasonably expected success. Ground 3, §1.

6. [6]

IPVG in combination with Conrad335 teaches claim 5 and the remaining limitations of this claim. Ex1002 ¶¶232–35.

Conrad335’s “plate 32” is mounted to “openable door [50]”:



Ex1005, Fig. 6g; Ex1002 ¶233; Ground 3, Claim 5. Conrad335 further teaches that “in one embodiment, the **plate 32** may be secured to the bottom 31 of a cyclone casing,” i.e., **bottom door 50**, as shown in Fig. 6g. Ex1005 ¶322, Fig. 6g; Ex1002 ¶234.

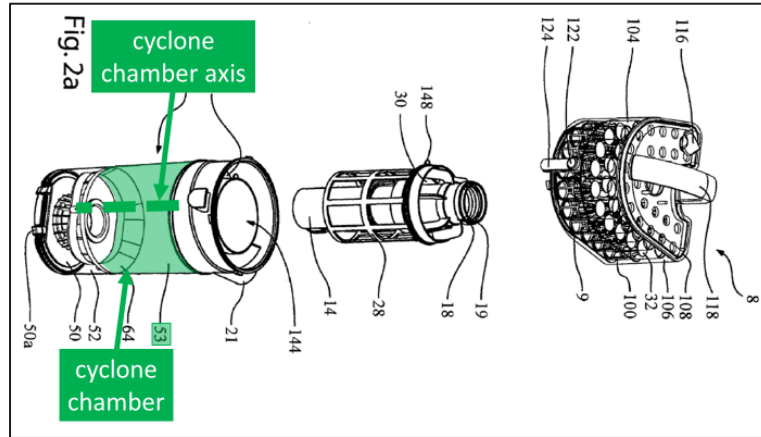
A POSA would have been motivated to modify IPVG’s “screwed cover 2” with Conrad335’s openable-door teachings, including “plate 32,” and would have reasonably expected success. Ground 3, §1.

7. [7]

IPVG in combination with Conrad335 teaches claim 1 and the remaining limitations of this claim. Ex1002 ¶¶236–42.

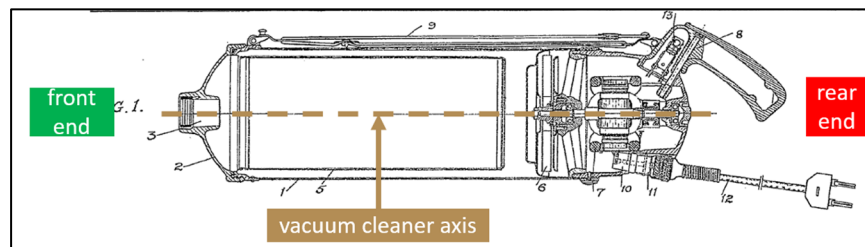
IPVG in combination with Conrad335 teaches the at least one cyclone having a cyclone axis extending longitudinally through the at least one cyclone. Ex1002 ¶237. When Conrad335’s teachings are incorporated into IPVG, Conrad335’s “openable door [50]” teachings replace IPVG’s “screwed cover 2.” Ground 3, [1a].

When so combined, Conrad335's “**cyclone chamber 53**” is at least one cyclone having a cyclone axis extending longitudinally through it:

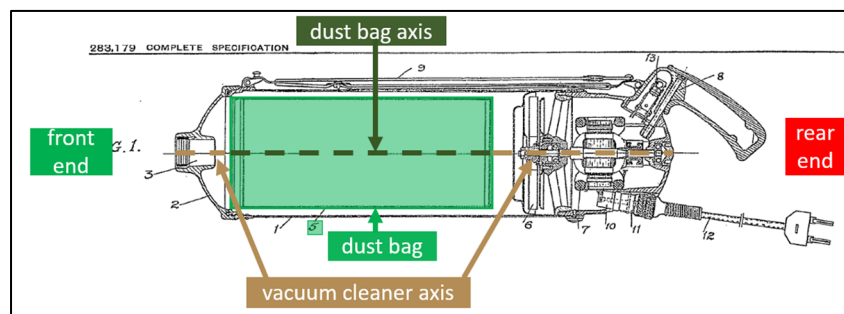


Ex1005, Fig. 2a; Ex1002 ¶237.

IPVG teaches the hand vacuum cleaner having an axis extending from the front end to the rear end:



Ex1006, Fig. 1; Ex1002 ¶238. This axis is generally parallel to the axis of IPVG's “**dust bag 5**”:



Ex1006, Fig. 1; Ex1002 ¶239. To the extent these axes are co-axial, a POSA would have understood co-axial axes are generally parallel because they extend in the same direction and maintain the same (zero) distance between them. Ex1002 ¶240.

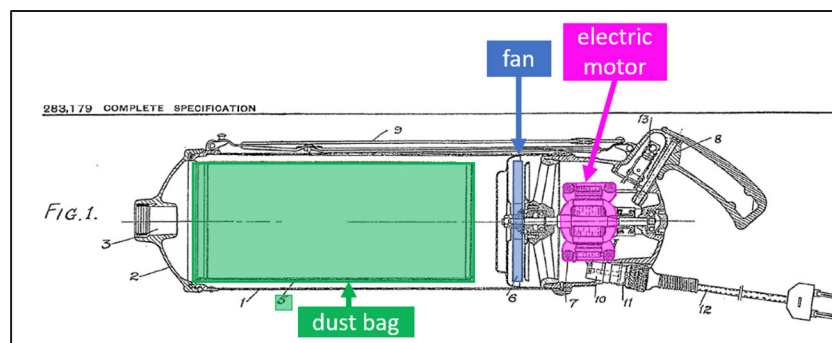
In the combined teachings of IPVG and Conrad335, Conrad335’s “openable door [50]” would substitute for IPVG’s “screwed cover 2” and Conrad335’s “cyclone separator 20” teachings would substitute for IPVG’s “dust bag 5.” Ground 3, §1. When so combined, Conrad335’s “cyclone chamber 53” axis is generally parallel to IPVG’s vacuum cleaner axis. Ex1002 ¶241.

A POSA would have been motivated to modify IPVG’s “screwed cover 2” and “dust bag 5” with Conrad335’s openable-door and cyclone-separator teachings and would have reasonably expected success. Ground 3, §1.

8. [8]

IPVG in combination with Conrad335 teaches claim 1 and the remaining limitations of this claim. Ex1002 ¶¶243–45.

IPVG’s “**dust bag 5**” is positioned forward of its “**fan 6**”/“**electric motor 7**”:



Ex1006, Fig. 1; Ex1002 ¶244.

A POSA would have been motivated to modify IPVG’s “dust bag 5” with Conrad335’s cyclone-separator teachings, oriented by lining up and substituting IPVG’s “screwed cover 2” with Conrad335’s “openable door [50]” and would have reasonably expected success. Ground 3, §1; Ex1002 ¶245. When so combined, Conrad335’s “cyclone chamber 53” is a first cyclone unit that is positioned forward of IPVG’s “electric motor 7” (which is a suction motor, Ground 3, [1e]). Ground 3, [1c]; Ex1002 ¶245.

9. [9]

IPVG in combination with Conrad335 teaches claim 1 and the remaining limitations of this claim. Ex1002 ¶¶246–49.

IPVG’s “screwed cover 2” is an openable door, Ground 3, [1d], and it is removable by removing the screws. Ex1002 ¶247.

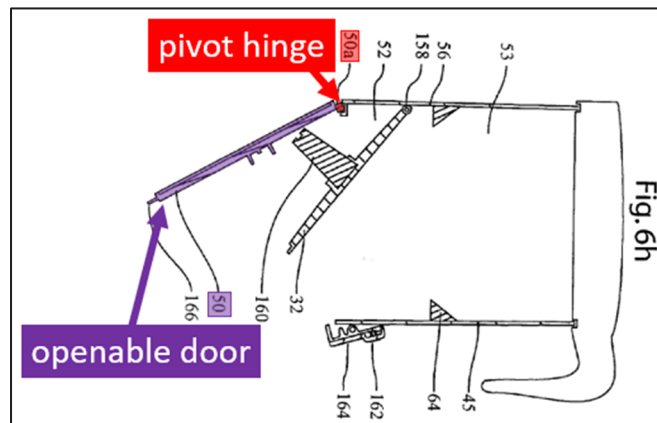
Further, in Conrad335, “the particles captured in the cyclone separator 20” can be “easily removed by ... removing the floor 50,” which is Conrad335’s “openable door [50].” Ex1005 ¶343.

A POSA would have been motivated to modify IPVG’s “screwed cover 2” with Conrad335’s “openable door [50]” and would have reasonably expected success. Ground 3, §1. The combined teachings meet this limitation because when Conrad335’s “openable door [50]” teachings are substituted for IPVG’s “screwed cover 2,” the cleaner’s door is removable. Ex1002 ¶249.

10. [10]

IPVG in combination with Conrad335 teaches claim 1 and the remaining limitations of this claim. Ex1002 ¶¶250–53.

Conrad335’s, “**openable door [50]**” “pivot[s] open about, e.g. **pivot hinges 50a**”:



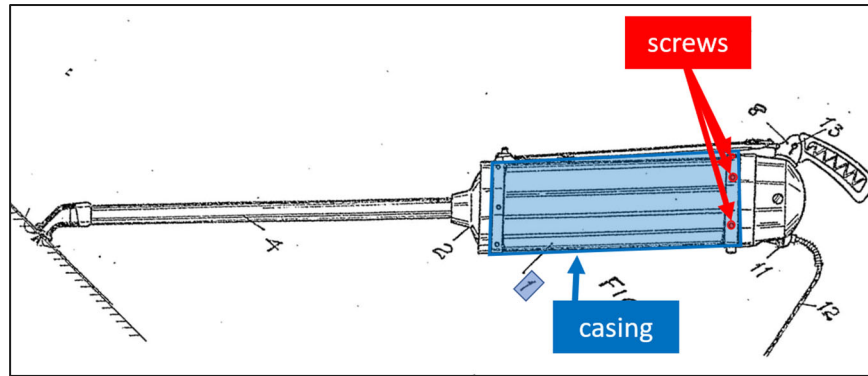
Ex1005 ¶¶147, 339; Fig. 6h; *see also id.* ¶338; Ex1002 ¶¶251–52.

A POSA would have been motivated to modify IPVG’s “screwed cover 2” with Conrad335’s openable-door teachings and would have reasonably expected success. Ground 3, §1.

11. [11]

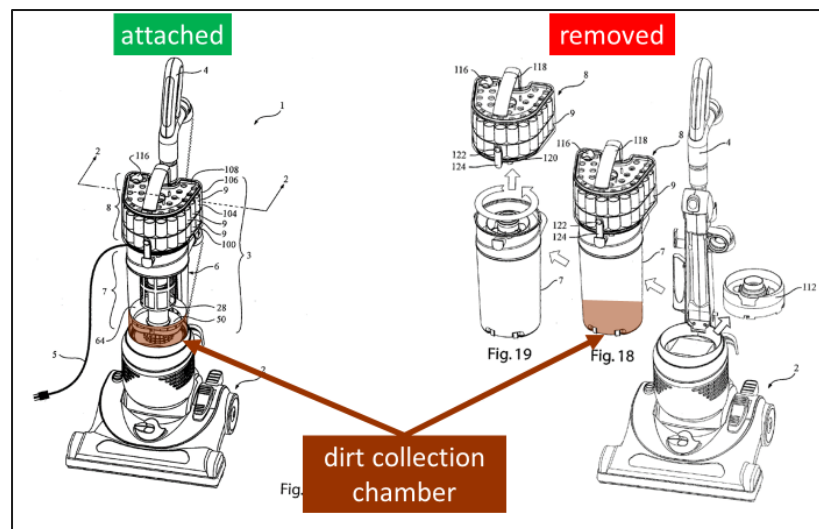
IPVG in combination with Conrad335 teaches claim 1 and the remaining limitations of this claim. Ex1002 ¶¶254–59.

IPVG’s “**casing 1**,” in which “dust bag 5” is stored, is removable from the hand vacuum cleaner by removing the **screws**:



Ex1006, Fig. 2; *see also id.*, 1:70-2:3 (describing use of “screws” in context of the handle); Ex1002 ¶¶255–56. IPVG’s “casing 1,” together with “dust bag 5” are thus a removable dirt-collection chamber. Ex1002 ¶257.

Likewise, Conrad335’s “first and second cyclonic stages 7, 8,” including their “dirt collection chamber,” “may be removed at the same time” “so they may be transported to a garbage can or the like for emptying.” Ex1005 ¶¶177, 350. Conrad335 depicts the **dirt-collection chamber** being removable from a cleaner:



Ex1005, Figs. 1, 18-19; Ex1002 ¶258.

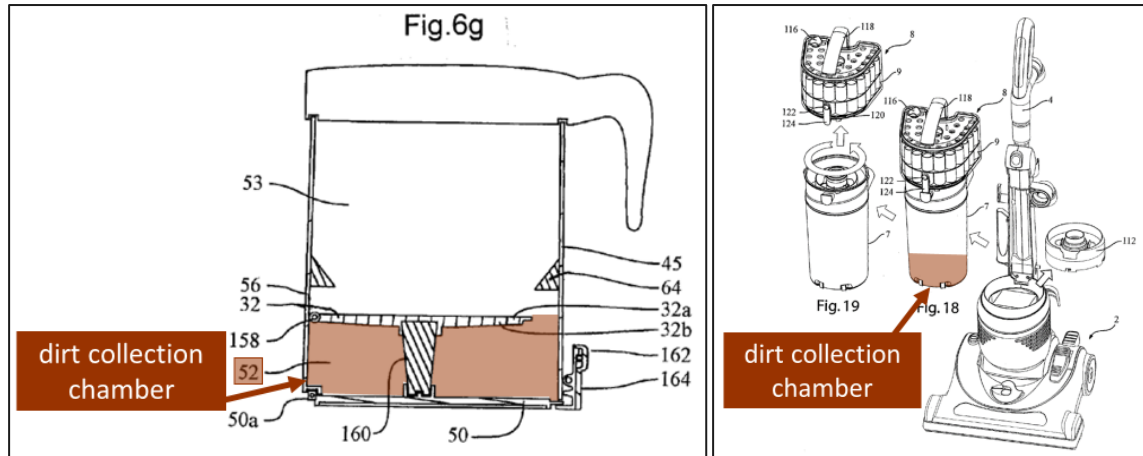
This limitation is met when Conrad335's teachings are incorporated with IPVG's, either by using IPVG's screws or Conrad335's cyclonic-separator connection-and-release mechanism, which a POSA would have been motivated to do and would have reasonably expected success doing. Ground 3, §1; Ex1002 ¶259.

12. [12]

IPVG in combination with Conrad335 teaches claim 1 and the remaining limitations of this claim. Ex1002 ¶¶260–63.

IPVG's dirt-collection chamber is removable from the hand vacuum cleaner. Ground 3, Claim 11. Further, IPVG's dirt-collection chamber is removable as a sealed unit for emptying, including because when IPVG's "casing 1" is unscrewed at the rear, it is still "closed at the front end by a screwed cover 2," and because IPVG uses a "dust bag 5," which a POSA would have understood is removed from IPVG as a sealed unit for emptying. Ex1006, 1:51-57, Fig. 2; Ex1002 ¶261.

Likewise, Conrad335's dirt-collection chamber is removable from the hand vacuum. Ground 3, Claim 11. When Conrad335's dirt-collection chamber is removed, it is a sealed unit:



Ex1005, Figs. 6g, 18; Ex1002 ¶¶262–63. Further, in Conrad335, the “first cleaning stage comprises a cyclonic cleaning unit that is sealed when removed from the surface cleaning apparatus other than fluid flow passages leading to and from the cyclones.” Ex1005 ¶186.

This limitation is met when Conrad335’s teachings are incorporated with IPVG’s, because the dirt-collection chamber remains removable from the surface-cleaning apparatus as a sealed unit for emptying, and a POSA would have been motivated to make this combination and would have reasonably expected success. Ground 3, §1; Ex1002 ¶263.

13. [13]

IPVG in combination with Conrad335 teaches claim 12 and the remaining limitations of this claim. Ex1002 ¶¶264–65.

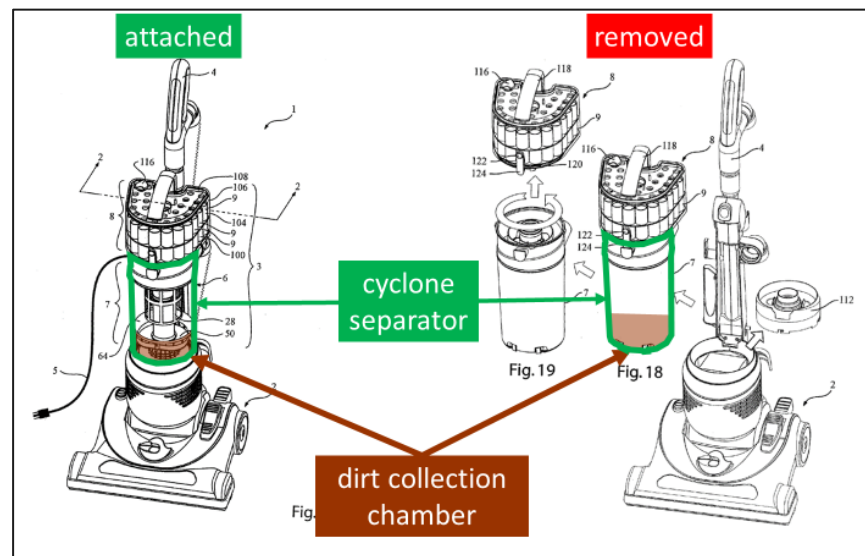
In Conrad335, the “first cleaning stage comprises a cyclonic cleaning unit that is sealed when removed from the surface cleaning apparatus other than fluid flow passages leading to and from the cyclones.” Ex1005 ¶186.

This limitation is met when Conrad335’s teachings are incorporated with IPVG’s, which a POSA would have been motivated to do and would have reasonably expected success doing. Ground 3, §1; Ex1002 ¶265.

14. [14]

IPVG in combination with Conrad335 teaches claim 1 and the remaining limitations of this claim. Ex1002 ¶¶266–68.

Conrad335’s “**dirt collection chamber 52**” is removable from the hand vacuum with its “**cyclone separator**”:



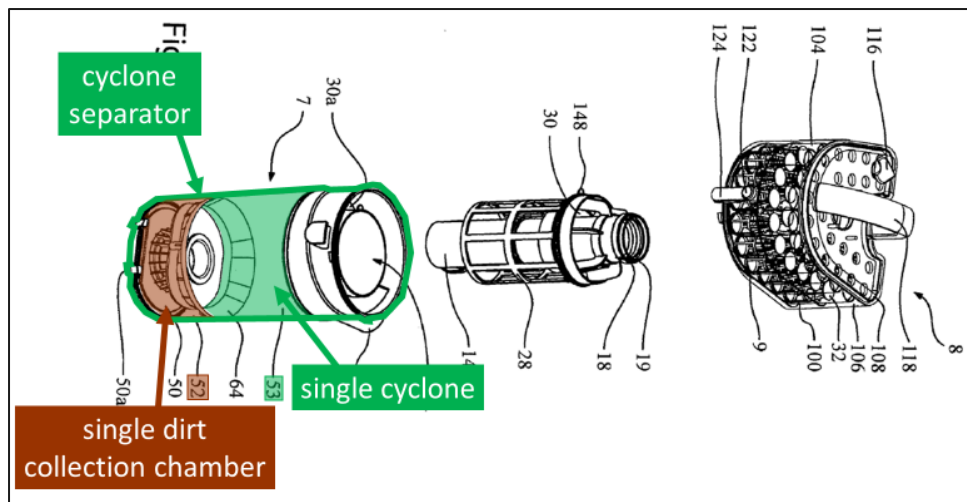
Ex1005, Figs. 1, 18-19; Ex1002 ¶267.

This limitation is met when Conrad335’s teachings are incorporated with IPVG’s, which a POSA would have been motivated to do and would have reasonably expected success doing. Ground 3, §1; Ex1002 ¶¶268.

15. [15]

IPVG in combination with Conrad335 teaches claim 1 and the remaining limitations of this claim. Ex1002 ¶¶269–73.

Conrad335’s “**cyclone separator 20**” has a **single cyclone** and a **single dirt collection chamber**:



Ex1005, Fig. 2a; Ex1002 ¶¶270–72; *see also* Ground 1, [1c]. Further, Conrad335’s “[m]ain casing 3 has a cyclonic cleaning unit 6 comprising a first cyclonic cleaning stage 7 comprising a single cyclone.” Ex1005 ¶274.

A POSA would have been motivated to modify IPVG’s “dust bag 5” with Conrad335’s cyclone-separator teachings and would have reasonably expected success. Ground 3, §1.

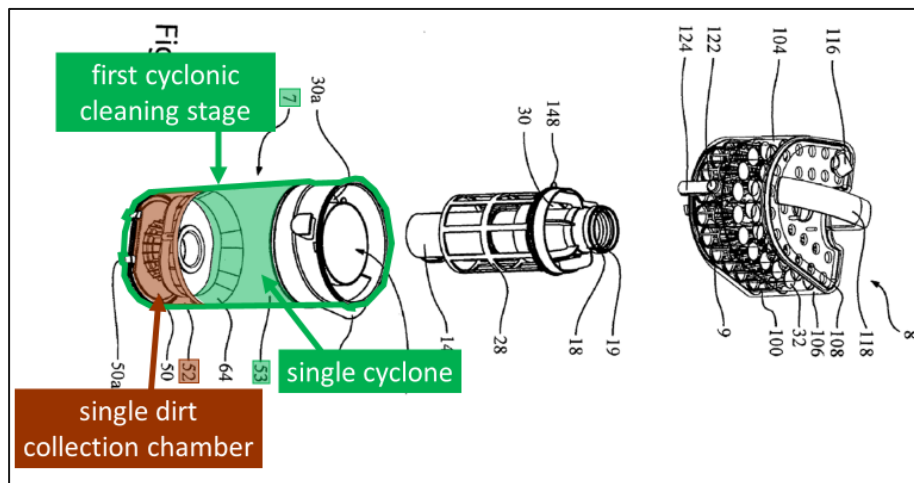
16. [16]

IPVG in combination with Conrad335 teaches claim 15 and the remaining limitations of this claim for the reasons explained for [1c]. *See* Ground 3, [1c]; Ex1002 ¶¶274–75.

17. [17]/[18]

IPVG in combination with Conrad335 teaches claim 16 and the remaining limitations of these claims. Ex1002 ¶¶276–81.

Conrad335’s “**first cyclonic cleaning stage 7**” is a single cyclone and single dirt-collection chamber comprising a one-piece assembly that is integrally formed:



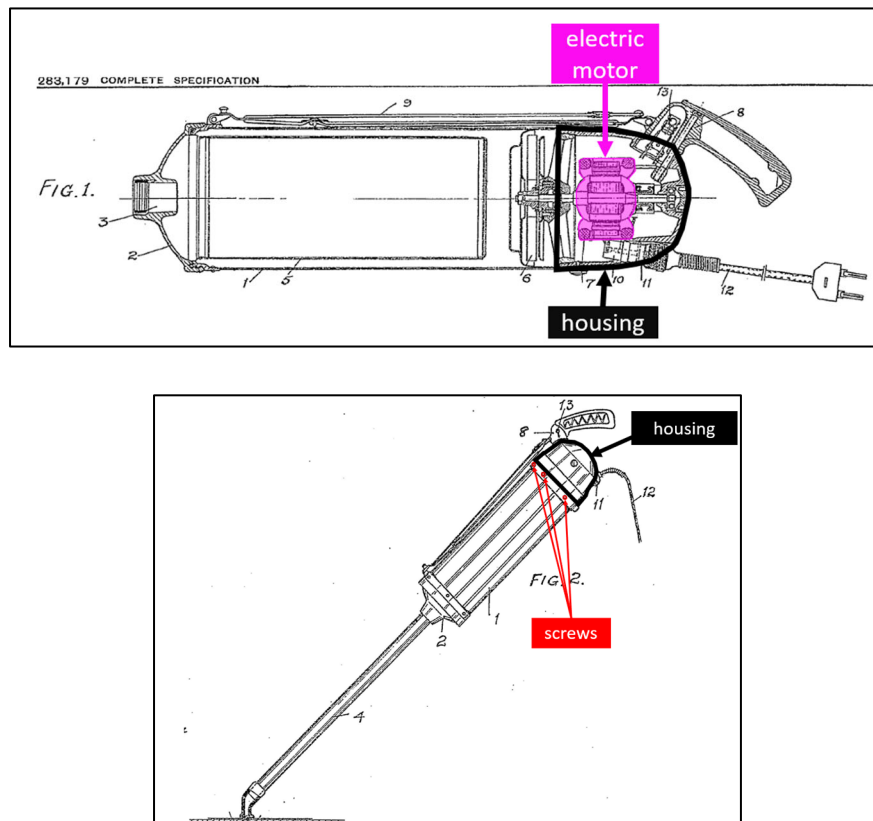
Ex1005, Fig. 2a; Ex1002 ¶¶278–80; *see also* Ex1005 ¶134 (“Each cyclone and associated dirt collection chamber is integrally molded from transparent plastic”).

A POSA would have been motivated to modify IPVG’s “dust bag 5” with Conrad335’s cyclone-separator teachings and would have reasonably expected success. Ground 3, §1.

18. [19]

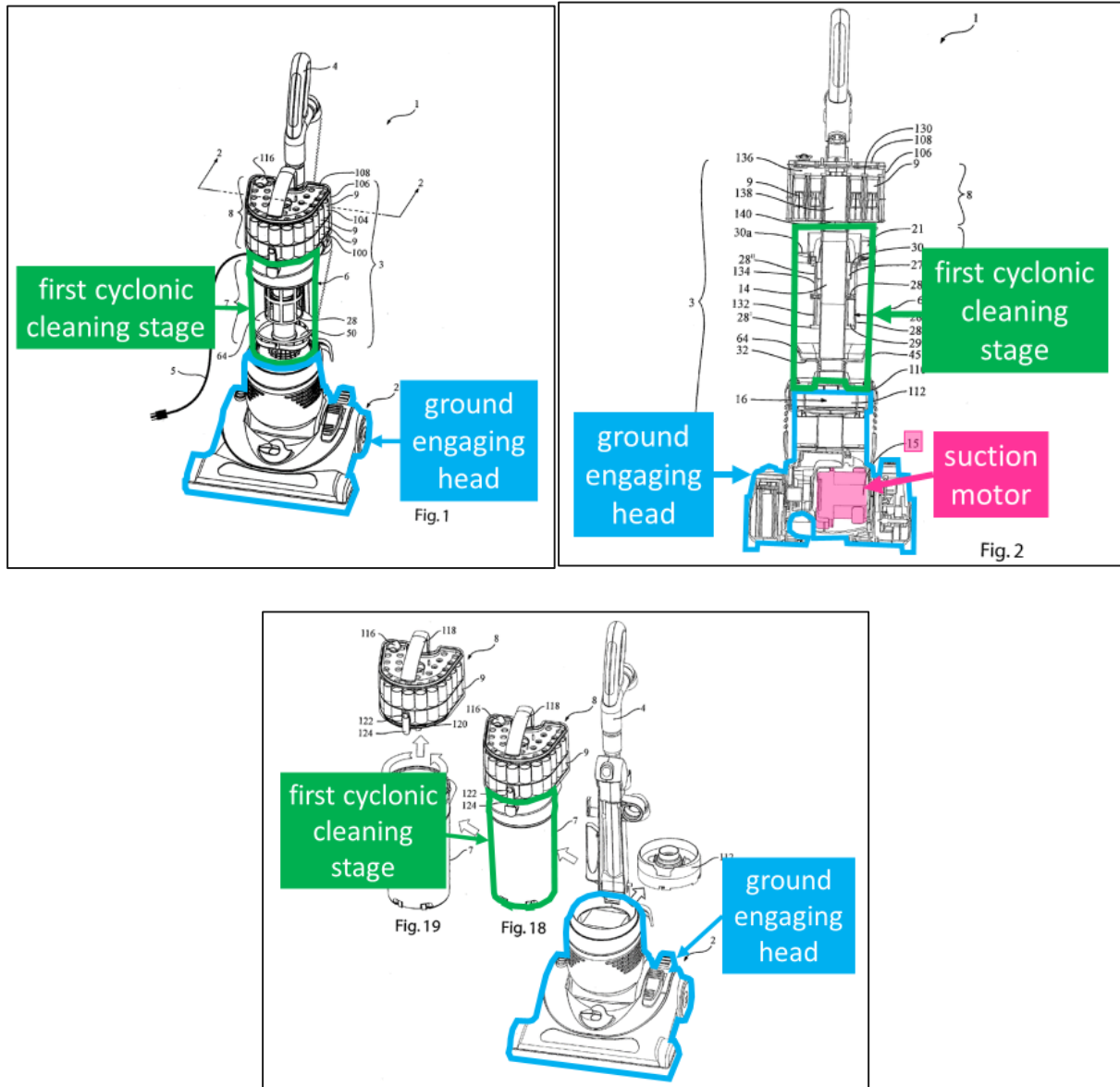
IPVG in combination with Conrad335 teaches claim 1 and the remaining limitations of this claim. Ex1002 ¶¶282–87.

IPVG’s “**electric motor 7**” is housed in a **housing** that is removably mounted by “**screws**”:



Ex1006, 1:51-57, Figs. 1-2; *see also id.*, 1:77-79; Ex1002 ¶¶283–84. A POSA would have understood the above-identified **housing** surrounds, houses, and supports IPVG’s “**electric motor 7**” and therefore that IPVG’s dirt-separation unit is removably mounted to the suction motor housing. Ex1002 ¶285.

Further, Conrad335 teaches that “**first cyclonic cleaning stage 7**” is removably mounted to “**ground engaging head 2**,” which a POSA would have understood is a suction motor housing at least because it surrounds, houses, and supports Conrad335’s “**suction motor 15**”:



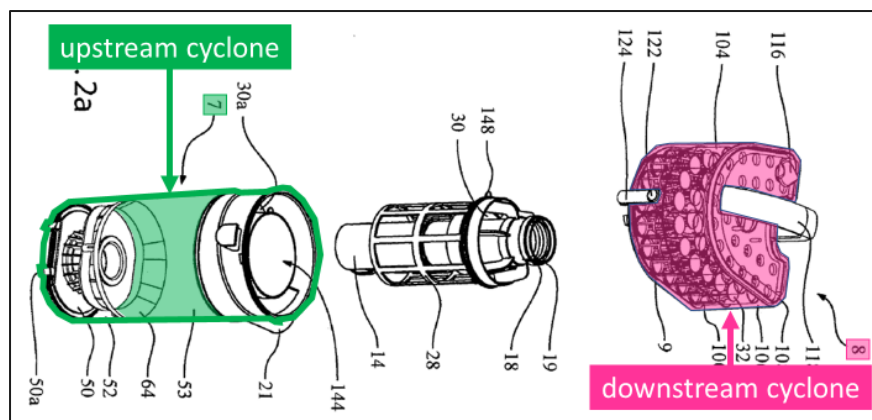
Ex1005, ¶274, Figs. 1-2, 18-19; Ex1002 ¶286.

This limitation is met when Conrad335’s teachings are incorporated with IPVG’s, which a POSA would have been motivated to do and would have reasonably expected success doing. Ground 3, §1; Ex1002 ¶287.

19. [20]

IPVG in combination with Conrad335 teaches claim 1 and the remaining limitations of this claim. Ex1002 ¶¶288–91.

In Conrad335, “the outlet from an **upstream cyclone** is connected in fluid communication with the inlet to a **downstream cyclone**”:



Ex1005 ¶62, Fig. 2a; Ex1002 ¶289. Further, Conrad335 teaches a “first cyclonic cleaning stage 7 comprising a single cyclone and a second cyclonic cleaning stage 8 comprising a plurality of cyclones 9 in parallel.” Ex1005 ¶274. Conrad335’s “second cyclonic cleaning stage 8,” which is its “downstream cyclone,” is a second cyclone unit downstream from the first cyclone unit. Ex1002 ¶290.

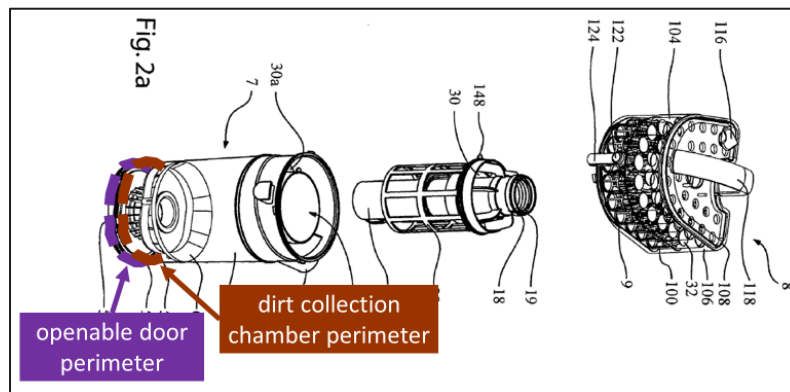
A POSA would have been motivated to modify IPVG's "dust bag" with Conrad335's cyclonic-separator teachings, including Conrad335's "second cyclonic cleaning stage 8," and would have reasonably expected success. Ground 3, §1.

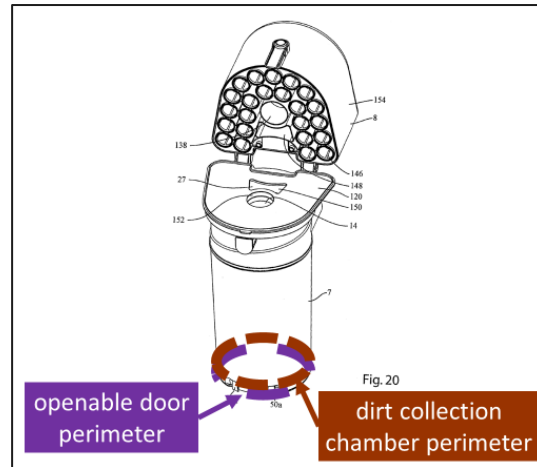
20. [21]

IPVG in combination with Conrad335 teaches claim 1 and the remaining limitations of this claim. Ex1002 ¶¶292–95.

Conrad335's at least one cyclone has a cyclone axis extending longitudinally through it. Ground 3, Claim 7.

Conrad335's "**dirt collection chamber 53**" has a perimeter that is generally the same as the perimeter of Conrad335's "**openable door [50]**":





Ex1005, Figs. 2a, 20; Ex1002 ¶¶293–94.

A POSA would have been motivated to modify IPVG’s “screwed cover 2” and “dust bag 5” with Conrad335’s openable-door and cyclone-separator teachings and would have reasonably expected success. Ground 3, §1. When so modified, Conrad335’s “dirt collection chamber 53” perimeter is at the front end. Ex1002 ¶295.

21. [22]

IPVG in combination with Conrad335 teaches claim 1 and the remaining limitations of this claim. Ex1002 ¶¶296–97.

For the reasons explained for [1d], IPVG’s “screwed cover 2” and Conrad335’s “openable door [50]” are each a front wall that is the openable door, and their combined teachings meet this limitation. Ground 3, [1a]; Ex1002 ¶297.

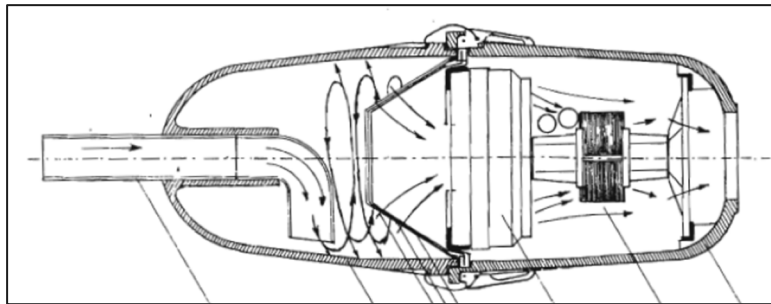
D. Ground 4: Martelliere in Combination with IPVG Renders Claims 23-24 Obvious

To the extent PO argues that Martelliere does not anticipate claims 23 and 24, Martelliere in combination with IPVG renders them obvious. Ex1002 ¶¶298–313.

1. Motivation to Combine Martelliere and IPVG

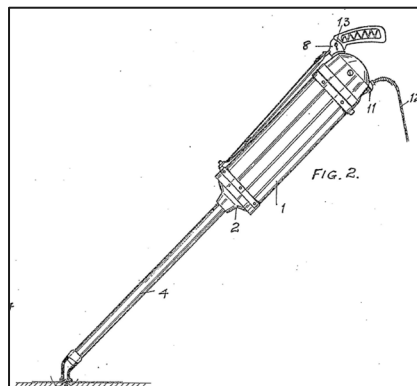
a. Scope and Content of Prior Art

Martelliere teaches a “broom type vacuum cleaner model, where the device is held vertically or slightly inclined” that uses “the ‘Whirlwind’ principle” and a “sieve filter *b*” to filter dust from air:



Ex1010, 1, Fig. 1.

IPVG teaches a hand/stick vacuum cleaner:



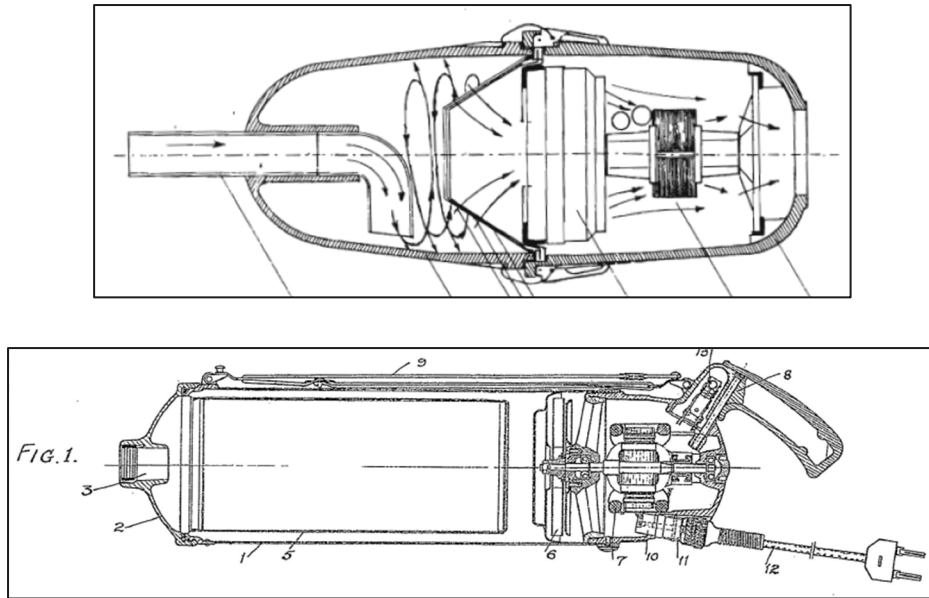
Ex1006, Fig. 2; Ground 3, §1.

b. Motivation To Combine

A POSA would have been motivated to combine Martelliere’s cyclonic-separation teachings with IPVG. Ex1002 ¶¶302–08.

A POSA reading IPVG—including its teaching that a “dust bag *or like member* through which the air stream passes” may be used as an air-filtration unit (Ex1006, 1:22-33)—would have been motivated to incorporate Martelliere’s teachings of “the ‘Whirlwind’ principle” (i.e., cyclonic filtration) as one such “like member” for its many known advantages, including advantages Martelliere explicitly teaches, and would have reasonably expected success. Ground 3, §1; Ex1010, 1; Ex1002 ¶¶302–03. Martelliere and IPVG are also analogous art—each teach vacuum cleaners with very similar layouts. Ex1002 ¶304.

This combination would have involved a simple substitution of known elements for others to obtain predictable results. Ex1002 ¶305; *see also* Ground 3, §1.b. IPVG teaches a cleaner having a dust-separation unit with a door covering one end that opens with a screw. Ex1006, Fig. 1. Martelliere likewise teaches a dust-separation unit with a door covering one end that detaches and pivots open with a latch. Ex1010, Fig. 1. A POSA would have understood the simple substitution of these separation units would achieve the predictable results of filtering air. Ex1002 ¶¶305–07. Further, as depicted below, Martelliere and IPVG depict a cleaner having a similar size, shape, and orientation:



Ex1010, Fig. 1; Ex1006, Fig. 1; Ex1002 ¶¶305–07.

It would have been obvious to at least try this combination. Ex1002 ¶308. A POSA would have understood there are a finite number of identified dust-separation solutions, including dust bags (as IPVG teaches) and cyclonic separators (as Martelliere teaches), and would have been motivated to select cyclonic separation as taught by Martelliere to achieve its known benefits. Ex1002 ¶308.

c. Reasonable Expectation of Success

A POSA would have reasonably expected success implementing Martelliere’s cyclonic cleaner using IPVG’s hand-stick cleaner teachings. Ex1002 ¶¶309–10. Martelliere teaches that its cyclonic-filtration unit can be used with a “broom type vacuum cleaner model,” such as IPVG’s hand-stick cleaner. Ex1010, 1. IPVG teaches that its dust-separation unit can be “a dust bag or like member,” and such “like member[s]” include Martelliere’s cyclonic-filtration unit. Ex1006, 1:22-33,

claim 1. A POSA would have had at least a reasonable expectation of success in making this simple substitution. Ex1002 ¶¶309–10; *see also* Ground 3, §1.c.

2. Martelliere and IPVG Render Obvious a Hand Vacuum Cleaner ([23pre]/[24pre])

Martelliere and IPVG each teach a hand vacuum cleaner. Ground 1, [23pre]/[24pre]; Ground 3, [1pre]/[23pre]/[24pre]/[25pre]. A POSA would have been motivated to combine Martelliere and IPVG and would have reasonably expected success. Ground 4, §1. The combined teachings meet these limitations because IPVG remains a hand vacuum cleaner once its dust bag is replaced with Martelliere’s cyclonic air-filtration unit. Ex1002 ¶311.

3. Martelliere and IPVG Render Obvious the Door Limitations ([23d]/[24d]/[23f])

IPVG teaches that its dirt-collection chamber has an openable door, and that its front wall comprises the openable door, which is openable when its dirt-collection chamber is mounted to the hand vacuum cleaner. Ground 3, [1a]/[1d], [23f]. A POSA would have been motivated to combine Martelliere and IPVG and would have reasonably expected success. Ground 4, §1. The combined teachings meet these limitations; substituting Martelliere’s cyclonic air-filtration teachings would not impact IPVG’s door. Ground 4, §1; Ex1006, Fig. 2; Ex1010, Fig. 1; Ex1002 ¶312.

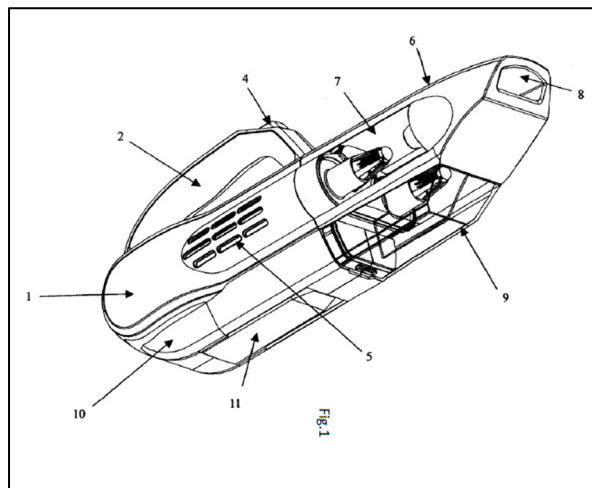
Further, it would have been obvious to modify IPVG’s door to include a hinge. Ex1002 ¶313. A POSA would have found this modification at least obvious to try,

as hinges were one of a finite number of commonly known ways to open a door, and because Martelliere teaches such a hinge (Martelliere's latches). Ground 1, [23d]; Ex1002 ¶313. A POSA would have understood substituting IPVG's screws for a hinge would permit fast, convenient, and hygienic dust emptying because a user could hold IPVG's vacuum cleaner over a trashcan and release the openable door, rather than having to remove each screw on "screwed cover 2," during which dirt could spill. Ex1002 ¶313. A POSA would have reasonably expected success because it would have involved the simple substitution of well-known parts, and because Martelliere already teaches such a mechanism. Ex1002 ¶313.

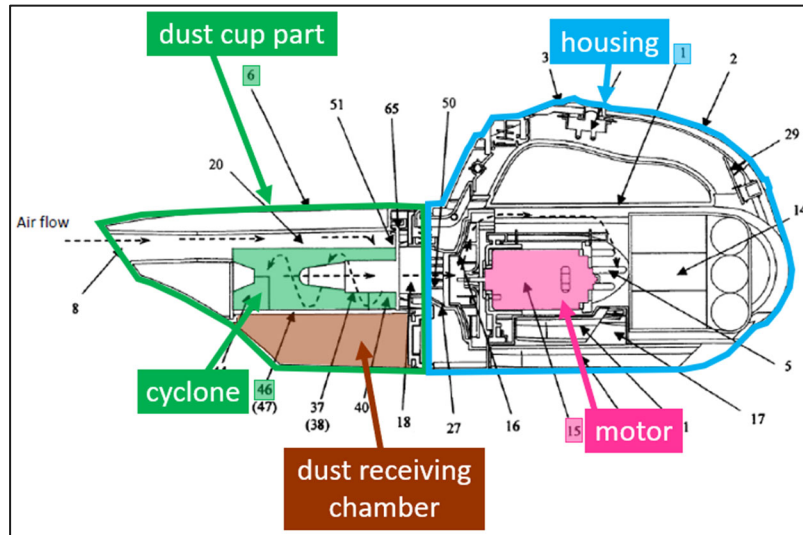
E. Ground 5: Jianan in Combination with Khalil Renders Claims 1-25 Obvious

1. Motivation to Combine Jianan and Khalil

Jianan teaches an "improved handheld vacuum cleaner" with an "efficient cyclone effect, a clean and convenient dust removal process, and constant suction performance":



Ex1013, 4, Fig. 1. Jianan's vacuum "includes a **housing** and a **dust cup part**," the housing has a "**motor**," and the dust cup part has a "cyclone body ... with two parallel **cyclones** and separate **dust receiving chambers**":

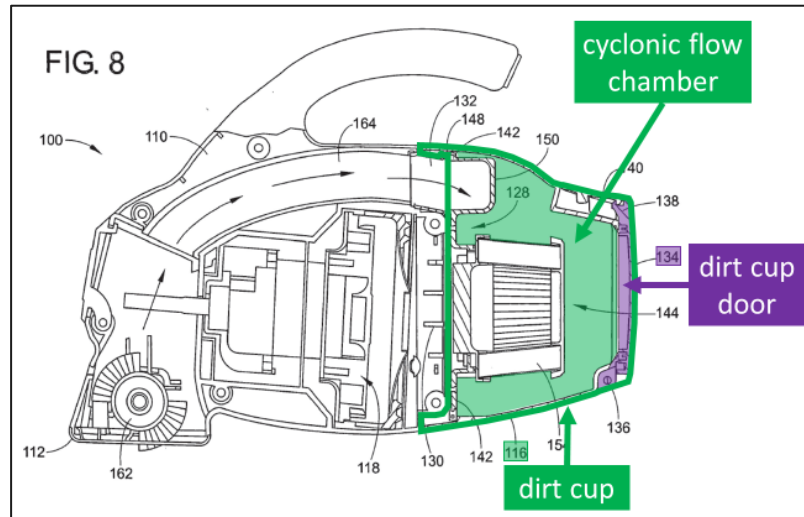


Ex1013, 4, Fig. 3; Ex1002 ¶316.

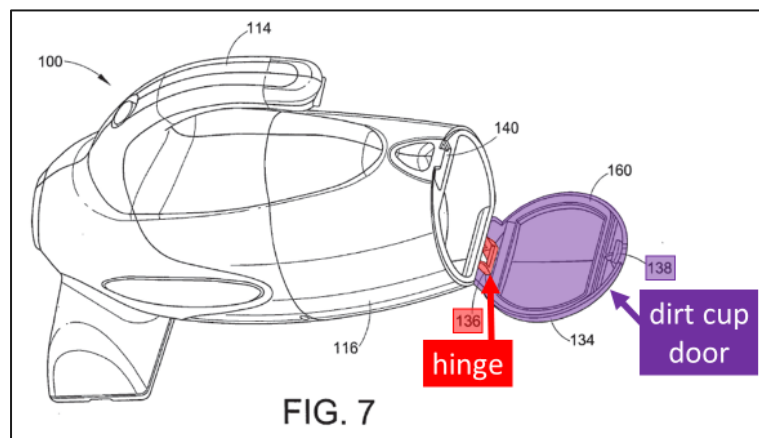
To empty the dust-collection chamber, one "separate[s] the dust cup 6 from the main housing 1" and empties dirt through "dust collection chamber opening 35," or uses "an opening and closing device" "that replaces the dust collection chamber opening 35," such as a "movable door on the dust collection chamber 9." Ex1013, 10, claim 3. However, Jianan does not specify further implementation details for its dust-collection chamber's "movable door." *Id.*

Khalil teaches a "hand-held vacuum cleaner," which "includes a **dirt cup** [116]" that is "detachable from the housing," a "**dirt cup door** [134]," and a

“**cyclonic flow chamber**,” which is “the volumetric space between the filter support plate 142 and the dirt cup door 134”:



Ex1014, Abstract, ¶29, Fig. 8; Ex1002 ¶318. The “**dirt cup door 134** ... pivot[s] downward about the **hinge 136**” for “convenient ... emptying”:



Ex1014 ¶¶27, 29, Fig. 7; Ex1002 ¶319.

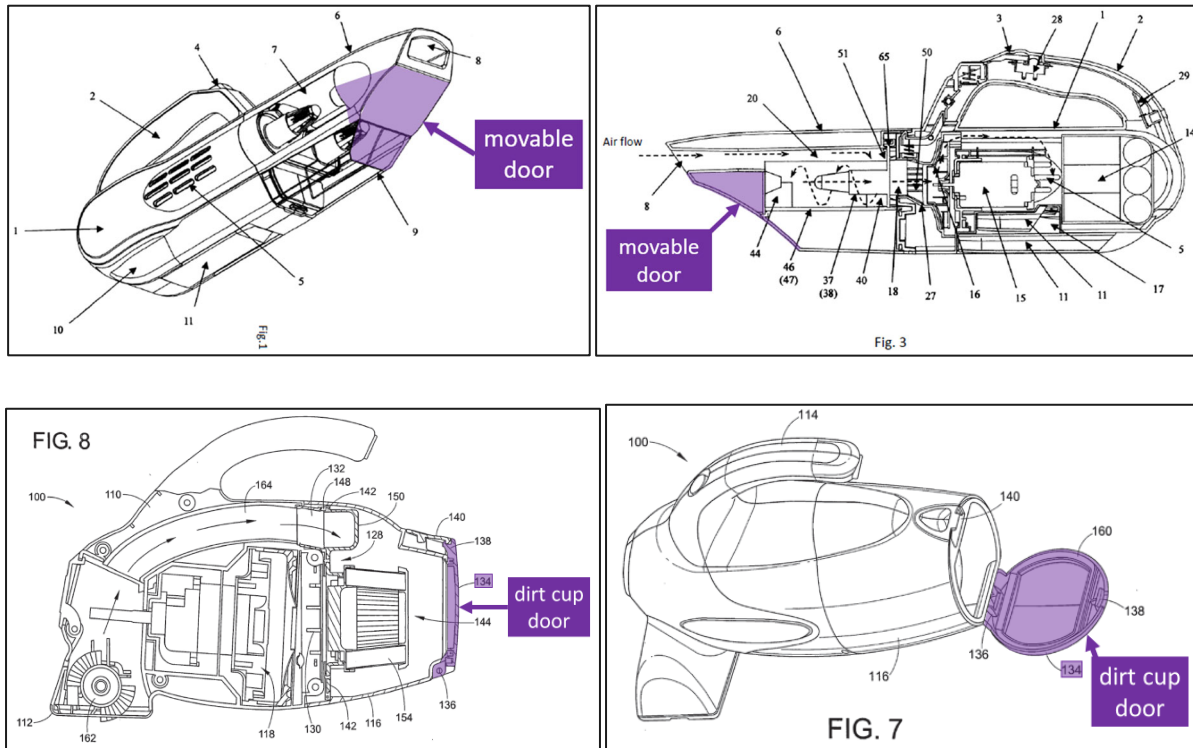
A POSA would have been motivated to combine Jianan and Khalil. Ex1002 ¶¶320–23. Jianan teaches “a clean and convenient dust removal process,” involving a “movable door on the dust collection chamber,” but does not provide

implementation details for that movable door. Ex1013, 4, 10. A POSA would have looked to references teaching implementation details for movable doors on dust-collection chambers in handvacs to enable Jianan's goal of providing "a clean and convenient dust removal process." *Id.*; Ex1002 ¶320. Khalil is one such reference; it provides implementation details on a "dirt cup door" that "pivot[s] downward about [a] hinge" to "provid[e] a convenient method of emptying the dirt cup" for a "cyclonic flow chamber" in a hand vacuum. Ex1014 ¶¶27, 29, Fig. 7; Ex1002 ¶320. The fact that both Jianan and Khalil teach solving the same problem ("convenient" dust removal processes in handvacs, Ex1013, 4; Ex1014 ¶27) would further motivate a POSA to combine their teachings and would give a POSA a reasonable expectation of success. Ex1002 ¶320.

Khalil is analogous art. Ex1002 ¶321. Like Jianan, Khalil teaches a "hand-held vacuum cleaner" with a "dirt cup" that is "detachable from the housing," a "cyclonic flow chamber," and a "dirt cup door" that "provides a convenient method of emptying the dirt cup." Ex1014, Abstract, ¶27, Figs. 7-8. Further, Khalil and Jianan both teach concepts that were well-known to POSAs at the time of the '407Patent's alleged invention. Ex1013, cover; Ex1014, cover.

To implement Jianan's "movable door on the dust collection chamber" teachings, a POSA would have substituted Khalil's detailed dirt-cup door teachings

of using an end-wall as a door, including its hinged door-opening mechanism, for the front wall of Jianan's hand vacuum cleaner (where Jianan's dirt cup is located):



Ex1013, 10, claim 3, Figs. 1, 3; Ex1014 ¶¶27, 33, Figs. 7-8; Ex1002 ¶322.

A POSA would have found this substitution at least obvious to try, as hinges were commonly known ways to open doors, and were one of a finite number of identified, predictable solutions for implementing a “movable door” as Jianan teaches, including screwing the door on or sliding it into place. Ex1002 ¶323. Further, pivotable, hinged doors were well-known for predictably and easily opening a door. Ex1002 ¶323. A POSA would have understood that a pivotable, hinged door, as Khalil teaches, would permit fast, convenient, and hygienic dust emptying because a user could hold Jianan's handvac over a trashcan and release the openable

door, rather than having to remove the entire dirt-collection chamber and carry it to a trashcan, during which dirt could spill. Ex1002 ¶323.

A POSA would have reasonably expected success incorporating Khalil's openable door into Jianan's cleaner because it would have involved this simple substitution of well-known parts, and because of the many similarities between Khalil's and Jianan's teachings. Ex1002 ¶324. Indeed, both Jianan's "dust cup part" and Khalil's "dirt cup" have an end with a "dust collection chamber opening," *see* Ex1013, 10; Ex1014 ¶¶27, 33, and both Jianan's "movable door" and Khalil's "dirt cup door" cover the opening and enable "clean and convenient dust removal," *see* Ex1013, 4, 10; Ex1014 ¶¶27, 33; Ex1002 ¶324.

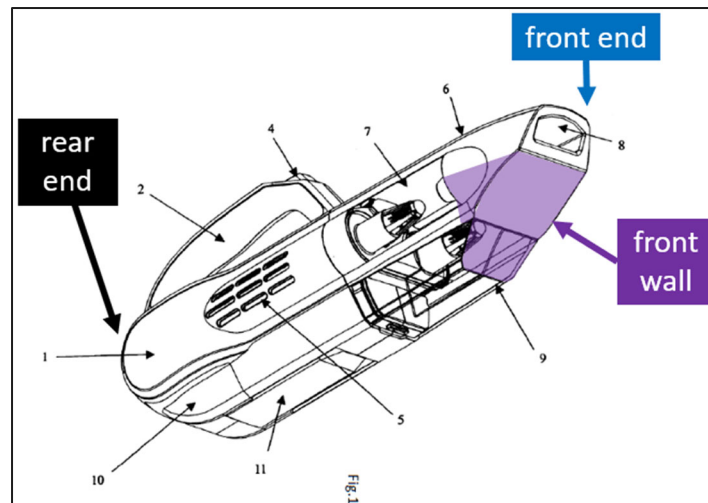
2. [1]/[23]/[24]/[25]

a. [1pre]/[23pre]/[24pre]/[25pre]

To the extent the preambles are limiting, Jianan teaches them. Ex1002 ¶¶325–26. Jianan teaches a "handheld vacuum cleaner." Ex1013, Abstract.

b. [1a]/[23a]/[24a]/[25a]

Jianan teaches these limitations. Ex1002 ¶¶327–28. Jianan's **front wall** is positioned underneath an "air inlet channel opening 8 located at the **front end** of the dust cup 6," opposite the **rear end**:

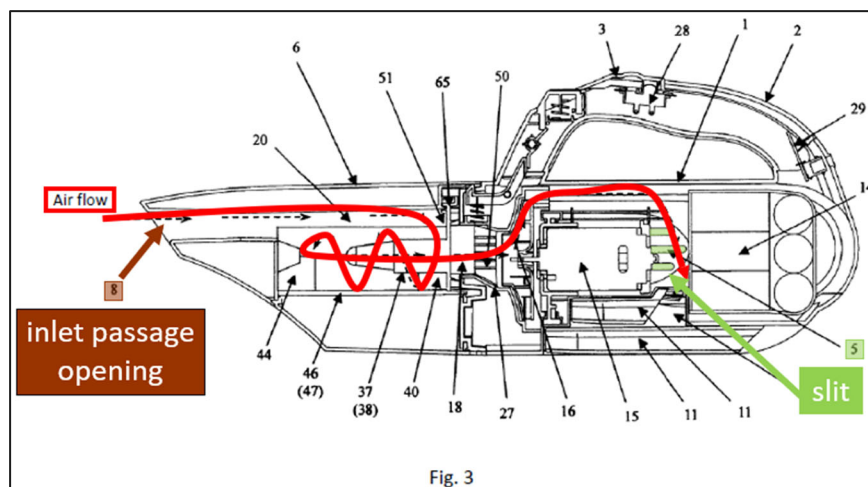


Ex1013, 7, Fig. 1; Ex1002 ¶¶327–28.

c. [1b]/[23b]/[24b]/[25b]

Jianan teaches these limitations. Ex1002 ¶¶329–31.

In Jianan, **air flows** into “**inlet passage opening 8**,” “through the air inlet passage 20 into the cyclone 46,” “into the main housing 1,” past the “motor 15,” where it “cool[s] the components,” and is “discharged from the housing through **slit 5**”:

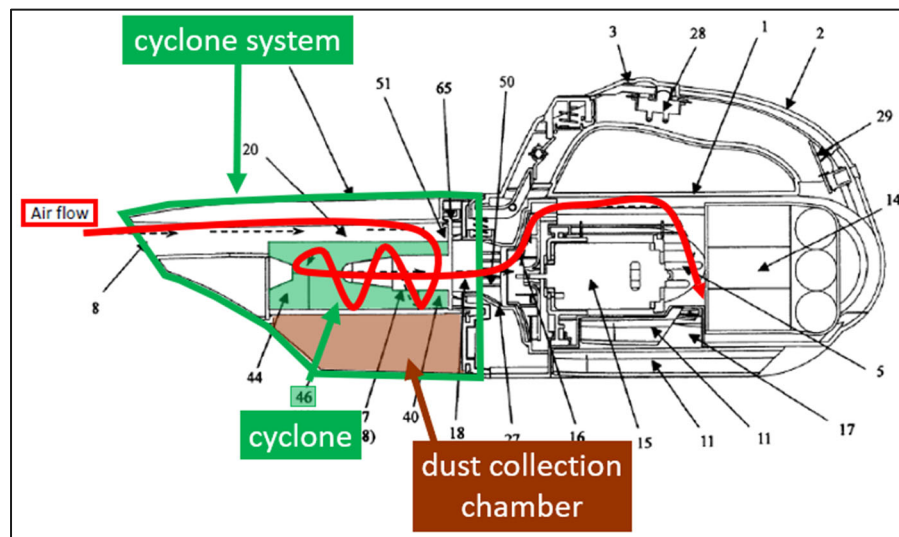


Ex1013, 8, Fig. 3; Ex1002 ¶¶330. Jianan’s “inlet passage opening 8” is a dirty air inlet; “slit 5” is a clean air outlet; and an airflow passage extends between them. Ex1002 ¶331.

d. [1c]/[23c]/[24c]/[25c]

Jianan in combination with Khalil teaches these limitations. Ex1002 ¶¶332–35.

Jianan teaches a first cyclone unit positioned in the airflow passage, the first cyclone unit comprising at least one cyclone and at least one dirt-collection chamber, and for [1c], at least one dirt-collection chamber external to the cyclone chamber: Jianan’s “**cyclone system**” with “**cyclone 46**” is “designed to collect dust 39 in an *independent dust collection chamber 9*” and is positioned in the **airflow passage**:



Ex1013, 10, Fig. 3; Ex1002 ¶¶333. “Since most of the dust collects in a *separate* dust receiving chamber, there is no need to clean the filter after each use.” Ex1013, 5. Jianan’s “cyclone system” is a first cyclone unit positioned in the airflow passage

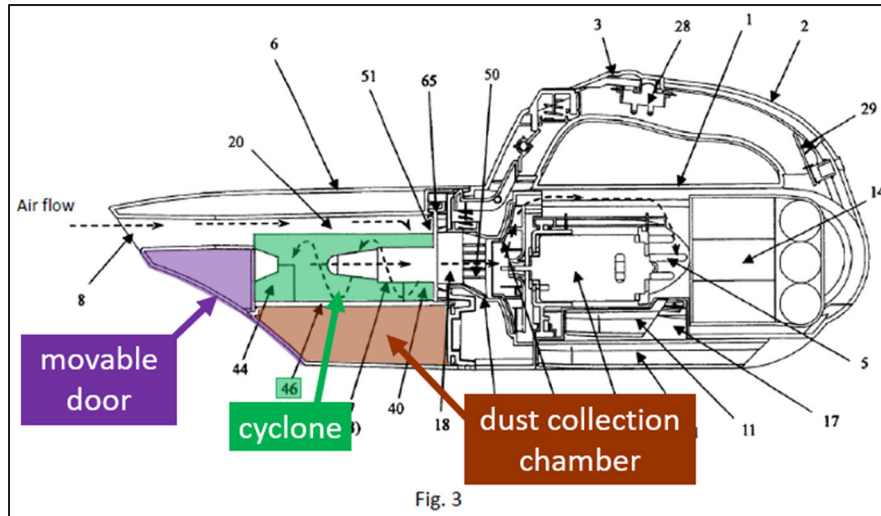
and Jianan's "dust collection chamber 9" is a dirt-collection chamber external to the cyclone chamber. Ex1002 ¶334.

Further, Khalil teaches a "cyclonic flow chamber" wherein separated "particles accumulate in or near the bottom and rear portions of the dirt cup 116." Ex1014 ¶¶29, 34. Khalil's "cyclonic flow chamber," positioned within "dirt cup 116," comprises a cyclone and a dirt-collection chamber, and Khalil's handvac "dirt cup" includes a first cyclone unit. Ex1002 ¶335.

e. [1d]/[23d]/[24d]/[25d]

Jianan in combination with Khalil teaches these limitations. Ex1002 ¶¶336–42.

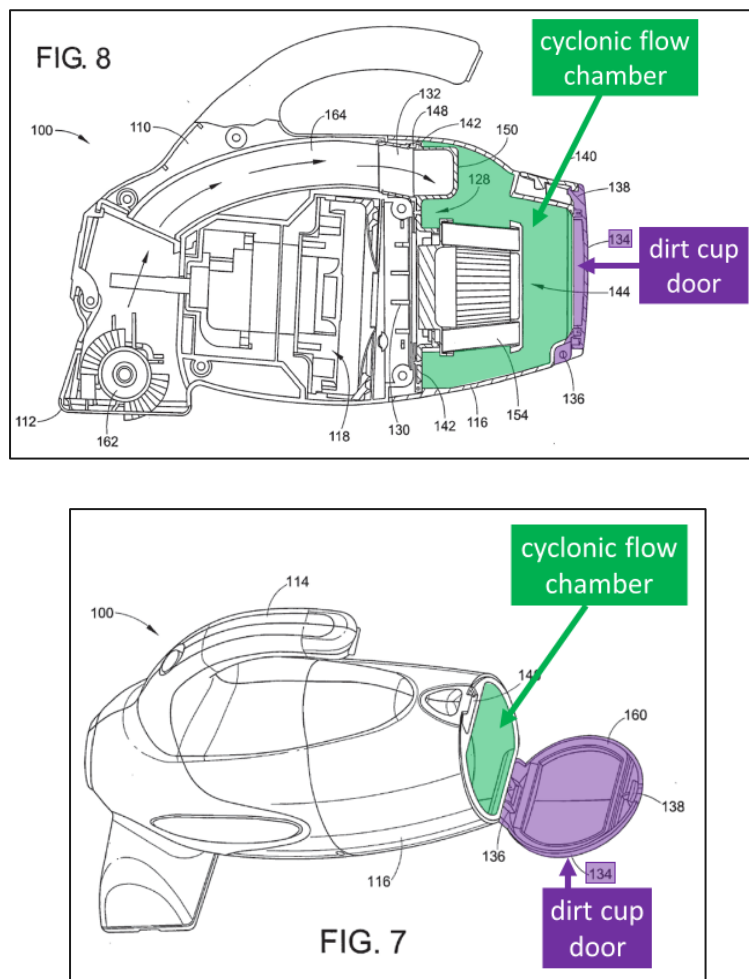
Jianan in combination with Khalil teaches the cyclone and dirt-collection chamber having an openable door, the front wall comprising the openable door, and for [1d], whereby, when the door is in an open position, both the cyclone and the dirt-collection chamber are opened. Ex1002 ¶337. Jianan's "dust collection chamber has at least one opening for emptying dirt." Ex1013, claim 2. In one embodiment, "dust collection chamber" has a "dust collection chamber opening" that "provides a clean and fast dust removal process." *Id.*, 10. However, Jianan teaches an "alternative device in which the dust chamber" opening can be replaced with "an opening and closing device such as a" "**movable door** on the **dust collection chamber**":



Id., 10, claim 3, Fig. 3; Ex1002 ¶¶337. A POSA would have understood one of a finite number of openable-door placements on the dirt-collection chamber is below the air inlet channel opening 8, such that it would have been obvious for the **front wall to comprise the openable door**. Ex1002 ¶338.

Further, a POSA would have understood Jianan’s openable door opens both the **cyclone** and the **dust-collection chamber**, as depicted above. Ex1002 ¶339. Jianan’s purpose is to provide a “clean and fast dust removal process.” Ex1013, 10. Although “most of the dust collects in a separate dust receiving chamber,” some will accumulate in the cyclone, which will need to be emptied. *Id.*, 5. A POSA would have understood fibrous materials (e.g., hair and string) often wrap around the conical cyclone filters, and must be pulled out manually. Ex1002 ¶339. Thus, a POSA would have understood to meet Jianan’s “clean and fast dust removal” objective, the openable door would cover (and when opened, expose) both the cyclone and the dirt-collection chamber for convenient cleaning. Ex1002 ¶339.

Because Jianan does not provide implementation details, a POSA would have looked to openable-door teachings, such as Khalil's, which provides those details and would have a reasonable expectation of success incorporating them. Ex1002 ¶340. Khalil teaches a “**dirt cup door 134**” covering an end of the hand vacuum cleaner, wherein the “volumetric space between the filter support plate 142 and the **dirt cup door 134** defines a **cyclonic flow chamber**”:



Ex1014 ¶29, Figs. 7-8; Ex1002 ¶¶340–41. Khalil’s **cyclonic-flow chamber** comprises a cyclone and a dirt collection chamber, which are both opened “when the

latch 140 is depressed, the catch 138 is released and a spring biasing element that may be located within the hinge 136 urges the **dirt cup door 134** open.” Ex1014 ¶33.

A POSA would have been motivated to implement Jinan’s movable-door teachings using Khalil’s dirt-cup-door teachings and would have reasonably expected success. Ground 5, §1. The combined teachings of Jianan and Khalil teach these limitations. Ex1002 ¶342.

f. [1e]/[23e]/[24e]/[25e]

Jianan, alone or in combination with Khalil teaches these limitations. Ex1002 ¶¶343–47.

Jianan’s “wall surrounding the motor 15 ... forms a long air path to guide clean air, which helps to cool the components and reduce noise.” Ex1013, 8. A POSA would have understood Jianan’s “motor” is a suction motor; the cooled “components” include the “motor”; and therefore the “motor” is a suction motor positioned in the airflow passage. Ex1002 ¶344.

Alternatively, to the extent PO argues that Jianan’s motor is not in the airflow passage, a POSA would have been motivated by Jianan’s disclosures to modify Jianan to place the motor in the airflow passage. Ex1002 ¶345. Suction motors have been positioned in airflow passages for cooling for over eighty years. Ex1008, 1:32-38, Fig. 2 (“it is desirable to pass the air through the fan motor for the purpose of

cooling”). Thus, positioning Jianan’s suction motor in the airflow passage would have been obvious to try, easy to implement using nearly century-old teachings, and would have yielded the predictable result of “cool[ing] [a] component[,]” i.e., “motor 11,” with “clean air,” which is one of Jianan’s objectives. Ex1013, 8; Ex1002 ¶345. A POSA would have reasonably expected success based on Jianan’s teachings of using airflow to cool components, the prior art’s teachings of using airflow to cool motors, and the location of the air outlet, “slit[s] 5” that surround the motor. Ground 5, [1b]; Ex1002 ¶345; *see also* Ex1013, 8, Fig. 3.

Likewise, Khalil teaches that the “airflow exits the dirt cup 116 via the collar 152a” and “[a]s the air flow passes through the suction fan and motor assembly 118,” it “cools the motor.” Ex1014 ¶34.

To the extent PO argues that Jianan’s motor is not positioned in the airflow passage, a POSA would have been motivated to combine Khalil’s airflow teachings with Jianan to obtain the benefits taught by Khalil of “cool[ing] the motor,” and, for the same reasons discussed above, would have reasonably expected success. Ex1002 ¶347. In their combined teachings, the suction motor is positioned in the airflow passage. Ex1002 ¶347.

g. [23f]

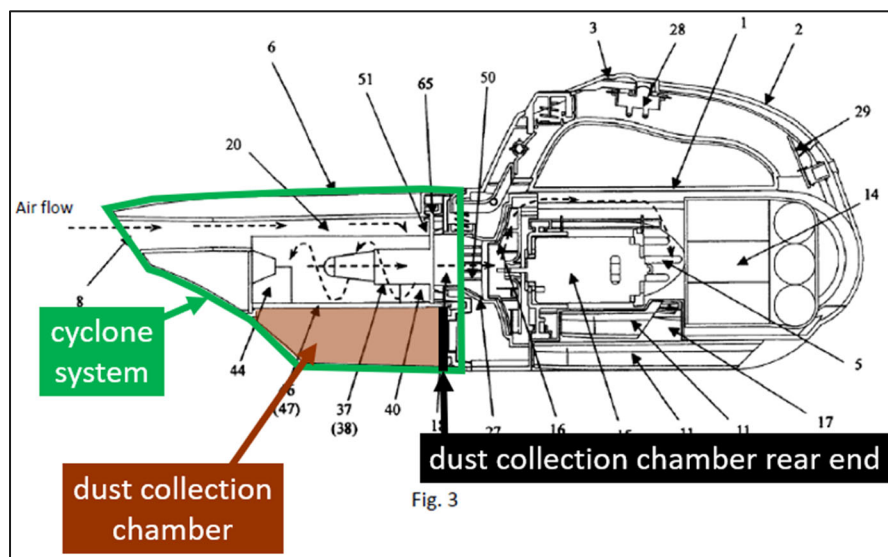
For the same reasons discussed for [1d], Jianan in combination with Khalil teaches this limitation. Ground 5, [1d]; Ex1002 ¶348.

h. [24f]

For the same reasons discussed for [1d], Jianan in combination with Khalil teaches this limitation. Ground 5, [1d]; Ex1002 ¶349.

i. [25f]

Jianan teaches this limitation. Ex1002 ¶¶350–52. Jianan’s “main components of the dust cup part, dust cup, and cyclone body are *permanently bonded* together”:

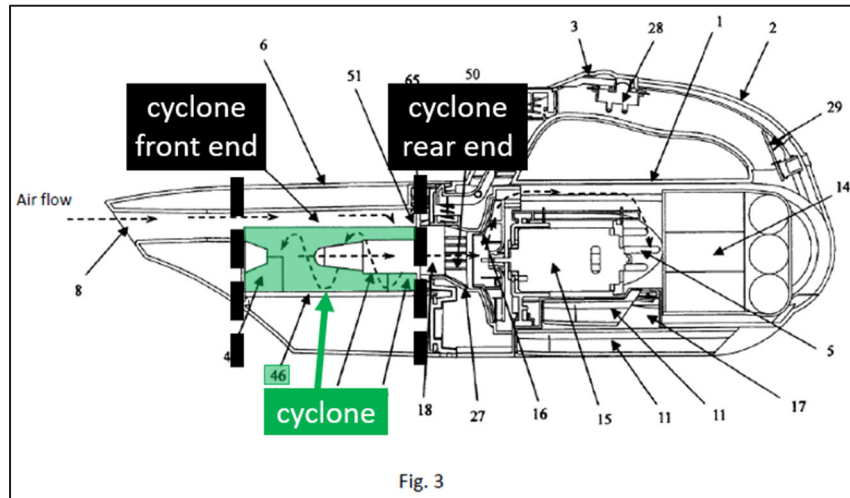


Ex1013, 4, Fig. 3; Ex1002 ¶¶351. A POSA would have understood Jianan’s “permanently bonded” “main components” include the dust-collection chamber, and the dust-collection chamber has a rear end non-removably mounted to the first cyclone unit. Ex1002 ¶352.

3. [2]

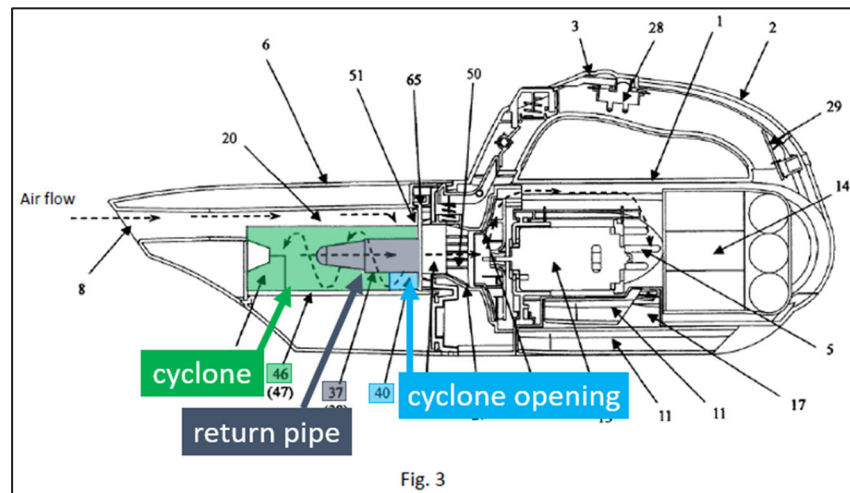
Jianan in combination with Khalil teaches claim 1 and the remaining limitations of this claim. Ground 5, Claim 1; Ex1002 ¶¶353–56.

Jianan's “**cyclone 46**” has a **front end** at the vacuum cleaner front end, and an opposite **rear end**:



Ex1013, Fig. 3; Ex1002 ¶354.

Jianan's “**cyclone**” has “**cyclone opening 40**,” which is a cyclone air inlet, and “**return pipe 37**,” which is a cyclone air outlet:

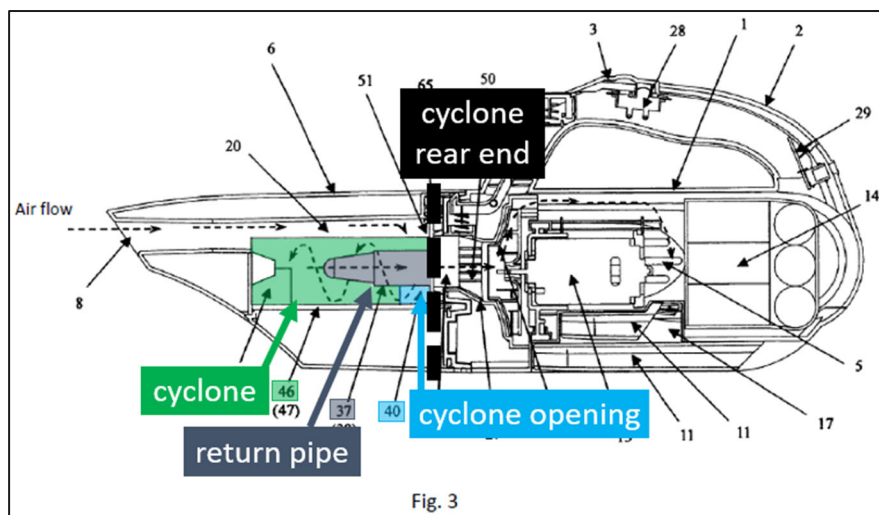


Ex1013, 9, Fig. 3; Ex1002 ¶¶355–56. “[D]ust-laden air ... enter[s] the cyclone ... through the **cyclone opening**” and exits the cyclone through “the **return pipe**.” Ex1013, 9.

4. [3]/[4]

Jianan in combination with Khalil teaches claim 2 and the remaining limitations of these claims. Ex1002 ¶¶357–59.

Jianan’s “**cyclone opening**” and “**return pipe**” are at the same end—the “**cyclone**” rear end:

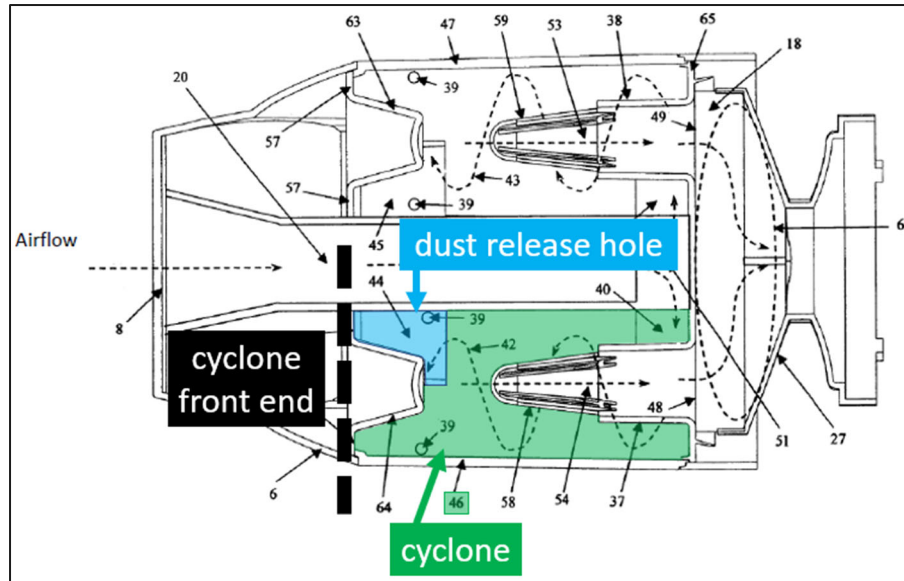


Ex1013, Fig. 3; Ex1002 ¶359.

5. [5]

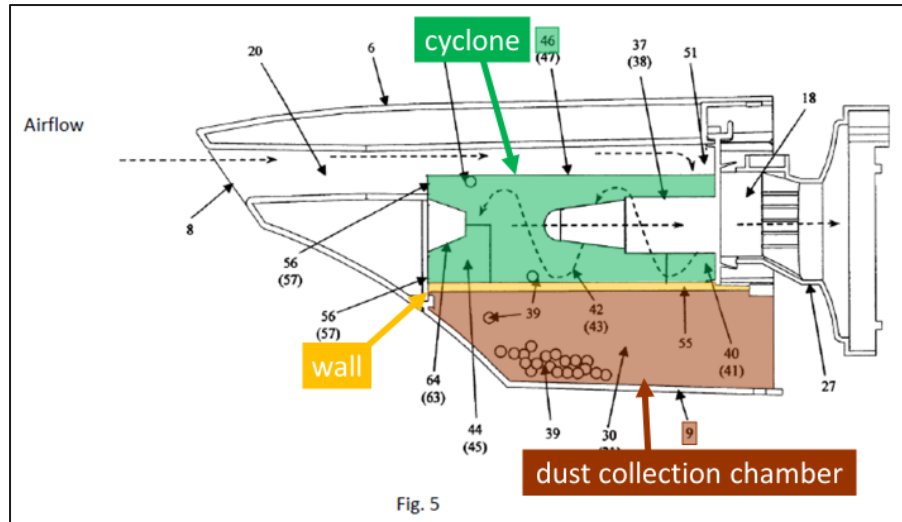
Jianan in combination with Khalil teaches claim 1 and the remaining limitations of this claim. Ex1002 ¶¶360–65.

Jianan teaches a cyclone front end (Ground 5, Claim 2) that has a dirt outlet: Jianan teaches a “**dust release hole**” at the **front end** of “**cyclone 46**”:

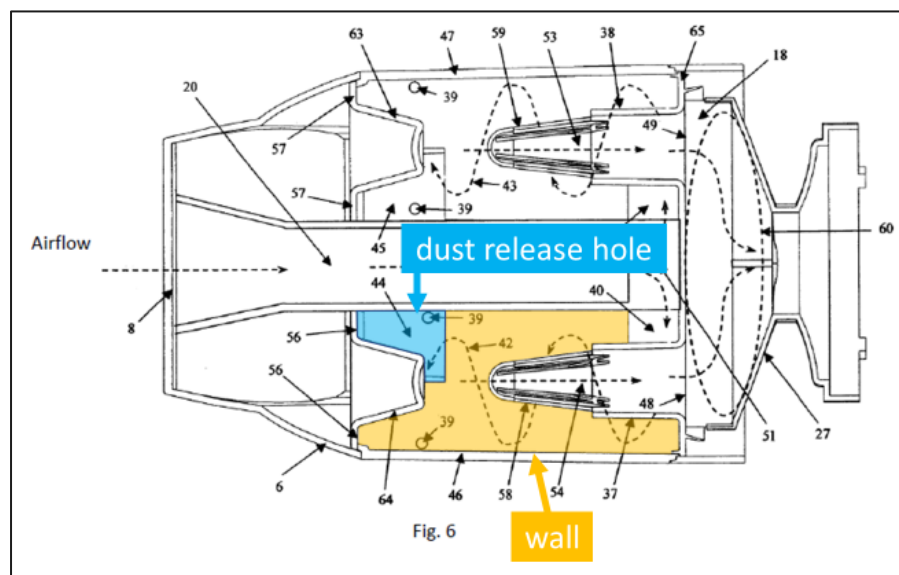


Ex1013, 9, Fig. 6; Ex1002 ¶361. “[D]ust collection chamber 9 is connected to the cyclone body via the **dust release hole**,” and “[d]uring normal operation,” “dust 39 escapes” “cyclone 46” “through the action of inertia.” Ex1013, 9. Jianan’s “**dust release hole**” is a dirt outlet. Ex1002 ¶362.

Jianan teaches a separation plate mounted in facing relation to the dirt outlet: Jianan’s “**wall 55**” separates “**cyclone 46**” and the “independent **dust collection chamber 9**”:



Ex1013, 9-10, Fig. 5; Ex1002 ¶363. “As a result, most of the dust ... separated through the cyclone” remains in the “dust collection chamber,” and “users will not have to clean the filter as often.” Ex1013, 10. Further, “**wall 55**” is mounted in facing relation to the “**dust release hole**”:



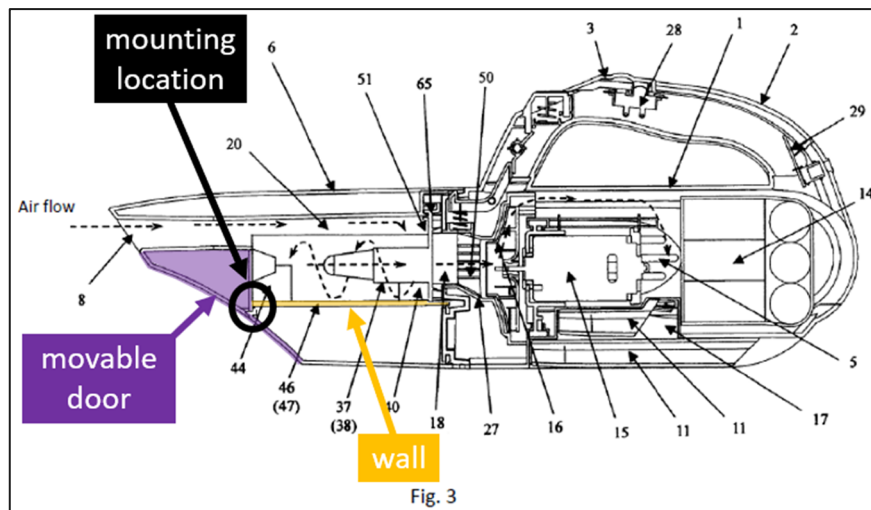
Ex1013, 9, Fig. 6; Ex1002 ¶364. A POSA would have understood Jianan’s “**wall**” is a separation plate mounted in facing relation to the dirt outlet. Ex1002 ¶365.

6. [6]

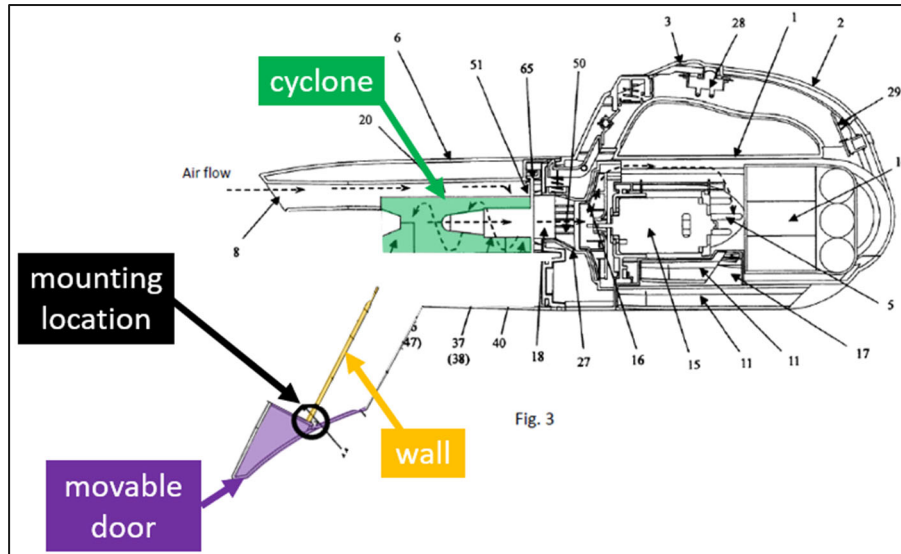
Jianan in combination with Khalil teaches claim 5 and renders obvious the remaining limitations of this claim. Ex1002 ¶¶366–71.

Jianan teaches a separation plate. Ground 5, Claim 5. Jianan in combination with Khalil teaches the openable door. Ground 5, [1d].

In their combined teachings, the separation plate is mounted to the door: Jianan’s “**wall**” is mounted to the “**movable door**”:



Ex1013, 9-10, Fig. 3; Ex1002 ¶¶367–68. As explained for [1d], a POSA would have understood Jianan’s “cyclone 46” must be cleaned manually and therefore would have been motivated to have the openable door open the cyclone. Ground 5, [1d]. For the same reasons, it would have been obvious to mount “**wall 55**” to Jianan’s “**moveable door**,” such that when the door pivots open, the “**wall**” slides out for more convenient cleaning of the **cyclone**:



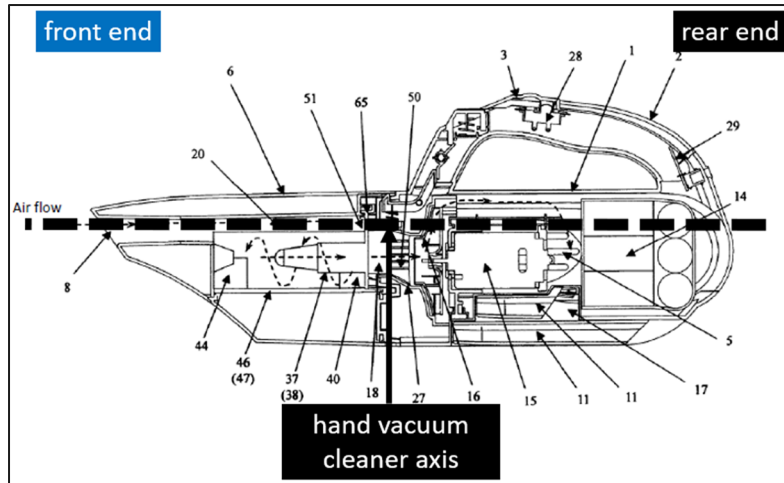
Ex1013, Fig. 3 (modified); Ex1002 ¶¶369–70. A POSA would have understood one of a finite number of places to mount “wall 55” is on the “movable door,” which would predictably increase access to “cyclone 46” and meet Jianan’s objective of “clean and fast dust removal.” Ex1013, 10; Ex1002 ¶370.

A POSA would have been motivated to implement Jinan’s movable-door teachings using Khalil’s dirt-cup-door teachings and would have reasonably expected success. Ground 5, §1. In their combined teachings, the separation plate is mounted to the door. Ex1002 ¶371.

7. [7]

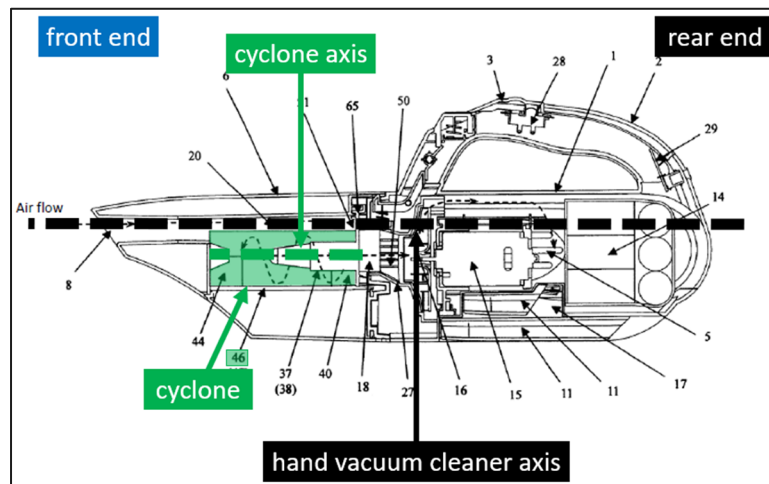
Jianan in combination with Khalil teaches claim 1 and the remaining limitations of this claim. Ex1002 ¶¶372–74.

Jianan’s handvac has an **axis** extending from the **front end** to the **rear end**:



Ex1013, Fig. 3; Ex1002 ¶373. This axis is generally parallel to Jianan’s “cyclone”

axis:

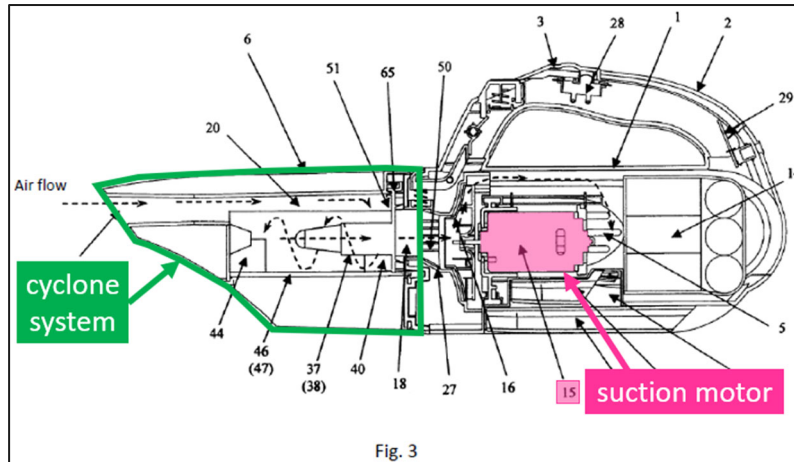


Ex1013, Fig. 3; Ex1002 ¶374.

8. [8]

Jianan in combination with Khalil teaches claim 1 and the remaining limitations of this claim. Ex1002 ¶¶375–77.

Jianan’s “cyclone system” is positioned forward of “motor 15”:

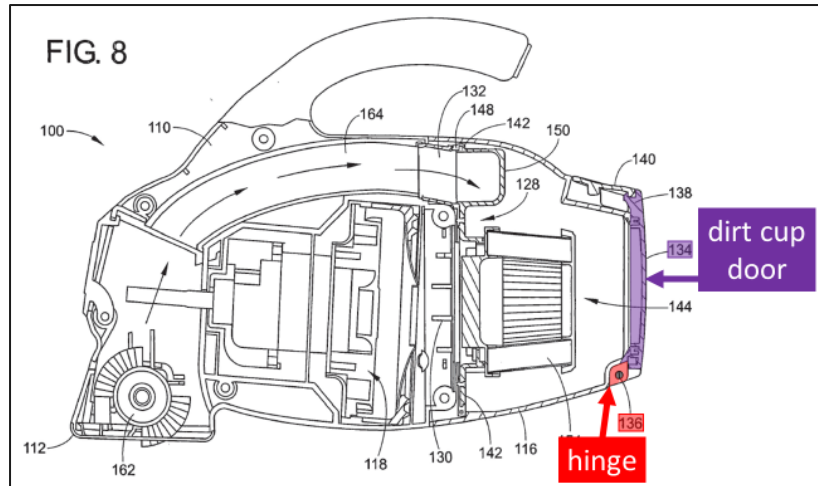


Ex1013, Fig. 3; Ex1002 ¶376. Jianan’s “**cyclone system**” is a first cyclone unit. Ground 5, [1c]. Jianan’s “**cyclone system**” is a first cyclone unit that is positioned forward of Jianan’s “**motor**” (which is a suction motor, Ground 5, [1e]). Ex1002 ¶377.

9. [9]

Jianan in combination with Khalil teaches claim 1 and the remaining limitations of this claim. Ex1002 ¶¶378–82.

Khalil teaches and renders obvious the door is removable: Khalil’s “**dirt cup door 134**” is pivotally mounted to the hand vacuum by “**hinge 136**”:



Ex1014 ¶37, Fig. 8; Ex1002 ¶379. A POSA would have understood Khalil's “**hinge**” is secured to the handvac by a removable screw or pin, at least because Khalil appears to depict one in the center of Khalil's “**hinge**,” which is exposed to the exterior for removal. Ex1002 ¶380. A POSA would have understood when the screw/pin is removed, the dirt-cup door is removable from the handvac. Ex1002 ¶380.

Alternatively, it would have been obvious to a POSA to include a screw or pin that removably attaches the hinge, and consequently the door, to the handvac for more convenient cleaning of the dirt-collection and cyclone chambers. Ex1002 ¶381. Using a screw or pin was a well-known technique to predictably removably attach a hinge to a cleaner, and it would have been obvious to try, as there were a finite number of solutions for doing so. Ex1002 ¶381.

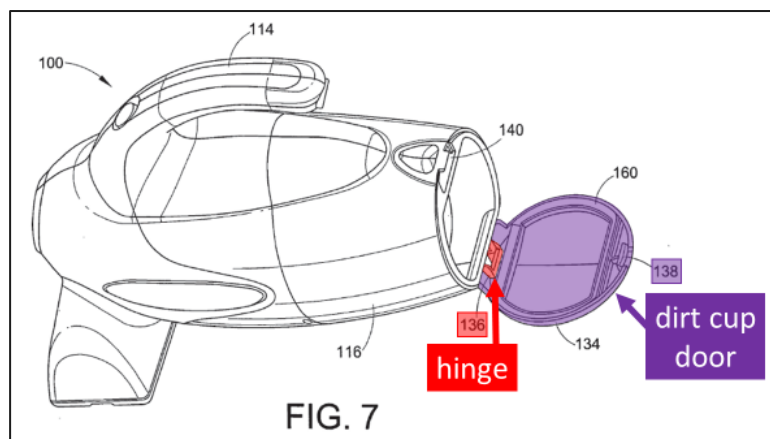
A POSA would have been motivated to implement Jinan's movable-door teachings using Khalil's dirt-cup-door teachings and would have reasonably

expected success. Ground 5, §1. In their combined teachings, the door is removable. Ex1002 ¶382.

10. [10]

Jianan in combination with Khalil teaches claim 1 and the remaining limitations of this claim. Ex1002 ¶¶383–86.

In Khalil, “[b]y depressing the latch 140, the catch 138 on the **dirt cup door 134** is released and the **dirt cup door 134** will pivot downward about the **hinge 136**”:



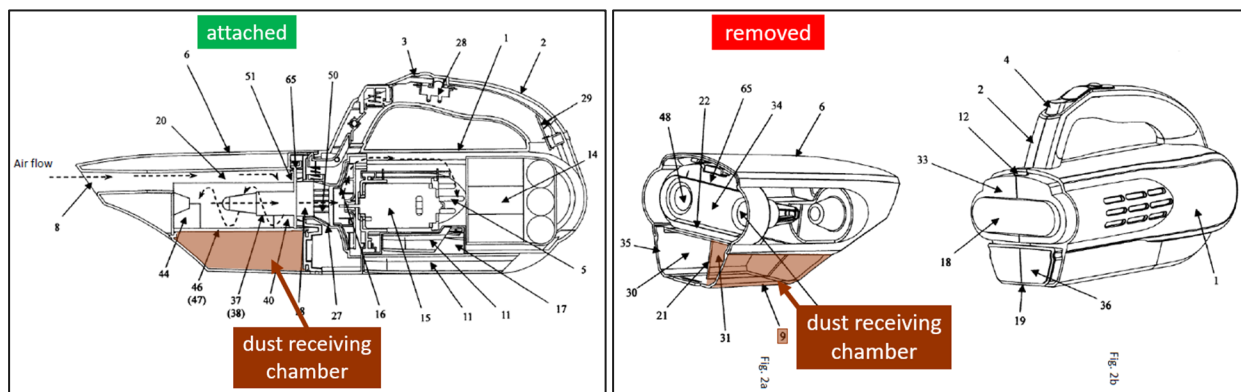
Ex1014 ¶27, Fig. 7; Ex1002 ¶384. Khalil’s “**dirt cup door**” is pivotably mounted to the handvac. Ex1002 ¶385.

A POSA would have been motivated to implement Jinan’s movable-door teachings using Khalil’s dirt-cup-door teachings and would have reasonably expected success. Ground 5, §1. In their combined teachings, the door is pivotally mounted to the handvac. Ex1002 ¶386.

11. [11]

Jianan in combination with Khalil teaches claim 1 and the remaining limitations of this claim. Ex1002 ¶¶387–89.

Jianan’s “dust cup” comprises “two parallel cyclones and separate **dust receiving chambers**,” and can be “separated from the main housing 1”:



Ex1013, 4, 7, Figs. 2a-3; Ex1002 ¶388. Jianan’s “dust receiving chambers” are dirt-collection chambers. Ex1002 ¶389.

12. [12]

Jianan in combination with Khalil teaches claim 1 and renders obvious the remaining limitations of this claim. Ex1002 ¶¶390–93.

Jianan’s dirt-collection chamber is removable from the handvac. Ground 5, Claim 11.

To the extent Jianan’s dirt-collection chamber is not removable as a sealed unit for emptying, it would have been obvious when combined with Khalil’s openable-door teachings. Ex1002 ¶392. A POSA would have been motivated to

seal Jianan’s “dust collection chamber opening” when using a front door because it would ensure that dirt did not fall out of the back, thereby providing a “clean and convenient dust removal process” that does not “soil the user’s hands,” both of which are Jianan’s stated purposes. Ex1013, 3-4, 10; Ex1002 ¶392. Further, sealing Jianan’s “dirt collection chamber opening” would have been obvious to try because its rear opening would no longer be needed (dirt can be removed through the front door), easy to implement using known techniques (namely, a rear wall), and it would have yielded the predictable result of preventing accidental dirt spillage. Ex1002 ¶392.

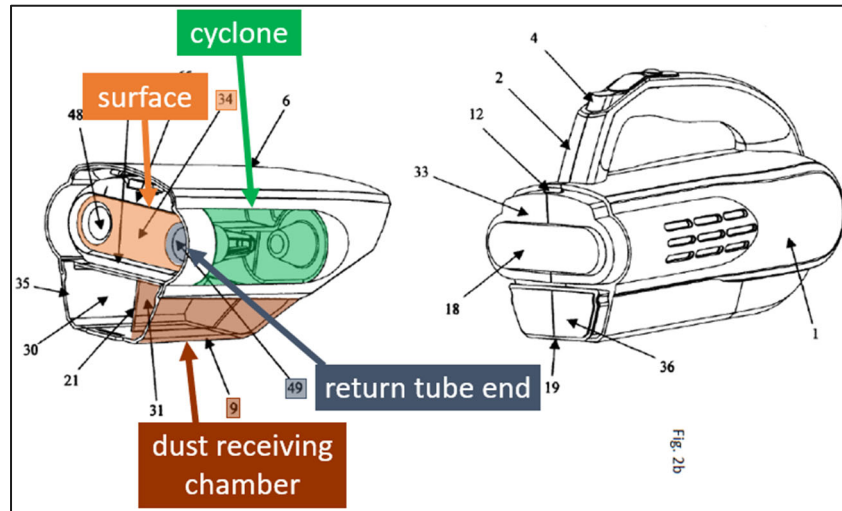
A POSA would have been motivated to implement Jinan’s movable-door teachings using Khalil’s dirt-cup-door teachings and would have reasonably expected success. Ground 5, §1. In their combined teachings, the dirt-collection chamber is removable from the surface cleaning apparatus as a sealed unit for emptying. Ex1002 ¶393.

13. [13]

Jianan in combination with Khalil renders claim 12 obvious and teaches the remaining limitations of this claim. Ex1002 ¶¶394–96.

Jianan teaches a first cyclone unit comprising a cyclone and a dirt-collection chamber. Ground 5, [1c]. Jianan in combination with Khalil renders obvious the

dirt-collection chamber is sealed when removed. Ground 5, Claim 12. Further, Jianan's "**cyclone**" is also sealed when removed:

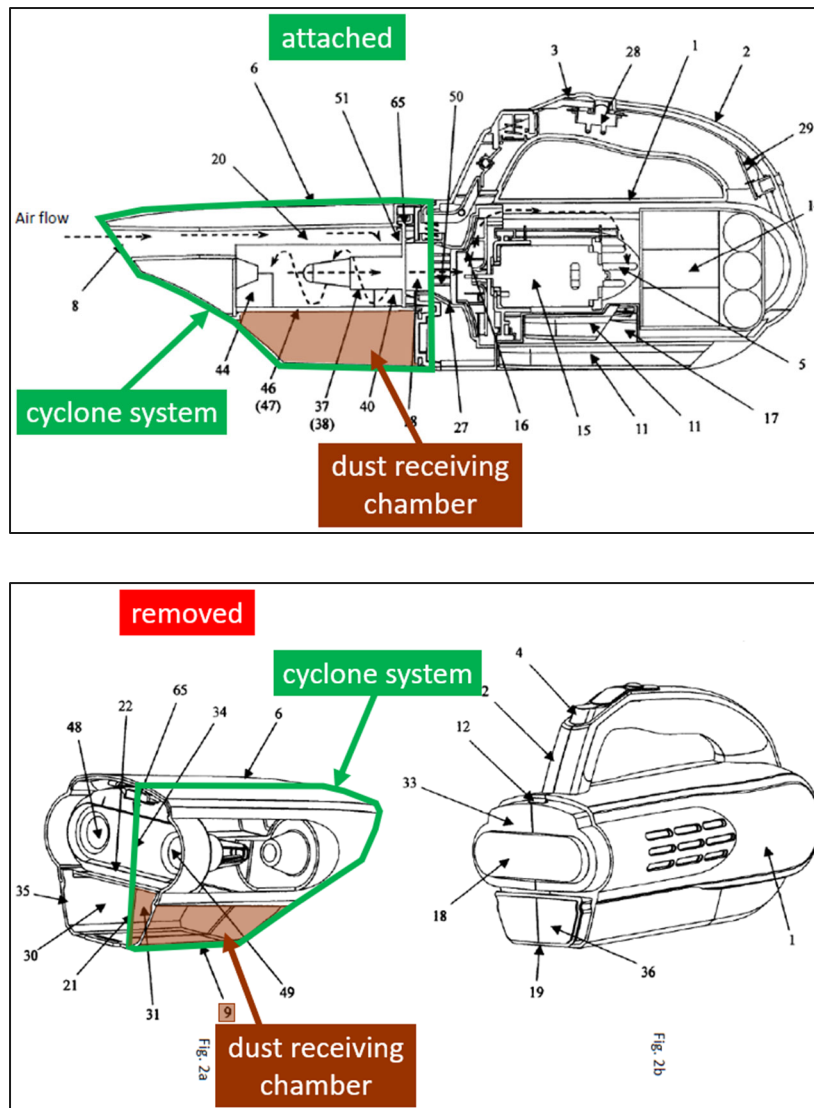


Ex1013, Figs. 2a-2b; Ex1002 ¶395. Jianan's "separator top 65 has a ... **return tube end 49**" and a "**surface 34**" located at the rear of "**cyclone**," depicted above. Ex1013, 7; Ex1002 ¶396. "Air leaves the cyclones 46 and 47 through return tube ends 48 and 49 respectively." Ex1013, 10. Jianan's "**return tube end**" is a fluid flow passage. Ex1002 ¶396. Jianan's "**cyclone**" is sealed when removed, and therefore the first cyclone unit is sealed when removed from the handvac other than fluid flow passages leading to and from the first cyclone unit. Ex1002 ¶396.

14. [14]

Jianan in combination with Khalil teaches claim 1 and the remaining limitations of this claim. Ex1002 ¶¶397–99.

Jianan's "**dust receiving chamber**" is removable from the hand vacuum with its "**cyclone system**":



Ex1013, Figs. 2a-3; Ex1002 ¶398. Jianan’s “cyclone system” is a first cyclone unit, and Jianan’s dirt-collection chamber is removable from the handvac with the first cyclone unit. Ex1002 ¶399; *see also* Ground 5, [1c].

15. [15]

Jianan in combination with Khalil teaches claim 1 and the remaining limitations of this claim. Ex1002 ¶¶400–06.

Jianan's "dust cup part includes two parallel cyclones," ("cyclone 46" and "cyclone 47") and "two dust collection chambers," wherein each cyclone and its respective dust collection chamber constitute a first and second "cyclone system":

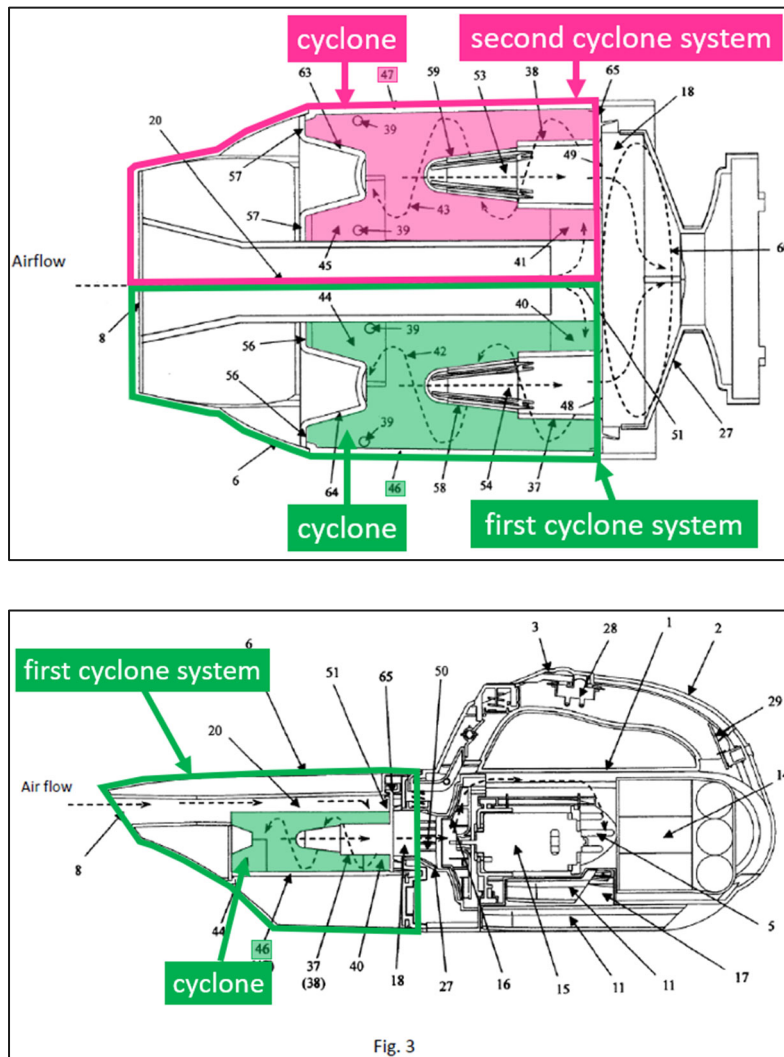


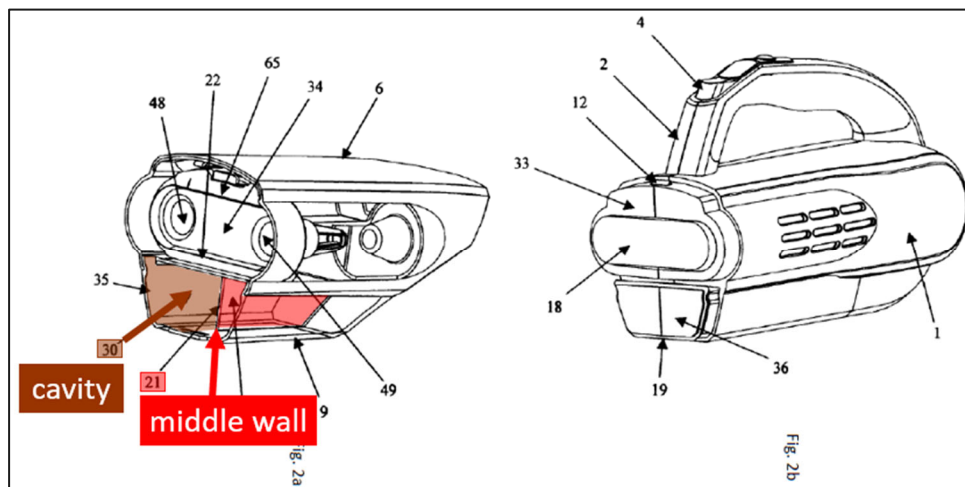
Fig. 3

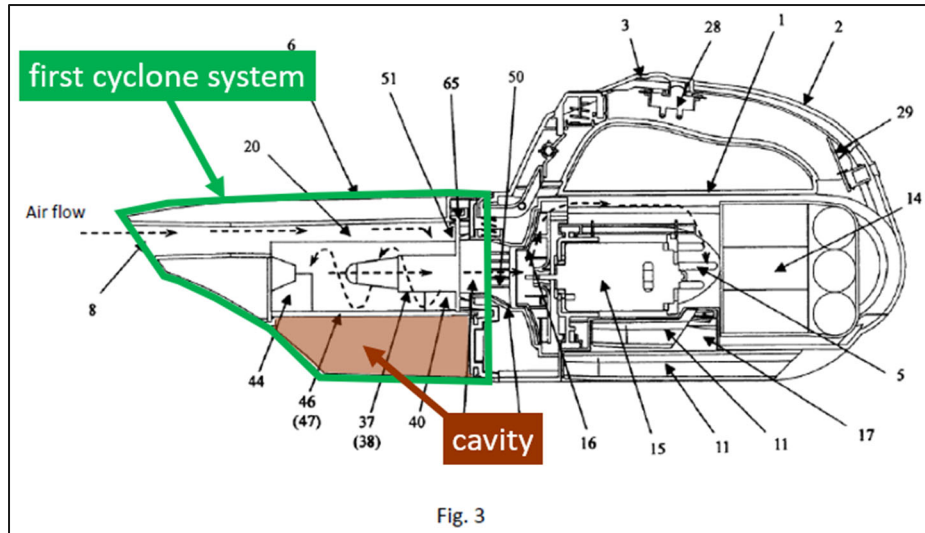
Ex1013, Abstract, 8, Figs. 6, 3; Ex1002 ¶401.

As shown above, Jianan's first and second cyclones are positioned in two separate cyclone systems that remove particles from the air separately. Ex1013, Figs. 6, 3; Ex1002 ¶402. Air "flows through the air inlet channel 20 to the T-shaped

double bifurcation 51, where the air flow is divided into two streams” and “enter[s] the cyclone 46 and cyclone 47 through the cyclone opening 40 and the cyclone opening 41, respectively.” Ex1013, 9. “[D]ust laden air flows tangentially onto the inner surfaces of the cyclones ... and forms vortices 43 and 42 within the respective cyclones, respectively,” prior to exiting the separate cyclones through the “return pipe 37 and the return pipe 38.” *Id.*, 8-9. Jianan’s first “cyclone system” is the first cyclone unit, and Jianan’s “cyclone 46” is the single cyclone in the first cyclone unit. Ex1002 ¶402.

Further, Jianan’s “dust chamber 9 includes a ... **middle wall 21**,” which “divides the cavity ... into two parts, forming a **cavity 30** and a cavity 31”:





Ex1013, 7, Figs. 2a-3. Jianan's "**cavity 30**" is the single dirt-collection chamber in the first cyclone unit. Ex1002 ¶¶403–04. Thus, Jianan's first cyclone unit has a single cyclone and a single dirt-collection chamber. Ex1002 ¶¶403–04.

Further, Khalil teaches "[w]hen the filter assembly 128 is inserted into the dirt cup 116, the volumetric space between the filter support plate 142 and the dirt cup door 134 defines a cyclonic flow chamber," which a POSA would have understood comprises a single cyclone and a single dirt-collection chamber. Ex1014 ¶29; Ex1002 ¶¶405–06; *see also* Ground 5, [1c].

16. [16]

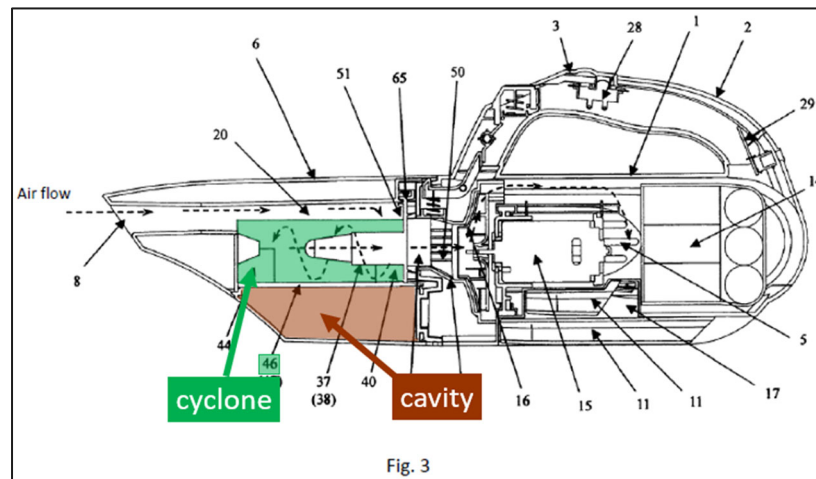
Jianan in combination with Khalil teaches claim 15 and the remaining limitations of this claim. Ex1002 ¶¶407–08.

For the same reasons explained for [1c], Jianan's single dirt-collection chamber is positioned exterior to the single cyclone. Ground 5, [1c]; Ex1002 ¶408.

17. [17]/[18]

Jianan in combination with Khalil teaches claim 16 and the remaining limitations of these claims. Ex1002 ¶¶409–12.

Jianan’s “cyclone” and “cavity” comprise a one-piece assembly and are integrally formed:

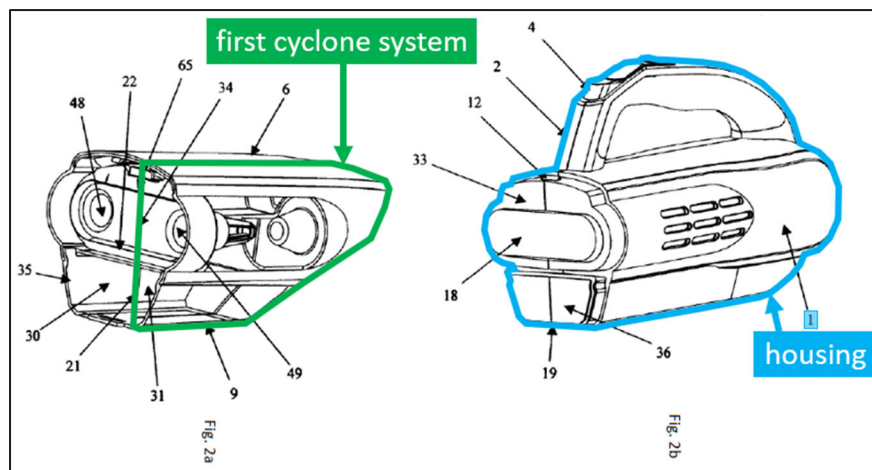
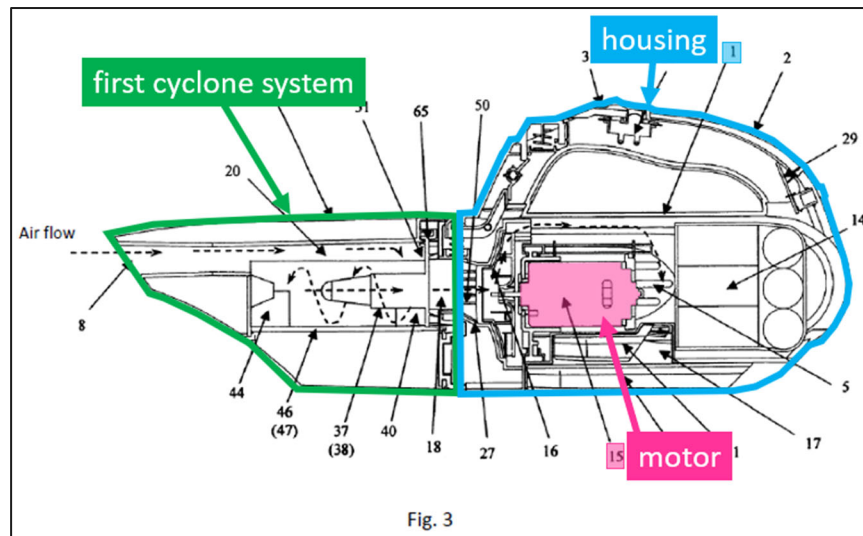


Ex1013, Fig. 3; Ex1002 ¶¶410–12; *see also* Ex1013, 4 (“main components of the dust cup part, dust cup, and cyclone body are *permanently bonded* together”).

18. [19]

Jianan in combination with Khalil teaches claim 1 and the remaining limitations of this claim. Ex1002 ¶¶413–15.

Jianan teaches that “[w]ithin the main **housing 1** is a battery pack 14 and a **motor 15**”:



Ex1013, 8, Figs. 2a-3; Ex1002 ¶414. As depicted above, the first “cyclone system” can be “separated from the main housing 1.” Ex1013, 7; Ex1002 ¶415. Jianan’s “main housing” is a suction motor housing because it houses the suction motor, and Jianan’s “motor” is the suction motor. Ex1002 ¶415.

19. [20]

Jianan in combination with Khalil teaches claim 1 and renders obvious the remaining limitations of this claim. Ex1002 ¶¶416–18.

Jianan teaches first and second cyclone units arranged in parallel, each unit comprising a single cyclone and a single dirt-collection chamber. Ground 5, Claim 15.

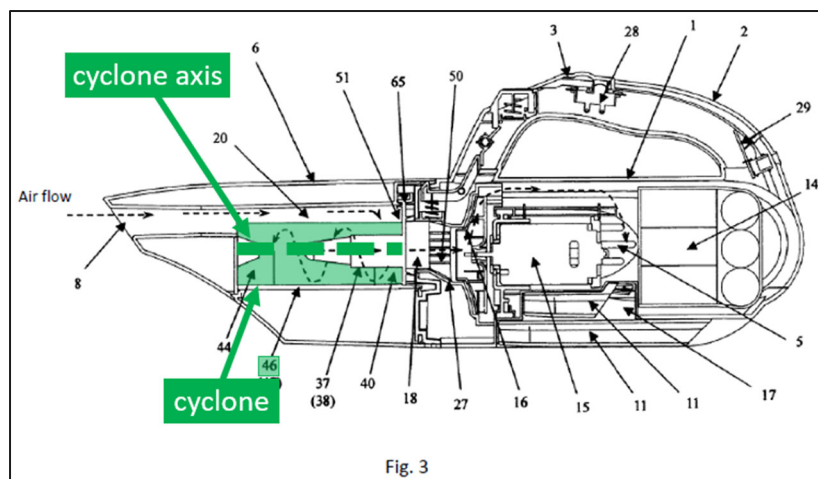
To the extent Jianan does not disclose the second cyclone unit downstream from the first cyclone unit, a POSA would have found this orientation obvious. Ex1002 ¶418. A POSA would have been motivated to rearrange Jianan’s first and second cyclone units to be in series, or, alternatively, to place a second set of parallel cyclone units downstream of Jianan’s first set, as this would further Jianan’s purpose of an “efficient cyclone effect ... and constant suction performance,” and would have reasonably expected success in doing so. Ex1013, 4; Ex1002 ¶418. Jianan explains that vacuum cleaners “using multiple cyclones can separate finer dust from the air,” and notes that the concept of “two cyclones arranged in series” has been disclosed in a “large number of patents,” which would have motivated a POSA to incorporate one. Ex1013, 3; Ex1002 ¶418. Incorporating an in-series multi-cyclone-unit orientation into Jianan’s hand vacuum would have involved the simple substitution of one well-known cyclone orientation for another, or, alternatively, the downstream addition of another set of parallel cyclone units, to achieve the predictable result of fine dust separation, and because there are only a finite number of multi-cyclone orientations to use—namely, two: parallel and in series. Ex1002 ¶418. When so modified, Jianan’s cleaner includes a second cyclone unit

downstream from the first cyclone unit. Ex1002 ¶418. A POSA would have reasonably expected success making this modification because in-series multi-cyclonic arrangements were well-known in the art, as Jianan recognizes, and because Jianan already teaches a multi-cyclone arrangement. Ex1002 ¶418.

20. [21]

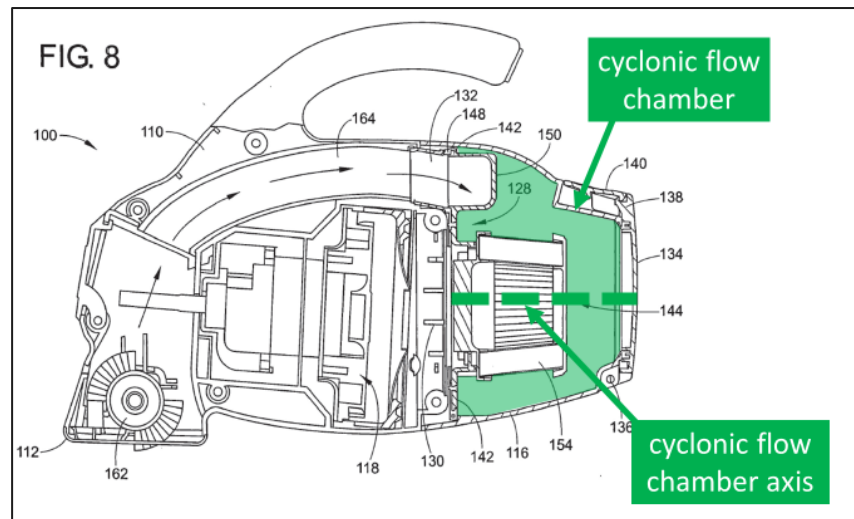
Jianan in combination with Khalil teaches claim 1 and the remaining limitations of this claim. Ex1002 ¶¶419–23.

Jianan’s “**cyclone**” has a longitudinally extending “**cyclone**” axis:



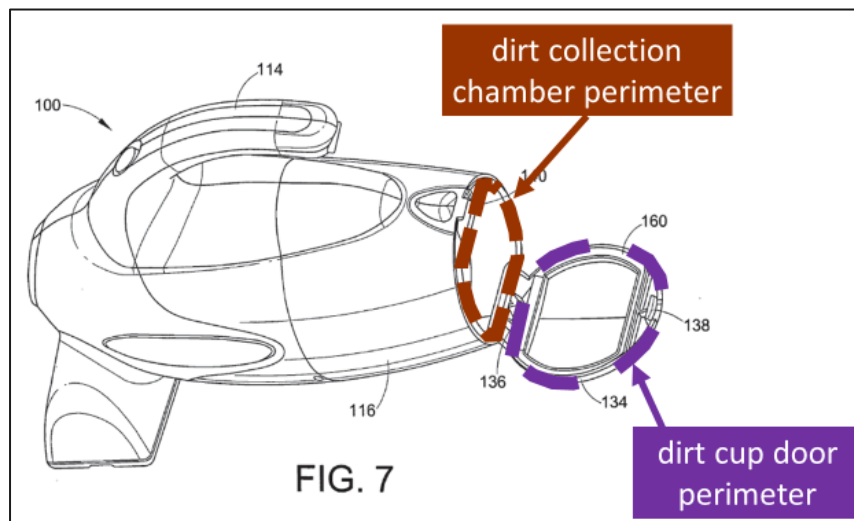
Ex1013, Fig. 3; Ex1002 ¶420.

Further, Khalil’s “**cyclonic flow chamber**” has a longitudinally extending “**cyclonic flow chamber**” axis:



Ex1014, Fig. 8; Ex1002 ¶421.

Further, Khalil’s “cyclonic flow chamber” **dirt collection chamber** has a perimeter that is generally the same as the perimeter of Khalil’s “**dirt cup door**”:



Ex1014, Fig. 7; Ex1002 ¶422.

A POSA would have been motivated to implement Jinan’s movable-door teachings using Khalil’s dirt-cup-door teachings and would have reasonably expected success. Ground 5, §1. When so combined, Khalil’s “dirt cup door 138”

perimeter is at the front end and is generally the same as dirt collection chamber's perimeter. Ex1002 ¶423.

21. [22]

Jianan in combination with Khalil teaches claim 1 and the remaining limitations of this claim. Ex1002 ¶¶424–25.

For the same reasons explained in [1d], Jianan in combination with Khalil renders obvious the front wall is the openable door. Ground 5, [1d]; Ex1002 ¶425.

IX. DISCRETIONARY FACTORS FAVOR INSTITUTION

A. §314(a)

Fintiv should not be followed because it exceeds the Director's authority, is arbitrary and capricious, was adopted without notice-and-comment rulemaking, violates the APA and AIA, and because "the PTAB will not rely on the *Fintiv* factors to discretionarily deny institution in view of parallel district court litigation where a petition presents compelling evidence of unpatentability," and this petition presents such compelling evidence. USPTO Interim Procedure For Discretionary Denials In AIA Post-Grant Proceedings With Parallel District Court Litigation, June 21, 2022, 42-5 (the "Guidance").

Nevertheless, *Fintiv* favors institution because each factor favors or is neutral for institution. *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020).

Factor 1 is neutral: there is no evidence that the court will or will not grant a stay if IPR is instituted, and because no such stay motion has yet been filed, this factor is neutral. *See, e.g., TSMC Ltd. v. Alidouble, Inc., IPR2023-00372*, Paper 7 at 10 (PTAB July 13, 2023).

Factor 2 favor institution: while the scheduled Litigation trial date is July 21, 2025—approximately 17 months away—any comparison of a projected FWD date against the scheduled trial date is speculative. *See Dish Network v. Broadband iTV, IPR2020-01280*, Paper 17 at 16 (PTAB Feb. 4, 2021) (“We cannot ignore the fact that the currently scheduled trial date is more than nine months away and much can change during this time”); Guidance at 8 (“Stakeholders correctly noted that scheduled trial dates are unreliable and often change[,]” and a “scheduled trial date . . . is not by itself a good indicator of [when] the district court trial will occur.”). Instead, “when considering the proximity of the district court’s trial date to the date when the PTAB final written decision will be due, the PTAB will consider the median time from filing to disposition of the civil trial for the district in which the parallel litigation resides.” *Id.* at 3. The median time to trial in the District of Massachusetts is 34.6 months according to Federal Court Management Statistics (December 31, 2023). Ex1023. The district court litigation was filed on August 15, 2023, when the ’407Patent was added to an Amended Complaint in Case No. 23-cv-1277, and which indicates an expected trial date of approximately July 1, 2026,

approximately 10 months after a FWD. Because the expected trial date is after the FWD deadline, this factor weighs in favor of institution. *Samsung Electronics Co., Ltd. et al v. Staton Techiya, LLC*, IPR2022-00302, Paper 13 at 10-12.

Factor 3 favors institution. “If, at the time of the institution decision, the district court has not issued orders related to the patent at issue in the petition, this fact weighs against exercising discretion to deny institution” *Apple Inc., v. Fintiv, Inc.*, IPR2020-00019, Paper No. 11 at 10 (PTAB Mar. 20, 2020) (precedential). No such substantive orders have issued with respect to the ’407Patent, and none are expected prior to institution. A *Markman* hearing is scheduled for July 16, 2024, and a *Markman* order is not expected until several months after the hearing. *E.g., iRobot Corp. v. SharkNinja Operating LLC et al.*, 19-cv-12125 (D. Mass.) (holding a *Markman* hearing on 8/6/2020 and issuing a *Markman* order on 1/14/21). Further, the parties’ investments in co-pending litigation have been low and will remain low at the time of institution. In the co-pending litigation, PO added the ’407Patent to an Amended Complaint on August 15, 2023 in Case No. 23-cv-11277, which the Court severed on October 13, 2023 as Case No. 23-cv-12372. On October 10, 2023, Dyson filed a motion to dismiss, which remains pending, and Dyson has not yet filed an Answer to the Complaint. Litigation, Dkt. 76. Fact discovery began on 10/30/2023, no depositions have yet been taken. Litigation, Dkts. 103–04. PO served its infringement contentions on

December 15, 2023, and Petitioners filed this petition within three months of those contentions. Ex1022.

Factor 4 favors institution because there is little overlap between the two proceedings. This Petition challenges 23 claims not at-issue in the Litigation, *see* Ex1021, 2; and Petitioners stipulate that, unless the Board denies or later vacates institution of this Petition, Petitioners will not seek resolution of invalidity in the copending litigation based on the specific grounds asserted in this Petition. Ex1024.

Factor 5 favors institution because although Petitioners and PO are also parties to the parallel litigations, the expected timing of the trial date favors institution. *Fusion Orthopedics, LLC v. Extremity Medical, LLC*, IPR2023-00894 Paper 15, at 32 (PTAB Nov. 17, 2023).

Factor 6 favors institution because, as shown in Section VIII, this Petition presents a compelling case of invalidity, based entirely on art that was not of record during prosecution.

The *General Plastics* factors favor institution because this is the only petition against the '407Patent. *General Plastics Indus. Co., Ltd. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19, 9-10 (PTAB Sept. 6, 2017).

B. §325(d)

The §325(d) factors favor institution. The relied-upon references were not previously before the Office, nor are they cumulative. *Advanced Bionics, LLC v.*

MED-EL Elektromedizinische Geräte GmbH, IPR2019-01469, Paper 6, 9-11 (PTAB Feb. 13, 2020) (precedential).

X. SECONDARY CONSIDERATIONS

Petitioners are unaware of any secondary considerations of non-obviousness.

XI. MANDATORY NOTICES UNDER 37 C.F.R. §42.8

A. Real Parties-in-Interest

Petitioners identify themselves as the real parties-in-interest.

B. Related Matters

To the best of Petitioners' knowledge, apart from the above-mentioned litigation, *SharkNinja Operating LLC v. Dyson, Inc.*, No. 1:23-cv-12372 (D. Mass.) (the "Litigation"), the '407 Patent has not been involved in any litigation, *inter partes* or post-grant review prior to this proceeding.

C. Lead and Backup Counsel, Service, and Power of Attorney

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Petitioners concurrently submit a Power of Attorney, 37 C.F.R. § 42.10(b), and consent to electronic service at DysonIPR@kirkland.com.

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

Petitioners concurrently electronically submit the required fees for this Petition. The Board is authorized to charge Deposit Account No. 506092 for any fee deficiency.

Petition for *Inter Partes* Review of U.S. Patent No. 8,607,407

Date: March 8, 2024

Respectfully submitted,

/s/ Christian Huehns

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Attorneys for Petitioner

CERTIFICATE OF COMPLIANCE

This Petition complies with the type-volume limitations as mandated in 37 C.F.R. § 42.24, totaling 13,772 words. Counsel has relied upon the word count feature provided by Microsoft Word.

/s/ Christian Huehns

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§ 42.6(e)(4)(i) *et seq.* and 42.105(b), the undersigned certifies that a copy of the foregoing document with the accompanying Exhibits listed in Petitioner's Exhibit List was caused to be served by Federal Express, costs prepaid, to Patent Owner at the following address of record:

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A copy was also served via electronic mail and FTP on the attorneys of record in the following related matter: SharkNinja Operating LLC et al. v. Dyson, Inc. et al., 1:23-cv-12372-ADB (D. Mass.):

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