

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.

DECLARATION OF ROBERT GIACHETTI

REGARDING

U.S. Patent No. 7,776,120

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I. INTRODUCTION

1. My name is Robert Giachetti. I have been retained by Dyson Technology Limited and Dyson, Inc. (collectively “Dyson” or “Petitioners”) as an independent expert in this proceeding.
2. I understand Dyson is challenging the validity of claims 1-20 of U.S. Patent No. 7,776,120 (the “120 Patent”) in this petition for *inter partes* review (“IPR”). I refer to these as the “Challenged Claims.”
3. I have been asked to consider whether certain references invalidate the Challenged Claims.
4. I am a salaried employee of Fusion Engineering, LLC. Fusion Engineering is being compensated for my time in connection with this matter at the consulting rate of \$410 per hour. My compensation is not affected by the content of my opinions, testimony, or the outcome of this matter.
5. The prior art references on which my opinions are based are:
 - U.S. Patent 7,669,282 (“Jung,” attached as Ex1005)
 - U.S. Patent 7,442,219 (“Jeong,” attached as Ex1006)
 - U.S. Patent 5,267,371 (“Soler,” attached as Ex1009)
 - U.S. Patent 2,542,635 (“Davis,” attached as Ex1010)
 - U.S. Patent Application Publication Number 2005/0198771 (“Min,” attached as Ex1011)
 - U.S. Patent 6,607,572 (“Gammack,” attached as Ex1016)
6. In my opinion, the Challenged Claims are invalid based on the following:

- Jung anticipates claims 1, 3-5, 7, 9-12, and 14-19 (Ground 1).
- Min anticipates claims 1, 3-5, 7, 9-12, 14-19 (Ground 2).
- Jung renders obvious claims 1, 3-7, 9-12, 14-19 (Ground 3).
- Min renders obvious claims 1, 3-7, 9-12, 14-19 (Ground 4)
- The combination of Jung and Jeong renders claims 8 and 20 obvious (Ground 5)
- The combination of Min and Jeong renders claims 8 and 20 obvious (Ground 6)
- The combination of Jung and Davis renders claims 2 and 13 obvious (Ground 7)
- The combination of Min and Jeong renders claims 2 and 13 obvious (Ground 8)
- Soler anticipates claims 1, 3-5, 9, 12, 14-15, 18-19 (Ground 9)
- Soler renders obvious claims 1, 3-5, 7, 9, 12, 14-19 (Ground 10)
- The combination of Soler and Gammack renders claims 8 and 20 obvious (Ground 11)
- The combination of Soler and Davis renders claims 2 and 13 obvious (Ground 12)

II. BACKGROUND AND QUALIFICATIONS

7. I am a Licensed Professional Engineer in Illinois and Oklahoma, with over 20 years of experience in mechanical engineering. My experience in machinery and mechanisms spans numerous industries; I have worked directly designing mechanical systems and machinery, and I have consulted on the operation of machinery in various fields, including

consumer products, commercial products, and industrial products.

8. I am employed by Fusion Engineering, LLC, where I have worked since November of 2020. Fusion is an engineering firm that provides multidisciplinary engineering consulting services.
9. I am currently the Senior Vice President at Fusion. In this role, I am responsible for providing engineering consulting services in mechanical engineering, coordinating client outreach, coordinating marketing materials, and recruiting.
10. I am currently a Member of ASTM International (formerly American Society for Testing and Materials) and ASME (American Society of Mechanical Engineers) where I sit on several committees, including the Power Transmission Gearing Committee (ASME), which looks at transferring movement with belts and gears. I am also on ASTM's F15 Consumer Product Committee, which handles matters such as consumer product safety guidelines. I am also a member of the ICPHSO (International Consumer Products Health & Safety Organization) group, and attend ICPHSO conferences, which cover health and safety issues relevant to consumer products.
11. I hold a Bachelor's, Master's, and Ph.D. degree in Mechanical Engineering. I have Minors in Physics (as an undergraduate) and

- Mechanics and Aeronautics (as a graduate student). I have taught courses in Physics, Mechanical Engineering, and Biomechanics across three universities.
12. I have been recognized as an expert in mechanical power transmission equipment, and I serve on the American Society of Mechanical Engineers (ASME) Power Transmission and Gearing Committee. I have also participated, by invitation, in the National Council of Examiners for Engineering and Surveying (NCEES) Mechanical Professional Activities and Knowledge Studies (PAKS) committee. This committee reviews and evaluates the problems and problem types that appear on the Mechanical Engineering Professional Engineering exam for licensure as a Professional Engineer.
 13. For the past 30 years, I have been involved in the area of machine design and applications of machine design. These machines and products have ranged from children's mattresses to garden hoses, pressure cookers, electronic tire/raft inflators, and industrial equipment including conveyors.
 14. In approximately 1993-1994, I was a part of a team that developed and built a functioning autonomous, battery-powered vacuum cleaner. This design and development project involved analyzing the layout and inclusion of various vacuum-cleaner components, such as surface

agitators, air filtration units, motors, fluid flow paths, batteries, and other electronic and mechanical components.

15. From 2003-2008, I was employed by the University of Wisconsin-Madison's Biomechanics laboratory in the Department of Kinesiology, where I was also a teaching assistant in biomechanics. While there, my research responsibilities included designing equipment with ergonomic handles for efficient use. While teaching biomechanics at the University of Wisconsin-Madison, I regularly instructed on the proper use of canes, crutches, and arm crutches in relationship to biomechanical principles, taking into consideration user ergonomics.
16. From 2008-2020, I was employed by Exponent, Inc., where I worked as a Senior Managing Engineer. At Exponent, I worked on various mechanical engineering projects that frequently related to consumer product design, machinery design, product and machinery performance, and human interaction with consumer products and industrial equipment.
17. In approximately 2010-2013, I conducted an engineering analysis of vacuum cleaner products. In particular, I single-handedly developed tests to assess the dust-collection efficacy of various physical-media filters used in bagless, cyclonic vacuum cleaners. My work on this project included product teardowns to analyze the efficacy and safety of these vacuum

cleaners and their filters. I also developed a protocol for nationwide in-home testing of vacuum cleaner filtration system efficacy across climates, as well as a protocol for analyzing the materials collected by the vacuum cleaners and their filters. This analysis considered, among other things, the size of particulates that were collected by vacuum cleaner cyclones and filters.

18. In approximately 2010-2014, I conducted an analysis of collets—a pipe and tube connection device—under dynamic fluid pressurization conditions. After initial and traditional methods of testing the collets, which included X-Rays and geometric measurements, failed to identify the source of collet failure, I developed novel tests intended to mimic real-world conditions. These novel tests involved a hydro-static test and a dynamic test. The hydro-static test involved exposing the collets to extended periods of pressurized conditions. The dynamic test involved development of a computer-controlled manifold system that could selectively pressurize, de-pressurize, and drain collets in various sequences to determine the difference in performance. The novel tests I developed successfully determined the root cause of the collet failures.
19. In approximately 2012-2017, I performed a holistic safety and efficacy analysis of various consumer vacuum-sealer products. In particular, I

- conducted tear-down analyses, reviewed the vacuum-sealers' performance for safety and functionality considerations, analyzed the function and operation of vacuum pumps, analyzed fluid flow paths, and analyzed the operation of small valves. I further worked with an electrical engineer to review the safety of the products' internal electronics.
20. Since approximately 2013 to the present, I have used principles of biomechanics, as well as principles of physics, to analyze the effect on a user or nearby operator of pressure cookers that failed, ejecting hot liquid. This work involved analyses of, among other things, forces that are applied to pressure cookers, the physics involved in the operation of pressure cookers, and biomechanical principles.
21. In approximately 2013-2016, I used industry testing methods and developed and designed novel experiments and testing related to fluid flow analysis for a consumer garden hose. The analysis involved testing the hose's strength, durability, environmental performance (temperature and UV exposure), and material selection in connection with user operation. I further designed computer-controlled pressurization and de-pressurization systems for these garden hoses. The system was initially powered pneumatically with compressed air driven through a manifold in conjunction with a tank of water. When scaled, the system involved two

parallel pumps that pressurized two groups of manifolds using computer-controlled valves in series to pressurize and de-pressurize expandable garden hoses. Developing this system involved, among other things, selecting the appropriate fluid power components and optimizing fluid flow paths.

22. In approximately 2015, I applied my biomechanical background to the use of cane handles, which involved assessing the amount of force to be applied to the handle and developing a handle that could both support that amount of force reliably and house a battery for novel electronics that were embedded in the cane.
23. In approximately 2015-2017, I investigated various properties of a garden hose ball valve. I worked as a part of a team to investigate valve properties, including materials, geometry, and seal selection. We further investigated fluid flow through the valve to ensure that the flow was optimized by analyzing valve shape with the Bernoulli equation.
24. In approximately 2016, I conducted an analysis of a cordless, handheld consumer leaf blower. In particular, I analyzed the functioning, operation, and failure of blower motors and fans in relation to the direction of fluid flow within a consumer leaf blower. This analysis concerned, among other things, consideration of fluid flow and mechanical design of leaf blowers,

specifically regarding fan blade failure and its potential impact on the consumer-operator.

25. In approximately 2017-2018, I conducted an efficacy analysis of hand grips for ergonomic handheld hose nozzles. This analysis included a review of handheld nozzles in the marketplace that were advertised as ergonomic, as well as biomechanically modelling postures expected to be associated with the ergonomic handheld nozzles. To biomechanically model these handheld nozzles, I used a program called 3DSSPP, which models, among other things, human balance and effort levels. This program can be used calculate human joint torque based on operator input, which I used (and continue to use) to analyze the ergonomics of holding various handles, including handles for household consumer products.
26. I further used 3DSSPP to model biomechanics for use in household consumer products and industrial products. For example, in my paper, *Analytical Model for Estimating Knee Loads During Ladder Climbing*, published in the 2013 edition of the ASME International Mechanical Engineering Congress Exposition, I discussed how force output at the hands based on arm posture influences the forces within the knee joint. At a high level, this involved analyzing the ergonomics of how posture influences likely force output of limbs, particularly in connection with

- household consumer products, specifically ladders.
27. In approximately 2018-2020, I analyzed the operation of computer-controlled blowers, manifolds, valves, and sensors in consumer air mattresses. In particular, the analysis concerned the ability to control and maintain constant air pressure within air mattresses at particular pressure set points. This analysis concerned, among other things, fluid dynamics, fluid flow, fluid path selection, and changes in pressure.
 28. In 2021, I published a paper, *Characterization of the Release of Heated and Pressurized Water from a Pressure Cooker*, in the Journal of Burns. In this paper, I analyzed and described how fluid is ejected from a pressure cooker as a result of a flash boil event. In this analysis, I considered the operation of an exemplary household pressure cooker, analyzing fluid dynamics resulting from the trade-off between volume of liquid and pressure on fluid dynamics and its effect on consumer-users.
 29. I have provided my full background in the curriculum vitae that is attached as Ex1003.

III. DOCUMENTS AND MATERIALS CONSIDERED

30. In forming the opinions expressed in this Declaration, I relied upon my education, training, knowledge, and experience in the relevant field of the art, as well as information pertaining to the documents described below.

31. In preparing this Declaration, I have considered the materials referenced herein, including the '120 patent and its file history, the Jung, Min, Jeong, Soler, Gammack, and Davis prior art references on which my opinions are based, and other documents listed in the Exhibit List of the Petition. These references and documents reflect the state of the relevant art at the time of the alleged invention and the background knowledge of a POSA.
32. I have also reviewed the Patent Owner ("PO")'s infringement and domestic industry claim charts for the '120 Patent served as part of PO's Complaint in the related litigation, *Certain Surface Cleaning Devices and Components Thereof*, 337-TA-1404 (the "ITC Litigation").

IV. LEGAL PRINCIPLES

33. Dyson's counsel has informed me of certain legal standards. I have applied these understandings in my analysis as detailed below. I am not an attorney and offer no legal opinions.
34. I have been informed and understand that a patent claim is invalid if it is obvious, and that obviousness requires that the claim be obvious from the perspective of a person of ordinary skill in the relevant art at the time of the alleged invention. I have been informed and understand that a claim may be obvious in view of a single prior art reference, or may be obvious in view of a combination of two or more prior art references.

35. I have been informed and understand that the level of ordinary skill in the art may be determined by considering such factors as the education level of those working in the field, the sophistication of the technology, the types of problems encountered in the art, the prior art solutions to those problems, and the speed at which innovations are made. I have been informed and understand that not all of these factors need be considered and that one or more of these factors may control.
36. I have been informed and understand that an obviousness analysis is based on several factors, including the scope and content of the prior art, what differences, if any, existed between the alleged invention and the prior art, and the level of ordinary skill in the pertinent art at the time of the alleged invention.
37. I have been informed and understand that to determine whether a claim is obvious, it is appropriate to consider, among other factors:
- (1) whether the teachings of the prior art references disclose known concepts combined in familiar ways, and when combined, would yield predictable results;
 - (2) whether a person of ordinary skill in the art could implement a predictable variation, and would see the benefit of doing so;
 - (3) whether the claimed elements represent one of a limited number of known design choices, and would have a reasonable expectation of success

- by those skilled in the art; (4) whether a person of ordinary skill would have recognized a reason to combine known elements in the manner described in the claim; (5) whether there is some teaching or suggestion in the prior art to make the modification or combination of elements claimed in the patent; and (6) whether the innovation applies a known technique that had been used to improve a similar device or method in a similar way.
38. I further have been informed and understand that while it may be helpful to identify a reason for this combination, common sense should guide and no rigid requirement of finding a teaching, suggestion, or motivation to combine is required.
39. I further have been informed and understand that certain factors called secondary considerations may be considered in evaluating the obviousness of a claim. I understand that such secondary considerations include, among other things, commercial success of the alleged invention, skepticism of those having ordinary skill in the art at the time of the alleged invention, unexpected results of the alleged invention, any long-felt but unsolved need in the art that was satisfied by the alleged invention, the failure of others to make the alleged invention, praise of the alleged invention by those having ordinary skill in the art, and copying of the alleged invention by others in the field. I have been informed and understand that there must

be a nexus—a connection—between any such secondary considerations and the alleged invention. I also have been informed and understand that contemporaneous and independent invention by others is a secondary consideration tending to show obviousness.

40. I have been informed and understand that a prior art reference may expressly or inherently describe a limitation of a claim. I have been informed and understand that if the prior art necessarily includes or functions in accordance with a claim's limitation, then the prior art inherently discloses that limitation. I have been informed and understand that to establish inherency, the evidence must make clear that the missing descriptive matter is necessarily present in the item of prior art and that it would be so recognized by persons of ordinary skill in the art.

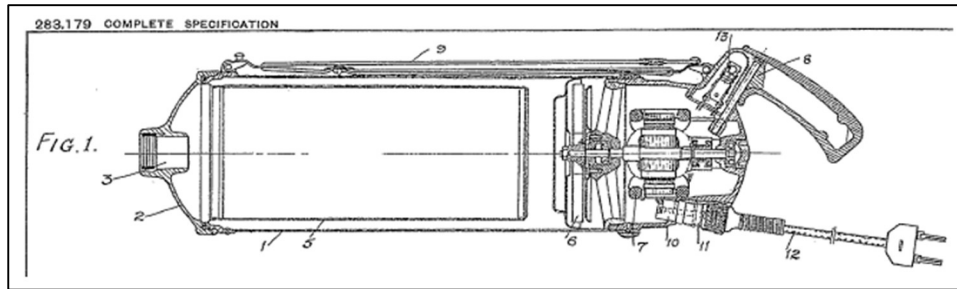
V. PERSON OF ORDINARY SKILL IN THE ART

41. In my opinion, a Person of Ordinary Skill in the Art ("POSA") in the subject matter of the '120 Patent would have had a bachelor's degree in mechanical engineering or a similar field and 2-3 years of experience in machine design, including machines that include fluid dynamics or fluid paths, such as vacuum cleaners. Additional education could offset less experience and vice versa, and a POSA could have also obtained similar knowledge and experience through other means.

42. I have been a POSA since at least 2003. The opinions I am offering are from the perspective of a POSA at the time of the alleged invention. For the purposes of my opinions below, I have been asked to assume that the relevant time frame is the relevant priority date for the Challenged Claims.

VI. TECHNOLOGY BACKGROUND

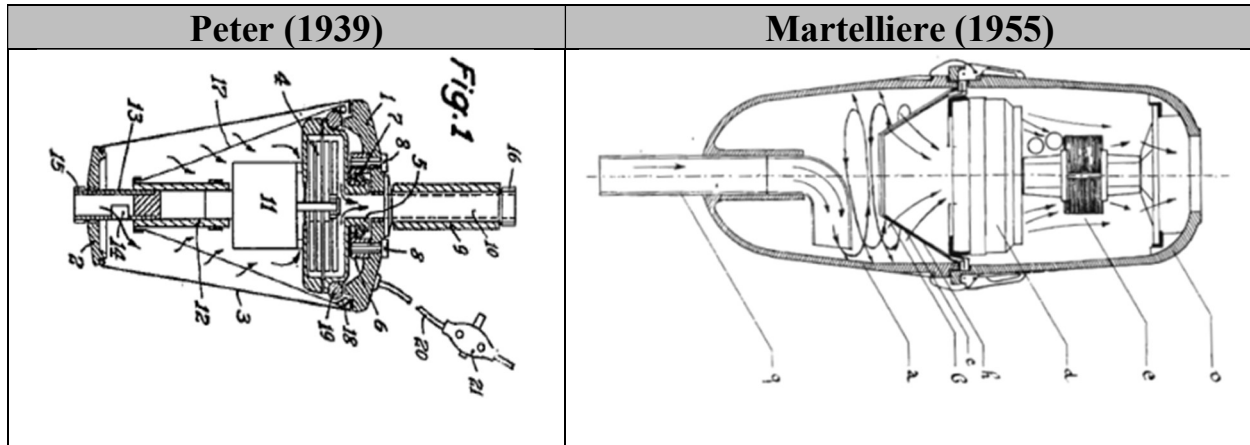
43. The Challenged Claims are directed to a “surface cleaning apparatus” configurations and features, including alignment of certain vacuum components, “a dirty inlet,” “a handle,” “a cyclone separator having ... a fluid inlet downstream from the dirt air inlet and a fluid outlet,” “a plate having ... positioned between a cyclone chamber and a dirt collection chamber,” and “a fluid flow motor.” Ex1001, Claims.
44. In my opinion, these features and configurations were well-known, as were the ’120 Patent’s claims’ remaining elements. *Id.*
45. For over a century, vacuum cleaners have been using the features that are described in the ’120 Patent, such as a suction motor that draws dirty air into a dirty air inlet, filtration processes that clean the air, and clean air outlets that exhaust the cleaned air. Many early vacuum cleaners, such as the vacuum cleaner described in U.K Patent Publication No. GB283,179 to Inventia Patent-Verwertungs-Gesellschaft (“IPVG”), used disposable dust bags to separate dust from the air, as shown in the figure below:



Ex1018, Fig. 1; *see also id.*, 1:22-33 (“According to the present invention the apparatus comprises a casing containing a motor driven fan and a dust bag or like member through which the air stream passes and provided with a handle by which the apparatus may be readily lifted during operation, the handle being formed at its end to be connected to the casing with a conical portion fitting in a conical bore of the casing and secured therein by a longitudinally acting screw arranged eccentrically of the bore.”).

46. Those skilled in the art at the time of the '120 Patent's alleged invention would have recognized that this dust-bag method is costly (dust bags must be replaced), loses effectiveness during use (dust-bag cleaners lose suction as they fill), and prevents the user from seeing how full the bag is, leaving a user to guess as to when to empty or replace the bag. However, those skilled in the art would have also recognized, more than 80 years ago, that vacuum cleaners that use cyclonic separation units—which use cyclonic airflow to separate heavier-than-air dust particles from the dirty air—have certain advantages over vacuum cleaners that use dust bag filtration units,

as was taught by Swiss Patent No. CH203,675 to Peter in 1939, and by French Patent No. 1,094,603 to Martelliere in 1955, as shown in the figures below:



Ex1020¹, Fig. 1; Ex1022², 1, Fig. 1.

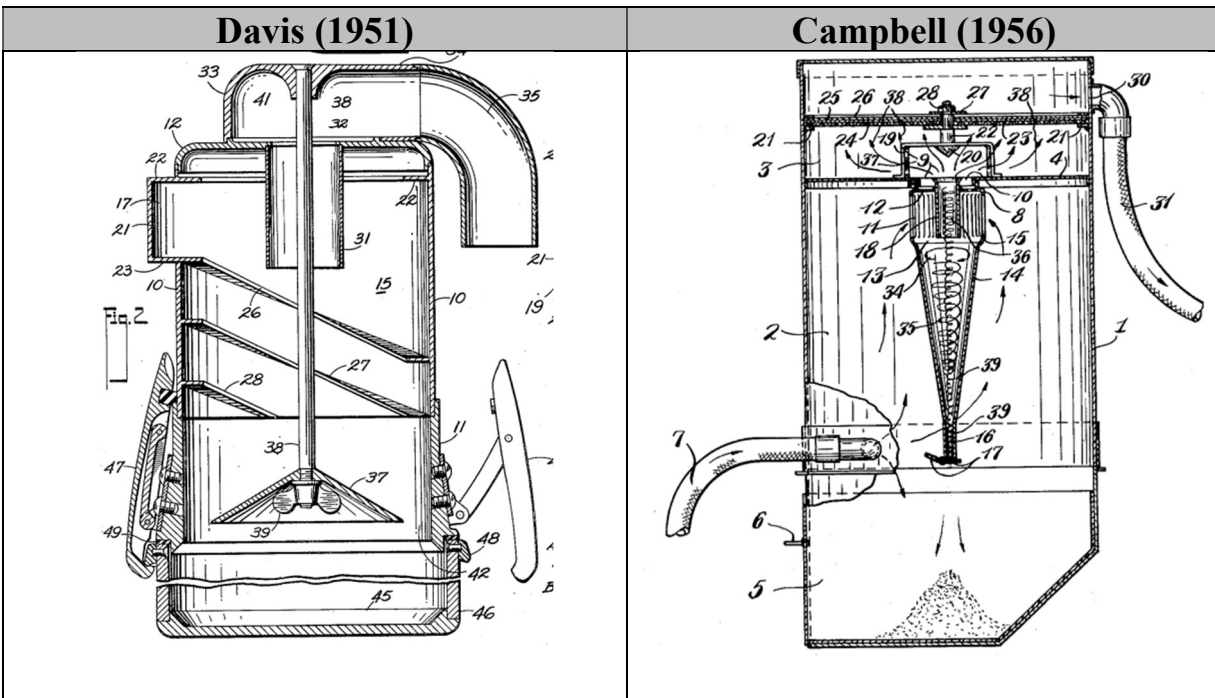
47. For example, Martelliere explains that “[b]y application of the ‘Whirlwind’ principle,” i.e., cyclonic filtration, “the materials are deposited in the bottom of the container, after having separated from the

¹ Ex1020 is a certified English translation of Ex1019, originally published in German. Citations to Ex1020 are by page, as the English translation does not include column or line numbers.

² Ex1022 is a certified English translation of Ex1021, originally published in French. Citations to Ex1022 are by page, as the English translation does not include column or line numbers.

air, before it passes through the filter screen,” which “prevent[s] clogging” and creates “stable suction,” and by using a transparent cyclonic chamber, “the user is able, when stopped, to see where the filling of the container is” and “can therefore better judge when it must be emptied.” Ex1022, 1.

48. Further, vacuum cleaners having baffles or partitions that separate different chambers, such as separating a dust separation chamber from a dust collection chamber, have also been known in the art for over 70 years, including as taught by U.S. Patent No. 2,542,655 to Davis et al. in 1951, U.S. Patent No. 2,768,707 to Campbell in 1956, and as shown in the figures below:



Ex1010, Fig. 2; Ex1023, Fig. 1; *see also* Ex1010, 4:19-23 (“[t]he baffle 37 is spaced from the inner wall of the casing portion to leave an annular passage 42 through which dust passes from the separating chamber into a collecting chamber 45.”); Ex1023, 2:14-17 (“a separation chamber 2 and a discharge chamber 3 separated by the partition 4 which preferably is disposed laterally of the container 1”).

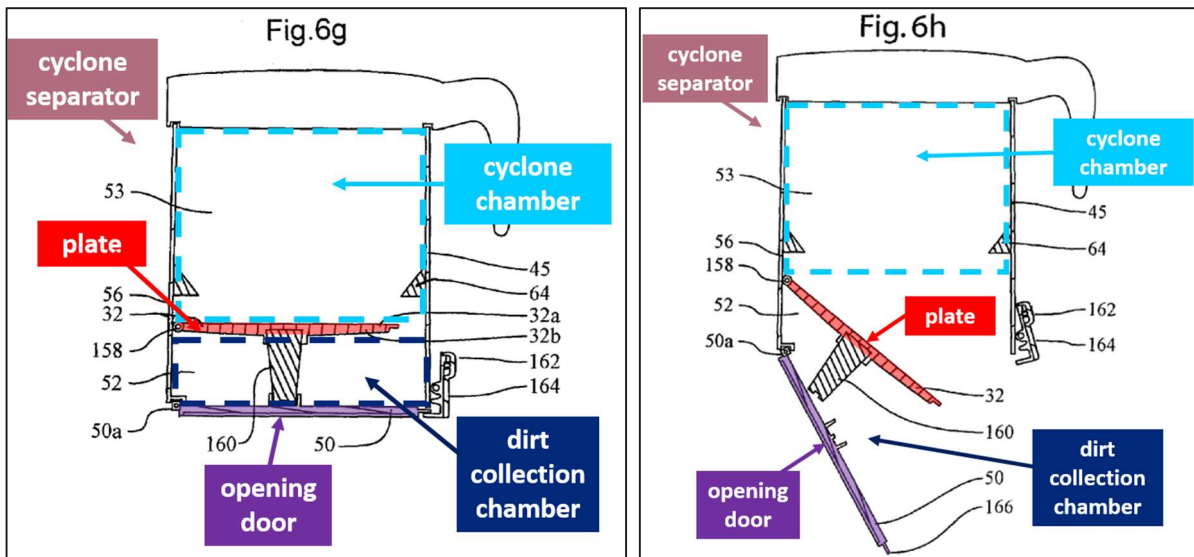
VII. BACKGROUND OF THE '120 PATENT

49. The '120 Patent is titled “Vacuum Cleaner with a Moveable Divider Plate.” Ex. 1001, Title. The '120 Patent states that it issued on August 17, 2010, from U.S. Patent Application No. 11/683,670, filed on March 8, 2007. *Id.*, Cover. The '120 Patent also states that it claims priority to provisional application No. 60/780,824, filed on March 10, 2006. *Id.*

A. Summary of the '120 Patent's Specification

50. The '120 Patent states that it relates to a cyclonic “surface cleaning apparatus,” such as a vacuum cleaner, having “a plate to divide a dirt collection chamber from a cyclone chamber.” Ex1001, 1:6-8, 1:45-50.

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



Id., 31:6-19, Figs. 6g, 6h.

52. The '120 Patent's claimed surface cleaning apparatus also include features such as "a dirt inlet," "a handle," "a cyclone separator having ... a fluid inlet downstream from the dirt air inlet and a fluid outlet," and "a fluid flow motor." *Id.*, Claims. In my opinion, these are a mix of well-known, interchangeable features and configurations.

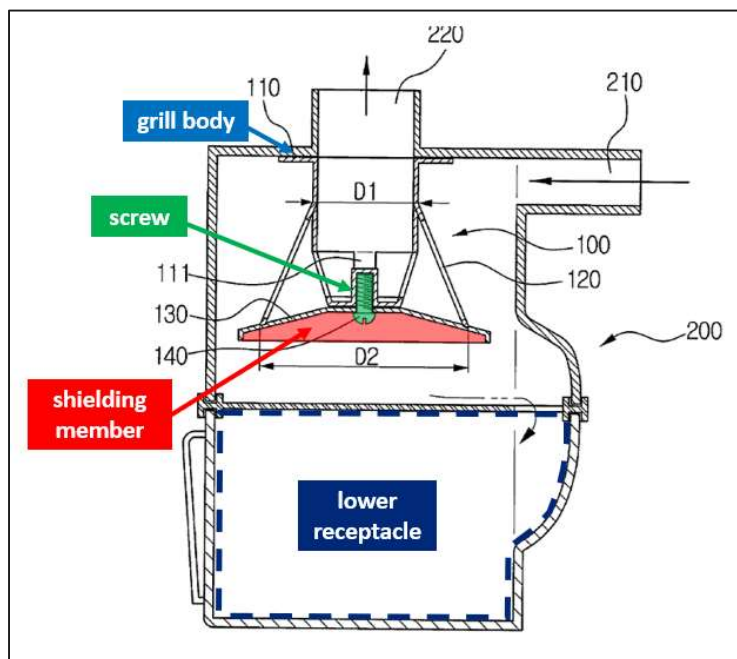
53. I have reviewed the '120 Patent's specification, and the combination of these claimed elements does not purport to provide any technical benefit or solve any purported problem.

B. Prosecution History of the '120 Patent

54. I have reviewed the prosecution history of the '120 Patent. The following is my understanding:

55. 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 receptacle** and a **shielding member 130** that can “be removed ... by unscrewing the **screw 140**”:



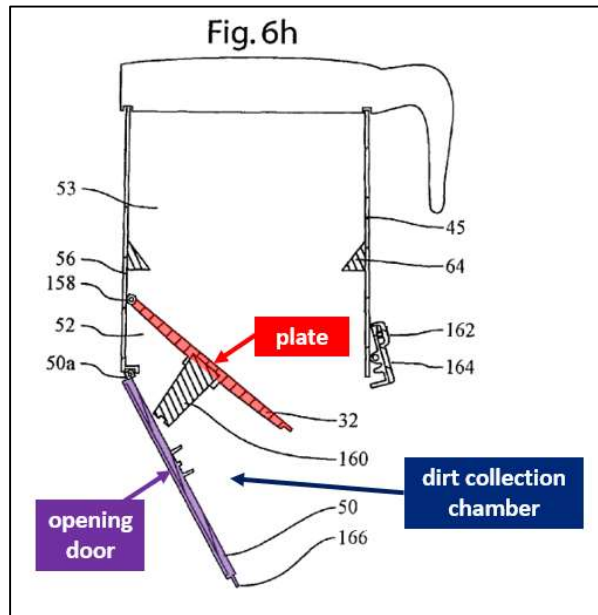
Ex1008, ¶¶15-17, Fig. 3.

56. 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.

57. The 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.

58. The 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. The Examiner then issued a Notice of Allowance following an Examiner’s Amendment. Ex1004, 210-217.
59. However, in my opinion, the PO’s claimed “moveable” plate, and the other limitations in the ’120 Patent’s claims, were well-known and taught by

prior art that was not before the Examiner.

60. Jung, Min, Jeong, Soler, Gammack, and Davis were not before the United States Patent and Trademark Office during the prosecution of the application that resulted in the '120 Patent. As such, the prior art combinations that are presented herein was not considered by the Examiner during the prosecution of the application that issued as the '120 Patent.

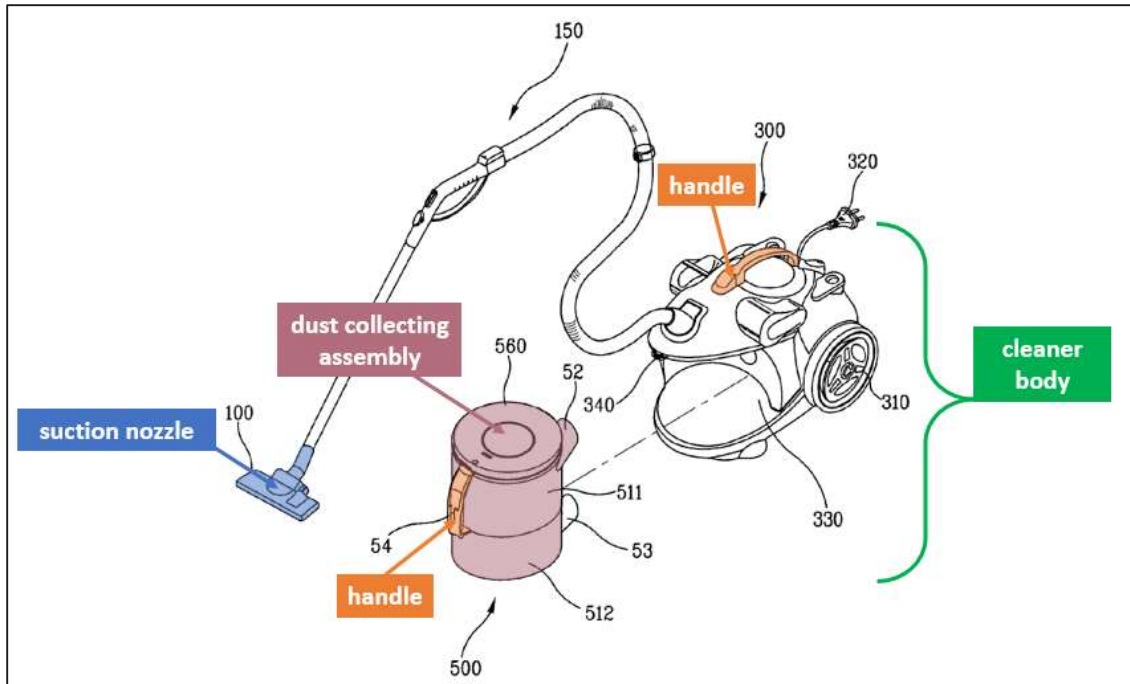
C. Priority Date of the Challenged Claims

61. For the purposes of my analysis, I have been instructed to apply, and have applied a priority date of March 10, 2006, for the Challenged Claims.

VIII. BACKGROUND OF THE PRIOR ART

A. Jung

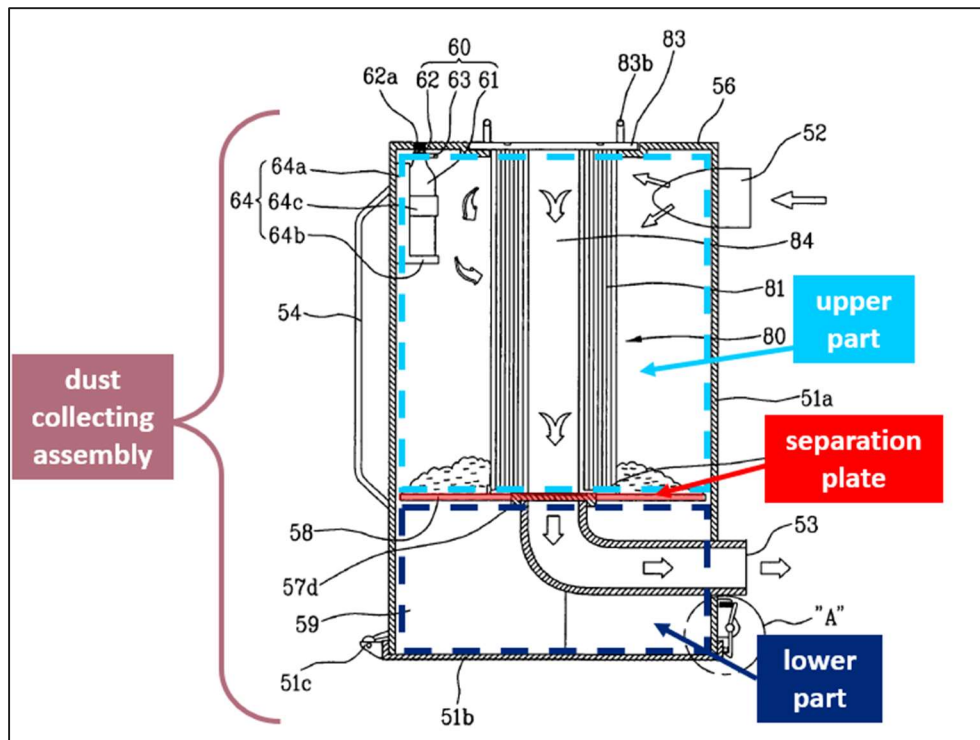
62. Jung is a U.S. Patent assigned to LG Electronics, filed December 8, 2004. Ex1005, Cover. Jung teaches a “vacuum cleaner” with a “**suction nozzle**,” two **handles**, including **handle 54**, a detachable **dust collecting assembly** to “separate[] and collect[] the impurities contained in the polluted 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.

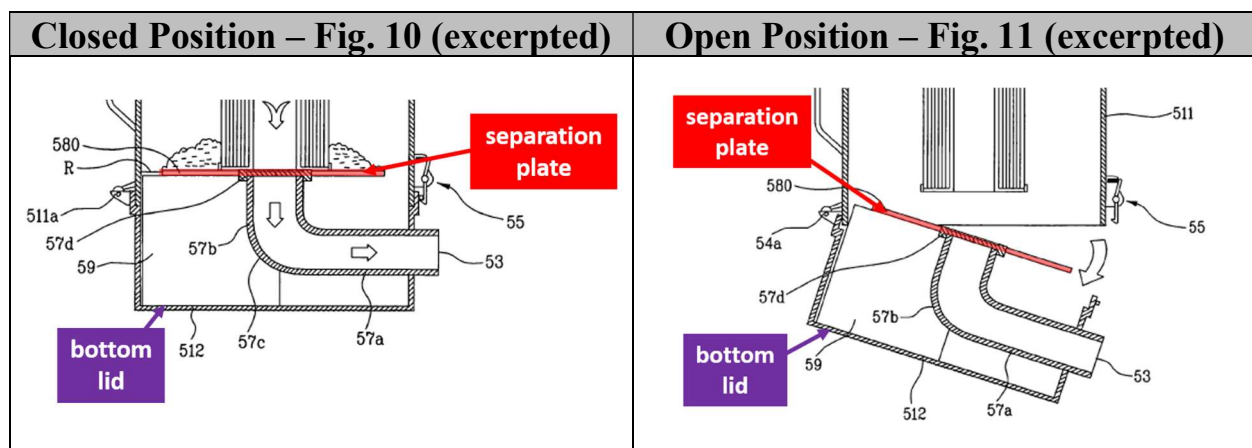
63. Jung teaches a **separation plate** that separates a cyclonic **dust collecting assembly** into an **upper part**, where impurities are separated using the cyclone principle, and a **lower part**, where the “impurities [are] collected” and “prevented from being interfered by the air flow.”³

³ Jung alternatively refers to these regions as “top space,” “upper space,” or “upper part,” and “bottom space,” “lower space,” or “lower part,” respectively. *See, e.g.*, Ex1005, 10:4-8, 11:57-12:12, 13:1-7. I have used “upper part” and “lower part” for ease of reference.



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

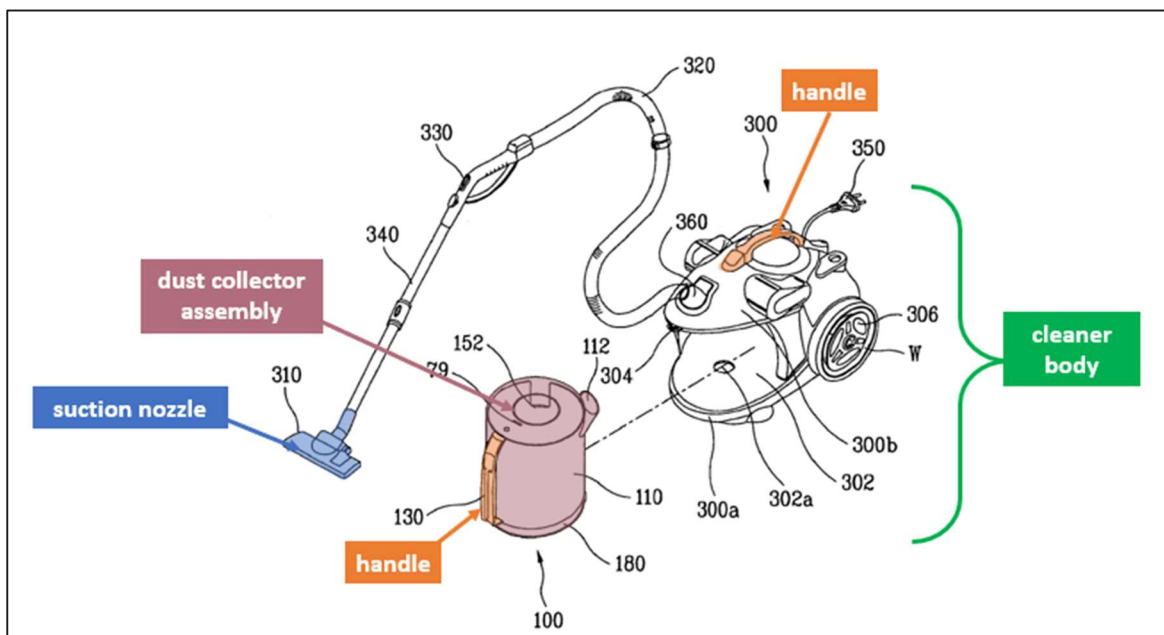
64. The **dust collecting assembly** has an openable **bottom lid**, and “the **separation plate** [is] rotated at the same time when the **bottom lid** [] is rotated”:



Ex1005, Figs. 8, 11, 10:18-24, 12:13-39.

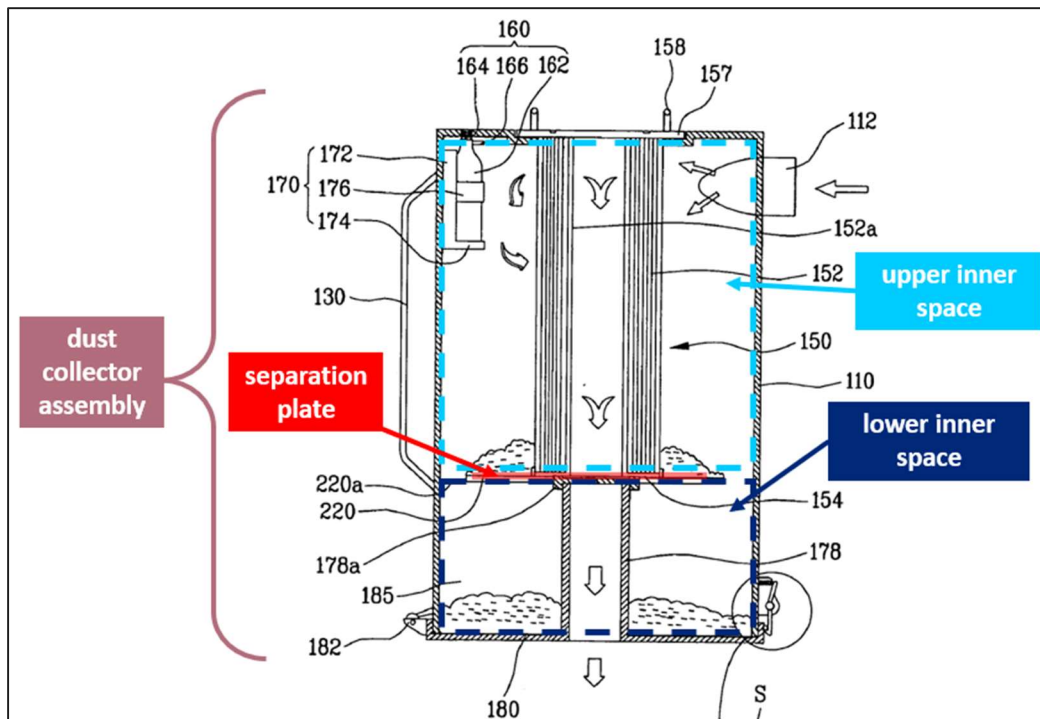
B. Min

65. Min is a U.S. Patent Publication assigned to LG Electronics, filed December 8, 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.



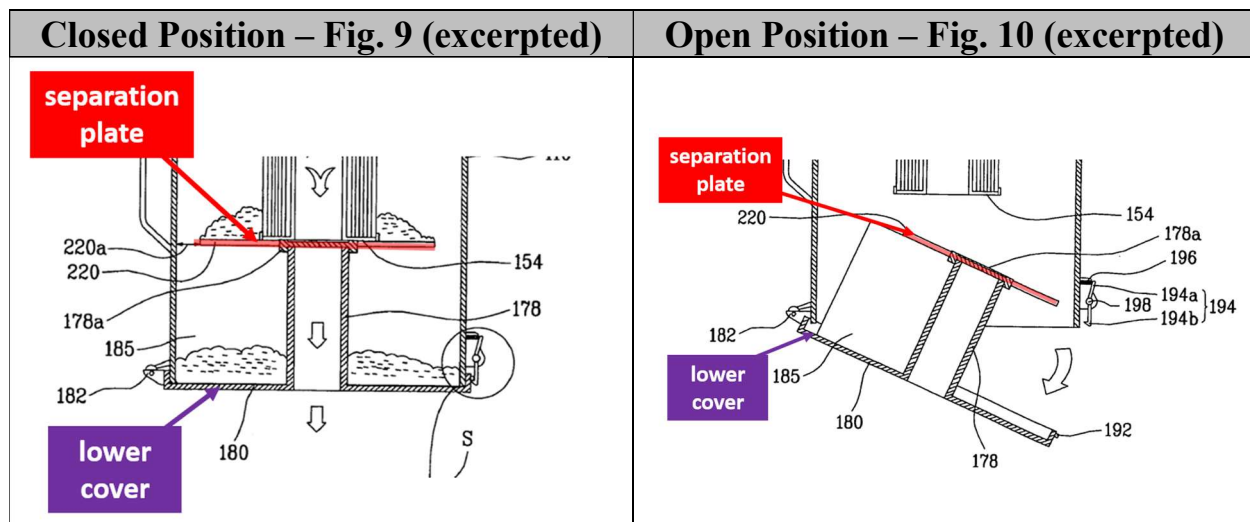
Ex1011, ¶¶ 117-119, Fig. 12.

66. 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.

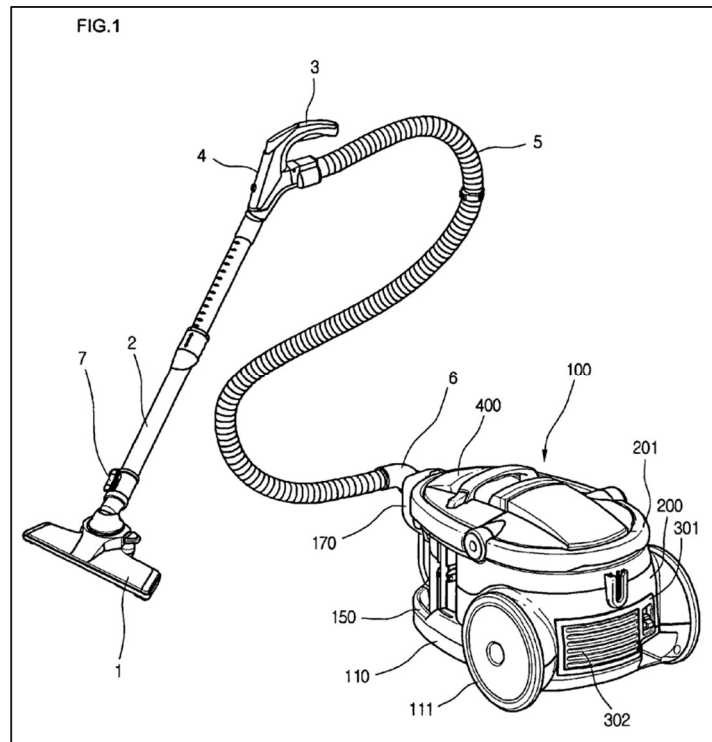
67. The **dust collecting assembly** has an openable **lower cover**, and the **separation plate** “rotates together with the **lower cover**”:



C. Jeong

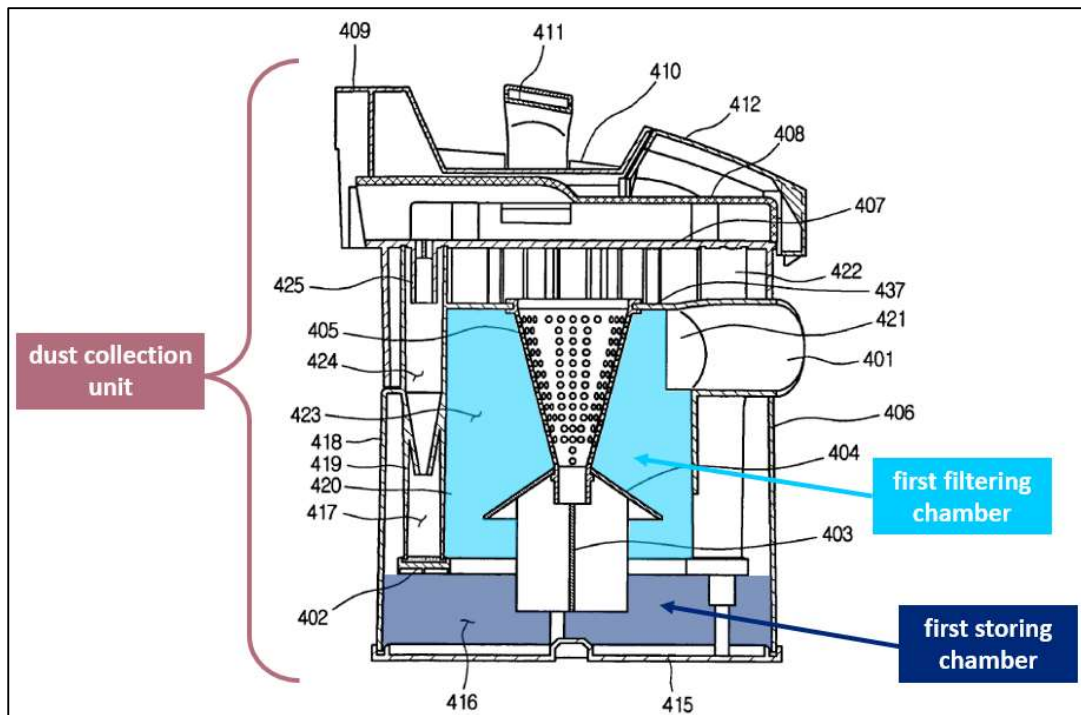
68. Jeong is a U.S. Patent also assigned to LG Electronics, filed September 23,

2005, for a similar vacuum cleaner to Jung and Min:



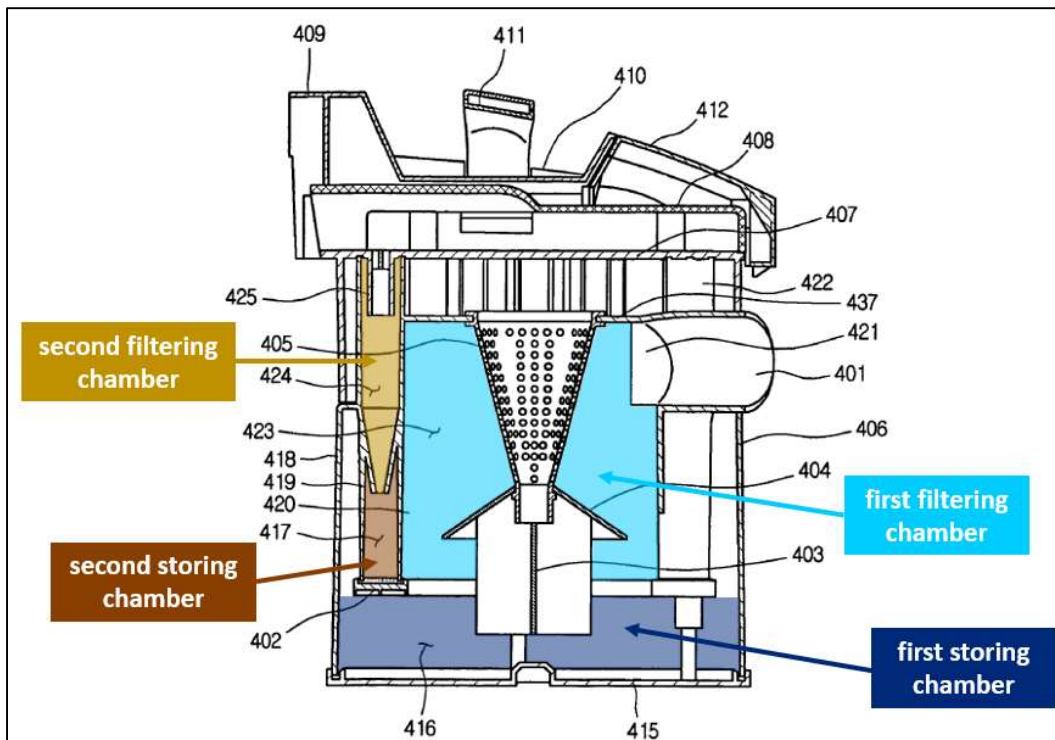
Ex1006, Cover, Fig. 1.

69. 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....”



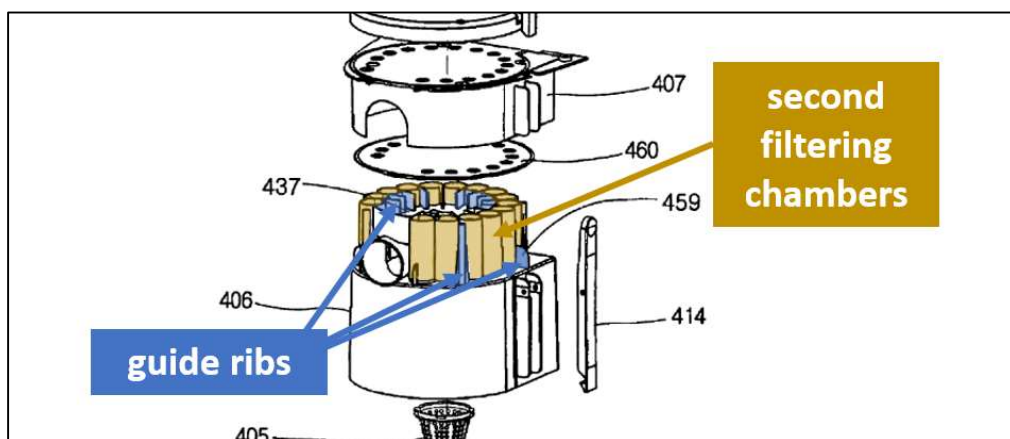
Ex1006, 6:20-53, 9:29-33, Fig. 7.

70. 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. “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.

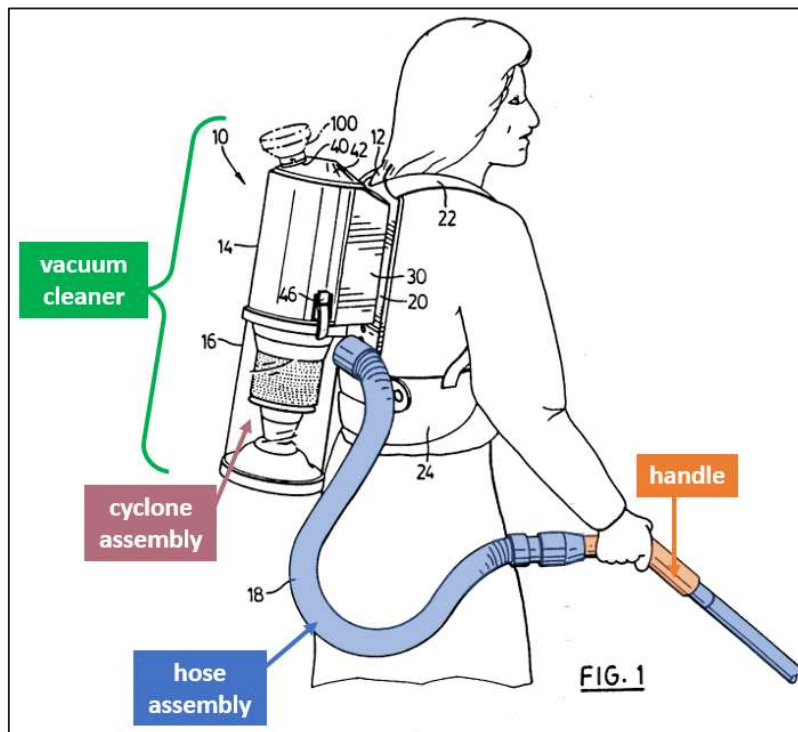
71. Jeong teaches that a “plurality of **guide ribs 459** are formed on” an outer circumference of a collection body of the **dust collection unit** and illustrates that the “plurality of **guide ribs 459**” are placed between the **second filtering chambers**:



Ex1006, 6:15-19, 6:58-60, Fig. 5 (excerpted).

D. Soler

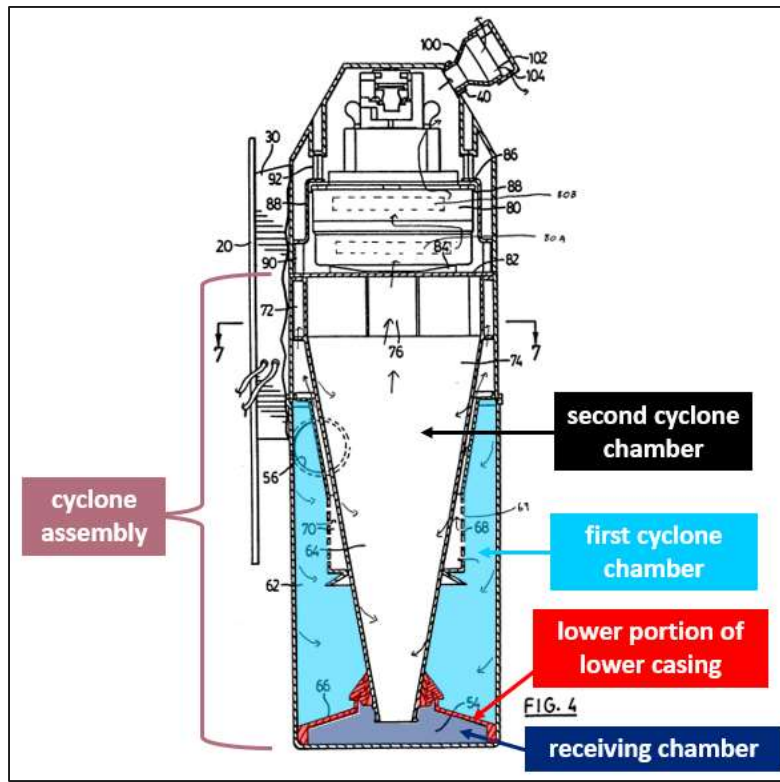
72. Soler is a U.S. Patent issued on December 7, 1993. Ex1009, Cover. Soler teaches a cyclonic **vacuum cleaner 10** with a **hose assembly 18**, a **handle**, and a **cyclone assembly**:



Ex1009, 4:10-16, 6:5-15, Fig. 1.

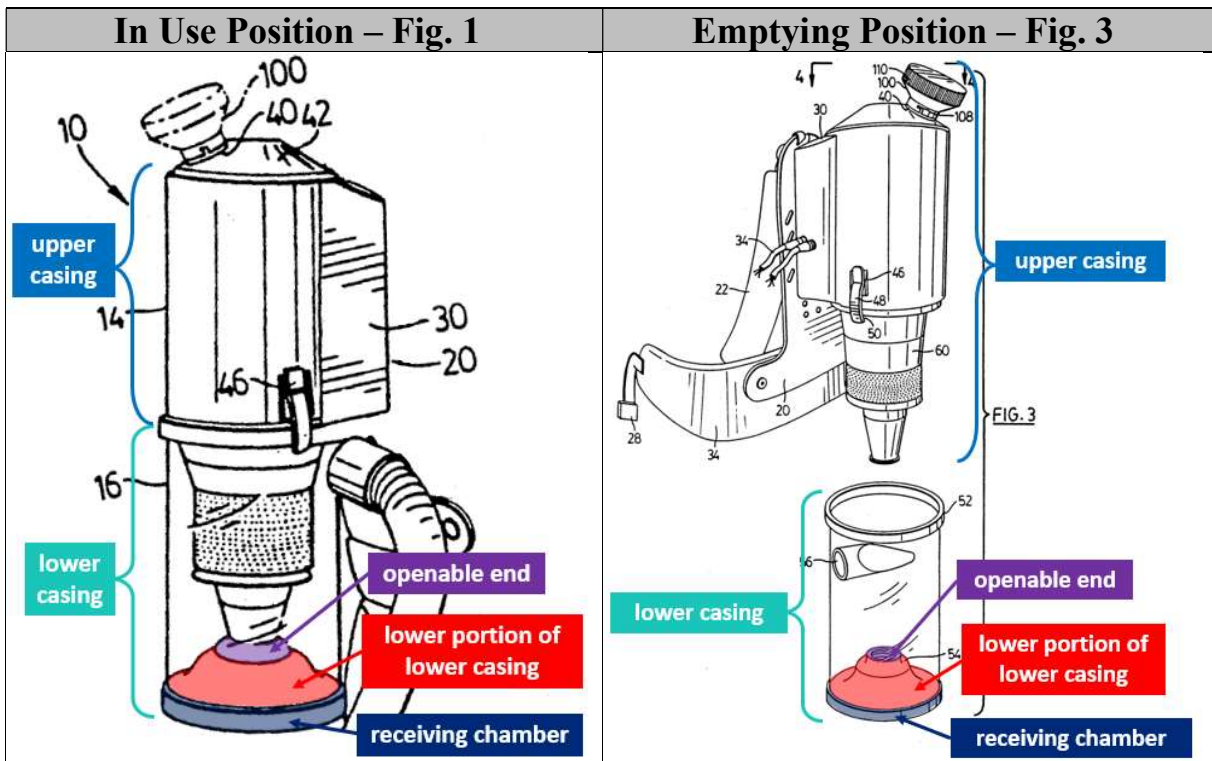
73. The **cyclone assembly** comprises a **first cyclone chamber 62** and a **second cyclone chamber 64** for separating dirt from air. Ex1009, 6:5-37. “The larger and heavier dirt” from the **first cyclone chamber 62** “is deposited in the **lower portion of lower casing [66]**” and “finer dirt particles”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

chamber 54.



Ex1009, 5:59-60, 6:5-37, Fig. 4.

74. 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.

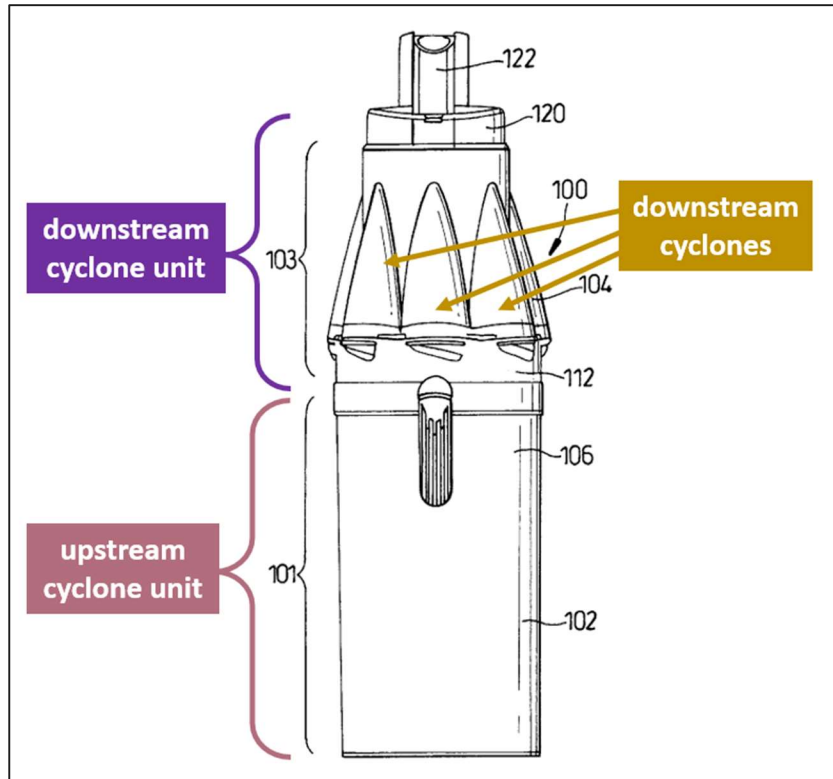


Ex1009, 5:46-57, Figs. 1 (excerpted), 3.

E. Gammack

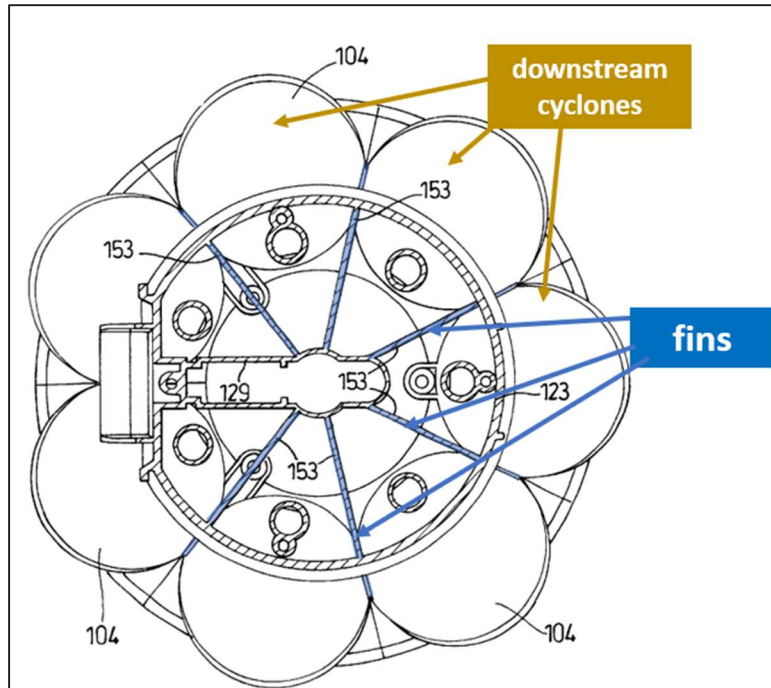
75. Gammack is a U.S. Patent issued August 19, 2003. Ex1016, Cover.

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.

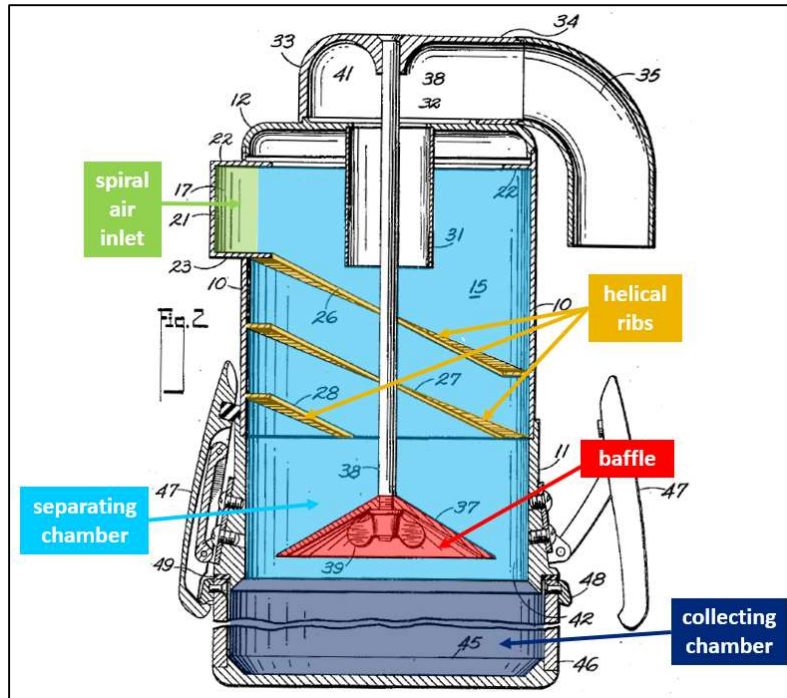
76. Gammack teaches that “**fins** are provided between the second ends of adjacent [**downstream**] **cyclones**”:



Ex1016, 5:50-65; Claims, Fig. 5.

F. Davis

77. Davis is a U.S. Patent issued on February 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. A **barrier 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 **barrier 37** and “seals off” the area below it:



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

IX. CLAIM CONSTRUCTION

78. I am unaware of any claim construction determinations related to the '120 Patent.

79. For purposes of this proceeding, I have been asked to consider, and have considered whether the Challenged Claims are invalid as anticipated or obvious under their plain and ordinary meaning.

X. INVALIDITY OPINIONS: '120 PATENT

80. In my opinion, the Challenged Claims of the '120 Patent are invalid based on the following references and combinations:

- Jung anticipates claims 1, 3-5, 7, 9-12, and 14-19 (Ground 1).
- Min anticipates claims 1, 3-5, 7, 9-12, 14-19 (Ground 2).

- Jung renders obvious claims 1, 3-6, 7, 9-12, 14-19 (Ground 3).
- Min renders obvious claims 1, 3-7, 9-12, 14-19 (Ground 4)
- The combination of Jung and Jeong renders claims 8 and 20 obvious (Ground 5)
- The combination of Min and Jeong renders claims 8 and 20 obvious (Ground 6)
- The combination of Jung and Davis renders claims 2 and 13 obvious (Ground 7)
- The combination of Min and Jeong renders claims 2 and 13 obvious (Ground 8)
- Soler anticipates claims 1, 3-5, 9, 12, 14-15 (Ground 9)
- Soler renders obvious claims 1, 3-5, 7, 9, 12, 14-19 (Ground 10)
- Soler in
- The combination of Soler and Gammack renders claims 8 and 20 obvious (Ground 11)
- The combination of Soler and Davis renders claims 2 and 13 obvious (Ground 12)

81. As part of my analysis, I have considered the scope and content of the prior art, and whether any differences between the alleged invention and the prior art are such that the subject matter, as a whole, would have been anticipated / obvious to a person having ordinary skill in the art at the time of the alleged invention, which I have been asked to assume was March 10, 2006, for the Challenged Claims of the '120 Patent, as discussed above. I have also considered the level of ordinary skill in the pertinent art.

82. I describe in detail below the scope and content of the prior art, as well as any differences between the alleged invention and the prior art, on an element-by-element basis for each Challenged Claim of the '120 Patent.

A. Ground 1: Jung Anticipates Claims 1, 3-5, 7, 9-12, and 14-19

83. In my opinion, Jung anticipates claims 1, 3-5, 7, 9-12, and 14-19.

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

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

Reference Number	Claim Limitation
[1pre]	"A surface cleaning apparatus comprising:"
[9pre]	"A surface cleaning apparatus comprising:"
[16pre]	"A surface cleaning apparatus comprising:"
[18pre]	"A surface cleaning apparatus comprising:"

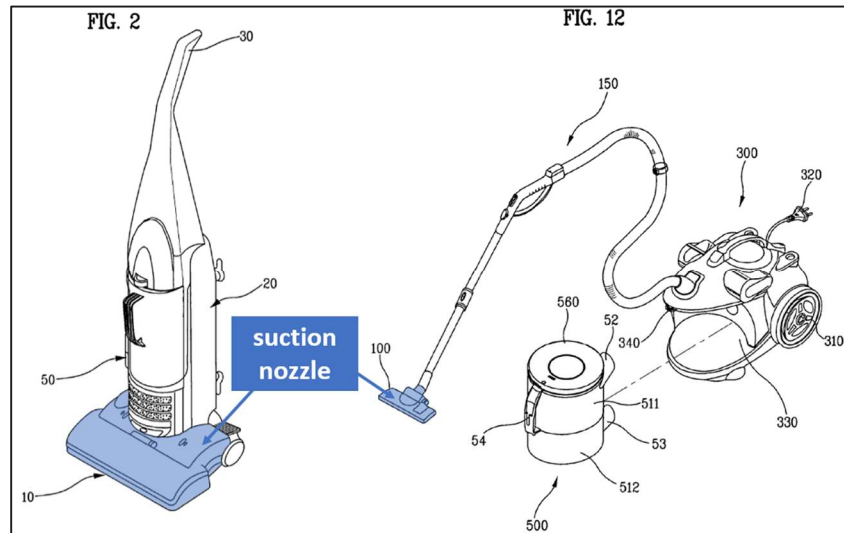
84. To the extent the preambles are limiting, in my opinion, Jung teaches a surface cleaning apparatus.

85. Jung teaches a "vacuum cleaner" for cleaning surfaces. Ex1005, Title, Abstract, 1:14-21, 4:44-49, 11:57-60, 12:46-50, Figs. 1-3, 12. A POSA would have understood that this is a surface cleaning apparatus.

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

Reference Number	Claim Limitation
[1a]	"a. a dirt inlet;"
[9a]	"(a) a dirt inlet;"
[16a]	"(a) a dirt inlet;"
[18a]	"(a) a dirt inlet;"

86. In my opinion, Jung teaches a dirt inlet and a dirt air inlet.⁴
87. Jung's vacuum cleaners include "a **suction nozzle 10** moving along a floor and sucking air containing impurities" and "**suction nozzle 100**" for the same:



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

88. A POSA would have understood that Jung's **suction nozzles** provide for the entrance of dirt and other impurities into Jung's vacuum cleaners. A POSA would thus have understood Jung's **suction nozzle 10** and **100** as a dirt inlet and a dirt air inlet.

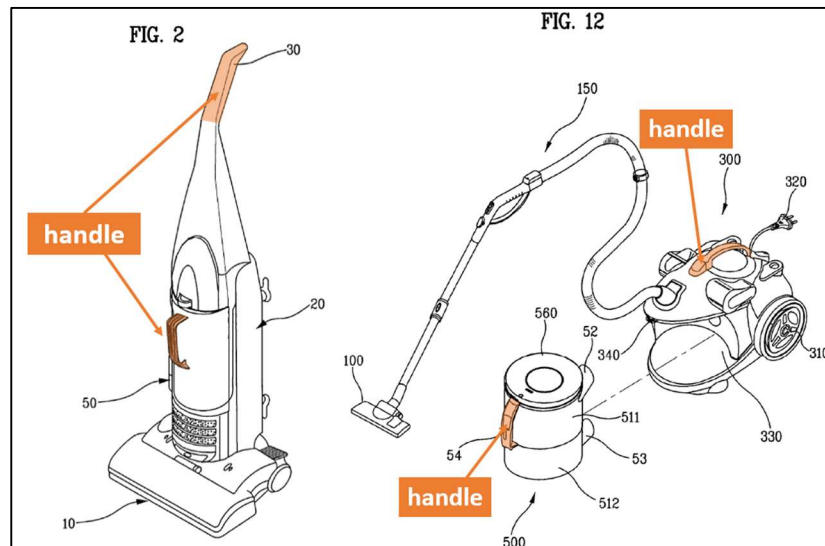
⁴ Elements [1c], [9c], [16c], and [18d] claim "the dirt air inlet."

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

Reference Number	Claim Limitation
[1b]	“b. a handle;”
[9b]	“(b) a handle;”
[16b]	“(b) a handle;”
[18b]	“(b) a handle;”

89. In my opinion, Jung teaches a handle.

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



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

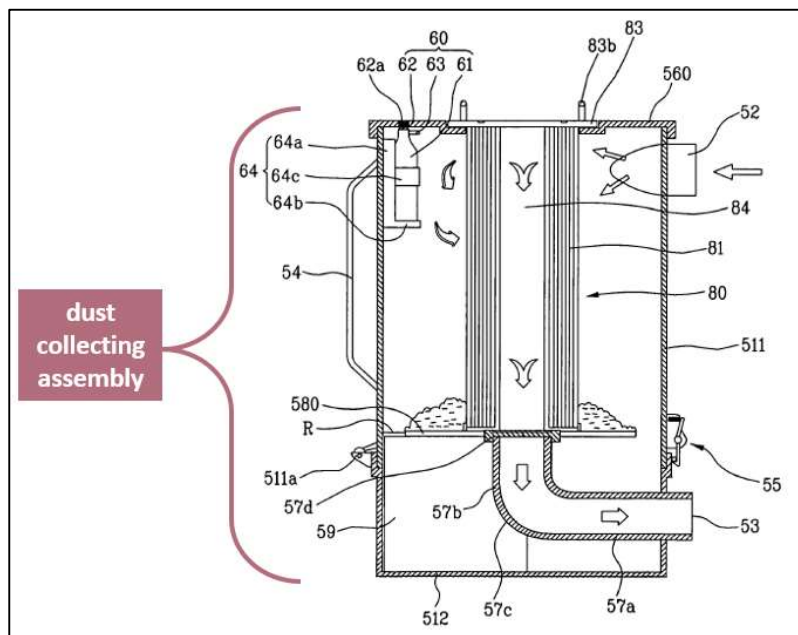
d. [1c]/[9c]/[16c]/[18c]/[18d]

Reference Number	Claim Limitation
[1c]	“c. a cyclone separator having an outer wall, a fluid inlet downstream from the dirt air inlet and a fluid outlet;”
[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;”
[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;”
[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;”

91. In my opinion, Jung teaches cyclone separator having an outer wall, a fluid inlet downstream from the dirt air inlet and a fluid outlet (Limitation [1c]).
92. In my opinion, Jung teaches 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. (Limitation [9c]).
93. In my opinion, Jung teaches 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. (Limitation [16c]).
94. In my opinion, Jung teaches a cyclonic unit comprising a cyclone chamber

and a dirt collection chamber and having an openable end, the cyclone chamber having an outer wall, a fluid inlet downstream from the dirt air inlet and a fluid outlet (Limitations [18c] and [18d]).

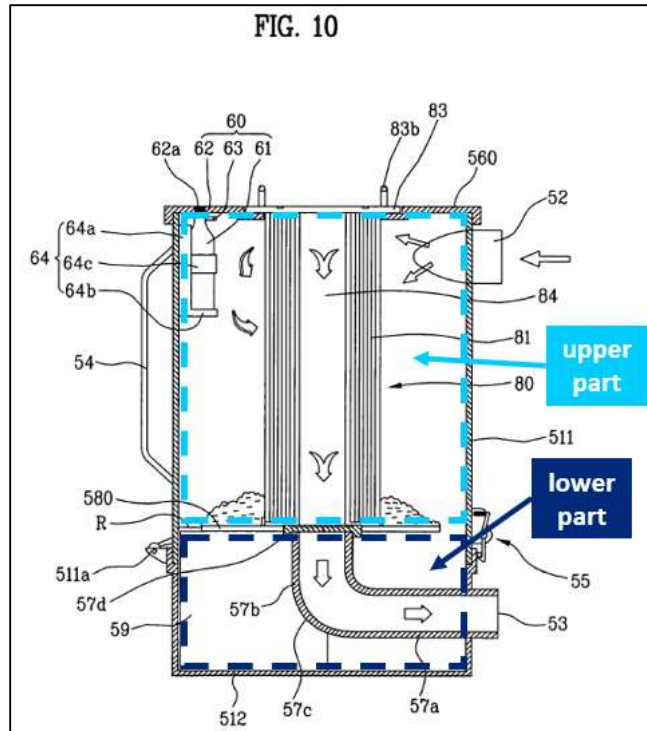
95. In my opinion, a POSA would have understood Jung's **dust collecting assembly** to be a "cyclone separator" and a "cyclonic unit." Jung's **dust collecting assembly** uses "the cyclonic principle" in which "[a]ir flowed into the **dust collecting assembly 500** flows cyclonically such that the large impurities are separated from the polluted air[.]" Ex1005, 6:6-40, 12:62-13:20. The cyclonic airflow is demonstrated, for example, in Figure 10 with the curved arrows:



Ex1005, Fig. 10.

96. Regarding Limitations [9c], [16c], and [18c],⁵ in my opinion, 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. 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** (which a POSA would have understood as a dirt collection chamber):

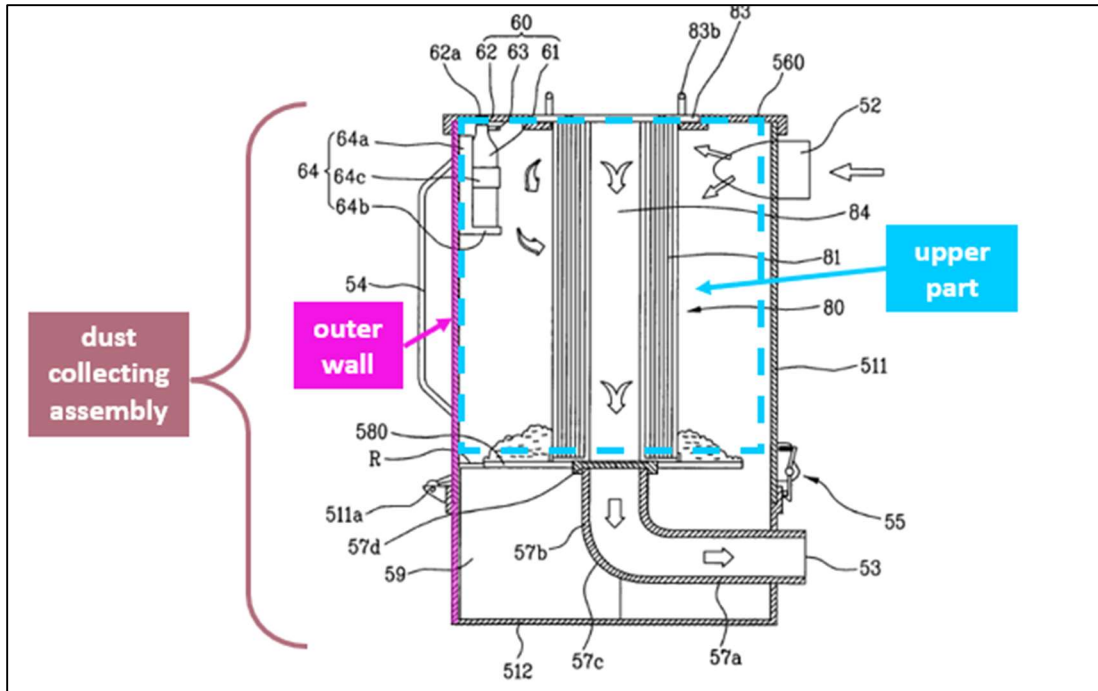
⁵ For Limitation [1d], in my opinion, Jung teaches “a cyclone chamber and a dirt collection chamber” for the same reasons as described here.



Id.

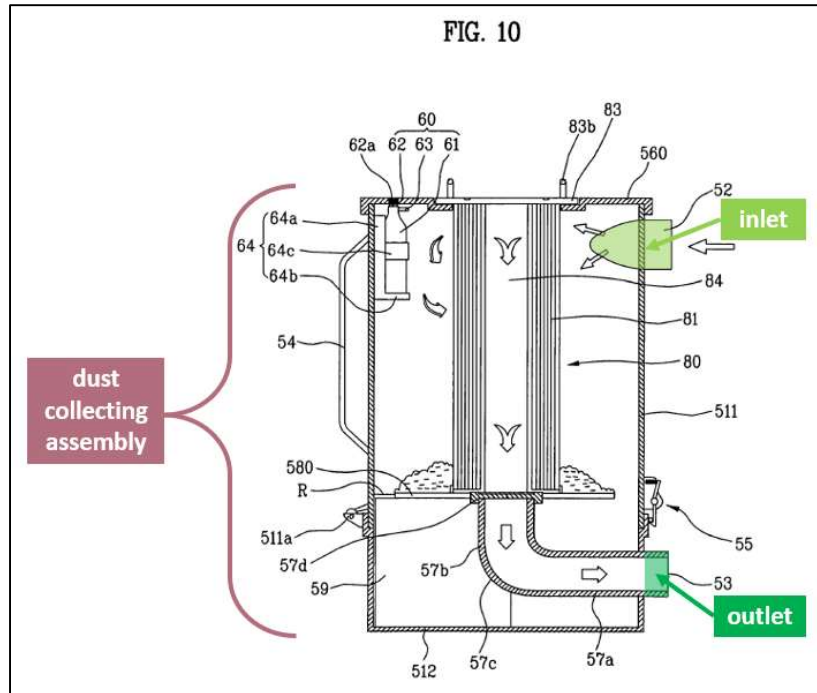
97. Regarding Limitations [1c] and [18d], in my opinion, Jung teaches that the “cyclone separator” and “cyclone chamber” each have an “outer wall.”⁶ As illustrated below, Jung’s **dust collecting assembly** and **upper part** each have an **outer wall**:

⁶ I understand and note that claim 13 claims “*the* outer wall” of the “cyclone chamber” and claim 16d claims “*the* outer wall” of the “cyclone separator,” both without antecedent basis. In my opinion, Jung teaches these limitations for the same reasons described here for Limitations [1c] and [18d].



Ex1005, Figs. 6, 8, 10-11, 6:29-40, 11:30-63.

98. Regarding Limitations [1c], [9c], and [16c], in my opinion, 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. Jung’s **dust collecting assembly** (“cyclone separator”) comprises an **inlet** (which a POSA would have understood as a “fluid inlet”) into which “polluted air containing impurities such as dust” is “suck[ed]” “through the main inlet of the suction nozzle.” *Id.* The air then moves cyclonically and passes through a filtering device 80 and is “exhausted” as clean air out of **outlet** (which a POSA would have understood as a “fluid outlet”):

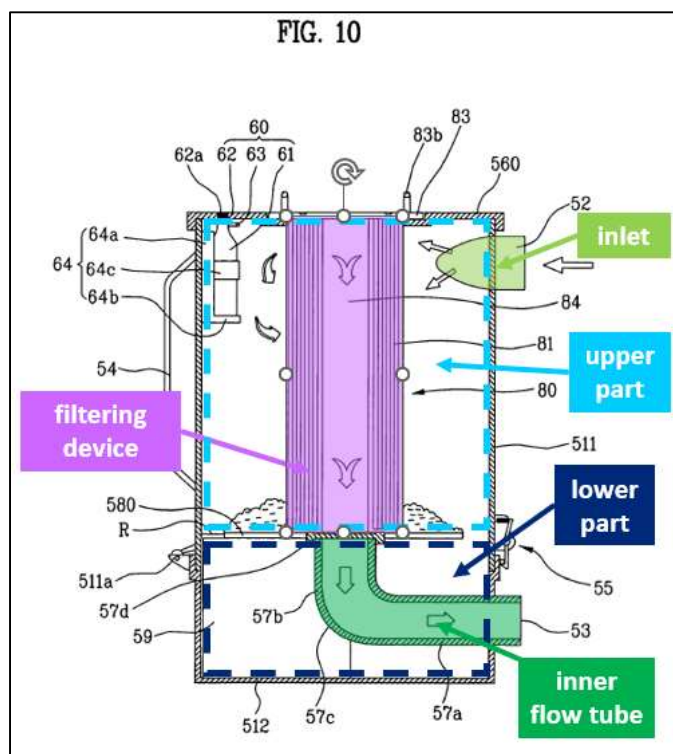


Id.

99. In my opinion, a POSA would have understood Jung's "inlet" to be downstream from the "dirt air inlet": as Jung teaches, 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.
100. Regarding Limitation [18d], in my opinion, 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. A POSA would have understood that 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 I describe above with respect to Limitations [1c], [9c], and [16c].

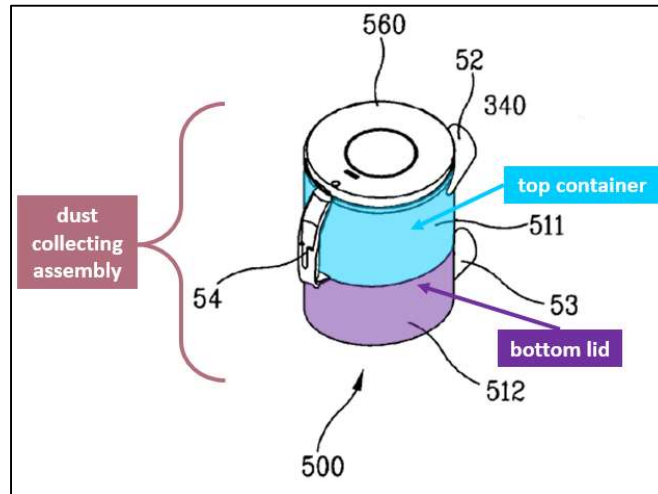
In my opinion, Jung also teaches that its **upper part** (“cyclone chamber”) has a fluid outlet: as illustrated below, Jung teaches that air exits its **upper part** (“cyclone chamber”) at the bottom end of **filtering device** and into an **inner flow tube**:



Id.

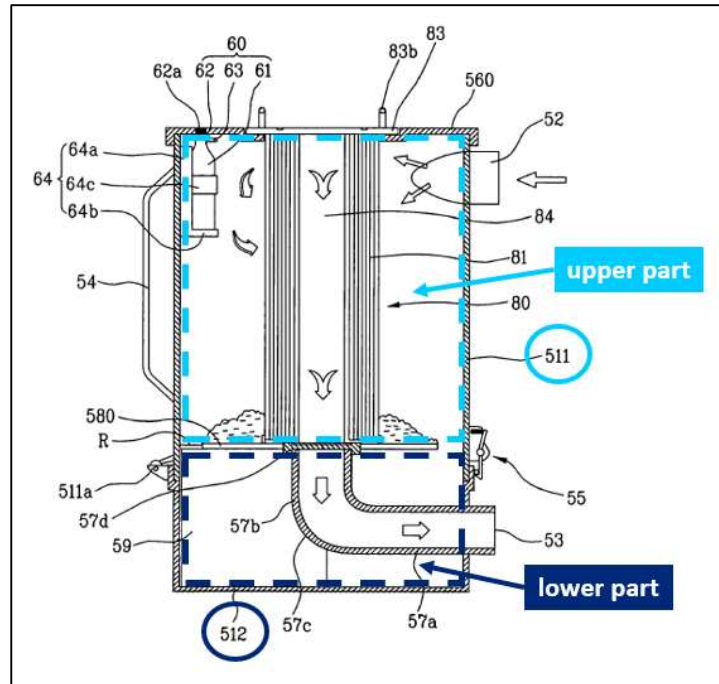
101. In my opinion, a POSA would have understood the bottom end of **filtering device** to be a “fluid outlet” of the “cyclone chamber.”
102. Regarding Limitations [9c], [16c], and [18c], in my opinion, Jung teaches that the “cyclone separator”/“cyclonic unit” has “an openable end.” Ex1005, Figs. 9-12, 12:13-19, 12:26-39. Jung discloses that its **dust**

collecting assembly has a “**bottom lid 512** for opening and closing the bottom of the **top container 511**”:



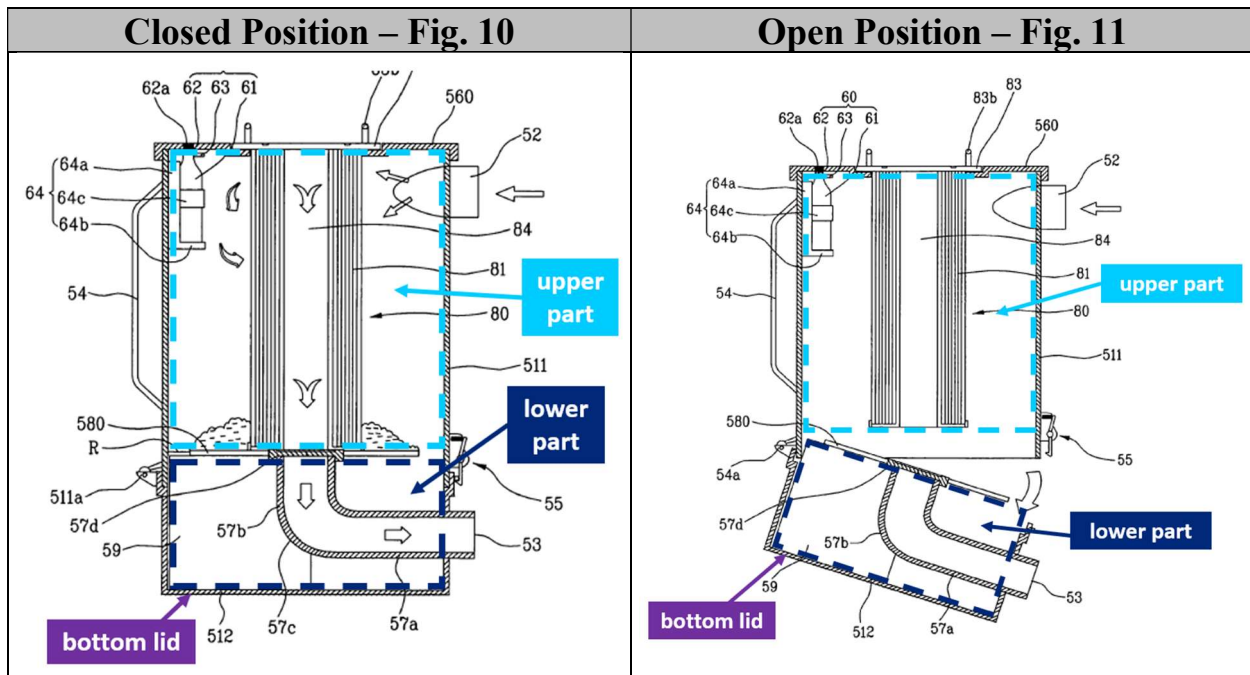
Id., Ex1005, 12:17-19, Fig. 12 (excerpted).

103. In Jung’s Figs. 9-12, a POSA would have understood that the **top container** corresponds to the **upper part** and the **bottom lid** corresponds to the **lower part**. For example, as shown in Figure 10, the **upper part** and the **lower part** are labeled 511 and 512, respectively:



Id.

104. Jung's entire **lower part** rotates "at the same time when the **bottom lid** 512 is rotated," as shown below in Figures 10-11:



Ex1005, Figs. 10-11, 12:13-19, 12:31-36, 13:24-29, 14:20-22.

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.*

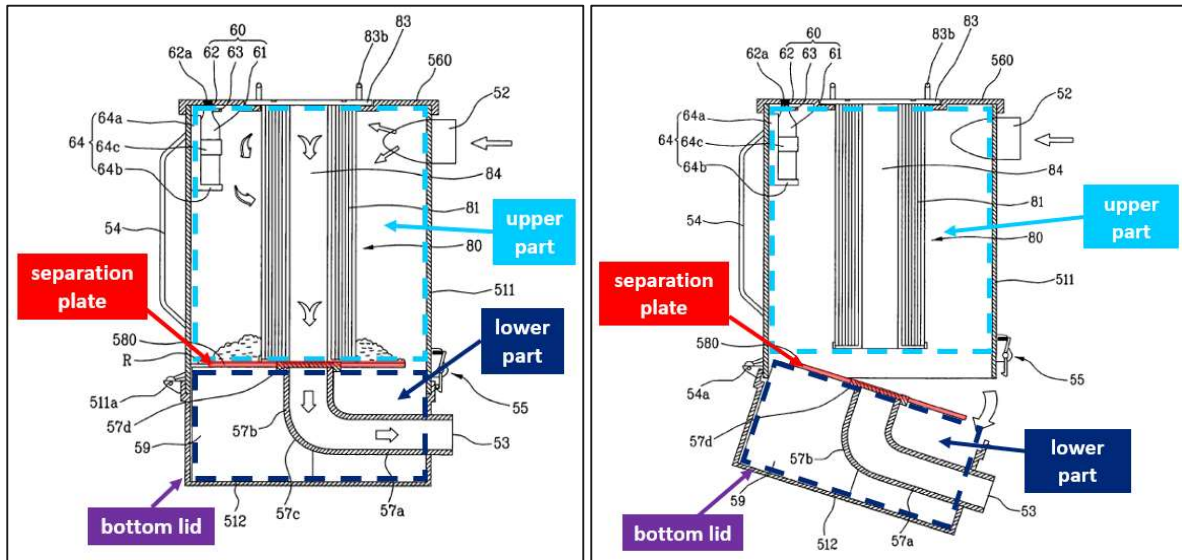
e. [1d]/[9d]/[16d]/[18e]

Reference Number	Claim Limitation
[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,”
[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”
[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,”
[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,”

106. In my opinion, Jung teaches 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 (Limitation [1d]).
107. In my opinion, Jung teaches 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 (Limitation [9d]).
108. In my opinion, Jung teaches 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 (Limitation [16d]).
109. In my opinion, Jung teaches 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 (Limitation [18e]).
110. In my opinion, Jung teaches “a plate having a cyclone chamber surface” and that is “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,

Fig. 10. Jung teaches that a **separation plate** separates the **upper part** and **lower part** of the dust collecting assembly:



Id.

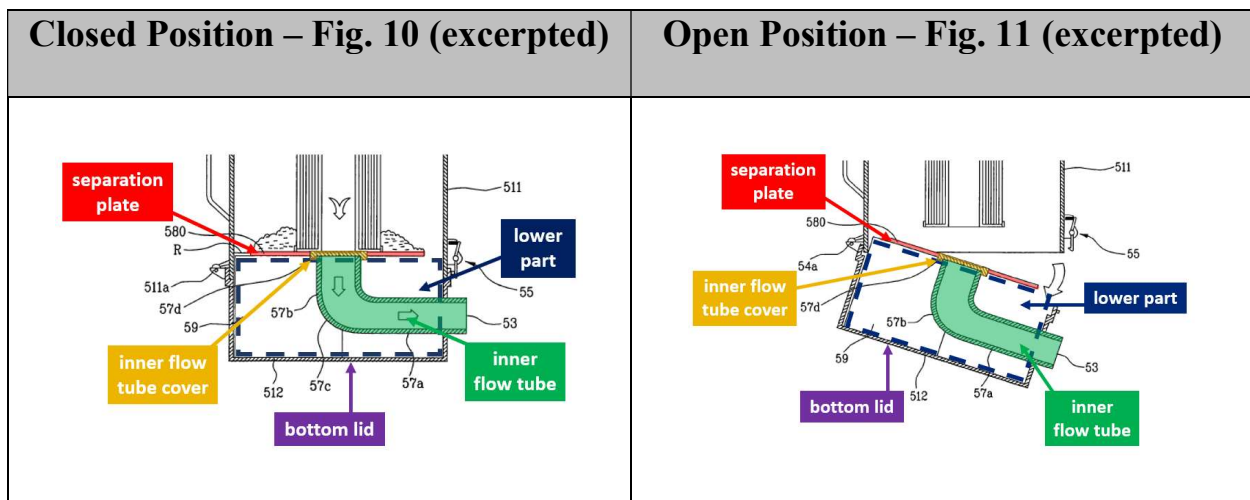
111. Jung’s **separation plate** is positioned between the “cyclone chamber” (*i.e.*, the **upper part**) and the “dirt collection chamber” (*i.e.*, the **lower part**).

Id. The **separation plate** has a surface facing the **upper part** and thus has “a cyclone chamber surface.” *Id.* A POSA would have understood Jung’s **separation plate** as being “a plate having a cyclone chamber surface” and that is “positioned between [a/the] cyclone chamber and [a/the] dirt collection chamber.”

112. Regarding Limitations [9d] and [18e], in my opinion, Jung teaches that the “plate [is] positioned...at an openable end.” In my opinion, 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.

113. 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, in my opinion, 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”:

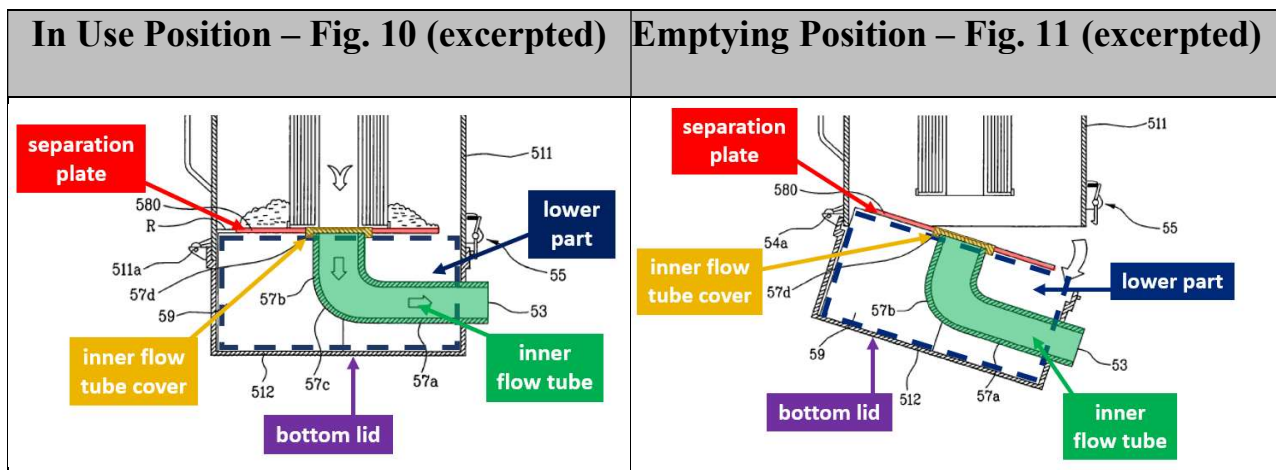


Id.

114. Regarding Limitation [1d], in my opinion, Jung teaches that the “dirt

collection chamber” has “an openable end” for the same reasons as I described in the previous paragraph.

115. Regarding Limitations [1d], [9d], and [18e], in my opinion, 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; *see also* Ground 1, Limitations [1c]/[9c]/[16c]/[18c]/[18d]. A POSA would have understood that 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 (*i.e.*, “in use”) position to an open (*i.e.*, “emptying”) position “at the same time when the **bottom lid 512** is rotated by a rotation” from a closed to an open position.

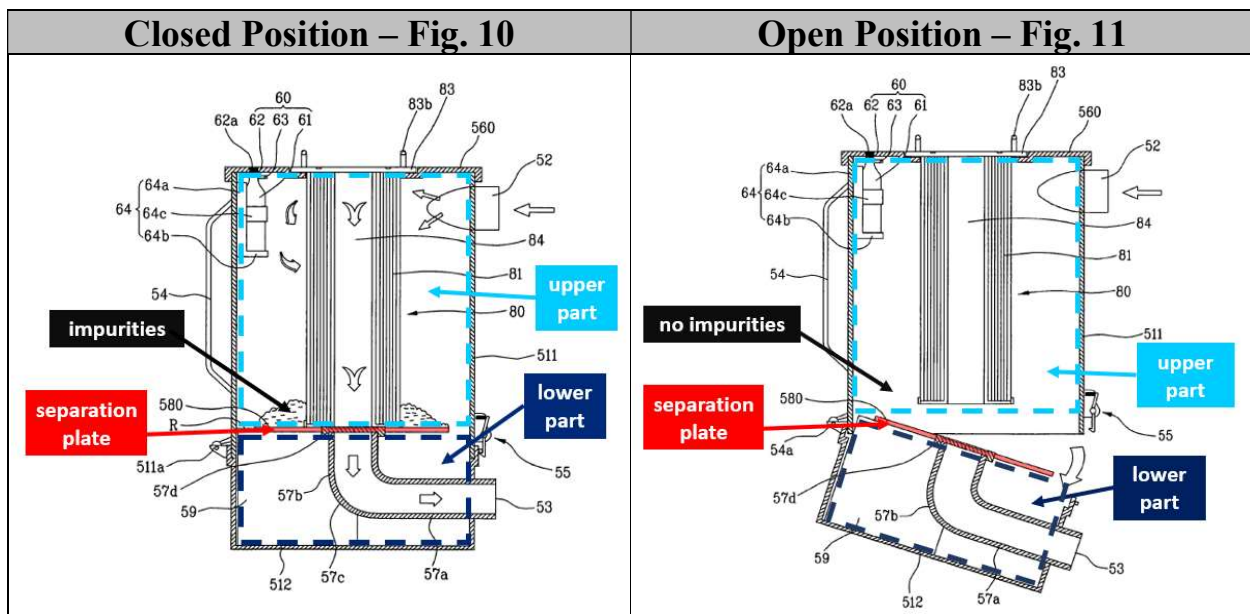


Ex1005, Figs. 10-11, 12:31-35.

116. For Limitation [1d], in my opinion, based on the paragraph above, the

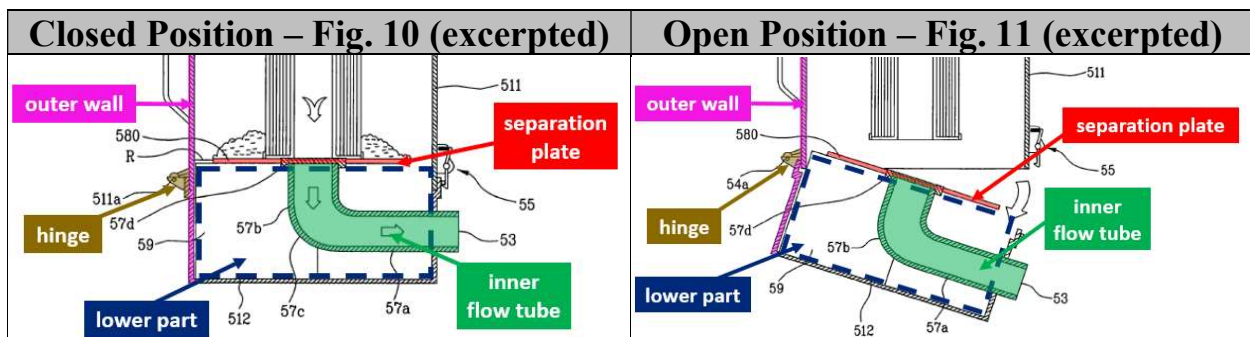
separation plate's movement from a closed (*i.e.*, “in-use”) position to an open (*i.e.*, “emptying”) position when the **bottom lid/lower part** rotates open results in “the plate being moveable between an in-use position and an emptying position when the openable end is opened.” Ex1005, Figs. 10-11,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

117. Regarding Limitations [1d], [9d], and [18e], in my opinion, 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. As illustrated below, when the **separation plate** rotates into the open (*i.e.*, “emptying”) position, the impurities collected in the **upper part** are discharged:



Ex1005, Figs. 10, 11.

118. Jung also explains that “a user [also] discharges the impurities piled up in the **bottom lid 512**” by rotating the **separation plate** into the open (*i.e.*, “emptying”) position. *See* Ex1005, 11:8-15, 12:31-39; 13:1-30; Figs. 10, 11.
119. Regarding Limitation [16d], in my opinion, Jung teaches that “the plate is pivotally mounted to the outer wall of the cyclone separator.” A POSA would have understood that 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 a **hinge** connected to the **outer wall** with the **lower part** “at the same time when the **bottom lid 512** is rotated by a rotation”:

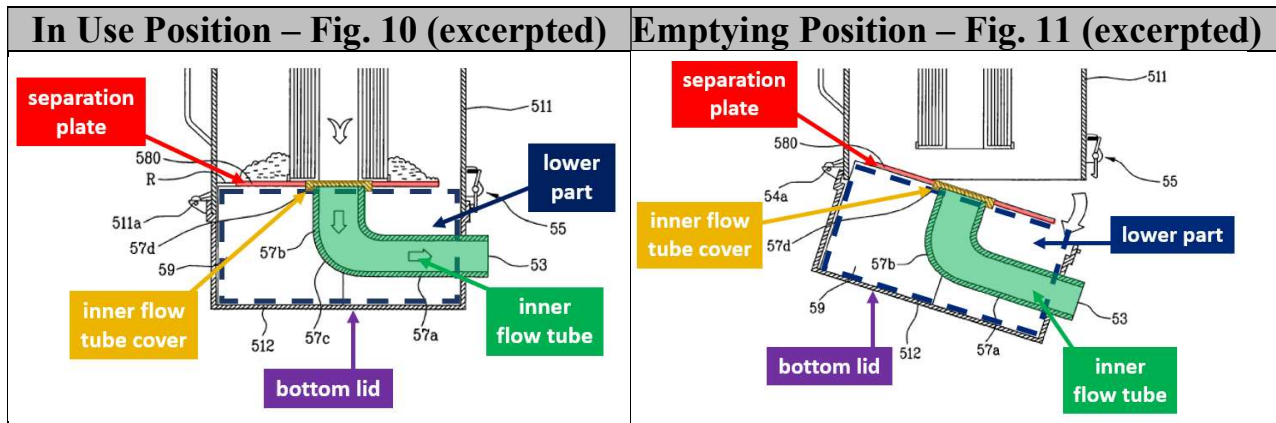


Ex1005, Figs. 10-11, 12:13-19; 13:24-29, 14:20-22; *See also* Ground 1, Limitations [1c]/[9c]/[16d]/[18e].

120. A POSA would have understood, in my opinion, Jung’s “plate” to be “pivotally mounted” via the **hinge** “to the **outer wall** of the cyclone

separator.” *Id.*

121. Regarding [18e], in my opinion, Jung teaches “the plate being supported by the openable end” of the “cyclonic unit.” Ex1005, Figs. 10-11, 9:39-42, 10:18-24, 11:57-63, 12:31-39; *See also* Ground 1, Limitations [1c]/[9c]/[16d]/[18e]. A POSA would have understood that **separation plate** is held in place by its attachment to the **lower part** via the **inner flow tube** at the **inner flow tube cover**.



Id.

122. Because the **inner flow tube cover** is part of the “openable end” and it supports the **separation plate**, in my opinion, a POSA would have understood Jung to disclose that the **separation plate** “is supported by the openable end.” *Id.*

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

Reference Number	Claim Limitation
[1e]	“e. a fluid flow motor.”
[9e]	“(e) a fluid flow motor.”
[16e]	“(e) a fluid flow motor.”
[18f]	“(f) a fluid flow motor.”

123. In my opinion, Jung teaches a fluid motor.

124. Jung’s vacuum cleaners include “a motor . . . for generating air suction force.” Figs. 2, 12, 1:24-30, 4:50-54, 5:18-22, 11:57-63, 12:51-67, 13:39-45. A POSA would have understood, in my opinion, Jung’s “motor” to be a “fluid flow motor.”

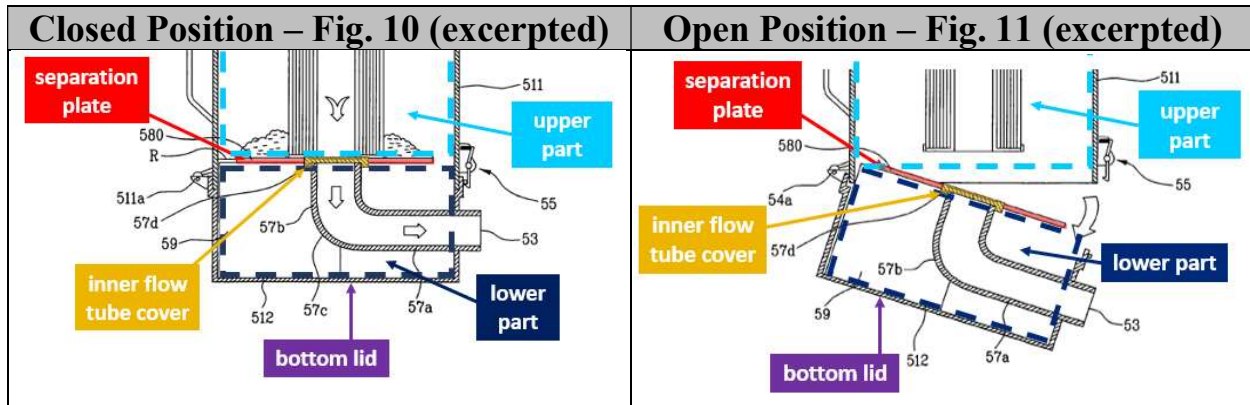
2. [3]

Reference Number	Claim Limitation
[3]	“The surface cleaning apparatus of claim 1 wherein the openable end of the dirt collection chamber is a bottom.”

125. In my opinion, Jung anticipates claim 1 and teaches wherein the openable end of the dirt collection chamber is a bottom.

126. Jung teaches claim 1. Ground 1, Limitations [1]/[9]/[16]/[18].

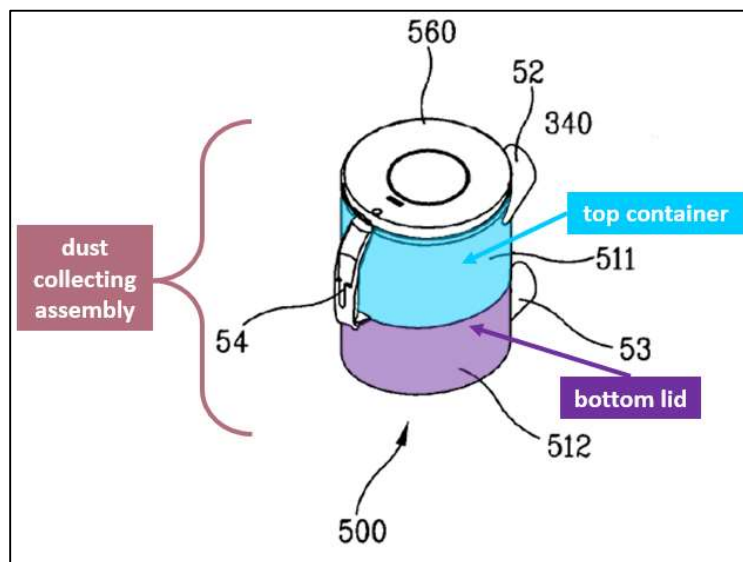
127. A POSA would have understood Jung’s “openable end” (*i.e.*, the **lower part/bottom lid** where the **separation plate** and **inner flow tube cover** are located) to be “a bottom” of the **upper part** (“cyclone separator”):



Ex1005, Figs. 10-11, 12:13-39; 13:24-29, 14:20-22.

128. Further, in my opinion, the lower portion of Jung’s **bottom lid** is an openable end of the dirt collection chamber. *Id.*

129. In my opinion, 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).

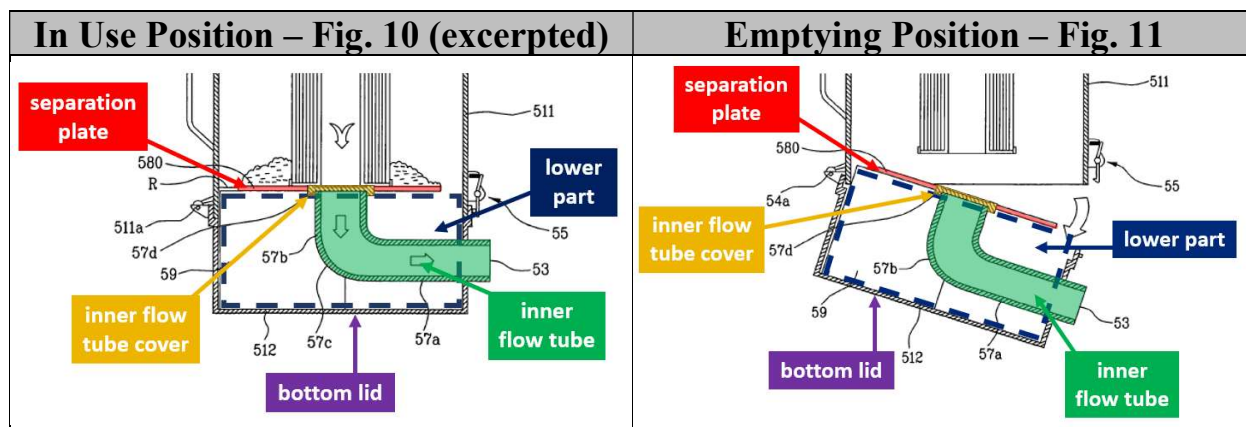
3. [4]

Reference Number	Claim Limitation
[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.”

130. In my opinion, Jung anticipates claim 1 and teaches wherein the plate is automatically moved to the emptying position when the openable end is opened.

131. Jung teaches claim 1. Ground 1, Limitations [1]/[9]/[16]/[18].

132. In opinion, a POSA would have understood that Jung’s **separation plate** is automatically moved from a closed position to an open (*i.e.*, “emptying”) position when the **bottom lid/lower part** is rotated open:



Ex1005, Figs. 10-11, 12:13-39; 13:24-29, 14:20-22; *See also* Ground 1, Limitations [1d]/[9d]/[16d]/[18e].

4. [5]

Reference Number	Claim Limitation
[5]	“The surface cleaning apparatus as claimed in claim 1 wherein the plate is supported by the openable end.”

133. In my opinion, Jung anticipates claim 1 and teaches wherein the plate is supported by the openable end.

134. Jung teaches claim 1. Ground 1, Limitations [1]/[9]/[16]/[18].

135. In my opinion, Jung also teaches that “the plate is supported by the openable end” for the reasons I previously discussed in Limitation [18e].
See Ground 1, Limitations [1d]/[9d]/[16d]/[18e].

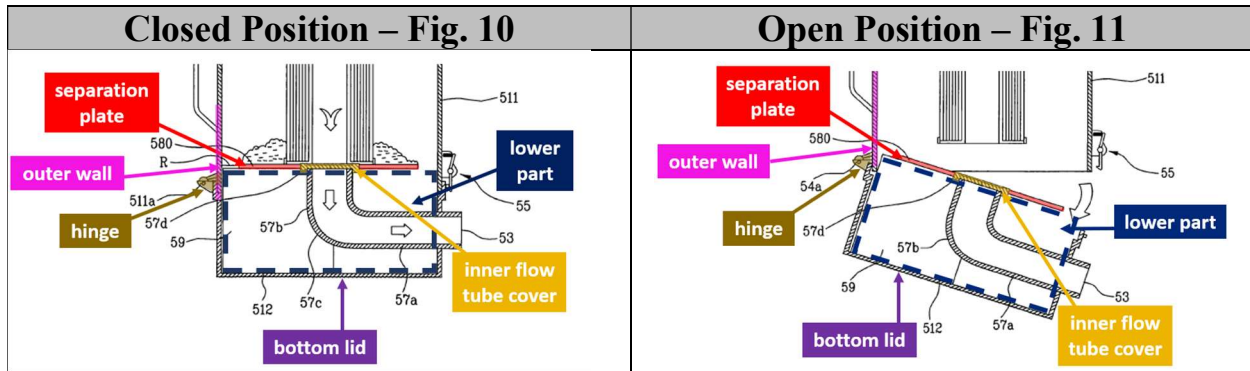
5. [7]

Reference Number	Claim Limitation
[7]	“The surface cleaning apparatus as claimed in claim 1 wherein the openable end is pivotally mounted to the cyclone separator.”

136. In my opinion, Jung anticipates claim 1 and teaches wherein the openable end is pivotally mounted to the cyclone separator.

137. Jung teaches claim 1. Ground 1, Limitations [1]/[9]/[16]/[18].

138. In my opinion, Jung teaches “wherein the openable end is pivotally mounted to the cyclone separator.” Ex1005, Figs. 10-11, 12:13-40; 14:20-22. Jung’s “openable end” is pivotably mounted to the **dust collector assembly** using a **hinge**:



Id.

6. [10]/[11]

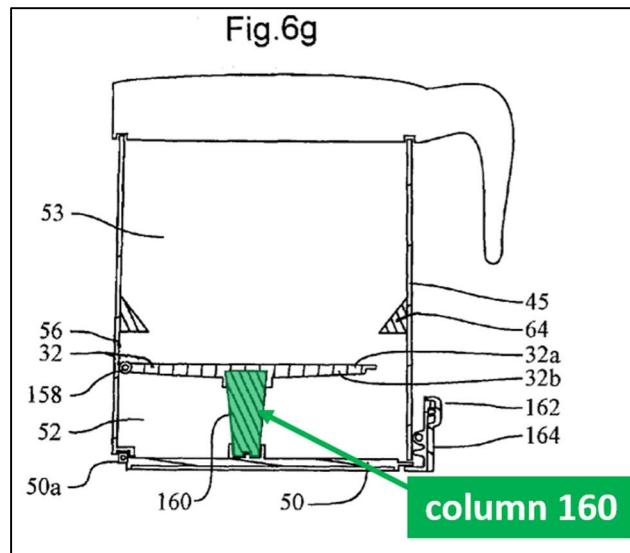
Reference Number	Claim Limitation
[10]	“The surface cleaning apparatus of claim 9 wherein the plate has a hand grip portion.”
[11]	“The surface cleaning apparatus of claim 10 wherein the hand grip portion comprises a shaft extending away from the plate.”

139. In my opinion, Jung anticipates claim 9 and teaches wherein the plate has a hand grip portion.

140. In my opinion, Jung anticipates claim 10 and teaches wherein the hand grip portion comprises a shaft extending away from the plate.

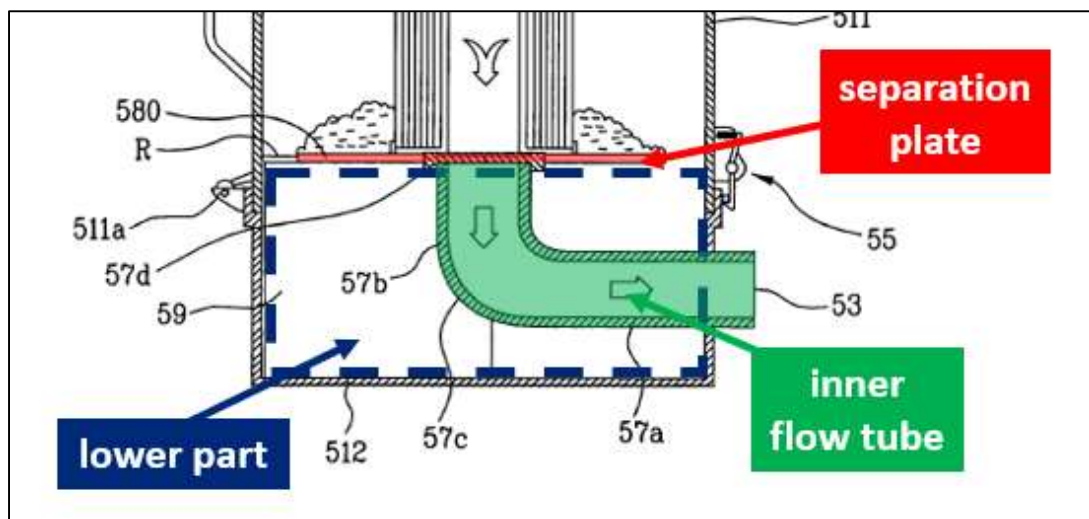
141. Jung teaches claim 9. Ground 1, Limitations [1]/[9]/[16]/[18].

142. The '120 Patent'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.

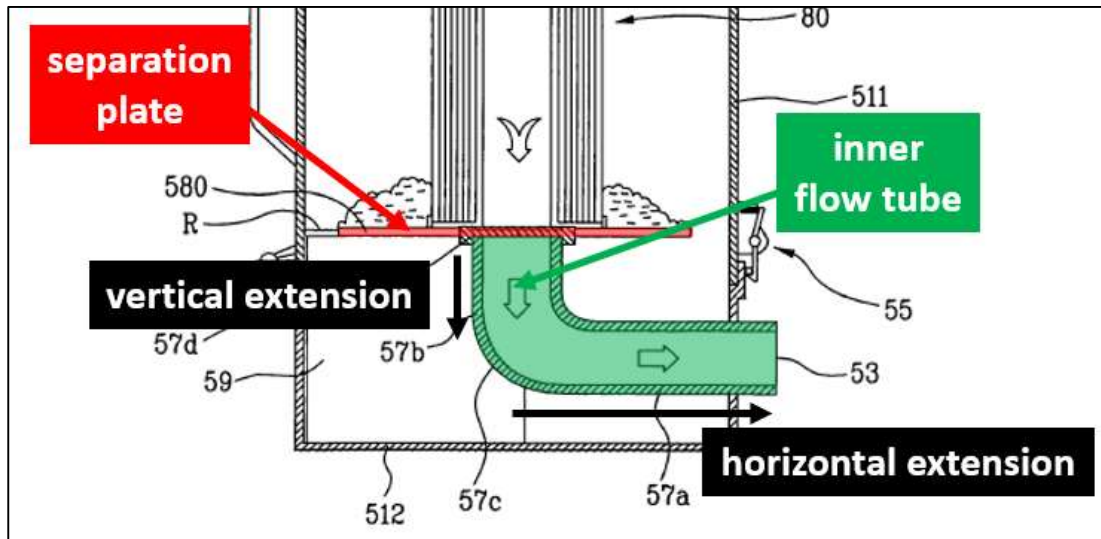
143. Jung teaches that the plate has a hand grip portion, including a hand grip portion comprising a shaft extending away from the plate: “the **inner flow tube 57** is incorporated integrally into the **separation plate**”:



Ex1001, Fig. 10, 12:31-39.

144. In my opinion, 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.

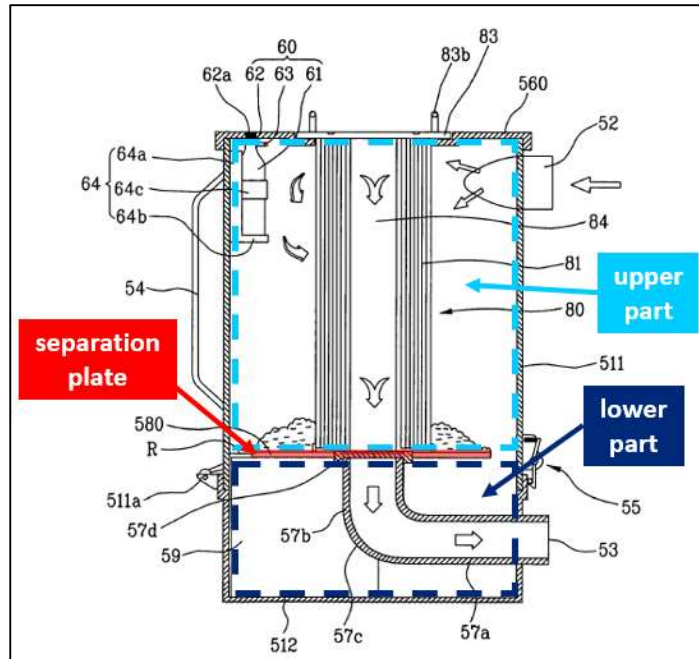
7. [12]

Reference Number	Claim Limitation
[12]	“The surface cleaning apparatus of claim 9 wherein the dirt collection chamber extends under the plate.”

145. In my opinion, Jung anticipates claim 9 and teaches wherein the dirt collection chamber extends under the plate.

146. Jung teaches claim 9. Ground 1, Limitations [1]/[9]/[16]/[18].

147. As depicted below in Figure 10, in my opinion, Jung also teaches that the “dirt collection chamber” (*i.e.*, **lower part**) “extends under the plate” (*i.e.*, **separation plate**):



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

8. [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.”

148. In my opinion, Jung anticipates claim 9 and teaches wherein the surface cleaning apparatus is selected from the group consisting of a vacuum cleaner, a sweeper and a carpet extractor.

149. Jung teaches claim 9. Ground 1, Limitations [1]/[9]/[16]/[18].

150. In my opinion, Jung teaches “a vacuum cleaner” for the same reasons as Limitations [1pre]/[9pre]/[16pre]/[18pre]. Ground 1, Limitations

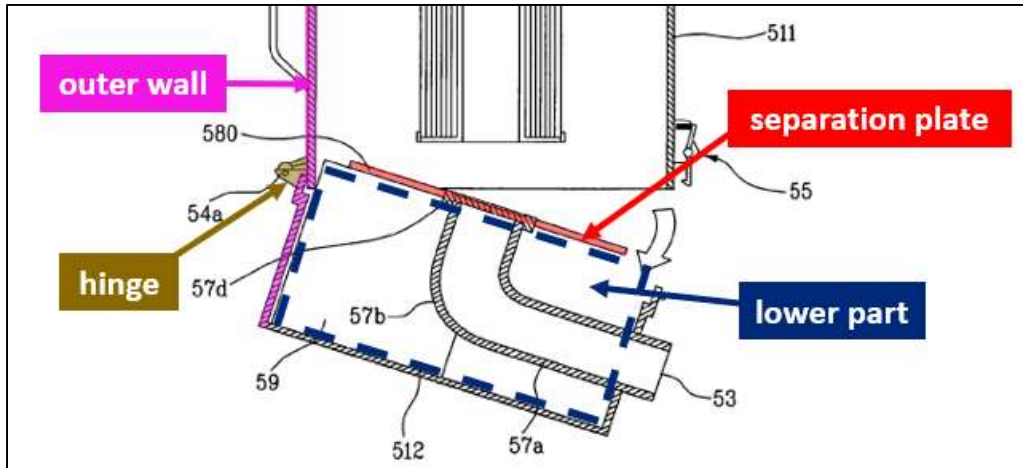
[1pre]/[9pre]/[16pre]/[18pre].

9. [15]/[19]

Reference Number	Claim Limitation
[15]	“The surface cleaning apparatus of claim 9 wherein the plate is moveable subsequent to the openable end being opened.”
[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.”

151. In my opinion, Jung anticipates claim 9 and teaches wherein the plate is moveable subsequent to the openable end being opened.
152. In my opinion, Jung anticipates claim 18 and teaches wherein the plate is moveable to a emptying position when the openable end is opened.
153. Jung teaches claims 9 and 18. Ground 1, Limitations [1]/[9]/[16]/[18].
154. Regarding claim 19, in my opinion, Jung’s **separation plate** “is moveable to a[n] emptying position when the openable end is opened” for the reasons I previously discussed for Limitation [1d], which applies equally to “the openable end” of the “cyclone separator,” “cyclone chamber,” and “cyclonic unit.” *See* Ground 1, Limitations [1d]/[9d]/[16d]/[18e].
155. Regarding claim 15, in my opinion, Jung also teaches that, “subsequent to the openable end being opened,” the **separation plate** “is moveable” because a POSA would have understood that the **lower part** (and thus the **separation plate**) can be rotated further up or down about the **hinge**

connected to the **outer wall**:



Ex1005, 12:26-39; Fig. 11.

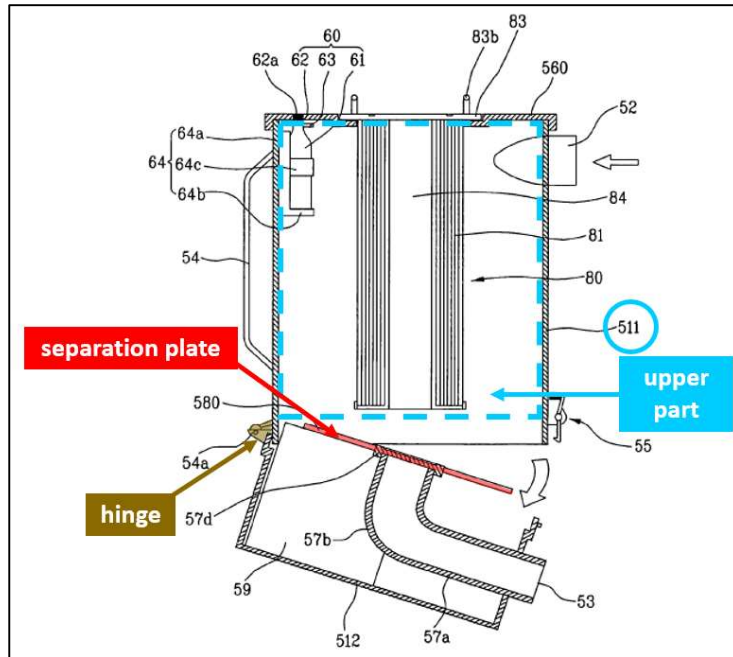
10. [17]

Reference Number	Claim Limitation
[17]	“The surface cleaning apparatus as claimed in claim 16 wherein the plate is pivotally mounted to the cyclone chamber.”

156. In my opinion, Jung anticipates claim 16 and teaches wherein the plate is pivotally mounted to the cyclone chamber.

157. Jung teaches claim 16. Ground 1, Limitations [1]/[9]/[16]/[18].

158. As I described above in Limitation [16d], the “plate” (**separation plate**) is “pivotally mounted” about a **hinge**:



Ex1005, Figs. 10-11, 12:13-39; 13:1-7, 13:24-29, 14:20-22; Ground 1, Limitations [1d]/[9d]/[16d]/[18e].

159. 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]

Reference Number	Claim Limitation
[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."
[17]	"The surface cleaning apparatus as claimed in claim 16 wherein the plate is pivotally mounted to the cyclone chamber."

160. Jung teaches that its vacuum cleaner "detachably receive[s] the dust collecting assembly." Ex1005, Abstract. Jung teaches its vacuum cleaner uses another dust collecting assembly, which Jung calls its "first embodiment" and illustrates in Figures 5-8.

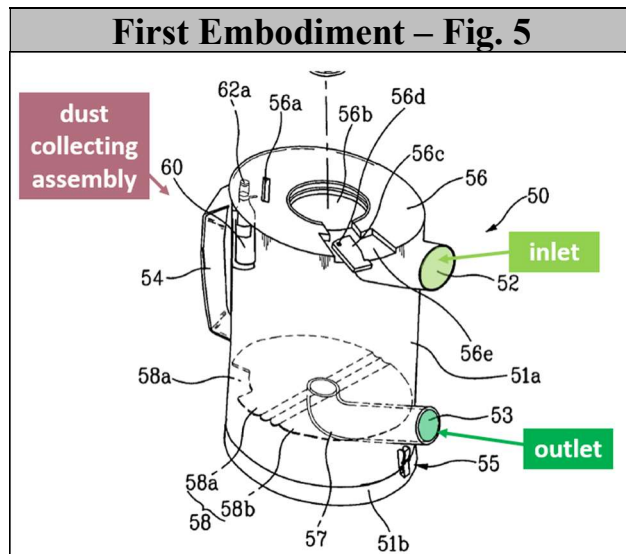
161. In my opinion, Jung's "first embodiment" teaches claims 16 and 17.

162. In my opinion, Jung's vacuum cleaner teaches Limitations [16pre]/[16a]/[16b]/[16e] for the reasons I described above. *See* Ground 1, Limitations [1]/[9]/[16]/[18].

163. In my opinion, Jung's "first embodiment" of a dust collecting assembly teaches Limitations [16c] and [16d].

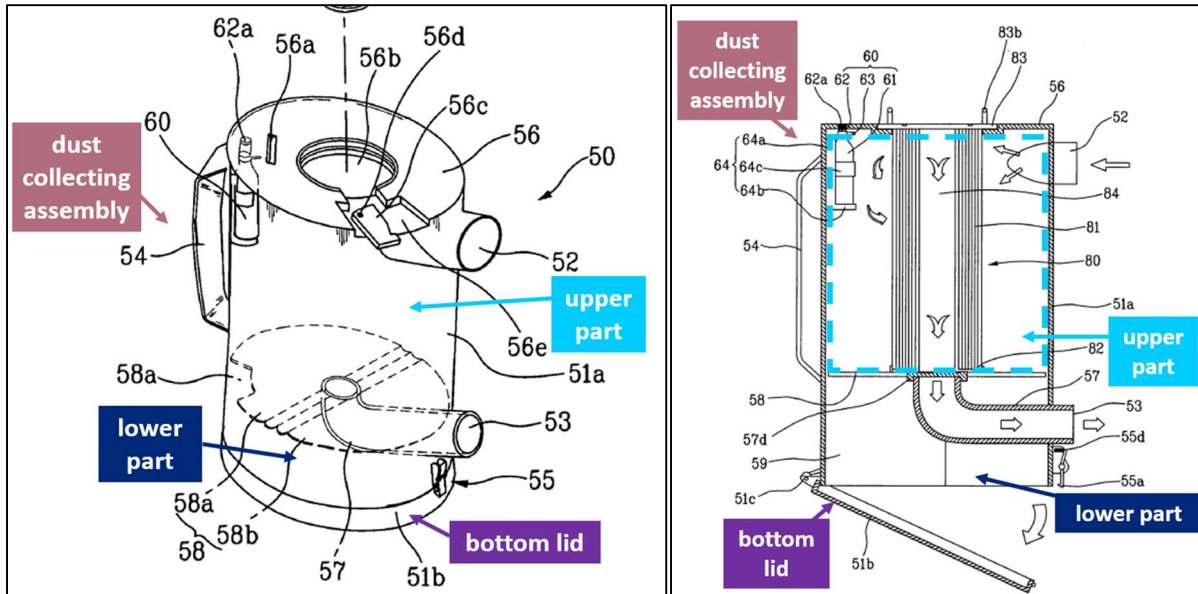
164. For Limitation [16c], Jung's "first embodiment" teaches "a cyclone

separator comprising ... a fluid inlet downstream from the dirt air inlet” and “a fluid outlet” because Jung’s “first embodiment” teaches a cyclonic **dust collecting assembly 50** with same **inlet 52** and **outlet 53** as I previously discussed above:



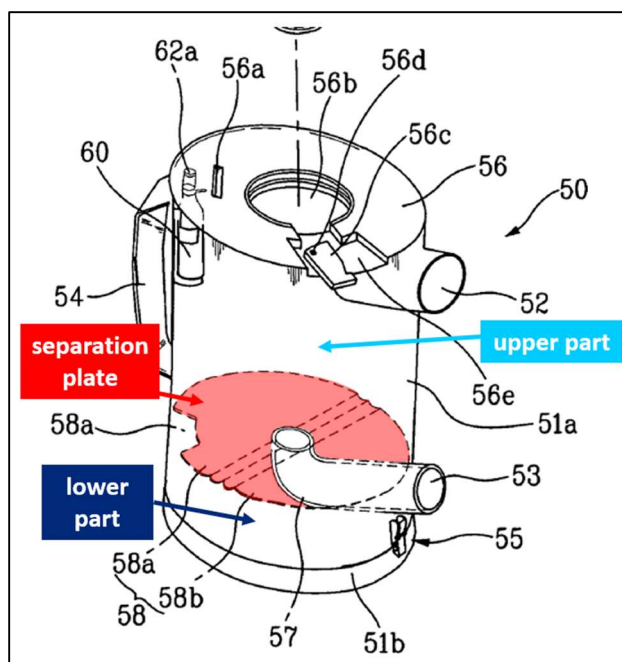
Ex1005, 6:5-11, Figs, 5, 10. See Ground 1, Limitations [1]/[9]/[16]/[18].

165. In my opinion, Jung’s “first embodiment” likewise teaches “a cyclone separator comprising a cyclone chamber and a dirt collection chamber ... [and] an openable end.” In Jung’s “first embodiment,” Jung teaches that **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”:



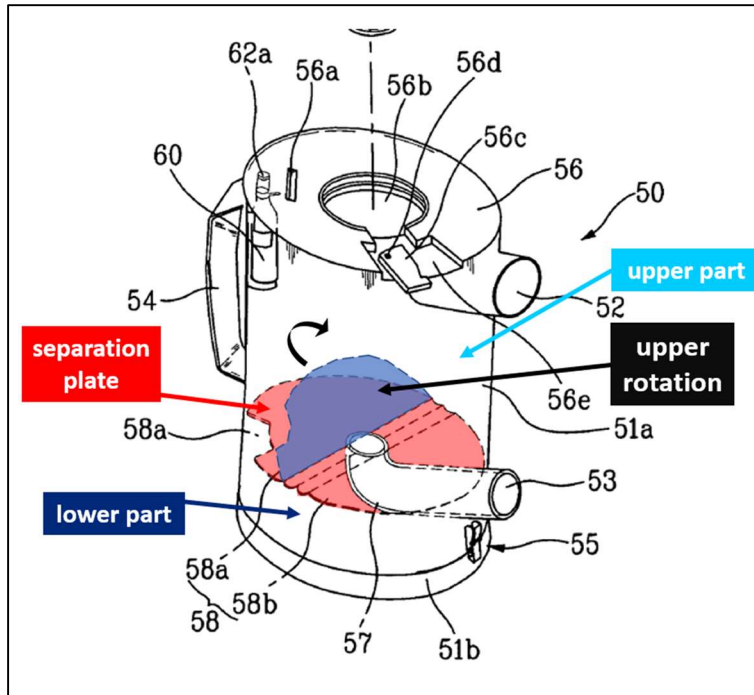
Ex1005, Figs. 5, 8, 10:6-15, 11:8-30, 12:13-19; *See also* Ground 1, Limitations [1]/[9]/[16]/[18].

166. Regarding Limitation [16d], in my opinion, Jung’s “first embodiment” teaches “a plate positioned between the cyclone chamber and the dirt collection chamber”: Jung teaches that **separation plate 58** is positioned between the **upper part** and the **lower part**:



Id.

167. In Jung’s “first embodiment,” in my opinion, the **separation plate** is pivotally mounted to the outer wall of the cyclone separator. Jung teaches that the 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.

168. Regarding Limitation [17], in my opinion, the **separation plate** is also pivotally mounted to the cyclone chamber (“**upper part**”). Jung teaches that the **separation plate** in Jung’s “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. In my opinion, a POSA would have also understood that because Jung’s separation plate pivots upward, the hinge or other structure that enables pivotable mounting would be located in the cyclone chamber. Ex1005, 3:49-51.

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

169. In my opinion, Min anticipates claims 1, 3-5, 7, 9-12, and 14-19.

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

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

Reference Number	Claim Limitation
[1pre]	“A surface cleaning apparatus comprising:”
[9pre]	“A surface cleaning apparatus comprising:”
[16pre]	“A surface cleaning apparatus comprising:”
[18pre]	“A surface cleaning apparatus comprising:”

170. To the extent the preambles are limiting, in my opinion, Min teaches a surface cleaning apparatus.

171. Min teaches vacuum cleaners for cleaning surfaces. Ex1011, Abstract, ¶¶ 3,12, Figs. 1-2, 12. A POSA would have understood that this is a surface cleaning apparatus.

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

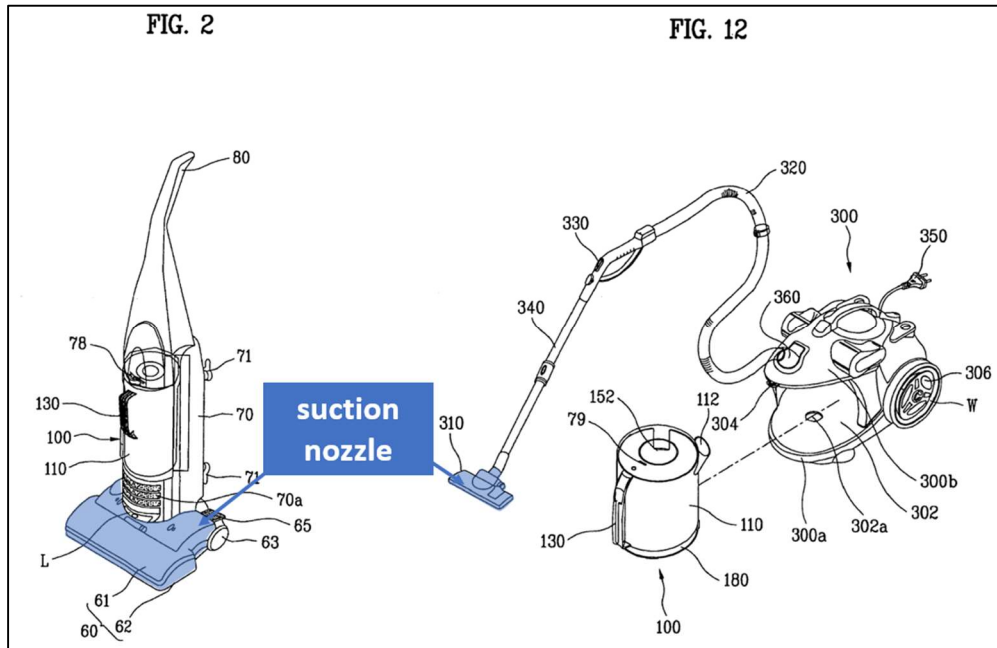
Reference Number	Claim Limitation
[1a]	“a. a dirt inlet;”
[9a]	“(a) a dirt inlet;”
[16a]	“(a) a dirt inlet;”
[18a]	“(a) a dirt inlet;”

172. In my opinion, Min teaches a dirt inlet and a dirt air inlet.⁷

173. Min teaches that its vacuum cleaners include “a **suction nozzle 60**” for “drawing in air containing impurities” and “**suction nozzle 310**” for the

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

same, which a POSA would have understood as a dirt inlet and a dirt air inlet:



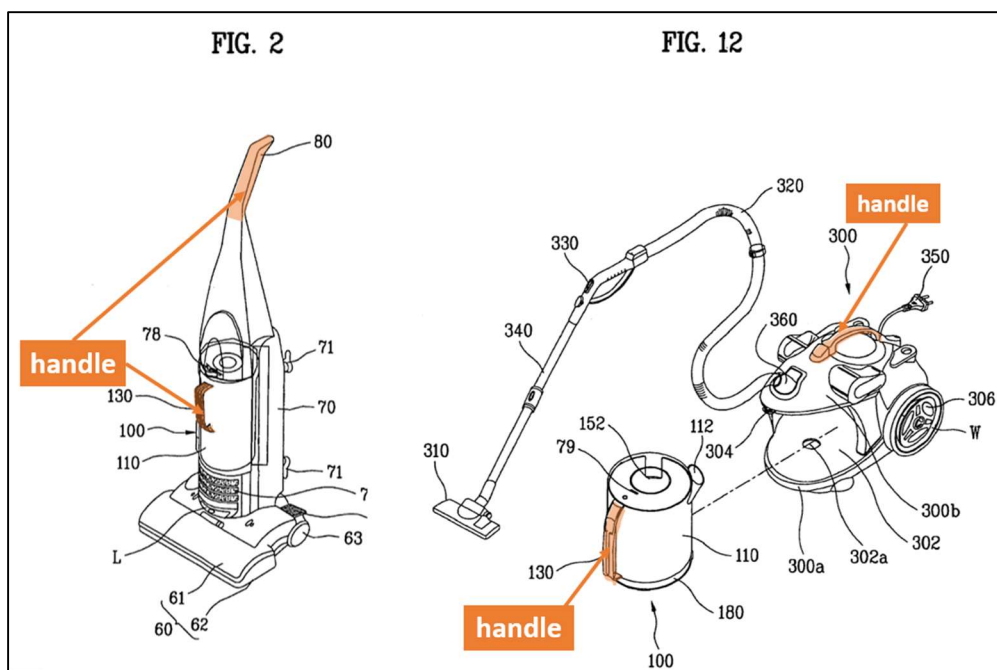
Ex1011, Figs. 2, 12, ¶¶ 45-47, 117-125.

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

Reference Number	Claim Limitation
[1b]	"b. a handle;"
[9b]	"(b) a handle;"
[16b]	"(b) a handle;"
[18b]	"(b) a handle;"

174. In my opinion, Min teaches a handle.

175. Min teaches that its vacuum cleaners include a **handle** on the main body (e.g., "**handle 80**") and on the dust collector assembly (e.g., "**handle 130**"):



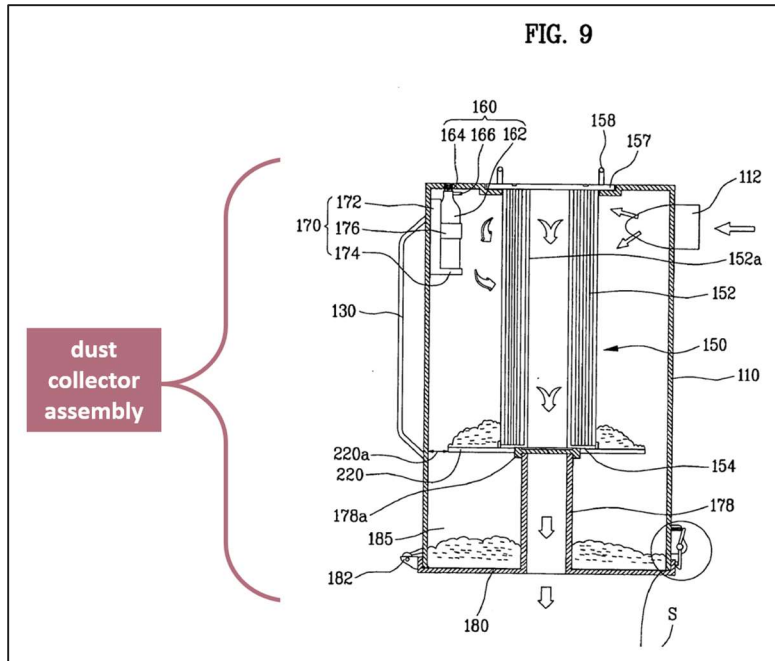
Ex1011, Figs. 2, 12, ¶¶ 45, 54, 61-62.

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

Reference Number	Claim Limitation
[1c]	“c. a cyclone separator having an outer wall, a fluid inlet downstream from the dirt air inlet and a fluid outlet;”
[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;”
[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;”
[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;”

176. In my opinion, Min teaches cyclone separator having an outer wall, a fluid

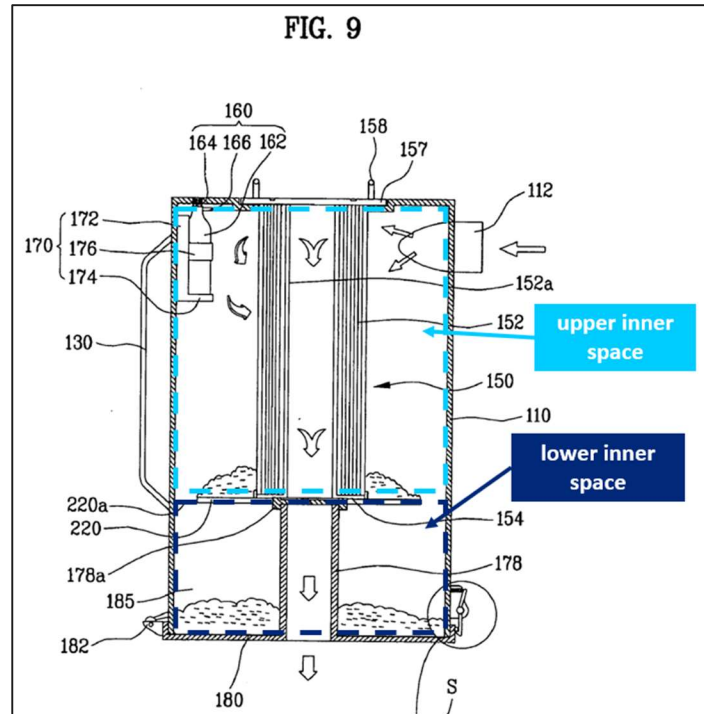
- inlet downstream from the dirt air inlet and a fluid outlet (Limitation [1c]).
177. In my opinion, Min teaches a cyclone separator comprising a cyclone chamber and a dirt collection chamber, the cyclone separator having a fluid inlet downstream from the dirt air inlet, an openable end and a fluid outlet. (Limitation [9c]).
178. In my opinion, Min teaches 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 (Limitation [16c])
179. In my opinion, Min teaches a cyclonic unit comprising a cyclone chamber and a dirt collection chamber and having an openable end, the cyclone chamber having an outer wall, a fluid inlet downstream from the dirt air inlet and a fluid outlet (Limitations [18c] and [18d]).
180. In my opinion, a POSA would have understood Min's **dust collector assembly** to be a "cyclone separator" and a "cyclonic unit." Min's "**dust collector assembly**" "filters impurities by using a cyclone." Ex1011, ¶ 59. The cyclonic airflow is demonstrated, for example, in Figure 9 with the curved arrows:



Ex1011, Fig. 9.

181. Regarding Limitations [9c], [16c], and [18c],⁸ in my opinion, Min teaches that its **dust collector assembly** comprises “a cyclone chamber and a dirt collection chamber.” Ex1011, Fig. 9, ¶¶ 59, 69 70-73, 105. 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 a **lower inner space**, where the “impurities with large masses” are accumulated:

⁸ For Limitation [1d], in my opinion, Jung teaches “a cyclone chamber and a dirt collection chamber” for the same reasons as described here.



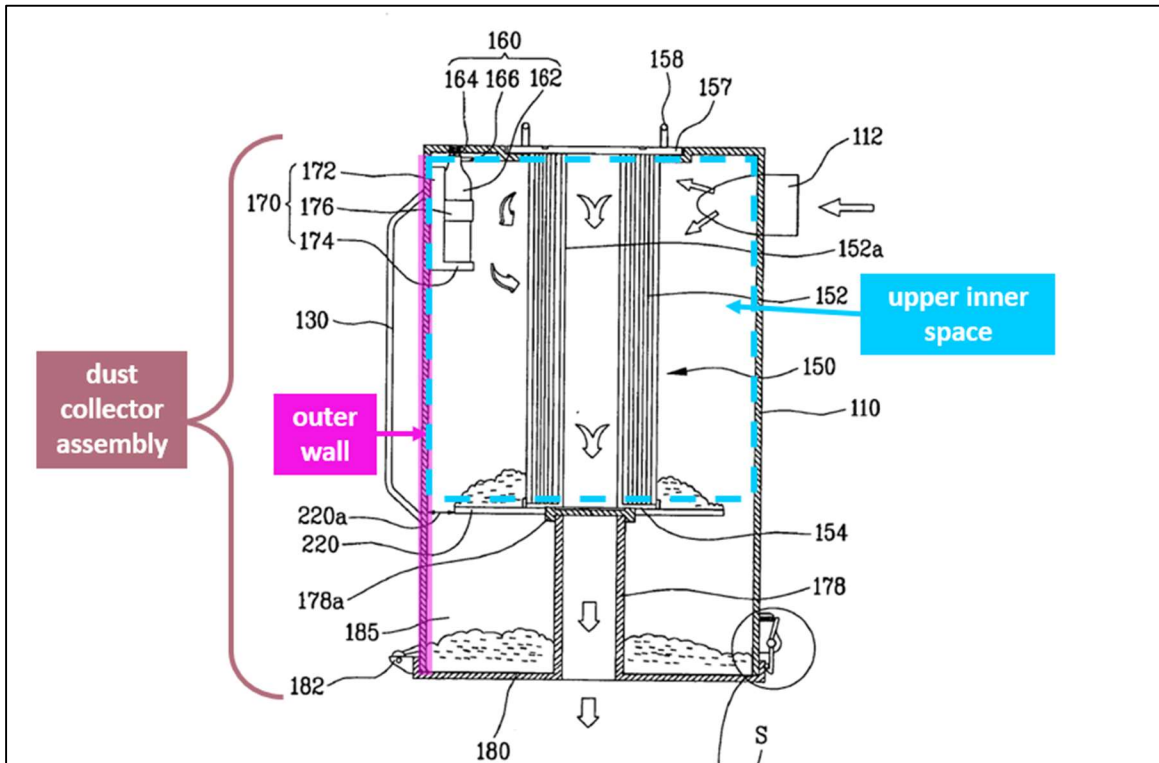
Id.

182. In my opinion, a POSA would have understood Min’s **upper inner space** to be “a cyclone chamber” and Min’s **lower inner space** to be “a dirt collection chamber.”

183. Regarding Limitations [1c] and [18d], in my opinion, Min teaches that the “cyclone separator” and “cyclone chamber” each have an “outer wall.”⁹ As

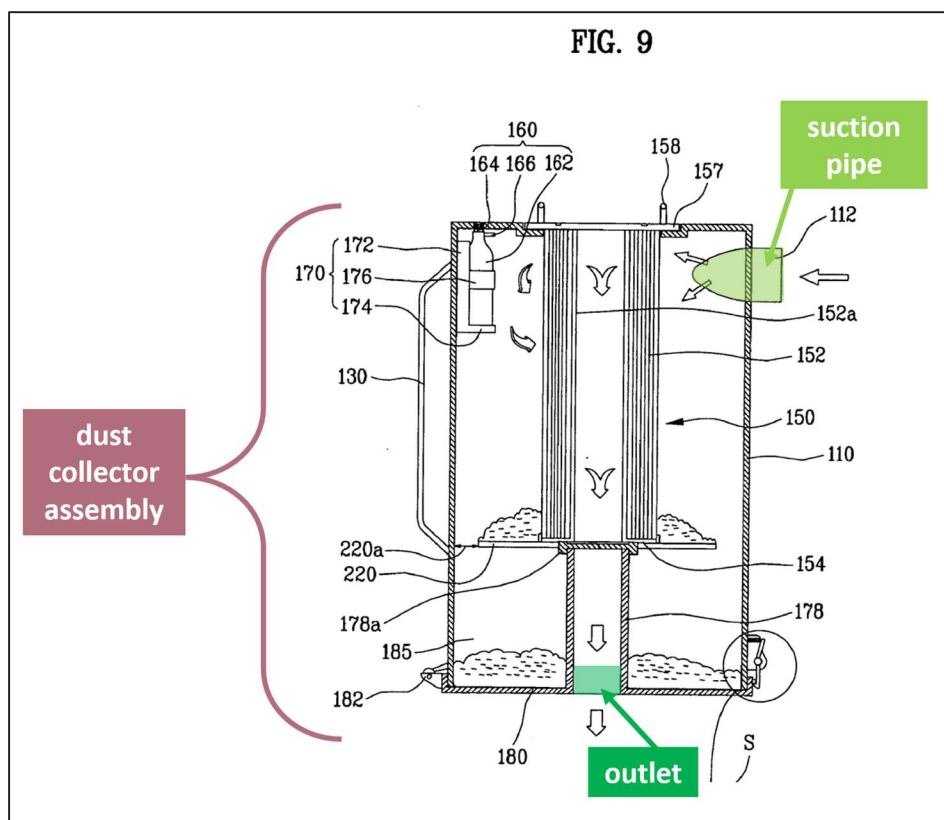
⁹ I understand and note that claim 13 claims “*the* outer wall” of the “cyclone chamber” and Limitation [16d] claims “*the* outer wall” of the “cyclone separator,” both without antecedent basis. In my opinion, Min teaches these limitations for the same reasons described here for Limitations [1c] and [18d].

illustrated below, Min's **dust collector assembly** and **upper inner space** each have an **outer wall**:



Ex1011, Figs. 6, 9-10.

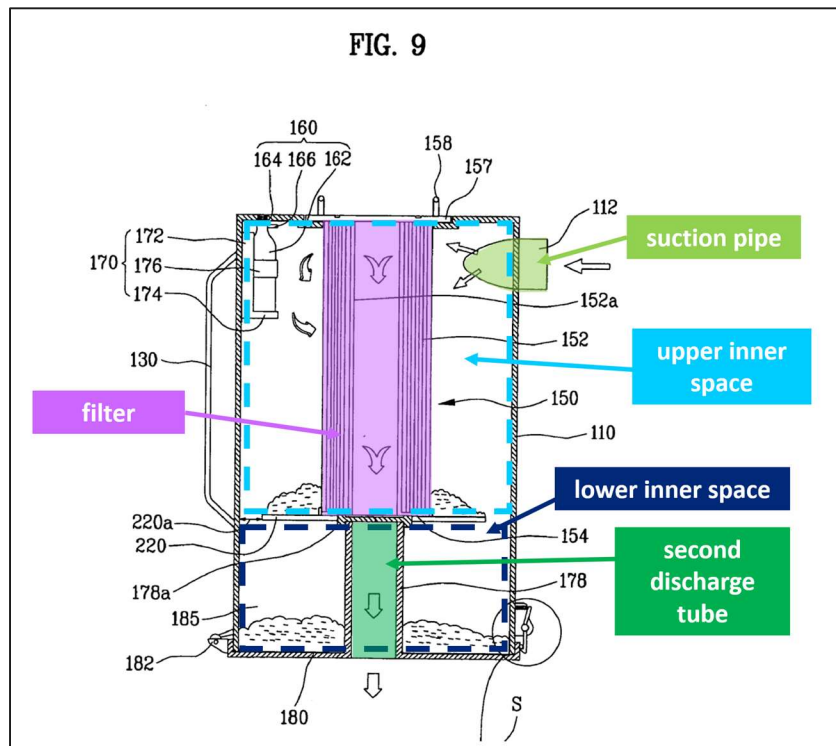
184. Regarding Limitations [1c], [9c], and [16c], in my opinion, Min teaches a “cyclone separator” with “a fluid inlet downstream from the dirt air inlet,” and “a fluid outlet.” Ex1011, Figs. 6, 9-10, ¶¶ 59, 68-69; 86-89, 100-106. Min’s **dust collector assembly** comprises a **suction pipe** (which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



Id.

185. In my opinion, a POSA would have understood Min’s “inlet” to be downstream from the “dirt air inlet”: as Min teaches, 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.
186. Regarding Limitation [18d], in my opinion, 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. A POSA would have understood that Min’s “**suction pipe**” is also an inlet of the “cyclone chamber” (*i.e.*, Min’s **upper inner space**) and is downstream

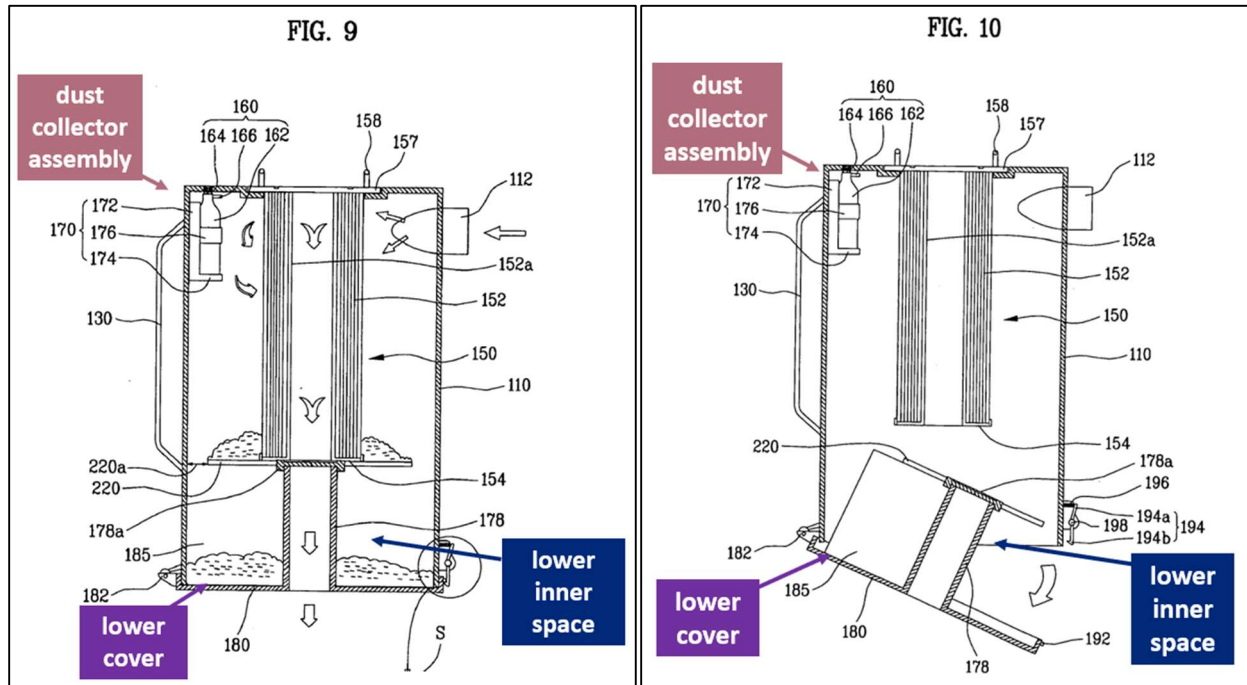
from “the dirt air inlet” for the same reasons I describe above with respect to Limitations [1c], [9c], and [16c]. In my opinion, Min also teaches that its **upper inner space** (“cyclone chamber”) has a fluid outlet: as illustrated below, Min teaches that air exits its **upper inner space** (“cyclone chamber”) at the bottom end of **filter** and into a **second discharge tube**:



Id.

187. In my opinion, a POSA would have understood the bottom end of Min’s **filter** to be a “fluid outlet” of the “cyclone chamber.”
188. Regarding Limitations [9c], [16c], and [18c], in my opinion, Min teaches that the “cyclone separator”/“cyclonic unit” has “an openable end.” Ex1011, Figs. 9-10, ¶¶ 80-87, 97-100, 108-113. Min teaches that its **dust**

collector assembly has a hinged **lower cover/lower inner space**, which a POSA would have understood as being individually and collectively an openable end of Min's **dust collector assembly**:



Id.

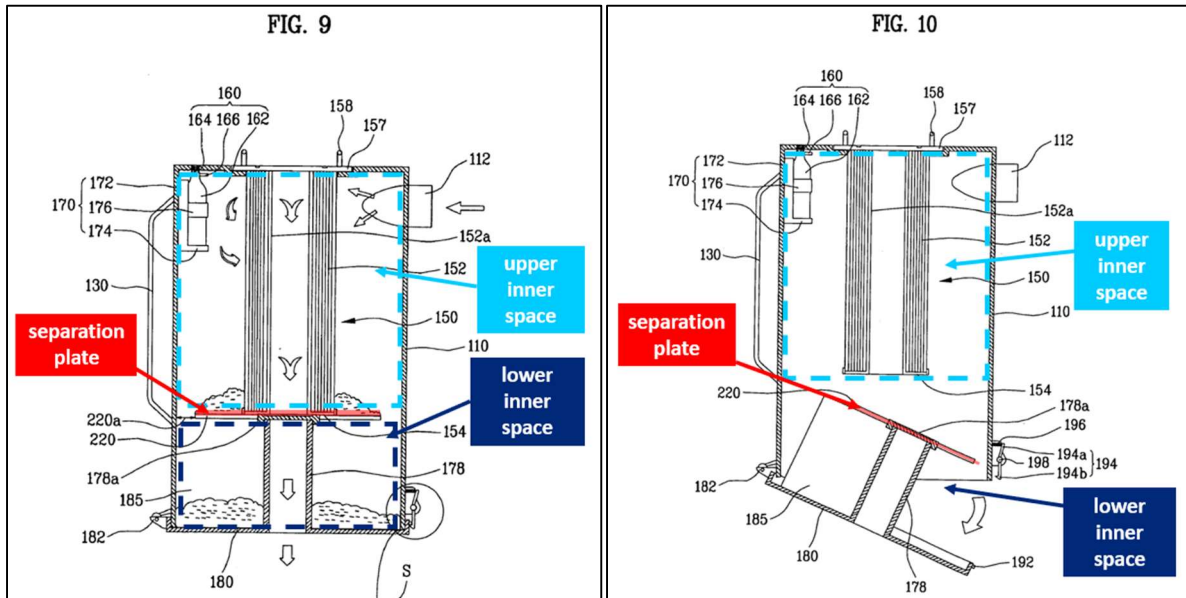
e. [1d]/[9d]/[16d]/[18e]

Reference Number	Claim Limitation
[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,”
[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”
[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,”
[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,”

189. In my opinion, Min teaches 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 (Limitation [1d]).
190. In my opinion, Min teaches 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 (Limitation [9d]).
191. In my opinion, Min teaches 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 (Limitation [16d]).
192. In my opinion, Min teaches 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 (Limitation [18e]).
193. In my opinion, 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. Min

teaches that a **separation plate** separates the **upper inner space** and **lower inner space** of the dust collecting assembly:

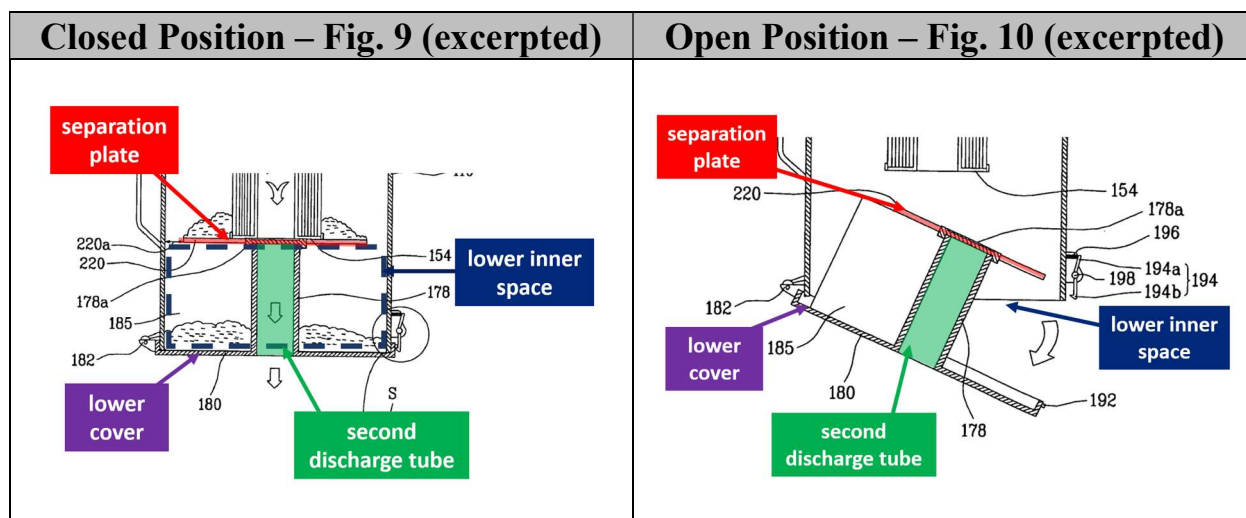


Id.

194. From this, a POSA would have understood Min's **separation plate** to be positioned between the "cyclone chamber" ("**upper inner space**") and the "dirt collection chamber" ("**lower inner space**"). *Id.* A POSA would have also understood Min's **separation plate** to have a surface facing the **upper inner space** and thus have "a cyclone chamber surface." *Id.*

195. Regarding Limitations [9d] and [18e], in my opinion, Min teaches that the "plate [is] positioned...at an openable end." Min teaches that its plate (**separation plate**) is positioned at "an openable end" of each of the "cyclone separator," the "dirt collection chamber," and the "cyclone chamber." And for Limitation [18e], Min teaches that its plate (**separation**

plate) is “positioned at the openable end” of the “cyclonic unit.” Ex1011, Figs. 9-10, ¶¶ 80-87, 99-100, 108-113. More particularly, Min teaches that the **separation plate** (“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**. A POSA would have Min’s **lower cover** and **lower inner space** to be individually and collectively “an openable end” of each of the “cyclone separator”/“cyclonic unit” (**dust collector assembly**). Additionally, because Min teaches an opening at and below the interface between the dirt collection chamber (**lower inner space**) and cyclone chamber (**upper inner space**), in my opinion, Min likewise teaches an openable end of both the “dirt collection chamber” and the “cyclone chamber”:

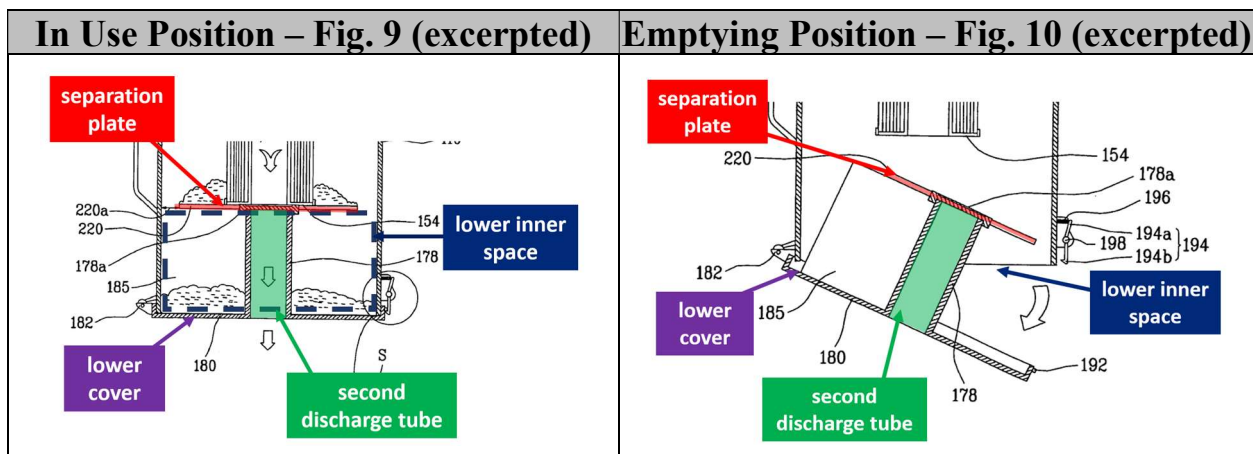


Id.

196. Regarding Limitation [1d], in my opinion, Min teaches that the “dirt

collection chamber” has “an openable end” for the same reasons that I described in the previous paragraph.

197. Regarding Limitations [1d], [9d], and [18e], in my opinion, Min teaches that the plate (**separation plate**) is “moveable”/“moveably mounted” “between an in use position and an emptying position.” Ex1011, Figs. 9-10, ¶¶ 87-88, 99-101, 110; *see also* Ground 2, Limitations [1c]/[9c]/[16c]/[18c]/[18d]. Min teaches that its **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”) position to an open (“emptying”) position “together with the **lower cover**”:

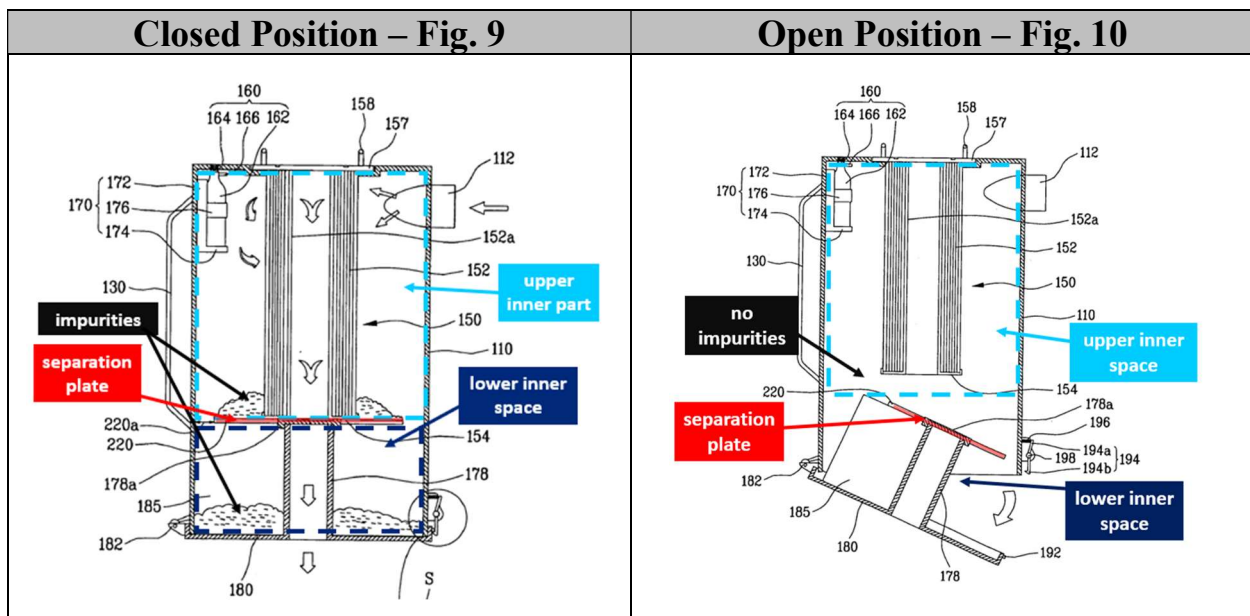


Id.

198. Regarding Limitation [1d], in my opinion, a POSA would have understood that **separation plate’s** movement from a closed (“in-use”) position to an

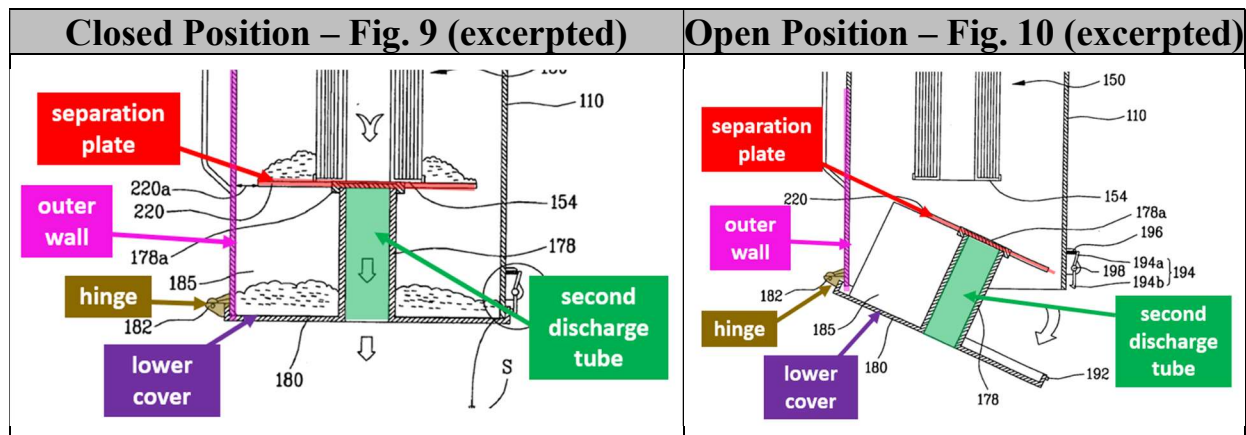
open (“emptying”) position when the **lower cover/lower inner space** rotates open results in “the plate being moveable between an in-use position and an emptying position when the openable end is opened.” *Id.*

199. Regarding Limitations [1d], [9d], and [18e], in my opinion, 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, ¶¶ 99, 108-110. Specifically, Min teaches that 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**” (from the **lower inner space**), “but also the impurities accumulated on the upper surface of the **separation plate**” (from the **upper inner part**):



Id.

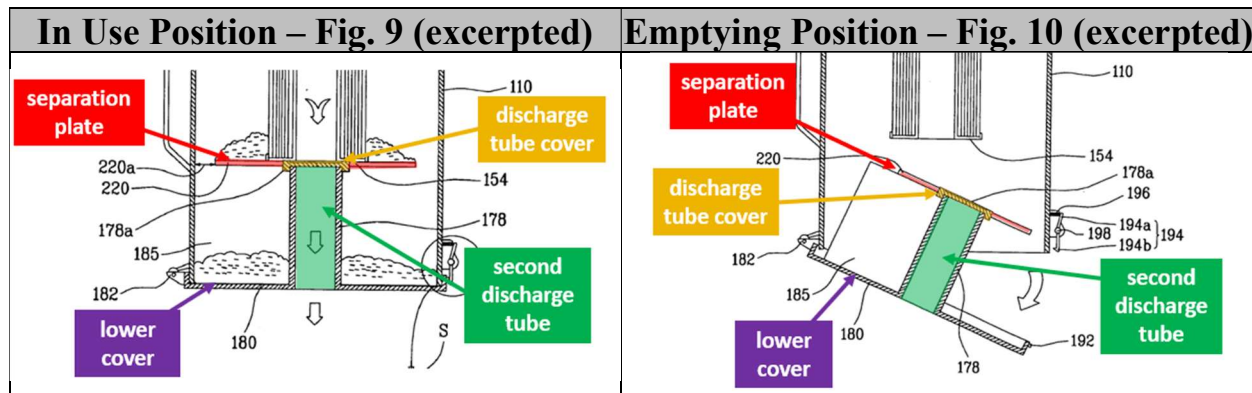
200. Regarding Limitation [16d], in my opinion, Min teaches that “the plate is pivotally mounted to the outer wall of the cyclone separator.” Min teaches that its **separation plate** is formed, together with **second discharge tube**, as a single body with **lower cover**. Ex1011, Figs. 9-10, ¶¶ 80, 87-88, 99-101, 108-112; *see also* Ground 2, Limitations [1c]/[9c]/[16c]/[18c]/[18d]. Min additionally teaches that the **separation plate** pivots about a **hinge** connected to the **outer wall** of Min’s **dust collector assembly** “together with the **lower cover**”:



Id.

201. From this, a POSA would have understood that Min’s “plate” (**separation plate**) is “pivotally mounted” via the **hinge** “to the **outer wall** of the cyclone separator” (**dust collector assembly**). *Id.*
202. Regarding Limitation [18e], in my opinion, Min teaches “the plate being supported by the openable end” of the “cyclonic unit.” Ex1011, Figs. 9-10,

¶¶ 87-88, 99-101, 110, *see also* Ground 2, Limitations [1c]/[9c]/[16c]/[18c]/[18d]. Min’s **separation plate** is held in place, which a POSA would understand as being “supported,” by its attachment to the **lower cover** via the **second discharge tube** at the **discharge tube cover**:



Id.

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

Reference Number	Claim Limitation
[1e]	“e. a fluid flow motor.”
[9e]	“(e) a fluid flow motor.”
[16e]	“(e) a fluid flow motor.”
[18f]	“(f) a fluid flow motor.”

203. In my opinion, Min teaches a fluid motor.

204. Min’s vacuum cleaners include “a motor” that generates “suction force.”

Ex1011, Figs. 2, 12, ¶¶ 49-57, 103, 106. A POSA would have understood, in my opinion, Min’s “motor” to be a “fluid flow motor.”

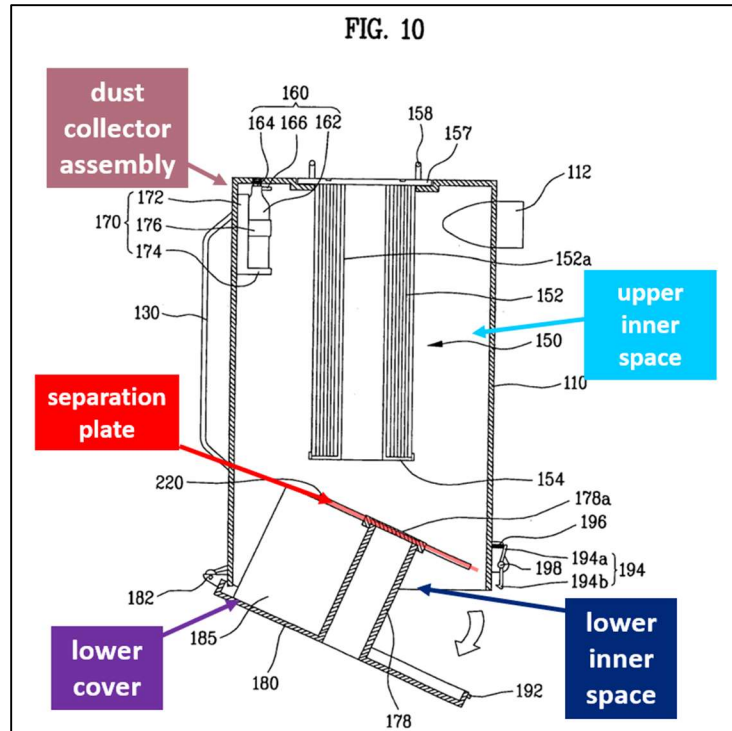
2. [3]

Reference Number	Claim Limitation
[3]	“The surface cleaning apparatus of claim 1 wherein the openable end of the dirt collection chamber is a bottom.”

205. In my opinion, Min anticipates claim 1 and teaches wherein the openable end of the dirt collection chamber is a bottom.

206. Min teaches claim 1. Ground 2, Limitations [1]/[9]/[16]/[18].

207. In my opinion, Min teaches “the openable end of the dirt collection chamber is a bottom.” Ground 2, Limitations [1d]/[9d]/[16d]/[18e]. As illustrated below, Min’s **lower cover/lower inner space**—which a POSA would have understood as individually and collectively 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**):



Ex1011, Fig. 10; Ground 2, Limitations [1d]/[9d]/[16d]/[18e].

3. [4]

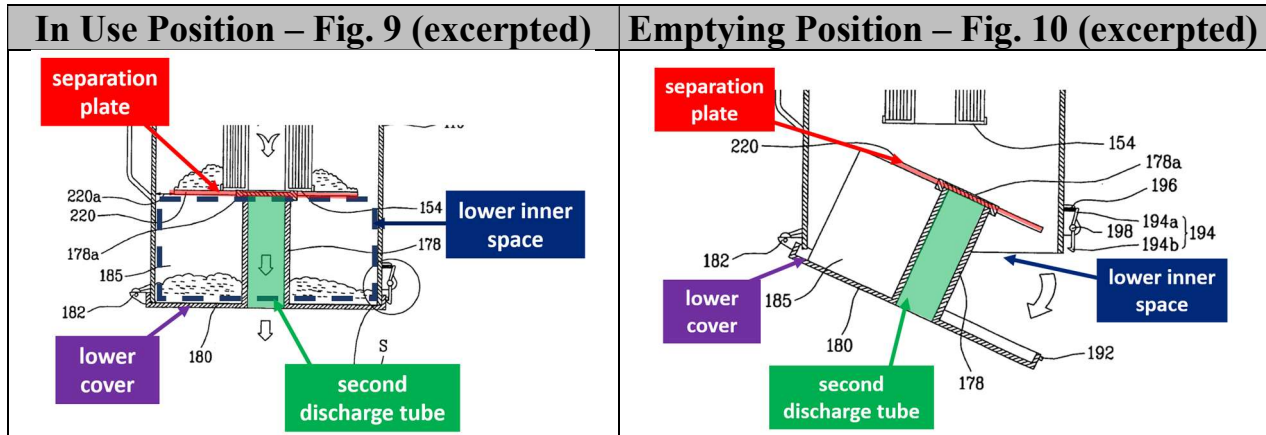
Reference Number	Claim Limitation
[4]	“The surface cleaning apparatus as claimed in claim 1 wherein the plate is automatically moved to the emptying position when the openable end is opened.”

208. In my opinion, Min anticipates claim 1 and teaches wherein the plate is automatically moved to the emptying position when the openable end is opened.

209. Min teaches claim 1. Ground 2, Limitations [1]/[9]/[16]/[18].

210. As illustrated below, in my opinion, a POSA would have understood that 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; Ground 2, Limitations [1d]/[9d]/[16d]/[18e].

4. [5]

Reference Number	Claim Limitation
[5]	“The surface cleaning apparatus as claimed in claim 1 wherein the plate is supported by the openable end.”

211. In my opinion, Min anticipates claim 1 and teaches wherein the plate is supported by the openable end.

212. Min teaches claim 1. Ground 2, Limitations [1]/[9]/[16]/[18].

213. In my opinion, Min teaches that “the plate is supported by the openable end” from the same reasons that I previously discussed in Limitation [18e]. Ground 2, Limitations [1d]/[9d]/[16d]/[18e].

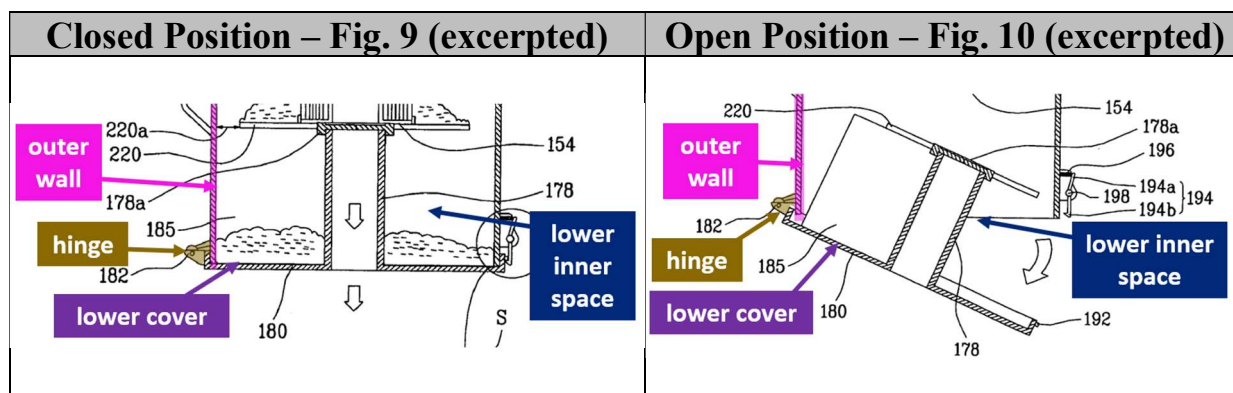
5. [7]

Reference Number	Claim Limitation
[7]	“The surface cleaning apparatus as claimed in claim 1 wherein the openable end is pivotally mounted to the cyclone separator.”

214. In my opinion, Min anticipates claim 1 and teaches wherein the openable end is pivotally mounted to the cyclone separator.

215. Min teaches claim 1. Ground 2, Limitations [1]/[9]/[16]/[18].

216. In my opinion, Min teaches that “the openable end is pivotally mounted to the cyclone separator.” Ex. 1011, Figs. 9-10, ¶¶80, 87-88, 99-101, 108-112. As illustrated below, Min’s **lower cover/lower inner space**—which a POSA would have understood as individually and collectively an “openable end”—is pivotally mounted to the **dust collector assembly** using a **hinge**:



Id.

6. [10]/[11]

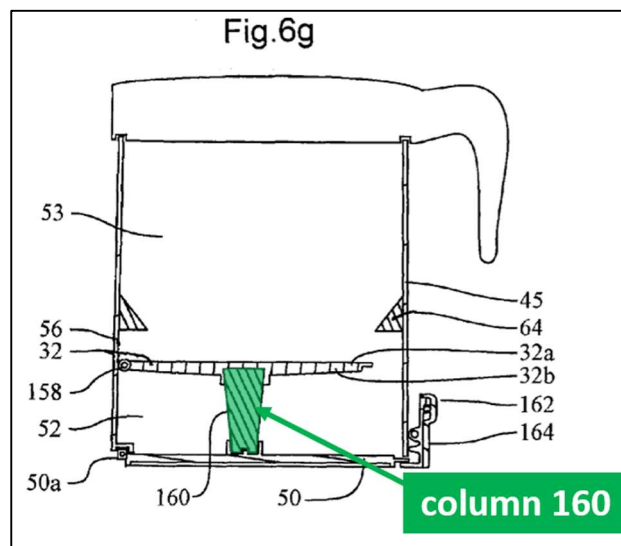
Reference Number	Claim Limitation
[10]	“The surface cleaning apparatus of claim 9 wherein the plate has a hand grip portion.”
[11]	“The surface cleaning apparatus of claim 10 wherein the hand grip portion comprises a shaft extending away from the plate.”

217. In my opinion, Min anticipates claim 9 and teaches wherein the plate has a hand grip portion.

218. In my opinion, Min anticipates claim 10 and teaches wherein the hand grip portion comprises a shaft extending away from the plate.

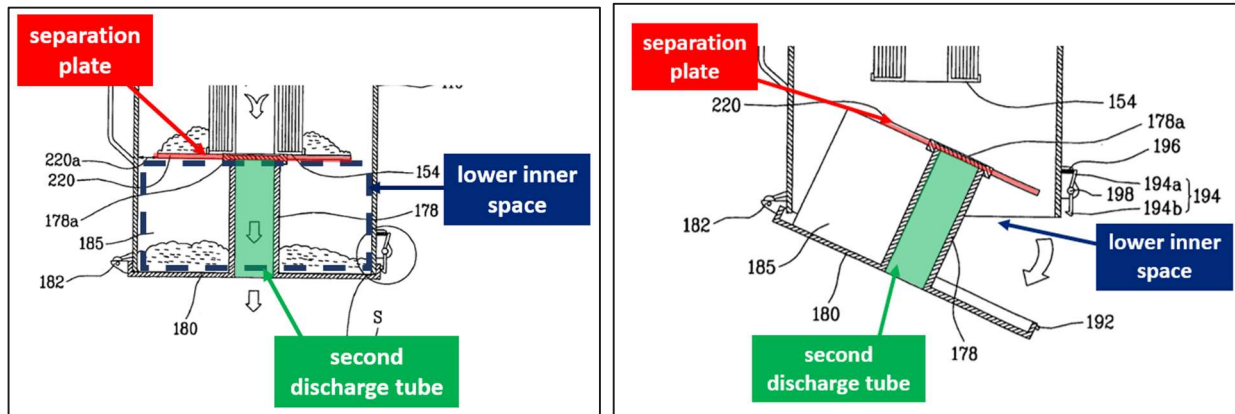
219. Min teaches claim 9. Ground 2, Limitations [1]/[9]/[16]/[18].

220. The '120 Patent'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:



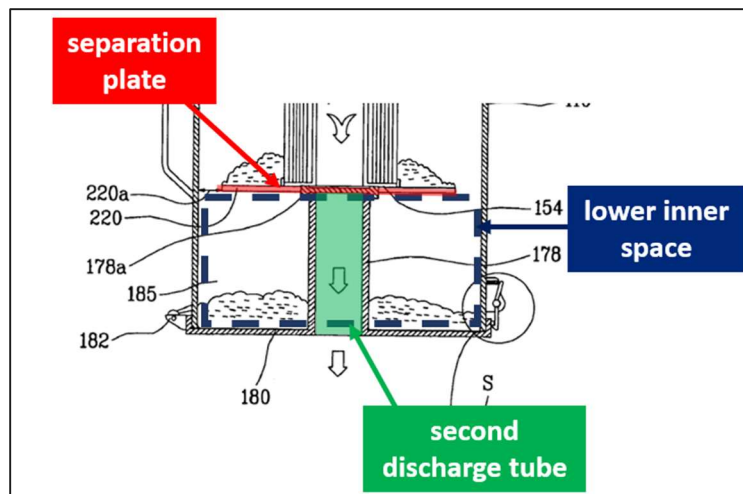
Ex1001, 4:34-36, Fig. 6g.

221. Min's **separation plate** (plate) “is formed as a single body with the **second discharge tube**”:



Ex1011, Fig. 9-10, ¶¶ 100, 110.

222. In my opinion, a POSA would have understood the “second discharge tube” to be both a hand grip portion and comprise a shaft that extends vertically away from the **separation plate**:



Id.

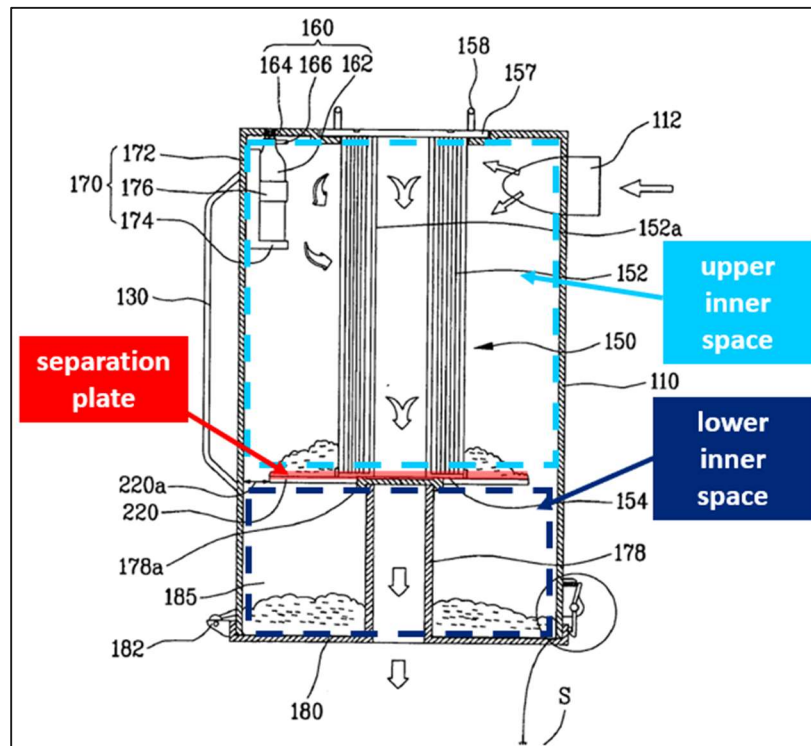
7. [12]

Reference Number	Claim Limitation
[12]	“The surface cleaning apparatus of claim 9 wherein the dirt collection chamber extends under the plate.”

223. In my opinion, Min anticipates claim 9 and teaches wherein the dirt collection chamber extends under the plate.

224. Min teaches claim 9. Ground 2, Limitations [1]/[9]/[16]/[18].

225. In my opinion, 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.

8. [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.”

226. In my opinion, Min anticipates claim 9 and teaches wherein the surface cleaning apparatus is selected from the group consisting of a vacuum cleaner, a sweeper and a carpet extractor.

227. Min teaches claim 9. Ground 2, Limitations [1]/[9]/[16]/[18].

228. In my opinion, Min teaches “a vacuum cleaner” for the same reasons as Limitations [1pre]/[9pre]/[16pre]/[18pre]. Ground 2, Limitations [1pre]/[9pre]/[16pre]/[18pre].

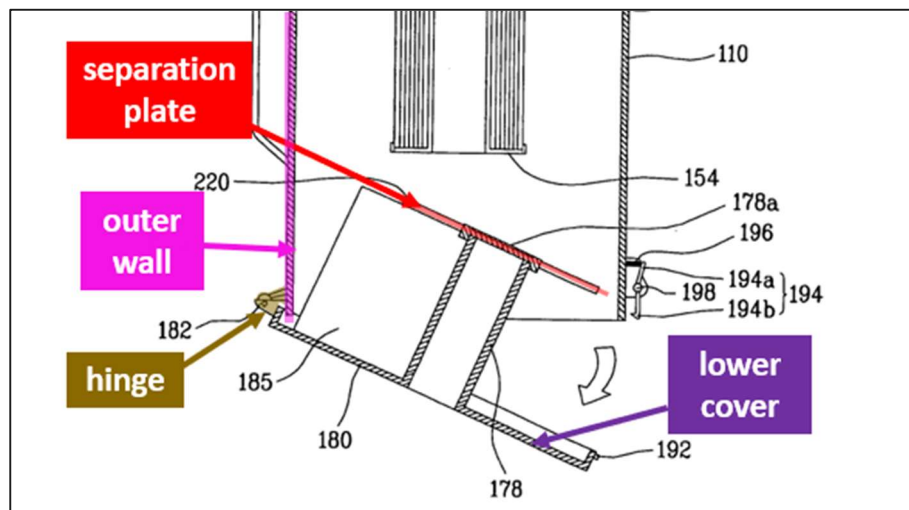
9. [15]/[19]

Reference Number	Claim Limitation
[15]	“The surface cleaning apparatus of claim 9 wherein the plate is moveable subsequent to the openable end being opened.”
[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.”

229. In my opinion, Min anticipates claim 9 and teaches wherein the plate is moveable subsequent to the openable end being opened.

230. In my opinion, Min anticipates claim 18 and teaches wherein the plate is moveable to a emptying position when the openable end is opened.

231. Min teaches claims 9 and 18. Ground 2, Limitations [1]/[9]/[16]/[18].
232. Regarding claim 19, in my opinion, Min's **separation plate** "is moveable to a[n] emptying position when the openable end is opened" for the same reasons I previously discussed for Limitation [1d], which applies equally to "the openable end" of the "cyclone separator," "cyclone chamber," and "cyclonic unit." Ground 2, Limitations [1d]/[9d]/[16d]/[18e].
233. For claim 15, in my opinion, Min teaches that, "subsequent to the openable end being opened," the **separation plate** "is moveable": as illustrated below, **lower cover** can be rotated further (and thus the **separation plate**) up or down about the **hinge** connected to the **outer wall**:



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

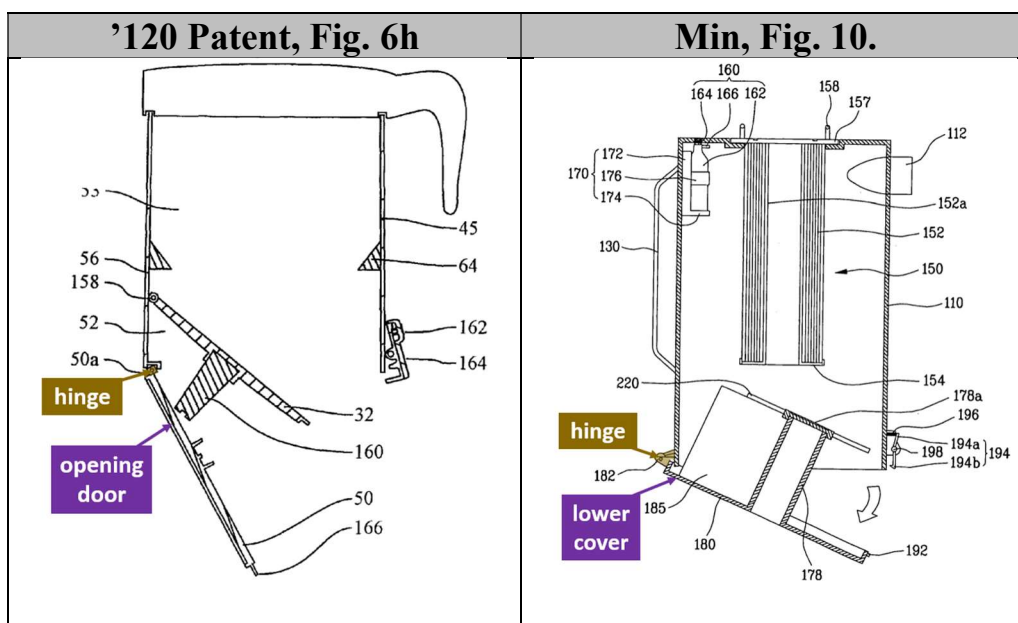
10. [17]

Reference Number	Claim Limitation
[17]	“The surface cleaning apparatus as claimed in claim 16 wherein the plate is pivotally mounted to the cyclone chamber.”

234. In my opinion, Min anticipates claim 16 and teaches wherein the plate is pivotally mounted to the cyclone chamber.

235. Min teaches claim 16. Ground 2, Limitations [1]/[9]/[16]/[18].

236. In my opinion, Min teaches that the plate is pivotably mounted to the cyclone chamber at least to the same extent as shown in the '120 Patent, which like Min depicts a hinged bottom:



Ex1001, Fig. 6h; Ex1011. Fig. 10.

C. Ground 3: Jung Renders Obvious Claims 1, 3-7, 9-12, and 14-19

237. In my opinion, Jung renders obvious claims 1, 3-7, 9-12, and 14-19

1. [1]/[3]-[5]/[7]/[9]-[12]/[14]-[19]

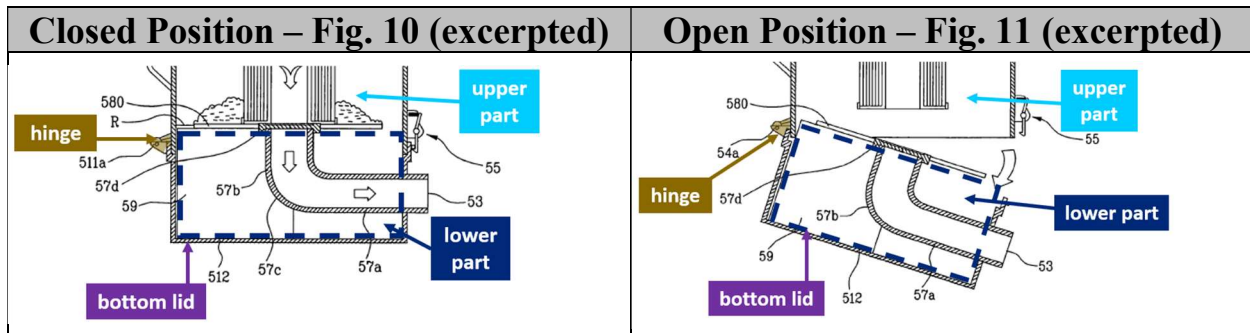
238. In my opinion, to the extent Jung does not anticipate the claims challenged in Ground 1, it renders them obvious.
239. Specifically, to the extent PO argues that different embodiments or disclosures were combined or used in Ground 1, in my opinion, those claims would have been obvious over Jung: 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 states 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.

2. [6]

Reference Number	Claim Limitation
[6]	“The surface cleaning apparatus as claimed in claim 1 wherein the openable end is removable from the cyclone separator.”

240. In my opinion, Jung anticipates and/or renders obvious claim 1 and teaches wherein the openable end is removable from the cyclone separator.
241. Jung teaches and/or renders obvious claim 1. Ground 1, Limitations [1]/[9]/[16]/[18]; Ground 3, Limitations [1]/[3]-[5]/[7]/[9]-[12]/[14]-[19].
242. Jung teaches that the **bottom lid/lower part** of the **dust collecting**

assembly rotate about a hinge:



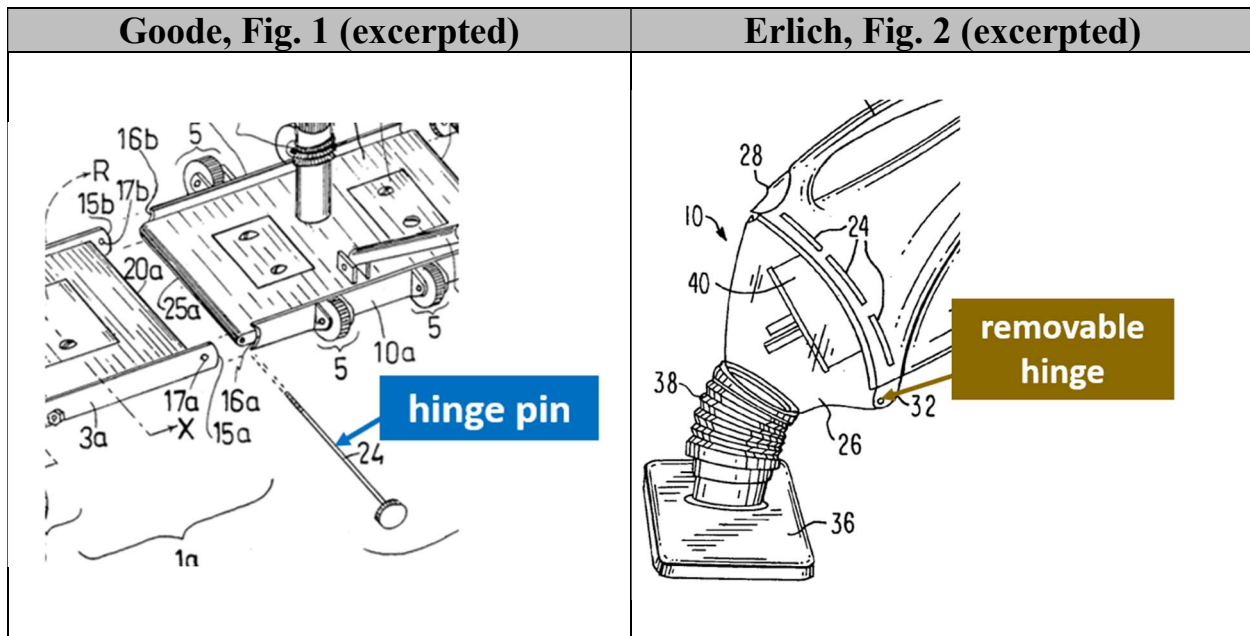
Ex1005, Figs. 10-11, 11:8-15, 14:23-27.

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

244. In my opinion, 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. Specifically, a POSA would have understood that detachable dust cups were known in the art and that such designs facilitated cleaning of dust collection assemblies / dust cups. For example, U.S. Patent No. 6,766,558 to Matsumoto teaches making a vacuum cleaner dust cup detachable to make it easier to “clean[] using water or the like”:

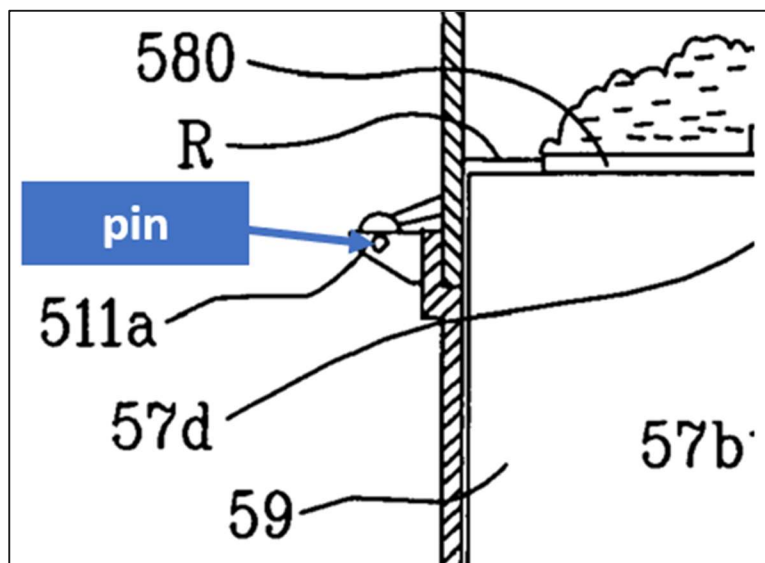
lid/lower part detachable from Jung's **upper part** would have made it easier to "perform cleaning" of the **lower part** and **upper part** by, for example, allowing a user to reach into harder to reach areas of the **dust collecting assembly**, allowing the separate parts (**bottom lid/lower part** and **upper part**) 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, such as a scrub brush.

247. In my opinion, a POSA would have also understood that removable hinges and hinge pins were well-known ways to make vacuum cleaner components detachable. For example, U.S. Pat. No. 4,637,086 to Goode teaches removable hinge pins separating sections of a vacuum cleaner, and U.S. Pat. No. 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.

248. Additionally, in my opinion, 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, such as cotter pins):



Ex1005, Fig. 10 (excerpted).

have a removable pin or to 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**.” Ex 1005, 14:23-27. Moreover, in my opinion, a POSA would have reasonably expected success in making this modification to Jung: both 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.

251. In my opinion, under the above modification to Jung (*i.e.*, modifying Jung’s **hinge** to be detachably connected to the lower end of Jung’s **dust collecting assembly**), Jung renders obvious claim 6 because when Jung’s **hinge** is removable or uses a removable pin, Jung’s “openable end” of the “dirt collection chamber” is likewise removable from the **dust collecting assembly** (“cyclone separator”). Ex1005, Fig. 11, 7:60-67, 11:8-39.

D. Ground 4: Min Renders Obvious 1, 3-7, 9-12, and 14-19

252. In my opinion, Min renders obvious claims 1, 3-7, 9-12, and 14-19.

1. [1]/[3]-[5]/[7]/[9]-[12]/[14]-[19]

253. In my opinion, to the extent Min does not anticipate the claims challenged in Ground 2, it renders them obvious.

254. Specifically, to the extent PO argues that different embodiments or disclosures were combined or used in Ground 2, in my opinion, those claims would have been obvious over Min: 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.

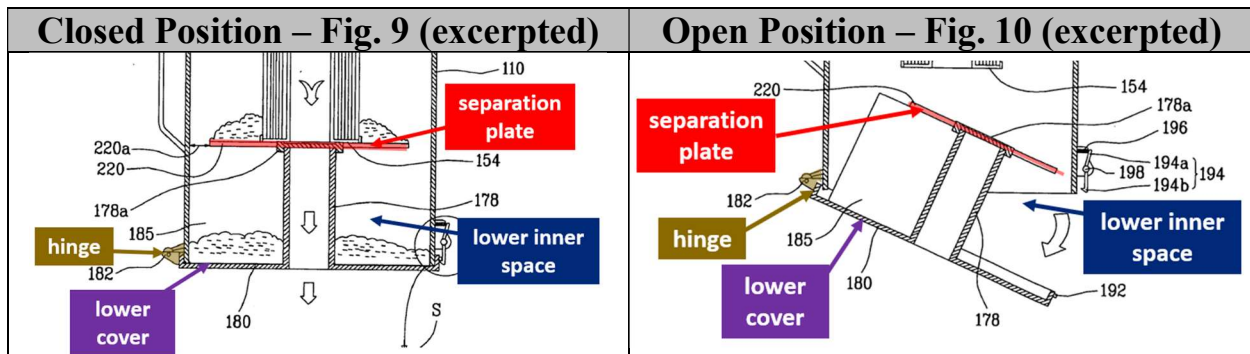
2. [6]

Reference Number	Claim Limitation
[6]	“The surface cleaning apparatus as claimed in claim 1 wherein the openable end is removable from the cyclone separator.”

255. In my opinion, Min anticipates and/or renders obvious claim 1 and teaches wherein the openable end is removable from the cyclone separator.

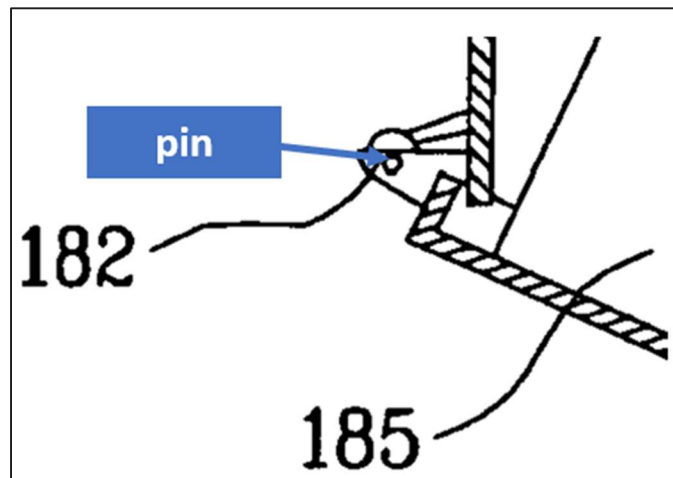
256. Min teaches and/or renders obvious claim 1. Ground 2, Limitations [1]/[9]/[16]/[18]; Ground 4, Limitations [1]/[3]-[5]/[7]/[9]-[12]/[14]-[19].

257. Similar to Jung, Min teaches that the **lower cover** of the **dust collector assembly** rotates about a **hinge**:



Ex1011, Figs. 9-10, ¶¶ 80, 108-112, 131.

258. Min teaches this design is advantageous because it makes it easier “to remove impurities accumulated in the dust collector.” *Id.*
259. Additionally, like Jung, a POSA would have also understood Min’s **hinge** to have a **hinge pin** (like Goode’s or other common widely available off-the-shelf pins such as cotter pins):



Ex1011, Fig. 10 (excerpted)

260. For the same reasons that as previously described in Ground 3, in my opinion, 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**. Ground 3, Limitations [6].
261. Under that modification to Min (*i.e.*, modifying Min’s **hinge** to be

detachably connected to the lower end of Min’s **dust collector assembly**), in my opinion, Min renders obvious claim 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”).

E. Ground 5: Jung in Combination with Jeong Renders Claims 8 and 20 Obvious

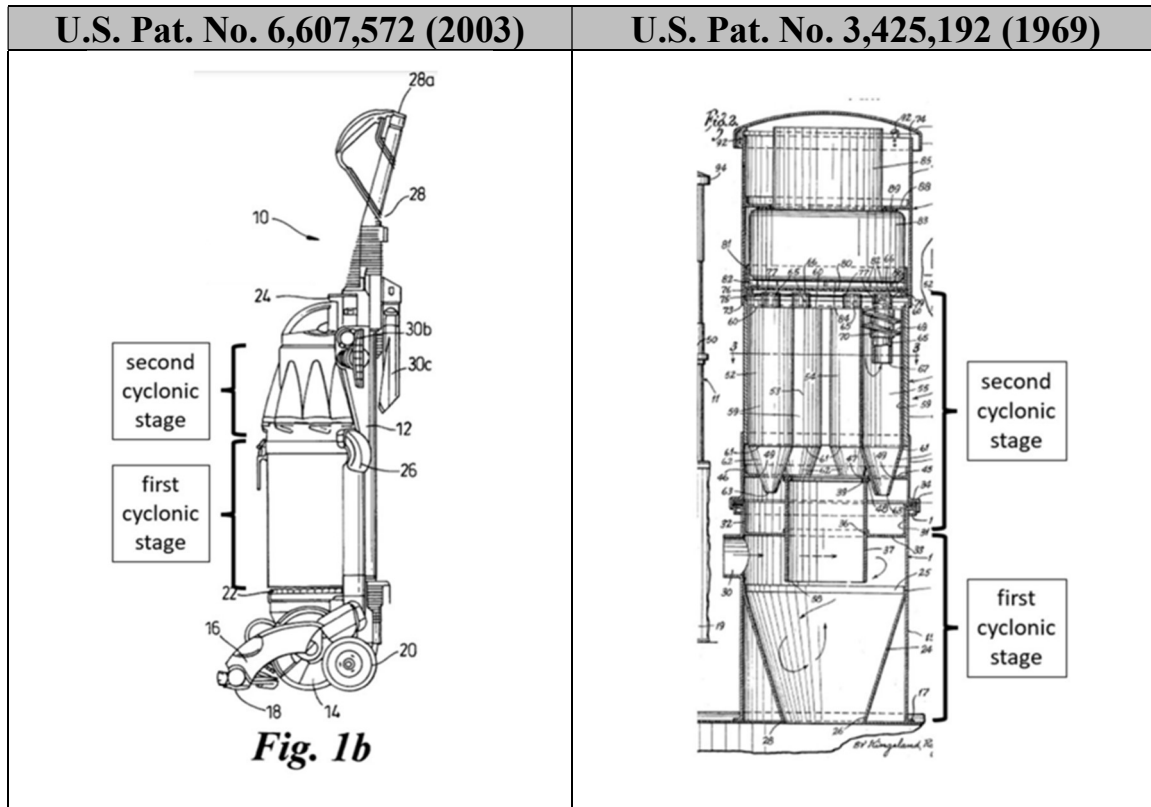
262. In my opinion, Jung in combination with Jeong renders obvious claims 8 and 20.

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

263. Jung teaches a single-stage cyclone for separating dust from air. Ex1005, Figs. 2, 10-12, 11:57-12:12, 12:46-13:10, 13:36-53.

264. In my opinion, a POSA would have understood that adding a second cyclonic stage to a single-stage cyclonic vacuum cleaner would have improved particle separation. For example, U.S. Pat. No. 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. A POSA would have also been aware that vacuums with multiple, smaller second stage cyclones were well-known in the art at the time of the '120 Patent. For example, as illustrated below, such two-stage vacuums have been known since the 1960s:



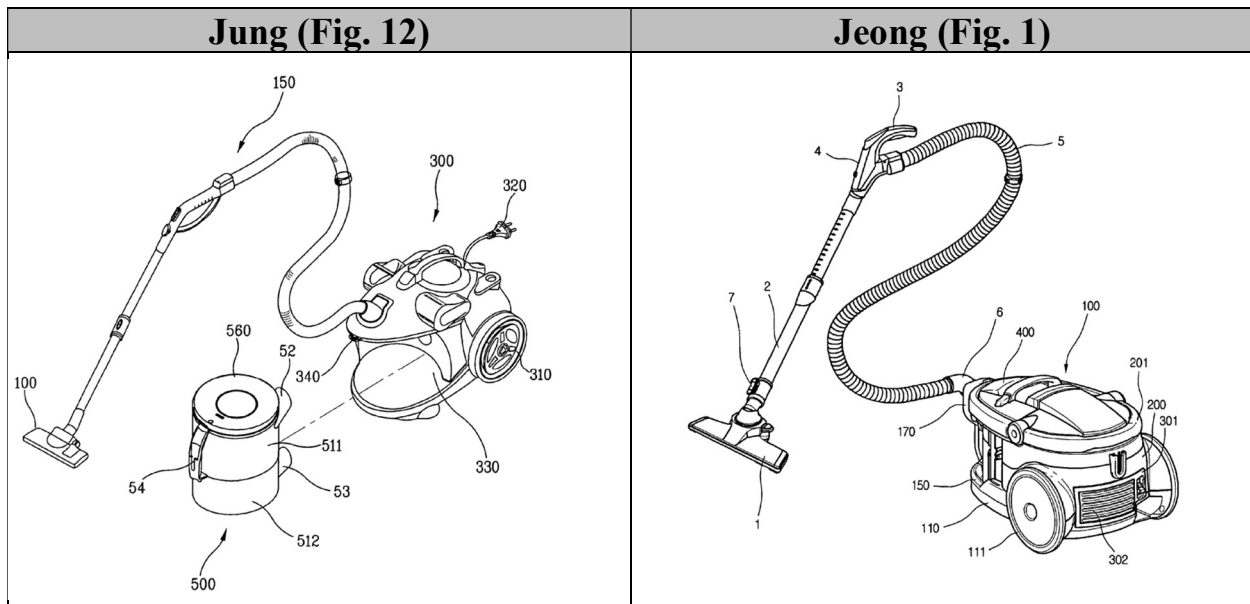
Ex1016, Fig. 1b; Ex1017, Fig 2.

265. In my opinion, 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 an upstream first stage. Ex1017, 1:35-39.

266. Given the above, in my opinion, 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.

267. Like Jung, Jeong is a patent also assigned to LG Electronics. Ex1006, Cover. As illustrated below, both Jung and Jeong depict a similar vacuum cleaner:



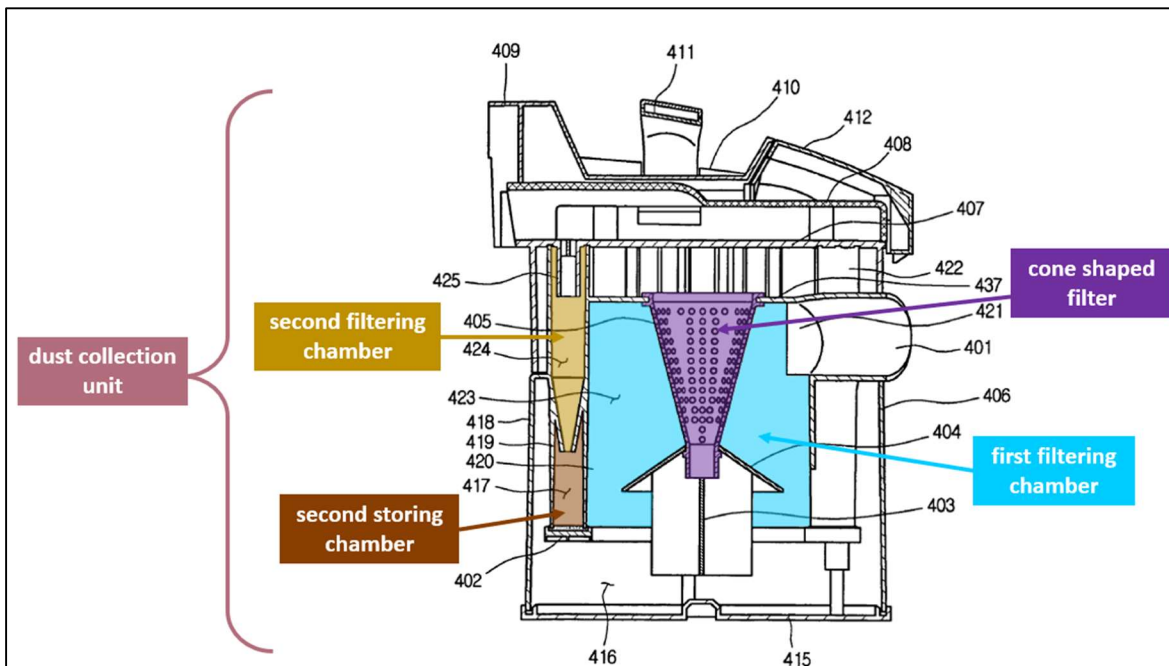
Ex1005, Fig. 12, Ex1006, Fig. 1.

268. Jeong teaches smaller downstream secondary cyclones and the benefits of such secondary cyclones. 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.

269. Jeong also 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.

270. In my opinion, 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**). In particular, a POSA would have been motivated to position 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. In my opinion, 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, with an additional downstream second cyclonic stage being one of them.

271. Moreover, in my opinion, 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 a POSA would have understood that an additional second cyclonic stage would have yielded the predictable and beneficial result of additional dust filtration. Ex1005, Figs. 1, 5-6, 8-12, Abstract; Ex1006, Figs. 1, 3-4, Abstract.

2. [8]/[20]

Reference Number	Claim Limitation
[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.”
[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.”

272. In my opinion, Jung in combination with Jeong renders obvious 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.

273. In my opinion, Jung in combination with Jeong renders obvious 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 plate.

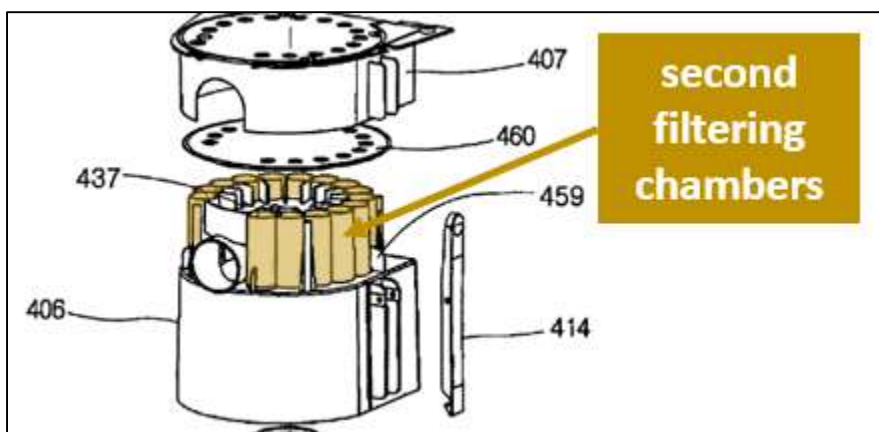
274. Jung teaches and/or renders obvious claims 1 and 18. Ground 1, Limitations [1]/[9]/[16]/[18]; Ground 3, Limitations [1]/[3]-[5]/[7]/[9]-[12]/[14]-[19].

275. Jeong teaches that its **second filtering chambers** filter impurities using “cyclone airflow.” Ex1006, 6:27-30, 6:37-46, 9:22-31. A POSA thus

would have understood Jeong's **second filtering chambers** to be “a cyclonic stage”/“cyclonic unit.”

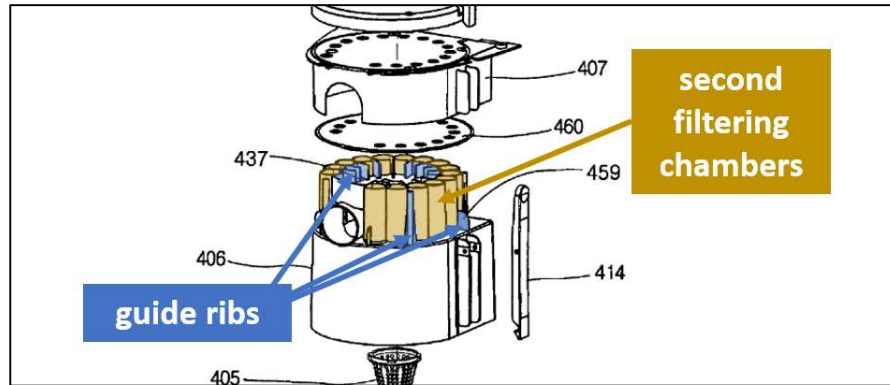
276. Regarding claim 8, in my opinion, the combination of Jung and Jeong teaches “a cyclonic stage downstream from the cyclone separator.” Because within Jeong, Jeong's **second filtering chambers** are downstream from Jeong's first cyclonic stage (“**first filtering chamber**”), a POSA would have understood that as implemented in the combination of Jung and Jeong, Jeong's **second filtering chambers** would have likewise been downstream from Jung's first cyclonic stage (Jung's **dust collecting assembly**). *See also* Ground 5, §1.

277. In my opinion, Jeong teaches that the downstream “cyclonic stage”/“cyclonic unit” (“**second filtering chambers**”) comprises a plurality of cyclones in parallel. As illustrated below, a POSA would have understood Jeong's cyclones to be both geometrically “in parallel” and have an airflow path “in parallel”:



Ex1006, Figs. 5-8; Abstract, 6:30-32; 6:58-7:5, 9:23-28.

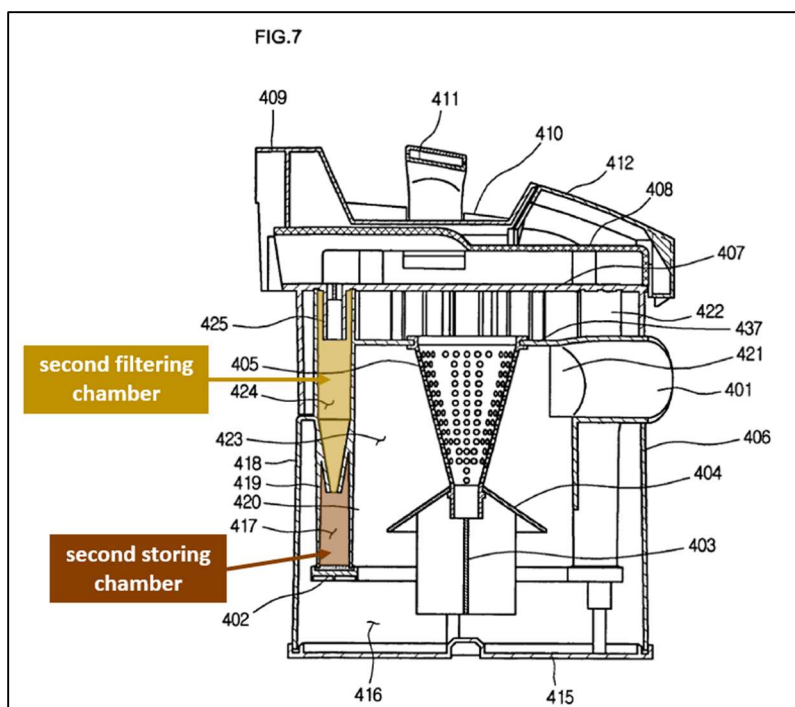
278. In my opinion, Jeong teaches “at least some of the plurality of cyclones is each provided with a divider plate”/“a plurality of divider plates.” Ex1006, Fig. 5, 6:15-19, 6:58-60. Jeong teaches that a “plurality of **guide ribs 459** are formed on” an outer circumference of its dust collection unit and illustrates that the plurality of **guide ribs** are placed between, and thus divide, the **second filtering chambers**:



Ex1006, Fig. 5, 6:15-19, 6:58-60.

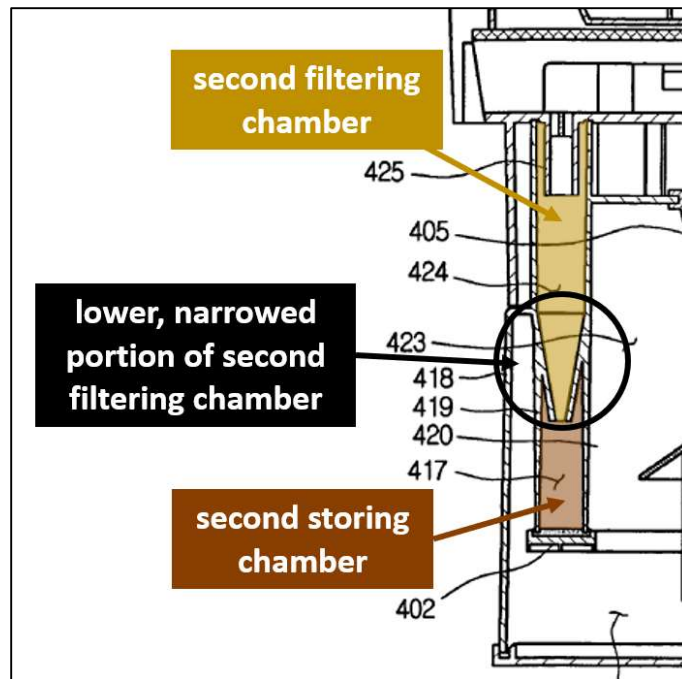
279. To the extent PO argues “divider plates” must be internal to the “cyclones,” in my opinion, Jeong likewise teaches these limitations to the same extent accused by PO in the co-pending ITC Litigation. Ex1006, 6:27-46, 9:29–37, Fig. 7.

280. 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**”:



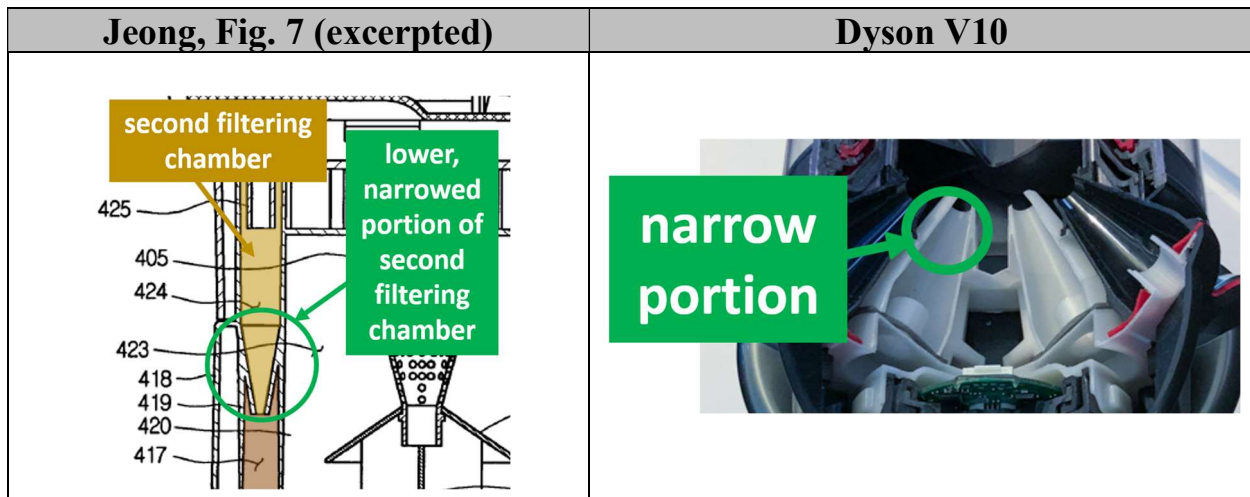
Id.

281. As illustrated below, Jeong teaches that “[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.

282. In my opinion, this is at least as much disclosure as PO accuses of infringement in the co-pending ITC Litigation:



Ex1006, Fig. 7; Ex1026 (excerpted).

283. Accordingly, in my opinion, these narrowed portions of Jeong's **second**

filtering chambers 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 the co-pending ITC Litigation.

F. Ground 6: Min in Combination with Jeong Renders Claims 8 and 20 Obvious

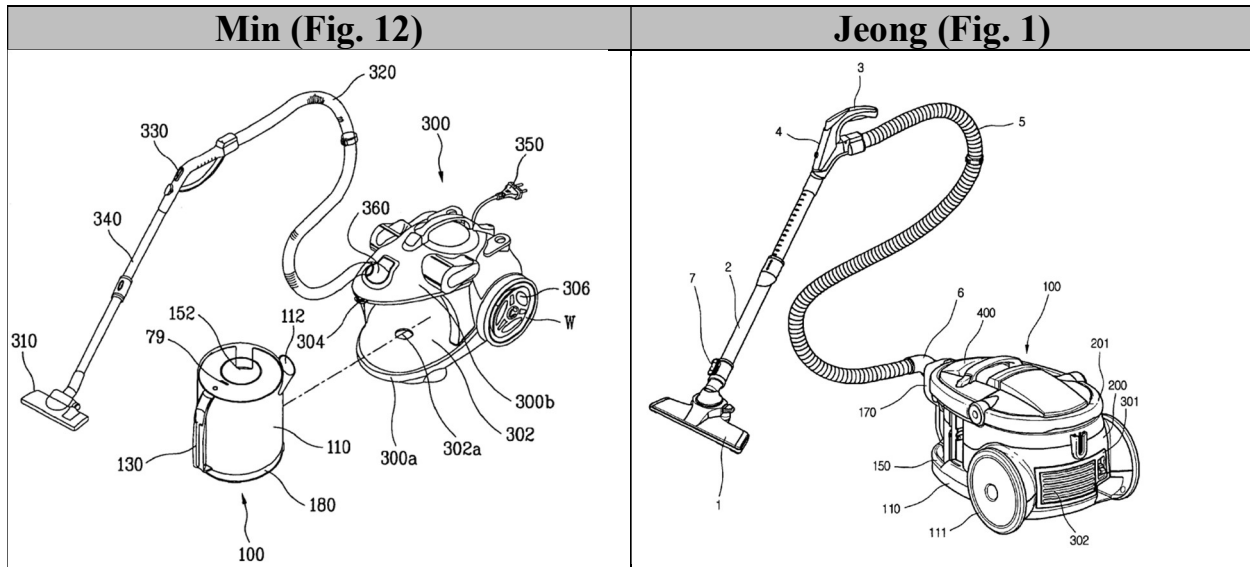
284. In my opinion, Min in combination with Jeong renders obvious claims 8 and 20.

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

285. Like Jung, Min teaches a single-stage cyclone for separating dust from air. Ex 1011, Fig. 9.

286. For the same reasons I previously explained in Ground 5, in my opinion, 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**). Ground 5, §1.

287. In my opinion, a POSA would have been further motivated to combine Min and Jeong because they were both LG Electronics Inc. patents that, as illustrated below, depict a similar vacuum cleaner:



Ex1011, Fig. 12, Ex1006, Fig. 1.

288. In my opinion, the combination of Jeong / Min would have been obvious to try and a POSA would have had a reasonably expectation of success for the same the reasons that I previously described 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. Ex1006, Figs. 1, 3-4, Abstract; Ex1011, Figs. 1, 5-6, 8-12, Abstract.

2. [8]/[20]

Reference Number	Claim Limitation
[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.”
[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.”

289. In my opinion, Min in combination with Jeong renders obvious 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.

290. In my opinion, Min in combination with Jeong renders obvious 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 plate.

291. Min teaches and/or renders obvious claims 1 and 18. Ground 2, Limitations [1]/[9]/[16]/[18]; Ground 4, Limitations [1]/[3]-[5]/[7]/[9]-[12]/[14]-[19].

292. For the reasons that I previously explained in Ground 5, Jeong’s **second filtering chambers** (“cyclonic stage”) are downstream from Min’s **dust collector assembly** (“cyclone separator”), which a POSA would have

understood as being “a cyclonic stage downstream from the cyclone separator.”

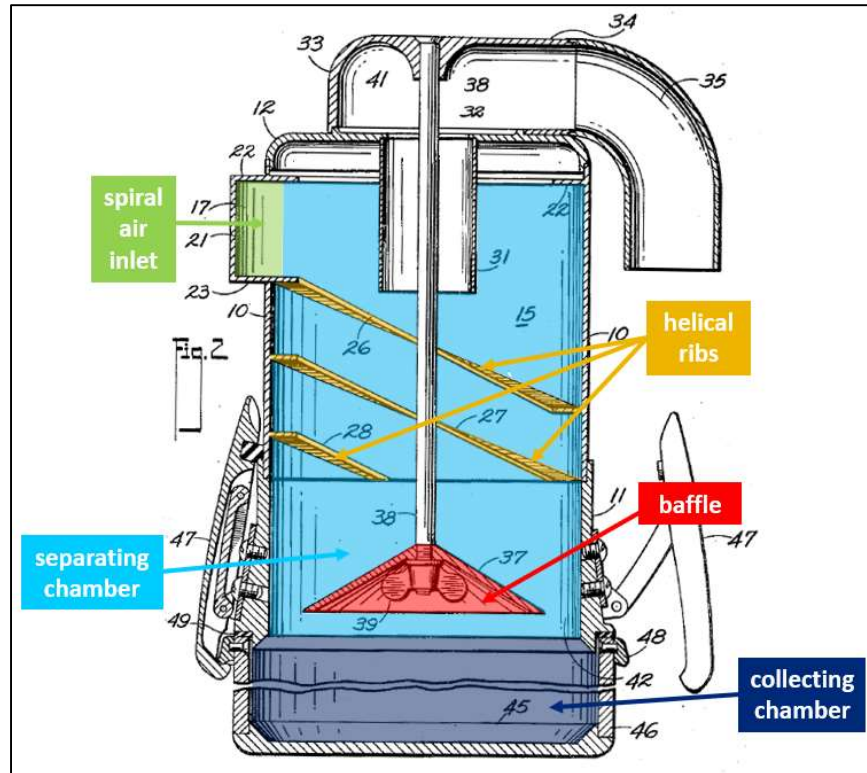
293. As to the features of claims 8 and 20, for the reasons I previously explained in Ground 5, Jeong teaches these remaining features of [8]/[20]. Ground 5, Limitations [8]/[20].

G. Ground 7: Jung in Combination with Davis Renders Claims 2 and 13 Obvious

294. In my opinion, Jung in combination with Davis renders obvious claim 2 and 13.

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

295. 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” (*e.g.*, preventing the air from prematurely losing cyclonic action):



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.

296. Davis additionally teaches that its **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 can “accelerate the air in a zone in which separation takes place, so that centrifugal force is increased.” Ex1010, 1:19-21, 2:34-35, 4:64-69.

297. In my opinion, a POSA would have been motivated to implement Davis’ **helical ribs** within Jung’s **dust collecting assembly**. In particular, Jung teaches that its **dust collecting assembly** is configured to “separat[e] and collect[] impurities such as dust by using the cyclone principle therein.” Ex1005, 6:29-40. Given this, 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. In my opinion, a POSA would have specifically been motivated to use the **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.
298. In my opinion, 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. Further, in my opinion, 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 in my opinion, 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]

Reference Number	Claim Limitation
[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."
[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."

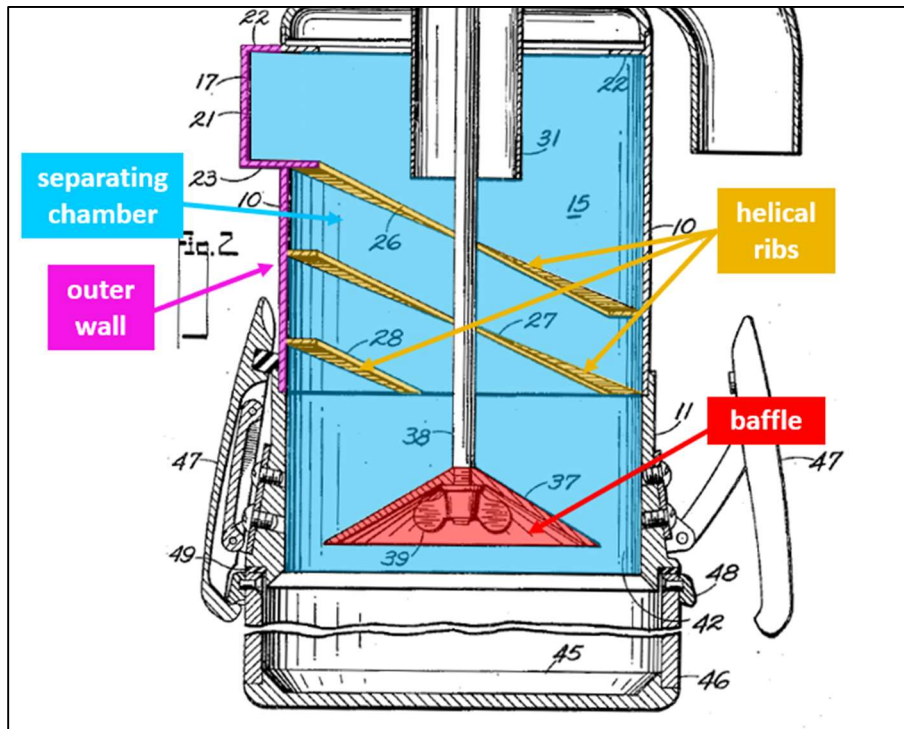
299. In my opinion, Jung in combination with Davis renders obvious the surface cleaning apparatus of claim 1 wherein a flow director having a flow directing surface that extends inwardly and downwardly into the cyclone chamber from the outer wall of the cyclone chamber to a position above the plate.

300. In my opinion, Jung in combination with Davis renders obvious 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.
301. Jung teaches and/or renders obvious claims 1 and 9. Ground 1, Limitations [1]/[9]/[16]/[18]; Ground 3, Limitations [1]/[3]-[5]/[7]/[9]-[12]/[14]-[19].
302. Davis' **helical ribs**, as implemented in Jung's **dust collecting assembly**, "direct and guide the flow of [air]" coming into the **dust collecting assembly** and thus, in my opinion, would have been understood by a POSA as "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.
303. In my opinion, the **helical ribs** ("flow director") of Davis further comprise "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." *Id.* As illustrated below, Davis' **helical ribs** extend inwardly and downwardly from the "**outer wall**"¹⁰ of Davis' **separating**

¹⁰ As I previously noted, claim 13 claims "**the** outer wall" of the cyclone chamber without antecedent basis recited in claim 9. Jung nonetheless teaches an outer wall for the same reasons as I previously explained in Limitation [1c]. Ground 1, Limitations [1c]/[9c]/[16c]/[18c]/[18d].

chamber to a position above Davis' baffle:



Id.

304. Given the similar purposes between the Davis's baffle and Jung's separation plate, in my opinion, a POSA implementing Davis's helical ribs in Jung's dust collecting assembly would have likewise caused the helical ribs to be positioned above, and stop before, Jung's separation plate. Therefore, in my opinion, the Jung/Davis combination discloses that the "flow directing surface" (helical ribs) extending "inwardly and downwardly into the cyclone chamber from the outer wall of the cyclone chamber to a position above the plate."

H. Ground 8: Min in Combination with Davis Renders Claims 2 and 13 Obvious.

305. In my opinion, Min in combination with Davis renders obvious claims 2 and 13.

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

306. Min teaches that its **dust collector assembly** is configured to filter impurities by using a cyclone using centrifugal force. Ex1011, ¶ 59.

307. For the reasons I previously explained in Ground 7, in my opinion, 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 Davis and Min 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, 2:23-30, 5:23-30, 5:47-66, 7:12-19, 7:34-43; Ex1011, ¶¶ 16, 70-

73, 98-100; Ground 7, §1.

308. In my opinion, the combination of Min and Davis would have been obvious to try and a POSA would have had a reasonable expectation of success for the reasons I previously described in Ground 7 and because Davis and Min are analogous art. Ground 7, §1.

2. [2]/[13]

Reference Number	Claim Limitation
[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.”
[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.”

309. In my opinion, Min in combination with Davis renders obvious 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.

310. In my opinion, Min in combination with Davis renders obvious 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.

311. Min teaches and/or renders obvious claims 1 and 9. Ground 2, Limitations [1]/[9]/[16]/[18]; Ground 4, Limitations [1]/[3]-[5]/[7]/[9]-[12]/[14]-[19].

312. In my opinion, for same reasons I previously explained in Ground 7, Davis' **helical ribs** as implemented in Min's **dust collector assembly** teach the features of claims 2 and 13. Ground 7, Limitations [2]/[13].

I. Ground 9: Soler Anticipates Claims 1, 3-5, 9, 12, 14-15, and 18-19

313. In my opinion, Soler anticipates claims 1, 3-5, 9, 12, 14-15, and 18-19.

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

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

Reference Number	Claim Limitation
[1pre]	"A surface cleaning apparatus comprising:"
[9pre]	"A surface cleaning apparatus comprising:"
[18pre]	"A surface cleaning apparatus comprising:"

314. To the extent the preambles are limiting, in my opinion, Soler teaches a surface cleaning apparatus.

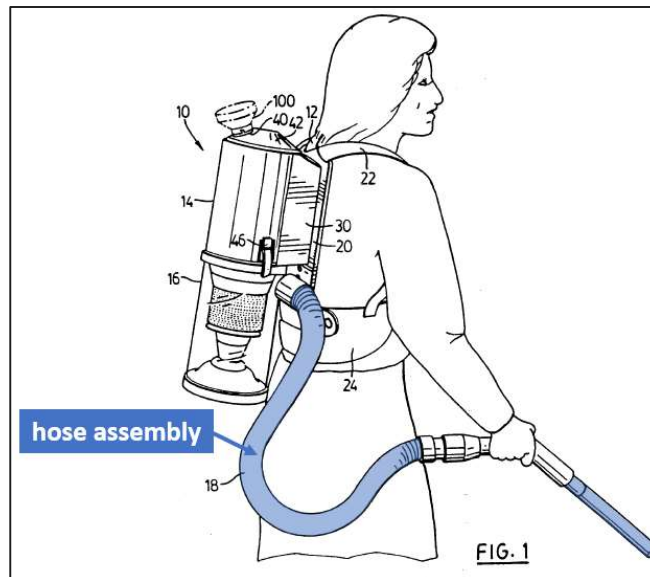
315. In particular, Soler teaches a vacuum cleaner which in my opinion a POSA would understand as a "surface cleaning apparatus." Ex1009, Abstract, Figs. 1-2, 1:9-12, 3:11-16.

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

Reference Number	Claim Limitation
[1a]	“a. a dirt inlet;”
[9a]	“(a) a dirt inlet;”
[18a]	“(a) a dirt inlet;”

316. In my opinion, Soler teaches a “dirt inlet”/“dirt air inlet.”¹¹

317. As illustrated below, a POSA would have understood Soler’s **hose assembly** to be a “dirt inlet”/“dirt air inlet”:



Ex1009, Fig. 1, 4:11-16, 6:65-7:5.

¹¹ [1c]/[9c]/[18d] claim “the dirt air inlet.”

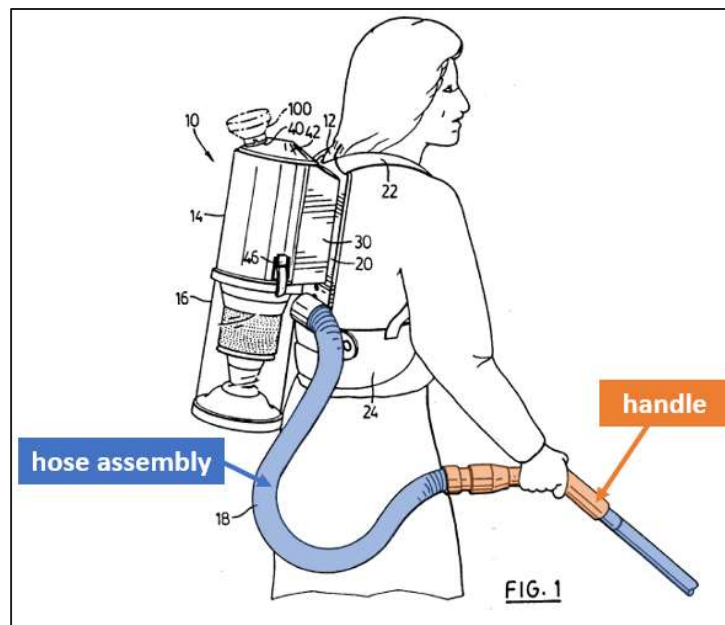
c. [1b]/[9b]/[18b]

Reference Number	Claim Limitation
[1b]	“b. a handle;”
[9b]	“(b) a handle;”
[18b]	“(b) a handle;”

318. In my opinion, Jung teaches a handle.

319. As illustrated below, a POSA would understand Soler’s vacuum to include

a **handle**:



Ex1009, 4:11-16, Fig. 1.

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

Reference Number	Claim Limitation
[1c]	“c. a cyclone separator having an outer wall, a fluid inlet downstream from the dirt air inlet and a fluid outlet;”
[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;”
[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;”

320. In my opinion, Soler teaches cyclone separator having an outer wall, a fluid inlet downstream from the dirt air inlet and a fluid outlet (Limitation [1c]).

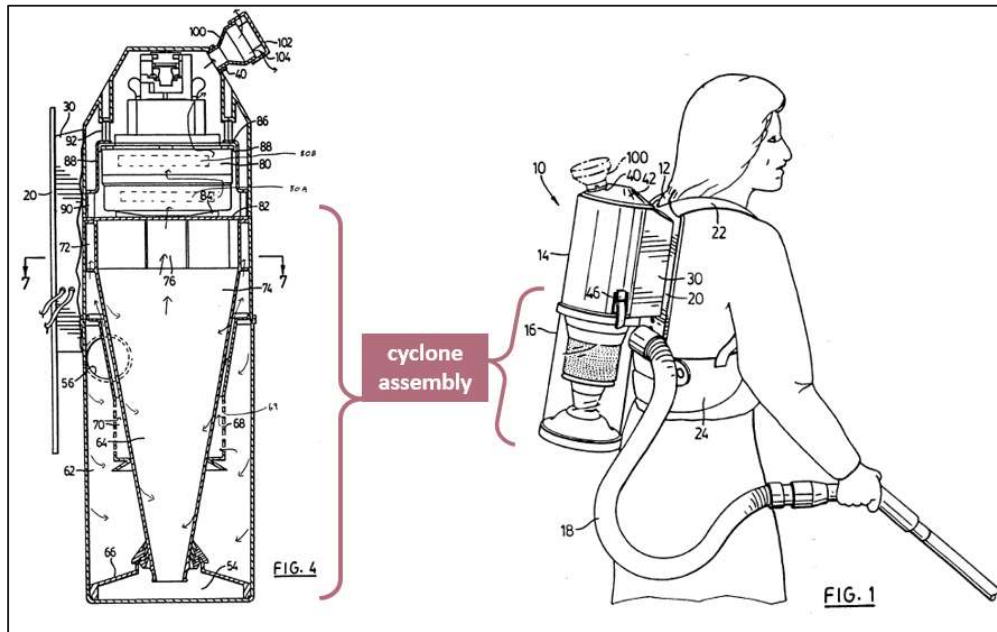
321. In my opinion, Soler teaches a cyclone separator comprising a cyclone chamber and a dirt collection chamber, the cyclone separator having a fluid inlet downstream from the dirt air inlet, an openable end and a fluid outlet. (Limitation [9c]).

322. In my opinion, Soler teaches a cyclonic unit comprising a cyclone chamber and a dirt collection chamber and having an openable end, the cyclone chamber having an outer wall, a fluid inlet downstream from the dirt air inlet and a fluid outlet (Limitations [18c] and [18d]).

323. In my opinion, 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. Soler teaches that its **cyclone assembly** “comprises at least one

cyclone,” and “[p]referably ... a first cyclone chamber and a second cyclone chamber in series”:

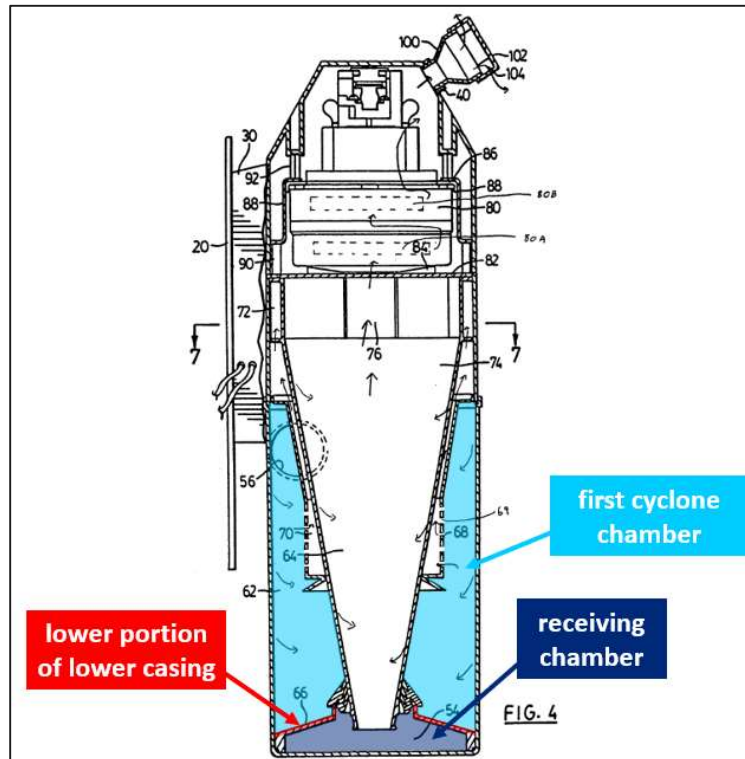


Id.

324. Regarding Limitations [9c]/[18c]¹², in my opinion, 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. Soler’s cyclone assembly comprises a **first cyclone chamber** which rotates “dirt laden air” such that “larger and heavier dirt is deposited in the lower portion of lower casing” (which a POSA would have understood as

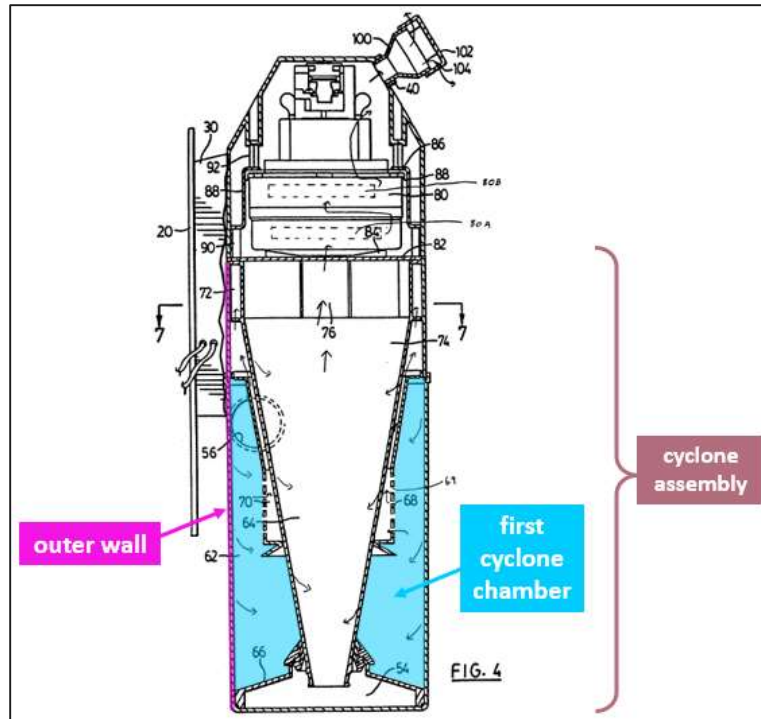
¹² For Limitation [1d], in my opinion, Soler teaches “a cyclone chamber and a dirt collection chamber” for the same reasons.

a “cyclone chamber”) and a second cyclone chamber that separates “finer dirt particles” that are then “deposited in [a] **receiving chamber**” (which a POSA would have understood as a “dirt collection chamber”):



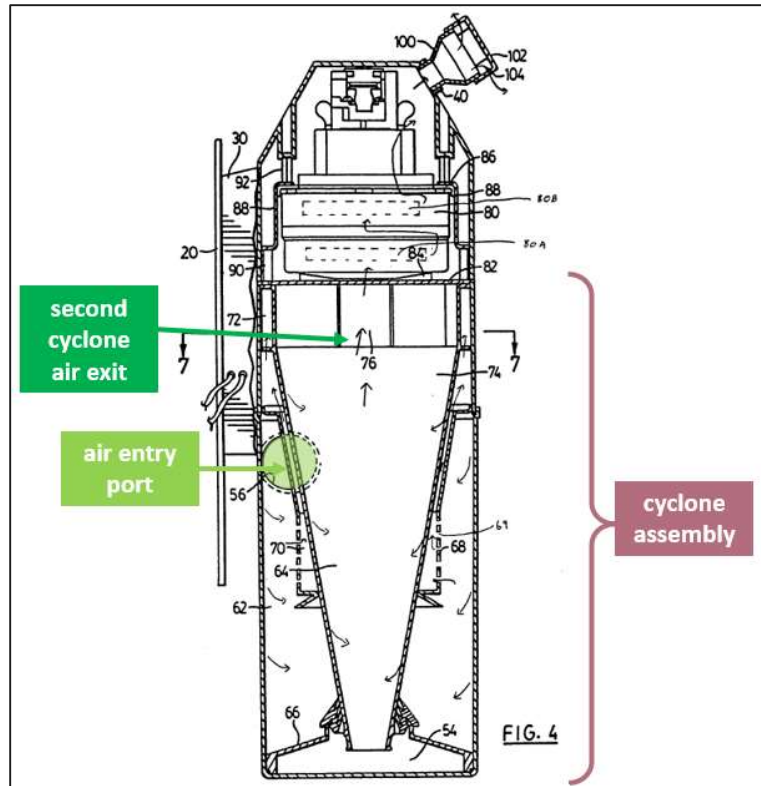
Id.

325. Regarding Limitations [1c]/[18d], in my opinion, Soler teaches that the “cyclone separator” and “cyclone chamber” each have an “outer wall.” Ex1009, 5:46-48, 6:5-21, Fig. 4. As illustrated below, Soler’s **cyclone assembly** and **first cyclone chamber** each have an **outer wall**:



Id.

326. Regarding Limitations [1c]/[9c], in my opinion, 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. Specifically, and as illustrated below, Soler teaches that its **cyclone assembly** (“cyclone assembly”) includes an **air entry port** (which a POSA would have understood as a “fluid inlet”) through which dirty air enters the first cyclone chamber. *Id.* Soler teaches that air then travels from the first cyclone chamber to the second cyclone chamber and exits the **cyclone assembly** via a **second cyclone air exit** (which a POSA would have understood as a “fluid outlet”):

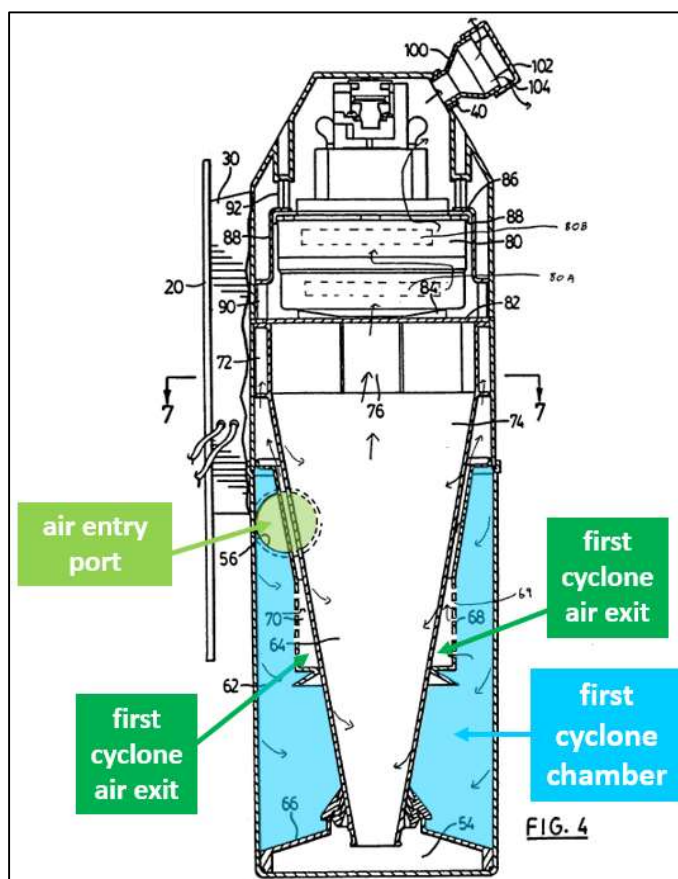


Id.

327. In my opinion, a POSA would have understood Soler’s “fluid inlet” as downstream from the “dirt air inlet” as Soler teaches that 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.*

328. Regarding Limitation [18d], in my opinion, 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. In my opinion, Soler’s **air entry port** is also an inlet of the cyclone chamber (*i.e.*,

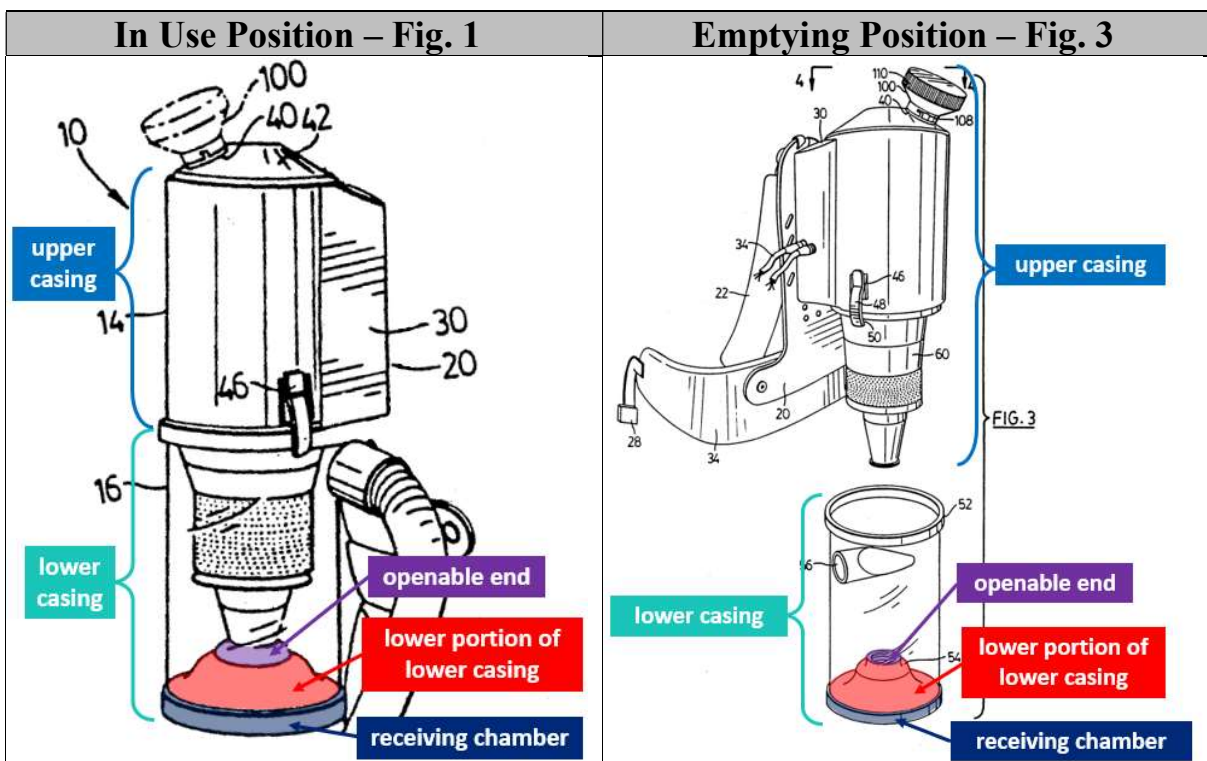
Soler's **first cyclone chamber**) and is downstream from the “dirt air inlet” for the same reasons as I previously described in Limitation [1c]/[9c]. Moreover, in my opinion, Soler teaches that its “cyclone chamber” (**first cyclone chamber**) has a fluid outlet: as illustrated below, Soler teaches that air exits the **first cyclone chamber** “via **first cyclone air exit** 68 to passage 70”:



Id.

329. In my opinion, a POSA would have understood Soler's **first cyclone air exit** as a “fluid outlet” of the “cyclone chamber” *Id.*

330. Regarding Limitations [9c]/[18c], in my opinion, Soler teaches that the “cyclone separator”/“cyclone chamber” has “an openable end.” Ex1009, Figs. 1, 3, 5:46-57. In my opinion and as illustrated below, a POSA would have understood that 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:



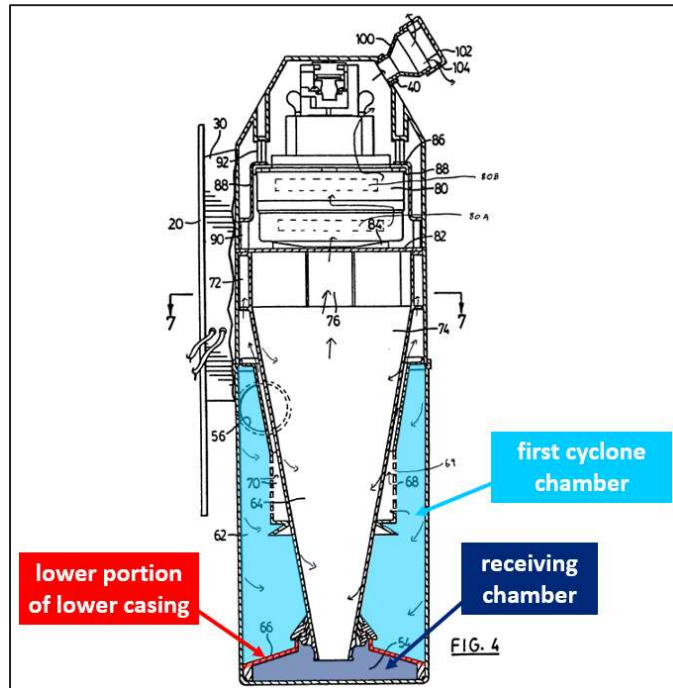
Id.

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

Reference Number	Claim Limitation
[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,”
[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”
[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,”

331. In my opinion, Soler teaches 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 (Limitation [1d]).

332. In my opinion, Soler teaches 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 (Limitation [9d]).
333. In my opinion, Soler teaches 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 (Limitation [18e]).
334. In my opinion, 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; *see also* Ground 9, Limitations [1c]/[9c]/[18c]/[18d]. Soler teaches that a **lower portion of lower casing** separates the **first cyclone chamber** from the **receiving chamber**:

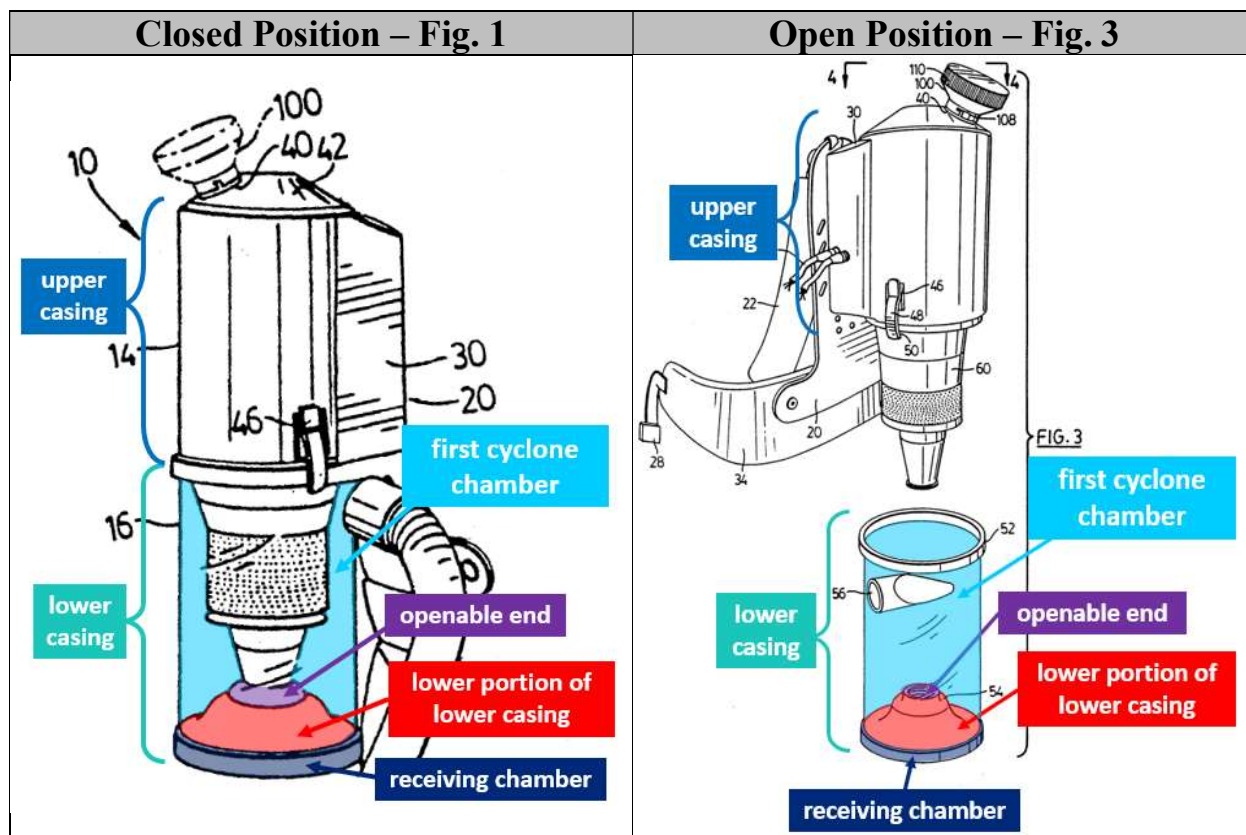


Id.

335. From this, a POSA would have understood that Soler’s **lower portion of lower casing** is positioned between the “cyclone chamber) (*i.e.*, the **first cyclone chamber**) and the “dirt collection chamber (*i.e.*, the **receiving chamber**). *Id.* In my opinion, a POSA would have also understood that the **lower portion of lower casing** has a surface facing the **first cyclone chamber** and thus has “a cyclone chamber surface.” *Id.*

336. Regarding Limitations [9d]/[18e], in my opinion, Soler teaches that the “plate [is] positioned...at an openable end.” In particular, in my opinion, a POSA would have understood that 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 Limitation [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; *see also* Ground 9, Limitations [1c]/[9c]/[18c]/[18d]. As illustrated below, the **openable end** of the **receiving chamber** is integral with the **lower portion of lower casing** (the “plate”), and, in my opinion, is thus at “an openable end” of the “dirt collection chamber” (**receiving chamber**) and the “cyclone chamber” (**first cyclone chamber**):

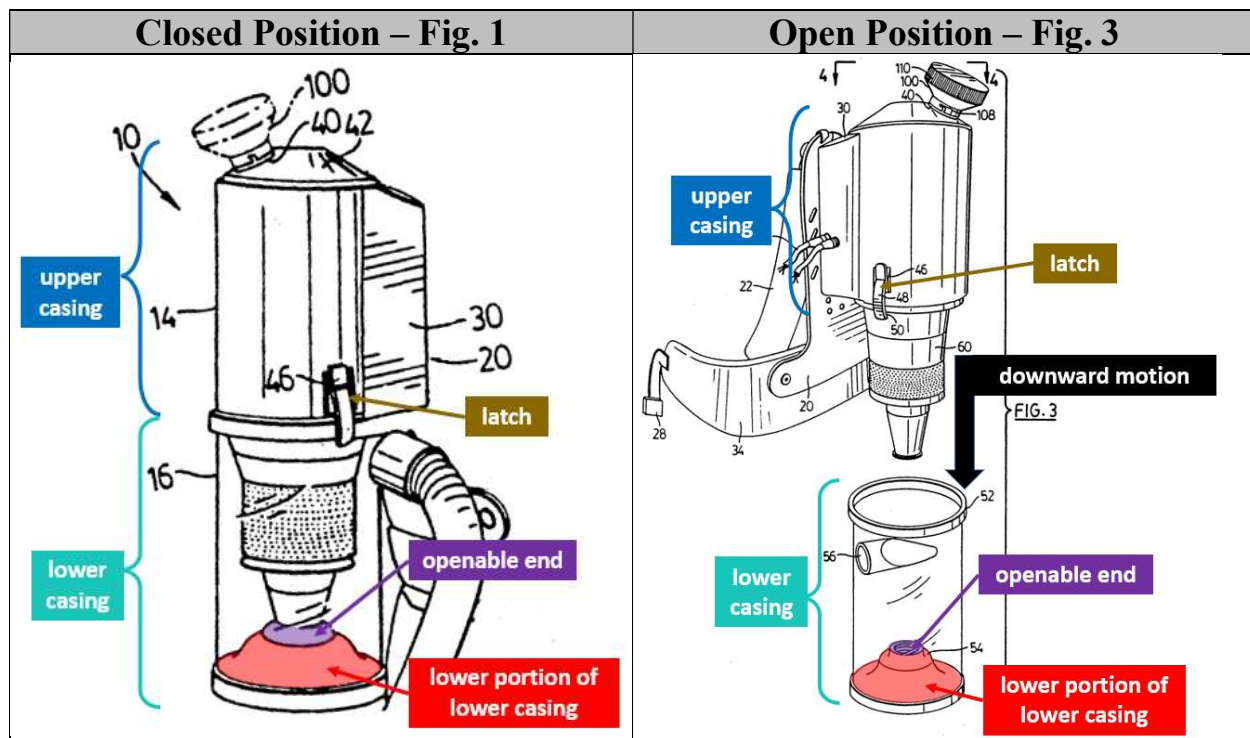


Id.

337. Further, the **openable end** is located within the **lower casing**, which a POSA would have understood is “an openable end” of the “cyclone

separator”/“cyclonic unit.” *Id.* Regarding Limitation [1d], in my opinion, Soler teaches that the “dirt collection chamber” has “an openable end” for these same reasons *Id.*

338. Regarding Limitations [1d]/[9d]/[18e], in my opinion, 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. 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**, Soler illustrates that the **openable end** of the **receiving chamber** is opened:



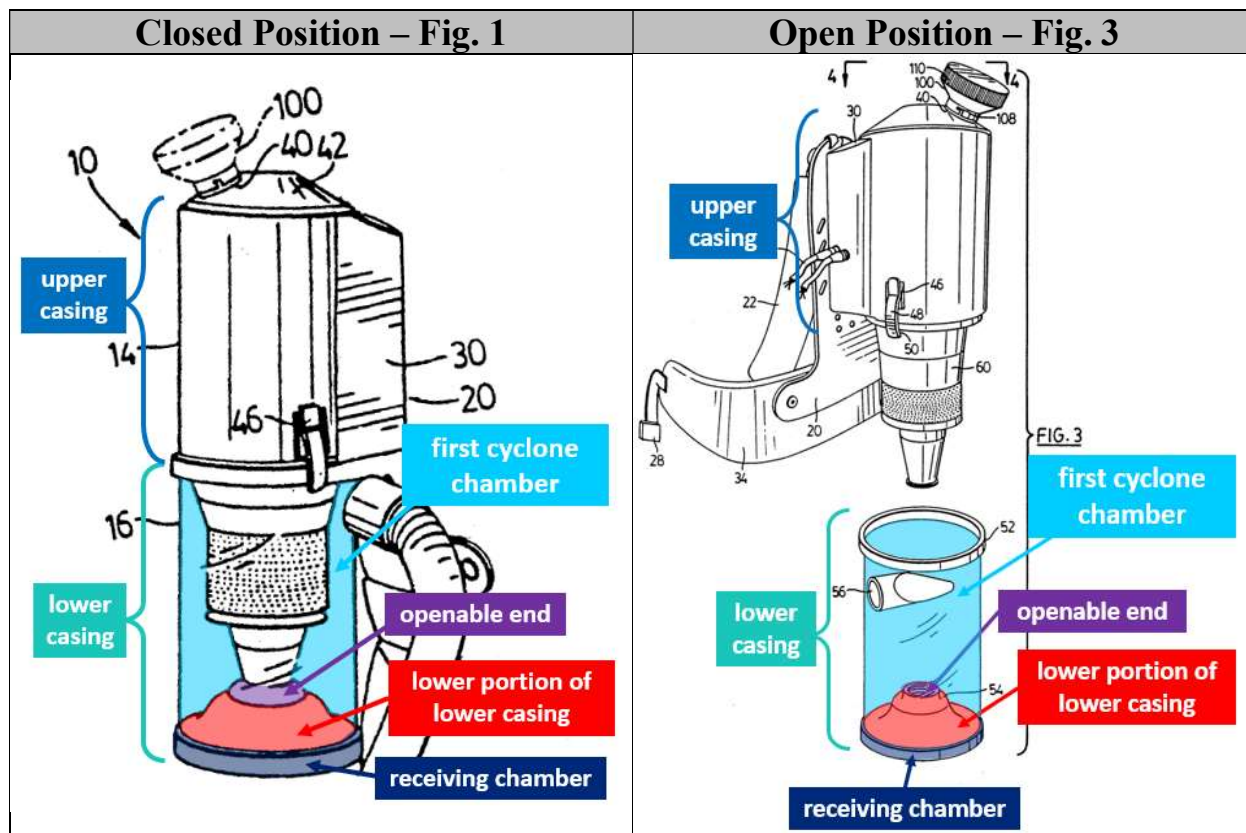
Id.

339. In my opinion, a POSA would have understood that 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.

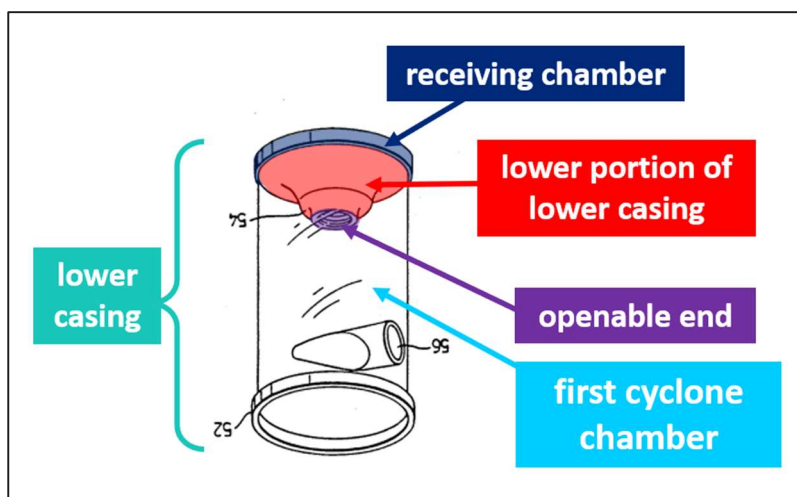
340. For Limitations [1d]/[9d]/[18e], in my opinion, Soler teaches that when the plate is in the emptying position, it is in a position to permit dirt in the cyclone chamber and the dirt collection chamber to be removed concurrently. Ex1009, Figs. 1, 3-4, 5:46-6:37. When the **lower portion of**

lower casing is in the open (“emptying”) position, in my opinion and as illustrated below, a POSA would have understood that 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.* In my opinion and as illustrated below, a POSA would have understood that 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**:



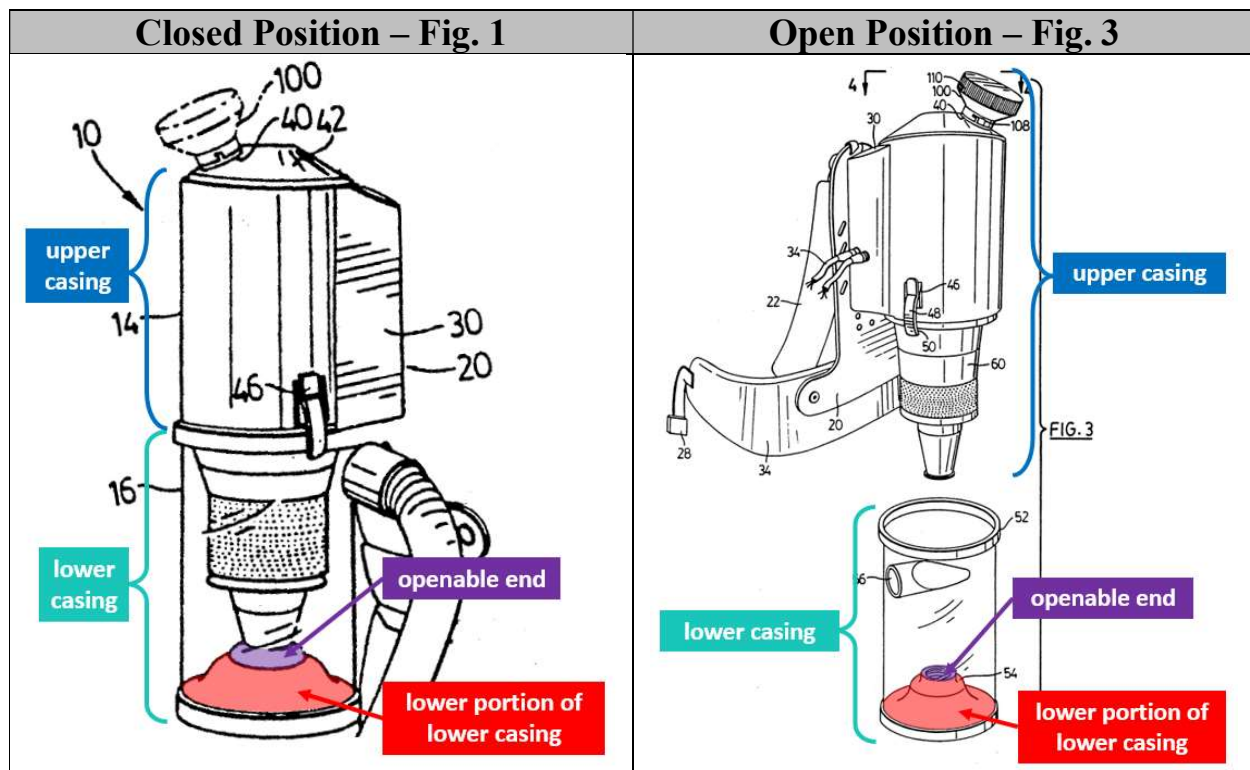
Id.

341. For example, in this state, in my opinion, a POSA would have understood that 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 tipping the **lower casing** upside down:



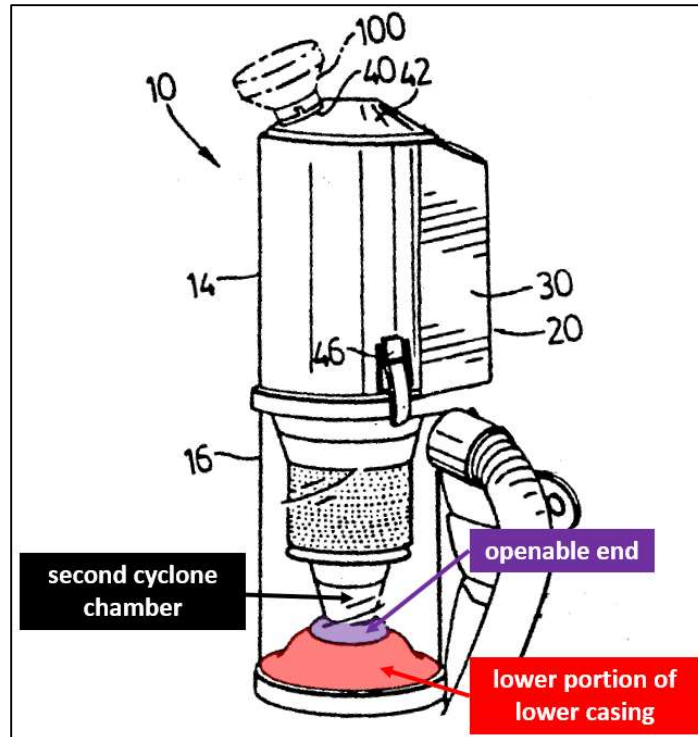
Id.

342. Regarding Limitation [18e], in my opinion, 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; *see also* Ground 9, Limitations [1c]/[9c]/[18c]/[18d]. 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.

343. Because the **openable end** is a part of the **lower portion of lower casing**, a POSA would have understood that it supports the **lower portion of lower casing**. *Id.* Further, in my opinion, a POSA would have understood that 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 as illustrated below acts as a central anchor or post for the **lower portion of lower casing**:



Id.

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

Reference Number	Claim Limitation
[1e]	“e. a fluid flow motor.”
[9e]	“(e) a fluid flow motor.”
[18f]	“(f) a fluid flow motor.”

344. In my opinion, Soler teaches a fluid motor.

345. Soler teaches that its vacuum cleaner includes a “motor” to “generate[] an air flow” Ex1009, 6:65-7:5, Fig. 1. In my opinion, a POSA would have understood Soler’s “motor” to be a “fluid flow motor.”

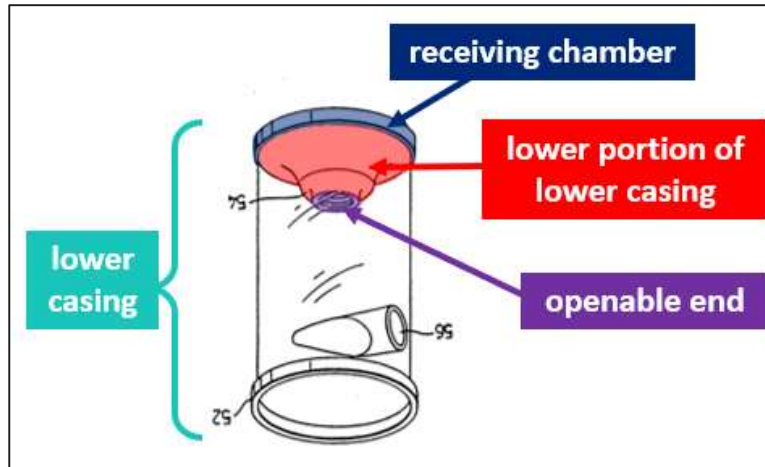
2. [3]

Reference Number	Claim Limitation
[3]	“The surface cleaning apparatus of claim 1 wherein the openable end of the dirt collection chamber is a bottom.”

346. In my opinion, Soler anticipates claim 1 and teaches wherein the openable end of the dirt collection chamber is a bottom.

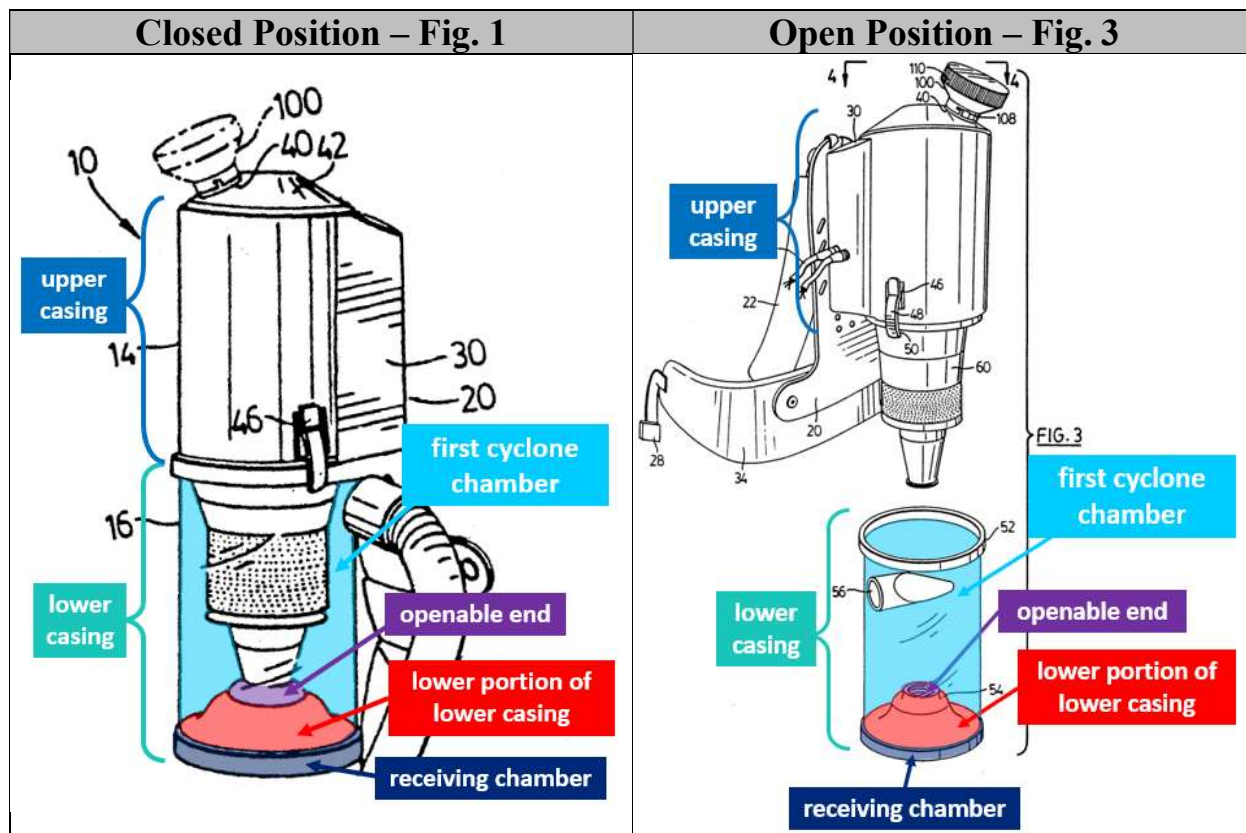
347. Soler teaches claim 1. Ground 9, Limitations [1]/[9]/[18].

348. In my opinion, Soler further teaches that “the openable end of the dirt collection chamber is a bottom.” Ex1009, Figs. 1, 3-4, 5:46-57, 6:5-37. In particular, a POSA would have understood that 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:



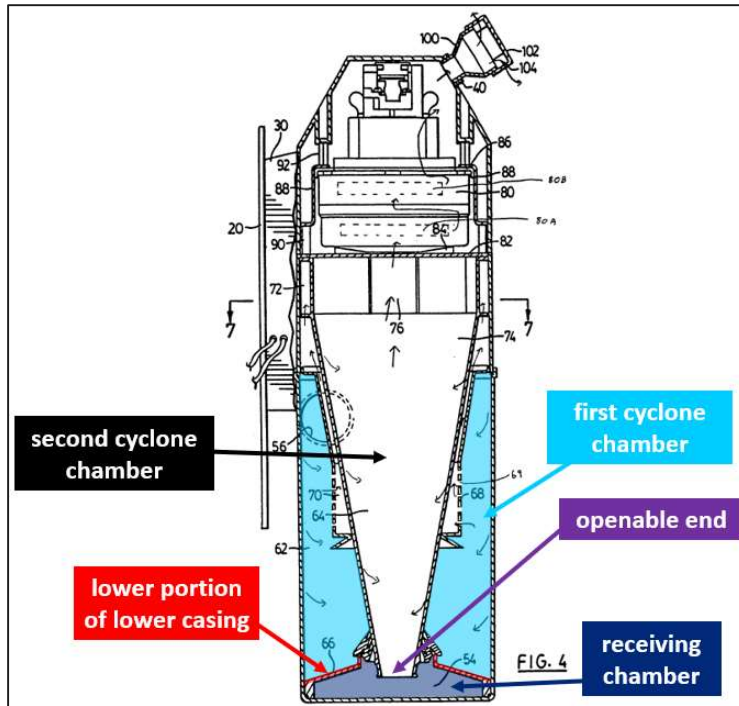
Id.

349. Additionally, in my opinion and as illustrated below, the **openable end** is also “a bottom” of the **first cyclone chamber** (“cyclone chamber”) and the **cyclone assembly** (“cyclone separator”):



Id.

350. Further, Soler further teaches debris is deposited in the **receiving chamber** from a **second cyclone chamber**. *Id.* Therefore, in my opinion, the **openable end** of the **receiving chamber** is also a bottom of the **second cyclone chamber**:



Id.

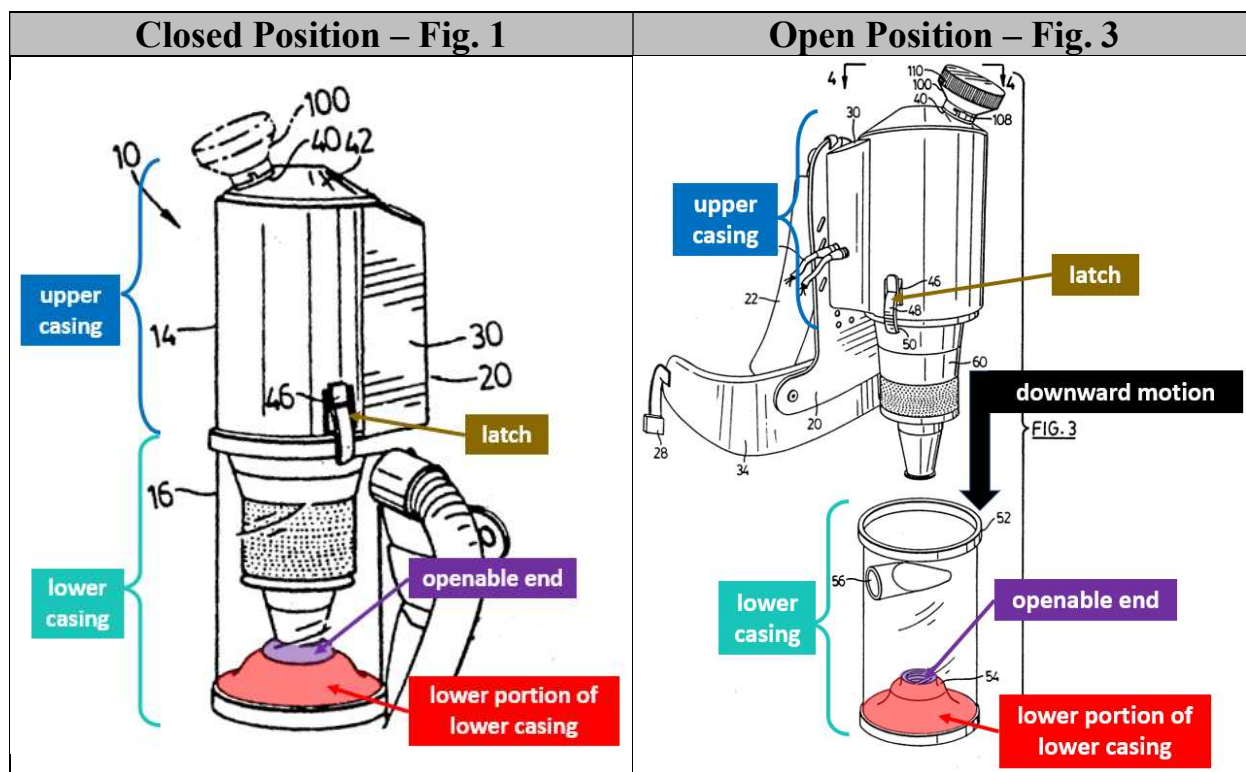
3. [4]/[15]/[19]

Reference Number	Claim Limitation
[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.”
[15]	“The surface cleaning apparatus of claim 9 wherein the plate is moveable subsequent to the openable end being opened.”
[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.”

351. In my opinion, Soler anticipates claim 1 and teaches wherein the plate is automatically moved to the emptying position when the openable end is opened.

352. In my opinion, Soler anticipates claim 9 and teaches wherein the plate is

- moveable subsequent to the openable end being opened.
353. In my opinion, Soler anticipates claim 18 and teaches wherein the plate is moveable to a emptying position when the openable end is opened.
354. Soler teaches claims 1, 9, and 18. Ground 9, Limitations [1]/[9]/[18].
355. Regarding claim 4, in my opinion, Soler further 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; Ground 9, Limitations [1d]/[9d]/[18e]. A POSA would have understood that 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.

356. Regarding claim 19, in my opinion, Soler’s **lower portion of lower casing** (plate) “is moveable to a[n] emptying position when the openable end is opened” for the reasons I previously discussed for Limitation [1d]. Ground 9, Limitations [1d]/[9d]/[18e]; Ex1009, Figs. 1, 3, 5:46-6:37.

357. Regarding claim 15, Soler teaches that, “subsequent to the openable end being opened,” the **lower portion of lower casing** (plate) “is moveable”: a POSA would have understood that 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.

4. [5]

Reference Number	Claim Limitation
[5]	“The surface cleaning apparatus as claimed in claim 1 wherein the plate is supported by the openable end.”

358. In my opinion, Soler anticipates claim 1 and teaches wherein the plate is supported by the openable end.

359. Soler teaches claim 1. Ground 9, Limitations [1]/[9]/[18].

360. In my opinion, Soler teaches “the plate is supported by the openable end” for the same reasons I previously discussed for Limitation [18e]. *See* Ground 9, Limitations [1d]/[9d]/[18e].

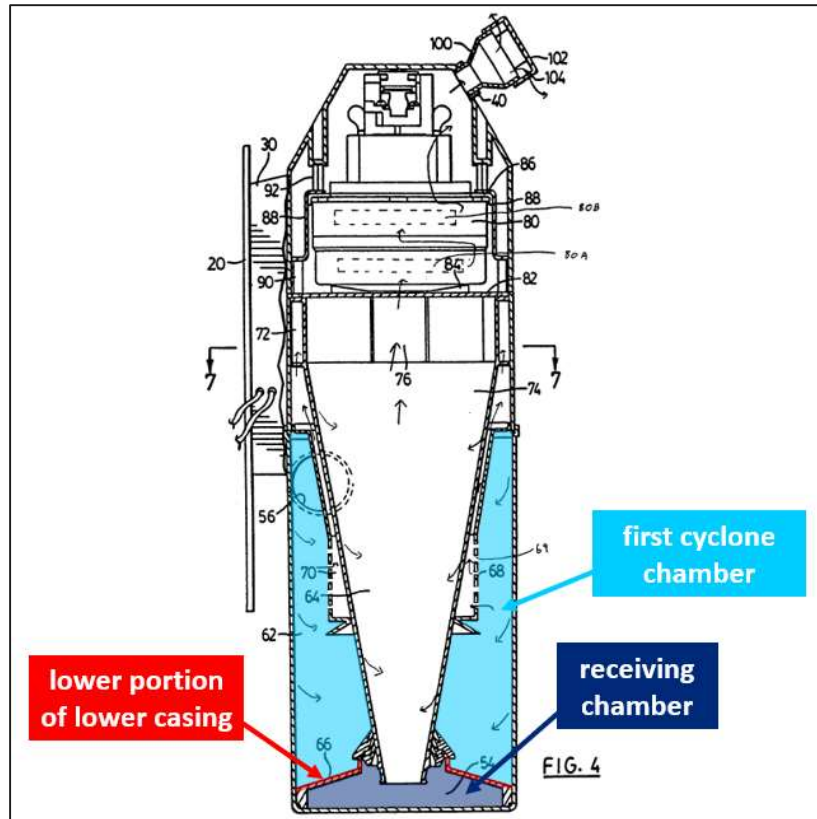
5. [12]

Reference Number	Claim Limitation
[12]	“The surface cleaning apparatus of claim 9 wherein the dirt collection chamber extends under the plate.”

361. In my opinion, Soler anticipates claim 9 and teaches wherein the dirt collection chamber extends under the plate.

362. Soler teaches claim 9. Ground 9, Limitations [1]/[9]/[18].

363. In my opinion, Soler further teaches that its “dirt collection chamber” (**receiving chamber**) “extends under the plate” (**lower portion of lower casing**), as depicted below in annotated Figure 4:



Ex1009, Fig. 4, 6:5-37.

6. [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."

364. In my opinion, Soler anticipates claim 9 and teaches wherein the surface cleaning apparatus is selected from the group consisting of a vacuum cleaner, a sweeper and a carpet extractor.

365. Soler teaches claim 9. Ground 9, Limitations [1]/[9]/[18].

366. In my opinion, Soler teaches a "vacuum cleaner" for the same reasons as I

described in Limitations [1pre]/[9pre]/[18pre]. Ground 9, Limitations [1pre]/[9pre]/[18pre].

J. Ground 10: Soler Renders Claims 1, 3-5, 7, 9, 12, 14-19 Obvious

367. In my opinion, Soler renders obvious claims 1, 3-5, 7, 9, 12, 14-19.

1. [1]/[3]-[5]/[9]/[12]/[14]-[15]/[18]-[19]

368. In my opinion, to the extent Soler does not anticipate the claims challenged in Ground 9, it renders them obvious.

369. Specifically, to the extent PO argues that different embodiments or disclosures were combined or used in Ground 9, in my opinion, those claims would have been obvious over Soler. In my opinion, a POSA would have found it obvious to combine or modify Soler's embodiments in view of other disclosures within Soler and making such combinations/modifications to the components of the disclosed invention would have used known methods and techniques to yield predictable results. In my opinion, doing so would have involved the simple substitution of known elements and would have been obvious to try as there were a limited number of known and predictable solutions for arranging the components in Soler's disclosed invention.

2. [16]

Reference Number	Claim Limitation
[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.”

370. In my opinion, Soler teaches a surface cleaning apparatus for the reasons I previously described in Ground 9. Ground 9, Limitations [1pre]/[9pre]/[18pre].

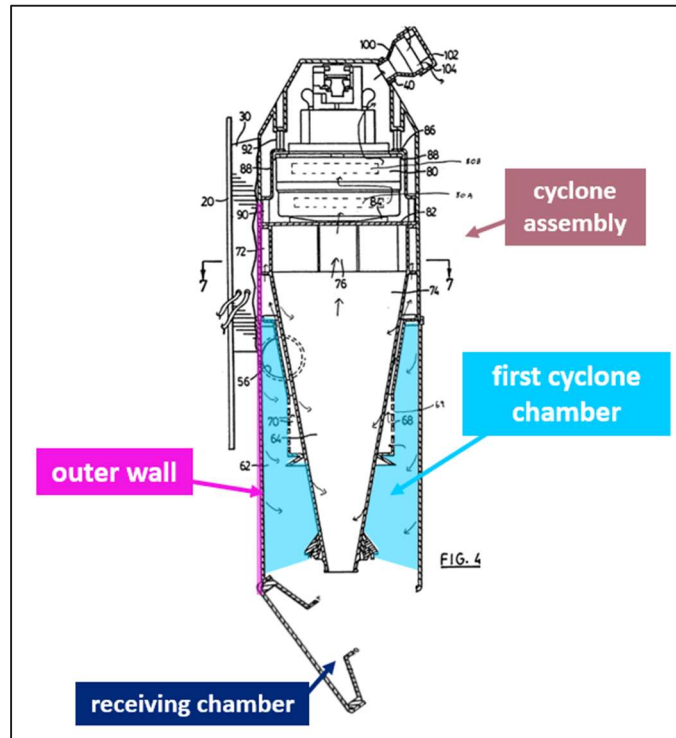
371. In my opinion, Soler teaches a dirt inlet for the reasons I previously described in Ground 9. Ground 9, Limitations [1a]/[9a]/[18a].

372. In my opinion, Soler teaches a handle for the reasons I previously described in Ground 9. Ground 9, Limitations [1b]/[9b]/[18b].

373. In my opinion, Soler teaches 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 for the reasons I previously described in Ground 9. Ground 9, Limitations [1c]/[9c]/[18c]/[18d].

374. In my opinion, Soler teaches a fluid flow motor apparatus for the reasons I previously described in Ground 9. Ground 9, Limitations [1e]/[9e]/[18f].
375. In my opinion, Soler renders obvious 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.
376. In my opinion, 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. 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; *see also* Ex1011 ¶ [0131]. 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]; *see also* Ex1006, Fig. 7; Ex1017, Fig. 3b.
377. Given such teachings regarding the benefits pivotally openable bottoms, which allow users to empty dirt quickly, conveniently, and hygienically without additional effort, in my opinion, 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**:

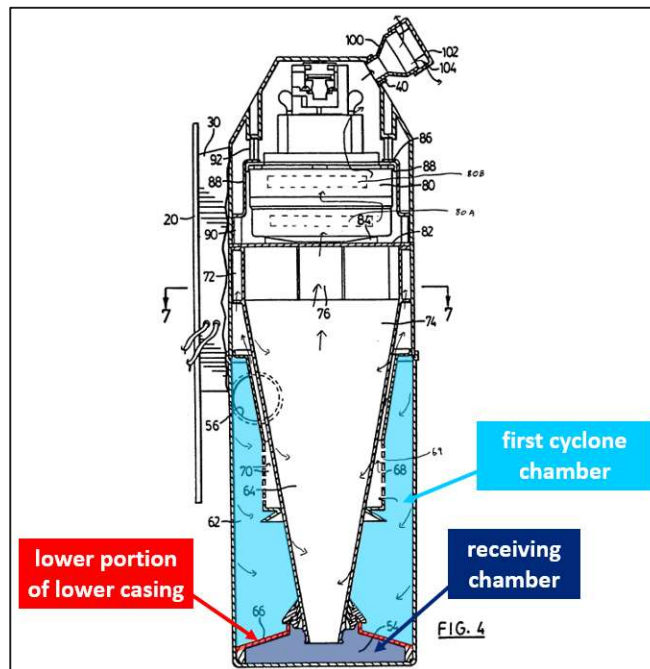


Ex1009, Fig. 4 (modified).

378. In my opinion, the modification above would have involved the straightforward 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). Moreover, in my opinion, making Soler's **receiving chamber** pivotally openable would have been at least obvious to try as there were a finite number of identified, predictable solutions for making it easier to discharge impurities from a vacuum cleaner. And in my opinion, 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 from a vacuum cleaner. *See, e.g.*, Ex1005, 14:19-27; Ex1024, Fig. 5, ¶ [0040].

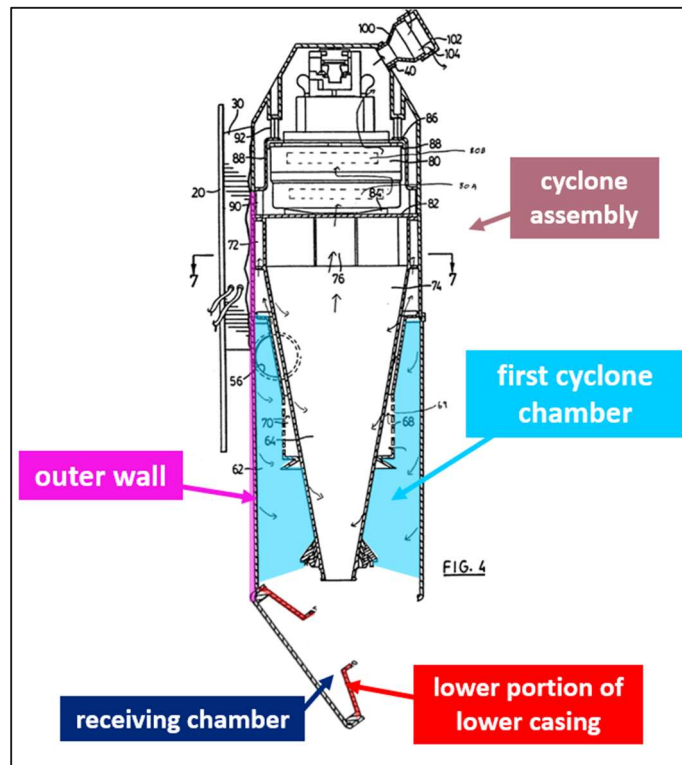
379. Under the above modification, in my opinion, Soler renders obvious Limitation [16d]. As illustrated below, Soler teaches that the **lower portion of lower casing** is positioned between the “cyclone chamber” (**first cyclone chamber**) and the “dirt collection chamber” (**receiving chamber**).



Ex1009, 6:5-37, Fig. 4; *See also* Ground 9, Limitations [1c]/[9c]/[18c]/[18d]

380. In my opinion, Soler, as modified above, renders obvious “wherein the

plate is pivotably mounted to the outer wall of the cyclone separator.” As modified, Soler’s **receiving chamber** is pivotally mounted to the **outer wall** of Soler’s **cyclone assembly**:



Ex1009, Fig. 4 (modified).

381. Because **lower portion of lower casing** (“plate”) is incorporated with the **receiving chamber**, in my opinion, a POSA would have understood that 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**.

3. [7]/[17]

Reference Number	Claim Limitation
[7]	“The surface cleaning apparatus as claimed in claim 1 wherein the openable end is pivotally mounted to the cyclone separator.”
[17]	“The surface cleaning apparatus as claimed in claim 16 wherein the plate is pivotally mounted to the cyclone chamber.”

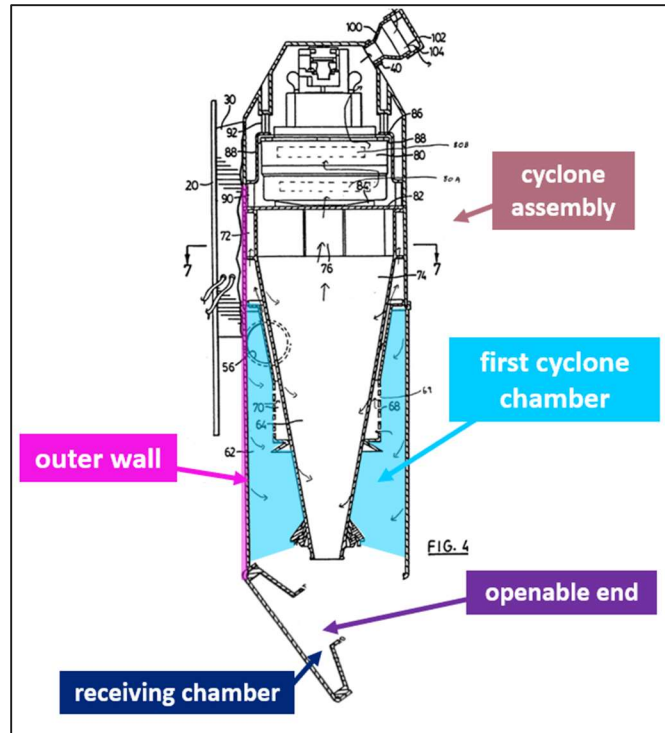
382. In my opinion, Soler renders obvious the surface cleaning apparatus as claimed in claim 1 wherein the openable end is pivotally mounted to the cyclone separator.

383. In my opinion, Soler renders obvious the surface cleaning apparatus as claimed in claim 16 wherein the plate is pivotally mounted to the cyclone chamber.

384. Soler anticipates claim 1 and renders obvious claim 16. Ground 9, Limitations [1]/[9]/[18]; Ground 10, Limitation [16].

385. In my opinion, Soler renders obvious claim 17 for the same reasons I previously described for claim 16. Ground 10, Limitation [16].

386. In my opinion, Soler also renders obvious claim 7 because, under the modification I previously described in Limitation [16d] and as illustrated below, 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”):



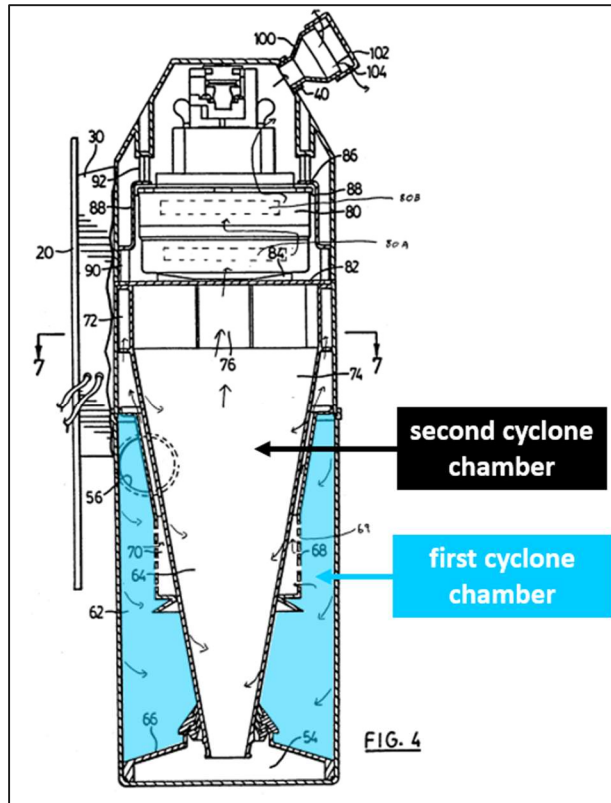
Id.

K. Ground 11: Soler in Combination with Gammack Renders Claims 8 and 20 Obvious

387. In my opinion, Soler in combination with Gammack renders obvious claim 8 and 20.

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

388. Soler teaches a vacuum cleaner with two single-chamber cyclones for separating dust from air:



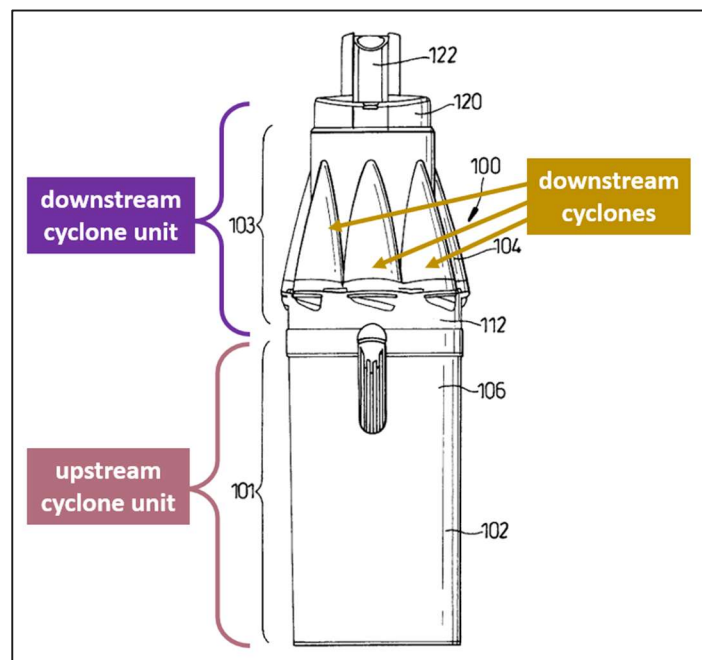
Ex1009, Fig. 4, 6:5-37.

389. In my opinion, a POSA would have understood that adding an additional cyclonic stage to a two-stage cyclonic vacuum cleaner would have improved particle separation. For example, U.S. Pat. No. 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; *see also* Ground 5, § 1. In my opinion, a POSA would have also understood that vacuums with third stage cyclones were known in the art. For example,

U.S. Pat. No. 6,482,252 to Conrad discloses a two-stage cyclonic vacuum and teaches that additional “third stage cyclones” could be added “to further [the] filtration means” of the vacuum. Ex1015, 9:9-12.

390. Given that Soler only had larger first/second cyclone chambers, in my opinion and given the above, 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.

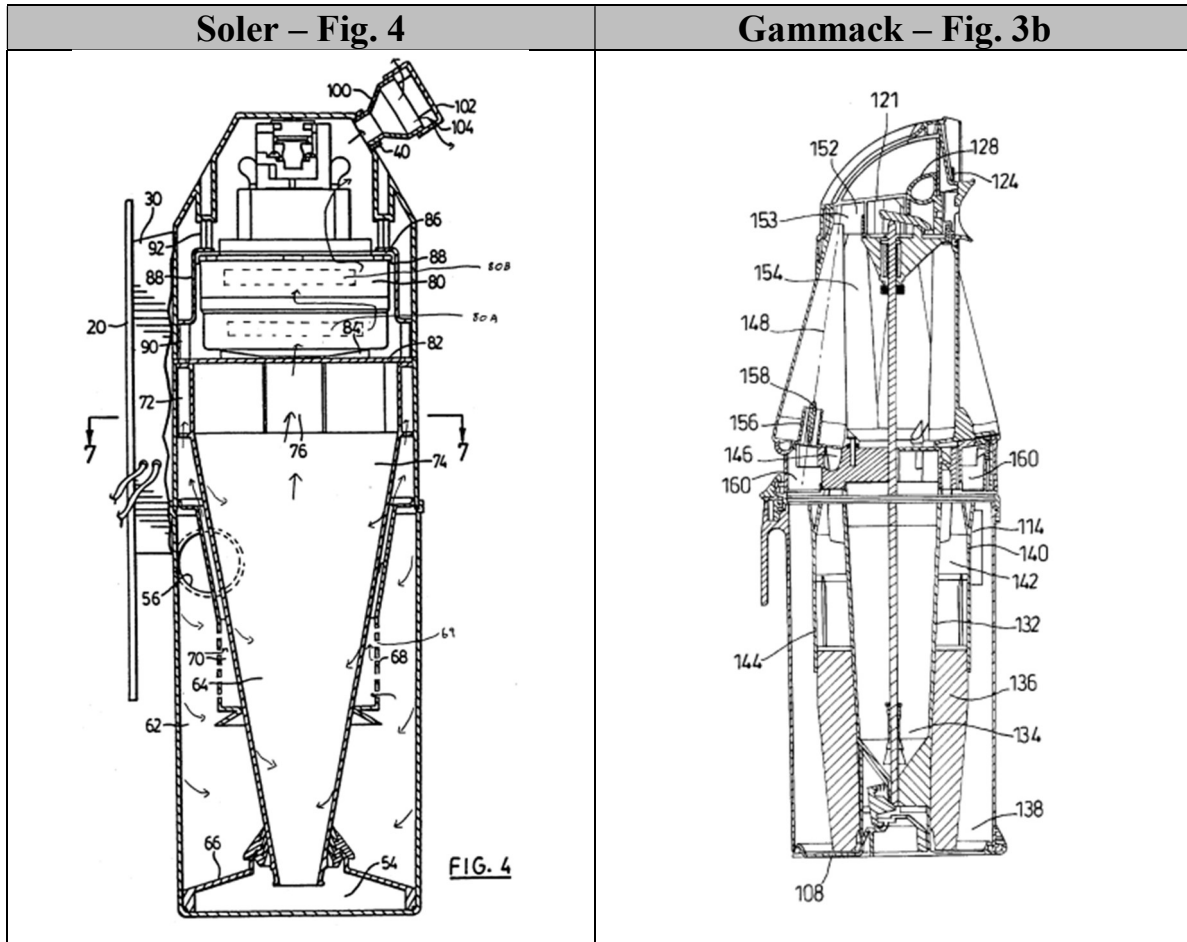
391. Gammack teaches smaller downstream cyclones and the benefits of such cyclones. Specifically, Gammack teaches a single “**upstream cyclone 102**” and **downstream cyclone unit 103** including a plurality of **downstream cyclones 104**:



Ex1016, 4:9-27, Fig. 2a.

392. Gammack teaches its second stage cyclones can remove “very fine dirt and dust particles” not filtered by a first stage. Ex1016, 6:22-55.
393. In my opinion, 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). More specifically, in my opinion, a POSA would have been motivated to position 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;.
394. In my opinion, modifying Soler in view of Gammack as described above 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. And in my opinion, a POSA also 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 from air and multiple filtering stages, and, as illustrated below, both Soler and Gammack depict a similar vacuum structure and overall

form factor, which a POSA would have understood to mean mechanical components of one to be easily implemented in the other:



Ex1009, Fig. 4; Ex1016, Fig. 3b

395. Moreover, in my opinion, 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; Ground 5, §1.

2. [8]/[20]

Reference Number	Claim Limitation
[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.”
[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.”

396. In my opinion, Soler in combination with Gammack renders obvious 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.

397. In my opinion, Soler in combination with Gammack renders obvious 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.

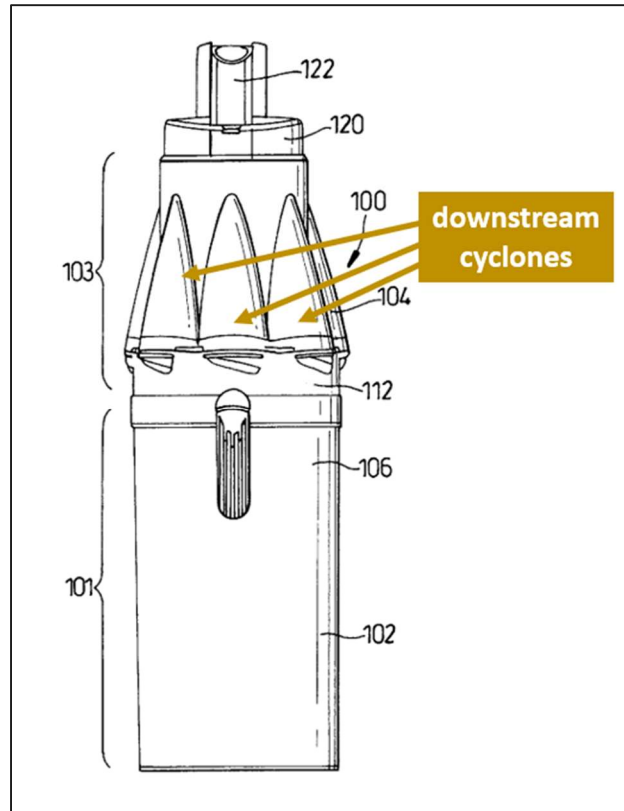
398. Soler teaches and/or renders obvious claims 1 and 18. Ground 9, Limitations [1]/[9]/[18]; Ground 10, Limitations [1]/[3]-[5]/[9]-[12]/[14]-[15]/[18]-[19].

399. In my opinion, a POSA would have understood Gammack’s **downstream cyclones 104** as collectively being “a cyclonic stage”/“cyclonic unit.”

Ex1016, 4:9-27, Fig. 2a.

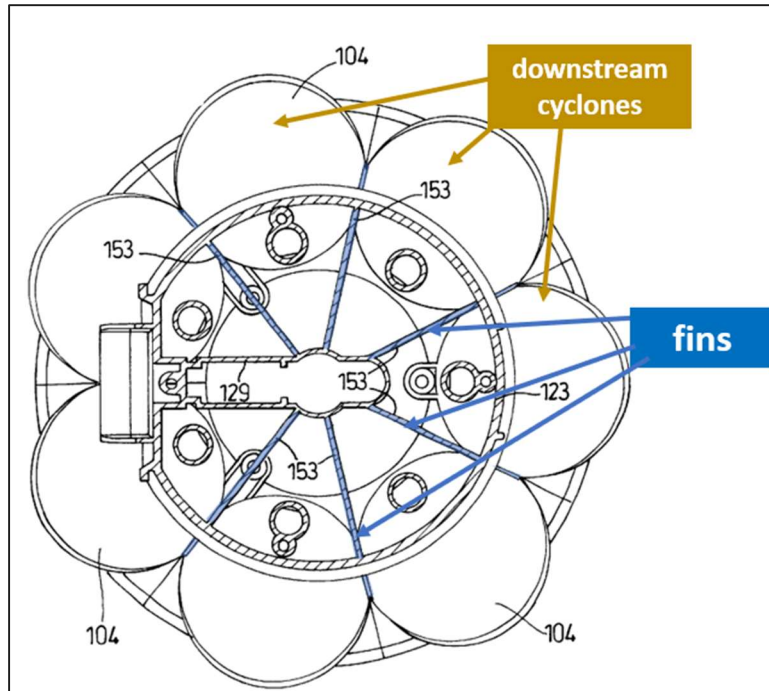
400. Regarding claim 8, in my opinion, the Soler/Gammack combination teaches “a cyclonic stage downstream from the cyclone separator.” Because Gammack’s **downstream cyclones 104** are downstream from Gammack’s single-chamber first cyclonic stage (“**upstream cyclone 102**”), as implemented in the Soler/Gammack combination, a POSA would have understood that Gammack’s **downstream cyclones 104** would likewise be downstream from Soler’s single-chamber first cyclone stage. Ex1016, 4:9-27, Fig. 2a.

401. In my opinion, Gammack teaches that the downstream “cyclonic stage”/“cyclonic unit” (**downstream cyclones 104**) comprises a plurality of cyclones in parallel. As illustrated below, a POSA would have understood Gammack’s **downstream cyclones 104** to be both geometrically “in parallel” and have an airflow path “in parallel”:



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

402. In my opinion, 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. Gammack teaches that “**fins** are provided between the second ends of adjacent [**downstream**] **cyclones**”:

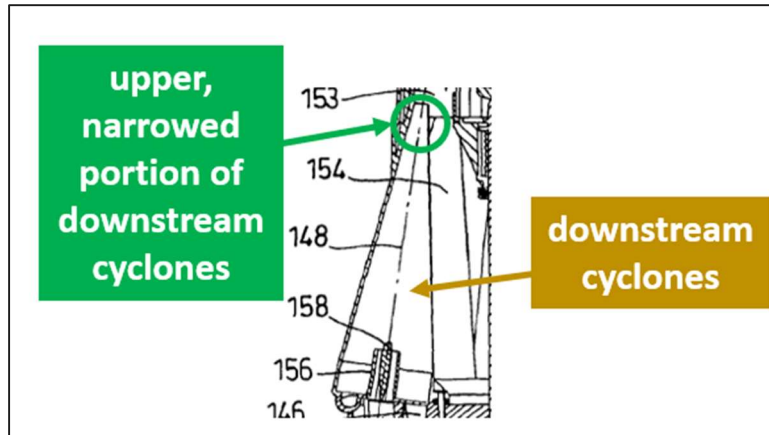


Ex1016, 10:1-2, Fig. 5.

403. In my opinion, a POSA would have understood Gammack’s **fins** to be “divider plates” of the **downstream cyclones**.

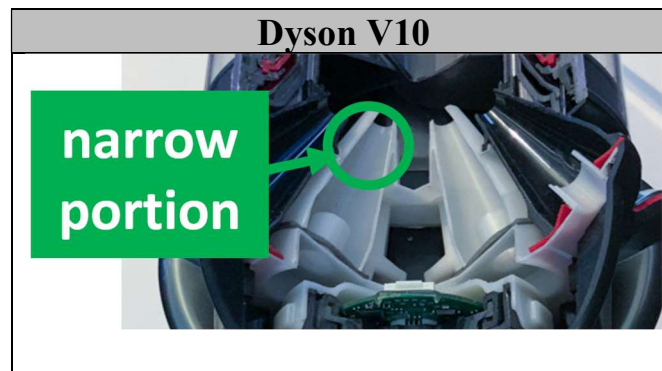
404. To the extent PO argues “divider plates” must be internal to the “cyclones,” in my opinion, Gammack likewise teaches claims 8 and 20 at least to the same extent accused by PO in the co-pending ITC Litigation.

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



Ex1006, Fig. 3b (excerpted)

406. As previously discussed, this is at least as much disclosure as PO accuses of infringement in the co-pending ITC Litigation:



Ex1026.

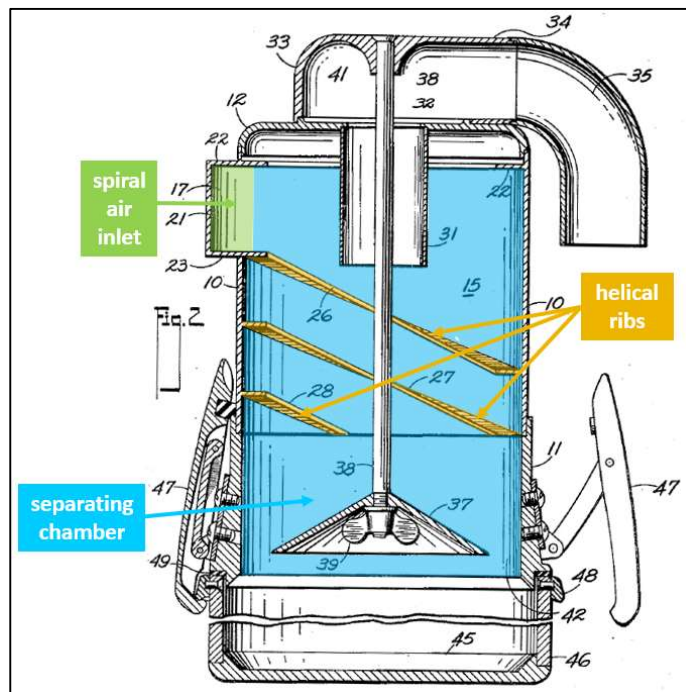
407. In my opinion, these narrowed portions of Gammack teach that “at least some of the plurality of cyclones is each provided with a divider plate”/“a plurality of divider plates” at least to the same extent as PO accuses in the co-pending ITC Litigation.

L. Ground 12: Soler in Combination with Davis Renders Claims 2 and 13 Obvious

408. In my opinion, Soler in combination with Davis renders obvious claim 2 and 13.

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

409. 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.

410. Davis additionally teaches that its **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 can “accelerate the air in a zone in which separation takes place, so that centrifugal force is increased.” Ex1010, 1:19-21, 2:34-36, 4:64-69.

411. In my opinion, a POSA would have been motivated to implement Davis’ **helical ribs** within Soler’s **cyclone assembly**. Soler teaches that its **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. Given this, 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. In my opinion, a POSA would have been specifically motivated to use **helical ribs** of Davis due to the similarity in the descriptions of cyclonic operation between Soler and Davis. 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 the 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. From this, in my opinion, 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.

412. In my opinion, 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]” (*e.g.*, preventing the air from prematurely losing cyclonic action). Ex1009, 6:17-25; Ex1010, Fig. 2, 4:57-5:3, 7:12-19. Further, in my opinion, 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. In my opinion, 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.

2. [2]/[13]

Reference Number	Claim Limitation
[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.”
[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.”

413. In my opinion, Soler in combination with Davis renders obvious 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.

414. In my opinion, Soler in combination with Davis renders obvious 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.

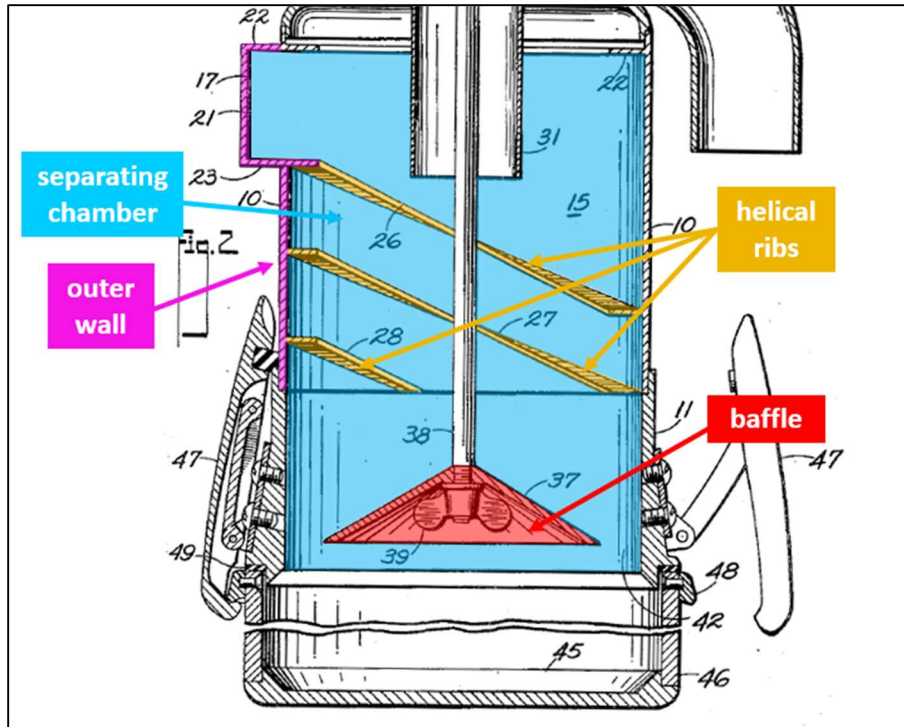
415. Soler teaches and/or renders obvious claims 1 and 9. Ground 9, Limitations [1]/[9]/[18]; Ground 10, Limitations [1]/[3]-[5]/[9]-[12]/[14]-[15]/[18]-[19].

416. Davis’ **helical ribs**, as implemented in Soler’s **cyclone assembly**, direct

the flow of air coming into the **cyclone assembly** and thus, in my opinion, would have been understood by a POSA as “a flow director.” Ex1010, Fig. 2, 2:51-3:34, 4:64-69, 3:59-66, 6:2-6; 7:12-19.

417. In my opinion, Davis’ **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 to a position above the plate.” Ex1010, Fig. 2. As illustrated below, Davis’ **helical ribs** extend inwardly and downwardly from the “**outer wall**”¹³ of Davis’ **separating chamber** to a position above Davis’ **baffle**:

¹³ I understand and note that [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.

418. Given the similar purposes between Davis' **baffle** and Soler's **lower portion of lower casing**, in my opinion, a POSA implementing Davis' **helical ribs** in Soler would have been motivated to cause the Davis' **helical ribs** to be positioned above, and stop before, Soler's **lower portion of lower casing**. Therefore, in my opinion, the Soler/Davis combination discloses that the "flow directing surface" extending "inwardly and downwardly into the cyclone chamber from the outer wall of the cyclone chamber to a position above the plate."

XI. SECONDARY CONSIDERATIONS OF NON-OBVIOUSNESS

419. I am unaware of any secondary considerations of non-obviousness that

provide evidence the claims of the above patents are not obvious. To the contrary, as I explained in detail above, the claims are based on an obvious combination of well-known vacuum cleaner parts and configurations. To the extent PO attempts to argue there are secondary considerations of non-obviousness, I reserve the right to evaluate PO's arguments and purported evidence at that time.

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of the Title 18 of the United States Code.

A handwritten signature in black ink, appearing to read "R. A. G. Smith". The signature is stylized with a large initial "R" and a prominent dot over the "i" in "Smith".

Dated: August 21, 2024