

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. IPR2024-01351

U.S. PATENT NO. 7,776,120

PETITION FOR *INTER PARTES* REVIEW

TABLE OF CONTENTS

	<u>Page</u>
I. INTRODUCTION	1
II. STANDING (§42.104(a)).....	3
III. RELIEF REQUESTED (§42.104(b)).....	3
IV. OVERVIEW OF THE '120Patent.....	4
A. The Specification.....	4
B. The Prosecution History.....	5
V. OVERVIEW OF PRIOR ART.....	7
A. Jung.....	7
B. Min	10
C. Jeong.....	13
D. Soler.....	16
E. Gammack.....	18
F. Davis.....	20
VI. LEVEL OF ORDINARY SKILL IN THE ART	21
VII. CLAIM CONSTRUCTION.....	21
VIII. THE CHALLENGED CLAIMS ARE UNPATENTABLE.....	22
A. Ground 1: Jung Anticipates [1]/[3]-[5]/[7]/[9]-[12]/[14]-[19].....	22
1. [1]/[9]/[16]/[18].....	22
2. [3]	36
3. [4]	37
4. [5]	38

TABLE OF CONTENTS (CONT'D)

	<u>Page</u>
5. [7]	38
6. [10]/[11]	38
7. [12]	40
8. [14]	41
9. [15]/[19]	41
10. [17]	42
11. Jung's Figures 5-8 Embodiment Also Teaches [16]/[17]	43
B. Ground 2: Min Anticipates [1]/[3]-[5]/[7]/[9]-[12]/[14]-[19]	47
1. [1]/[9]/[16]/[18]	47
2. [3]	60
3. [4]	61
4. [5]	62
5. [7]	62
6. [10]/[11]	62
7. [12]	64
8. [14]	65
9. [15]/[19]	65
10. [17]	66
C. Ground 3: Jung Renders Obvious [1]/[3]-[7]/[9]-[12]/[14]-[19]	67
1. [6]	68
D. Ground 4: Min Renders Obvious [1]/[3]-[7]/[9]-[12]/[14]-[19]	73

TABLE OF CONTENTS (CONT'D)

	<u>Page</u>
1. [6]	73
E. Ground 5: Jung in Combination with Jeong Renders [8]/[20] Obvious.....	75
1. Jeong Teaches Secondary Cyclones with Storing Chambers and Separated by Guide Ribs That a POSA Would Have Been Motivated to Incorporate into Jung	75
2. [8]/[20]	79
F. Ground 6: Min in Combination with Jeong Renders [8]/[20] Obvious.....	83
1. Jeong Teaches Secondary Cyclones with Storing Chambers and Separated by Guide Ribs That a POSA Would Have Been Motivated to Incorporate into Min.....	83
2. [8]/[20]	84
G. Ground 7: Jung in Combination with Davis Renders [2]/[13] Obvious.	85
1. A POSA Would Have Been Motivated to Incorporate Davis' Helical Ribs into Jung	85
2. [2]/[13]	87
H. Ground 8: Min in Combination with Davis Renders [2]/[13] Obvious.	89
1. A POSA Would Have Been Motivated to Incorporate Davis' Helical Ribs into Min	89
2. [2]/[13]	90
I. Ground 9: Soler Anticipates [1]/[3]-[5]/[9]/[12]/[14]-[15]/[18]- [19]	90
1. [1]/[9]/[18]	90

TABLE OF CONTENTS (CONT'D)

	<u>Page</u>
2. [3]	105
3. [4]/[15]/[19]	108
4. [5]	110
5. [12]	110
6. [14]	111
J. Ground 10: Soler Renders [1]/[3]-[5]/[7]/[9]/[12]/[14]-[19] Obvious.....	111
1. [16]	111
2. [7]/[17]	115
K. Ground 11: Soler in Combination with Gammack Renders [8]/[20] Obvious.....	116
1. Gammack Teaches Downstream Cyclones with Storing Chambers and Separated by Fins That a POSA Would Have Been Motivated to Incorporate into Soler	116
2. [8]/[20]	120
L. Ground 12: Soler in Combination with Davis Renders [2]/[13] Obvious.....	124
1. A POSA Would Have Been Motivated to Incorporate Davis' Helical Ribs into Soler	124
2. [2]/[13]	127
IX. DISCRETIONARY FACTORS FAVOR INSTITUTION	128
A. §314(a).....	128
B. §325(d)	129
X. SECONDARY CONSIDERATIONS	130

TABLE OF CONTENTS (CONT'D)

	<u>Page</u>
XI. MANDATORY NOTICES UNDER 37 C.F.R. §42.8.....	130
A. Real Parties-in-Interest.....	130
B. Related Matters.....	130
C. Lead and Backup Counsel, Service, and Power of Attorney	130
XII. PAYMENT OF FEES UNDER 37 C.F.R. §42.103.....	131

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).....	129
<i>Becton, Dickinson, & Co. v. B. Braun Melsungen AG,</i> IPR2017-01586, Paper 8 (PTAB Dec. 15, 2017)	129
<i>Certain Surface Cleaning Devices and Components Thereof,</i> U.S.I.T.C. Inv. No. 337-TA-1404.....	130
<i>Fasteners for Retail, Inc. v. RTC Indus., Inc.,</i> IPR2019-00994, Paper 9 (PTAB Nov. 5, 2019).....	129
<i>Google LLC v. Valtrus Innovations Ltd.,</i> IPR2022-01197, Paper 12 (PTAB Mar. 29, 2023)	130
<i>Wellman, Inc. v. Eastman Chem. Co.,</i> 642 F.3d 1355 (Fed. Cir. 2011)	<i>passim</i>
Statutes	
35 U.S.C. §311	3
Other Authorities	
37 C.F.R. §42.8	130
37 C.F.R. § 42.10(b)	131
37 C.F.R. §42.100(b)	21
37 C.F.R. §42.103	131

LIST OF EXHIBITS

Exhibit No.	Description
1001	U.S. Patent No. 7,776,120 (“the ’120Patent”)
1002	Declaration of Robert Giachetti
1003	<i>Curriculum Vitae</i> of Robert Giachetti
1004	File History of U.S. Patent No. 7,776,120 (App. No. 11/683,670)
1005	U.S. Patent No. 7,669,282 (“Jung”)
1006	U.S. Patent No. 7,442,219 (“Jeong”)
1007	Complainants’ Complaint Exhibit 47, Technical Domestic Industry Claim Chart regarding the ’120Patent in the related litigation, <i>Certain Surface Cleaning Devices and Components Thereof</i> , U.S.I.T.C. Inv. No. 337-TA-1404 (the “ITC Litigation”)
1008	U.S. Patent App. Pub. No. 2002/0178698 (“Oh”)
1009	U.S. Patent No. 5,267,371 (“Soler”)
1010	U.S. Patent No. 2,542,635 (“Davis”)
1011	U.S. Patent App. Pub. No. 2005/0198771 (“Min”)
1012	U.S. Patent No. 4,637,086 (“Goode”)
1013	U.S. Patent No. 6,766,558 (“Matsumoto”)
1014	U.S. Patent No. 7,060,182 (“Erllich”)
1015	U.S. Patent No. 6,482,252 (“Conrad252”)
1016	U.S. Patent No. 6,607,572 (“Gammack”)
1017	U.S. Patent No. 3,425,192 (“Davis192”)
1018	U.K. Patent Publication No. GB283,179 to Inventia Patent-Verwertungs-Gesellschaft (“IPVG”)

Petition for *Inter Partes* Review of U.S. Patent No. 7,776,120

1019	Swiss Patent No. CH203,675 to Peter (“PeterCH”)
1020	Certified English translation of Swiss Patent No. CH203,675 to Peter (“Peter”)
1021	French Patent No. 1,094,603 (“MartelliereFR”)
1022	Certified English translation of French Patent No. 1,094,603 to Martelliere (“Martelliere”)
1023	U.S. Patent No. 2,768,707 to Campbell (“Campbell”)
1024	U.S. Patent App. Pub. No. 2004/0112022 (“Vuijk”)
1025	U.S. Patent No. 6,344,064 (“Conrad064”)
1026	Cross-Sectional Image of Dyson V10

LIST OF CHALLENGED CLAIMS

Reference Number	Claim Limitation
Claim 1	
[1pre]	A surface cleaning apparatus comprising:
[1a]	a. a dirt inlet;
[1b]	b. a handle;
[1c]	c. a cyclone separator having an outer wall, a fluid inlet downstream from the dirt air inlet and a fluid outlet;
[1d]	d. a plate having a cyclone chamber surface and positioned between a cyclone chamber and a dirt collection chamber, the dirt collection chamber having an openable end, the plate being moveable between an in use position and an emptying position when the openable end is opened wherein, in the emptying position, the plate is in a position to permit dirt in the cyclone chamber and the dirt collection chamber to be removed concurrently; and,
[1e]	e. a fluid flow motor.
Claim 2	
[2]	The surface cleaning apparatus of claim 1 wherein a flow director having a flow directing surface that extends inwardly and downwardly into the cyclone chamber from the outer wall of the cyclone chamber to a position above the plate.
Claim 3	
[3]	The surface cleaning apparatus of claim 1 wherein the openable end of the dirt collection chamber is a bottom.
Claim 4	
[4]	The surface cleaning apparatus as claimed in claim 1 wherein the plate is automatically moved to the emptying position when the openable end is opened.
Claim 5	
[5]	The surface cleaning apparatus as claimed in claim 1 wherein the plate is supported by the openable end.
Claim 6	
[6]	The surface cleaning apparatus as claimed in claim 1 wherein the openable end is removable from the cyclone separator.
Claim 7	
[7]	The surface cleaning apparatus as claimed in claim 1 wherein the openable end is pivotally mounted to the cyclone separator.

Reference Number	Claim Limitation
Claim 8	
[8]	The surface cleaning apparatus as claimed in claim 1 further comprising a cyclonic stage downstream from the cyclone separator and comprising a plurality of cyclones in parallel wherein at least some of the plurality of cyclones is each provided with a divider plate.
Claim 9	
[9pre]	A surface cleaning apparatus comprising:
[9a]	(a) a dirt inlet;
[9b]	(b) a handle;
[9c]	(c) a cyclone separator comprising a cyclone chamber and a dirt collection chamber, the cyclone separator having a fluid inlet downstream from the dirt air inlet, an openable end and a fluid outlet;
[9d]	(d) a plate positioned between the cyclone chamber and the dirt collection chamber at an openable end, the plate is moveably mounted between an in use position and an emptying position wherein the plate is in a position to permit dirt in the cyclone chamber and the dirt collection chamber to be removed concurrently; and
[9e]	(e) a fluid flow motor.
Claim 10	
[10]	The surface cleaning apparatus of claim 9 wherein the plate has a hand grip portion.
Claim 11	
[11]	The surface cleaning apparatus of claim 10 wherein the hand grip portion comprises a shaft extending away from the plate.
Claim 12	
[12]	The surface cleaning apparatus of claim 9 wherein the dirt collection chamber extends under the plate.
Claim 13	
[13]	The surface cleaning apparatus of claim 9 wherein a flow director having a flow directing surface that extends inwardly and downwardly into the cyclone chamber from the outer wall of the cyclone chamber to a position above the plate.
Claim 14	

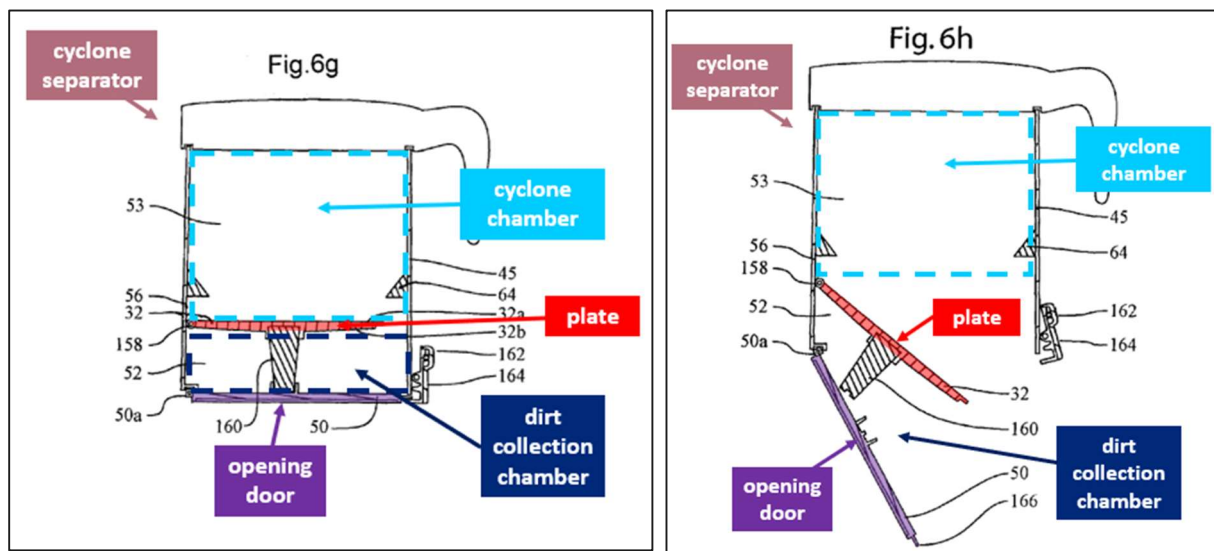
Reference Number	Claim Limitation
[14]	The surface cleaning apparatus as claimed in claim 9 wherein the surface cleaning apparatus is selected from the group consisting of a vacuum cleaner, a sweeper and a carpet extractor.
Claim 15	
[15]	The surface cleaning apparatus of claim 9 wherein the plate is moveable subsequent to the openable end being opened.
Claim 16	
[16pre]	A surface cleaning apparatus comprising:
[16a]	(a) a dirt inlet;
[16b]	(b) a handle;
[16c]	(c) a cyclone separator comprising a cyclone chamber and a dirt collection chamber, the cyclone separator having a fluid inlet downstream from the dirt air inlet, an openable end and a fluid outlet;
[16d]	(d) a plate positioned between the cyclone chamber and the dirt collection chamber, wherein the plate is pivotally mounted to the outer wall of the cyclone separator; and,
[16e]	(e) a fluid flow motor.
Claim 17	
[17]	The surface cleaning apparatus as claimed in claim 16 wherein the plate is pivotally mounted to the cyclone chamber.
Claim 18	
[18pre]	A surface cleaning apparatus comprising:
[18a]	(a) a dirt inlet;
[18b]	(b) a handle;
[18c]	(c) a cyclonic unit comprising a cyclone chamber and a dirt collection chamber and having an openable end;
[18d]	(d) the cyclone chamber having an outer wall, a fluid inlet downstream from the dirt air inlet and a fluid outlet;
[18e]	(e) a plate positioned at the openable end and having a cyclone chamber surface and positioned between the cyclone chamber and the dirt collection chamber, the plate being supported by the openable end; the plate is moveably mounted between an in use position and an emptying position wherein, in the emptying position, the plate is in a position to permit dirt in the cyclone chamber and the dirt collection chamber to be removed concurrently and,

Petition for *Inter Partes* Review of U.S. Patent No. 7,776,120

Reference Number	Claim Limitation
[18f]	(f) a fluid flow motor.
Claim 19	
[19]	The surface cleaning apparatus as claimed in claim 18 wherein the plate is moveable to a emptying position when the openable end is opened.
Claim 20	
[20]	The surface cleaning apparatus as claimed in claim 18 further comprising a cyclonic unit comprising a plurality of cyclones in parallel and a plurality of divider plates.

I. INTRODUCTION

U.S. Patent No. 7,776,120 (“the ’120Patent”) relates to a “cyclonic surface cleaning apparatus” (e.g., a cyclonic vacuum cleaner) with a **plate** “substantially divid[ing a] **cyclone separator** into a **cyclone chamber** and a **dirt collection chamber**.”¹ Ex1001, Abstract, 1:6-17. The **plate** may be “moveable when a door, e.g., a bottom **opening door 50**” of the cyclone separator is opened:

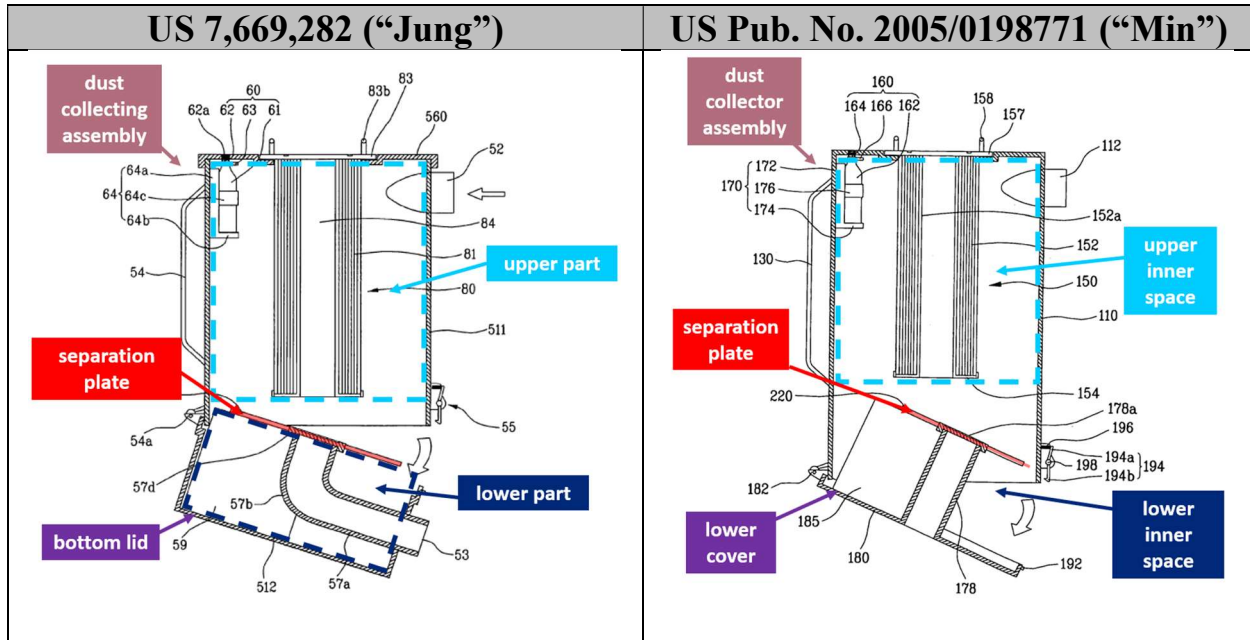


Id., 31:6-19, Figs. 6g-6h; Ex1002 ¶¶50-52.

However, the prior art taught this configuration years before: for example, two references from LG Electronics each use the “cyclone principle” in a **dust collecting assembly/dust collector assembly** with a **separation plate** that separates a cyclone chamber (**upper part/upper inner space**) and a dirt collection chamber (**lower**

¹ All emphasis and image annotations added unless otherwise specified.

part/lower inner space) and that is moveable when a bottom lid/lower cover opens:



Ex1005, 6:29-40; 10:4-17; 12:10-19, Fig. 11; Ex1011, Fig. 10, ¶¶16, 70-73, 98-100; Ex1002 ¶¶5,80,91-122,176-202.

The '120Patent's claims' remaining elements are directed to well-known vacuum components (*e.g.*, a dirt inlet, a handle, and a fluid flow motor), the combination of which does not purport to provide any technical benefit or solve any purported problem. *See generally* Ex1001. These basic components were likewise well-known in the prior art, which anticipates or renders obvious all challenged claims.

II. STANDING (§42.104(A))

Petitioners certify that the '120 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 1-20 as follows²:

Prior Art	Basis (Pre-AIA)
U.S. 7,669,282 (“Jung”), filed 12/08/2004, issued 03/02/2010	102(e)
U.S. 7,442,219 (“Jeong”), filed 09/23/2005, issued 08/28/2008	
U.S. Patent App. Pub. No. 2005/0198771 (“Min”), filed 12/8/2004, published 09/15/2005	102(e); 102(a)
U.S. 5,267,371 (“Soler”), issued 12/07/1993	102(b)
U.S. 6,607,572 (“Gammack”), issued 08/19/2003	
U.S. 2,542,635 (“Davis”), issued 02/20/1951	

Grounds	Claims	Basis
1	1, 3-5, 7, 9-12, 14-19	§102; Jung
2	1, 3-5, 7, 9-12, 14-19	§102; Min

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

Grounds	Claims	Basis
3	1, 3-7, 9-12, 14-19	§103; Jung
4	1, 3-7, 9-12, 14-19	§103; Min
5	8, 20	§103; Jung and Jeong
6	8, 20	§103; Min and Jeong
7	2, 13	§103; Jung and Davis
8	2, 13	§103; Min and Davis
9	1, 3-5, 9, 12, 14-15, 18-19	§102; Soler
10	1, 3-5, 7, 9, 12, 14-19	§103; Soler
11	8, 20	§103; Soler and Gammack
12	2, 13	§103; Soler and Davis

IV. OVERVIEW OF THE '120PATENT

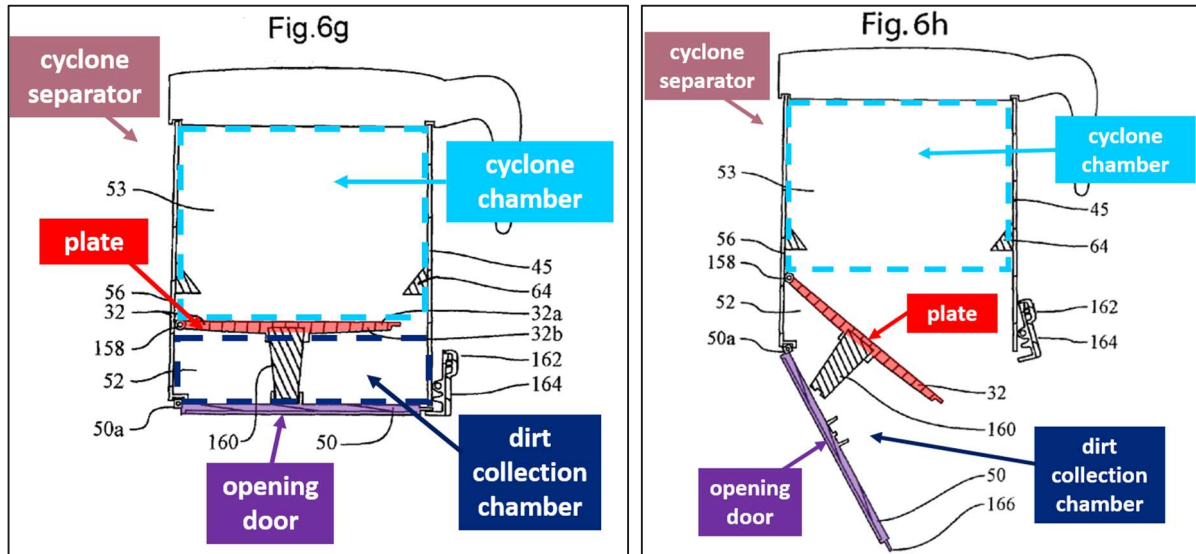
The '120Patent, titled “Vacuum Cleaner with a Moveable Divider Plate,” issued from U.S. Application No. 11/683,670, filed 03/08/2007, and claims priority to U.S. Provisional Application No. 60/780,824, filed 03/10/2006.³ Ex1001, Cover.

A. The Specification

The '120Patent relates to a vacuum cleaner with a **plate** that divides a **cyclone separator** into a **cyclone chamber** and a **dirt collection chamber**. Ex1001, 1:5-10,

³ Petitioners reserve the right to challenge priority in co-pending litigation.

26:53-68. The **plate** may be “moveable when a door, e.g., a bottom **opening door**” is opened:

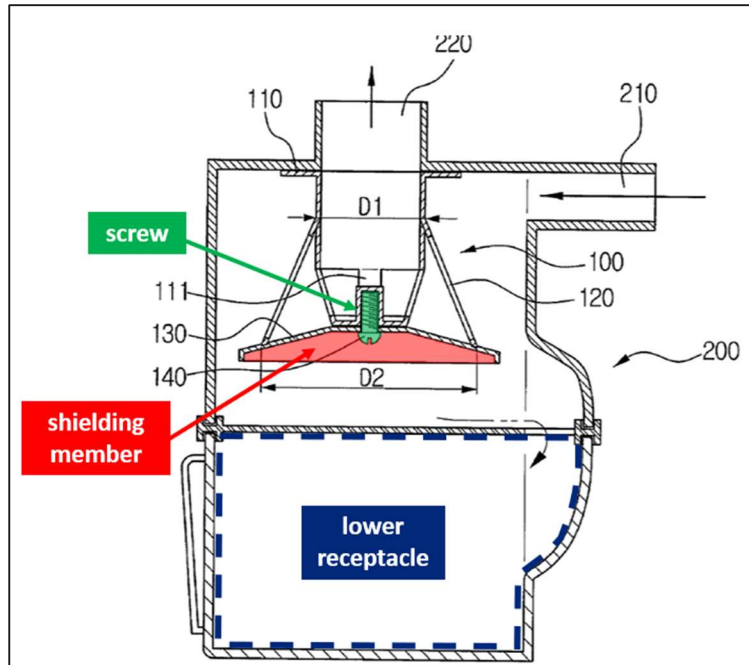


Id., 31:6-19, Figs. 6g-6h; Ex1002 ¶¶50-51.

The '120Patent's vacuum cleaner also has well-known features including “a dirt inlet,” “a handle,” and “a fluid flow motor”—the combination of which does not purport to solve any problem. Ex1001, Claims; Ex1002 ¶¶43-44,52-52.

B. The Prosecution History

During prosecution, the Examiner rejected most pending claims as anticipated by U.S. 2002/0178698 (“Oh”). Ex1004, 188. Oh teaches a “cyclone dust collecting apparatus for a vacuum cleaner” with a **lower receptable** and a **shielding member 130** that can “be removed ... by unscrewing the **screw 140**”:



Ex1008, Fig. 3 ¶¶15-17; Ex1002 ¶55.

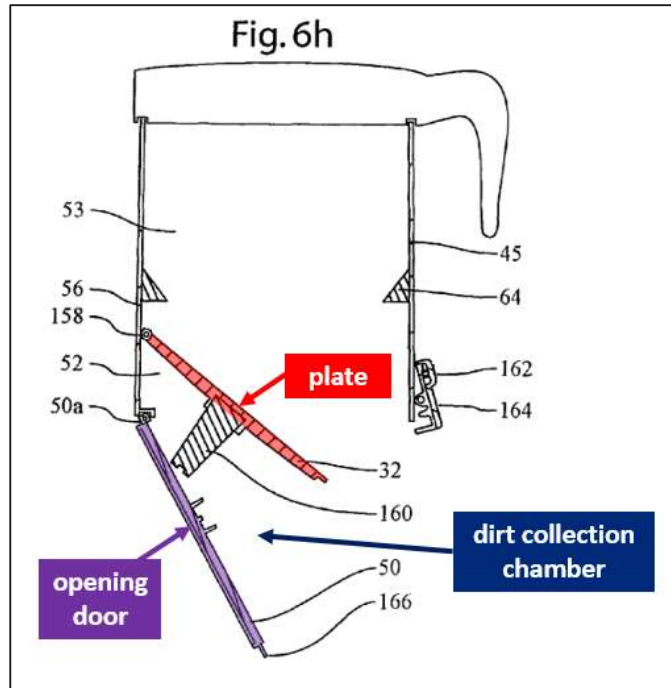
In response, PO amended claim 1 to require the dirt collection chamber “hav[e] an openable end” and the plate to be “moveable to an emptying position when the openable end is opened”:

(d) a plate having a cyclone chamber surface and positioned between to substantially divide the cyclone separator into a cyclone chamber and a dirt collection chamber, the dirt collection chamber having an openable end, the plate being removably mounted in the cyclone separator, moveable to an emptying position when the openable end is opened;

Ex1004, 197; Ex1002 ¶56.

PO identified Fig. 6h as showing how “the **openable end** of the **dirt collection chamber** is in the open position and the **plate 32** has moved to an empty position.”

Ex1004, 204.



Ex1001, Fig. 6h; Ex1002 ¶57.

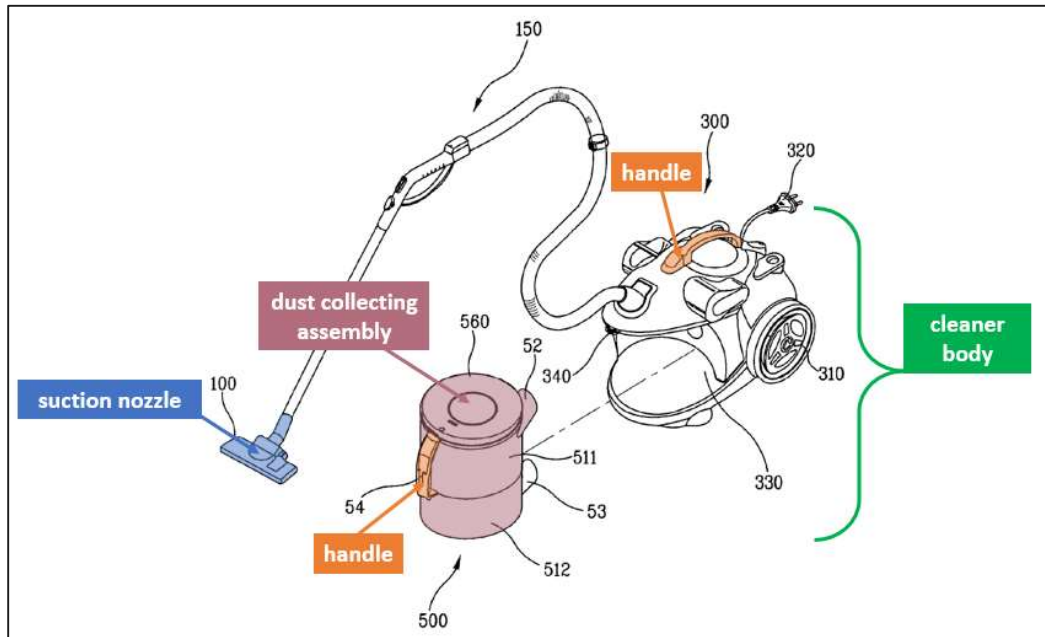
PO argued this amendment distinguished Oh, whose “**shielding member 130** would remain in position” when “the **lower dust receptacle** ... is removed.” Ex1004, 204; Ex1008, Fig. 3; Ex1002 ¶58. The Examiner then issued a Notice of Allowance following an Examiner’s Amendment. Ex1004, 210-217. However, PO’s claimed “moveable” plate, and the other limitations in the ’120Patent’s claims, were well-known and taught by prior art that was not before the Examiner. Ex1002 ¶¶59-60.

V. OVERVIEW OF PRIOR ART

A. Jung

Jung is a U.S. Patent assigned to LG Electronics, filed 12/08/2004. Ex1005, Cover. Jung teaches a “vacuum cleaner” with a “suction nozzle,” two handles,

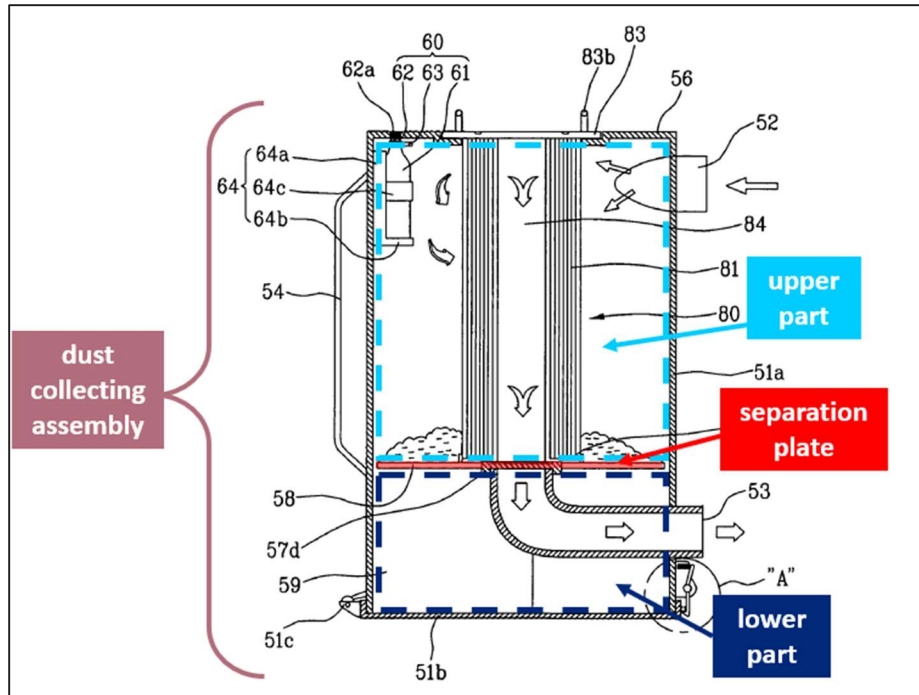
including **handle 54**, a detachable **dust collecting assembly** to “separate[] and collect[] the impurities contained in the polluted air” via “a cyclone principle,” and a **cleaner body** that includes “a motor for generating air suction”:



Ex1005, 1:14-16, 4:50-54, 5:18-22, 6:6-11, 6:29-40, 11:57-12:12, 12:46-13:10, 13:36-53, Figs. 2, 12; Ex1002 ¶62.

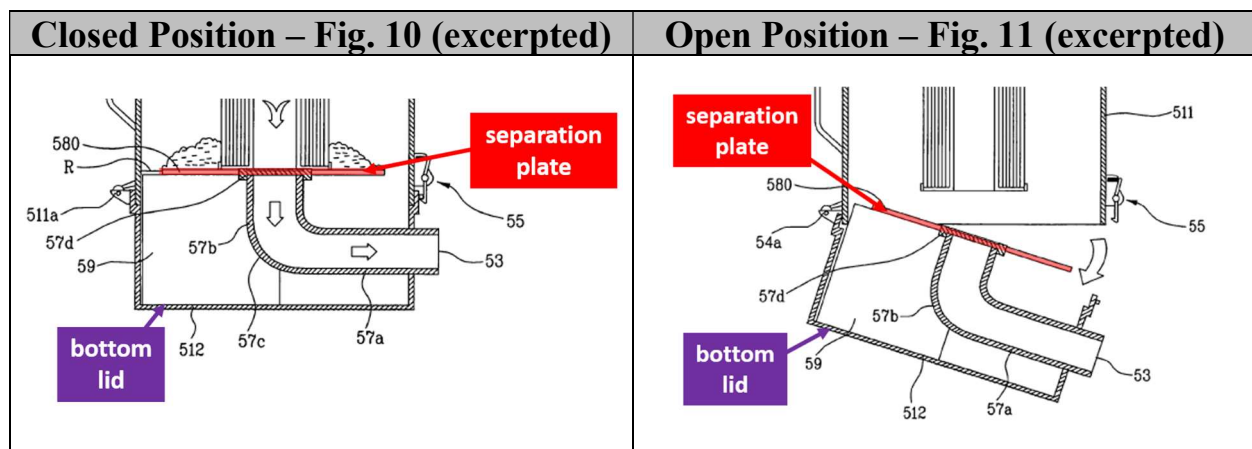
Jung teaches a **separation plate** that separates a cyclonic **dust collecting assembly** into an **upper part**, where impurities are separated using the cyclone principle, and a **lower part**, where the “impurities [are] collected” and “prevented from being interfered by the air flow.”⁴

⁴ Jung alternatively refers to these regions as “top space,” “upper space,” or “upper part,” and “bottom space,” “lower space,” or “lower part,” respectively. *See*



Ex1005, Fig. 10, 6:29-40, 10:4-17, 11:60-12:12, 12:62-13:10; Ex1002 ¶63.

The **dust collecting assembly** has an openable **bottom lid**, and “the **separation plate** [is] rotated at the same time when the **bottom lid** [] is rotated”:

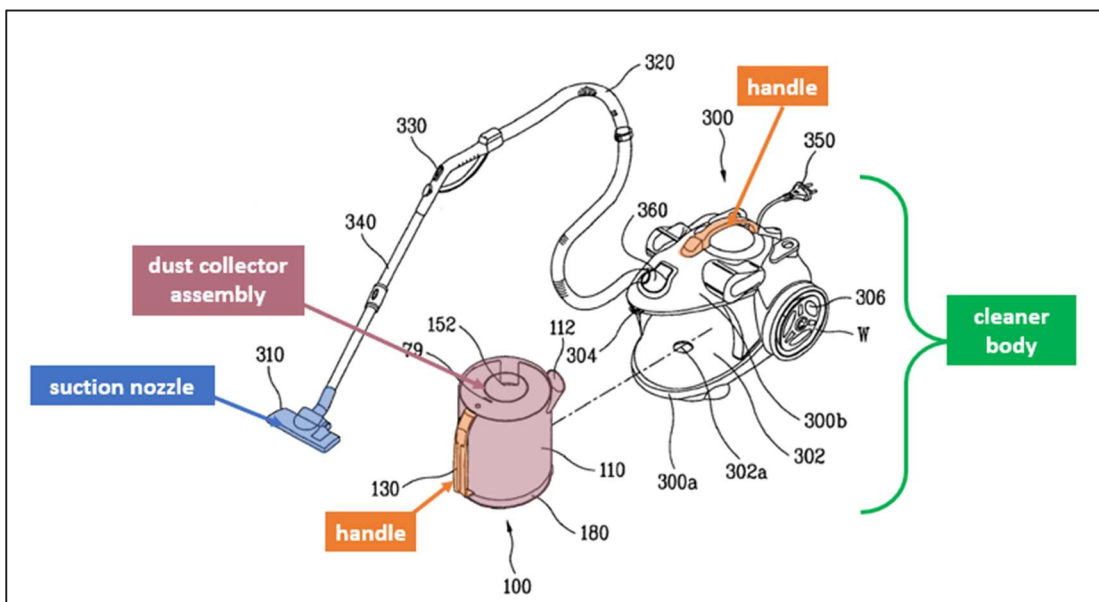


Ex1005, 10:4-8, 11:57-12:12, 13:1-7; Ex1002 ¶63. Petitioners use “upper part” and “lower part” herein.

Ex1005, Figs. 8, 11, 10:18-24, 12:13-39; Ex1002 ¶¶64.

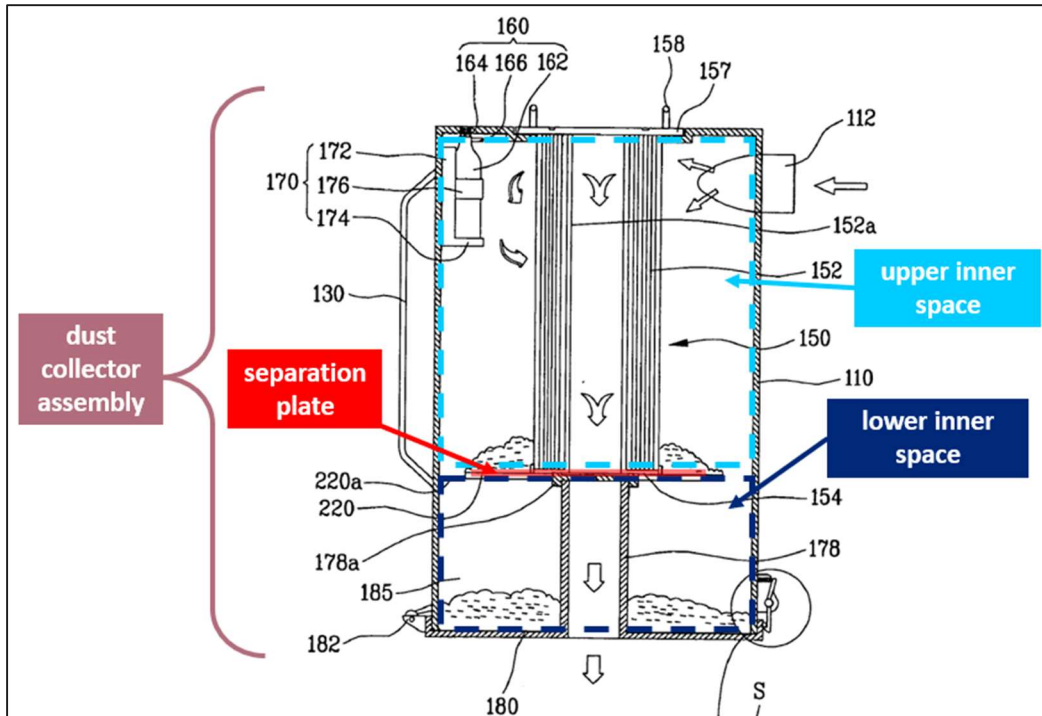
B. Min

Min is a U.S. Patent Publication assigned to LG Electronics, filed 12/08/2004. Ex1011, Cover. Like Jung, Min teaches a “vacuum cleaner” with a **suction nozzle**, two **handles**, including **handle 130**, a detachable cyclonic **dust collector assembly**, and a **cleaner body** with a motor for generating air suction.



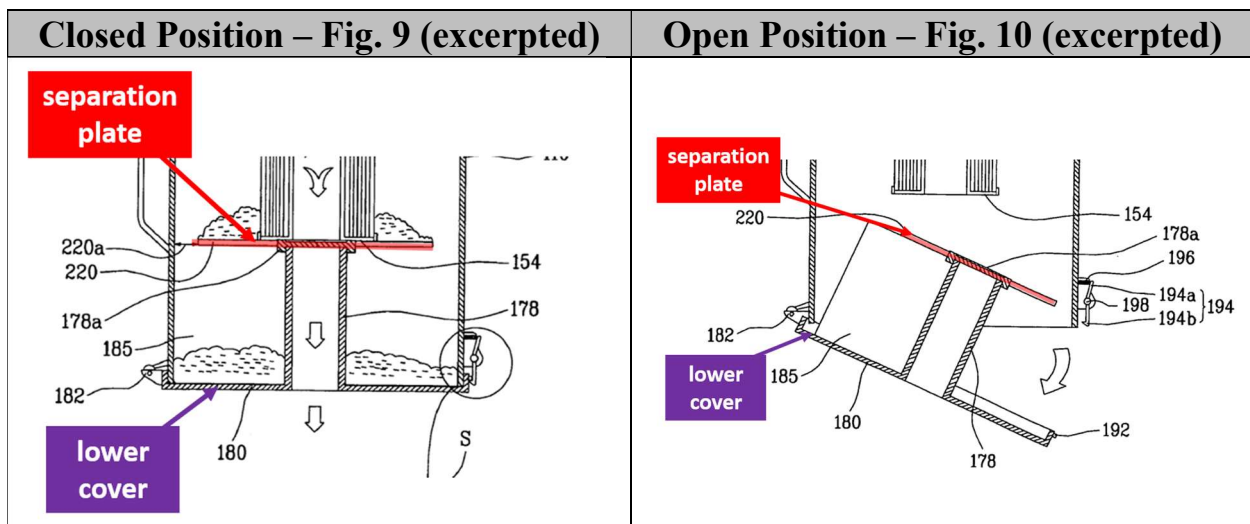
Ex1011, ¶¶117-119, Fig. 12; Ex1002 ¶65.

Like Jung, Min discloses a **separation plate** that separates the cyclonic **dust collector assembly** into an **upper inner space**, where impurities are separated using a cyclone, and a **lower inner space**, where “impurities with large masses” accumulate:



Ex1011, Figs. 9-10, ¶¶16, 70-73, 98-100; Ex1002 ¶66.

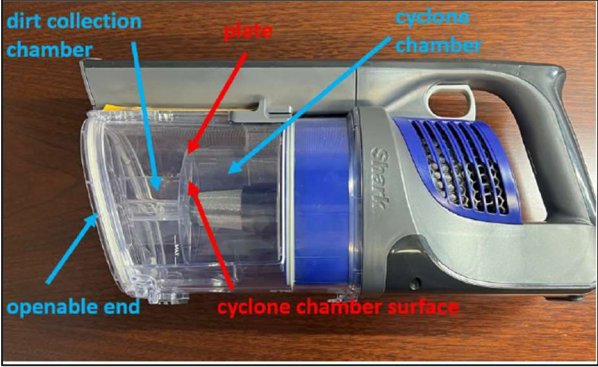
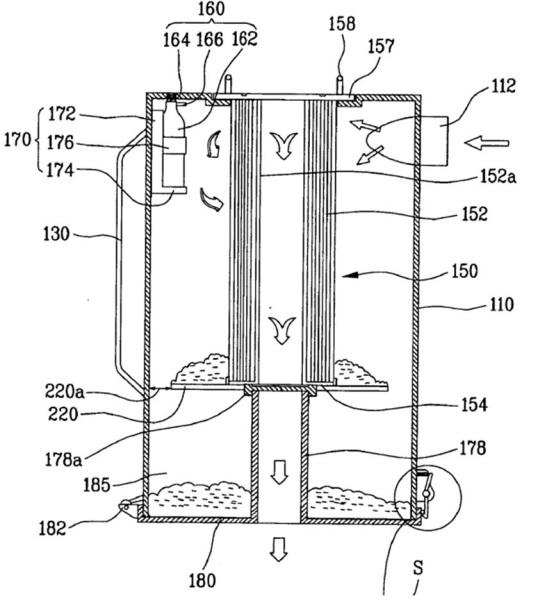
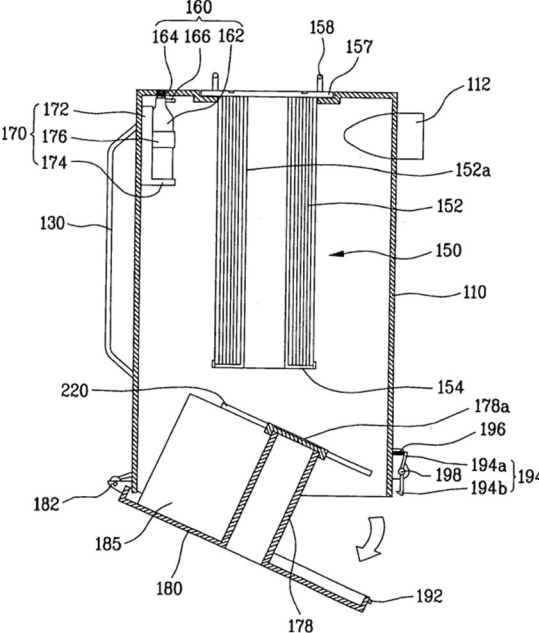
The **dust collecting assembly** has an openable **lower cover**, and the **separation plate** “rotates together with the **lower cover**”:



Ex1011, Figs. 9-10, ¶¶99-100; Ex1002 ¶67.

Petition for *Inter Partes* Review of U.S. Patent No. 7,776,120

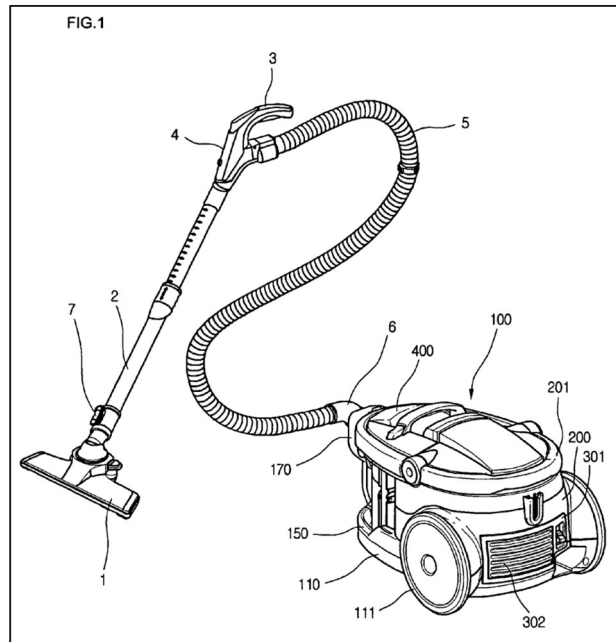
In the co-pending ITC Litigation, PO contended that certain alleged domestic industry products resembling Min practice most of the '120Patent's claims:

Alleged Domestic Industry Products	Min
 A photograph of a Shark brand handheld vacuum cleaner. The device is shown from a side-front perspective. Labels with arrows point to various components: 'dirt collection chamber' (pointing to the clear plastic front), 'plate' (pointing to a red internal component), 'cyclone chamber' (pointing to the blue cylindrical section), 'openable end' (pointing to the bottom of the clear chamber), and 'cyclone chamber surface' (pointing to the side of the blue section).	 A cross-sectional diagram of a vacuum cleaner assembly. The diagram shows a vertical housing with internal components. At the top, there is a motor assembly (160) with parts 164, 166, and 162. Below the motor, there is a cyclone assembly (158, 157) and a dirt collection chamber (112). The diagram includes various numbered components such as 172, 176, 174, 130, 220a, 220, 178a, 185, 182, 180, 152a, 152, 150, 110, 154, 178, and 180. Arrows indicate the flow of air and debris through the system.
 A photograph of the same Shark brand handheld vacuum cleaner, but with the clear plastic front removed. A red arrow points to a red plate (178) that is in the 'emptying position'. A red label indicates that 'dirt in the cyclone chamber and the dirt collection chamber is removed concurrently'.	 A cross-sectional diagram of the vacuum cleaner assembly in an emptying position. The diagram shows the internal components, including the motor assembly (160), cyclone assembly (158, 157), and dirt collection chamber (112). The diagram includes various numbered components such as 172, 176, 174, 130, 220, 178a, 185, 182, 180, 152a, 152, 150, 110, 154, 178, 196, 194a, 194b, 192, and 178. Arrows indicate the flow of air and debris through the system.

Ex1011, Figs. 9-10; Ex1007, 6, 8.

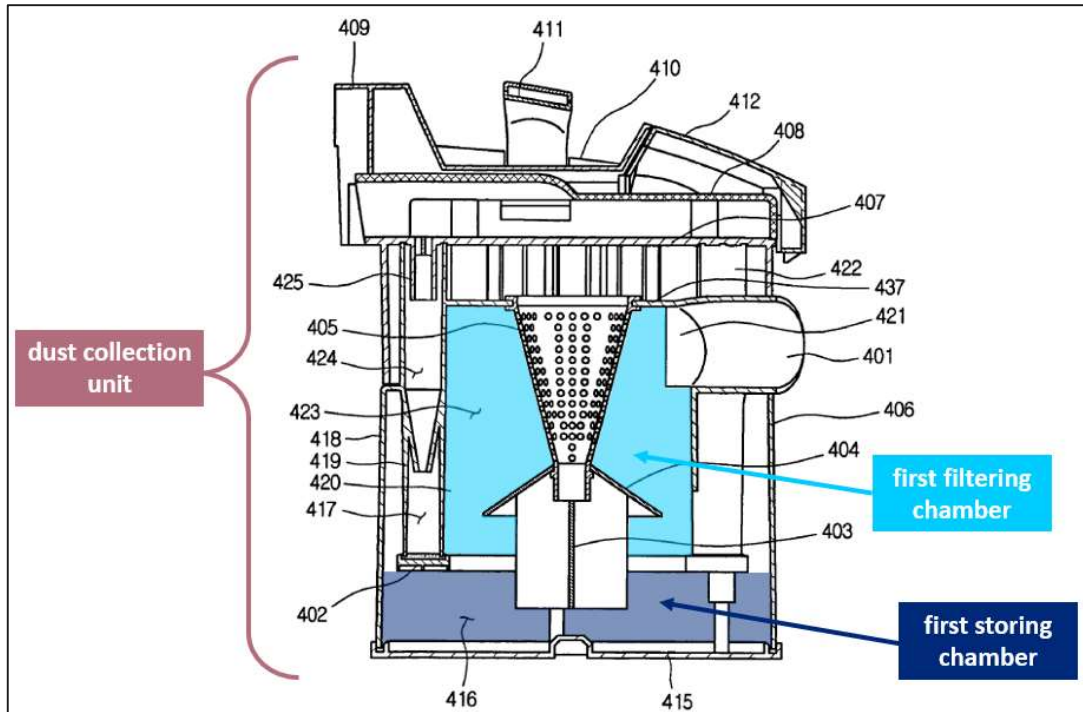
C. Jeong

Jeong is a U.S. Patent also assigned to LG Electronics, filed 09/23/2005, for a similar vacuum cleaner to Jung and Min:



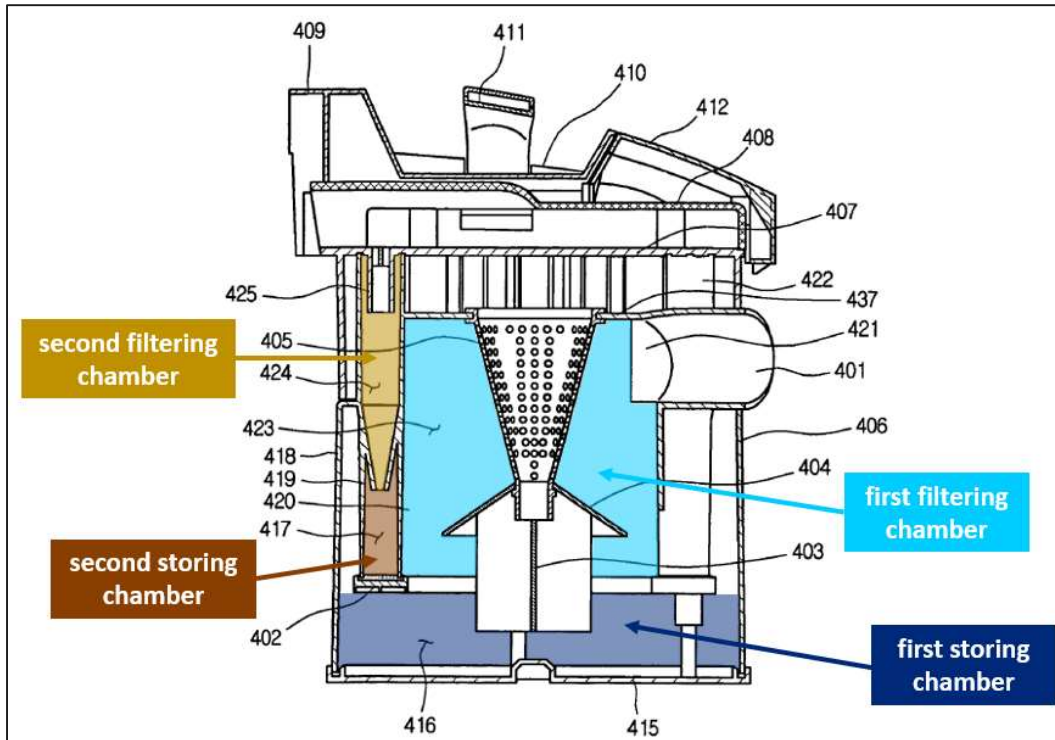
Ex1006, Cover, Fig. 1.

Jeong teaches a **dust collection unit** that uses “cyclone airflow” in a “**first filtering chamber**” and uses a “**first storing chamber 416**... under the **first filtering chamber 423** to store the [filtered] foreign objects....”



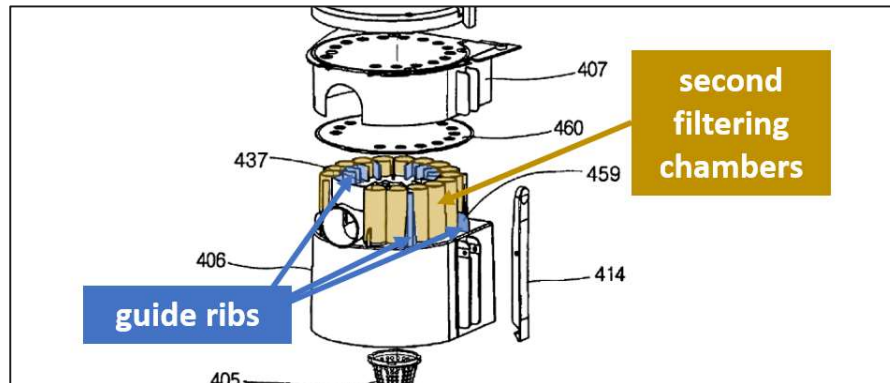
Ex1006, 6:20-53, Fig. 7; Ex1002 ¶69.

Jeong further teaches a plurality of **second filtering chambers 424** to “filter the foreign objects still contained in the air and introduced via the **first filtering chamber 423** by generating the cyclone airflow.” Ex1006, 6:20-57, Fig. 7; Ex1002 ¶70. “The foreign objects filtered in the **second filtering chambers 424** by the cyclone airflow are settled in the **second storing chamber 417**,” and “to prevent the settle[d] foreign objects from flying, a width of each of the lower portion of the **second filtering chambers []** are narrowed.”



Ex1006, 9:29-33, Fig. 7; Ex1002 ¶70.

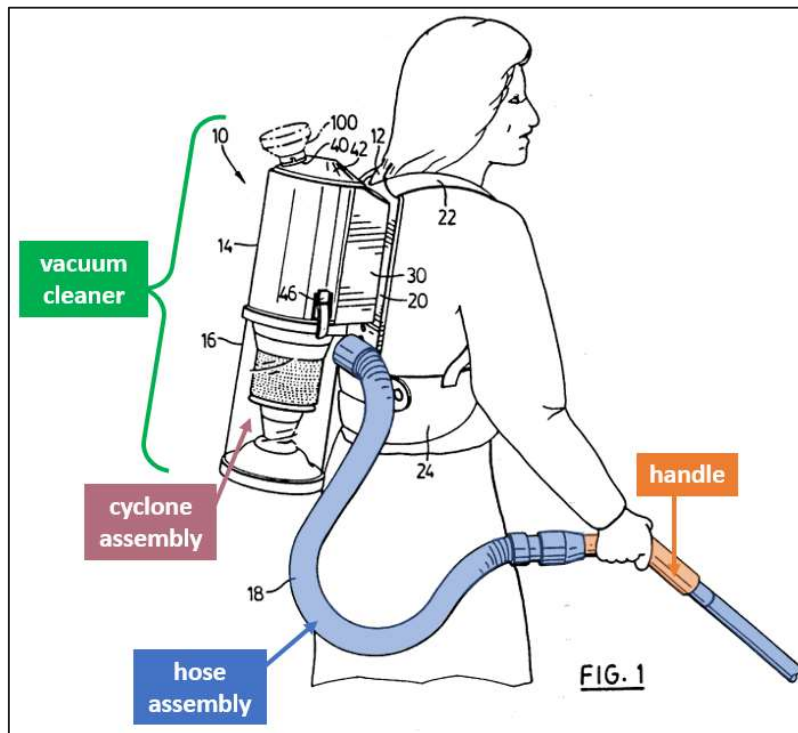
Jeong teaches that a “plurality of **guide ribs 459** are formed on” an outer circumference of a collection body of the **dust collection unit** and illustrates that the “plurality of **guide ribs 459**” are placed between the **second filtering chambers**:



Ex1006, 6:15-19, 6:58-60, Fig. 5 (excerpted); Ex1002 ¶71.

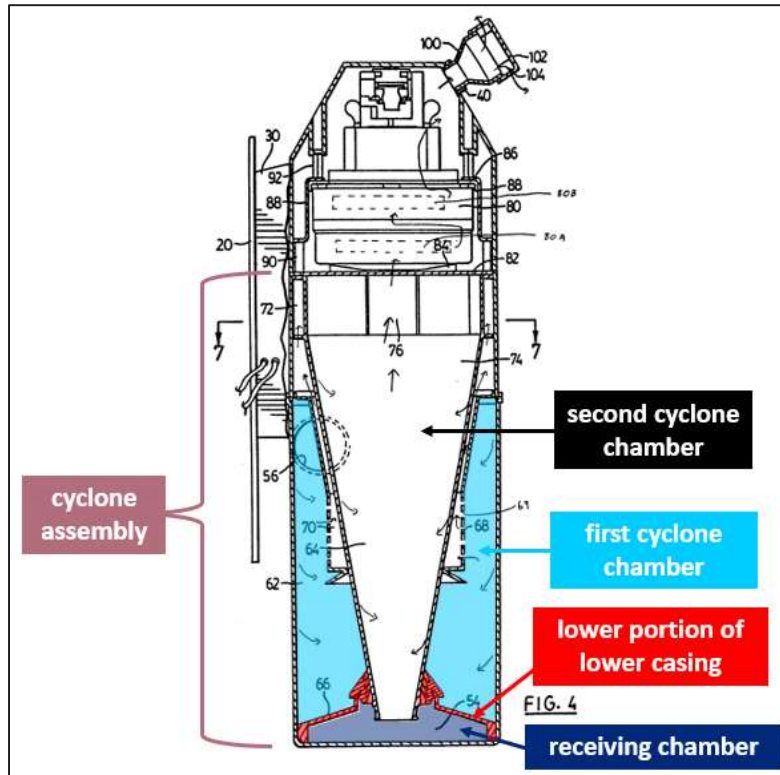
D. Soler

Soler is a U.S. Patent issued on 12/07/1993. Ex1009, Cover. Soler teaches a cyclonic **vacuum cleaner 10** with a **hose assembly 18**, a **handle**, and a **cyclone assembly**:



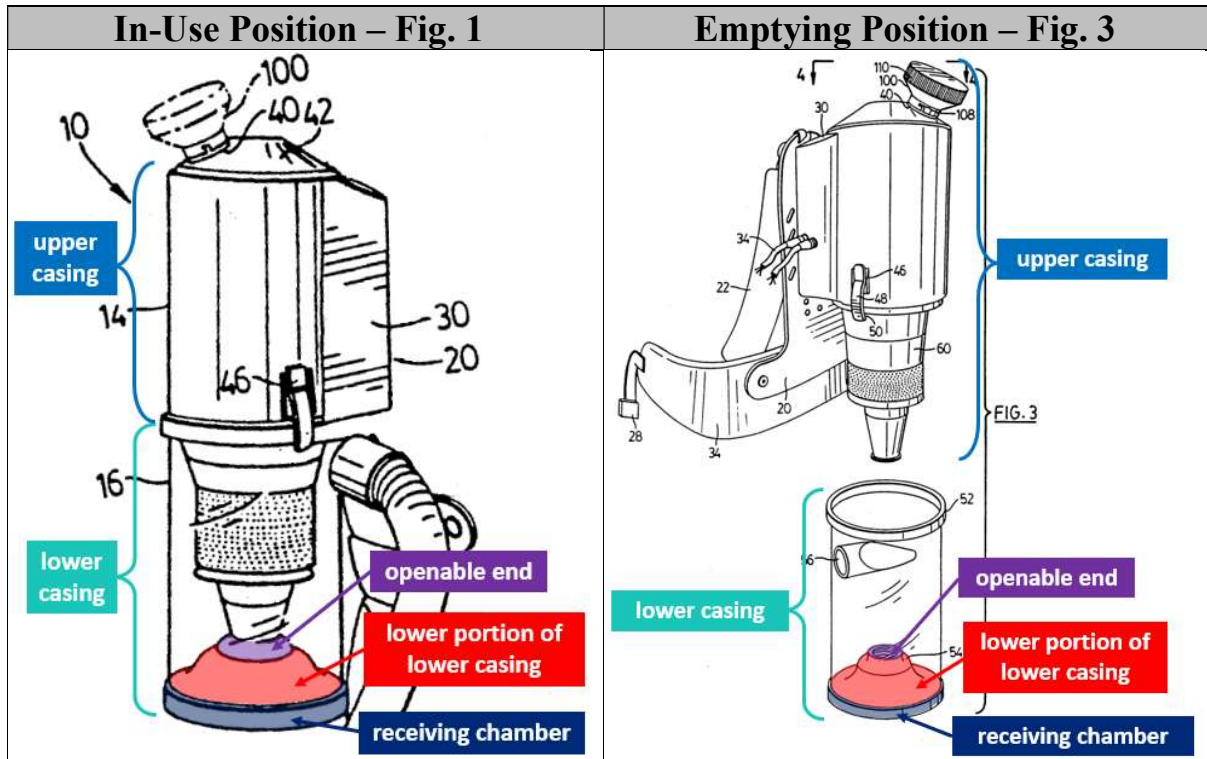
Ex1009, 4:10-16, 6:5-15, Fig. 1; Ex1002 ¶72.

The **cyclone assembly** comprises a **first cyclone chamber 62** and a **second cyclone chamber 64** for separating dirt from air. Ex1009, 6:5-37. “The larger and heavier dirt” from the **first cyclone chamber 62** “is deposited in the **lower portion of lower casing [66]**” and “finer dirt particles” from the **second cyclone chamber 64** are deposited in **receiving chamber 54**.



Ex1009, 5:59-60, 6:5-37, Fig. 4; Ex1002 ¶73.

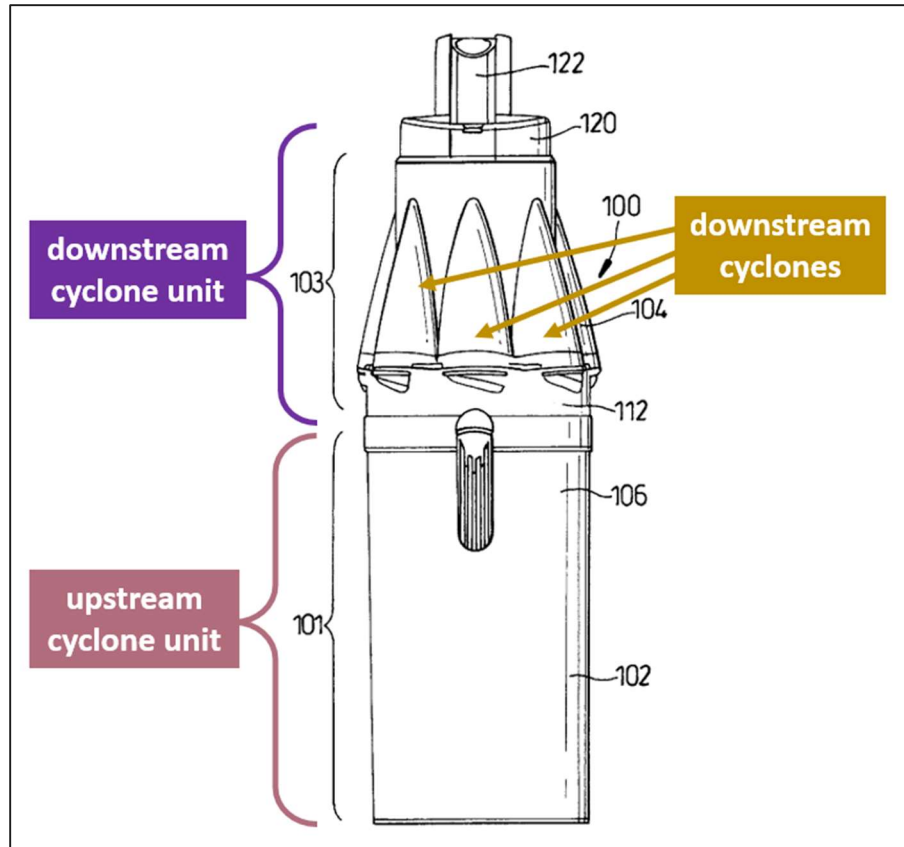
Soler's **lower casing 16** is "releasably mounted on **upper casing 14**" such that when the **upper casing 14** is released, the **lower portion of lower casing** moves downward from an in-use position into an emptying position, and an **openable end** of **receiving chamber 54** is opened.



Ex1009, 5:46-57, Figs. 1 (excerpted), 3; Ex1002 ¶74.

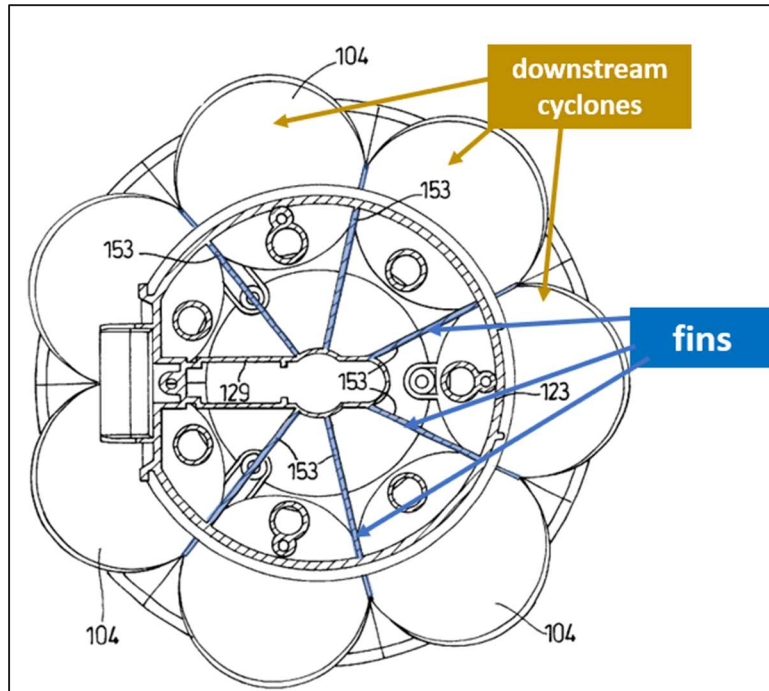
E. Gammack

Gammack is a U.S. Patent issued 08/19/2003. Ex1016, Cover. Gammack teaches a vacuum cleaner with a single “**upstream cyclone 102**” and a “**downstream cyclone unit 103** including a plurality of **downstream cyclones 104**”:



Ex1016, 4:9-27, Fig. 2a; Ex1002 ¶75.

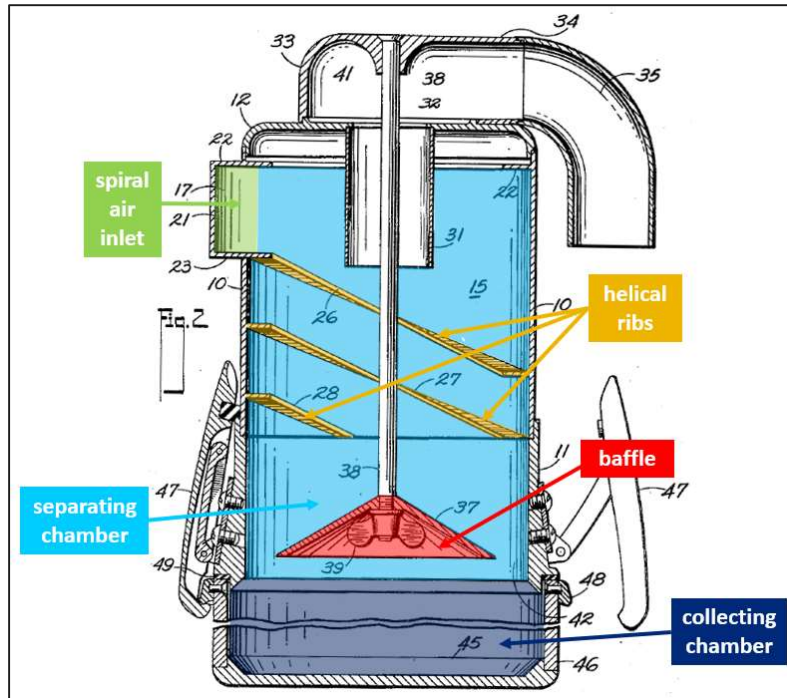
Gammack teaches that “**fins** are provided between the second ends of adjacent [downstream] cyclones”:



Ex1016, 5:50-65; Claims, Fig. 5; Ex1002 ¶76.

F. Davis

Davis is a U.S. Patent issued on 02/20/1951. Ex1010, Cover. Davis teaches a dust separator with a “**separating chamber 15**, within which [dust] ... is separated from the air.” *Id.*, 2:58-3:1. Davis teaches that “dust-laden air enters the **separating chamber**” via an inlet conduit that merges into **spiral air inlet 17**, and **helical ribs** then “direct the air in a helical path.” Ex1010, 3:4-10, 3:30-34; 3:59-64, Fig. 2; Ex1002 ¶77. A **baffle 37** leaves “an annular passage 42 through which dust passes from the **separating chamber** into a **collecting chamber 45**” and keeps “substantially all of the air” above **baffle 37** and “seals off” the area below it:



Ex1010, 4:19-24, 5:23-46, 6:74-8:10, Fig. 2; Ex1002 ¶¶77.

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, e.g., vacuum cleaners. Ex1002 ¶41. Additional education could offset less experience and vice versa, and a POSA could have also obtained similar knowledge/experience through other means. *Id.*

VII. CLAIM CONSTRUCTION

Petitioners are unaware of any “prior claim construction determination” related to the ’120 Patent. 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) (internal quotes and citation omitted). Petitioners do not believe 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.⁵

VIII. THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. Ground 1: Jung Anticipates [1]/[3]-[5]/[7]/[9]-[12]/[14]-[19]

1. [1]/[9]/[16]/[18]

a. [1pre]/[9pre]/[16pre]/[18pre]⁶

If the preambles are limiting, Jung teaches vacuum cleaners which are “surface cleaning apparatus[es].” Ex1005, Abstract, 1:14-21, 4:44-49, 11:57-60, 12:46-50, Figs. 1-3, 12; Ex1002 ¶¶84-85.

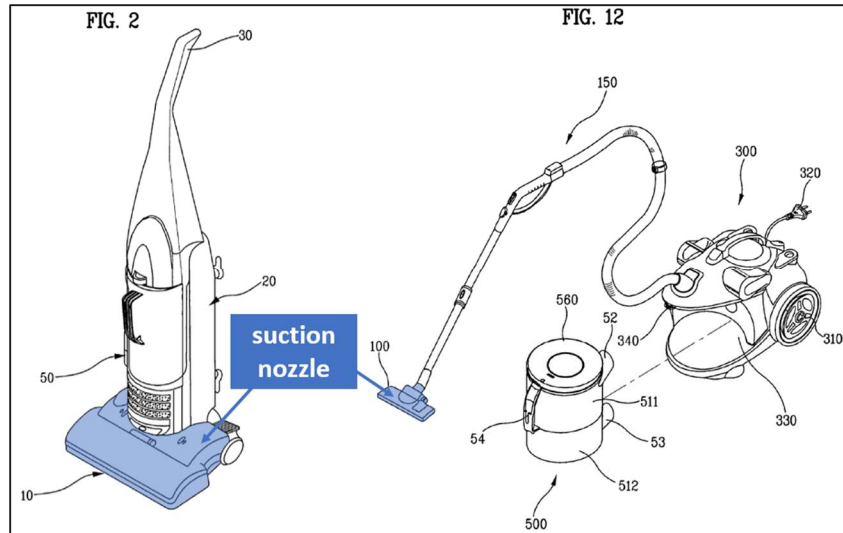
b. [1a]/[9a]/[16a]/[18a]

Jung teaches a “dirt inlet”/“dirt air inlet.”⁷ Ex1002 ¶86. Jung’s vacuum cleaners include “**suction nozzle 10**” for “sucking air containing impurities” and “**suction nozzle 100**” for the same and thus teaches a “dirt inlet”/“dirt air inlet”:

⁵ Petitioners reserve all rights to raise claim construction and other arguments in litigation.

⁶ List of Challenged Claims, *supra*.

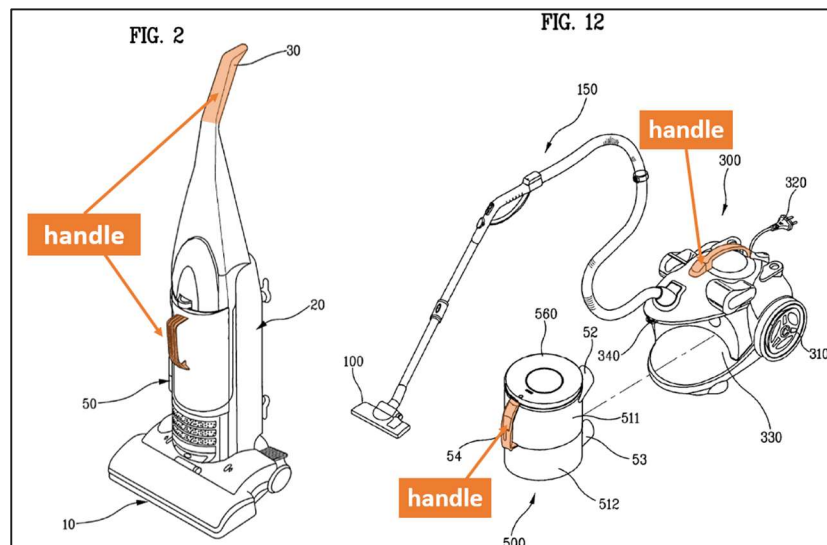
⁷ [1c]/[9c]/[16c]/[18d] claim “the dirt air inlet.”



Ex1005, Figs. 2, 12, 1:24-30, 4:50-54, 5:18-22, 11:57-63, 12:51-67, 13:39-45;
Ex1002 ¶¶87-88.

c. [1b]/[9b]/[16b]/[18b]

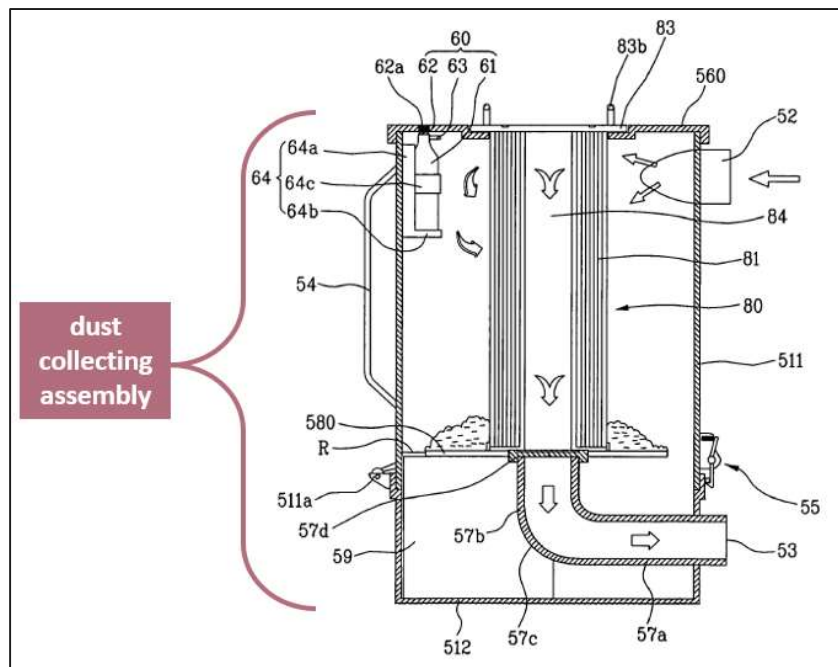
Jung teaches “a handle.” Ex1002 ¶89. Jung’s vacuum cleaners include a **handle** on the cleaner body [20/300] (e.g., “**handle 30**”) and on the dust collecting assembly [50/500] (e.g., “**handle 54**”):



Ex1005, Figs. 2, 12, 4:50-54, 6:29-40, 11:57-63, 13:46-53; Ex1002 ¶¶90.

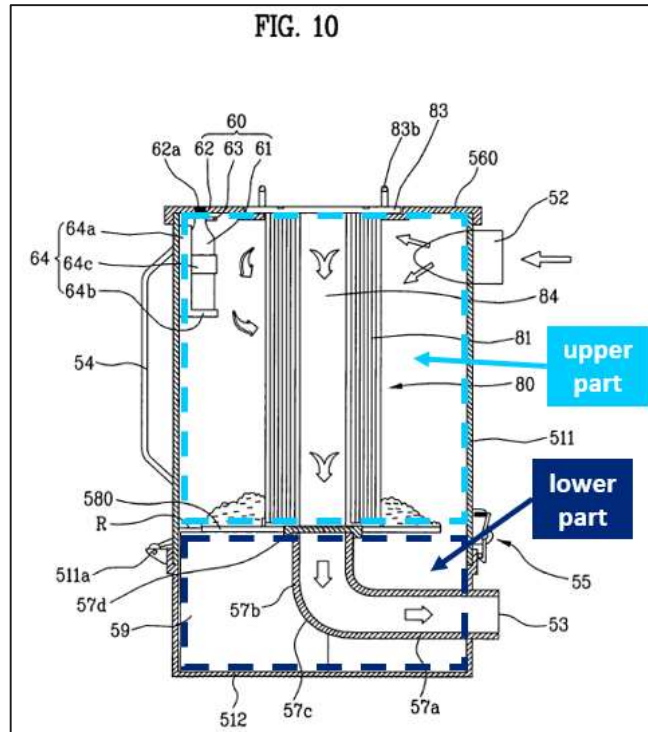
d. [1c]/[9c]/[16c]/[18c]/[18d]

Jung teaches these limitations. Ex1002 ¶¶91-94. Jung's **dust collecting assembly** is a "cyclone separator"/"cyclonic unit." Ex1005, 6:6-40, 12:62-13:20; Ex1002 ¶¶95. Jung's **dust collecting assembly** uses "the cyclonic principle" in which "[a]ir flowed into the **dust collecting assembly 500** flows cyclonically such that the large impurities are separated from the polluted air[.]" *Id.* Figure 10 illustrates the cyclonic airflow using curved arrows:



Ex1005, Fig. 10; Ex1002 ¶¶95.

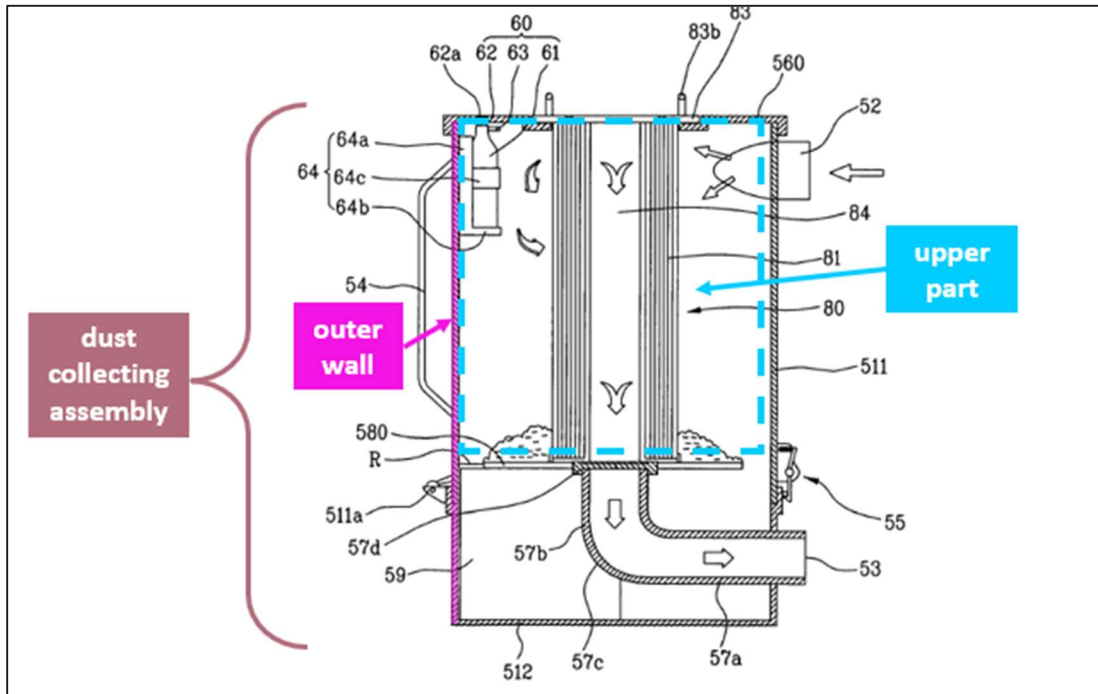
For [9c]/[16c]/[18c]⁸, Jung teaches that its **dust collecting assembly** (“cyclone separator”/“cyclonic unit”) comprises “a cyclone chamber and a dirt collection chamber.” Ex1005, Fig. 10, 6:34-36, 10:4-17; 11:64-12:12; 13:1-7; Ex1002 ¶96. Jung’s **dust collecting assembly** is divided into an **upper part**, where impurities are separated via the cyclonic principle (and is thus a cyclone chamber), and a **lower part**, where the “impurities [are] collected” and “prevented from being interfered by the air flow” in the **upper part** (and is thus a dirt collection chamber):



Id.

⁸ For [1d], Jung teaches “a cyclone chamber and a dirt collection chamber” for the same reasons. Ex1002 ¶96.

For [1c]/[18d], Jung teaches that the “cyclone separator” and “cyclone chamber” each have an “outer wall.”⁹ The **dust collecting assembly** and its **upper part** each have an **outer wall**:

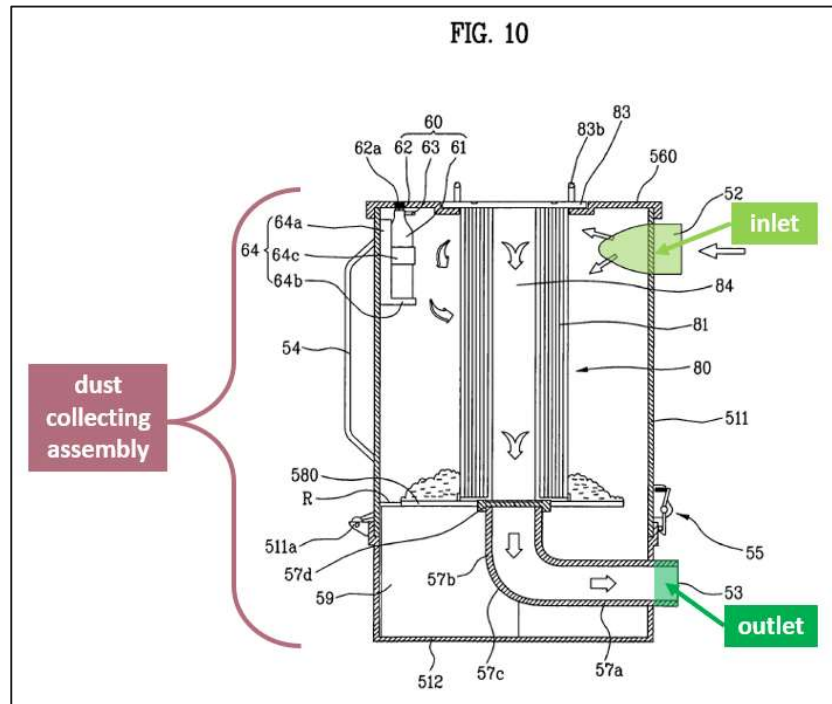


Ex1005, Figs. 10-11, 6:29-40, 11:30-63; Ex1002 ¶97.

For [1c]/[9c]/[16c], Jung teaches a “cyclone separator” with “a fluid inlet downstream from the dirt air inlet,” and “a fluid outlet.” Ex1005, Figs. 3, 5-6, 8-12, 3:58-62, 6:29-40, 6:50-61, 9:50-57, 11:57-12:2, 12:51-61, 13:8-20; Ex1002 ¶98. Jung’s **dust collecting assembly** (“cyclone separator”) comprises an **inlet** (“fluid

⁹ [13] claims “*the* outer wall” of the cyclone chamber and [16d] claims “*the* outer wall” of the cyclone separator without antecedent basis. Jung teaches these limitations for the same reasons as [1c]/[18d]. Ex1002 ¶97.

inlet”) into which “polluted air containing impurities such as dust” is “suck[ed]” “through the main inlet of the suction nozzle.” *Id.* The air moves cyclonically and passes through a filtering device 80 and is “exhausted” from an **outlet** (“fluid outlet”):

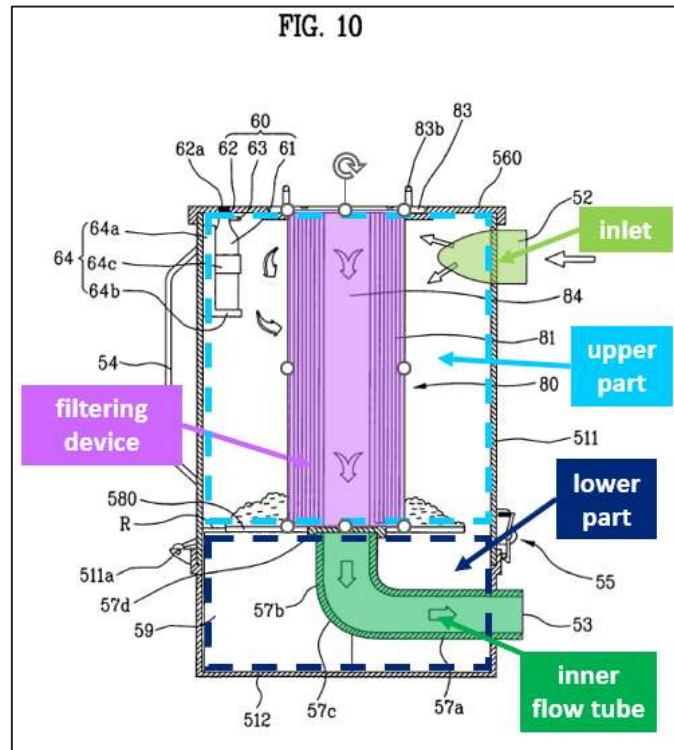


Id.

Jung’s “inlet” is downstream from the “dirt air inlet”: a “polluted air conduit” guides “the polluted air sucked through the main inlet of the suction nozzle 10 to the **inlet**” of the **dust collecting assembly**. Ex1005, 6:50-53, Figs. 2, 10; Ex1002 ¶¶99.

For [18d], Jung teaches that the “cyclone chamber” likewise has “a fluid inlet downstream from the dirt air inlet,” and “a fluid outlet.” Ex1005, Figs. 3, 5-6, 8-12, 3:58-62, 6:29-40, 6:50-61, 9:50-57, 11:57-12:2, 12:51-61, 13:8-20; Ex1002 ¶¶100-

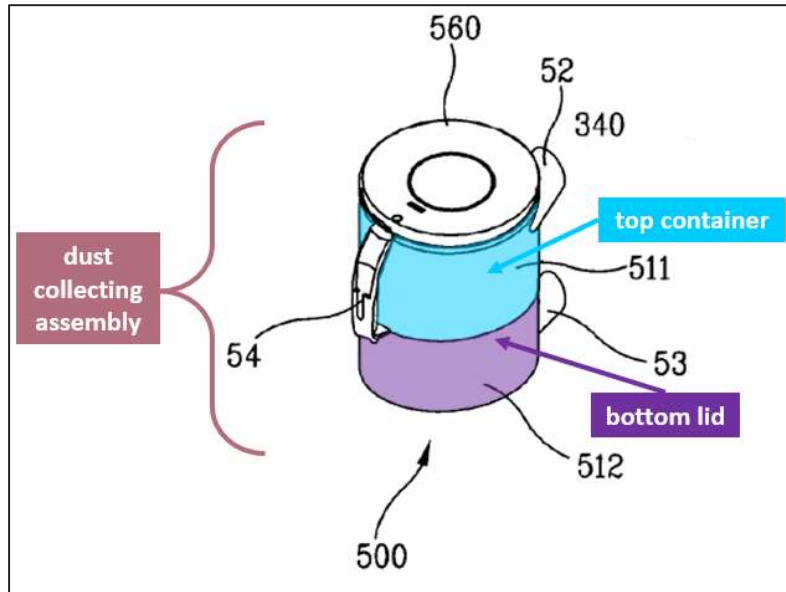
101. Jung’s “inlet” is also an inlet of the cyclone chamber (*i.e.*, Jung’s **upper part**) and is downstream from the dirt air inlet for the same reasons as [1c]/[9c]/[16c]. Jung’s **upper part** (“cyclone chamber”) has a fluid outlet: Jung teaches that air exits its **upper part** at the bottom end of **filtering device** and into an **inner flow tube**:



Id.

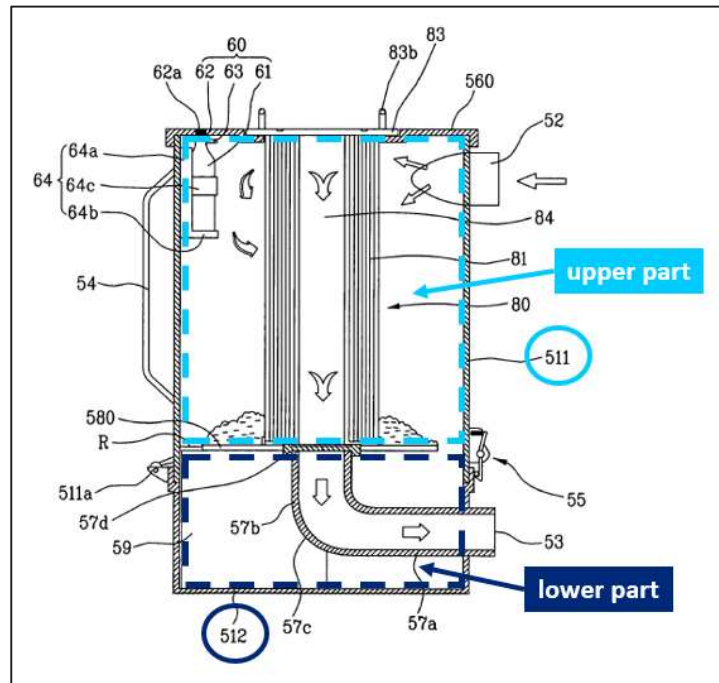
Jung’s bottom end of **filtering device** is thus a “fluid outlet” of the “cyclone chamber.” *Id.*

For [9c]/[16c]/[18c], Jung teaches that the “cyclone separator”/“cyclonic unit” has “an openable end.” Ex1005, Figs. 9-12, 12:13-19, 12:26-39; Ex1002 ¶¶102-103. Jung’s **dust collecting assembly** has a “**bottom lid 512** for opening and closing the bottom of the **top container 511**”:



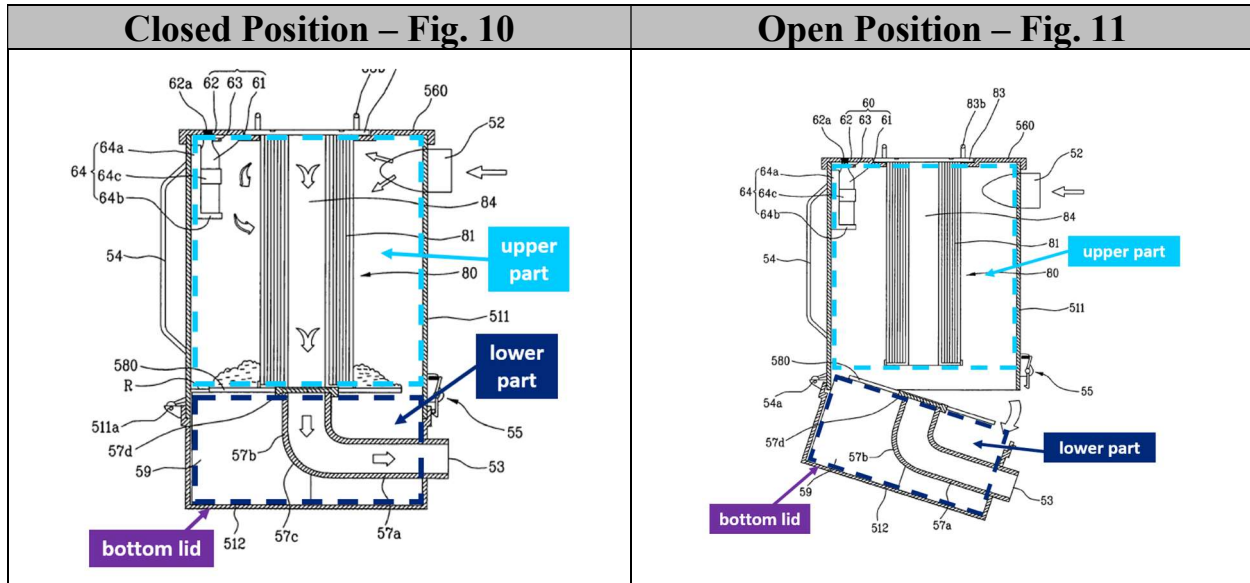
Id., Ex1005, 12:17-19, Fig. 12 (excerpted).

In Jung's Figs. 9-12, the **top container** corresponds to the **upper part** and the **bottom lid** corresponds to the **lower part**, for example as shown in Figure 10, where the **upper part** and the **lower part** are labeled 511 and 512, respectively:



Ex1005, Fig. 10; Ex1002 ¶103.

Jung’s entire **lower part** rotates “at the same time when the **bottom lid 512** is rotated,” as shown in Figures 10-11:



Ex1005, Figs. 10-11, 12:13-19, 12:31-36, 13:24-29, 14:20-22; Ex1002 ¶¶104-105.

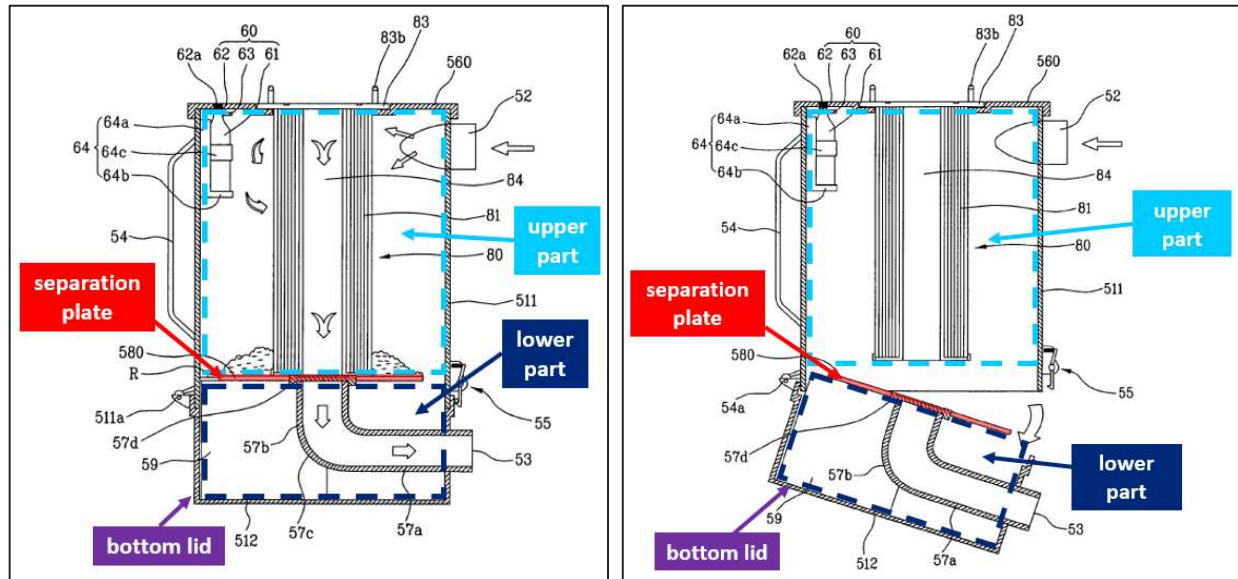
Jung’s dust collecting assembly (the “cyclone separator”/“cyclonic unit”), which comprises both the **upper part/top container** and the **lower part/bottom lid**, therefore has “an openable end,” *i.e.*, the **lower part/bottom lid** of the dust collecting assembly, which individually and collectively are an openable end. *Id.*

e. [1d]/[9d]/[16d]/[18e]

Jung teaches these limitations. Ex1002¶¶106-109.

Jung teaches “a plate having a cyclone chamber surface” and “positioned between [a/the] cyclone chamber and [a/the] dirt collection chamber.” Ex1005, Figs.

10-11, 10:4-30, 11:57-12:12, 13:1-7; Ex1002 ¶¶110-111. Jung's **separation plate** separates the **upper part** and **lower part** of the dust collecting assembly:

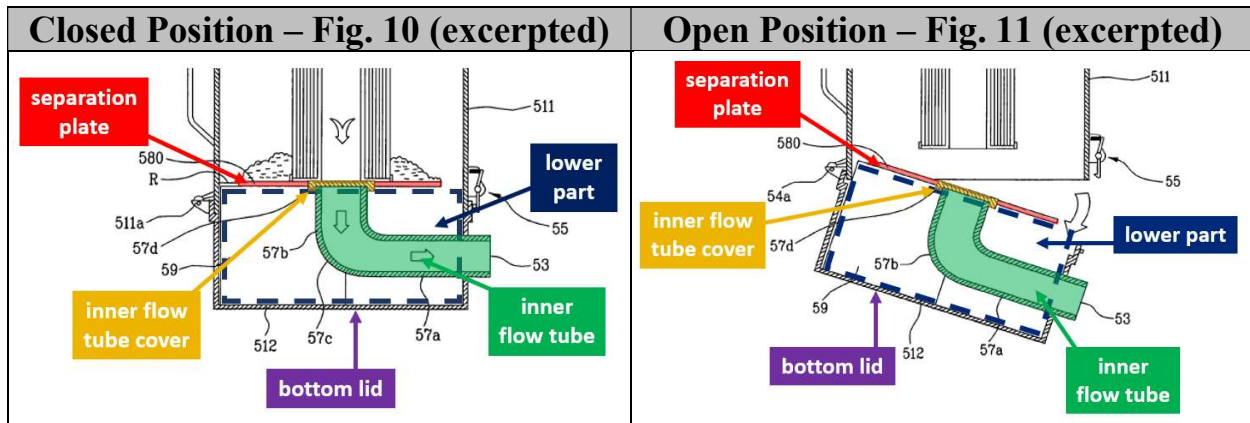


Id.

Jung’s **separation plate** is positioned between the “cyclone chamber” (*i.e.*, the **upper part**) and the “dirt collection chamber” (*i.e.*, the **lower part**). *Id.* The **separation plate** has a surface facing the **upper part** and thus has “a cyclone chamber surface.” *Id.*

For [9d]/[18e], Jung teaches that the “plate [is] positioned...at an openable end.” Ex1002 ¶112. Jung teaches that its plate is positioned at “an openable end” of each of the “cyclone separator,” the “dirt collection chamber,” and the “cyclone chamber,” and for [18e], Jung teaches that its plate is “positioned at the openable end” of the “cyclonic unit.” Ex1005, Figs. 10-11, 9:39-42, 10:18-24, 11:57-63, 12:13-39, 12:31-39, 13:24-29, 14:20-22; Ex1002 ¶¶112-114. As illustrated below,

the **separation plate** is “incorporated integrally” with the **inner flow tube** at the **inner flow tube cover**, and both the **separation plate** and **inner flow tube cover** are located at the top of the **bottom lid/lower part**, which is at “an openable end” of each of the “cyclone separator”/“cyclonic unit,” and because Jung teaches opening at and below the interface between the dirt collection chamber and cyclone chamber, it likewise teaches an openable end of both the “dirt collection chamber” and the “cyclone chamber”:

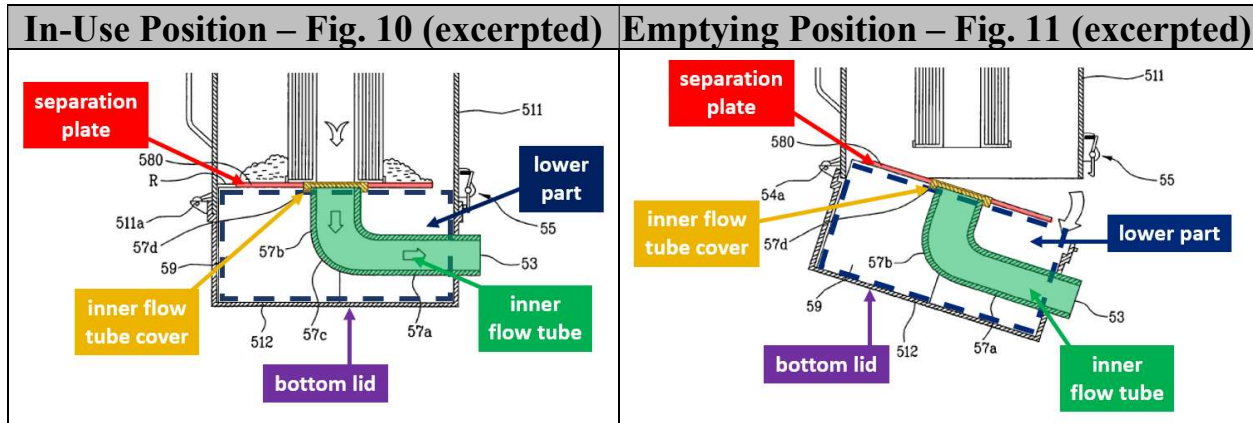


Id.

Regarding [1d], Jung teaches that the “dirt collection chamber” has “an openable end” for the same reasons. *Id.*

For [1d]/[9d]/[18e], Jung teaches that the plate is “moveable”/“moveably mounted” “between an in use position and an emptying position.” Ex1005, Figs. 10-11, 12:13-19; 13:24-29, 14:20-22; Ex1002 ¶¶115-116; §VIII.A.1.d, *supra*. Jung’s **separation plate** is mounted (e.g., incorporated integrally) to the **inner flow tube** (via the **inner flow tube cover**) which is incorporated integrally with **bottom lid**

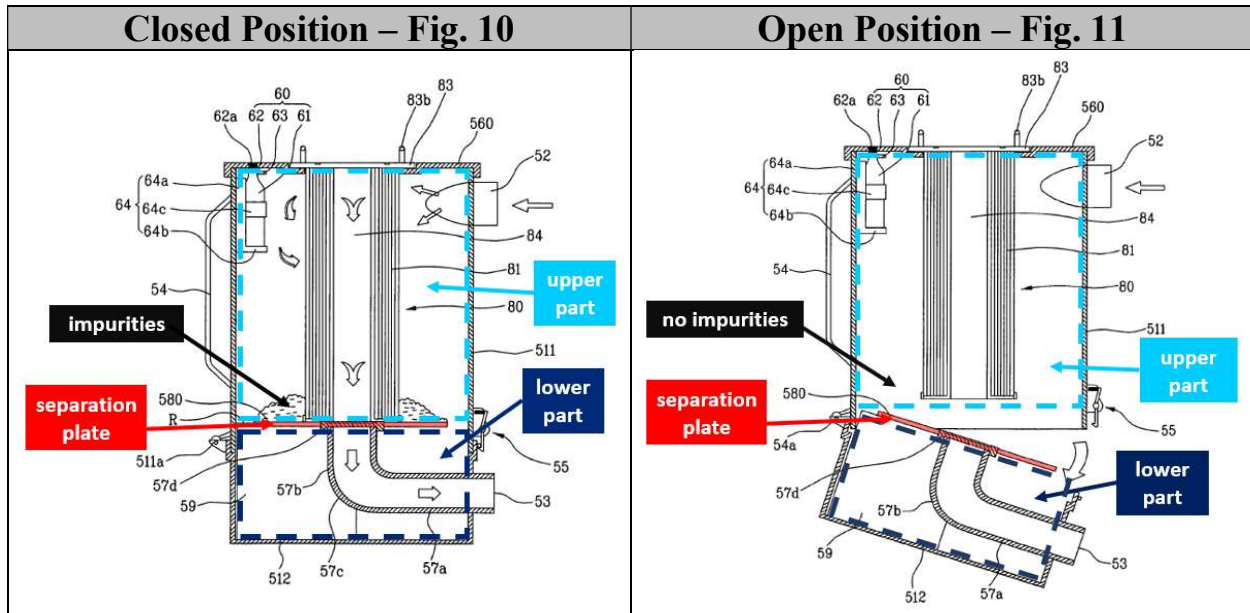
such that **separation plate** automatically rotates from a closed (“in use”) position to an open (“emptying”) position “at the same time when the **bottom lid 512** is rotated by a rotation” from a closed to an open position.



Ex1005, Figs. 10-11, 12:31-35; Ex1002 ¶¶115-116.

For [1d], the **separation plate's** movement from a closed (“in-use”) position to an open (“emptying”) position when the **bottom lid/lower part** rotates open results in “the plate being moveable between an in-use position and an emptying position when the openable end is opened.” Ex1005, Figs. 10-11, 12:13-19; 13:24-29, 14:20-22.

For [1d]/[9d]/[18e], Jung teaches that when the plate is in the emptying position, it is in a position to permit dirt in the cyclone chamber and the dirt collection chamber to be removed concurrently. Ex1005, Figs. 10-11, 11:8-15, 12:31-39; 13:1-30; Ex1002 ¶117. When the **separation plate** rotates into the open (“emptying”) position, impurities collected in the **upper part** are discharged:



Id.

“[A] user [also] discharges the impurities piled up in the **bottom lid**” by rotating the **separation plate** into the open (“emptying”) position. Ex1005, 11:8-15, 12:31-39; 13:1-30; Figs. 10-11; Ex1002 ¶118.

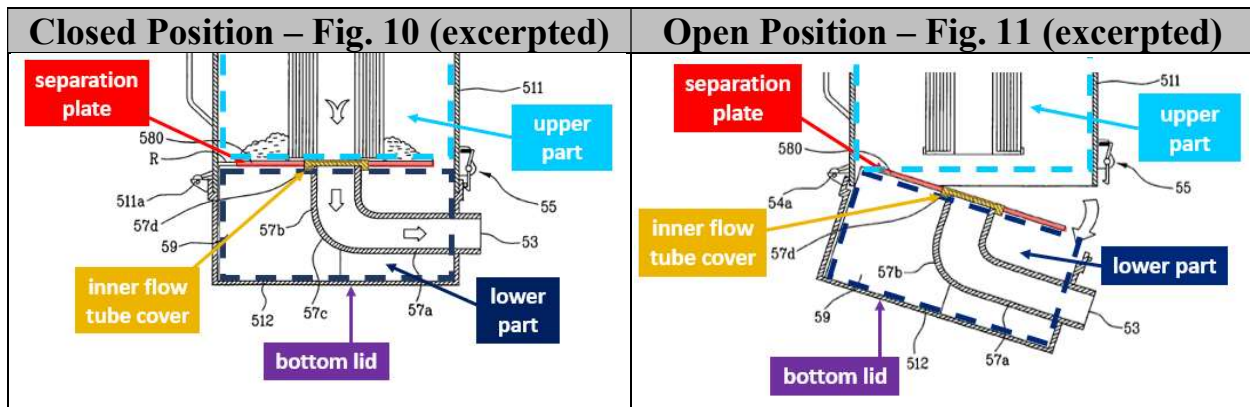
For [16d], Jung teaches that “the plate is pivotally mounted to the outer wall of the cyclone separator.” Ex1002¶¶119-120. The **separation plate** is mounted to the **lower part** via its integral attachment to the **inner flow tube** which is in turn integrally attached to the **bottom lid**. Ex1005, 12:31-39. Because the **separation plate** is mounted to the **lower part**, it pivots about Jung’s **hinge** connected to the **outer wall** with the **lower part** “at the same time when the **bottom lid 512** is rotated by a rotation”:

f. [1e]/[9e]/[16e]/[18f]

Jung teaches these limitations. Ex1005, Figs. 2, 12, 1:24-30, 4:50-54, 5:18-22, 11:57-63, 12:51-67, 13:39-45; Ex1002 ¶¶123-124. Jung’s vacuum cleaners include “a motor ... for generating air suction force.” *Id.*

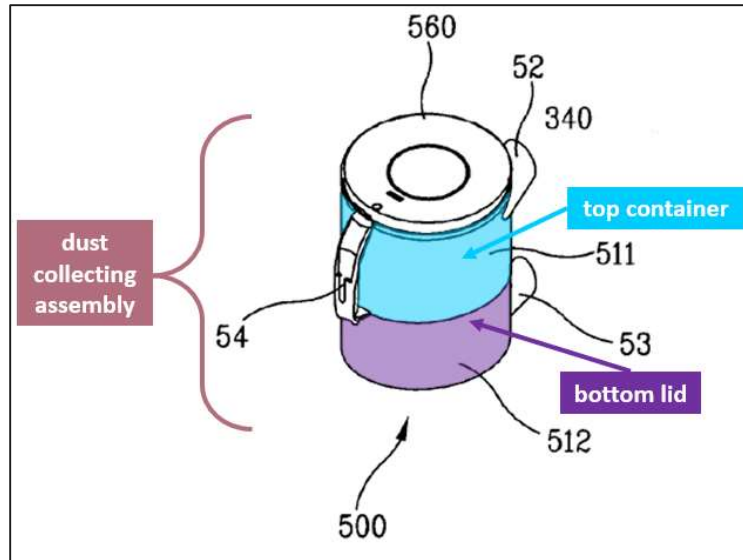
2. [3]

Jung teaches [1]. §VIII.A.1, *supra*; Ex1002 ¶¶125-126. Jung teaches “wherein the openable end of the dirt collection chamber is a bottom.” Ex1005, Figs. 10-11, 12:13-39; 13:24-29, 14:20-22; Ex1002 ¶125,127. Jung’s “openable end” (*i.e.*, the **lower part**/**bottom lid** where the **separation plate** and **inner flow tube cover** are located) is “a bottom” of the **upper part** (“cyclone separator”):



Id.

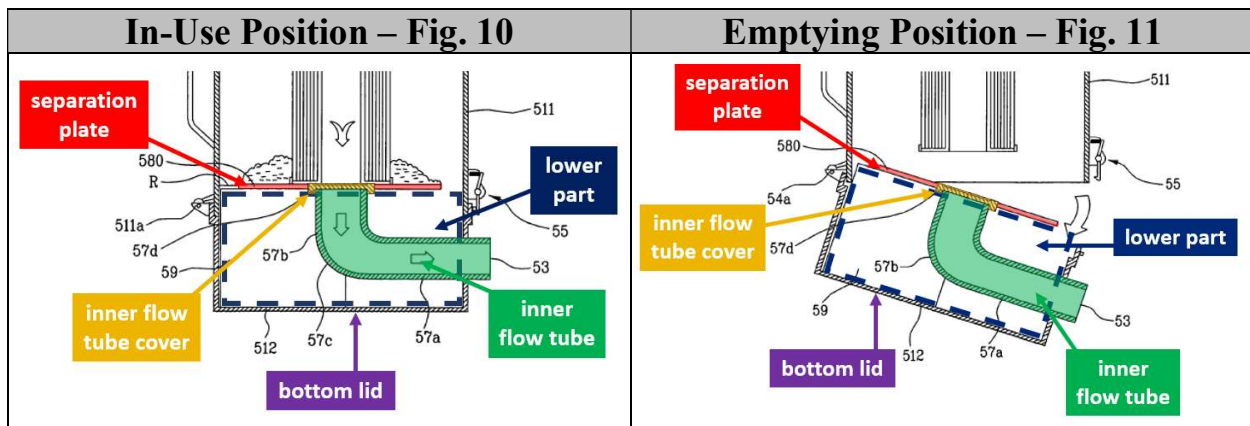
Further, the lower portion of Jung’s “bottom lid” is an openable end of the dirt collection chamber. *Id.* Jung’s “openable end” is likewise “a bottom” of the overall “dust collecting assembly” (*i.e.*, the “cyclone separator”):



Ex1005, 12:13-19, Fig. 12 (excerpted); Ex1002 ¶¶128-129.

3. [4]

Jung teaches [1]. §VIII.A.1, *supra*; Ex1002 ¶¶130-131. Jung’s **separation plate** is automatically moved from a closed position to an open (“emptying”) position when the **bottom lid/lower part** is rotated open:



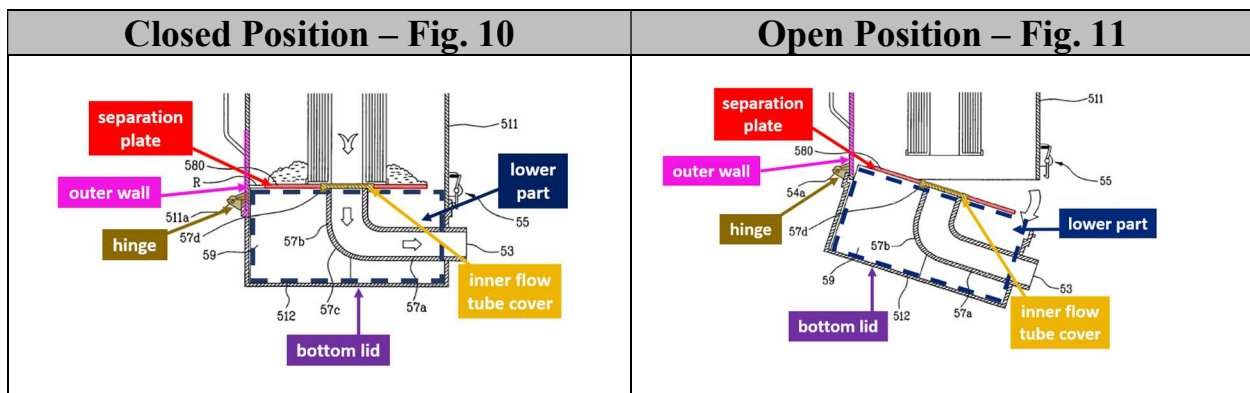
Ex1005, Figs. 10-11, 12:13-39; 13:24-29, 14:20-22; Ex1002 ¶132; §VIII.A.1.e, *supra*.

4. [5]

Jung teaches [1]. §VIII.A.1, *supra*; Ex1002 ¶¶133-134. Jung teaches that “the plate is supported by the openable end” as discussed for [18e]. §VIII.A.1.e, *supra*; Ex1002 ¶135.

5. [7]

Jung teaches [1]. §VIII.A.1, *supra*; Ex1002 ¶¶136-137. Jung teaches that “the openable end is pivotally mounted to the cyclone separator.” Ex1005, Figs. 10-11, 12:13-40; 14:20-22; Ex1002 ¶138. Jung’s “openable end” is pivotally mounted to the **dust collector assembly** using a **hinge**:

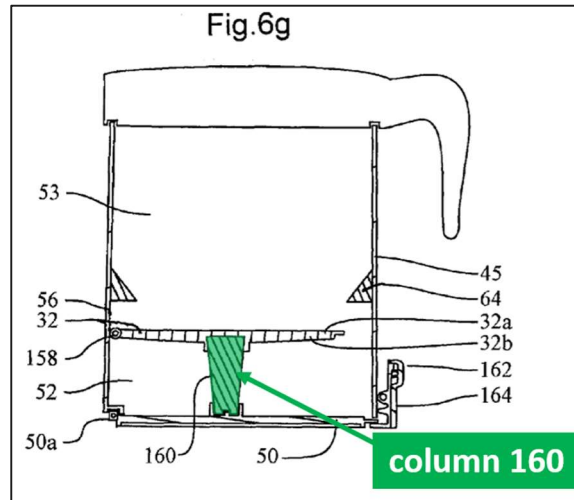


Id.

6. [10]/[11]

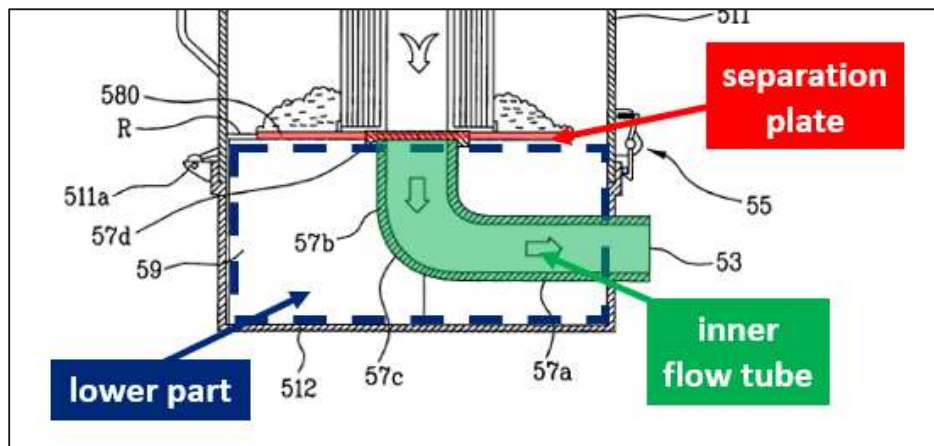
Jung teaches [9]. §VIII.A.1, *supra*; Ex1002 ¶¶139-141. For [10], Jung teaches “the plate has a hand grip portion,” and for [11], Jung teaches that “the hand grip portion comprises a shaft extending away from the plate.” Ex1005, Fig. 10, 12:31-39; Ex1002 ¶¶139-140,142-144. The ’120Patent’s specification’s only description

of its “hand grip portion” is that “[p]referably, the hand grip portion comprises a shaft extending away from the plate,” and illustrates “**column 160**” in Figure 6g:



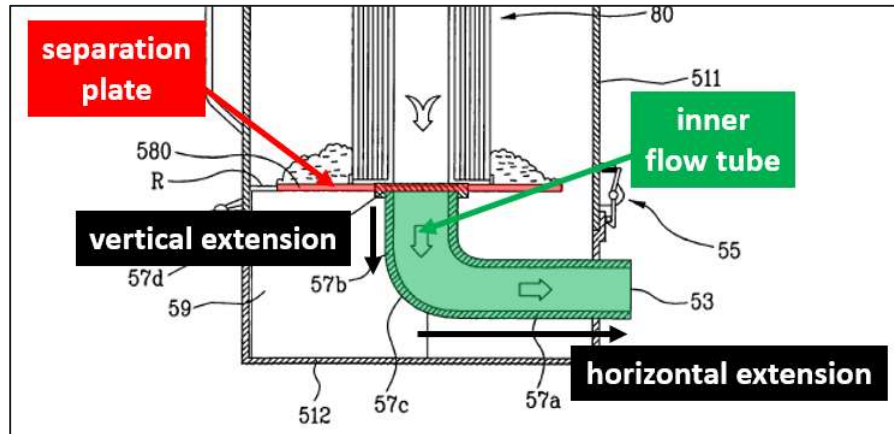
Ex1001, 4:34-36, Fig. 6g; Ex1002 ¶¶142-144.

Jung teaches that the plate has a hand grip portion, including a hand grip portion comprising a shaft extending away from the plate: “the **inner flow tube 57** is incorporated integrally into the **separation plate**”:



Ex1005, Fig. 10, 12:31-39; Ex1002 ¶¶142-144.

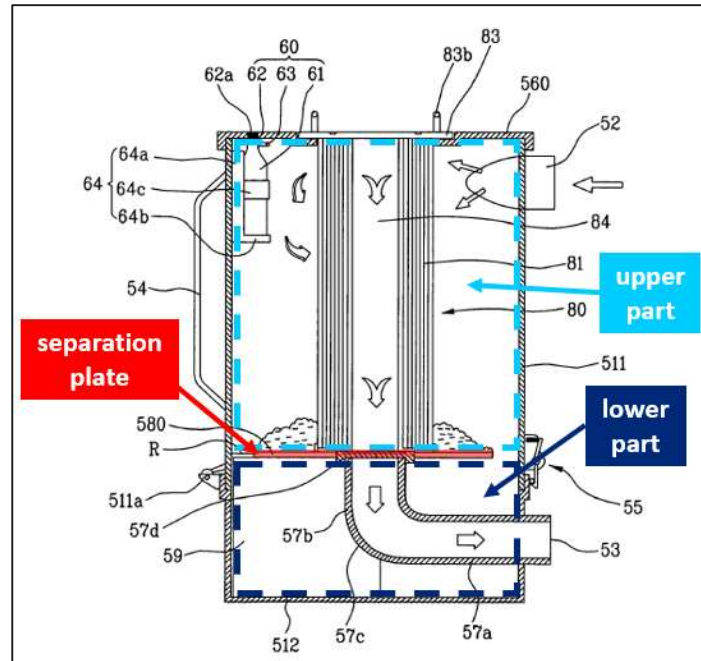
The “**inner flow tube**” is both a hand grip portion and a comprises vertical and horizontal shafts that individually and collectively extend away from the **separation plate** both vertically and horizontally:



Id.

7. [12]

Jung teaches [9]. §VIII.A.1, *supra*; Ex1002 ¶¶145-146. Jung’s “dirt collection chamber” (**lower part**) “extends under the plate” (**separation plate**), as depicted in Figure 10:



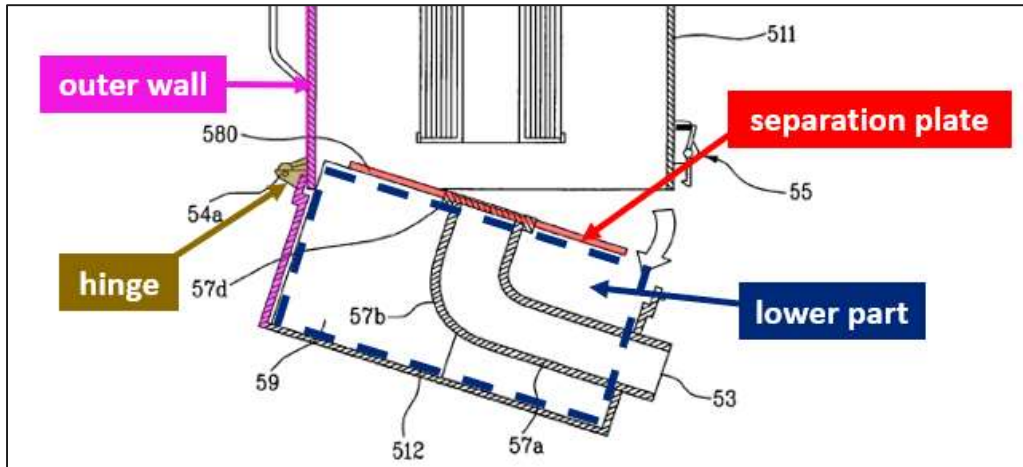
Ex1005, Fig. 10, 6:34-36, 10:4-17; 11:64-12:12; 13:1-7; Ex1002 ¶147.

8. [14]

Jung teaches [9]. §VIII.A.1, *supra*; Ex1002 ¶¶148-149. Jung teaches a “vacuum cleaner” for the same reasons as [9pre]. Ex1002 ¶150.

9. [15]/[19]

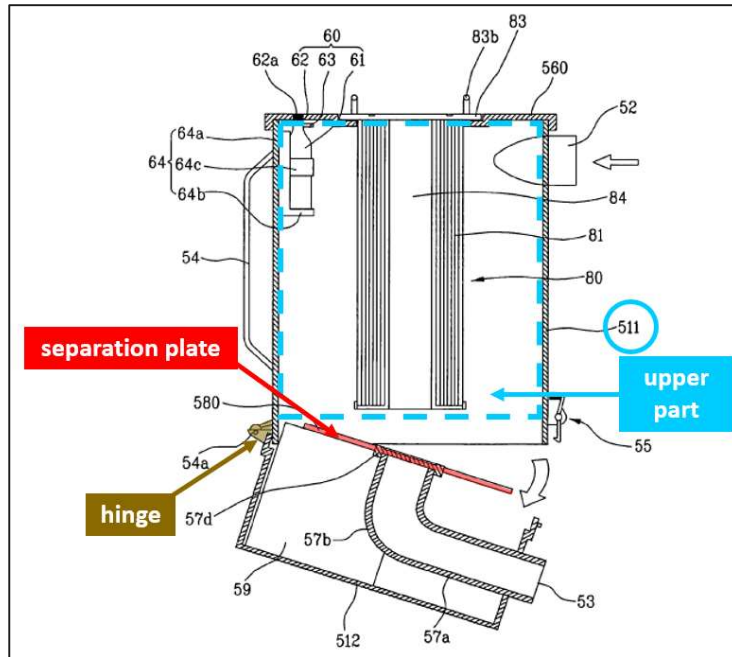
Jung teaches [9] and [18]. §VIII.A.1, *supra*; Ex1002 ¶¶151-153. Regarding [19], Jung’s **separation plate** “is moveable to a[n] emptying position when the openable end is opened” as discussed for [1d], which applies equally to “the openable end” of the “cyclone separator,” “cyclone chamber,” and “cyclonic unit.” §VIII.A.1.e, *supra*; Ex1002 ¶154. For [15], Jung teaches that, “subsequent to the openable end being opened,” the **separation plate** “is moveable” by further rotating the **lower part** (and thus the **separation plate**) about the **hinge** on the **outer wall**:



Ex1005, 12:26-39; Fig. 11; Ex1002 ¶155.

10. [17]

Jung teaches [16]. §VIII.A.1, *supra*; Ex1002 ¶¶156-157. Jung teaches that “the plate is pivotally mounted to the cyclone chamber.” Ex1005, Figs. 10-11, 12:13-39; 13:1-7, 13:24-29, 14:20-22; §VIII.A.1.d ([16d]), *supra*; Ex1002 ¶¶158-159. As described in [16d], the “plate” (**separation plate**) is “pivotally mounted” about a **hinge**:



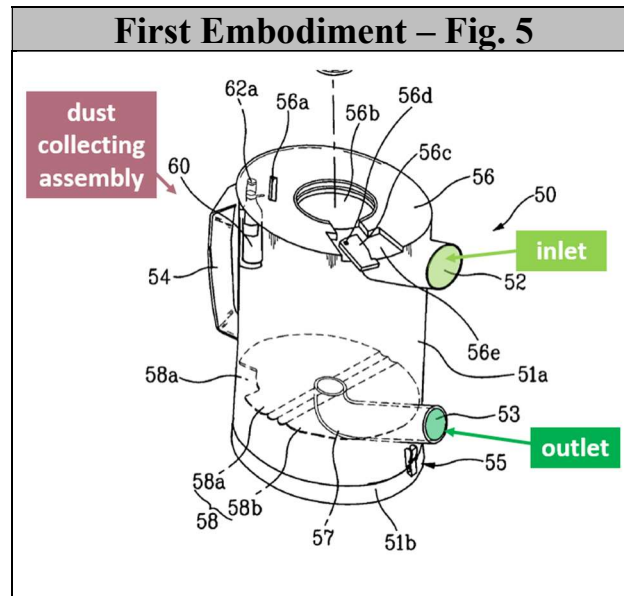
Id.

The **hinge** is positioned at “a first lower end of the **top container 511**,” which is part of the **upper part** (“cyclone chamber”) of the dust collecting assembly (“cyclone separator”) including as shown above in Figure 11. *Id.*

11. Jung’s Figures 5-8 Embodiment Also Teaches [16]/[17]

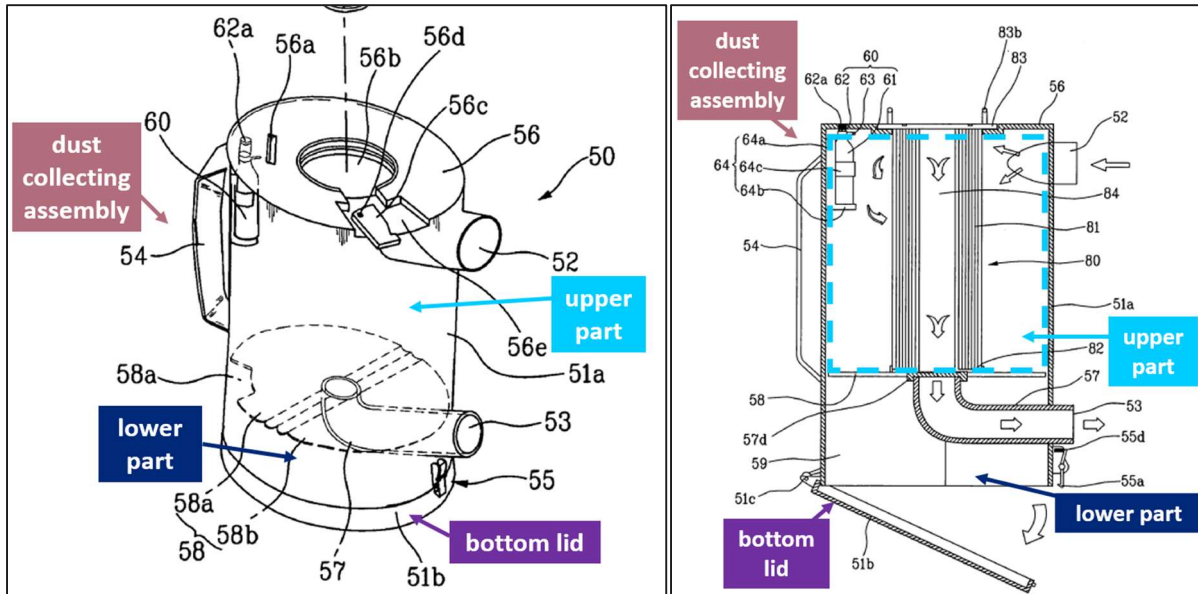
Jung teaches that its vacuum cleaner “detachably receive[s] the dust collecting assembly.” Ex1005 at Abstract. Ex1002 ¶160. Jung teaches its vacuum cleaner uses another dust collecting assembly, which Jung calls its “first embodiment” and illustrates in Figures 5-8, and that also teaches [16]/[17]. Ex1002 ¶¶160-161. Jung’s vacuum cleaner teaches [16pre]/[16a]/[16b]/[16e] for the reasons above. §VIII.A.1, *supra*; Ex1002 ¶162. Jung’s “first embodiment” of a dust collecting assembly teaches [16c] and [16d]. Ex1002 ¶163. For [16c], Jung’s “first embodiment” teaches

“a cyclone separator comprising ... a fluid inlet downstream from the dirt air inlet”
and “a fluid outlet”: Jung teaches a cyclonic **dust collecting assembly 50** with same **inlet 52** and **outlet 53** discussed above:



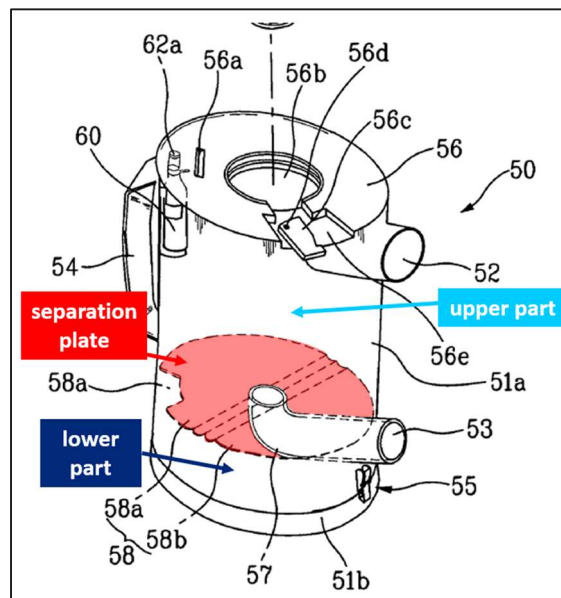
Ex1005, 6:5-11, Figs, 5, 10. §VIII.A.1, *supra*; Ex1002 ¶164.

Jung’s “first embodiment” likewise teaches “a cyclone separator comprising a cyclone chamber and a dirt collection chamber ... [and] an openable end.” Ex1002 ¶165. Jung’s **dust collecting assembly 50** (cyclone separator) includes an **upper part** (“cyclone chamber”) where impurities are cyclonically separated, a **lower part** (“dirt collection chamber”) where impurities are collected, and an openable **lower part/bottom lid 51b**, which individually and collectively are an “openable end”:



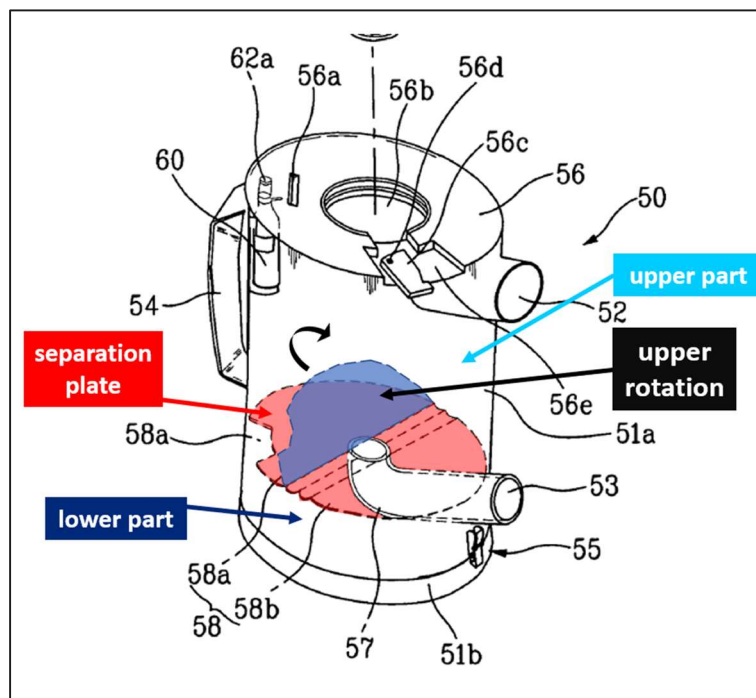
Ex1005, Figs. 5, 8, 10:6-15, 11:8-30, 12:13-19; §VIII.A.1, *supra*; Ex1002 ¶¶165-166.

For [16d], Jung’s “first embodiment” teaches “a plate positioned between the cyclone chamber and the dirt collection chamber”: Jung’s **separation plate 58** is positioned between the **upper part** and the **lower part**:



Id.

In Jung’s “first embodiment,” the **separation plate** is pivotally mounted to the outer wall of the cyclone separator: Jung’s separation plate “is configured with two semicircular plates 58b and 58c rotated at upper part thereof,” such that the semicircular plates “rotate in an upper direction” of the dust collecting assembly, which a POSA would have understood is as shown below:



Ex1005, Fig. 5 (modified), 3:54-56, 6:29-40, 7:60-67, 10:4-24; Ex1002 ¶167.

For [17], the **separation plate** is also pivotally mounted to the cyclone chamber (“**upper part**”): the **separation plate** in Jung “first embodiment” is pivotally mounted at the interface of the cyclone chamber (“**upper part**”) and dust collection chamber (“**lower part**”), and is thus pivotally mounted to the cyclone

chamber. Ex1005, 3:49-51; Ex1002 ¶168. A POSA would have understood that because the separation plate pivots upward, the hinge or other structure that enables pivotable mounting would be in the cyclone chamber. *Id.*

B. Ground 2: Min Anticipates [1]/[3]-[5]/[7]/[9]-[12]/[14]-[19]

1. [1]/[9]/[16]/[18]

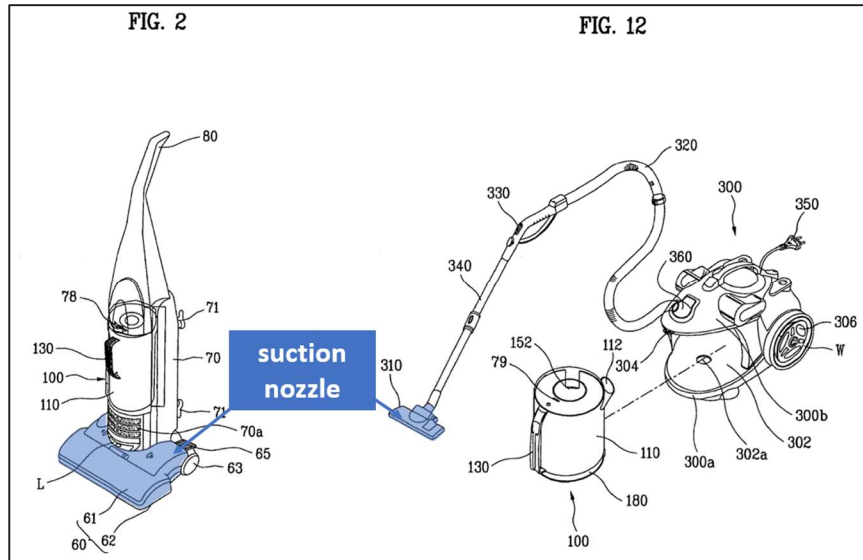
a. [1pre]/[9pre]/[16pre]/[18pre]

If the preambles are limiting, Min teaches vacuum cleaners, which are “surface cleaning apparatus[es].” Ex1011, Abstract, ¶¶3,12, Figs. 1-2, 12; Ex1002 ¶¶170-171.

b. [1a]/[9a]/[16a]/[18a]

Min teaches a “dirt inlet”/“dirt air inlet.”¹⁰ Ex1002 ¶172. Min’s vacuum cleaners include “a **suction nozzle 60**” for “drawing in air containing impurities” and “**suction nozzle 310**” for the same and thus teaches a “dirt inlet”/“dirt air inlet”:

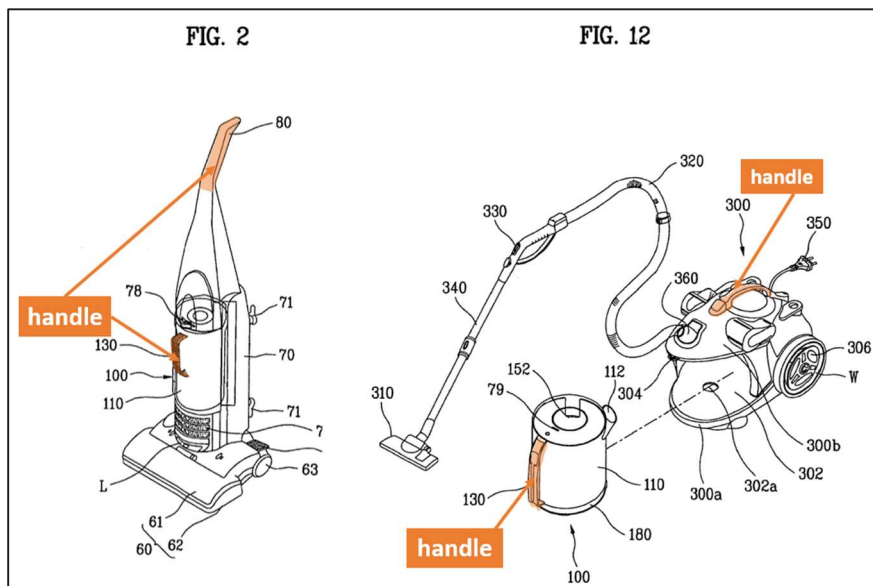
¹⁰ [1c]/[9c]/[16c]/[18d] claim “the dirt air inlet.”



Ex1011, Figs. 2, 12, ¶¶45-47, 117-125; Ex1002 ¶173.

c. [1b]/[9b]/[16b]/[18b]

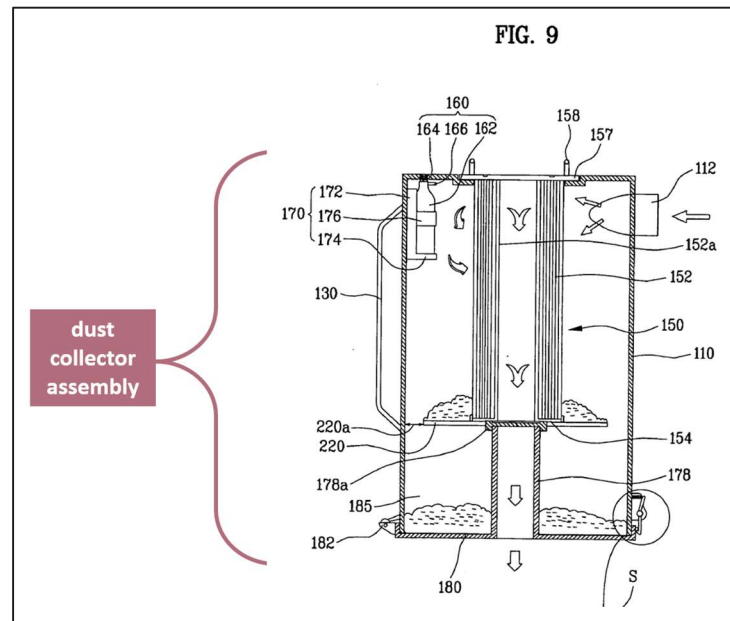
Min teaches “a handle.” Ex1002 ¶174. Min’s vacuum cleaners include a **handle** on the main body (e.g., “**handle 80**”) and dust collector assembly (e.g., “**handle 130**”):



Ex1011, Figs. 2, 12, ¶¶45, 54, 61-62; Ex1002 ¶175.

d. [1c]/[9c]/[16c]/[18c]/[18d]

Min teaches these limitations. Ex1002 ¶¶176-179. As shown with arrows below, Min’s “**dust collector assembly**” “filters impurities by using a cyclone” and is thus a “cyclone separator”/“cyclonic unit”:

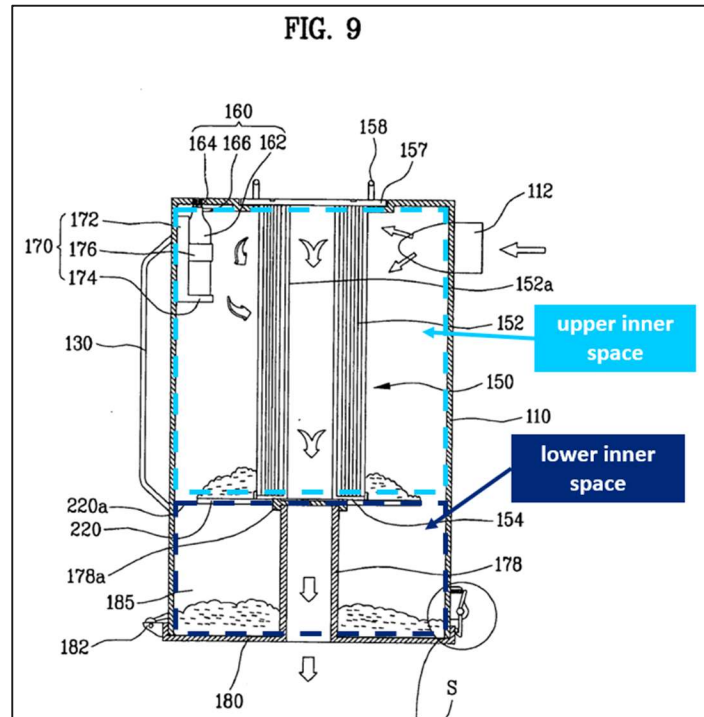


Ex1011, Fig. 9, ¶59; Ex1002 ¶180.

For [9c]/[16c]/[18c]¹¹, Min teaches that its **dust collector assembly** comprises “a cyclone chamber and a dirt collection chamber.” Ex1011, Fig. 9, ¶¶59,69-73, 105; Ex1002 ¶¶181-182. Min’s **dust collector assembly** includes a dust collector divided into an **upper inner space**, where, as illustrated below, air “spirally flows” such that impurities are filtered “by using a cyclone using centrifugal force” (and is thus a

¹¹ For [1d], Min teaches “a cyclone chamber and a dirt collection chamber” for the same reasons. Ex1002 ¶181.

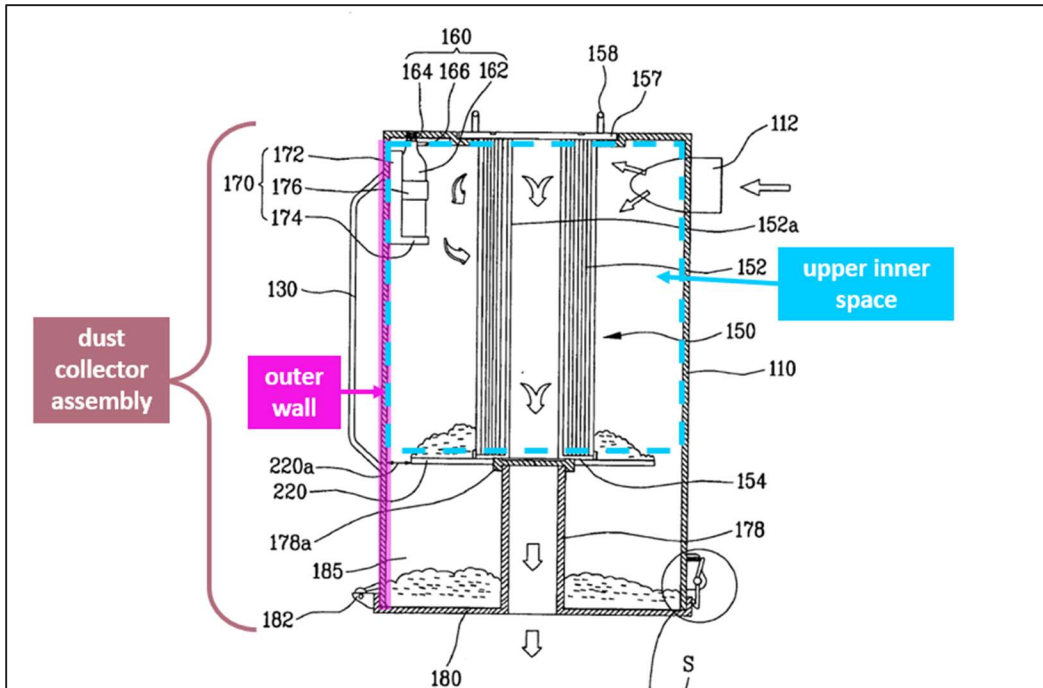
cyclone chamber), and a **lower inner space**, where the “impurities with large masses” are accumulated (and is thus a dirt collection chamber):



Id.

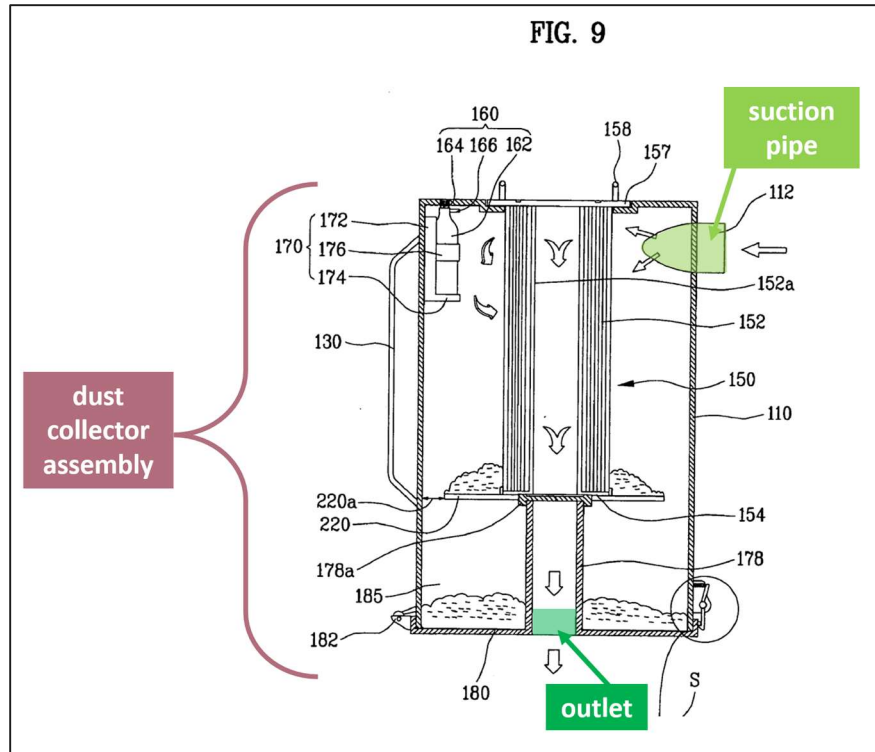
For [1c]/[18d], Min teaches that the “cyclone separator” and “cyclone chamber” each have an “outer wall.”¹² The **dust collector assembly** and **upper inner space** each have an **outer wall**:

¹² [13] claims “*the* outer wall” of the cyclone chamber and [16d] claims “*the* outer wall” of the cyclone separator without antecedent basis. Min teaches these limitations for the same reasons as [1c]/[18d]. Ex1002 ¶183.



Ex1011, Figs. 6, 9-10, Ex1002 ¶183.

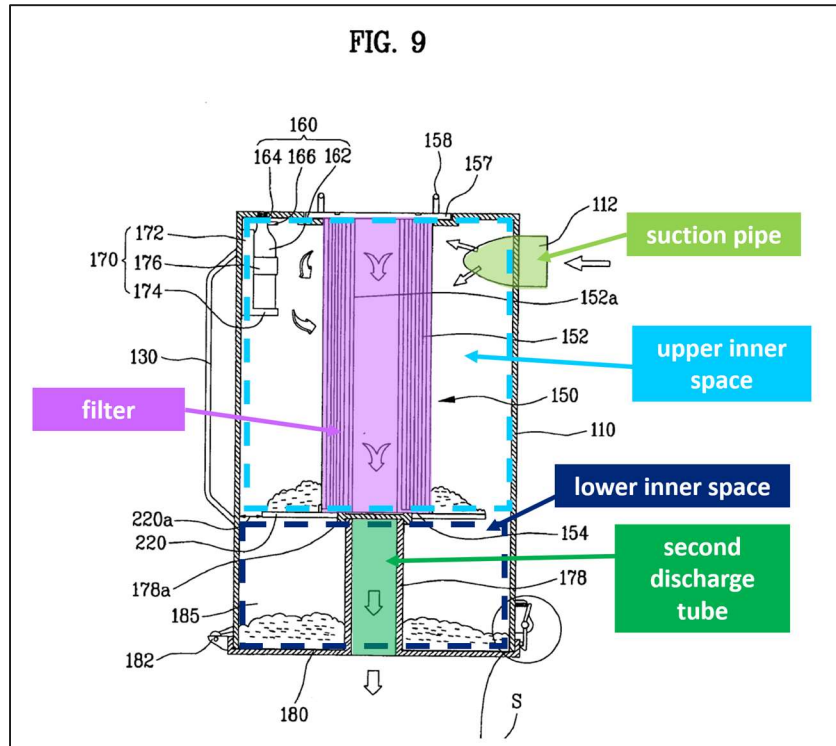
For [1c]/[9c]/[16c], Min teaches a “cyclone separator” with “a fluid inlet downstream from the dirt air inlet,” and “a fluid outlet.” Ex1011, Figs. 6, 9-10, ¶¶59, 68-69; 86-89, 100-106; Ex1002 ¶¶184. Min’s **dust collector assembly** comprises a **suction pipe** (“fluid inlet”) where it filters dirt using a cyclone. *Id.* The air then passes through another filter 152 and is discharged from an **outlet** (“fluid outlet”):



Id.

Min’s “inlet” is downstream from the “dirt air inlet”: Min’s **suction pipe** guides “the air drawn in by the suction nozzle 60 into the dust collector” of the **dust collector assembly**. Ex1011, ¶68, Figs. 9-10; Ex1002 ¶185.

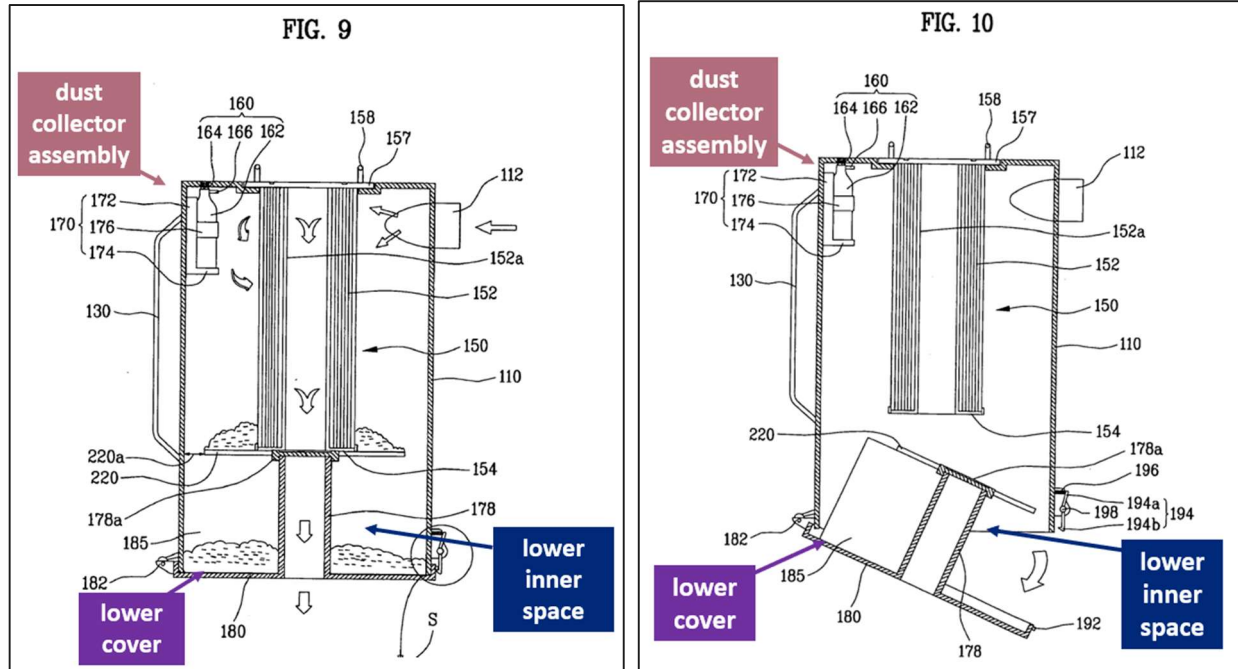
For [18d], Min teaches that the “cyclone chamber” likewise has “a fluid inlet downstream from the dirt air inlet,” and “a fluid outlet.” Ex1011, Figs. 6, 9-10, ¶¶68-69; 86-89, 100-106; Ex1002 ¶¶186-187. Min’s “**suction pipe**” is also an inlet of the cyclone chamber (Min’s **upper inner space**) and is downstream from the dirt air inlet for the same reasons as [1c]/[9c]/[16c]. Min’s **upper inner space** (“cyclone chamber”) also has a fluid outlet: Min teaches that air exits its **upper inner space** at the bottom end of **filter** and into a **second discharge tube**:



Id.

The bottom end of Min’s **filter** is thus a “fluid outlet” of the “cyclone chamber.” *Id.*

For [9c]/[16c]/[18c], Min teaches that the “cyclone separator”/“cyclonic unit” has “an openable end.” Ex1011, Figs. 9-10, ¶¶80-87, 97-100, 108-113; Ex1002 ¶188. Min teaches that its **dust collector assembly** has a hinged **lower cover/lower inner space**, which individually and collectively are an openable end of Min’s **dust collector assembly**:

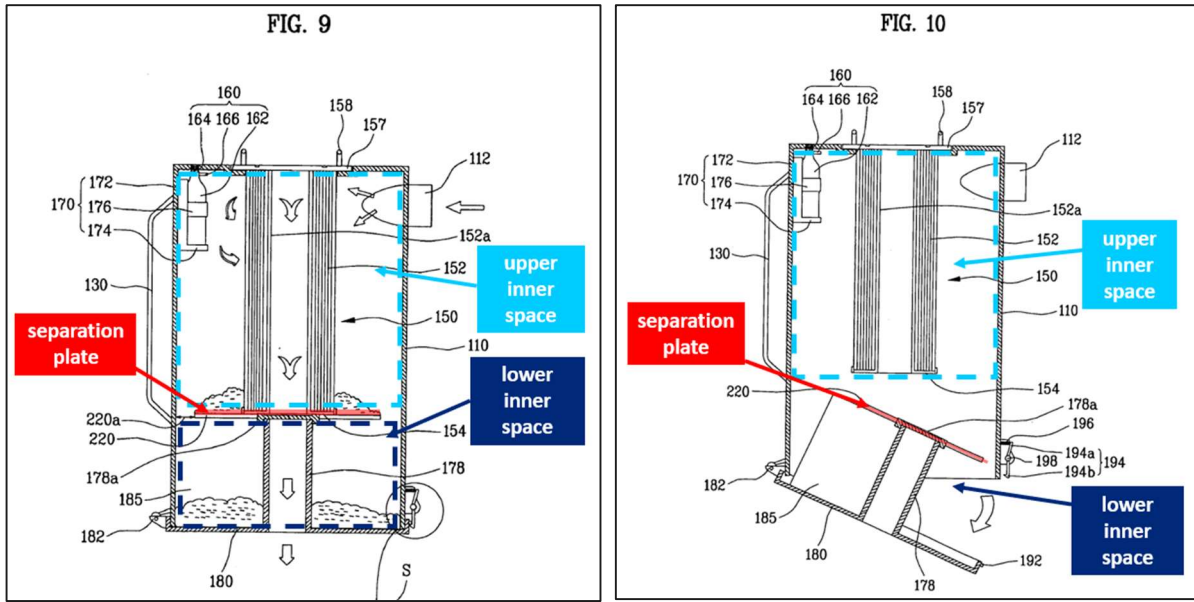


Id.

e. [1d]/[9d]/[16d]/[18e]

Min teaches these limitations. Ex1002 ¶¶189-192.

Min teaches “a plate having a cyclone chamber surface” and that is “positioned between [a/the] cyclone chamber and [a/the] dirt collection chamber.” Ex1011, Figs. 9-10, ¶¶16, 70-73, 98-100; Ex1002 ¶¶193-194. Min teaches that a **separation plate** separates the **upper inner space** and **lower inner space** of the dust collecting assembly:

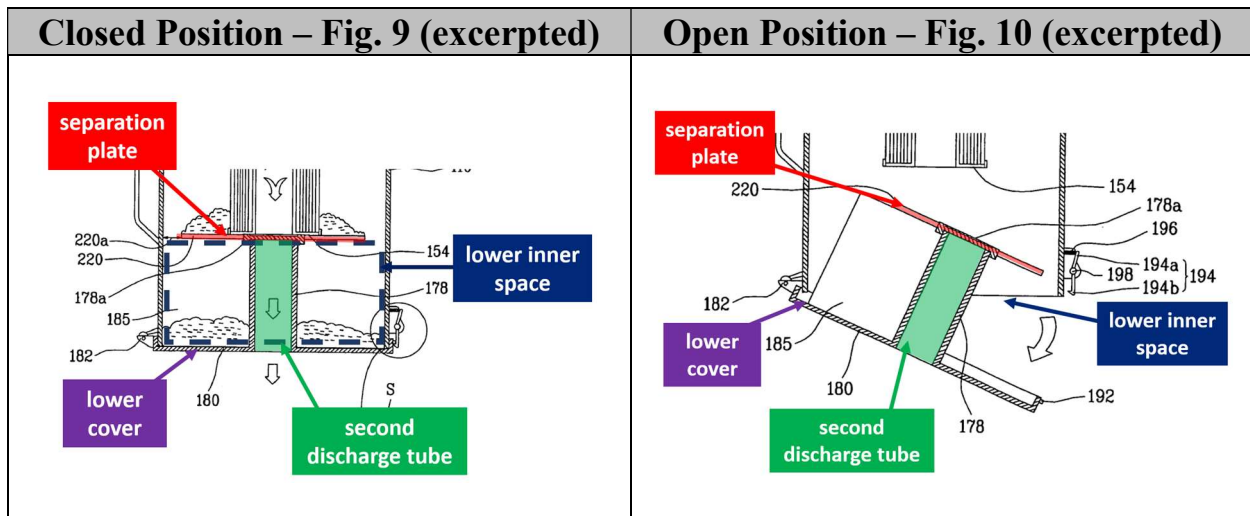


Id.

Min’s **separation plate** is positioned between the “cyclone chamber” (“**upper inner space**”) and the “dirt collection chamber” (“**lower inner space**”). *Id.* The **separation plate** has a surface facing the **upper inner space** and thus has “a cyclone chamber surface.” *Id.*

For [9d]/[18e], Min teaches that the “plate [is] positioned...at an openable end.” Ex1002 ¶195. Min teaches that its plate is positioned at “an openable end” of each of the “cyclone separator,” the “dirt collection chamber,” and the “cyclone chamber,” and for [18e], Min teaches that its plate is “positioned at the openable end” of the “cyclonic unit.” Ex1011, Figs. 9-10, ¶¶80-87, 99-100, 108-113. Ex1002 ¶¶195-196. Min teaches that the **separation plate**, along with the **second discharge tube**, is “formed as a single body” with the **lower cover** such that the **separation plate** “rotates together with the **lower cover**” and **lower inner space** which

individually and collectively are “an openable end” of each of the “cyclone separator”/“cyclonic unit,” and because Min teaches an opening at and below the interface between the dirt collection chamber and cyclone chamber, it likewise teaches an openable end of both the “dirt collection chamber” and the “cyclone chamber”:

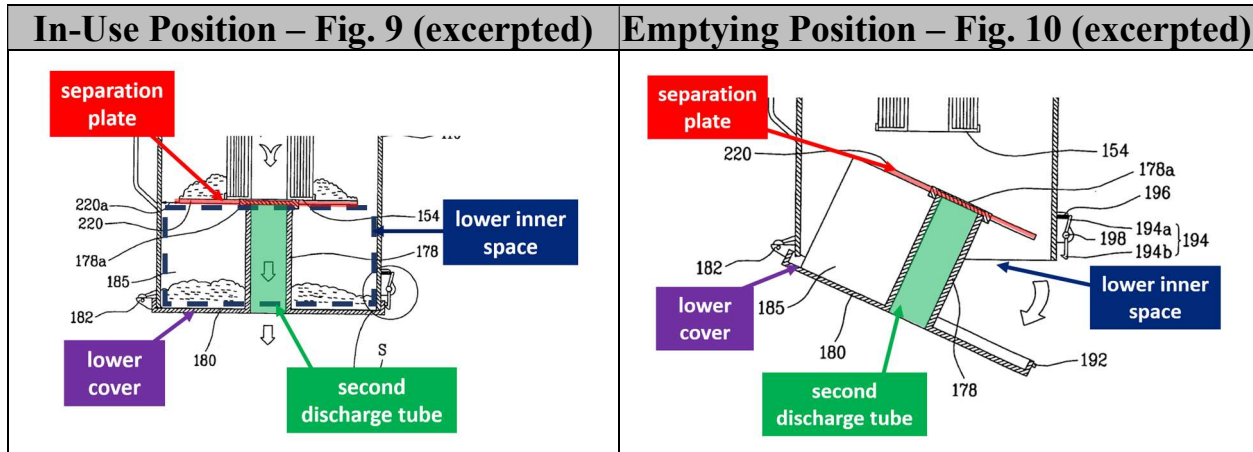


Id.

For [1d], Min teaches that the “dirt collection chamber” has “an openable end” for the same reasons. *Id.*

For [1d]/[9d]/[18e], Min teaches that the plate is “moveable”/“moveably mounted” “between an in use position and an emptying position.” Ex1011, Figs. 9-10, ¶¶87-88, 99-101, 110; Ex1002 ¶¶197-198; §VIII.B.1.d, *supra*. Min’s **separation plate** is mounted (*e.g.*, formed as a single body) to the **second discharge tube** which is formed as a single body with **lower cover** such that **separation plate**

automatically rotates from a closed (“in use”) to an open (“emptying”) position “together with the **lower cover**”:

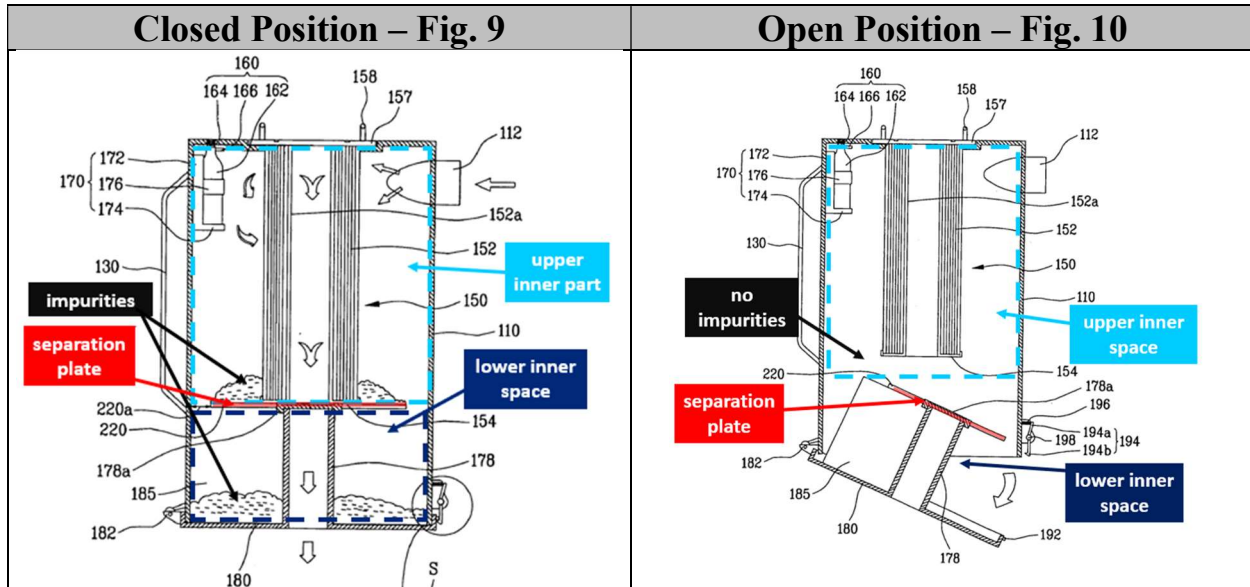


Id.

For [1d], the **separation plate's** movement from a closed (“in-use”) position to an open (“emptying”) position when the **lower cover/lower inner space** rotates open results in “the plate being moveable between an in-use position and an emptying position when the openable end is opened.” *Id.*

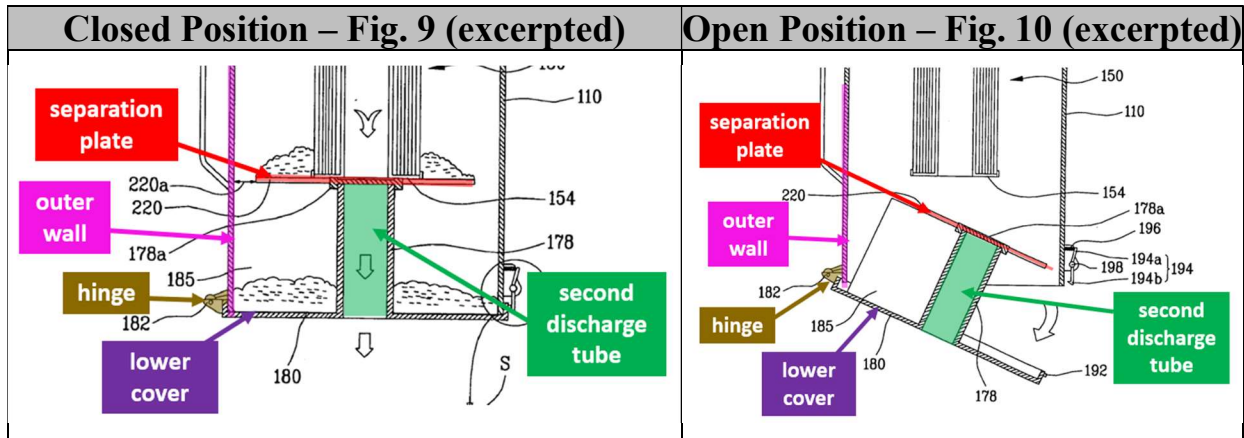
For [1d]/[9d]/[18e], Min teaches that when the plate is in the emptying position, it is in a position to permit dirt in the cyclone chamber and the dirt collection chamber to be removed concurrently. Ex1011, Figs. 9-10, ¶¶199, 108-110; Ex1002 ¶¶199. When the **separation plate** rotates into the open (“emptying”) position, “the user can remove not only the impurities accumulated on the upper surface of the **lower cover**” (*i.e.*, from the **lower inner space**), “but also the

impurities accumulated on the upper surface of the **separation plate**” (*i.e.*, from the **upper inner part**).



Id.

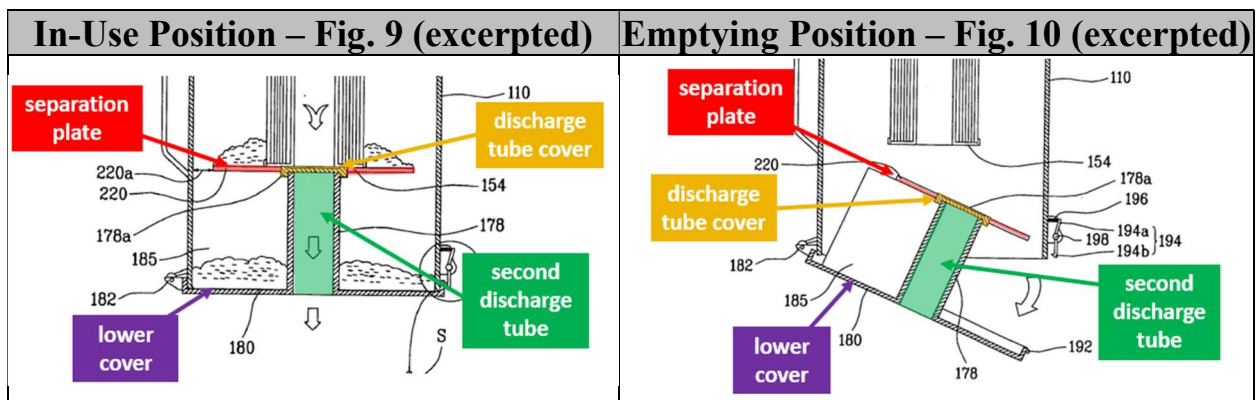
For [16d], Min teaches that “the plate is pivotally mounted to the outer wall of the cyclone separator.” Ex1002 ¶200. Min’s **separation plate** is formed, together with **second discharge tube**, as a single body with **lower cover**. Ex1011, Figs. 9-10, ¶¶80, 87-88, 99-101, 108-112; §VIII.B.1.d, *supra*; Ex1002¶¶200-201. The **separation plate** pivots about a **hinge** connected to the **outer wall** of Min’s **dust collector assembly** “together with the **lower cover**”:



Id.

Min’s “plate” is therefore “pivotally mounted” via the **hinge** “to the **outer wall** of the cyclone separator.” *Id.*

For [18e], Min teaches “the plate being supported by the openable end” of the “cyclonic unit.” Ex1011, Figs. 9-10, ¶¶87-88, 99-101, 110, §VIII.B.1.d, *supra*; Ex1002 ¶202. The **separation plate** is held in place (*i.e.*, supported) by its attachment to the **lower cover** via the **second discharge tube** at the **discharge tube cover**.



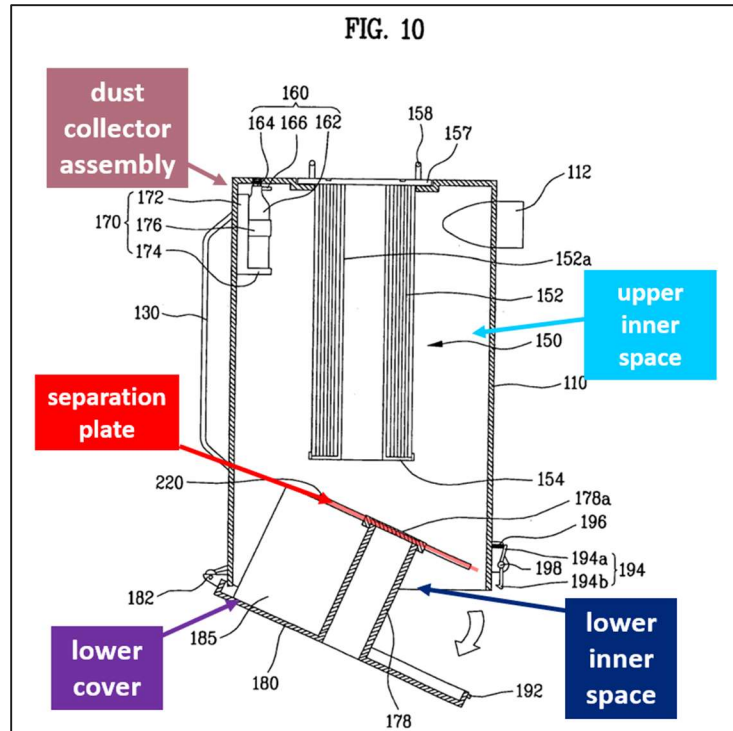
Id.

f. [1e]/[9e]/[16e]/[18f]

Min teaches these limitations. Ex1011, Figs. 2, 12, ¶¶49-57, 103, 106; Ex1002 ¶¶203-204. Min’s vacuum cleaners include “a motor” that generates “suction force.” *Id.* Min’s “motor” is a “fluid flow motor.” *Id.*

2. [3]

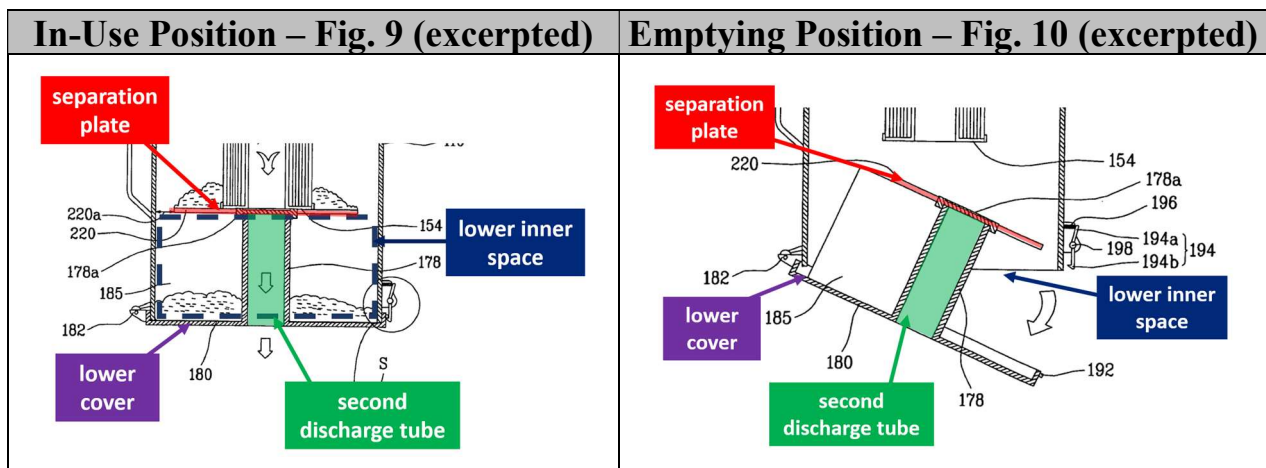
Min teaches [1]. §VIII.B.1, *supra*; Ex1002 ¶¶205-206. Min teaches “the openable end of the dirt collection chamber is a bottom.” Ex1011, Fig. 10; §VIII.B.1.e, *supra*; Ex1002 ¶207. Min’s “**lower cover/lower inner space**—which individually and collectively are an “openable end,” are “a bottom” of multiple claimed structures: Min’s **lower cover** is “a bottom” of the dirt collection chamber (**lower inner space**), Min’s **lower cover/lower inner space** are individually and collectively a bottom of the cyclone separator (**upper inner part**), and Min’s **lower cover/lower inner space** are collectively “a bottom” of the cyclone chamber (**dust collector assembly**).



Id.

3. [4]

Min teaches [1]. §VIII.B.1, *supra*; Ex1002 ¶¶208-209. Min's **separation plate** is automatically moved from a closed ("in-use") position to an open ("emptying") position when the openable end is rotated open:



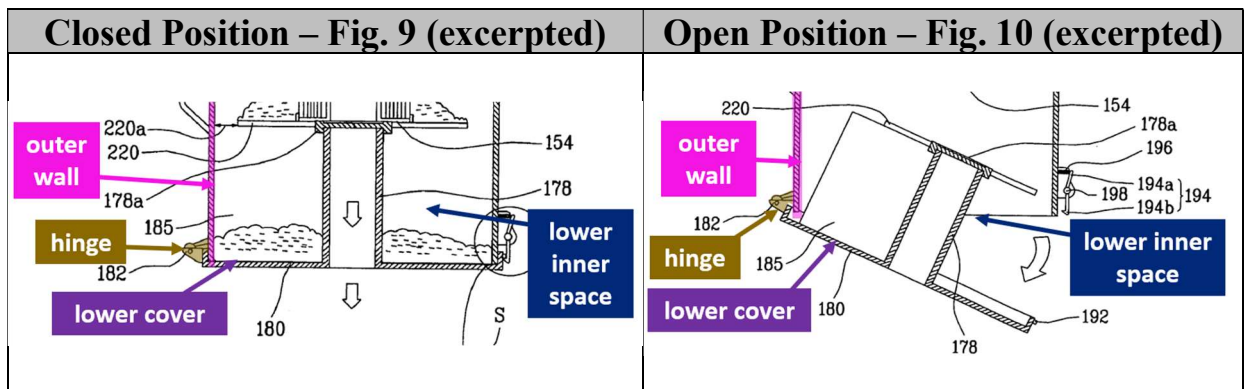
Ex1011, Figs. 9-10, ¶¶87-88, 99-101, 110; Ex1002 ¶210; §VIII.B.1.e, *supra*.

4. [5]

Min teaches [1]. §VIII.B.1, *supra*; Ex1002 ¶¶211-212. Min teaches that “the plate is supported by the openable end” as discussed for [18e]. §VIII.B.1.e, *supra*; Ex1002 ¶213

5. [7]

Min teaches [1]. §VIII.B.1, *supra*; Ex1002 ¶¶214-215. Min teaches that “the openable end is pivotally mounted to the cyclone separator.” Ex1011, Figs. 9-10, ¶¶80, 87-88, 99-101, 108-112; Ex1002 ¶216. Min’s **lower cover/lower inner space**—which individually and collectively are an “openable end”—is pivotally mounted to the **dust collector assembly** using a **hinge**:

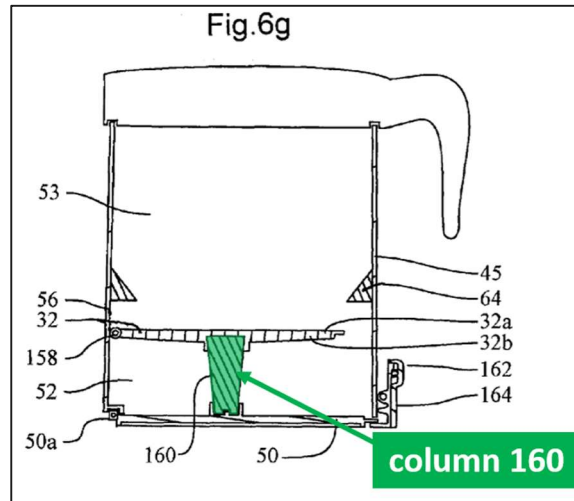


Id.

6. [10]/[11]

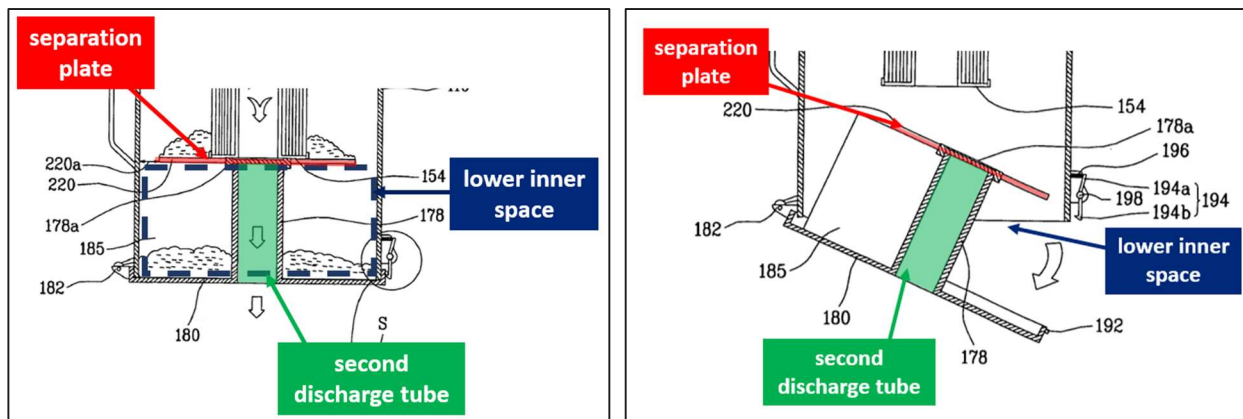
Min teaches [9]. §VIII.B.1, *supra*; Ex1002 ¶¶217-218. For [10], Min teaches “the plate has a hand grip portion,” and for [11], Min teaches that “the hand grip portion comprises a shaft extending away from the plate.” Ex1011, Fig. 9-10, ¶¶100,

110; Ex1002 ¶¶217-218,220-222. The '120Patent's specification's only description of its "hand grip portion" is that "[p]referably, the hand grip portion comprises a shaft extending away from the plate," and illustrates "**column 160**" in Figure 6g:



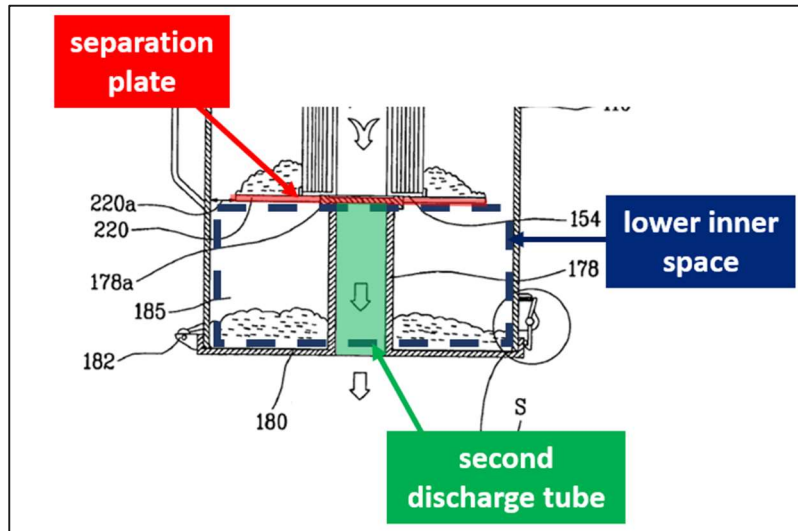
Ex1001, 4: 34-36, Fig. 6g; Ex1002 ¶¶220-222.

Min teaches that the plate has a hand grip portion, including a hand grip portion comprising a shaft extending away from the plate: Min's **separation plate** "is formed as a single body with the **second discharge tube**":



Ex1011, ¶¶100-101, Figs. 9-10 (excerpted).

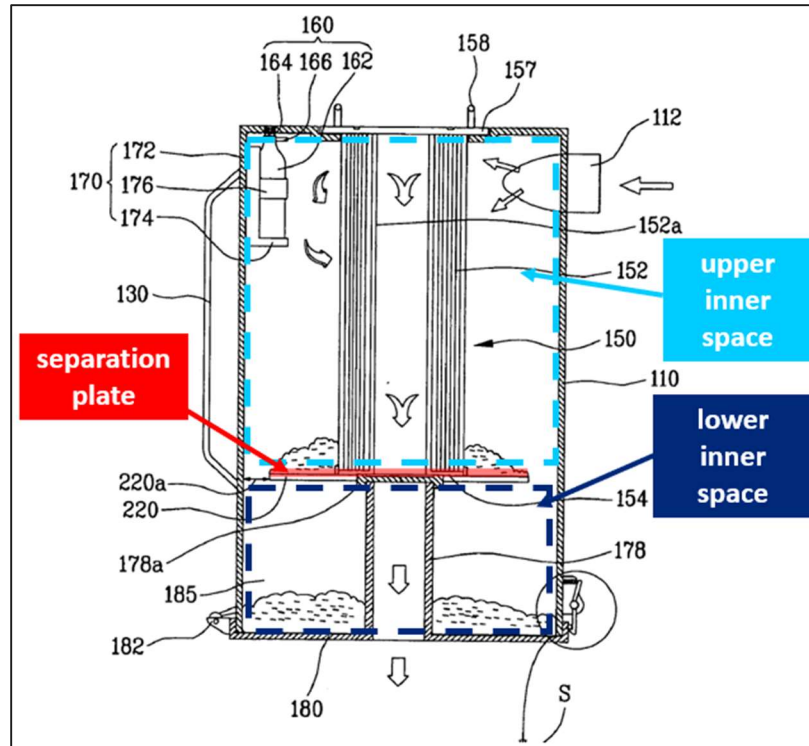
The “second discharge tube” is both a hand grip portion and comprises a shaft that extends vertically away from the **separation plate**:



Id.

7. [12]

Min teaches [9]. §VIII.B.1, *supra*; Ex1002 ¶¶223-224. Min teaches that its “dirt collection chamber” (**lower inner space**) “extends under the plate” (**separation plate**), as depicted in Figure 9:



Ex1011, Fig. 9, ¶¶98, 105; Ex1002 ¶225.

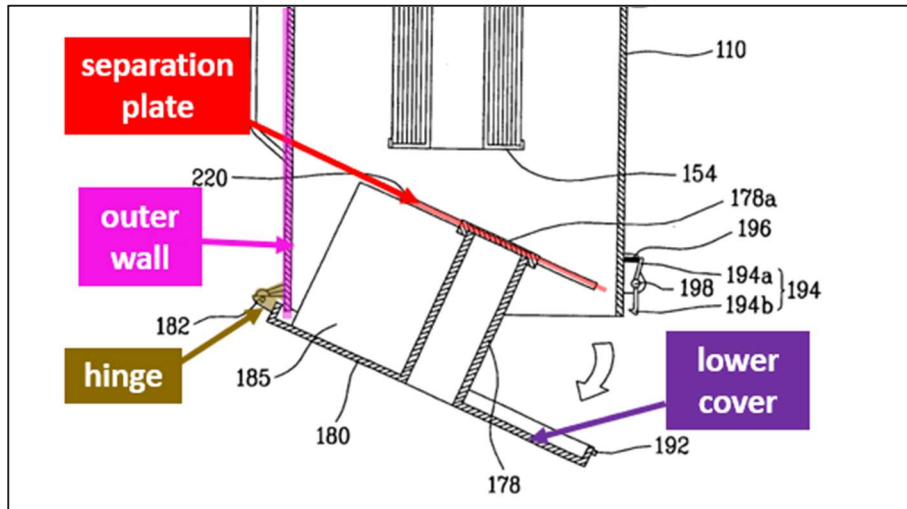
8. [14]

Min teaches [9]. §VIII.B.1, *supra*; Ex1002 ¶¶226-227. Min teaches “a vacuum cleaner” for the same reasons as [1pre]. Ex1002 ¶228.

9. [15]/[19]

Min teaches [9]/[18]. §VIII.B.1, *supra*; Ex1002 ¶¶229-231. Regarding [19], Min’s **separation plate** “is moveable to a[n] emptying position when the openable end is opened” as discussed for [1d], which applies equally to “the openable end” of the “cyclone separator,” “cyclone chamber,” and “cyclonic unit.” §VIII.B.1.e, *supra*; Ex1002 ¶232. For [15], Min teaches that, “subsequent to the openable end being opened,” the **separation plate** “is moveable” by further rotating the **lower cover**

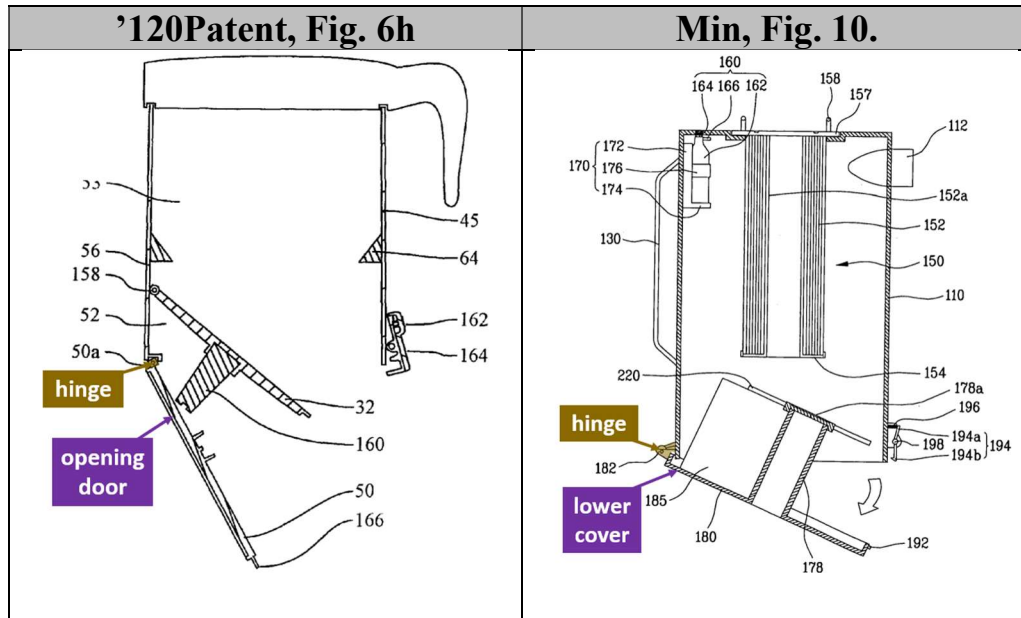
(and thus the **separation plate**) up or down about the **hinge** connected to the **outer wall**:
wall:



Ex1011, ¶¶80, 87-88, 99-101, 108-112; Fig. 10; Ex1002 ¶233.

10. [17]

Min teaches [16]. §VIII.B.1, *supra*; Ex1002 ¶¶234-235. Min teaches that the plate is pivotably mounted to the cyclone chamber at least to the same extent as shown in the '120Patent, which like Min depicts a hinged bottom:



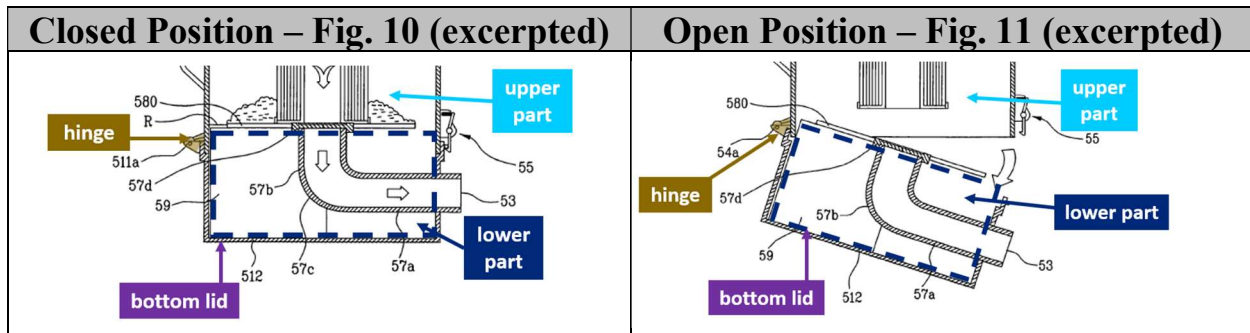
Ex1001, Fig. 6h; Ex1011. Fig. 10; Ex1002 ¶236.

C. Ground 3: Jung Renders Obvious [1]/[3]-[7]/[9]-[12]/[14]-[19]

To the extent Jung does not anticipate the claims challenged in Ground 1, it renders them obvious. Ex1002 ¶¶238-239. To the extent PO argues that Petitioners have combined or otherwise used disclosures from different embodiments in Ground 1, those claims would have been obvious over Jung. *Id.* Jung teaches that “various modifications and variations can be made in the present invention without departing from the spirit or scope of the inventions” and that descriptions for “the same or like parts of the first embodiment” of the dust collecting assembly are omitted for the second embodiment such that the descriptions of the first embodiment for those components also apply to the second embodiment. Ex1005, 11:57-63, 14:28-31; Ex1002 ¶¶238-239.

1. [6]

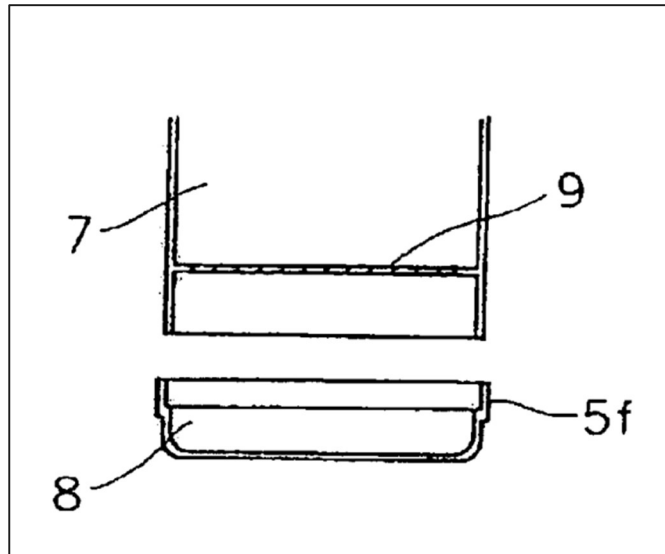
Jung anticipates and/or renders obvious [1]. §§VIII.A.1, VIII.C, *supra*; Ex1002 ¶¶240-241. Jung teaches that the **bottom lid/lower part** of the **dust collecting assembly** rotate about a **hinge**:



Ex1005, Figs. 10-11, 11:8-15, 14:23-27; Ex1002 ¶¶242-243.

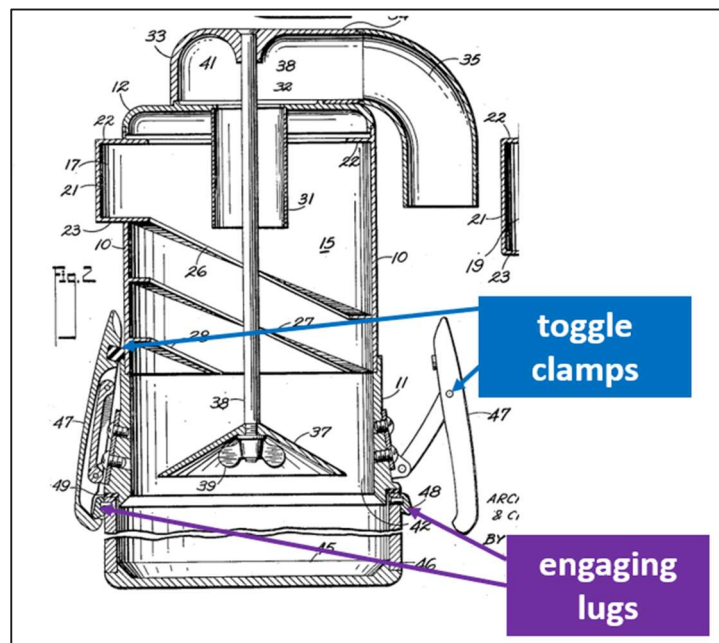
Jung teaches this design is advantageous because it makes it “easy to discharge the impurities and to clean the **dust collecting assembly**.” *Id.*

A POSA would have been motivated to modify Jung’s **bottom lid/lower part** to make it detachable from Jung’s **upper part** to, for example, make it easier to clean the **dust collecting assembly** by enabling it to split into two parts. Ex1002 ¶244. A POSA would have understood that detachable dust cups were known in the art and that such designs facilitated cleaning. For example, U.S. 6,766,558 to Matsumoto teaches making a vacuum cleaner dust cup detachable to make it easier to “clean[] using water or the like”:



Ex1013, Fig. 17, 7:66-8:23; Ex1002 ¶244.

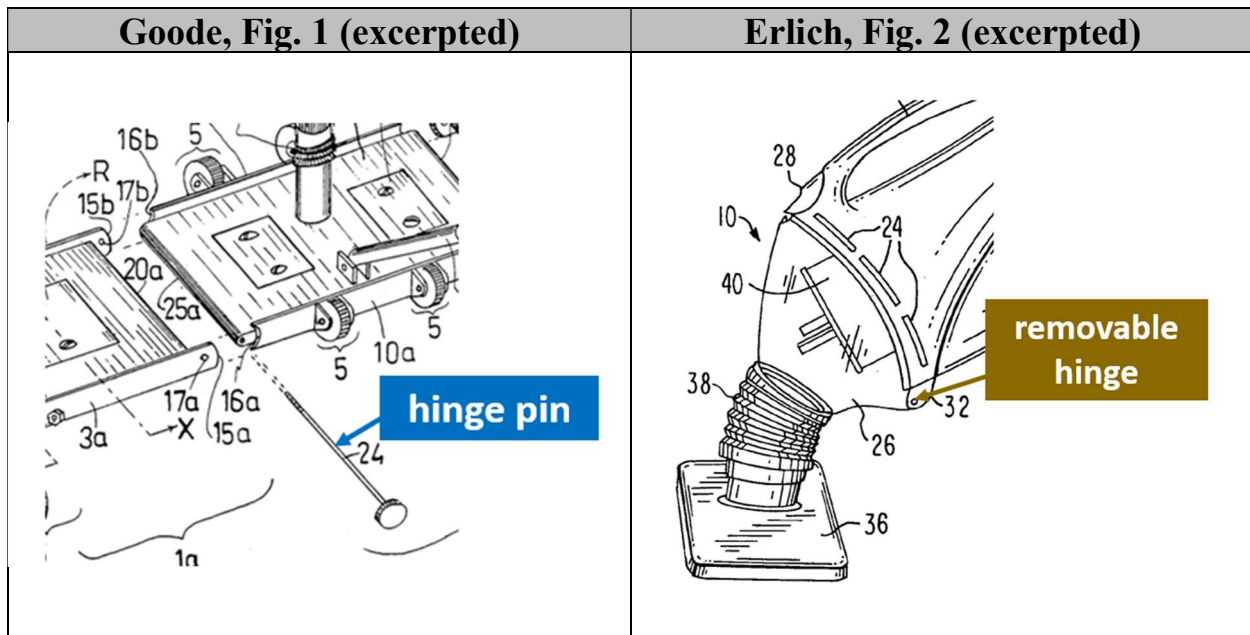
Similarly, a POSA would have understood Davis to teach a detachable dust cup via **toggle clamps** and **engaging lugs**:



Ex1010, Fig. 2, 4:25-31; Ex1002 ¶245

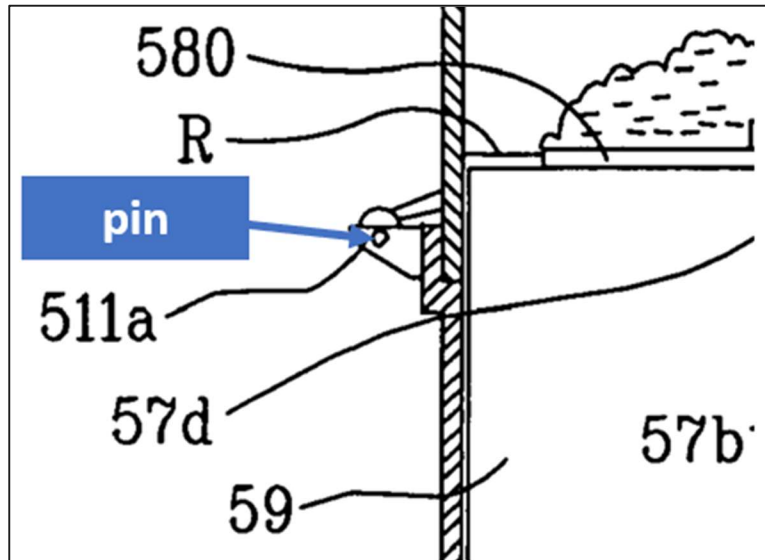
A POSA would have understood that making Jung’s **bottom lid/lower part** detachable from Jung’s **upper part** would have made it easier to “perform cleaning” of the **lower part** and **upper part** by, for example, allowing a user to reach into areas of the **dust collecting assembly**, allowing the separate parts to fit into smaller sinks or a dishwasher for cleaning/soaking, and making it more convenient to clean the **dust collecting assembly** with water or cleaning tools. Ex1002 ¶246

A POSA would have understood that removable hinges and hinge pins were well-known ways to make vacuum cleaner components detachable. Ex1002 ¶247. For example, U.S. 4,637,086 to Goode teaches removable hinge pins separating sections of a vacuum cleaner, and U.S. 7,060,182 to Erlich teaches “removable hinge[s]” that allow a housing of a cleaner to be “detached from the hinge”:



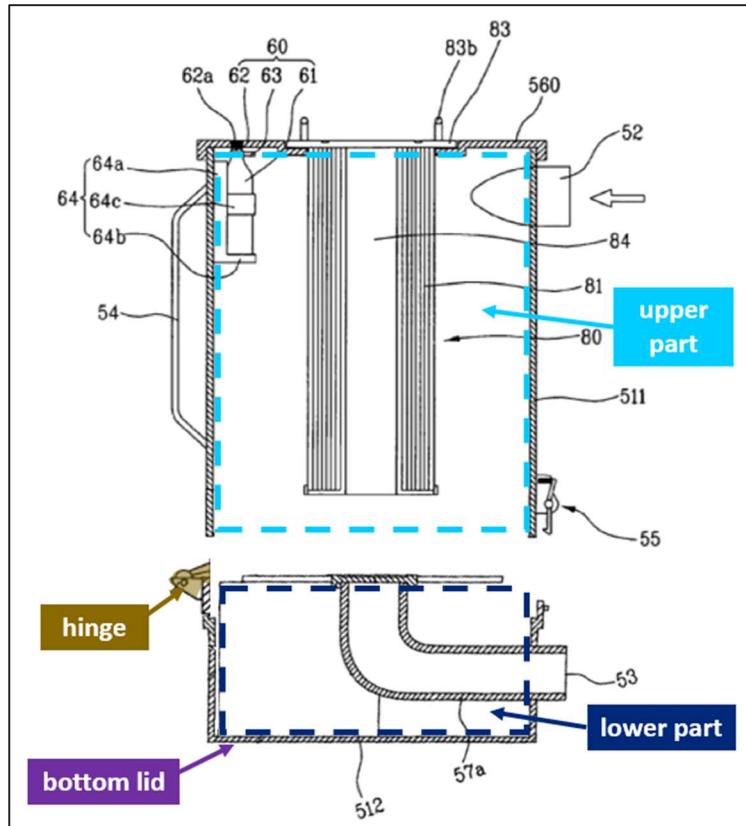
Ex1012, Fig. 1, Abstract, Claims; Ex1014, Fig. 2, 4:15-27; Ex1002 ¶247.

A POSA would have understood Jung's **hinge** to have a **hinge pin** (such as Goode's or other common widely available off-the-shelf pins, like cotter pins):



Ex1005, Fig. 10 (excerpted); Ex1002 ¶248.

A POSA would have been motivated to modify Jung's **hinge** to be detachably connected to the lower end of Jung's **dust collecting assembly** (e.g., according to well-known techniques such as making Jung's **hinge pin** or **hinge** removable as shown in Goode and Erlich) such that the **bottom lid/lower part** would be detachable from Jung's **upper part**:



Ex1005, Fig. 11 (modified); Ex1002 ¶249.

This modification would have involved the simple substitution of Jung’s **hinge/pin** with well-known hinges/pins in the art (*e.g.*, removable hinge pins or removable hinges). Ex1002 ¶250. Modifying Jung’s **hinge** to have a removable pin or be removable itself would have been at least obvious to try as there were a finite number of identified, predictable hinge structures and a finite number of solutions to make it easier to discharge the impurities and “clean the **dust collecting assembly**.” Ex1005, 14:23-27; Ex1002 ¶250. A POSA would have reasonably expected success: removable hinge pins and removable hinges were well-known

approaches for creating detachable components and it was known that dust cups would detach using such a hinge. *Id.*

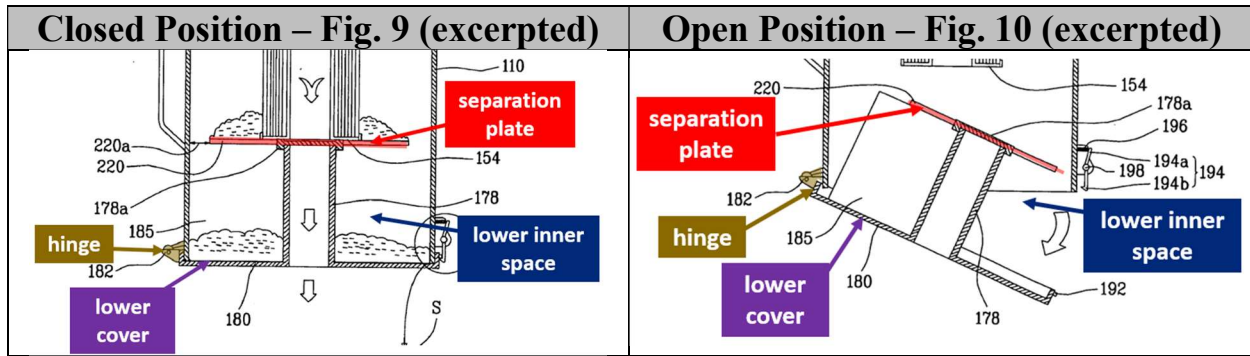
Under the above modification, Jung renders obvious [6] because when Jung's **hinge** is removable or uses a removable pin, Jung's "openable end" of the "dirt collection chamber" is removable from the **dust collecting assembly** ("cyclone separator"). Ex1005, Fig. 11, 7:60-67, 11:8-39; Ex1002 ¶251.

D. Ground 4: Min Renders Obvious [1]/[3]-[7]/[9]-[12]/[14]-[19]

To the extent Min does not anticipate certain claims of the '120Patent, it renders them obvious. Ex1002 ¶¶253-254 To the extent PO argues that Petitioners have combined or otherwise used disclosures from different embodiments in Ground 2, those claims would have been obvious over Min. *Id.* Min teaches that "various modifications and variations can be made in the present invention without departing from the spirit or scope of the inventions." Ex1011, ¶133; Ex1002 ¶¶253-254.

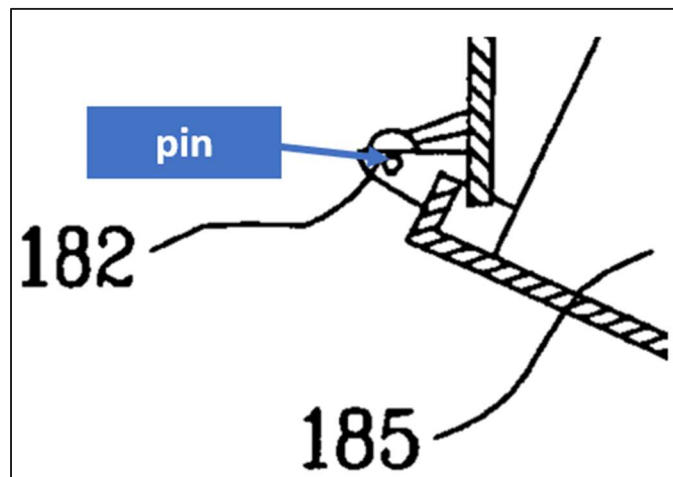
1. [6]

Min anticipates and/or renders obvious [1]. §§VIII.B.1, VIII.D, *supra*; Ex1002 ¶¶255-256. Like Jung, Min teaches that the **lower cover** of the **dust collector assembly** rotates about a **hinge**:



Ex1011, Figs. 9-10, ¶¶80, 108-112, 131; Ex1002 ¶¶257-258.

Min teaches this design is advantageous because it makes it easier to remove impurities. *Id.* Additionally, like Jung, a POSA would have understood Min's **hinge** to have a **hinge pin** (like Goode's or other common widely available off-the-shelf pins like cotter pins):



Ex1011, Fig. 10 (excerpted); Ex1002 ¶259.

For the reasons in Ground 3, a POSA would have been motivated to modify Min's **hinge** to be detachably connected to the lower end of Min's **dust collector assembly** (e.g., according to well-known techniques such as making Min's **hinge**

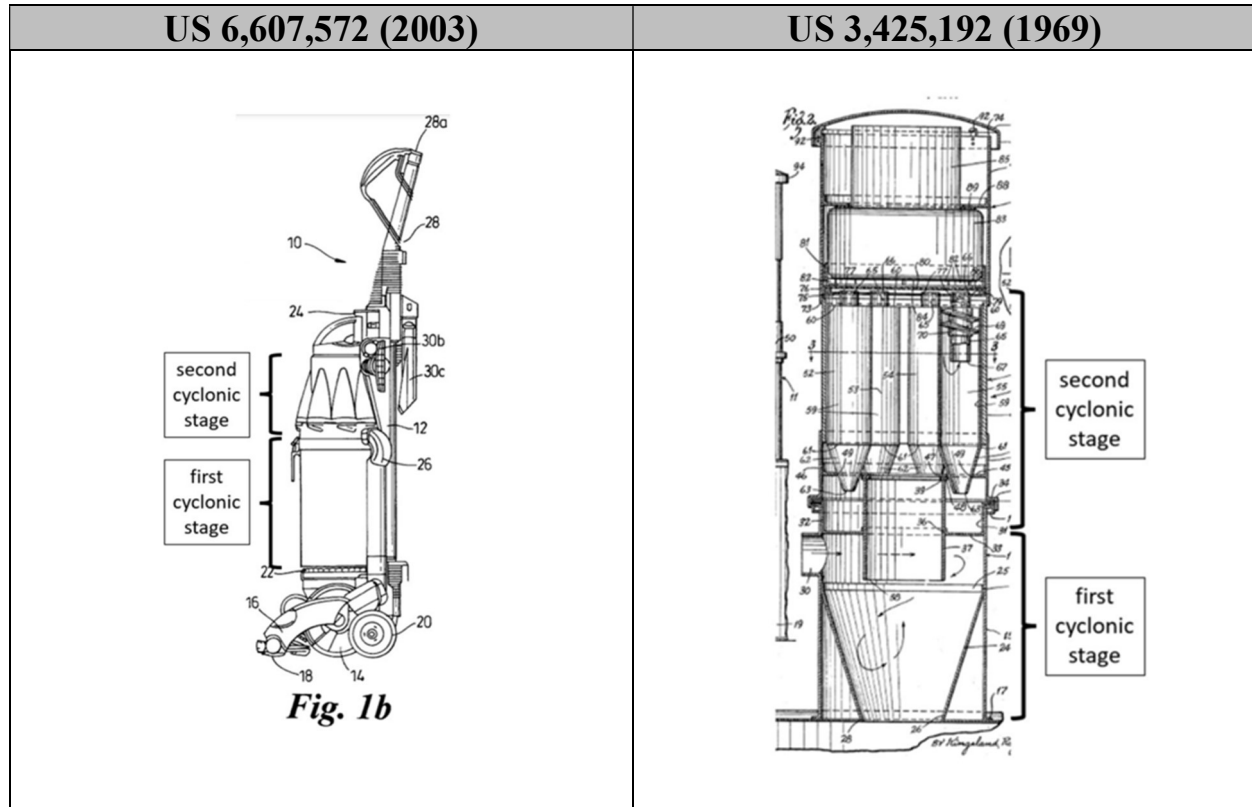
pin or **hinge** removable as shown in Goode and Erlich) such that the **lower cover/lower inner space** would be detachable from Min's **upper inner space**. §VIII.C.1., *supra*; Ex1002 ¶¶260-261. Under that modification, Min renders obvious [6] because making Min's **hinge** detachably connected to the lower end of **dust collector assembly** also makes “the openable end” (*i.e.*, the **lower cover/lower inner space**—individually and collectively) removable from the **dust collector assembly** (“cyclone separator”). *Id.*

E. Ground 5: Jung in Combination with Jeong Renders [8]/[20] Obvious

1. Jeong Teaches Secondary Cyclones with Storing Chambers and Separated by Guide Ribs That a POSA Would Have Been Motivated to Incorporate into Jung

Jung teaches a single-stage cyclonic vacuum cleaner. Ex1005, Figs. 2, 10-12, 11:57-12:12, 12:46-13:10, 13:36-53; Ex1002 ¶263. A POSA would have understood that adding a second cyclonic stage to a single-stage cyclone improved particle separation. Ex1002 ¶264. For example, U.S. 6,344,064 to Conrad teaches that “multiple cyclones connected in parallel or series ha[d] long been known to be advantageous in the separation of particulate matter” over a single cyclone because a second stage of downstream cyclones can filter the “ever-smaller particles” not filtered by the upstream stage. Ex1025, 1:18-52; Ex1002 ¶264. Vacuums with multiple, smaller second stage cyclones were well-known in the art at the time of the

'120Patent. Ex1002 ¶264. For example, such vacuums have been known since the 1960s:

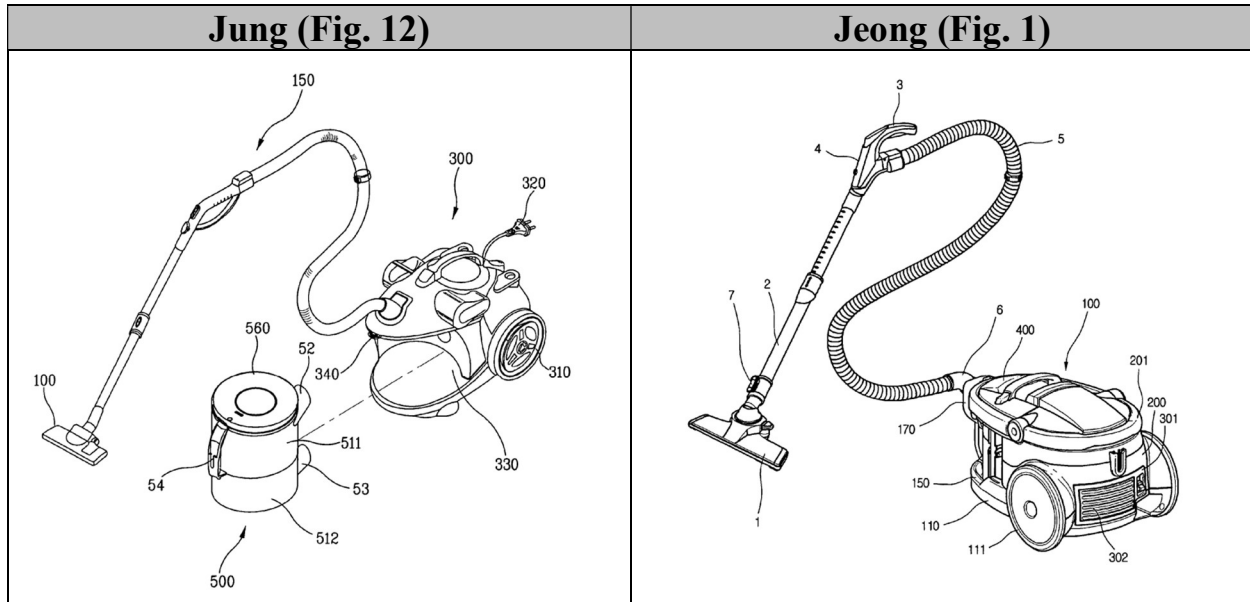


Ex1016, Fig. 1b; Ex1017, Fig 2; Ex1002 ¶264.

A POSA would have understood that smaller second stage cyclones were advantageous because they could remove “finer dirt and foreign matter particles” not filtered by a first stage. Ex1017, 1:35-39; Ex1002 ¶265. A POSA would have been motivated to modify Jung to include smaller downstream secondary cyclones to improve Jung’s dust separation capabilities, particularly for fine particles. Ex1002 ¶266.

Like Jung, Jeong is a patent also assigned to LG Electronics. Ex1006, Cover.

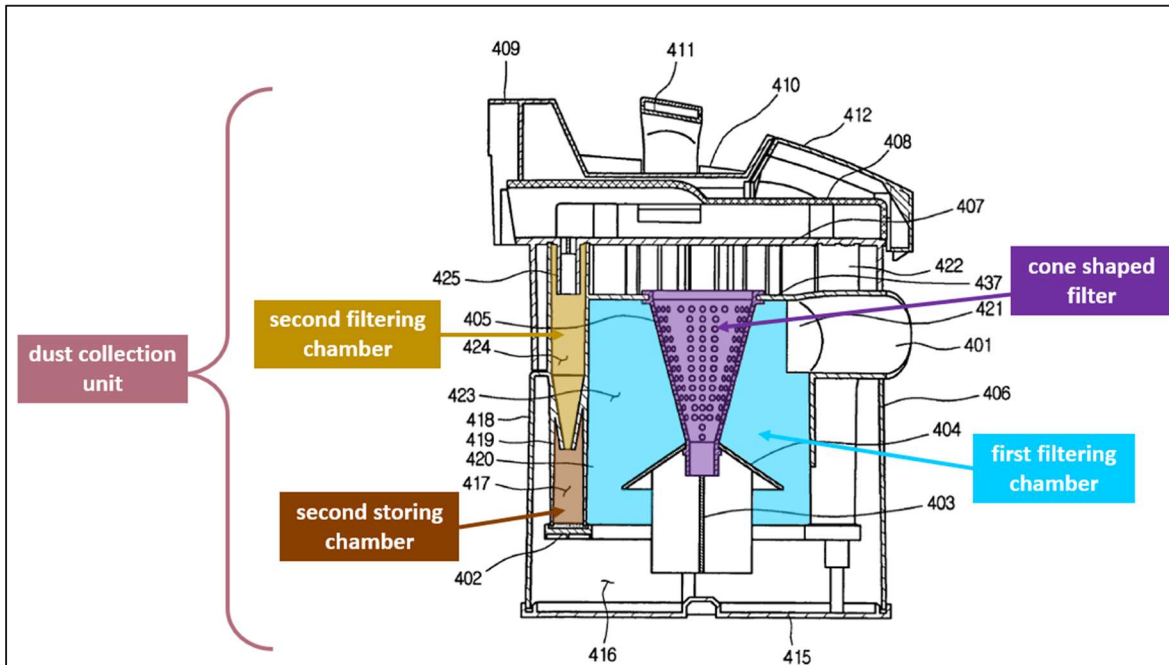
Both Jung and Jeong depict a similar vacuum cleaner:



Ex1005, Fig. 12, Ex1006, Fig. 1; Ex1002 ¶267.

Jeong teaches smaller downstream secondary cyclones and the benefits of such secondary cyclones. Ex1002 ¶268. Specifically, Jeong teaches a two-stage **dust collection unit** with a “**first filtering chamber 423** for filtering the foreign object[s] ... by generating the cyclone airflow” and a **cone-shaped filter** through which the filtered air is passed into a plurality of **second filtering chambers** to “filter the foreign objects still contained in the air and introduced via the **first filtering chamber 423** by generating the cyclone airflow,” a design which increases Jeong’s “dust collection efficiency.” Ex1006, 6:28-46, 8:37-56, 9:11-36, 10:24-25, Fig. 7; Ex1002 ¶¶268-269. Jeong teaches that “[t]he foreign objects filtered in the **second**

filtering chambers 424 by the cyclone airflow are settled in the **second storing chamber 417**”:



Id.

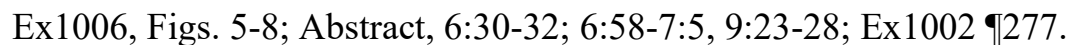
A POSA would have been motivated to improve Jung’s dust collection capabilities by adding Jeong’s **second filtering chambers** and **second storing chamber** as a downstream second cyclonic stage to Jung’s **dust collecting assembly** (e.g., downstream of Jung’s **upper part/lower part**). Ex1002 ¶270. A POSA would have positioned Jeong’s **second filtering chambers** and **second storing chambers** in a semi-circular arrangement around Jung’s **dust collecting assembly** in the manner disclosed in Jeong or in other ways understood in the art. Ex1006, Figs. 5-8, 6:58-7:12; Ex1002 ¶270. Modifying Jung in view of Jeong as described would have been at least obvious to try as there were only a finite number of predictable

ways to achieve additional dust filtration in a cyclonic vacuum cleaner. Ex1002 ¶270-271. A POSA would have had a reasonable expectation of success making this modification as Jung and Jeong are analogous art—both are LG Electronics patents for similar cyclonic vacuum cleaners having dust collection assemblies for collecting and separating impurities—and because a POSA would have understood that an additional second cyclonic stage would have yielded the predictable and beneficial result of additional dust filtration. *Id.*

2. [8]/[20]

Jung in combination with Jeong renders these claims obvious. Ex1002 ¶¶272-273. Jung anticipates and/or renders obvious [1]/[18]. §§VIII.A.1, VIII.C, *supra*. Ex1002 ¶274. Jeong’s **second filtering chambers** filter impurities using “cyclone airflow” and are therefore “a cyclonic stage”/“cyclonic unit.” Ex1006, 6:27-30, 6:37-46, 9:22-31; Ex1002 ¶275.

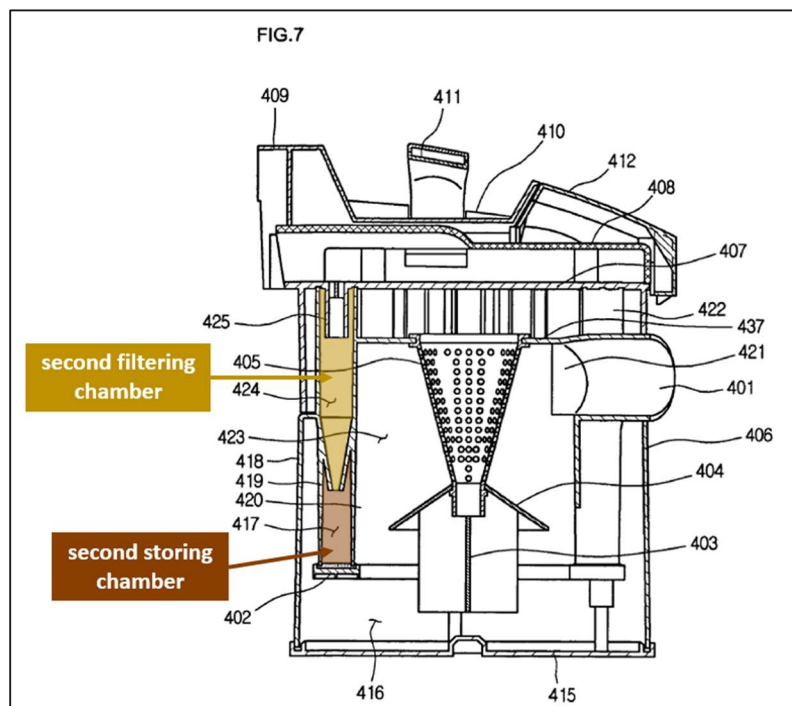
For [8], the Jung/Jeong combination teaches “a cyclonic stage downstream from the cyclone separator”: because Jeong’s **second filtering chambers** are downstream from Jeong’s first cyclonic stage (“**first filtering chamber**”), as implemented in the Jung/Jeong combination, Jeong’s **second filtering chambers** would likewise be downstream from Jung’s first cyclonic stage (Jung’s **dust collecting assembly**). §VIII.E.1., *supra*; Ex1002 ¶276



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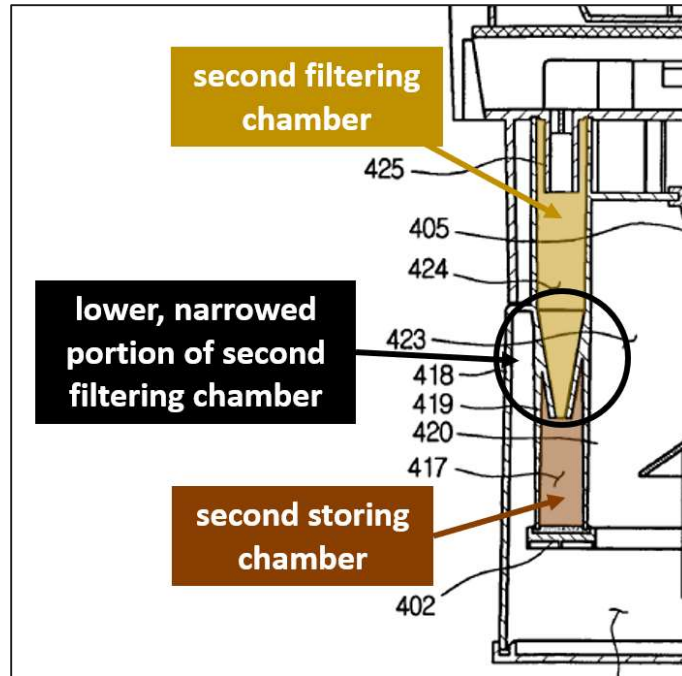
To the extent PO argues “divider plates” must be internal to the “cyclones,” Jeong likewise teaches these limitations to the same extent accused by PO in co-pending litigation. Ex1006, 6:27-46, 9:29-37, Fig. 7; Ex1002 ¶¶279-281.

Jeong teaches that “[t]he foreign objects filtered in the **second filtering chambers 424** by the cyclone airflow are settled in the **second storing chamber 417**”:



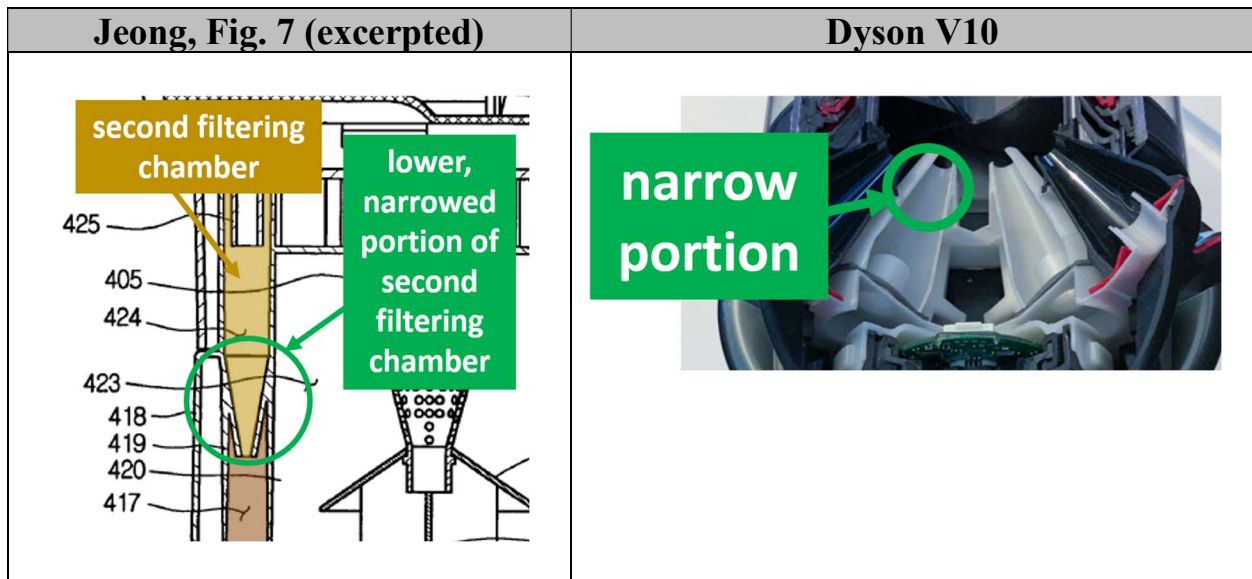
Id.

“[T]o prevent the settle[d] foreign objects from flying, a width of each of the lower portion of the **second filtering chambers []** are narrowed”:



Id.

This is at least as much disclosure as PO accuses of infringement in the co-pending litigation:



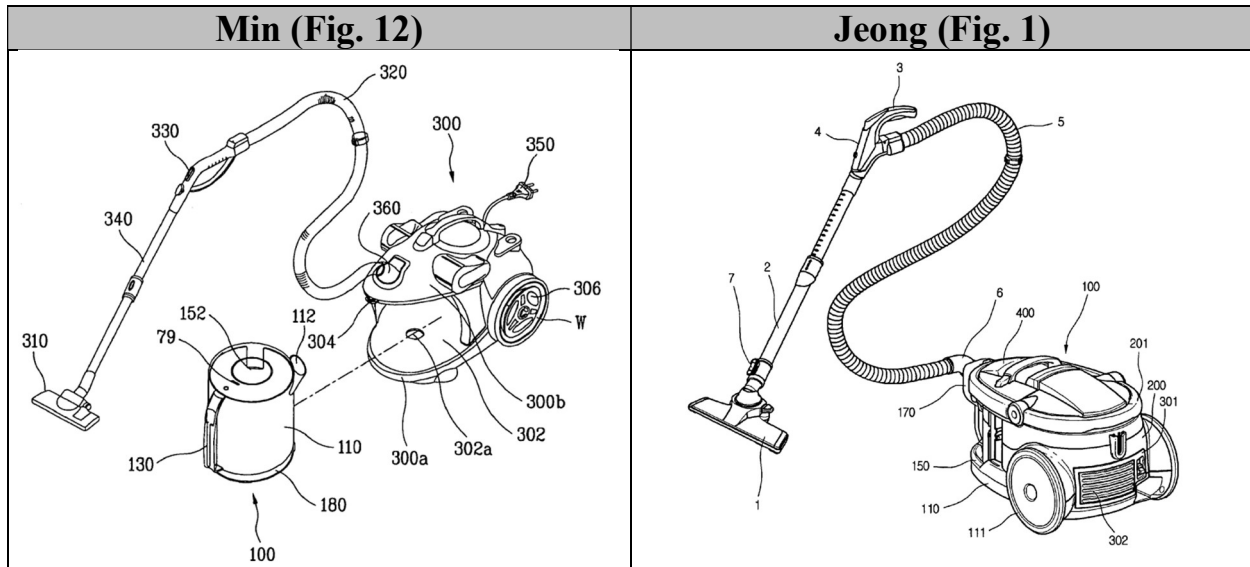
Ex1006, Fig. 7; Ex1026; Ex1002 ¶¶282-283.

These narrowed portions thus teach that “at least some of the plurality of cyclones is each provided with a divider plate”/“a plurality of divider plates” at least to the same extent as PO accuses in co-pending litigation. *Id.*

F. Ground 6: Min in Combination with Jeong Renders [8]/[20] Obvious

1. Jeong Teaches Secondary Cyclones with Storing Chambers and Separated by Guide Ribs That a POSA Would Have Been Motivated to Incorporate into Min

Like Jung, Min teaches a single-stage cyclonic vacuum cleaner. Ex1011, Fig. 9, Ex1002 ¶285. For the reasons in Ground 5, a POSA would have been motivated to add Jeong’s **second filtering chambers** and **second storing chamber** as a downstream second cyclonic stage to Min’s **dust collector assembly** (*e.g.*, downstream of Min’s **upper inner space/lower inner space**). §VIII.E.1., *supra*; Ex1002 ¶286. A POSA would have been further motivated to combine Min and Jeong as they are both LG Electronics Inc. patents that depict a similar vacuum cleaner:



Ex1011, Fig. 12, Ex1006, Fig. 1; Ex1002 ¶287.

Such a modification would have been obvious to try and a POSA would have had a reasonably expectation of success for the reasons in Ground 5 and because Jeong and Min are analogous art—both are LG Electronics Inc. patents related to cyclonic vacuum cleaners having dust collection assemblies for collecting and separating impurities. Ex1002 ¶288.

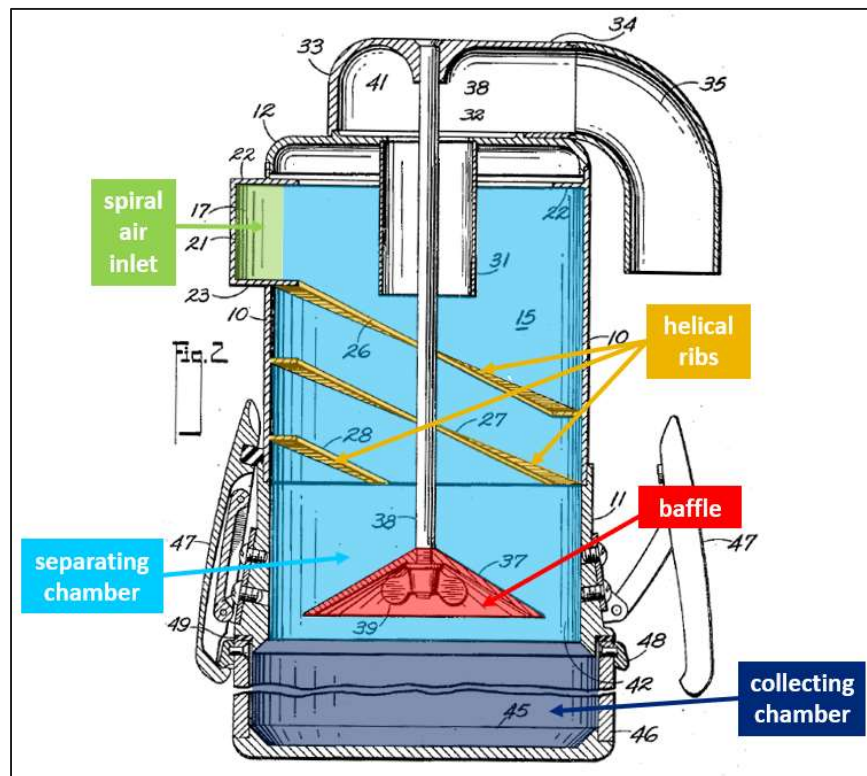
2. [8]/[20]

Min in combination with Jeong renders these claims obvious. Ex1002 ¶¶289-290. Min anticipates and/or renders obvious [1]/[18]. §§VIII.B.1, VIII.D, *supra*; Ex1002 ¶291. For the reasons in Ground 5, Jeong’s **second filtering chambers** (“cyclonic stage”) are downstream from Min’s **dust collector assembly** (“cyclone separator”) and Jeong teaches the remaining features of [8]/[20]. §VIII.E.1., *supra*; Ex1002 ¶¶292-293.

G. Ground 7: Jung in Combination with Davis Renders [2]/[13] Obvious.

1. A POSA Would Have Been Motivated to Incorporate Davis' Helical Ribs into Jung

Davis teaches a vacuum cleaner with a “cyclone type” **separating chamber** that uses **helical ribs** to “direct and guide the flow of gas” within the separating chamber, which results in improved cyclonic dust collection because the **helical ribs** help “drive the [incoming] air stream in a helical path to [a] **baffle 37** [which] prevent[s] any appreciable portion of the incoming air from short-circuiting to [a] low pressure area”:



Ex1010, Fig. 2, 1:16-21, 1:60-2:2, 2:51-3:34, 3:59-66, 4:64-69, 6:2-6; 7:12-19;

Ex1002 ¶¶295-296.

Davis' **helical ribs**, which “guid[e] the air in a continuation of a helical path ... resulting in a helical movement of air,” help “giv[e] sufficient [] momentum,” to incoming air, which “accelerate[s] the air in a zone in which separation takes place, so that centrifugal force is increased” (*e.g.*, preventing the air from prematurely losing cyclonic action). Ex1010, 1:19-21, 2:34-35, 4:64-69.

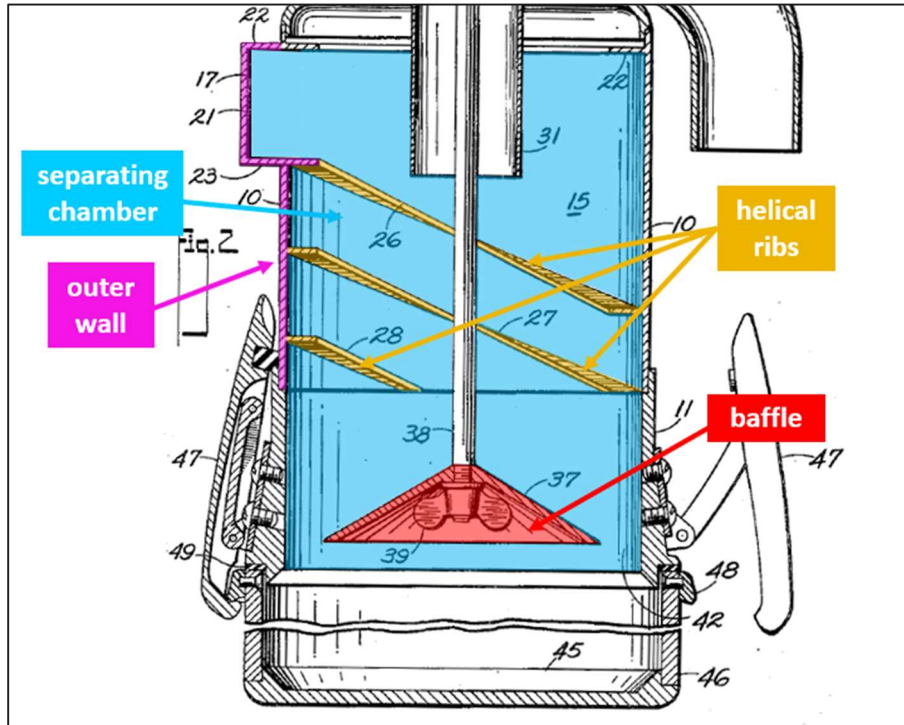
A POSA would have been motivated to implement Davis' **helical ribs** within Jung's **dust collecting assembly**. Ex1002 ¶297. Jung's **dust collecting assembly** is configured to “separat[e] and collect[] impurities such as dust by using the cyclone principle therein.” Ex1005, 6:29-40. A POSA would have recognized that Davis' **helical ribs** would have improved the cyclonic dust collection of Jung's **dust collecting assembly** by “giv[ing] sufficient momentum,” to incoming air and preventing that air from “short-circuiting to [] low pressure area[s]” (*e.g.*, prematurely losing cyclonic action). Ex1010, Fig. 2, 2:34-35, 7:12-19; Ex1002 ¶297. A POSA, moreover, would specifically be motivated to use **helical ribs** of Davis due to the similarity in layouts between Davis and Jung: both references teach plates (Jung's **separation plate** and Davis' **baffle**) that separate dust collection chambers (Jung's **lower part** and Davis' **collecting chamber**) from cyclonic chambers (Jung's **upper part** and Davis' **separating chamber**) to accomplish a similar goal (exhaust clean air and prevent dust from being risen by flowing air). Ex1005, 9:63-17, 10:25-30, 13:1-7; Ex1010, 4:6-34; 5:23-30, 5:47-66, 7:12-19, 7:34-43; Ex1002 ¶297.

The combination of Jung and Davis would have involved a simple substitution of well-known elements (*e.g.*, incorporation of Davis’ **helical ribs**) within a known structure (*e.g.*, Jung’s **dust collecting assembly**) to obtain the predictable result of improving cyclonic dust collection by giving “sufficient momentum” to incoming air and preventing that air from “short-circuiting to [] low pressure area[s].” Ex1010, Fig. 2, 6:55-60, 7:12-19; Ex1002 ¶298. The combination of Jung and Davis would have been at least obvious to try: there were a finite number of ways to improve cyclonic dust collection, and even less ways to add momentum to incoming air while still avoiding low pressure areas. *Id.* And a POSA would have reasonably expected success: Jung and Davis disclose similar cyclonic vacuum cleaners and a POSA would have understood that adding Davis’ **helical ribs** into Jung’s **dust collecting assembly** would provide the predictable result of preventing incoming air from prematurely losing cyclonic action. *Id.*

2. [2]/[13]

Jung in combination with Davis renders these claims obvious. Ex1002 ¶¶299-300. Jung anticipates and/or renders obvious [1]/[9]. §VIII.A.1, §VIII.C, *supra*; Ex1002 ¶301. Davis’ **helical ribs**, implemented in Jung’s **dust collecting assembly**, “direct and guide the flow of [air]” coming into the **dust collecting assembly** are thus “a flow director.” Ex1010, Fig. 2, 1:16-21, 1:60-2:2, 3:59-66, 4:64-5:3, 5:47-66, 6:2-6; 7:12-19; Ex1002 ¶¶302-303. The **helical ribs** (“flow director”) further

comprise “a flow directing surface that extends inwardly and downwardly into the cyclone chamber from the outer wall of the cyclone chamber.” *Id.* Davis’ **helical ribs** extend inwardly and downwardly from the “**outer wall**”¹³ of Davis’ **separating chamber** to a position above Davis’ **baffle**:



Id.

Given the similar purposes between the Davis’s **baffle** and Jung’s **separation plate**, a POSA implementing Davis’s **helical ribs** in Jung’s **dust collecting**

¹³ As noted, [13] claims “*the* outer wall” of the cyclone chamber without antecedent basis recited in [9]. Jung nonetheless teaches an outer wall for the same reasons as [1c]. §VIII.A.1.d, *supra*. Ex1002 ¶303.

assembly would have likewise caused the **helical ribs** to be positioned above, and stop before, Jung's **separation plate**. Ex1002 ¶304. Therefore, the Jung/Davis combination discloses that the “flow directing surface” extending “to a position above the plate.” *Id.*

H. Ground 8: Min in Combination with Davis Renders [2]/[13] Obvious.

1. A POSA Would Have Been Motivated to Incorporate Davis' Helical Ribs into Min

Min's **dust collector assembly** is configured to filter impurities by using a cyclone using centrifugal force. Ex1011, ¶59; Ex1002 ¶306. For the reasons in Ground 7, a POSA would have been motivated to implement Davis' **helical ribs** within Min's **dust collector assembly**, including because a POSA would have recognized that Davis' **helical ribs** would have improved the cyclonic dust collection in Min's **dust collector assembly** by “giv[ing] sufficient momentum,” to incoming air and preventing that air from “short-circuiting to [] low pressure area[s],” and because Davis and Min are similar art: both teach plates (Min's **separation plate** and Davis' **baffle**) that separate dust collection chambers (Min's **lower inner space** and Davis' **collecting chamber**) from cyclonic chambers (Min's **upper inner space** and Davis' **separating chamber**) to accomplish a similar goal (exhaust clean air and prevent dust from being risen by flowing air). Ex1010, 2:34-36, 5:23-30, 5:47-66, 7:12-19, 7:34-43; Ex1011, ¶¶16, 70-73, 98-100; §VIII.G.1.,

supra; Ex1002 ¶307. Such a combination would have been obvious to try and a POSA would have had a reasonable expectation of success for the reasons in Ground 7 and because Davis and Min are analogous art. *Id.*

2. [2]/[13]

Min in combination with Davis renders these claims obvious. Ex1002 ¶¶309-310. Min anticipates and/or renders obvious [1]/[9]. §§VIII.B.1, VIII.D, *supra*. Ex1002 ¶311. For the reasons in Ground 7, Davis’ **helical ribs** as implemented in Min’s **dust collector assembly** teach [2]/[13]. §VIII.G.1., *supra*; Ex1002 ¶313.

I. Ground 9: Soler Anticipates [1]/[3]-[5]/[9]/[12]/[14]-[15]/[18]-[19]

1. [1]/[9]/[18]

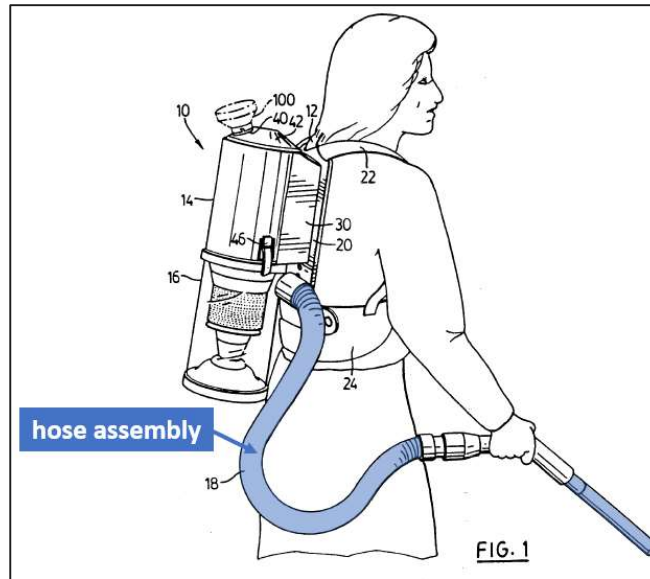
a. [1pre]/[9pre]/[18pre]

If the preambles are limiting, Soler teaches a vacuum cleaner which is a “surface cleaning apparatus.” Ex1009, Abstract, Figs. 1-2, 1:9-12, 3:11-16; Ex1002 ¶¶314-315

b. [1a]/[9a]/[18a]

Soler teaches a “dirt inlet”/“dirt air inlet.”¹⁴ Ex1002 ¶316. For example, Soler’s **hose assembly** is a “dirt inlet”/“dirt air inlet”:

¹⁴ [1c]/[9c]/[16c]/[18d] claim “the dirt air inlet.”

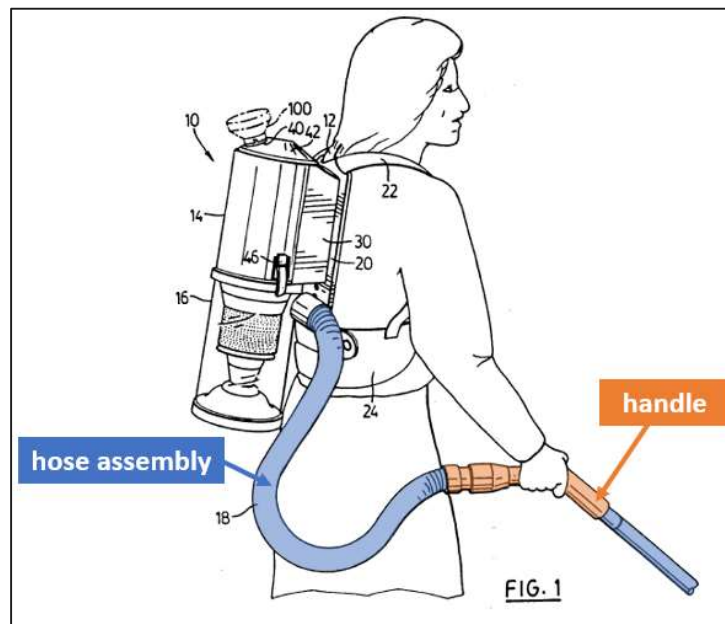


Ex1009, Fig. 1, 4:11-16, 6:65-7:5; Ex1002 ¶317.

c. [1b]/[9b]/[18b]

Soler teaches these limitations. Ex1009, 4:11-16, Fig. 1; Ex1002 ¶¶318-319.

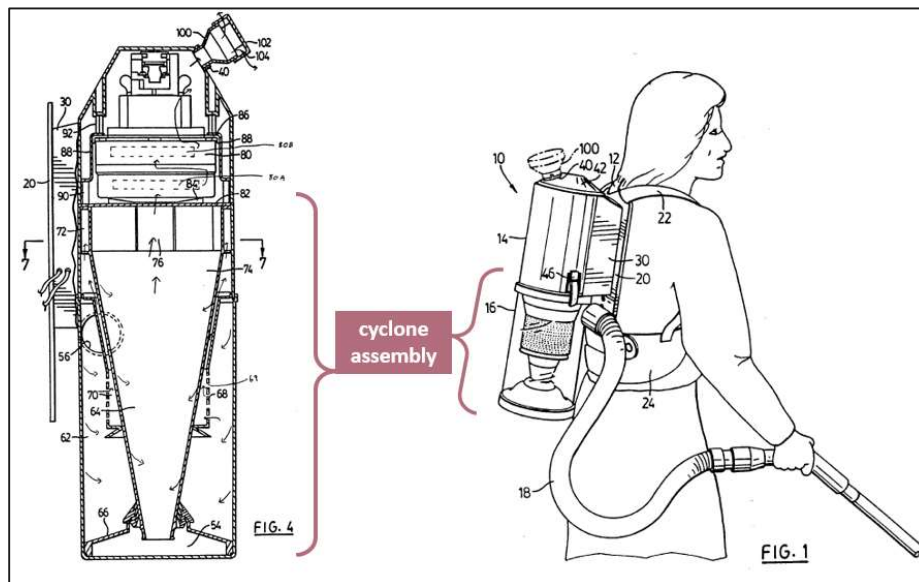
Soler teaches a **handle**:



Id.

d. [1c]/[9c]/[18c]/[18d]

Soler teaches these limitations. Ex1002 ¶¶320-322. Soler’s **cyclone assembly** is a “cyclone separator”/“cyclonic unit.” Ex1009, Figs. 1-4, 1:9-12, 3:3-21, 5:8-10, 6:5-37; Ex1002 ¶323. Soler’s **cyclone assembly** “comprises at least one cyclone,” and “[p]referably ... a first cyclone chamber and a second cyclone chamber in series”:

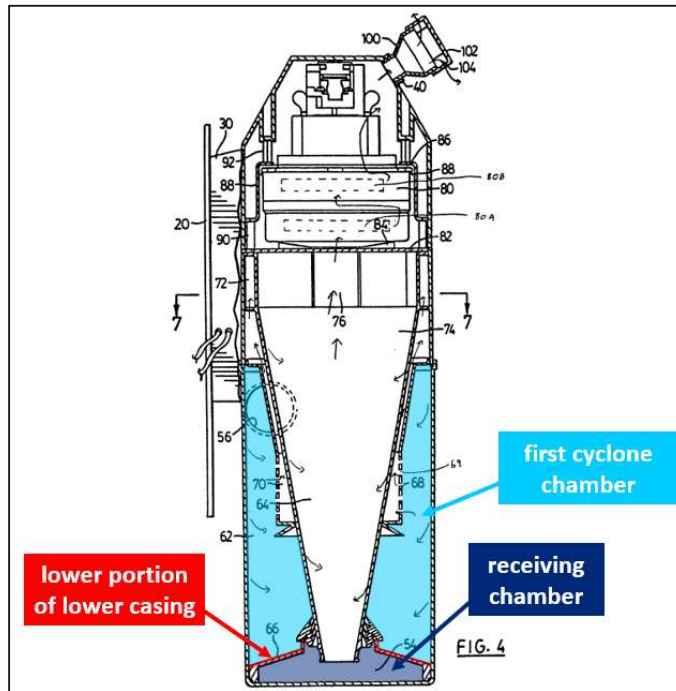


Id.

For [9c]/[18c]¹⁵, Soler teaches that its **cyclone assembly** (“cyclone separator”/“cyclonic unit”) comprises “a cyclone chamber and a dirt collection chamber.” Ex1009, Fig. 4, 6:5-37; Ex1002 ¶324. Soler’s cyclone assembly comprises a **first cyclone chamber** which rotates “dirt laden air” such that “larger

¹⁵ For [1d], Soler teaches “a cyclone chamber and a dirt collection chamber” for the same reasons. Ex1002 ¶324.

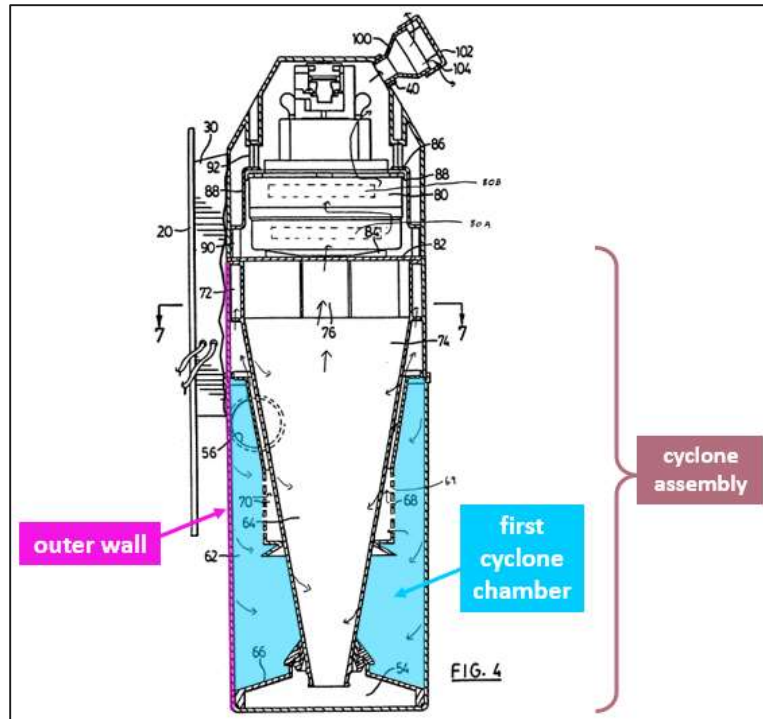
and heavier dirt is deposited in the lower portion of lower casing” (a “cyclone chamber”) and a second cyclone chamber that separates “finer dirt particles” that are then “deposited in [a] **receiving chamber**” (a “dirt collection chamber”):



Id.

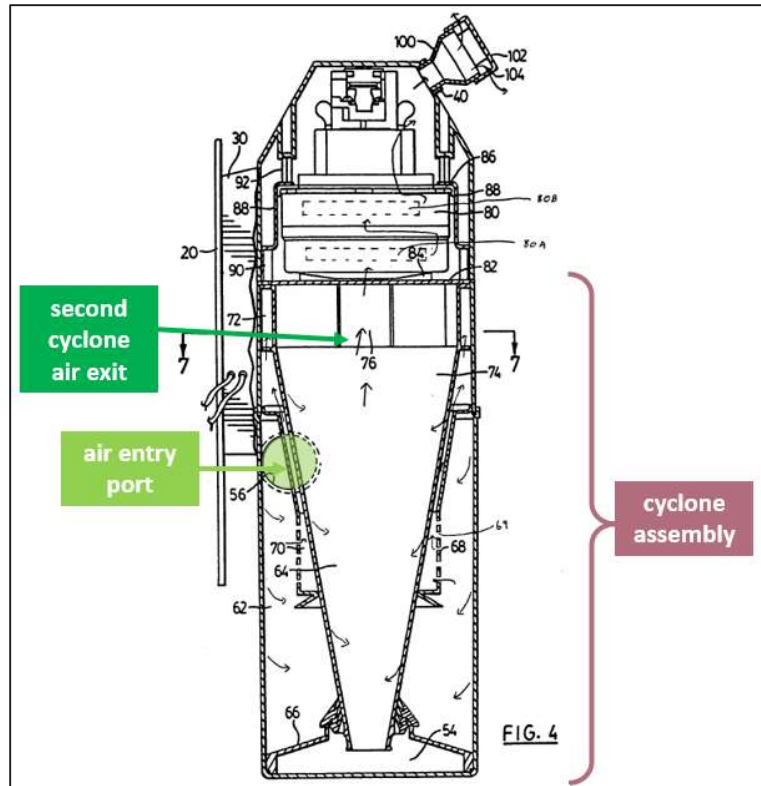
For [1c]/[18d], Soler teaches that the “cyclone separator” and “cyclone chamber” each have an “outer wall.” Ex1009, 5:46-48, 6:5-21, Fig. 4; Ex1002 ¶325.

Soler’s **cyclone assembly** and **first cyclone chamber** each have an **outer wall**:



Id.

For [1c]/[9c], Soler teaches a “cyclone separator” with “a fluid inlet downstream from the dirt air inlet” and “a fluid outlet.” Ex1009, 5:59-65, 6:5-21, 6:65-7:5, Figs. 3-4; Ex1002 ¶¶326-327. Soler’s **cyclone assembly** (“cyclone assembly”) includes an **air entry port** (“fluid inlet”) through which dirty air enters the first cyclone chamber. *Id.* The air then travels from the first cyclone chamber to the second cyclone chamber and exits the **cyclone assembly** via a **second cyclone air exit** (“fluid outlet”):

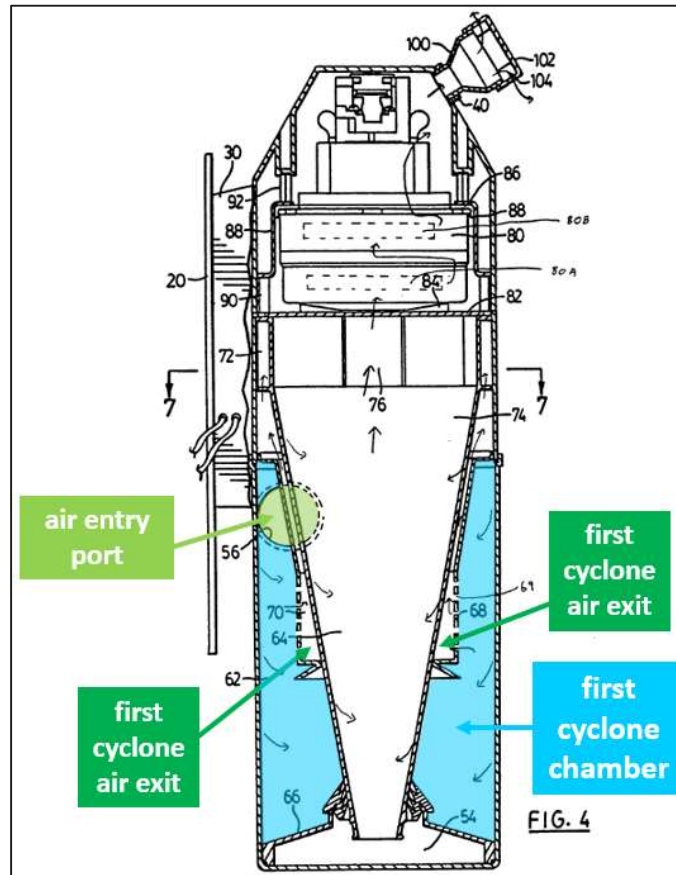


Id.

Soler’s “fluid inlet” is downstream from the “dirt air inlet”: the hose assembly (“dirt inlet”) is connected to the **air entry port** (“fluid inlet”) such that air travels through the hose to the **air entry port** into the first cyclone chamber. *Id.*

For [18d], Soler teaches that the “cyclone chamber” likewise has “a fluid inlet downstream from the dirt air inlet” and “a fluid outlet.” Ex1009, 5:59-65, 6:5-21, 6:65-7:5, Figs. 3-4; Ex1002 ¶¶328-329. Soler’s **air entry port** is also an inlet of the cyclone chamber (*i.e.*, Soler’s **first cyclone chamber**) and is downstream from the “dirt air inlet” for the same reasons as [1c]/[9c]. *Id.* Soler’s “cyclone chamber” (**first**

cyclone chamber) also has a fluid outlet: Soler teaches that air exits the **first cyclone chamber** “via **first cyclone air exit** 68 to passage 70”:



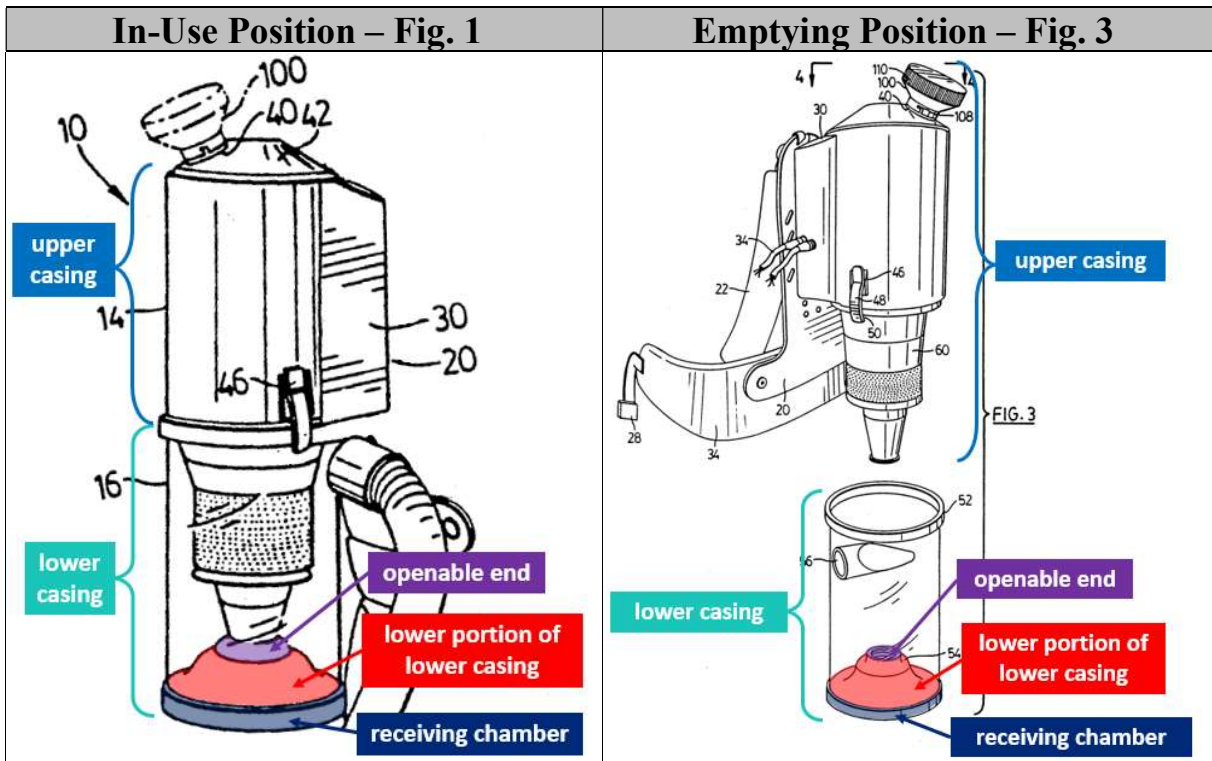
Id.

Soler’s **first cyclone air exit** is thus a “fluid outlet” of the “cyclone chamber”

Id.

For [9c]/[18c], Soler teaches that the “cyclone separator”/“cyclone chamber” has “an openable end.” Ex1009, Figs. 1, 3, 5:46-57; Ex1002 ¶330. Soler’s **lower casing** is “releasably mounted on **upper casing 14**” such that when released, the **lower portion of lower casing** moves downward from an **in-use position** (attached

to the upper casing) into an **emptying position** (detached from the upper casing), and an **openable end** of the **receiving chamber** (“dirt collection chamber”) is opened:

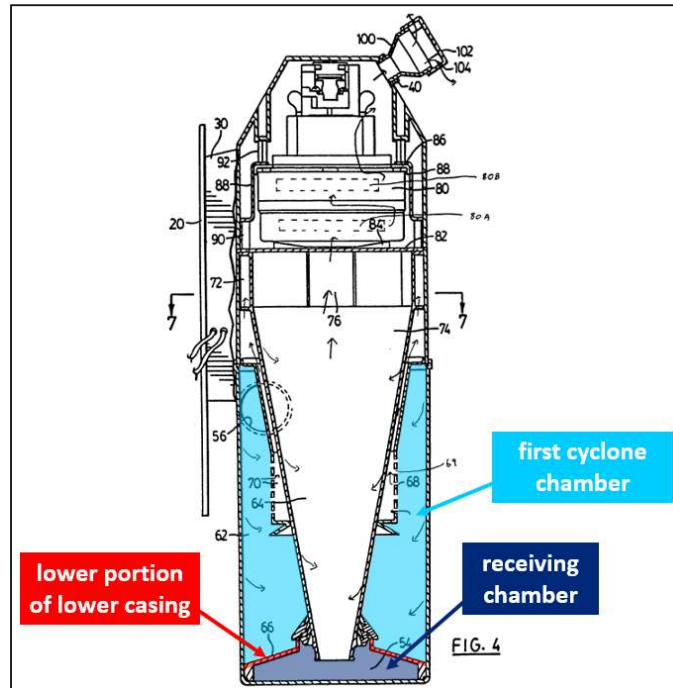


Id.

e. [1d]/[9d]/[18e]

Soler teaches these limitations. Ex1002 ¶¶331-333.

Soler teaches “a plate having a cyclone chamber surface” and that is “positioned between [a/the] cyclone chamber and [a/the] dirt collection chamber.” Ex1009, 6:5-37, Fig. 4; Ex1002 ¶¶334-335; §VIII.I.1.d, *supra*. Soler teaches that a **lower portion of lower casing** separates the **first cyclone chamber** from the **receiving chamber**:

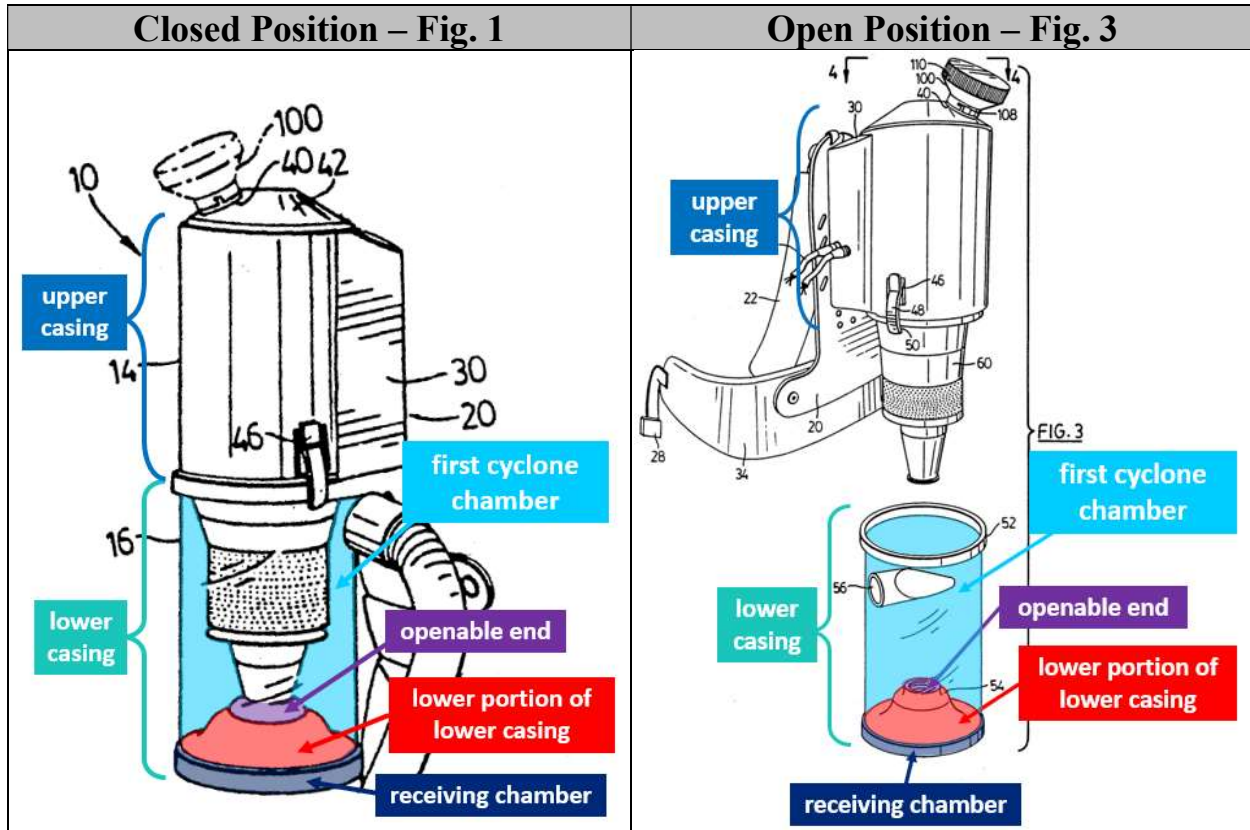


Id.

Soler's **lower portion of lower casing** is thus positioned between the “cyclone chamber” (**first cyclone chamber**) and the “dirt collection chamber” (**receiving chamber**). *Id.* The **lower portion of lower casing** has a surface facing the **first cyclone chamber** and thus has “a cyclone chamber surface.” *Id.*

For [9d]/[18e]. Soler teaches that the “plate [is] positioned...at an openable end.” Ex1002 ¶336. Soler teaches that its plate is positioned at “an openable end” of each of the “cyclone separator,” the “dirt collection chamber,” and the “cyclone chamber,” and for [18e], Soler teaches that its plate is “positioned at the openable end” of the “cyclonic unit.” Ex1009, Figs. 1, 3-4, 5:59-65, 6:5-37; Ex1002 ¶¶336-337; §VIII.I.1.d, *supra*. As illustrated below, the **openable end** of the **receiving chamber** is integral with the **lower portion of lower casing** (the “plate”), and is

thus at “an openable end” of the “dirt collection chamber” (**receiving chamber**) and the “cyclone chamber” (**first cyclone chamber**):

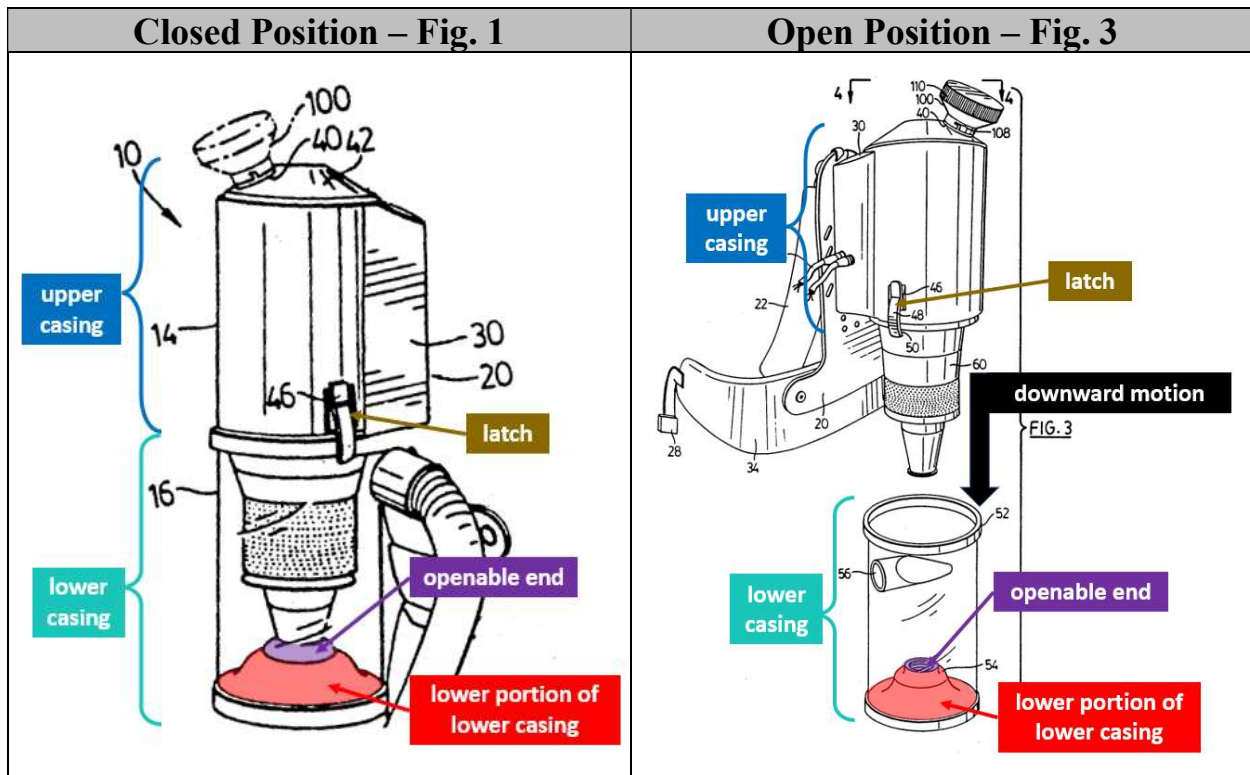


Id.

Further, the **openable end** is located within the **lower casing**, which is “an openable end” of the “cyclone separator”/“cyclonic unit.” *Id.* Regarding [1d], Soler teaches that the “dirt collection chamber” has “an openable end” for the same reasons. *Id.*

For [1d]/[9d]/[18e], Soler teaches that the plate is “moveable”/“moveably mounted” between an in-use position and an emptying position. Ex1009, Figs. 1, 3, 5:46-6:37; Ex1002 ¶¶338-339. Soler illustrates that when the **lower casing** is

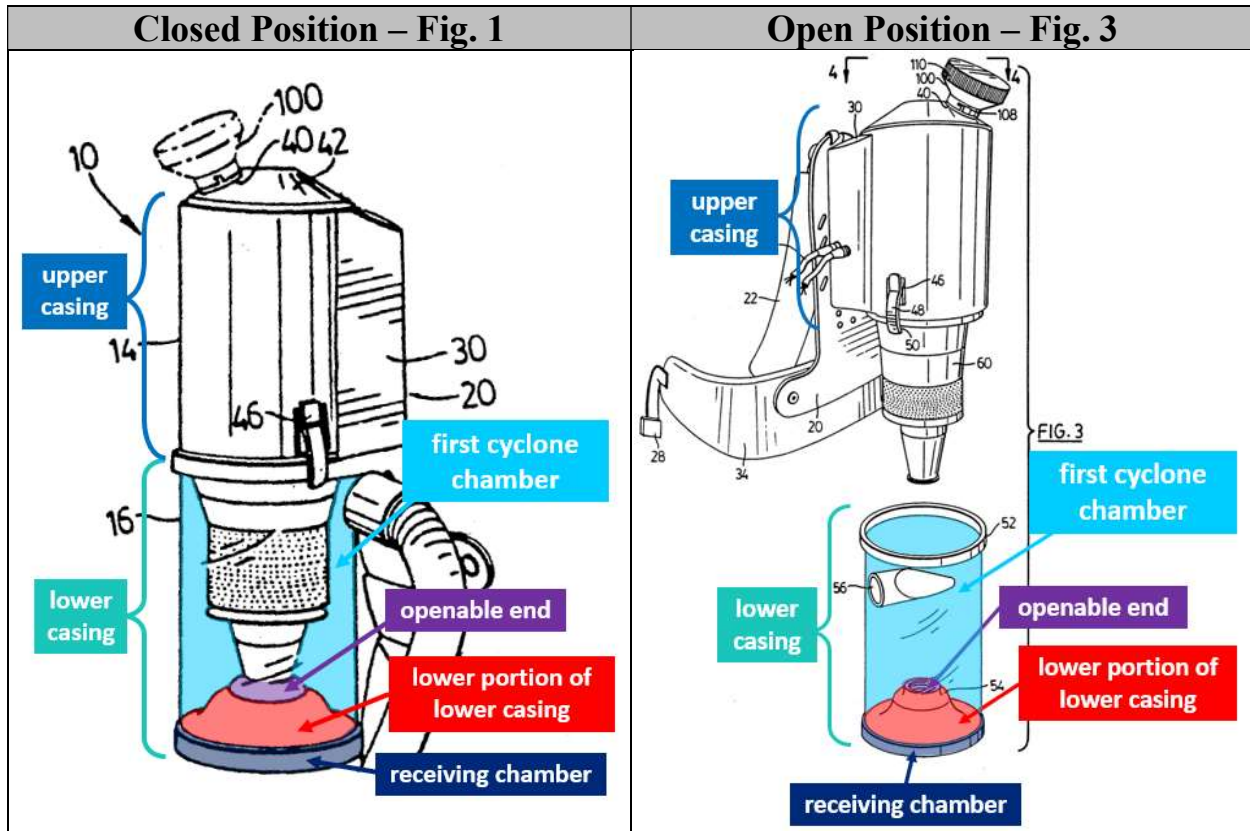
detached from the **upper casing** via opening the **latches**, the **lower portion of lower casing** moves downward from an **in-use position** (attached to the cyclone assembly) into an **emptying position** (detached from the cyclone assembly) with the **lower casing**. *Id.* When the **lower casing** is moved to the **emptying position**, the **openable end** of the **receiving chamber** is opened:



Id.

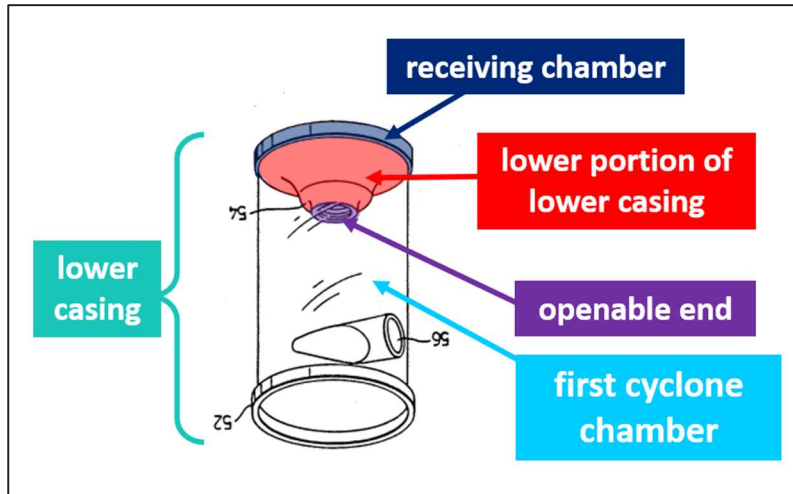
The movement of **lower portion of lower casing** from a closed (“in-use”) position to an open (“emptying”) position when the **lower casing**—including the **receiving chamber**—moves downward is “the plate being moveable between an in-use position and an emptying position when the openable end is opened.” *Id.*

For [1d]/[9d]/[18e], Soler teaches that when the plate is in the emptying position, it is in a position to permit dirt in the cyclone chamber and the dirt collection chamber to be removed concurrently. Ex1009, Figs. 1, 3-4, 5:46-6:37; Ex1002 ¶¶340-341. When the **lower portion of lower casing** is in the open (“emptying”) position, the collected dirt/dust can be removed from the “cyclone chamber” (**first cyclone chamber**) because the **lower portion of lower casing** (where debris from the **first cyclone chamber** collects) is exposed without obstruction between itself and the open end of the **lower casing**. *Id.* Debris from the “dirt collection chamber” (**receiving chamber**) is also able to be removed because the **openable end** of the **receiving chamber** is opened and there is no obstruction between the opening and the open end of the **lower casing**:



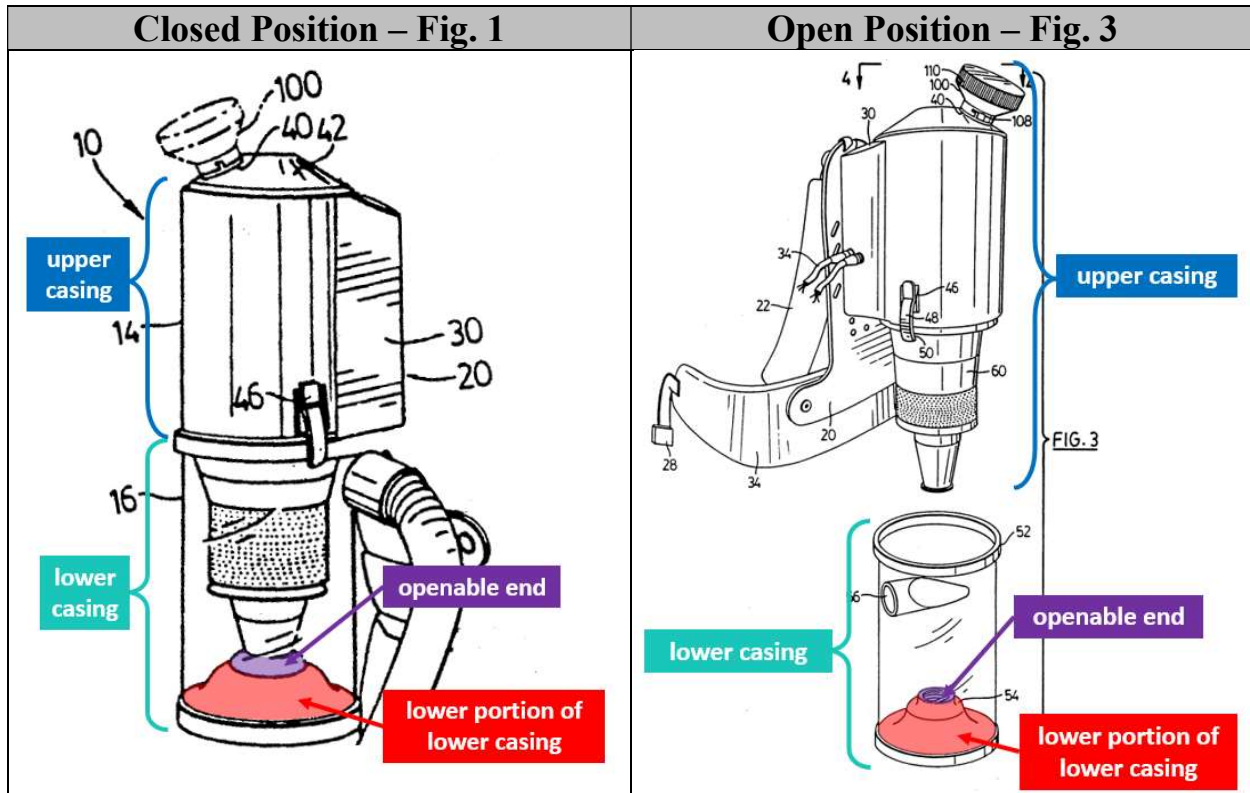
Id.

For example, in this state, the “plate” (**lower portion of lower casing**) is in position to permit debris from both the “cyclone chamber” (**first cyclone chamber**) and “dirt collection chamber” (**receiving chamber**) to be removed concurrently by simply tipping the **lower casing** upside down:



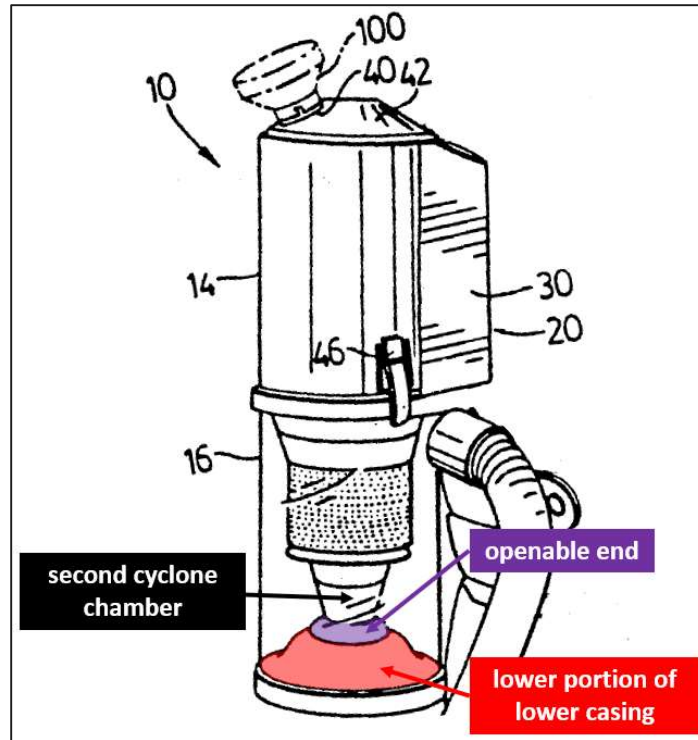
Id.

For [18e], Soler teaches “the plate being supported by the openable end” of the “cyclonic unit.” Ex1009, Figs. 1, 3-4, 5:59-65, 6:5-37; Ex1002 ¶¶342-343; §VIII.I.1.d, *supra*. As illustrated below, the **lower portion of lower casing** (“plate”) is positioned such that the **openable end** is integral with the **lower portion of lower casing**:



Id.

Because the **openable end** is a part of the **lower portion of lower casing**, it supports the **lower portion of lower casing**. *Id.* Further, the **openable end** supports the lower portion of **lower casing** by providing connection between the **lower portion of lower casing** and the **second cyclone chamber**, which acts as a central anchor or post for the **lower portion of lower casing**:



Id.

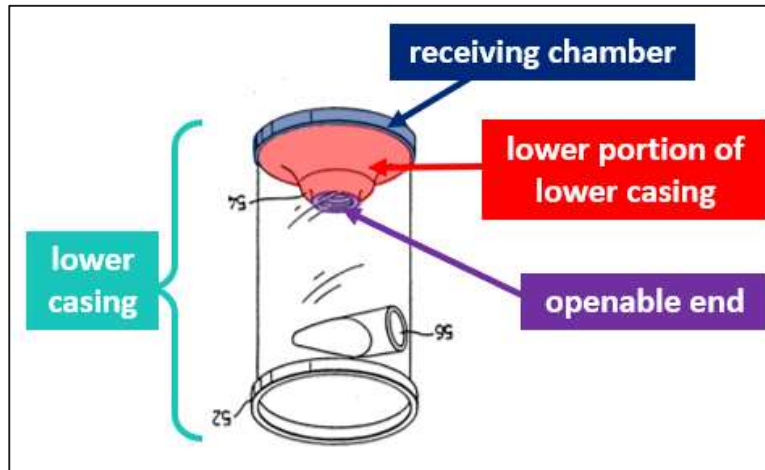
f. [1e]/[9e]/[18f]

Soler teaches these limitations. Ex1009, 6:65-7:5, Fig. 1; Ex1002 ¶¶344-345. Soler’s vacuum cleaner includes a “motor” to “generate[] an air flow” *Id.* Soler’s “motor” is a “fluid flow motor.” *Id.*

2. [3]

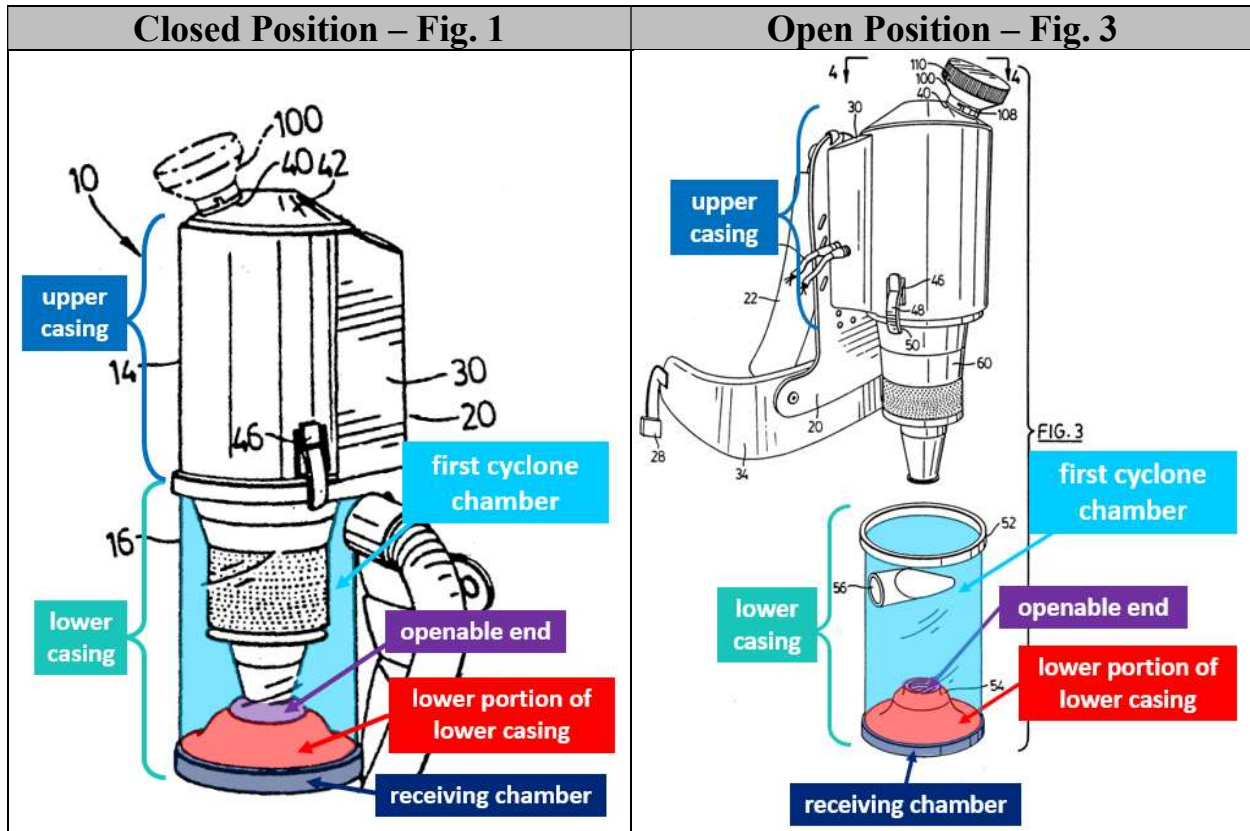
Soler anticipates [1]. §VIII.I.1, *supra*; Ex1002 ¶¶346-437. Soler discloses that “the openable end of the dirt collection chamber is a bottom.” Ex1009, Figs. 1, 3-4, 5:46-57, 6:5-37; Ex1002 ¶¶348-350. Soler’s **openable end** is “a bottom” of multiple claimed structures: the “dirt collection chamber” (**receiving chamber**), the “cyclone chamber” (**first cyclone chamber**), and the “cyclone separator” (**cyclone**

assembly). *Id.* For example, as illustrated below, the **openable end** of the **receiving chamber** (“dirt collection chamber”) is a bottom of the **receiving chamber** (“dirt collection chamber”) when the **lower casing** is being emptied:



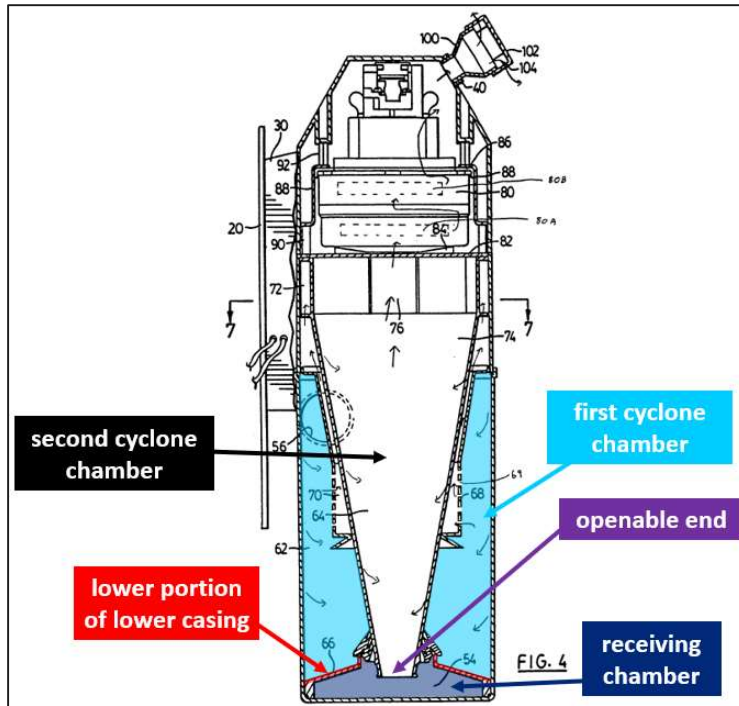
Id.

The **openable end** is also “a bottom” of the **first cyclone chamber** (“cyclone chamber”) and the **cyclone assembly** (“cyclone separator”):



Id.

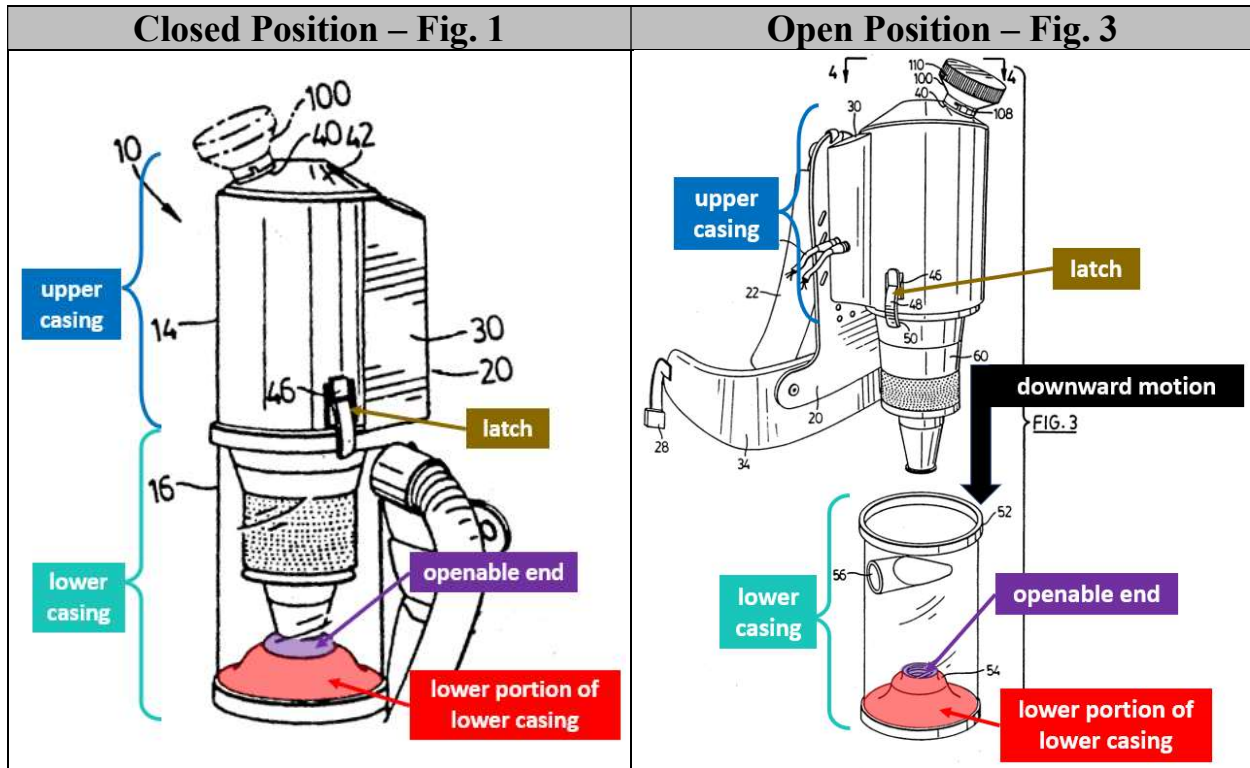
Soler further teaches debris is deposited in the **receiving chamber** from a **second cyclone chamber**. *Id.* The **openable end** of the **receiving chamber** is also a bottom of the **second cyclone chamber**:



Id.

3. [4]/[15]/[19]

Soler anticipates [1]/[9]/[18]. §VIII.I.1, *supra*; Ex1002 ¶¶351-354. For [4], Soler discloses that “the plate is automatically moved to the emptying position when the openable end is opened.” Ex1009, Figs. 1, 3, 5:46-65, 6:5-37; Ex1002 ¶355; §VIII.I.1.e, *supra*. When the **lower casing** is detached from the **upper casing** via opening the **latches**, the **lower portion of lower casing** (“plate”) moves automatically to an **emptying position** (detached from the cyclone assembly) in tandem with the **lower casing** because the **lower portion of lower casing** is attached to the **lower casing**:



Id.

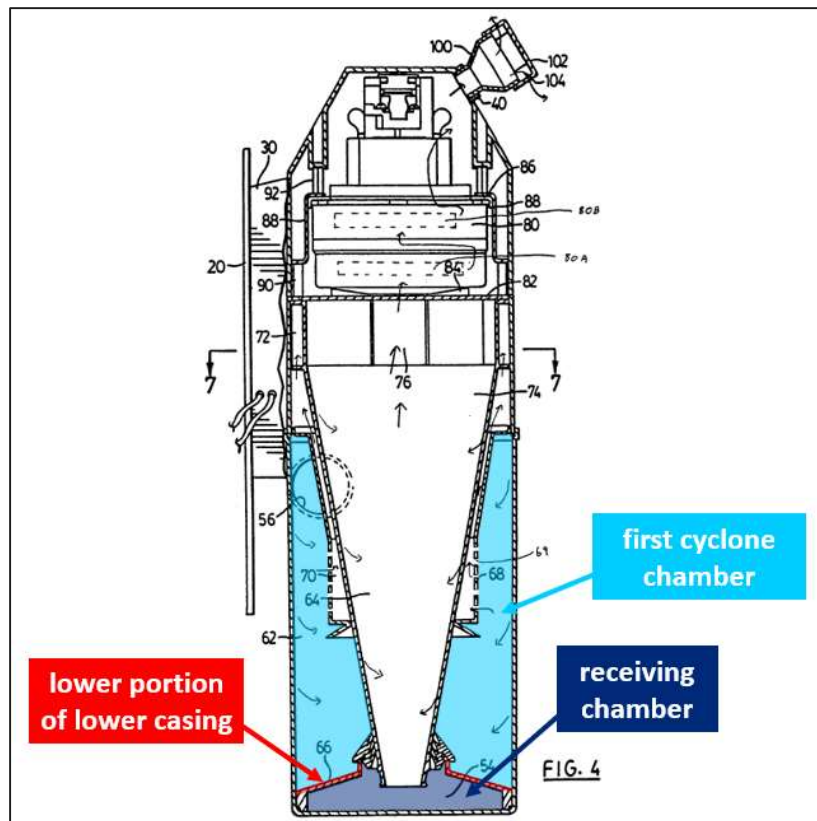
For [19], Soler’s **lower portion of lower casing** (“plate”) “is moveable to a[n] emptying position when the openable end is opened” as discussed for [1d]. §VIII.I.1.e, *supra*; Ex1009, Figs. 1, 3, 5:46-6:37; Ex1002 ¶¶356-357. For [15], Soler teaches that, “subsequent to the openable end being opened,” the **lower portion of lower casing** (“plate”) “is moveable”: once in the **emptying position** (*i.e.*, detached from the upper casing), the **lower portion of lower casing** (“plate”) can be moved further simply by moving the **lower casing**, *e.g.*, to empty the cyclone assembly. *Id.*

4. [5]

Soler anticipates [1]. §VIII.I.1, *supra*; Ex1002 ¶¶358-359. For [5], Soler discloses “the plate is supported by the openable end” as discussed for [18e]. §VIII.I.1.e, *supra*; Ex1002 ¶360.

5. [12]

Soler anticipates [9]. §VIII.I.1, *supra*; Ex1002 ¶¶361-362. Soler’s “dirt collection chamber” (**receiving chamber**) “extends under the plate” (**lower portion of lower casing**), as depicted in Figure 4:



Ex1009, Fig. 4, 6:5-37; Ex1002 ¶363.

6. [14]

Soler teaches [9]. §VIII.I.1, *supra*; Ex1002 ¶¶364-366. Soler teaches a vacuum for the same reasons as [9pre]. *Id.*

J. Ground 10: Soler Renders [1]/[3]-[5]/[7]/[9]/[12]/[14]-[19] Obvious

To the extent Soler does not anticipate certain claims of the '120Patent, it renders them obvious. Ex1002 ¶¶368-369. To the extent PO argues that Petitioners have combined or otherwise used disclosures from different embodiments in Ground 9, those claims would have been obvious over Soler. *Id.* A POSA would have found it obvious to combine or modify Soler's embodiments in view of other disclosures within Soler. *Id.* Making such combinations/modifications to Soler's components would have been obvious to try and would have used known methods and techniques to yield predictable results. *Id.*

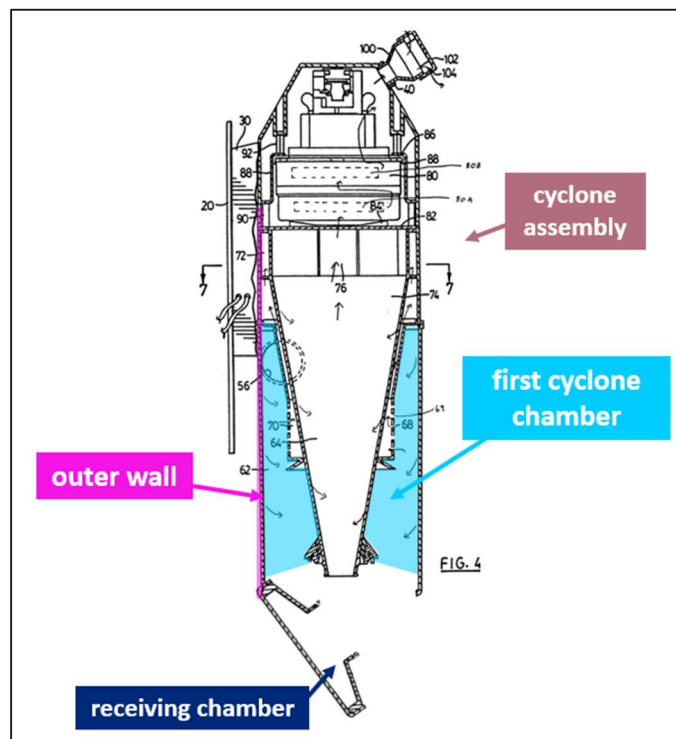
1. [16]

Soler anticipates and/or renders obvious [16pre]/[16a]/[16b]/[16c]/[16e] for the reasons described above. §§VIII.I.1, VIII.J, *supra*; Ex1002 ¶¶370-374.

Regarding [16d], a POSA would have understood that once removed, a user rotates Soler's **lower casing** to empty it, and would have been motivated to modify Soler to include a pivotably openable bottom to avoid this step and make it more fast, convenient, and hygienic for users to empty. Ex1002 ¶¶375-376. For example, Jung teaches that its pivotable openable bottom made it "eas[ier] to discharge [] impurities and to clean the dust collecting assembly." Ex1005, 14:19-27; Ex1011

¶[0131]; Ex1002 ¶376. U.S. Pat. App. Pub. No. 2004/0112022 to Vuijk similarly teaches that its pivotally openable base allows dirt to fall out of its separator unit “with little or no additional effort” and such that “a user is not brought into contact with the dirt.” Ex1024, Fig. 5, ¶[0040]; Ex1006, Fig. 7; Ex1017, Fig. 3b; Ex1002 ¶376.

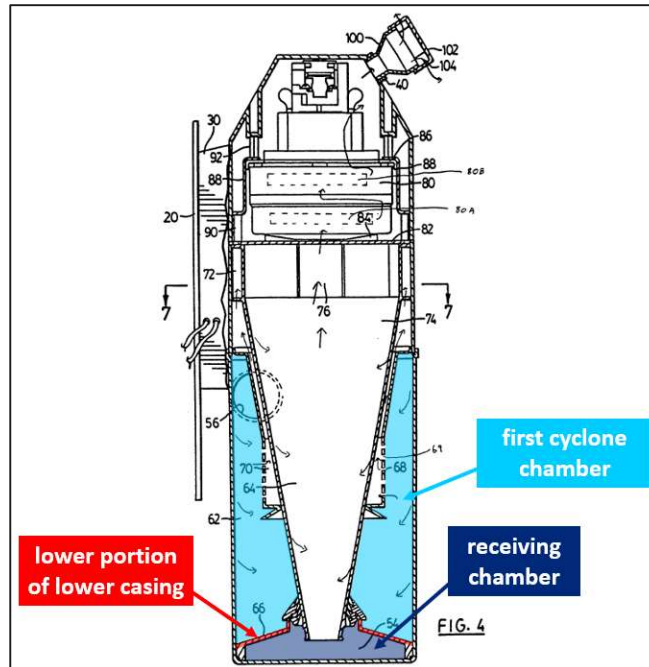
Given such teachings regarding the benefits pivotally openable bottoms, which allow users to empty dirt quickly, conveniently, and hygienically without additional effort, a POSA would have been motivated to modify Soler, as shown below, to make the **receiving chamber** (a base/bottom) pivotally openable with respect to the **outer wall** of Soler’s **cyclone assembly**:



Ex1009, Fig. 4 (modified); Ex1002 ¶¶377-378.

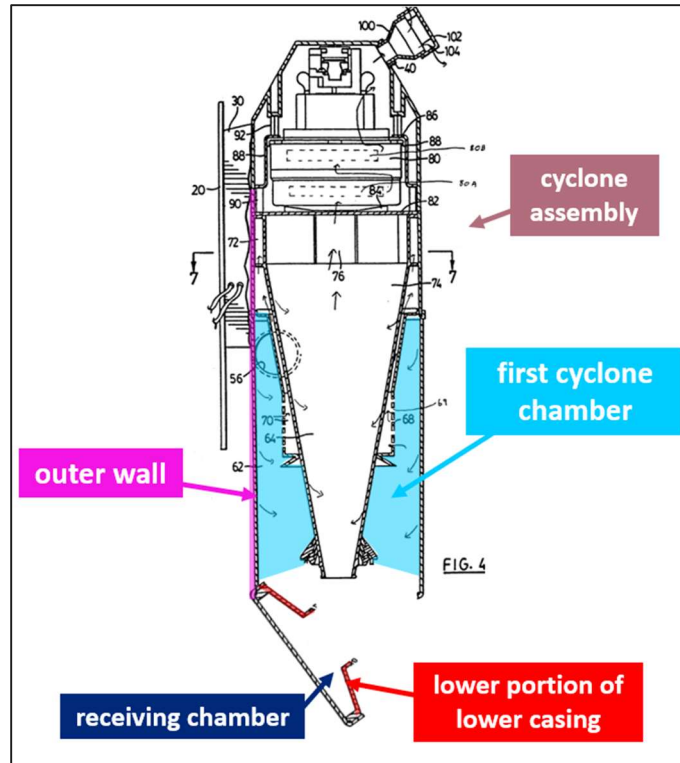
This modification would have involved the simple adjustment of known elements taught by Soler (*i.e.*, Soler’s **receiving chamber**) with methods well-known in the art for making bottoms pivotally openable (*e.g.*, hinges, push rods, or latches). *Id.* Making Soler’s **receiving chamber** pivotally openable would have been at least obvious to try as there were a finite number of predictable solutions for making it easier to discharge impurities from a vacuum cleaner. *Id.* A POSA would have reasonably expected success: making a bottom of a vacuum cleaner pivotally openable was well-known and a POSA would have understood the benefits of pivotally openable bottom in making it easier for users to discharge impurities. *See, e.g.*, Ex1005, 14:19-27; Ex1024, Fig. 5, ¶[0040]; Ex1002 ¶378.

Soler renders obvious [16d]. Ex1002 ¶379. Soler’s **lower portion of lower casing** is positioned between the “cyclone chamber” (**first cyclone chamber**) and the “dirt collection chamber” (**receiving chamber**).



Ex1009, 6:5-37, Fig. 4; Ex1002 ¶379; §VIII.I.1.d, *supra*.

Soler, as modified above, renders obvious “wherein the plate is pivotably mounted to the outer wall of the cyclone separator.” Ex1002 ¶380. As modified, Soler’s **receiving chamber** is pivotally mounted to the **outer wall** of Soler’s **cyclone assembly**:



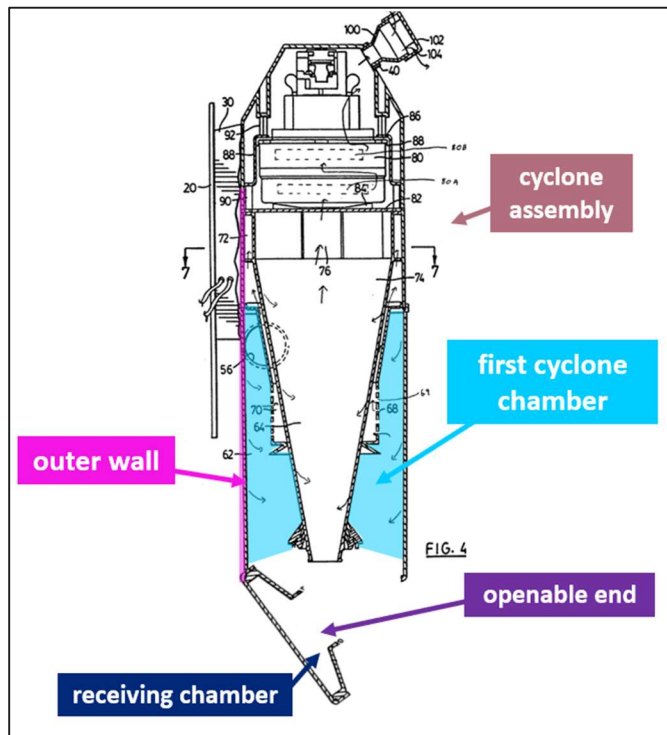
Ex1009, Fig. 4 (modified); Ex1002 ¶380.

Because **lower portion of lower casing** (“plate”) is incorporated with the **receiving chamber**, the **lower portion of lower casing** also pivots (*i.e.*, is “pivotally mounted”) with respect to the **outer wall** of Soler’s **cyclone assembly** (“cyclone separator”), and more specifically with respect to the **first cyclone chamber** (“cyclone chamber”) of the **cyclone assembly**. Ex1002 ¶381.

2. [7]/[17]

Soler renders these claims obvious. Ex1002 ¶¶382-383. Soler anticipates and/or renders obvious [1]/[16]. §VIII.I.1, §VIII.J.2, *supra*; Ex1002 ¶384. Soler renders obvious [17] for the same reasons as [16]. §VIII.J.2, *supra*; Ex1002 ¶¶385-386. For [7], under the modification described in [16d], the **openable end** of the

receiving chamber also pivots (*i.e.*, is “pivotally mounted”) with respect to the **outer wall** of Soler’s **cyclone assembly** (“cyclone separator”):

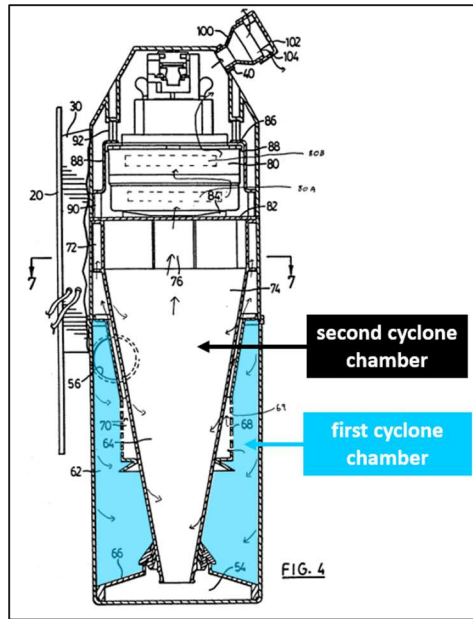


Id.

K. Ground 11: Soler in Combination with Gammack Renders [8]/[20] Obvious

1. Gammack Teaches Downstream Cyclones with Storing Chambers and Separated by Fins That a POSA Would Have Been Motivated to Incorporate into Soler

Soler teaches a vacuum cleaner with two single-chamber cyclones:

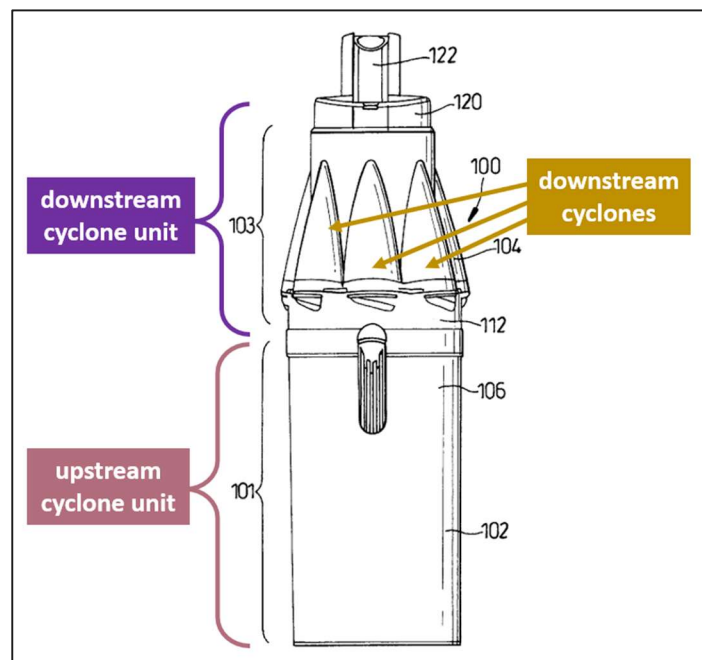


Ex1009, Fig. 4, 6:5-37. Ex1002 ¶388.

A POSA would have understood that adding an additional cyclonic stage to a two-stage cyclonic vacuum cleaner would have improved particle separation. Ex1002 ¶389. For example, U.S. 6,344,064 to Conrad teaches that “multiple cyclones connected in parallel or series ha[d] long been known to be advantageous in the separation of particulate matter” because smaller downstream cyclones can filter the “ever-smaller particles” not filtered by upstream stages. Ex1025, 1:18-52; Ex1002 ¶389; §VIII.E.1, *supra*. A POSA would have understood that vacuums with third stage cyclones were known in the art. For example, U.S. 6,482,252 to Conrad teaches a two-stage cyclonic vacuum and that additional “third stage cyclones” could be added “to further [the] filtration means” of the vacuum. Ex1015, 9:9-12, Ex1002 ¶389. Given that Soler only had larger first/second cyclone chambers, a POSA would

have been motivated to modify Soler to include a smaller, third stage cyclones improve Soler's dust separation capabilities, particularly for fine particles. Ex1002 ¶390.

Gammack teaches smaller downstream cyclones and the benefits of such cyclones. Specifically, Gammack teaches a single “**upstream cyclone 102**” and **downstream cyclone unit 103** including a plurality of **downstream cyclones 104**:

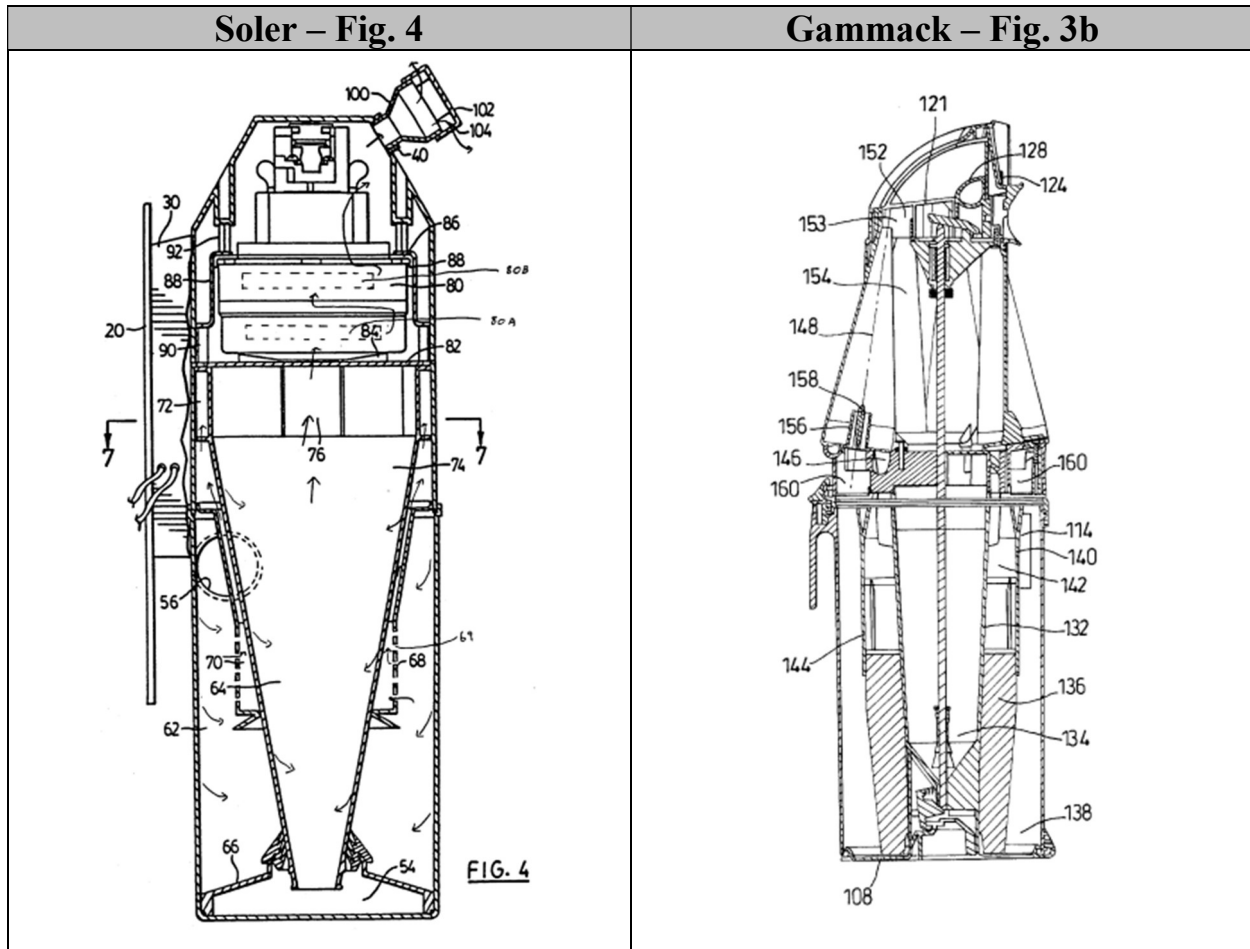


Ex1016, 4:9-27, Fig. 2a; Ex1002 ¶391.

Gammack teaches its second stage cyclones can remove “very fine dirt and dust particles” not filtered by a first stage. Ex1016, 6:22-55; Ex1002 ¶392.

A POSA would have been motivated to improve Soler's dust collection capabilities by adding Gammack's **downstream cyclone unit 103**, including its plurality of **downstream cyclones 104**, either in place of Soler's second cyclone or

as a downstream third cyclonic stage to Soler's cyclone assembly (*e.g.*, downstream of Soler's second cyclone chamber). Ex1002 ¶393. A POSA would have positioned Gammack's **downstream cyclone unit 103** in place of or above Soler's second cyclone chamber in the manner disclosed in Gammack or in other ways understood in the art. Ex1016, 4:9-27, Fig. 2a; Ex1002 ¶393. Modifying Soler in view of Gammack would have been at least obvious to try as there were only a finite number of predictable ways to achieve additional dust filtration, especially for fine particles, in a cyclonic vacuum cleaner. Ex1002 ¶394. A POSA would have had a reasonable expectation of success making this modification: Soler and Gammack are both directed to cyclonic vacuum cleaners with dust collection assemblies providing for cyclonic separation of debris and multiple filtering stages, and, as illustrated below, depict a similar vacuum structure and overall form factor, allowing for the mechanical components of one to be easily implemented in the other:



Ex1009, Fig. 4; Ex1016, Fig. 3b; Ex1002 ¶394.

A POSA would have understood that the simple substitution of one second stage cyclone for another, or the addition of a third cyclonic stage, would have yielded the predictable and beneficial result of additional dust filtration, particularly for fine particles. Ex1025, 1:18-52; §VIII.E.1, *supra*; Ex1002 ¶395.

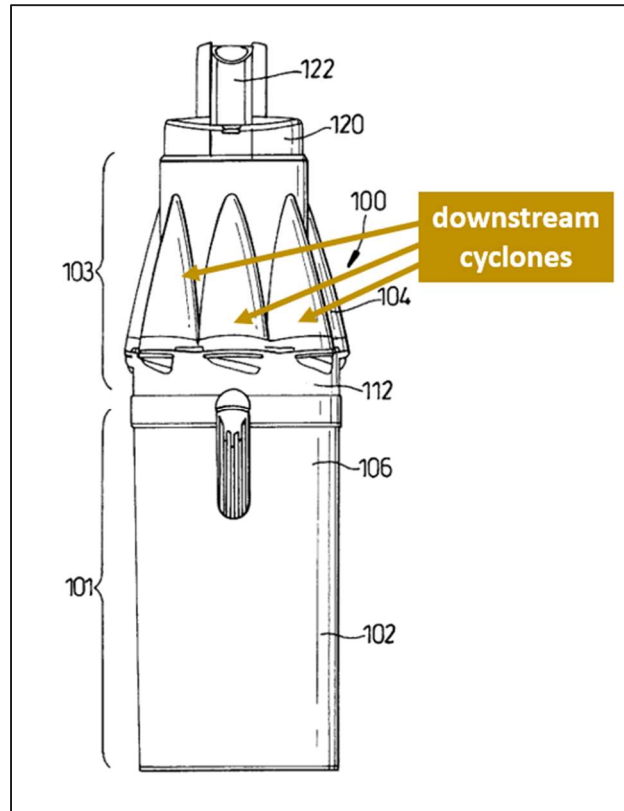
2. [8]/[20]

Soler in combination with Gammack renders these claims obvious. Ex1002 ¶¶396-397. Soler alone anticipates and/or renders obvious [1]/[18]. §§VIII.I.1,

VIII.J, *supra*; Ex1002 ¶398. Gammack's **downstream cyclones 104** collectively are “a cyclonic stage”/“cyclonic unit.” Ex1016, 4:9-27, Fig. 2a; Ex1002 ¶399.

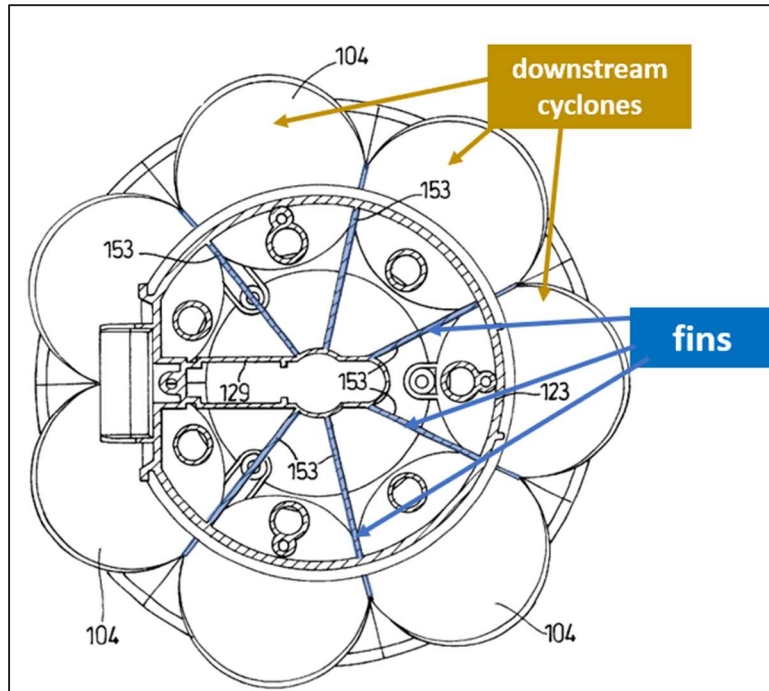
Regarding [8], the Soler/Gammack combination teaches “a cyclonic stage downstream from the cyclone separator”: because Gammack's **downstream cyclones 104** are downstream from Gammack's single-chamber first cyclonic stage (“**upstream cyclone 102**”), as implemented in the Soler/Gammack combination, Gammack's **downstream cyclones 104** would likewise be downstream from Soler's single-chamber first cyclone stage. Ex1016, 4:9-27, Fig. 2a; Ex1002 ¶400.

Gammack teaches that the downstream “cyclonic stage”/“cyclonic unit” (**downstream cyclones 104**) comprises a plurality of cyclones in parallel: Gammack's **downstream cyclones 104** are both geometrically “in parallel” and have an airflow path “in parallel”:



Ex1016, 4:9-27, Fig. 2a; Claims. Ex1002 ¶401.

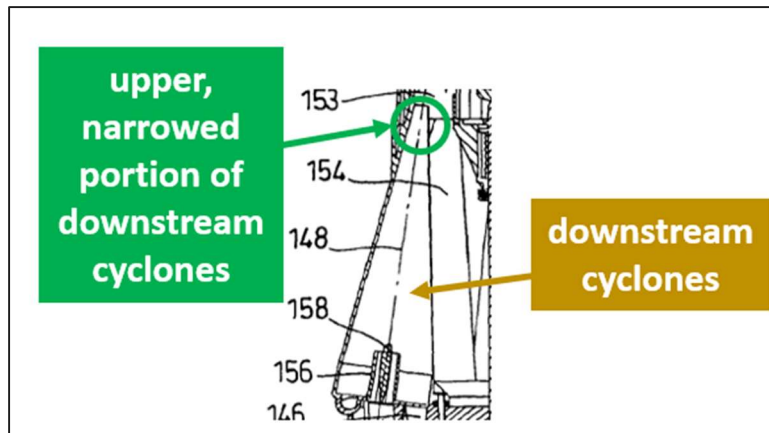
Gammack teaches “at least some of the plurality of cyclones is each provided with a divider plate”/“a plurality of divider plates.” Ex1016, 5:50-65; Claims, Fig. 5; Ex1002 ¶¶402-403. Gammack teaches that “**fins** are provided between the second ends of adjacent [**downstream**] **cyclones**”:



Ex1016, 10:1-2, Fig. 5. Gammack's **fins** are "divider plates." *Id.*

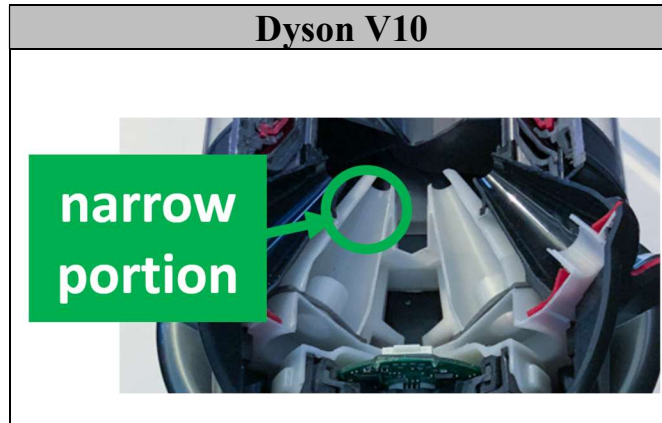
To the extent PO argues "divider plates" must be internal to the "cyclones," Gammack likewise teaches these limitations to the same extent accused by PO in co-pending litigation. Ex1002 ¶404.

Like Jeong, Gammack illustrates that its **downstream cyclones 104** have a narrowed portion:



Ex1006, Fig. 3b (excerpted); Ex1002 ¶405.

This is at least as much disclosure as PO accuses of infringement in the co-pending litigation:



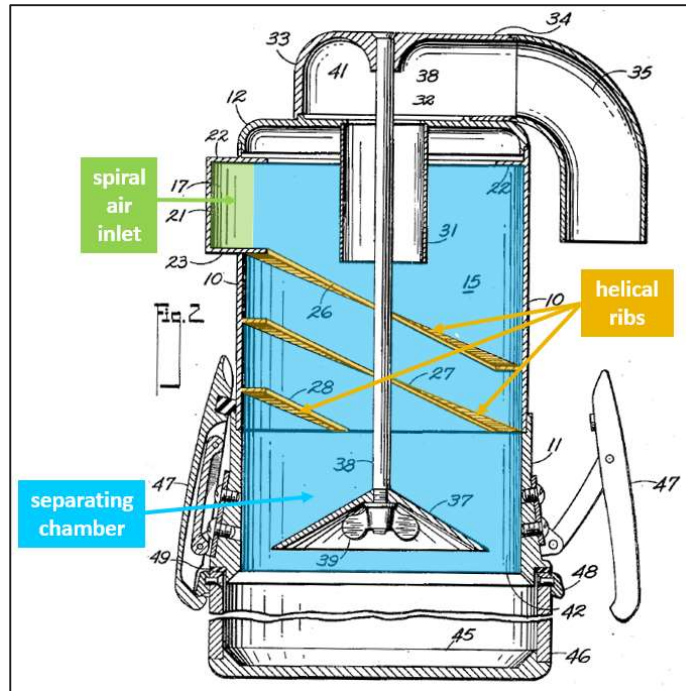
Ex1026; Ex1002 ¶¶406-407.

These narrowed portions thus teach that “at least some of the plurality of cyclones is each provided with a divider plate”/“a plurality of divider plates” at least to the same extent as PO accuses in co-pending litigation *Id.*

L. Ground 12: Soler in Combination with Davis Renders [2]/[13] Obvious

1. A POSA Would Have Been Motivated to Incorporate Davis’ Helical Ribs into Soler

Davis teaches vacuum cleaner with a “cyclone type” **separating chamber** that uses **helical ribs** to “direct and guide the flow of gas” in a helical path (*i.e.*, a cyclone) after dust enters via a **spiral air inlet**, resulting in better dust collection:



Ex1010, Fig. 2, 2:51-3:34, 4:64-69, 3:59-66, 6:2-6; 7:12-19; Ex1002 ¶¶409-410.

Davis’ **helical ribs**, which “guide the air in a continuation of a helical path ... resulting in a helical movement of air,” help “giv[e] sufficient momentum,” to incoming air, which “accelerate[s] the air in a zone in which separation takes place, so that centrifugal force is increased” (*e.g.*, preventing the air from prematurely losing cyclonic action). Ex1010, 1:19-21, 2:34-36, 4:64-69.

A POSA would have been motivated to implement Davis’ **helical ribs** within Soler’s **cyclone assembly**. Ex1002 ¶411. Soler’s **cyclone assembly** is intended to provide an “improved filtering mechanism” by causing “cyclonic rotation of the dirt laden air within the first cyclone.” Ex1009, 3:25-28, 3:50-54; Ex1002 ¶411. A POSA would have recognized that Davis’ **helical ribs** would have improved the cyclonic dust collection of Soler’s **cyclone assembly** by “giv[ing] sufficient momentum,” to

incoming air and preventing that air from “short-circuiting to [] low pressure area[s]” (e.g., prematurely losing cyclonic action). Ex1010, Fig. 2, 2:34-36, 7:12-19; Ex1002 ¶411. A POSA, moreover, would specifically be motivated to use **helical ribs** of Davis due to the similarity in the descriptions of cyclonic operation between the two references. Ex1002 ¶411. For example, Soler notes that “centrifugal force is applied to the dirt laden air causing the dirt laden air to rotate within first cyclone chamber,” and Davis discloses that its ribs guide air in a helical (*i.e.*, spiral) path such that the “centrifugal force developed by the circumferential component of the movement of the air stream urges the dust and dirt entrained in the air[.]” Ex1009, 6:17-25; Ex1010, 4:57-5:3; Ex1002 ¶411. A POSA would have understood that Davis’ **helical ribs** would have improved the efficiencies of Soler by furthering the “centrifugal force [] applied to the dirt laden air causing the dirt laden air to rotate within first cyclone chamber.” Ex1009, 6:17-25; Ex1010, 4:57-5:3; Ex1002 ¶411.

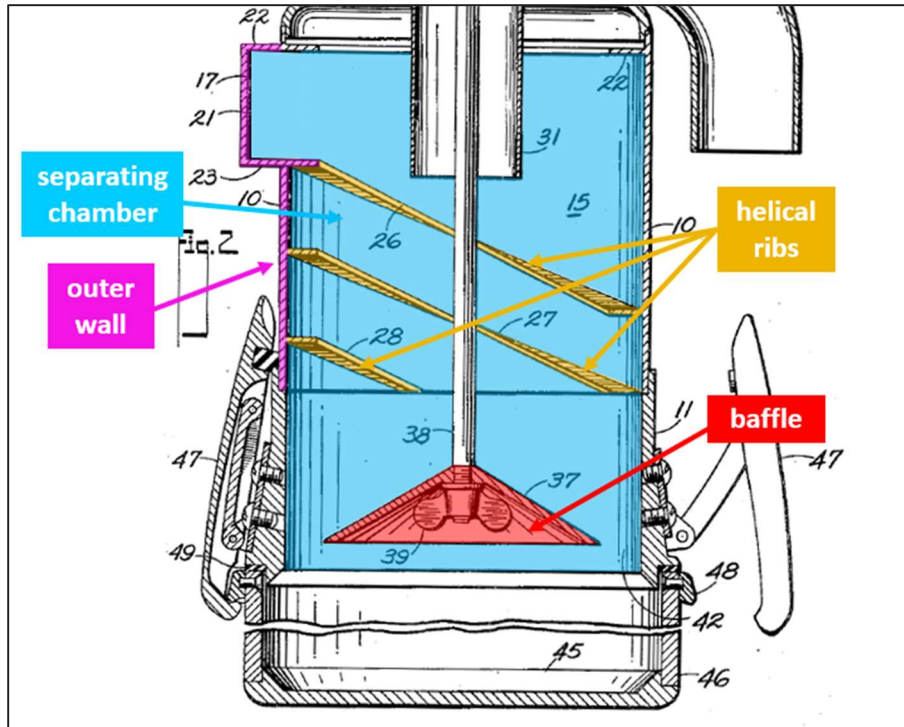
The combination of Soler and Davis would have involved a simple substitution of well-known elements (e.g., Davis’ **helical ribs**) into a known structure (Soler’s **cyclone assembly**) to obtain the predictable result of increasing the efficiency of dirt removal by giving “sufficient momentum” to incoming air and preventing that air from “short-circuiting to [] low pressure area[s].” Ex1009, 6:17-25; Ex1010, Fig. 2, 4:57-5:3, 7:12-19; Ex1002 ¶412. The combination of Soler and Davis would have been at least obvious to try: there are a finite number of ways to

improve cyclonic dust collection, and finite ways to add momentum to incoming air while still avoiding low pressure areas. *Id.* A POSA would have expected the combination to be successful: the addition of Davis’ **helical ribs**—whose benefit had been known for years—in Soler would not only leave Soler’s existing functionality intact but would improve its dust collecting functionality. *Id.*

2. [2]/[13]

Soler in combination with Davis renders these claims obvious. Ex1002 ¶¶413-414. Soler anticipates and/or renders obvious [1]/[9]. §§VIII.1.1, VIII.J, *supra*; Ex1002 ¶415. Davis’ **helical ribs**, implemented in Soler’s **cyclone assembly**, direct the flow of air coming into the **cyclone assembly** and thus constitute “a flow director.” Ex1010, Fig. 2, 2:51-3:34, 4:64-69, 3:59-66, 6:2-6; 7:12-19; Ex1002 ¶416. The **helical ribs** (“flow director”) further comprise “a flow directing surface that extends inwardly and downwardly into the cyclone chamber from the outer wall of the cyclone chamber.” Ex1010, Fig. 2; Ex1002 ¶417. Davis’ **helical ribs** extend inwardly and downwardly from the “**outer wall**”¹⁶ of Davis’ **separating chamber** to a position above Davis’ **baffle**:

¹⁶ As noted, [13] claims “*the* outer wall” of the cyclone chamber without antecedent basis recited in [9]. Soler nonetheless teaches an outer wall for the same reasons as [1c]. §VIII.I.1.d, *supra*.



Id.

Given the similar purposes between Davis’ **baffle** and Soler’s **lower portion of lower casing**, a POSA implementing Davis’ **helical ribs** in Soler would have positioned Davis’ **helical ribs** above, and stop before, Soler’s **lower portion of lower casing**. Ex1002 ¶418. Therefore, the Soler/Davis combination discloses that the “flow directing surface” extending “to a position above the plate.” *Id.*

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 it “does not apply to parallel U.S.

International Trade Commission (ITC) proceedings” USPTO Interim Procedure For Discretionary Denials In AIA Post-Grant Proceedings With Parallel District Court Litigation, June 21, 2022, 2, 4-5 (the “Guidance”).

B. §325(d)

The §325(d) factors favor institution, as all six *Becton Dickinson* factors weigh in favor of institution. *Becton, Dickinson, & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 (PTAB Dec. 15, 2017); *see also Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 at 8 (PTAB Feb. 13, 2020).

The Board has consistently “held that a reference that ‘was neither applied against the claims nor discussed by the Examiner’ does not weigh in favor of exercising [] discretion under §325(d).” *Fasteners for Retail, Inc. v. RTC Indus., Inc.*, IPR2019-00994, Paper 9 at 7-11 (PTAB Nov. 5, 2019). The prior art references relied on herein were not cited on the face of the ’120Patent. Ex1005, Cover. The combination of prior art presented in this Petition, and the relied-upon references were not previously meaningfully before the Office, nor are they cumulative, and examiner did not address them. *Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469 Paper 6, 9-11 (PTAB Feb. 13, 2020) (precedential).

Because Petitioners “cannot be expected to anticipate every argument that may be raised by a patent owner” regarding §325(d), if PO raises such a challenge, Petitioners request the opportunity to respond, including to address why such a challenge was not reasonably foreseeable; why the references that were not disclosed are non-cumulative; and/or why the Examiner misapprehended and/or overlooked the art at issue. *Google LLC v. Valtrus Innovations Ltd.*, IPR2022-01197, Paper 12 at 5 (PTAB Mar. 29, 2023) (vacating denial of institution based on §325(d)).

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, *Certain Surface Cleaning Devices and Components Thereof*, U.S.I.T.C. Inv. No. 337-TA-1404, the ’120Patent 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. 7,776,120

Date: August 22, 2024

Respectfully submitted,

/s/ Christian Huehns

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CERTIFICATE OF COMPLIANCE

This Petition complies with the type-volume limitations as mandated in 37 C.F.R. § 42.24, totaling 13,787 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 Petitioners' Exhibit List was caused to be served by Federal Express, costs prepaid, to Patent Owner at the following address of record:

1059 – Bereskin & Parr LLP / S.E.N.C.R.L., srl.
40 King Street West
40th Floor
Toronto, ON
Canada

A copy was also served via electronic mail and FTP on the attorneys of record in the following related matter: Investigation 337-TA-1404, *In the Matter of Certain Surface Cleaning Devices and Components Thereof* at:

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/s/ Sheryl Brongiel
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