

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. 10,327,607

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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 1-14 of U.S. Patent No. 10,327,607 (the “’607Patent”) 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.K. Patent Publication GB2,399,780A (“Liddell”)
 - U.K. Patent Publication GB2,372,434A (“Organ”)
 - U.S. Patent No. 1,940,609 (“Simpson”)
 - Dyson DC14 Owner’s Manual (“DC14Manual”)
 - U.S. Patent Publication US2004/0237482A1 (“Lim”)
 - U.S. Patent 5,267,371 (“Soler”)
6. In my opinion, the Challenged Claims are invalid based on the following:
 - Liddell anticipates claims 1, 3-4, and 6-13.

- Liddell alone or in combination with Organ renders obvious claims 1 and 3-13.
- The combination of Liddell, Organ, and DC14Manual renders obvious claim 10.
- The combination of Liddell and Lim renders obvious claim 14; or the combination of Liddell, Organ, and Lim renders obvious claim 14.
- The combination of Simpson and Liddell renders obvious claims 1-4 and 6-13.
- The combination of Simpson, Liddell, and Organ renders obvious claims 1-13.
- The combination of Simpson, Liddell, and DC14Manual renders obvious claim 10; or the combination of Simpson, Liddell, Organ and DC14Manual renders obvious claims 10.
- The combination of Simpson, Liddell, and Lim renders obvious claim 14; or the combination of Simpson, Liddell, Organ and Lim renders obvious claim 14.
- The combination of Soler and Liddell renders obvious claims 1-4 and 6-13.
- The combination of Soler, Liddell, and Organ renders obvious claims 4-5.
- The combination of Soler, Liddell, and Lim renders obvious claim 14.

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 Director of Mechanical Engineering 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 (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 tear-downs 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 wholistic 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 Exhibit 1003.

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 reviewed the '607 Patent and its file history, as well as the Liddell, Organ, DC14 Manual, Lim, Simpson, and Soler prior art references on which my opinions are based. Other references I have reviewed are mentioned below. 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 contentions served in the related litigation, *SharkNinja Operating LLC v. Dyson, Inc.*, No. 1:23-cv-12372 (D. Mass.) (the "Litigation").

IV. LEGAL PRINCIPLES

33. Dyson's counsel has informed me of certain legal standards. I am not an attorney. 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. 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.

38. 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.

39. 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

40. In my opinion, a Person of Ordinary Skill in the Art ("POSA") in the subject matter of the '607Patent 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.

41. 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

42. The Challenged Claims are directed to vacuum cleaner configurations and features, including, first and second cyclonic cleaning stages, a motor, the alignment of airflow path segments, and one or more handles. *See* Ex1001, Claims.
43. I have reviewed the '607Patent's specification and these configurations do not purport to solve a technical problem.
44. I have also reviewed the file history of the '607Patent. None of the references I rely upon in forming my invalidity opinions appear to have been before the patent office.
45. In my opinion, as set forth in more detail below, these undisclosed references invalidate every claim of the '607Patent.

VII. BACKGROUND OF THE '607PATENT

46. The '607Patent is titled "Hand Carriable Surface Cleaning Apparatus." Ex1001, Title. The '607Patent issued on June 25, 2019, from U.S. Patent

Application No. 15/181,537, which was filed on June 14, 2016. *Id.*, Cover. The '607Patent claims priority, through multiple applications, to U.S. Provisional Patent Application No. 60/870,175, which was filed on December 15, 2006. *Id.*, 1:6-21.

A. Summary of The '607Patent's Specification

47. The '607Patent “relates to a surface cleaning apparatus” with a “portable surface cleaning unit” mountable on “a base” where “the portable surface cleaning apparatus is usable when mounted on the base or when removed therefrom.” Ex1001, 1:25-30.
48. The '607Patent identifies two alleged problems with existing vacuum cleaners: (1) “an upright vacuum cleaner may not be useable in smaller or crowded areas” and (2) while “[c]anister vacuum cleaners...improv[e] mobility,” “consumers must separately move a canister body, which can add an extra step during the cleaning process.” *Id.*, 1:45-54.
49. The '607Patent purports to solve this with a “surface cleaning apparatus comprising a base with a removable portable surface cleaning unit” that “is usable when mounted on the base or when removed therefrom.” *Id.*, 1:25-30, 1:64-2:25. An example of this configuration is shown in Figure 13, which is reproduced below.

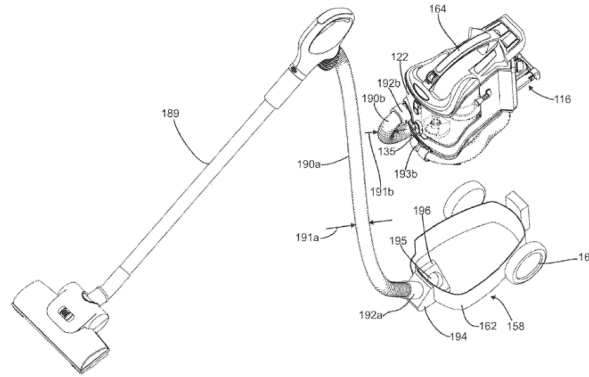


Fig. 13

Id., Fig. 13.

50. However, in my opinion, the '607Patent's claims are not directed towards a base or a removable cleaner. *Id.*, Claims.
51. Instead, the claims of the '607Patent include a combination of well-known, interchangeable vacuum cleaner features—such as a “dirty air inlet,” a “clean air outlet,” a “first cyclonic cleaning stage,” a “second cyclonic cleaning stage” that is “longitudinally moveable,” a “suction motor,” and a “handle.” The features claimed by the '607Patent do not purport to solve an alleged problem in the art. *Id.*, Claims. In fact, they do not purport to solve any problem.

B. Prosecution History of the '607Patent

52. The independent claims of the '607 patent (claims 1, 12, 13, and 14) issued without any prior art rejections. Ex1004, 985-989.
53. Some other claims were rejected, but PO proceeded only with claims that the Examiner did not reject. *Id.*

54. When the Examiner allowed the claims, the Examiner included the following remarks in the Reasons for Allowance:

“[T]he limitation of wherein the plurality of second cyclones includes a first set of second cyclones arranged in an inner ring and a second set of second cyclones arranged in an outer ring laterally surrounding the inner ring, was not found in the prior art.”

Id., 1044.

55. However, the limitation requiring an “inner ring” and “outer ring” of second cyclones is only in claim 1. Ex1001, Claims. This limitation is not independent claims 12-14. *Id.* Also, this limitation was known in the art, including in Liddell, which was not before the Examiner. Ex1005, Fig. 7; 5:20-23, 10:5-7.
56. The Examiner gave no further reasons for allowing the claims. *See* Ex1004, 1044.

C. Priority Date of the Challenged Claims

57. I understand that the priority date of a patent is used to judge whether a reference qualifies as prior art for the purposes of anticipation or obviousness. I understand that a patent may rely on the filing date of an earlier application for its priority date only if the earlier application

discloses support for the claims of the later application. I also understand that if even a single feature of a claimed invention was not disclosed or was not inherent in the earlier application, then the claim is not entitled to priority based on that earlier application. For the purposes of my analysis, I have been instructed to apply a priority date of December 15, 2006, for the Challenged Claims.

VIII. BACKGROUND OF THE PRIOR ART

A. Liddell

58. Liddell is a 2004 Dyson patent publication that teaches a “vacuum cleaner” with a “cyclonic separating apparatus”:

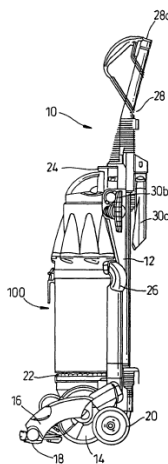
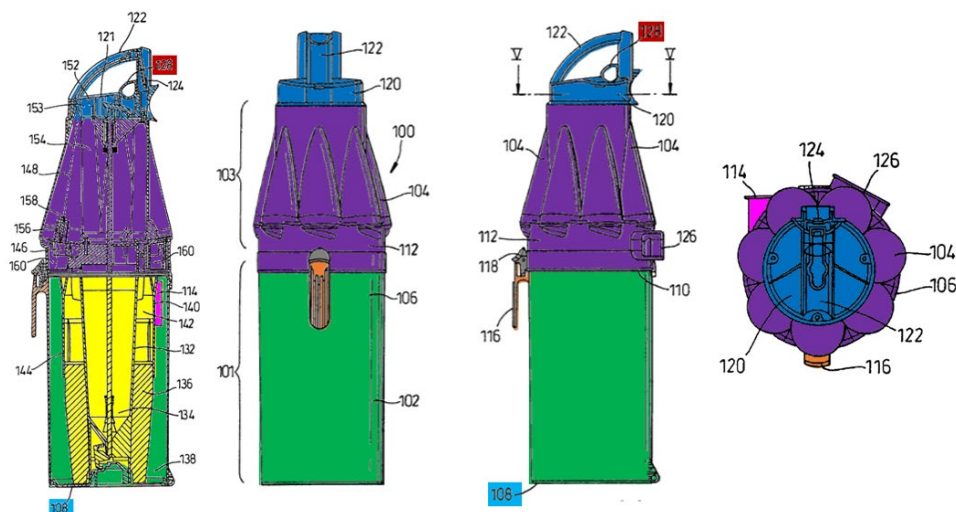


Fig. 1b

Ex1005, 4:8-9; Fig. 1b.

59. Liddell teaches that cyclonic separating apparatus 100 has an **upstream cyclone unit 101** and a **downstream cyclone unit 103**. *Id.*, 5:20-23. Liddell also teaches that **bin 106** has an openable **base 108** and can be

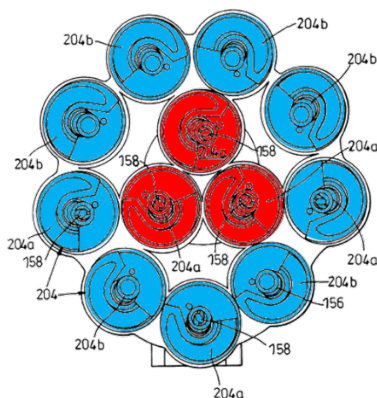
released from **downstream cyclone unit 103** using **handle 116** and catch **118**. *Id.*, 5:30-6:2, 6:23-25, 7:5-6.



Id., Figs. 3b, 2a-2c.

60. The components shaded in yellow in Fig. 3b above are shroud 140, internal wall 132, and baffles 136. *Id.*, 7:1-21.

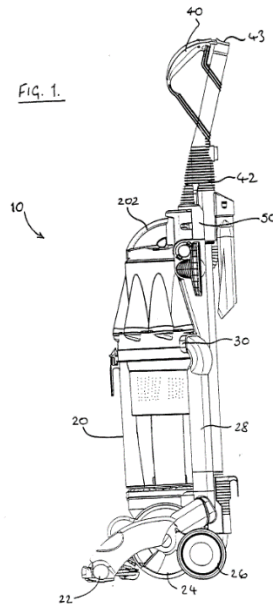
61. Liddell teaches that **downstream cyclone unit 103** includes downstream cyclones 104/204, arranged in an **inner ring** and an **outer ring**:



Id., Fig. 7; 5:20-23, 10:5-7.

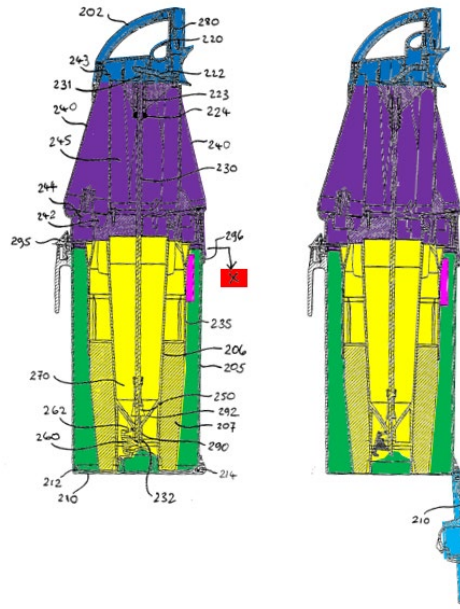
B. Organ

62. Organ is a 2002 Dyson patent publication directed to a similar vacuum design as Liddell:



Ex. 1006, Fig. 1.

63. Like Liddell, Organ teaches that “**chamber 205** [] is removable from the **remainder of the separator unit 20**,” and moves “in the direction shown by the **arrow X**,” the vertical direction shown in Fig. 3:

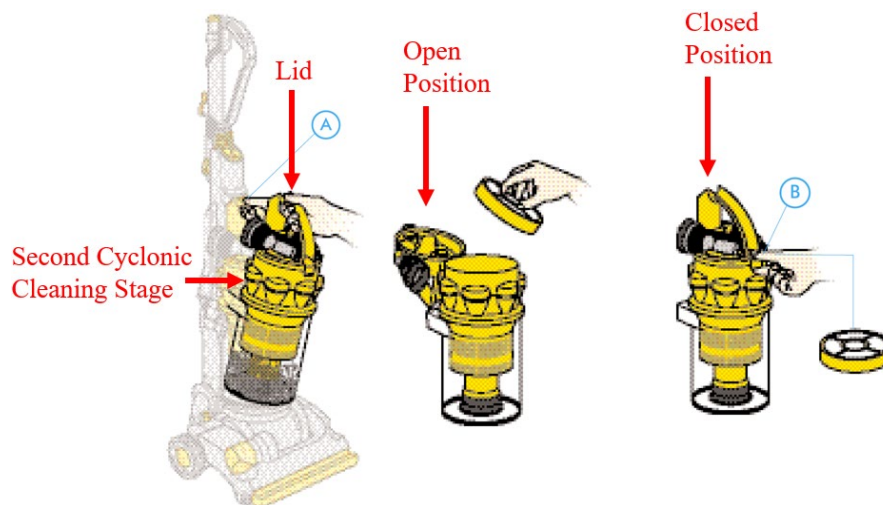


Id., 6:22-31, 12:1-9, Figs. 3, 5.

64. Organ also teaches that it “is not possible to separate the **chamber 205** from the **remainder of the separator unit 20** until a user operates the release mechanism” which opens the **base 210**. *Id.*, 12:1-16; 3:7-19, 8:10-9:20.

C. DC14Manual

65. DC14Manual is a user manual for the Dyson DC14, dated June 3, 2004. DC14Manual teaches a cyclonic vacuum cleaner with an openable lid, which provides access to a cleanable “lifetime filter:”



Ex1009, 10.

66. DC14Manual was publicly available at Dyson's U.S. website (http://www.dyson.com:80/aftersales/Manuals/dc14_opmanual_USA.pdf)

) no later than October 13, 2005, as shown by the Wayback Machine.

Ex1015, 1-4, 148-164.

67. Furthermore, as shown in a March 23, 2006 Wayback Machine capture of Dyson's website, Dyson made its manuals available to the public via a "Dyson Online Help" section of its website (<http://www.dyson.com:80/aftersales/>), where customers could access "Manuals." Ex1030,

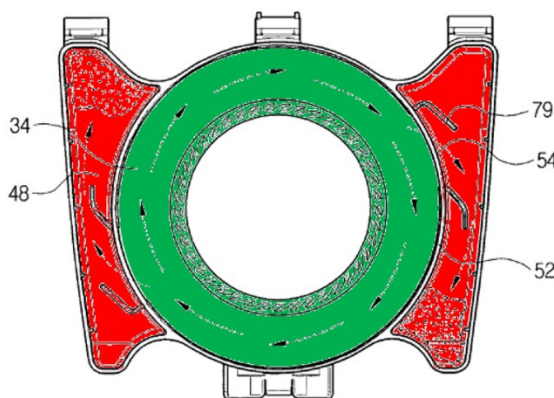
(<https://web.archive.org/web/20060323101255/http://www.dyson.com:80/aftersales/help.asp?sinavtype=inpage>).

68. In my opinion, DC14Manual was indexed and available on Dyson's website in such a way that POSAs would have been able to locate it with

a straightforward internet search or navigation of Dyson's website. At the time of the '607 patent, Dyson was (and remains) a large and well-known vacuum cleaner manufacturer such that POSAs would have been familiar with Dyson and its website. Therefore, in my opinion, a POSA exercising reasonable diligence would have been able to locate DC14Manual.

D. Lim

69. Lim is a 2004 US patent publication that teaches a cyclonic vacuum cleaner where “**dust-collecting chambers 48** are partitioned off from the **cyclone chamber 34** by a partition 52:”

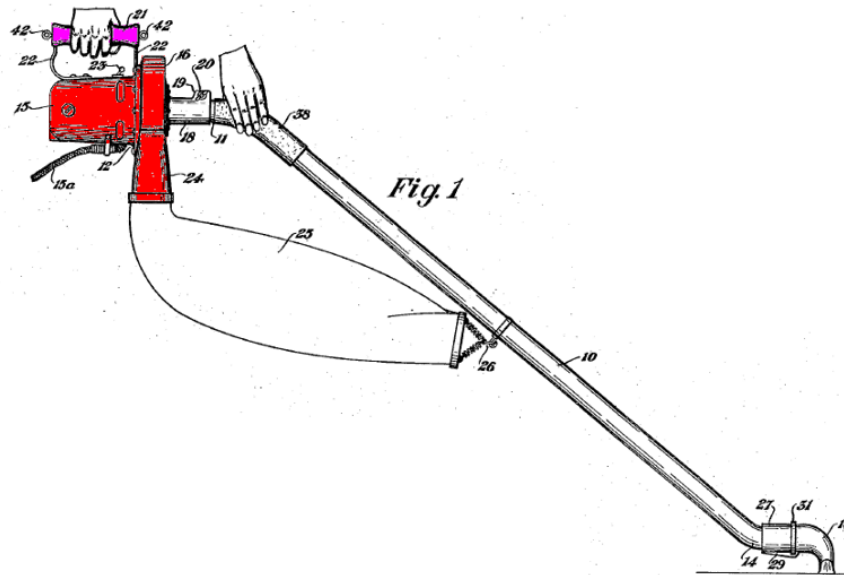


Ex1010, [0002], [0053], Fig. 5.

70. Lim also teaches that dirt is “subjected to the centrifugal force” of the cyclone and “the dirt flows into the plurality of **dust-collecting chamber 48** formed in both sides of the lower casing 40 of the cyclone body 20 through the connecting port 54.” *Id.* [0066].

E. Simpson

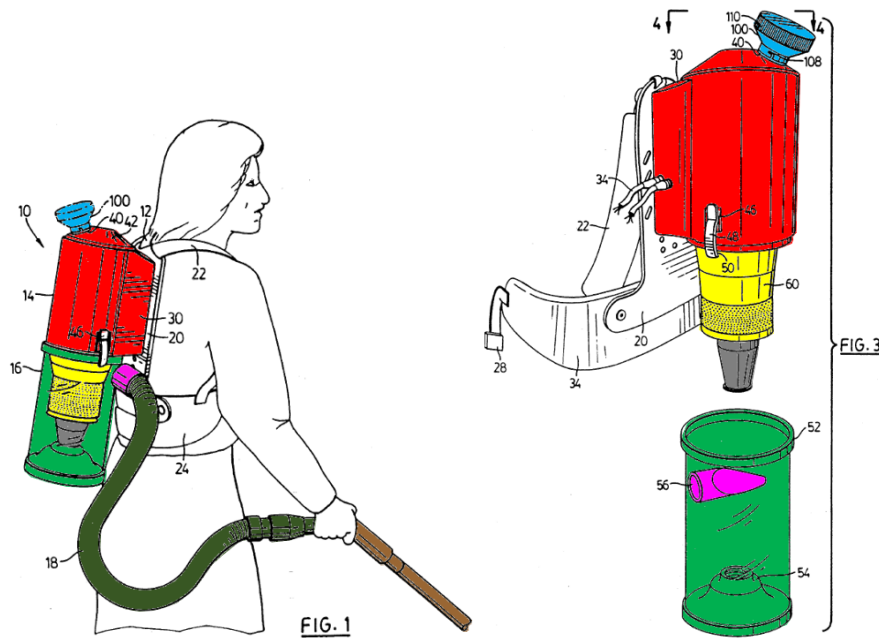
71. Simpson relates to a hand vacuum with a “**motor-fan exhausting unit** [that] is freely carried by the **handle**.”



Ex1007, 1:45-58, 1:101-107, 2:78-84, Fig. 1.

F. Soler

72. Soler is a 1993 US patent that teaches a backpack vacuum cleaner with “a first cyclone and a second cyclone in series.” Ex1008, 1:9-11, 3:18-19. Soler teaches that a “**lower casing 16**” (which contains “**first cyclone chamber 62**”) “is releasably mounted on **upper casing 14**” (which contains “**second cyclone chamber 64/74**”) such that **second cyclone chamber 64/74** is moveable relative to **first cyclone chamber 62**:



Id., 5:46-47, 6:5-37, Figs. 1, 3.

IX. CLAIM CONSTRUCTION

73. I am unaware of any claim construction determinations related to the '607Patent.

74. For purposes of this proceeding, I have considered whether the Challenged Claims are invalid as anticipated or obvious under their plain and ordinary meaning. I have also considered whether the Challenged Claims are invalid as anticipated or obvious if the preambles are construed as limiting, and if the term “hand carriable” is construed as “able to be carried by a hand or hands.” In my opinion, the Challenged Claims are invalid under each construction.

X. INVALIDITY OPINIONS: '607PATENT

75. In my opinion, the Challenged Claims of the '607Patent are invalid based on the following references and combinations:

- Liddell anticipates claims 1, 3-4, and 6-13.
- Liddell alone or in combination with Organ renders obvious claims 1 and 3-13.
- The combination of Liddell, Organ, and DC14Manual renders obvious claim 10.
- The combination of Liddell and Lim renders obvious claim 14; or the combination of Liddell, Organ, and Lim renders obvious claim 14.
- The combination of Simpson and Liddell renders obvious claims 1-4 and 6-13.
- The combination of Simpson, Liddell, and Organ renders obvious claims 1-13.
- The combination of Simpson, Liddell, and DC14Manual renders obvious claim 10; or the combination of Simpson, Liddell, Organ and DC14Manual renders obvious claims 10.
- The combination of Simpson, Liddell, and Lim renders obvious claim 14; or the combination of Simpson, Liddell, Organ and Lim renders obvious claim 14.
- The combination of Soler and Liddell renders obvious claims 1-4 and 6-13.
- The combination of Soler, Liddell, and Organ renders obvious claims 4-5.

- The combination of Soler, Liddell, and Lim renders obvious claim 14.

76. As part of my obviousness 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 obvious to a person having ordinary skill in the art at the time of the alleged invention. I took the time of the alleged invention to be December 15, 2006 for the Challenged Claims of the '607Patent, as discussed above. I have also considered the level of ordinary skill in the pertinent art.

77. 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 '607Patent.

A. Ground 1: Liddell Anticipates Claims 1, 3-4, and 6-13

1. Liddell Anticipates Claims [1]/[12]/[13]

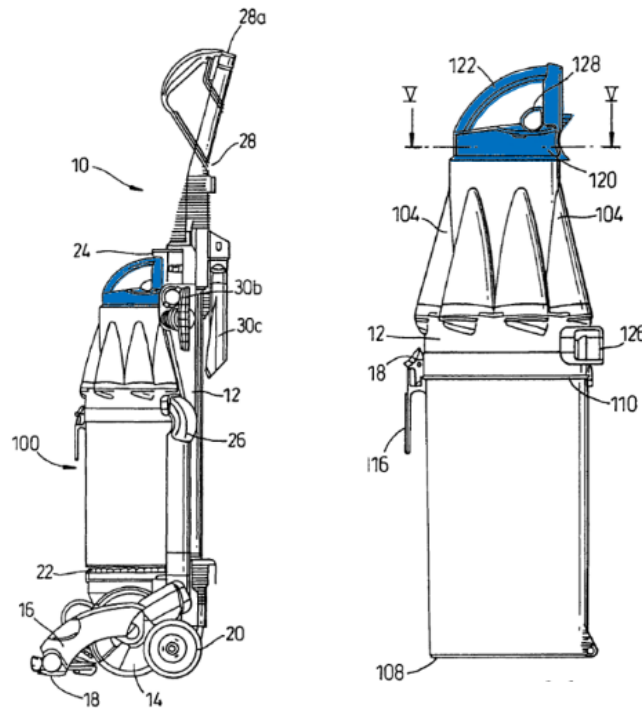
a. [1pre]/[12pre]/[13pre]

Reference Number	Claim Limitation
[1pre]	"A hand carriable surface cleaning apparatus comprising:"
[12pre]	"A hand carriable surface cleaning apparatus comprising:"
[13pre]	"A hand carriable surface cleaning apparatus comprising:"

78. To the extent the preambles are construed as limiting, it is my opinion that Liddell teaches hand carriable surface cleaning apparatus.

79. Liddell teaches a “vacuum cleaner” for cleaning surfaces. Ex1005, 4:8-18.

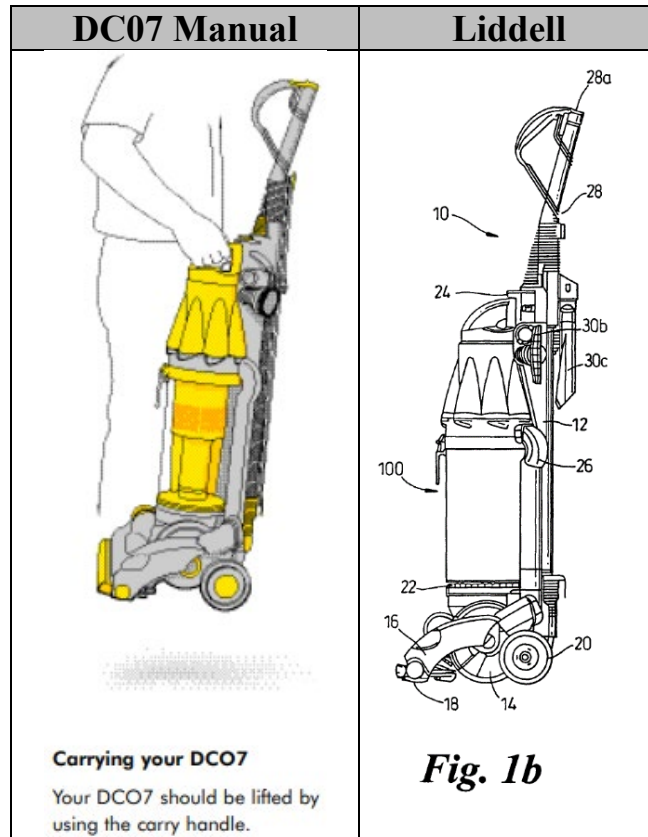
In my opinion, Liddell’s vacuum cleaner is hand carriable: it includes “**handle 122**” for carrying the device.



Id., Figs. 1b, 2b; 6:16-18.

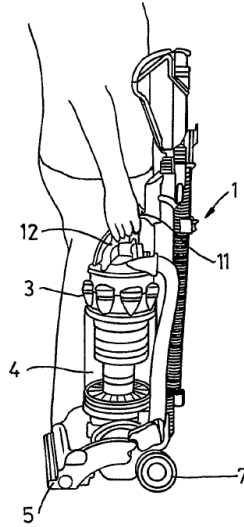
80. In my opinion, a POSA would have understood that Liddell’s entire vacuum could be carried by this handle and thus teaches a hand-carriable surface cleaning apparatus. Other examples in the prior art confirm this.

81. For example, the product manual for Dyson’s DC07 vacuum shows vacuums like the one taught by Liddell were hand carriable. It both depicts the DC07 being carried as well as instructs users that “Your DC07 should be lifted by using the carry handle.”



Ex1014, 6; Ex1005, Fig. 1b.

82. This manual for the DC07 vacuum was available on Dyson’s website in 2005. Ex1015, 1-4, 135-147. Further, a Dyson patent publication filed in 2004 depicts a similarly-configured vacuum and states that “[t]he handle 12 on the separating apparatus 3 also serves to allow the user to lift and carry the appliance as a whole, as shown in Figure [3]”:



Ex1018, Fig. 3, 5:29-30.

b. [1a]/[12a]/[13a]

Reference Number	Claim Limitation
[1a]	“a fluid flow path extending between a dirty air inlet and a clean air outlet;”
[12a]	“a fluid flow path extending between a dirty air inlet and a clean air outlet;”
[13a]	“a fluid flow path extending between a dirty air inlet and a clean air outlet;”

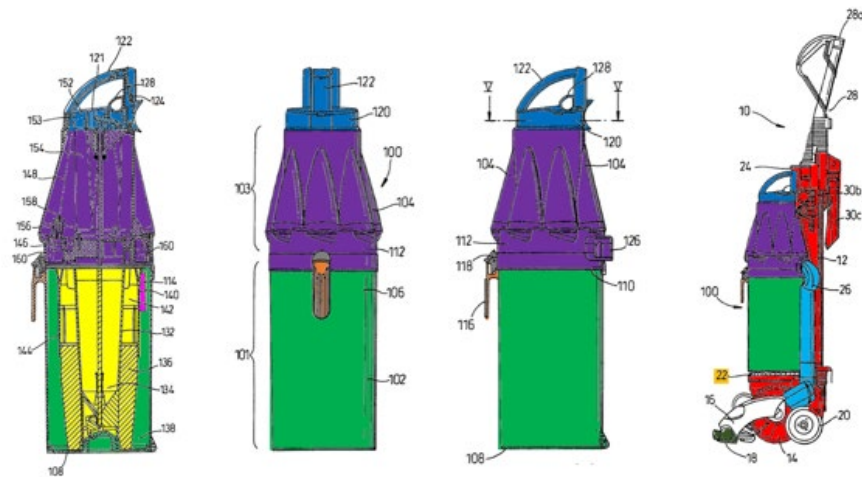
83. In my opinion, Liddell teaches a fluid flow path extending between a dirty air inlet and a clean air outlet.

84. In my opinion, Liddell’s cleaner has a dirty air inlet; collectively “inlet 18,” “upstream ducting,” and “inlet port 114;” a clean air outlet, located at “filter cover 22” where air is “exhausted from the vacuum cleaner;” and a fluid flow path extending between the dirty air inlet and the clean air outlet.

Ex1005, 4:11-12, 4:31-5:30, 6:1-2, 6:20-23, 7:17-26, 8:7-14, 9:14-31,

9:31-10:3.

85. Dirty air enters vacuum 10 at **inlet 18** and then passes from “upstream ducting” to **inlet port 114**, where it enters the **upstream cyclone unit 101**. Ex1005, 4:11-12, 4:31-5:3, 5:5-9, 5:26-5:30, 6:1-2. Partially cleaned air exits **upstream cyclone unit 101** through **perforated portion 144 of shroud 140** and passes to **downstream cyclone unit 103**. *Id.*, 7:17-26, 9:14-31. Air exits **downstream cyclone unit 103** through **outlet port 126** and passes through **downstream ducting 26** to **motor casing 14** where it exits the vacuum cleaner 10 via a clean air outlet at **filter cover 22**. *Id.*, 4:31-5:14, 6:20-23, 8:7-14, 9:31-10:3.



Id., Figs. 3b, 2a-2b, 1b.¹

¹ The components shaded in yellow in Fig. 3b above are shroud 140, internal wall 132, and baffles 136. *Id.*, 7:1-21.

c. [1b]/[12b]/[13b]

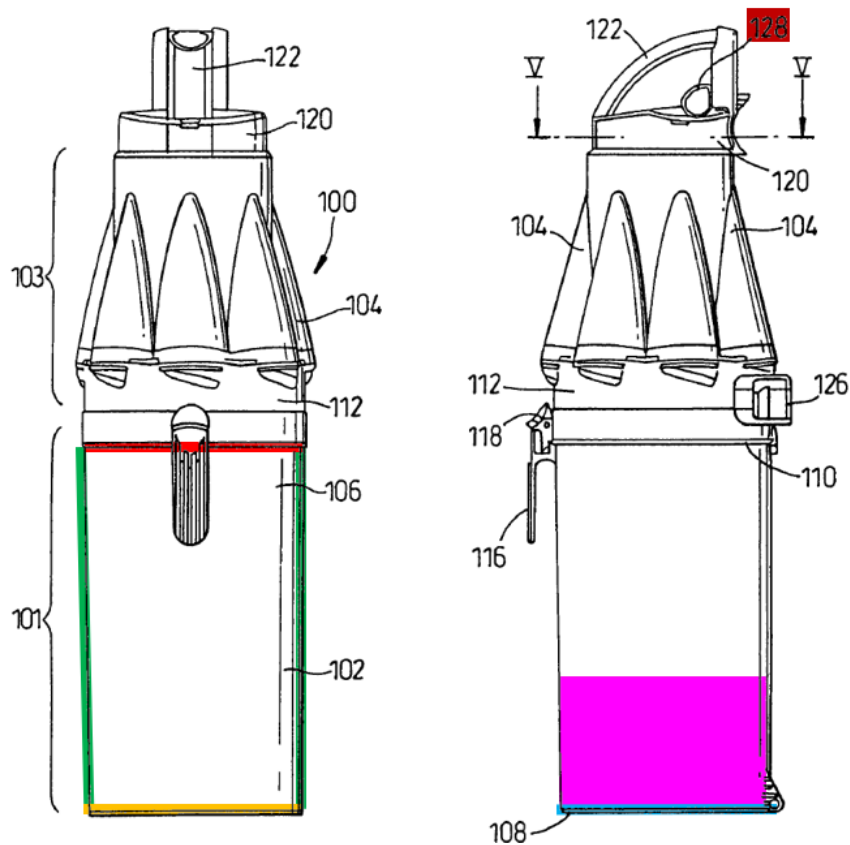
Reference Number	Claim Limitation
[1b]	“a first cyclonic cleaning stage positioned in the fluid flow path downstream from the dirty air inlet, the first cyclonic cleaning stage comprising an upper end, a bottom end spaced longitudinally below the upper end and a side wall extending therebetween, the first cyclonic cleaning stage having a dirt collection region with a bottom door that is openable to empty the dirt collection region;”
[12b]	“a first cyclonic cleaning stage positioned in the fluid flow path downstream from the dirty air inlet, the first cyclonic cleaning stage comprising an upper end, a bottom end spaced longitudinally below the upper end and a side wall extending therebetween, the first cyclonic cleaning stage having a dirt collection region with a bottom door that is openable to empty the dirt collection region;”
[13b]	“a first cyclonic cleaning stage positioned in the fluid flow path downstream from the dirty air inlet, the first cyclonic cleaning stage comprising an upper end, a bottom end spaced longitudinally below the upper end and a side wall extending therebetween, the first cyclonic cleaning stage having a dirt collection region with a bottom door that is openable to empty the dirt collection region;”

86. In my opinion, Liddell teaches a first cyclonic cleaning stage positioned in the fluid flow path downstream from the dirty air inlet, the first cyclonic cleaning stage comprising an upper end, a bottom end spaced longitudinally below the upper end and a side wall extending therebetween, the first cyclonic cleaning stage having a dirt collection region with a bottom door that is openable to empty the dirt collection region.

87. In my opinion, Liddell teaches a first cyclonic cleaning stage, “upstream cyclone unit 101 consisting of a single upstream cyclone 102.” Ex1005,

5:20-5:22, Fig. 2a. “The upstream cyclone 102 consists essentially of a cylindrical bin 106 having a closed base 108.” *Id.*, 5:23-24. Upstream cyclone 102 is positioned in the fluid flow path downstream from the dirty air inlet. *Id.*, 5:26-27 (“inlet port 114 is provided in the cylindrical bin 106 in order to allow dirty air to be introduced to the interior of the upstream cyclone 102”).

88. In my opinion, Liddell teaches a first cyclonic cleaning stage having an upper end (**upper end 110**, which abuts inlet support member 112), a bottom end (**bottom end of cylindrical bin 106**) spaced longitudinally below the upper end and a side wall (**side wall of cylindrical bin 106**) extending therebetween, and a dirt collection region (**collection space 138**) with a bottom door (**base 108**). *Id.*, 5:20-30, 6:14-25, 9:11-9:15, 7:10-15.



Id., Figs. 2a-2b.

89. Liddell teaches that the bottom door is openable to empty the dirt collection region: “[t]he upper portion 120 [] carries an **actuating lever 128** designed to activate a mechanism for opening the **base 108** of the cylindrical bin 106 for emptying purposes.” *Id.*, 6:23-6:25, 7:3-6, 9:11-14.

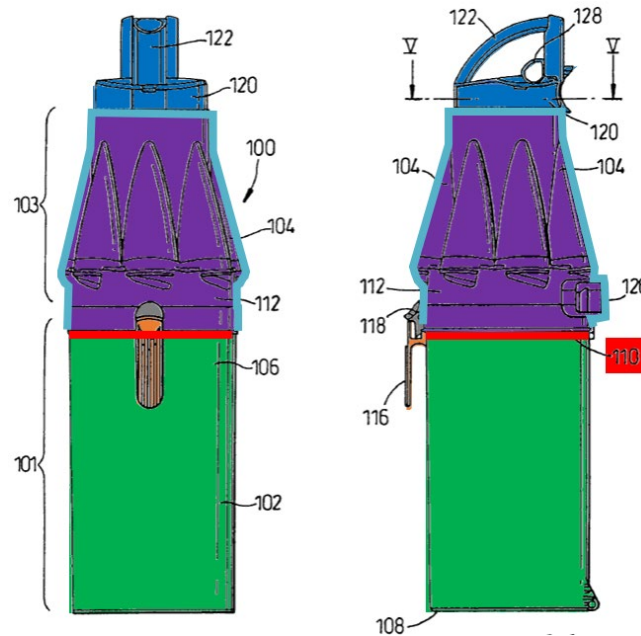
d. [1c]/[12c]/[13c]

Reference Number	Claim Limitation
[1c]	“a second cyclonic cleaning stage positioned in the fluid flow path downstream from the first cyclonic cleaning stage, the second cyclonic cleaning stage having an upper end which is positioned above the upper end of the first cyclonic cleaning stage, the second cyclonic cleaning stage is longitudinally moveable relative to all of the sidewall of the first cyclonic cleaning stage;”
[12c]	“a second cyclonic cleaning stage positioned in the fluid flow path downstream from the first cyclonic cleaning stage, the second cyclonic cleaning stage having an upper end which is positioned above the upper end of the first cyclonic cleaning stage, the second cyclonic cleaning stage is longitudinally moveable relative to all of the sidewall of the first cyclonic cleaning stage;”
[13c]	“a second cyclonic cleaning stage positioned in the fluid flow path downstream from the first cyclonic cleaning stage, the second cyclonic cleaning stage having an upper end which is positioned above the upper end of the first cyclonic cleaning stage, the second cyclonic cleaning stage is longitudinally moveable relative to all of the sidewall of the first cyclonic cleaning stage;”

90. In my opinion, Liddell teaches a second cyclonic cleaning stage positioned in the fluid flow path downstream from the first cyclonic cleaning stage, the second cyclonic cleaning stage having an upper end which is positioned above the upper end of the first cyclonic cleaning stage, the second cyclonic cleaning stage is longitudinally moveable relative to all of the sidewall of the first cyclonic cleaning stage.

91. In my opinion, Liddell teaches a second cyclonic cleaning stage, “downstream cyclone unit 103,” that is positioned in the fluid flow path downstream from the first cyclonic cleaning stage, “upstream cyclone unit 101.” *Id.*, 5:20-5:22, 7:18-26, 9:7-10:3, Fig. 2a. In my opinion, Liddell

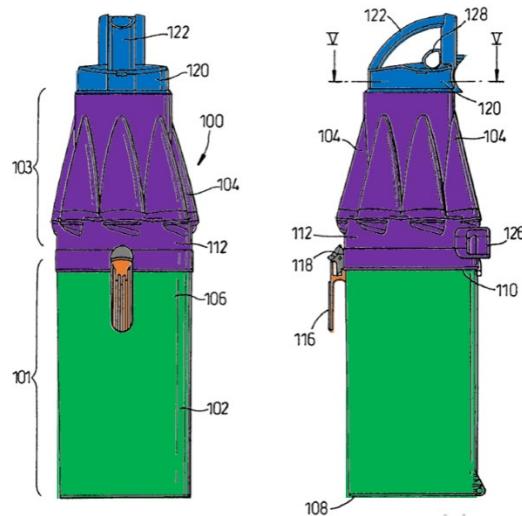
further teaches the second cyclonic cleaning stage (**downstream cyclone unit 103**) has an upper end (**upper surface** of **downstream cyclone unit 103**) which is positioned above the upper end of the first cyclonic cleaning stage (**upper end 110** of **upstream cyclone unit 101**), as shown below:



Id., Figs. 2a-2b.

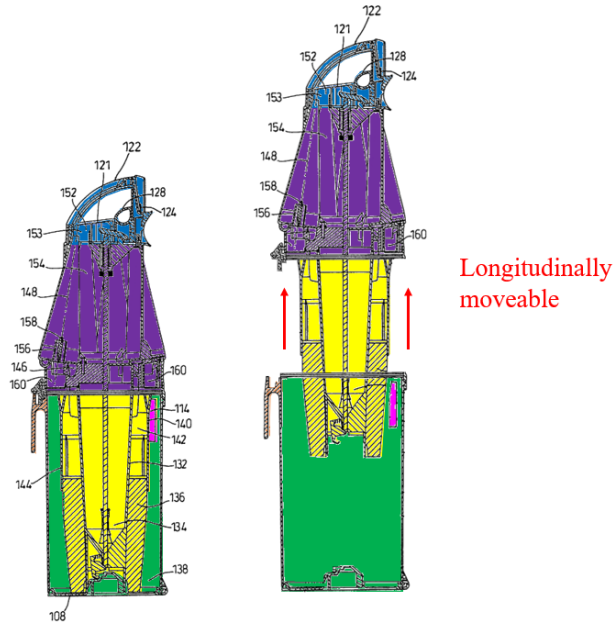
92. Liddell teaches that the second cyclonic cleaning stage (**downstream cyclone unit 103**) is longitudinally moveable relative to all of the sidewall of the first cyclonic cleaning stage (side wall of **cylindrical bin 106** of **upstream cyclone unit 101**). **Inlet support member 112** is part of the **downstream cyclone unit 103** (Ex1005, Fig. 2a, 7:17-26), and Liddell teaches that “[a] **handle 116** and a **catch 118** are provided on the **cylindrical bin 106** and the **inlet support member 112** respectively in

order to provide means for releasing the **cylindrical bin 106** from the **inlet support member 112** when the **cylindrical bin 106** requires to be emptied.” *Id.*, 5:30-6:2.



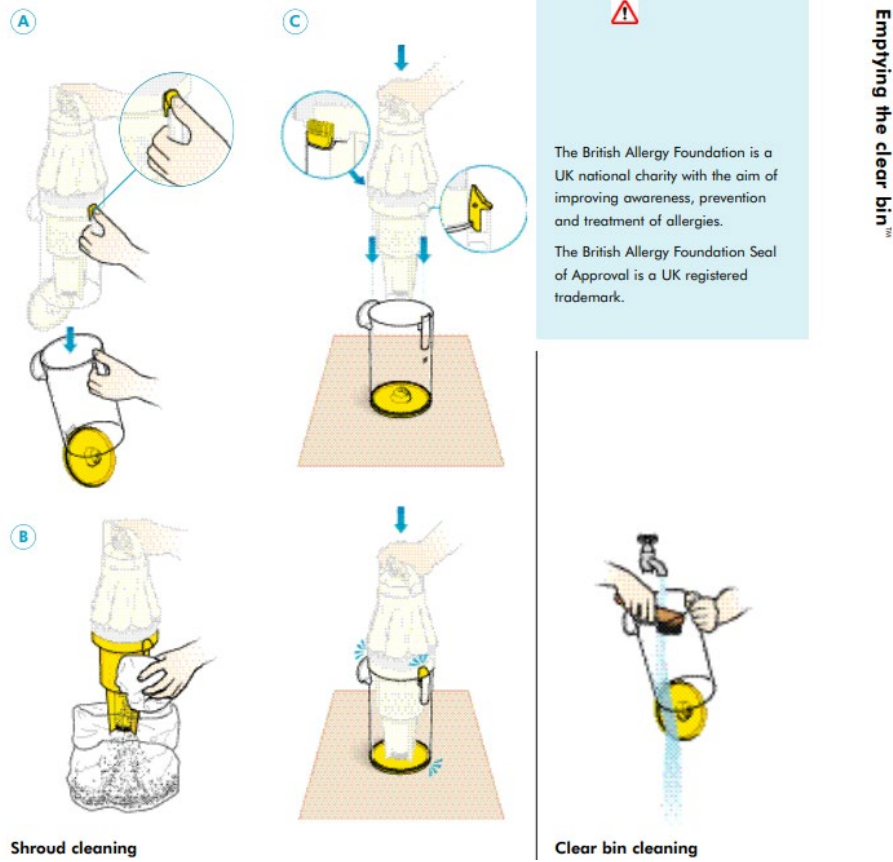
Id., Figs. 2a-2b.

93. When **handle 116** and **catch 118** are disengaged, the **cylindrical bin 106** is released from the **inlet support member 112**, and **downstream cyclone unit 103** moves longitudinally relative to the entire sidewall of **the upstream cyclone unit 101**. *Id.*, 6:16-25, 7:17-26.
94. In my opinion, a POSA would have understood that, once they are released from one another, the **cylindrical bin 106** and **downstream cyclone unit 103** are moveable in any direction from one another, including longitudinally, as demonstrated below.



Ex1005, Fig. 3b(modified).

95. Other examples in the prior art support this understanding. For example, the product manual for Dyson's DC07 vacuum shows vacuums like the one taught by Liddell and depicts it with a second cyclonic cleaning stage that is moveable relative to the sidewall of a first cyclonic cleaning stage when the "clear bin" housing the first cyclonic cleaning stage is released from the second cyclonic cleaning stage for cleaning:



Ex1014, 10.

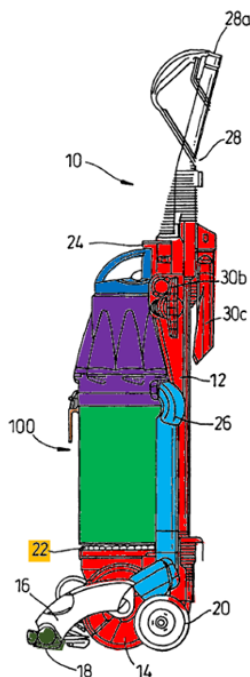
e. [1d]/[12d]/[13d]

Reference Number	Claim Limitation
[1d]	“a suction motor positioned in the fluid flow path downstream from the second cyclonic cleaning stage;”
[12d]	“a suction motor positioned in the fluid flow path downstream from the second cyclonic cleaning stage;”
[13d]	“a suction motor positioned in the fluid flow path downstream from the second cyclonic cleaning stage;”

96. In my opinion, Liddell teaches a suction motor positioned in the fluid flow path downstream from the second cyclonic cleaning stage.

97. Liddell teaches a suction motor, a “motor located in the **motor casing 14.**”

Ex1005, 5:5-14. Liddell's motor is in the fluid flow path downstream from the second cyclonic cleaning stage (**downstream cyclone unit 103**), as shown below.



Id. Fig. 1b.

98. Liddell teaches “the motor located in the **motor casing 14** is activated so that [the] air is drawn into the vacuum cleaner via either the suction inlet 18 or the distal end 28a of the hose and wand assembly 28. This dirty air...is passed to the cyclonic separation apparatus 100,” which “comprises an **upstream cyclone unit 101**...and a **downstream cyclone unit 103**.” *Id.*, 5:5-9, 5:20-22. After passing from **upstream cyclone unit 101** to **downstream cyclone unit 103**, cleaned air exits the cyclonic separating apparatus 100 via outlet port 126 and travels “down the upstanding body

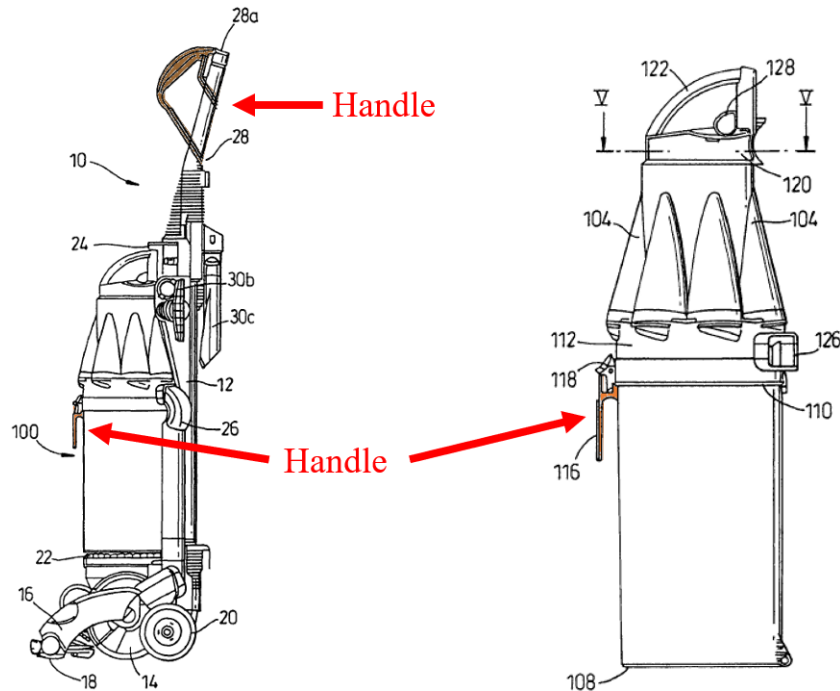
12 to the **motor casing 14** via the **downstream ducting 26**. The cleaned air is used to cool the motor located in the **motor casing 14** before being exhausted from the vacuum cleaner 10 via the **filter cover 22**.” *Id.*, 5:5-14, 6:20-23, 7:17-25, 9:7-10:3; *see also* Ground 1, Limitations [1a]/[12a]/[13a] and [1c]/[12c]/[13c].

f. [1e]/[12e]/[13e]

Reference Number	Claim Limitation
[1e]	“a handle;”
[12e]	“a handle;”
[13e]	“a handle;”

99. In my opinion, Liddell teaches a handle.

100. Liddell teaches that vacuum cleaner 10 includes a “**hose and wand assembly 28**” that “function[s] as a handle.” Ex1005, 4:16-4:17, Fig. 1. Liddell also teaches a “**handle 116**...on the cylindrical bin 106.” *Id.*, 5:30-6:2.



Id., Figs 1b, 2b.

101. Further, for limitations [1e] and [12e], it is my opinion that Liddell’s “handle 122” also satisfies this limitation. Ex1005, 4:16-4:17, 5:30-6:2, 6:17-6:19, Figs. 1b, 2b.

g. [1f]

Reference Number	Claim Limitation
[1f]	“wherein the second cyclonic cleaning stage comprises a plurality of second cyclones connected fluidly in parallel with each other,”

102. In my opinion, Liddell teaches the second cyclonic cleaning stage comprises a plurality of second cyclones connected fluidly in parallel with each other.

103. Liddell teaches that “**downstream cyclone unit 103** consist[s] of a

plurality of downstream cyclones 104[204] arranged in parallel.” Ex1005, 5:21-5:22, 10:5-10:6, Figs. 4a, 7.

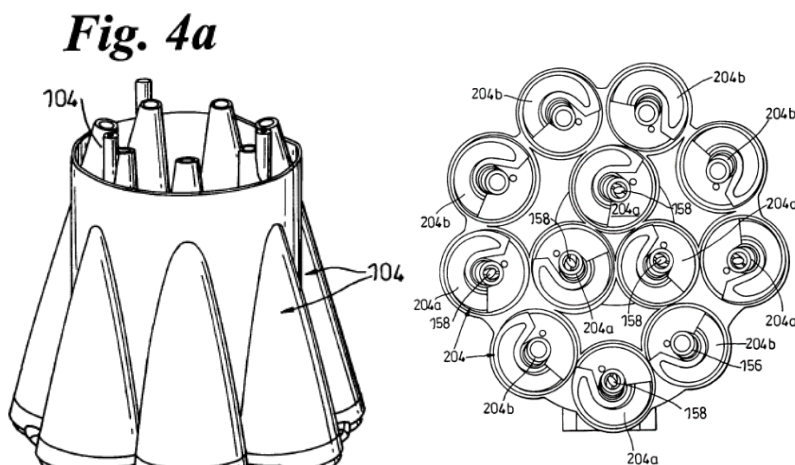


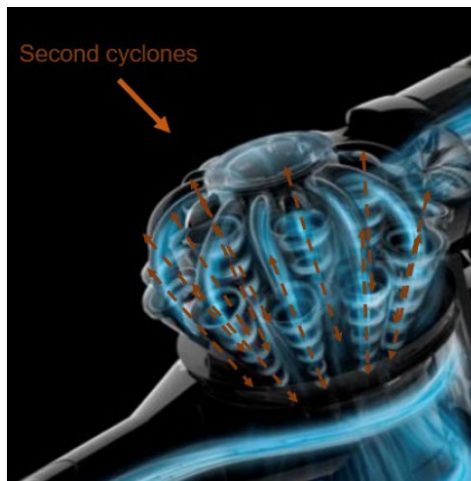
Fig. 7

Id., Figs. 4a, 7.

104. Liddell teaches that the parallel-connected downstream cyclones 104/204 are connectedly fluidly: “exiting the upstream cyclone 102...partially-cleaned air [] moves along the air passageway 142 in which it is divided into seven portions. Each portion enters either one of the first cyclones 104a[204a] or one of the second cyclones 104b[204b] via the respective inlet 146.” *Id.*, 9:15-18, 7:20-26, 7:29-8:3. Cleaned air then passes from each of the downstream cyclones 104/204 “into the annular chamber 160 and from there to the outlet port 126.” *Id.*, 9:19-10:3, 8:7-14, 7:28-8:5. Liddell’s cyclones are therefore connected fluidly in parallel with each other.

105. In Liddell's Figure 7 embodiment, the downstream cyclones are labeled 204 instead of 104. Ex1005, 10:5-12, Fig. 7. All references in my declaration to downstream cyclones 104 are equally applicable to downstream cyclones 204.

106. Like Liddell, the accused Dyson V8 vacuum has alleged downstream cyclones that are inclined slightly toward the longitudinal axis of downstream cyclone unit, as shown below in PO's infringement contentions in the parallel district court litigation:



<https://www.dyson.com/vacuum-cleaners/cordless/v8/absolute-hepa-silver> (annotated)

Ex1017, 28-29; Ex1016.

107. In my opinion, to the extent the accused Dyson V8 vacuum's alleged downstream cyclones are connected fluidly in parallel, so are Liddell's.

h. [1g]

Reference Number	Claim Limitation
[1g]	“wherein the second cyclones are positioned around a central longitudinal axis that extends through the first cyclonic cleaning stage and the openable bottom door,”

108. In my opinion, Liddell teaches the second cyclones are positioned around a central longitudinal axis that extends through the first cyclonic cleaning stage and the openable bottom door.

109. In my opinion, Liddell teaches that the second cyclones (downstream cyclones 104/204) are positioned around a central longitudinal **axis 150** that extends through the first cyclonic cleaning stage (upstream cyclone unit 101) and the openable bottom door (**base 108**):

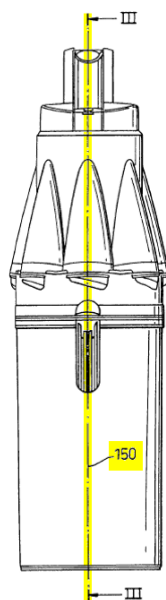


Fig. 3a

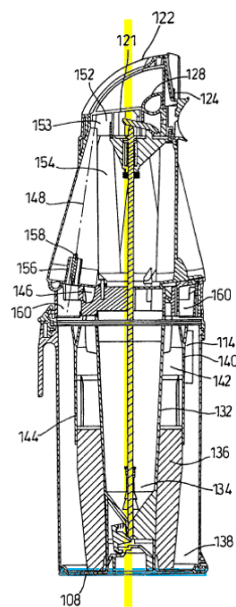
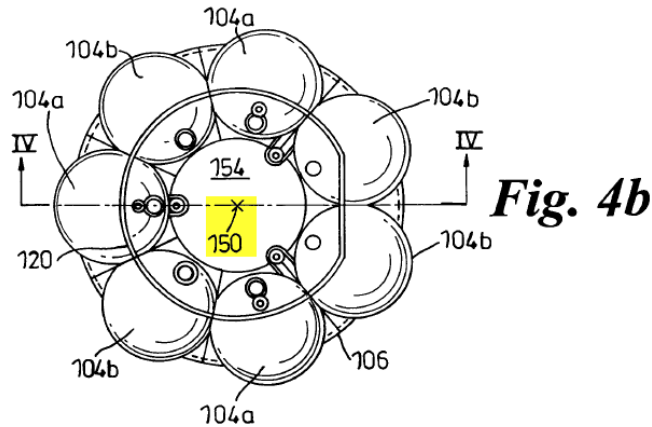


Fig. 3b



Ex1005, Figs. 3a-3b, 4b, 5:23-24, 6:6-6:7, 7:5-6, Figs. 1-3b, 7.

110. Liddell states the “downstream cyclones 104[204] are equi-angularly spaced about the central longitudinal **axis 150** of the downstream cyclone unit...” Ex1005, 6:6-8.

i. **[1h]**

Reference Number	Claim Limitation
[1h]	“wherein the plurality of second cyclones includes a first set of second cyclones arranged in an inner ring and a second set of second cyclones arranged in an outer ring laterally surrounding the inner ring.”

111. In my opinion, Liddell teaches the plurality of second cyclones includes a first set of second cyclones arranged in an inner ring and a second set of second cyclones arranged in an outer ring laterally surrounding the inner ring.

112. In my opinion, Liddell teaches that the plurality of second cyclones (downstream cyclones 104/204) include a first set of second cyclones

arranged in an inner ring and a second set of second cyclones arranged in an outer ring laterally surrounding the inner ring. Liddell teaches that “twelve parallel cyclones 204 are provided,” and “[n]ine of the cyclones 204 are located in an **outer ring** and three cyclones are located in an **inner ring**.” Ex1005, 10:5-10:20.

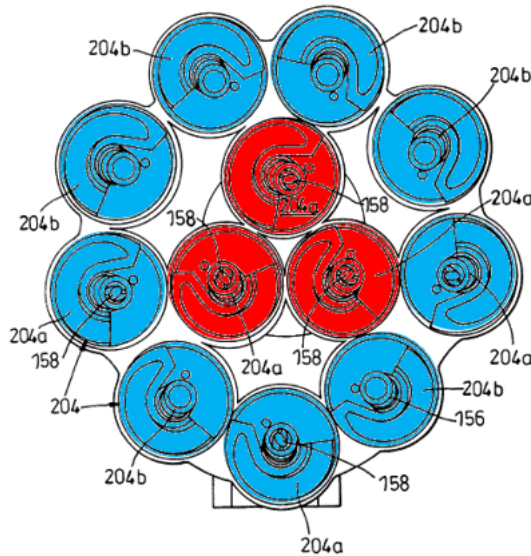


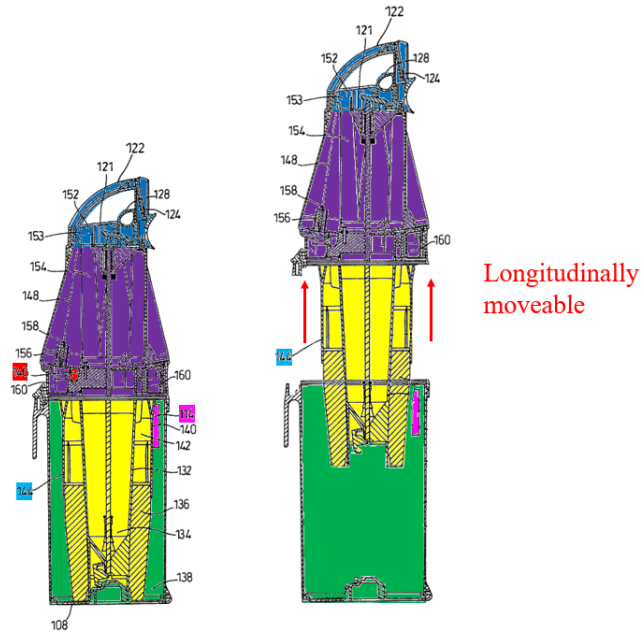
Fig. 7

Id., Fig. 7.

j. [12f]

Reference Number	Claim Limitation
[12f]	wherein the first cyclonic cleaning stage has a first stage air inlet, each cyclone of the second cyclonic cleaning stage has a second stage air inlet downstream from the first stage air inlet and the hand carryable surface cleaning apparatus further comprises a screen positioned in the fluid flow path between the first stage air inlet and the second stage air inlet, wherein the screen is longitudinally moveable relative to the sidewall.

113. In my opinion, Liddell teaches the first cyclonic cleaning stage has a first stage air inlet, each cyclone of the second cyclonic cleaning stage has a second stage air inlet downstream from the first stage air inlet and the hand carriable surface cleaning apparatus further comprises a screen positioned in the fluid flow path between the first stage air inlet and the second stage air inlet, wherein the screen is longitudinally moveable relative to the sidewall.
114. In my opinion, Liddell teaches the first cyclonic cleaning stage (**upstream cyclone unit 101**) has a first stage air inlet (**inlet port 114**). *See* Ground 1, Limitations [1a]/[12a]/[13a].
115. In my opinion, Liddell further teaches that each cyclone of the second cyclonic cleaning stage (**downstream cyclones 104/204**) has a second stage air inlet (**inlet 146**) downstream from the first stage air inlet (**inlet port 114**), and that the hand carriable surface cleaning apparatus (vacuum cleaner 10) further has a screen (**perforated portion 144** of **shroud 140**) positioned in the fluid flow path between the first stage air inlet and the second stage air inlet, wherein the screen is longitudinally moveable relative to the sidewall (sidewall of **cylindrical bin 106**).

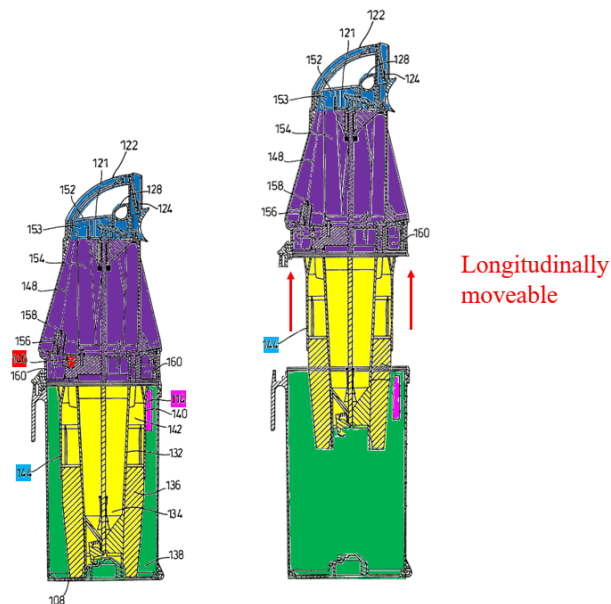


Ex1005, Fig. 3b(modified).

116. Liddell teaches that the “inlet port 114 is provided in the cylindrical bin 106 in order to allow dirty air to be introduced to the interior of the upstream cyclone 102.” Ex1005, 5:22-30, 9:8-11. Liddell further teaches that “[l]ocated outwardly of the internal wall 132 in an upper portion of the upstream cyclone 102 is a shroud 140,” which “has a perforated portion 144 allowing air to pass from the interior of the upstream cyclone 102 to the air passageway 142. The air passageway 142 communicates with the inlet 146 of each of the downstream cyclones 104[204].” *Id.*, 7:17-33, 8:7-14, 9:7-10:3.

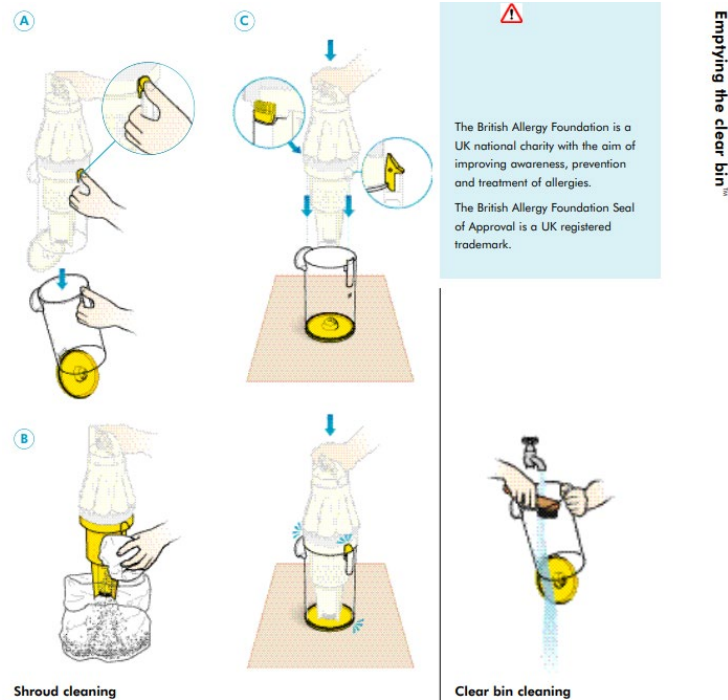
117. When cylindrical bin 106 is released for emptying, the perforated portion 144 of shroud 140 remains attached to the remainder of the

cyclonic separating apparatus 100, and thus is longitudinally moveable relative to the **cylindrical bin 106**, as depicted below. Ex1005, 7:17-8:5, Fig. 3b; *see* Ground 1, Limitations [1c]/[12c]/[13c].



Ex1005, Fig. 3b(modified).

118. A POSA’s understanding of Liddell’s teachings is further supported by the product manual for Dyson’s DC07 vacuum, which shows vacuums like the one taught by Liddell. It shows a perforated shroud moving longitudinally to the sidewall of a first cyclonic cleaning stage when the “clear bin” (which houses the first cyclonic cleaning stage) is released from the remainder of the cyclone assembly:



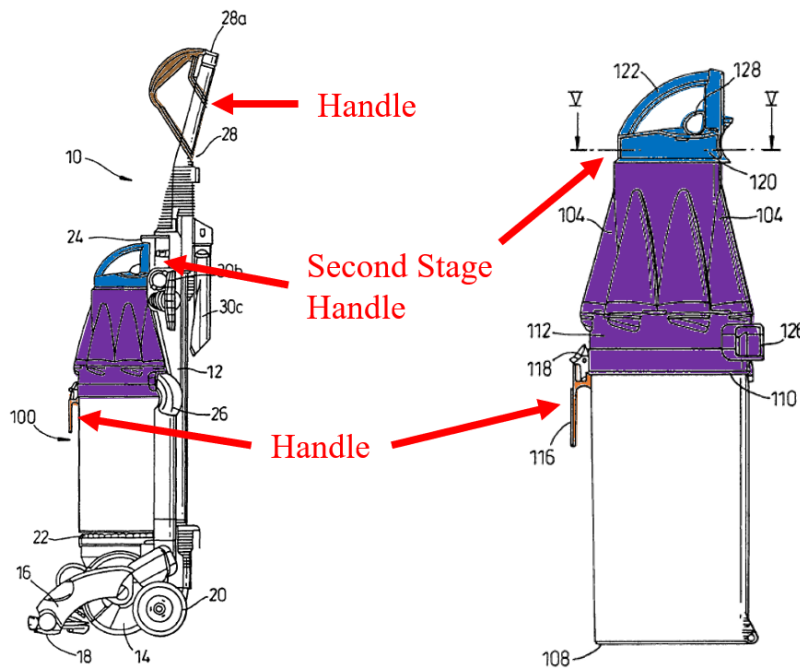
Ex1014, 1, 10.

k. [13f]

Reference Number	Claim Limitation
[13f]	“wherein the second cyclonic cleaning stage further comprises a second stage handle.”

119. In my opinion, Liddell teaches the second cyclonic cleaning stage further comprises a second stage handle.

120. In my opinion, in addition to **hose and wand assembly 28** and **handle 116** (each of which satisfies the claimed “handle” of limitation [13e]), Liddell teaches the second cyclonic cleaning stage (**downstream cyclone unit 103**) further has a second stage handle (**handle 122**):



Ex1005, 4:16-4:17, 5:30-6:2, 6:17-6:19, Figs. 1b, 2b.

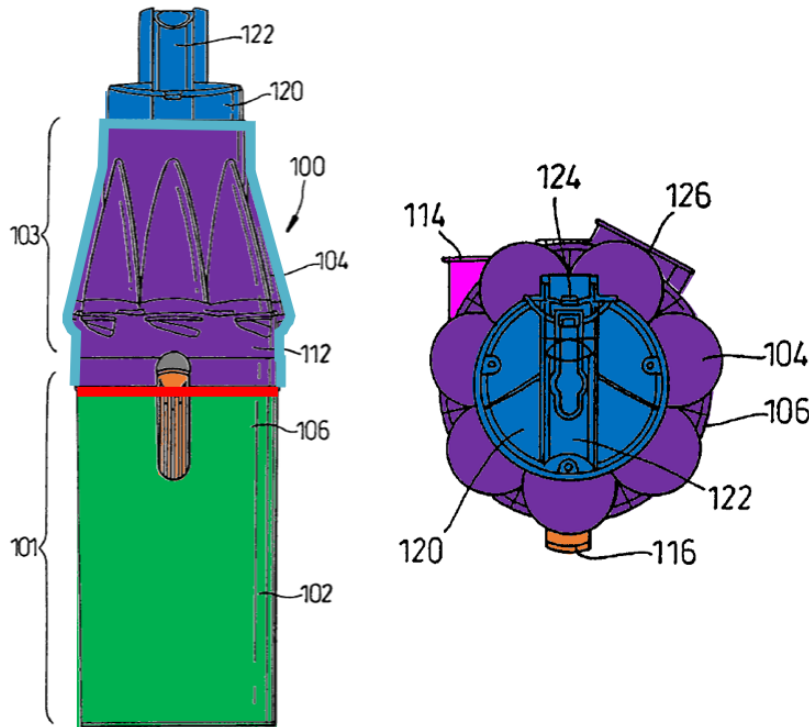
2. Liddell Anticipates Claim [3]

Reference Number	Claim Limitation
[3]	“The hand carriable surface cleaning apparatus of claim 1, wherein the upper end of the second cyclonic cleaning stage overlies the entire upper end of the first cyclonic cleaning stage.”

121. In my opinion, Liddell anticipates the hand carriable surface cleaning apparatus of claim 1 and further teaches the upper end of the second cyclonic cleaning stage overlies the entire upper end of the first cyclonic cleaning stage.

122. In my opinion, Liddell teaches that the upper end of the second cyclonic cleaning stage (**upper surface** of **downstream cyclone unit 103**) overlies the entire upper end of the first cyclonic cleaning stage (**upstream cyclone**

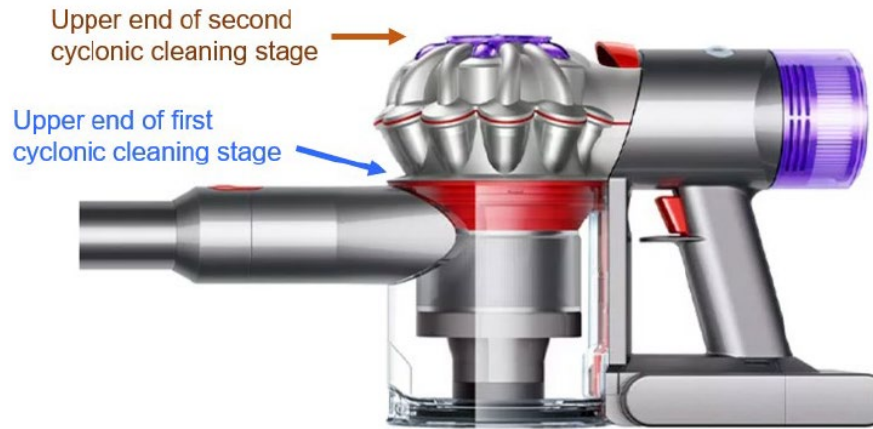
unit 101), as shown below:



Ex1005, Figs. 2a&2c.

123. As shown, the upper surface of Liddell's downstream cyclone unit 103, which is an upper end, completely overlies the top of upstream cyclone unit 101, such that upstream cyclone unit 101 is completely covered when viewed from above.

124. Like Liddell, the top of the alleged downstream cyclone unit on the accused Dyson V8 vacuum is narrower than the alleged upstream cyclone unit, as shown below in PO's infringement contentions in the parallel district court litigation:



<https://www.dyson.com/vacuum-cleaners/cordless/v8/silver-nickel> (annotated)

Ex1017, 23-24; Ex1016.

125. In my opinion, to the extent the upper end of the accused Dyson V8 vacuum’s alleged downstream cyclone unit overlies the entire upper end of the alleged upstream cyclone unit, so does Liddell’s.

3. Liddell Anticipates Claim [4]

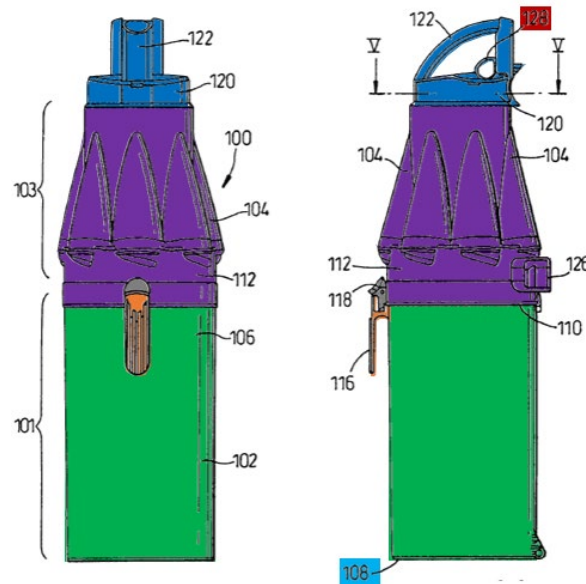
Reference Number	Claim Limitation
[4]	“The hand carriable surface cleaning apparatus of claim 1, wherein the second cyclonic cleaning stage is moveable relative to the sidewall while the bottom door is open.”

126. In my opinion, Liddell anticipates the hand carriable surface cleaning apparatus of claim 1 and further teaches the second cyclonic cleaning stage is moveable relative to the sidewall while the bottom door is open.

127. In my opinion, Liddell teaches that the second cyclonic cleaning stage (**downstream cyclone unit 103**) is moveable relative to the sidewall (side wall of **cylindrical bin 106**) while the bottom door (**base 108**) is open. *See*

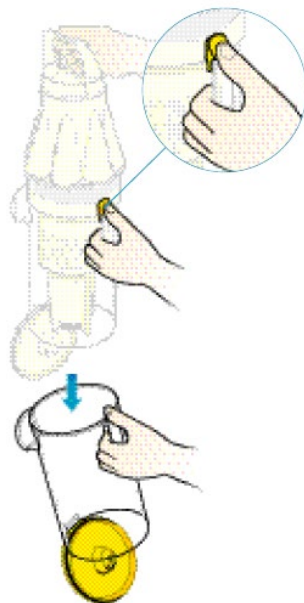
Ground 1, Limitations [1b]/[12b]/[13b] and [1c]/[12c]/[13c].

128. Liddell teaches both “releasing the cylindrical bin” and “opening the base” in order to empty cylindrical bin 106. Ex1005, 5:30-6:3, 6:23-25, 7:5-8, 7:28-29, Figs 2a-2b, 3b. In my opinion, a POSA would understand Liddell allows both to be performed at the same time. For example, Liddell teaches **downstream cyclone unit 103** is moveable relative to the sidewall of **cylindrical bin 106** while **base 108** is opened by disengaging **handle 116** and **catch 118** after engaging **actuating lever 128**. *Id.*



Ex1005, Figs. 2a–2b.

129. Other examples in the prior art support this understanding. For example, Dyson’s DC07 manual shows and depicts a “clear bin” is releasable after its base is open:



Ex1014, 10.

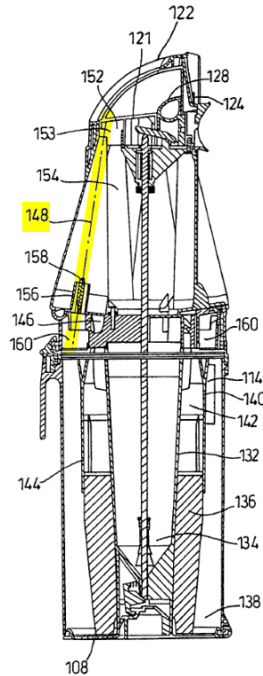
4. Liddell Anticipates Claim [6]

Reference Number	Claim Limitation
[6]	“The hand carriable surface cleaning apparatus of claim 1, wherein each second cyclone comprises a respective cyclone axis about which air circulates within the second cyclone, wherein the cyclone axes are generally longitudinal.”

130. In my opinion, Liddell anticipates the hand carriable surface cleaning apparatus of claim 1 and further teaches each second cyclone comprises a respective cyclone axis about which air circulates within the second cyclone, wherein the cyclone axes are generally longitudinal.

131. In my opinion, Liddell teaches that each second cyclone (downstream cyclone 104/204) has a respective cyclone axis (longitudinal axis 148), wherein the cyclone axes are generally longitudinal.

132. Liddell states “[e]ach downstream cyclone 104 has a **longitudinal axis 148** (see Figure 3b)....” Ex1005, 6:10-12, 6:5-16, Fig. 7.



Id., Fig. 3b.

133. Liddell also teaches that air circulates within the second cyclone (downstream cyclone 104/204) about the cyclone axis (longitudinal axis 148):

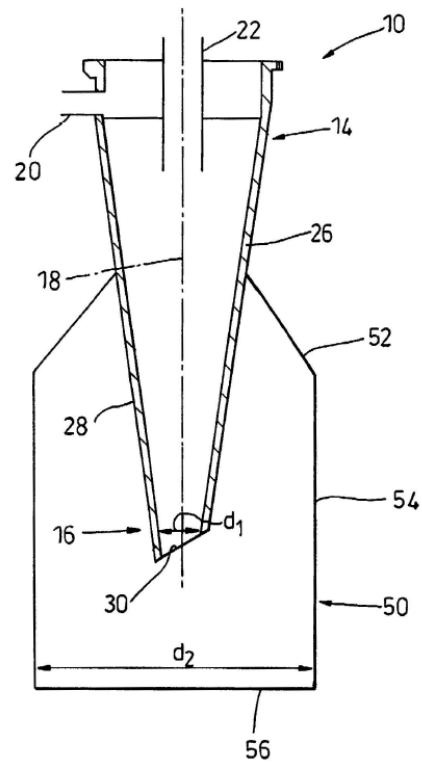
[Air] enters either one of the first cyclones 104a[/204a] or one of the second cyclones 104b[/204b] via the respective inlet 146. Each inlet 146 forces the incoming air to follow a helical path inside the cyclone 104a[/204a], 104b[/204b]. The tapering bodies 105 of the first and second cyclones 104a[/204a], 104b[/204b] cause further, intense cyclonic separation to take

place inside each of the first and second cyclones 104a[/204a], 104b[/204b] so that very fine dirt and dust particles are separated from the main airflow. The dirt and dust particles exit the uppermost end of each of the first and second cyclones 104a[/204a], 104b[/204b] whilst the cleaned air returns to the lower end of the respective cyclone 104a[/204a], 104b[/204b] along the axis 148 thereof. The cleaned air exits via the vortex finder 156.

Ex1005, 9:16-22; *see also id.*, 7:22-25, Fig. 4c.

134. In my opinion, a POSA would understand Liddell's teachings that air enters inlet 146, follows a helical path within each cyclone 104/204, and exits via vortex finder 156 at the bottom of each cyclone while dirt is deposited via the upper most end indicates air circulates within each downstream cyclone 104/204 about the longitudinal axis 148.
135. For example, UK Patent Publication GB2,385,292 ("Dummelow"), a 2003 Dyson publication cited by Liddell (Ex1005, 10:9) describes the airflow in a frusto-conical cyclone with a similar configuration as Liddell's downstream cyclones 104/204. As in Liddell, Dummelow states that air enters the widest portion of the cyclone via inlet 20, forms a vortex around longitudinal axis 18, and exits the widest portion of the cyclone at outlet

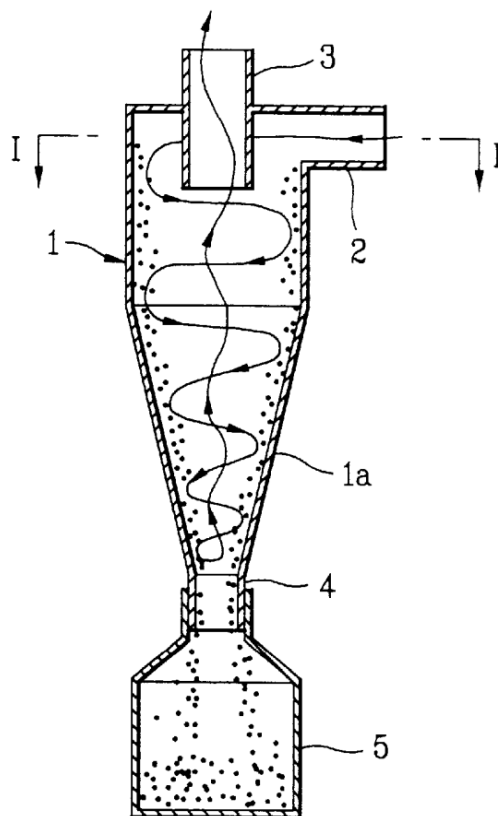
22 while dust is deposited through cone opening 30:



Ex1011, 4-5, Fig. 2.

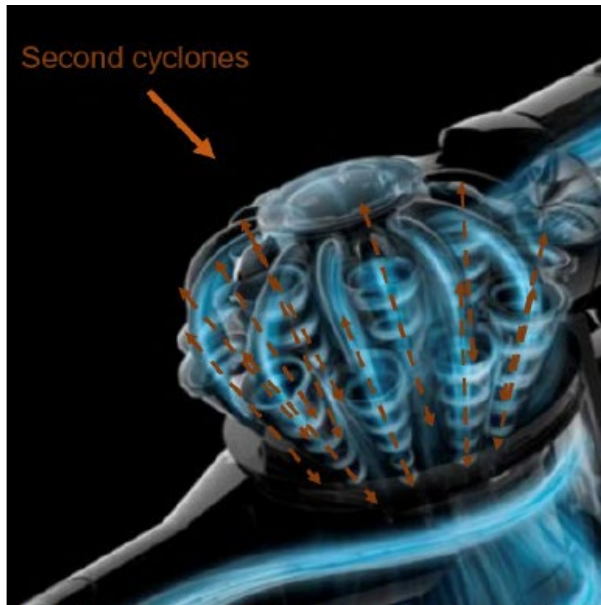
136. Similarly, US Patent No. 6,572,668 (“An”), a 2003 patent, also describes the airflow in a frusto-conical cyclone with a similar configuration as Liddell’s downstream cyclones 104/204. As in Liddell, air enters widest portion of the cyclone at inlet 2, circulates around cone part 1a, and exits the widest portion of the cyclone at air outlet 3 while dust is deposited through dust outlet 4:

FIG. 2



Ex1032, Fig. 2, 1:18-63.

137. Like Liddell, the accused Dyson V8 vacuum has alleged downstream cyclones that are inclined slightly toward the longitudinal axis of downstream cyclone unit, as shown below:



<https://www.dyson.com/vacuum-cleaners/cordless/v8/absolute-hepa-silver> (annotated)

Ex1017, 28-29; Ex1016.

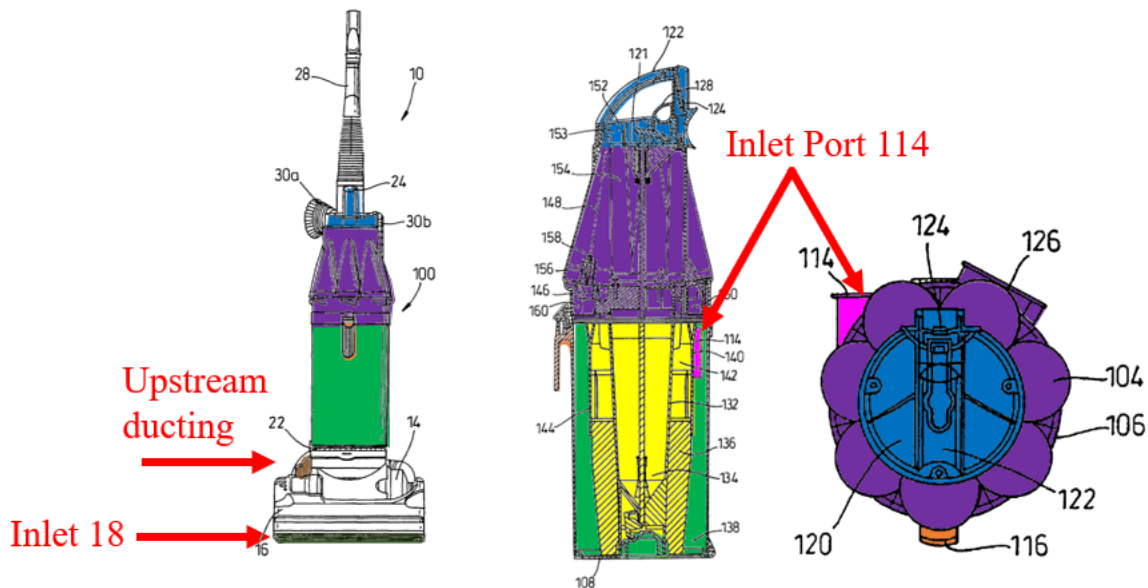
138. In my opinion, to the extent the accused Dyson V8 vacuum's alleged downstream cyclones are generally longitudinal, so are Liddell's.

5. Liddell Anticipates Claim [7]

Reference Number	Claim Limitation
[7]	"The hand carriable surface cleaning apparatus of claim 1, wherein the dirty air inlet comprises a conduit extending forwardly from the first cyclonic cleaning stage, and wherein the second cyclonic cleaning stage is longitudinally moveable relative to the conduit."

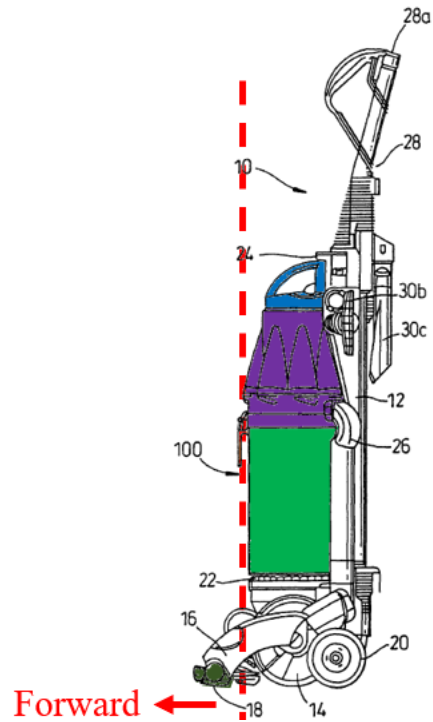
139. In my opinion, Liddell anticipates the hand carriable surface cleaning apparatus of claim 1, wherein the dirty air inlet comprises a conduit extending forwardly from the first cyclonic cleaning stage, and wherein the second cyclonic cleaning stage is longitudinally moveable relative to the conduit.

140. In my opinion, Liddell teaches the dirty air inlet (**inlet 18**, “**upstream ducting**,” and **inlet port 114**) has a conduit (airways formed by **inlet 18**, “**upstream ducting**,” and **inlet port 114**) extending forwardly from the first cyclonic cleaning stage (**upstream cyclone unit 101**), and wherein the second cyclonic cleaning stage (**downstream cyclone unit 103**) is longitudinally moveable relative to the conduit.



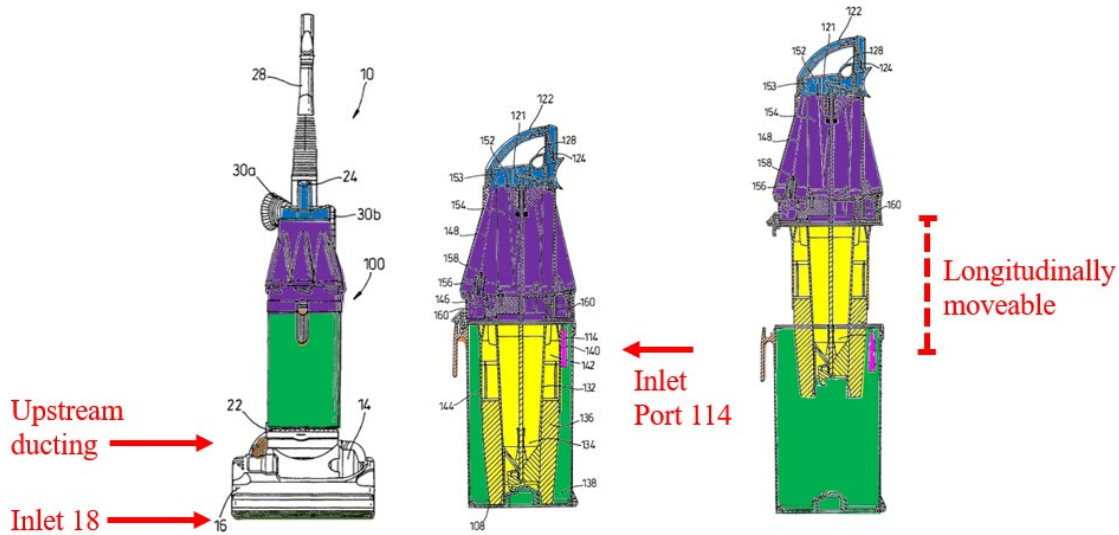
Ex1005, Figs. 1a, 3b, 2c.

141. **Inlet 18**, “**upstream ducting**,” and **inlet port 114** form a conduit extending from **inlet port 114** on **upstream cyclone unit 101** to the suction inlet 18 in cleaning head 16. The conduit of **inlet 18**, “**upstream ducting**,” and **inlet port 114** extends forwardly from **upstream cyclone unit 101**, as illustrated below:



Id., Fig. 1b.

142. In my opinion, Liddell’s second cyclonic cleaning stage (**downstream cyclone unit 103**) is longitudinally moveable relative to the conduit running through **inlet 18**, “**upstream ducting**,” and **inlet port 114**. When the **cylindrical bin 106** is released from the **downstream cyclone unit 103** (such as for cleaning or emptying, as I explained for limitations [1c] and [4]), the **downstream cyclone unit 103** is longitudinally moveable relative to the conduit of **inlet 18**, “**upstream ducting**,” and **inlet port 114** because **inlet port 114** remains connected to **cylindrical bin 106**, **inlet 18** remains connected to cleaning head 16, and “**upstream ducting**” remains connected to upstanding body 12:



Ex1005, Fig. 1a, 3b(modified).

6. Liddell Anticipates Claim [8]

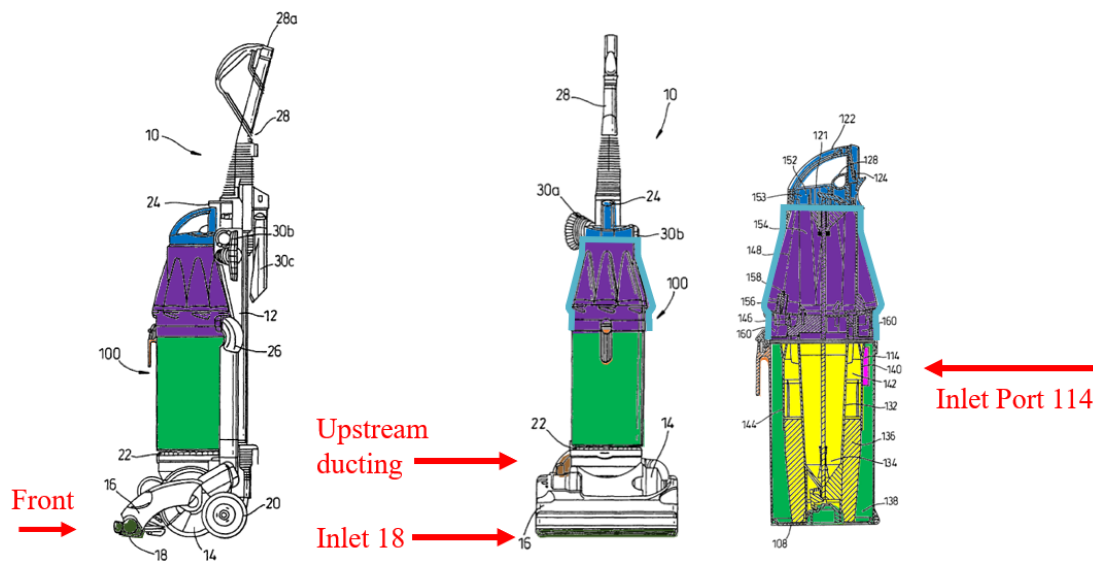
Reference Number	Claim Limitation
[8]	“The hand carriable surface cleaning apparatus of claim 7, wherein the dirty air inlet is located at a front end of the hand carriable surface cleaning apparatus and the upper end of the second cyclonic cleaning stage is located above the dirty air inlet.”

143. In my opinion, Liddell anticipates the hand carriable surface cleaning apparatus of claim 1 and further teaches the dirty air inlet is located at a front end of the hand carriable surface cleaning apparatus and the upper end of the second cyclonic cleaning stage is located above the dirty air inlet.

144. In my opinion, Liddell teaches the dirty air inlet (**inlet 18, upstream ducting**, and **inlet port 114**) is located at a front end of the hand carriable surface cleaning apparatus (vacuum cleaner 10) and the upper end of the

second cyclonic cleaning stage (**upper surface** of **downstream cyclone unit 103**) is located above the dirty air inlet.

145. In my opinion, the dirty air inlet (**inlet 18**, **upstream ducting**, and **inlet port 114**) is located at a front end of the hand carriable surface cleaning apparatus at least because its **inlet 18** is located at a front end of the vacuum cleaner 10, as shown in Fig. 1b. Also, in my opinion, the entire second cyclonic cleaning stage (**downstream cyclone**), including its upper end, is above the **inlet 18**, **upstream ducting**, and **inlet port 114**:

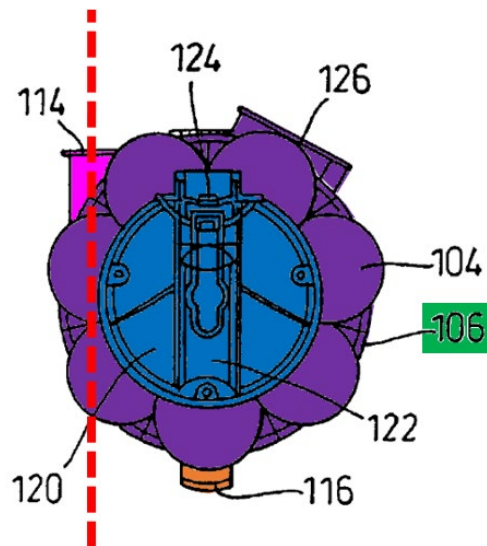


Ex1005, Fig. 1a-1b, 3b, 5:24-30, 7:28-30.

7. Liddell Anticipates Claim [9]

Reference Number	Claim Limitation
[9]	“The hand carriable surface cleaning apparatus of claim 7, wherein the conduit defines an axis that intersects the first cyclonic cleaning stage.”

146. In my opinion, Liddell anticipates the hand carriable surface cleaning apparatus of claim 1 and further teaches the conduit defines an axis that intersects the first cyclonic cleaning stage.
147. In my opinion, Liddell teaches the dirty air inlet conduit (airways formed by inlet 18, upstream ducting, and inlet port 114) defines an axis that intersects the first cyclonic cleaning stage (upstream cyclone unit 101). Ex1005, 5:22-30, 9:8-11. The conduit meets upstream cyclone unit 101 at inlet port 114, and forms an axis that intersects the cylindrical bin 106 of the upstream cyclone unit 101, as shown below.



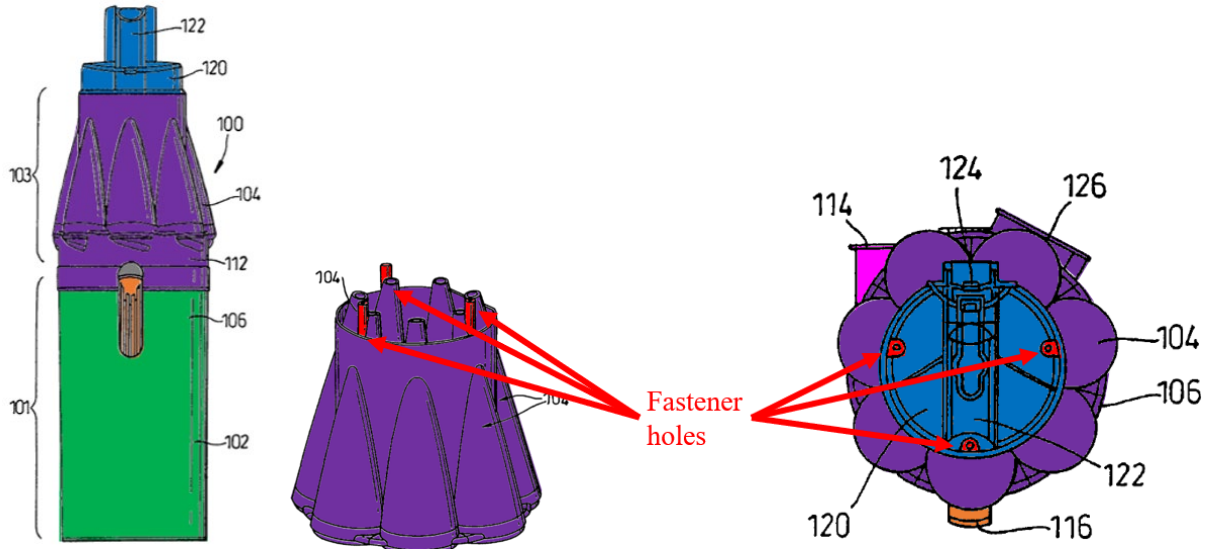
Id., 5:24-30, 7:28-30, Fig. 2c.

8. Liddell Anticipates Claim [10]

Reference Number	Claim Limitation
[10]	“The hand carriable surface cleaning apparatus of claim 1, further comprising an openable lid that is moveable between a closed position, in which the lid overlies the second cyclonic cleaning stage, and an open position in which the second cyclonic cleaning stage is accessible.”

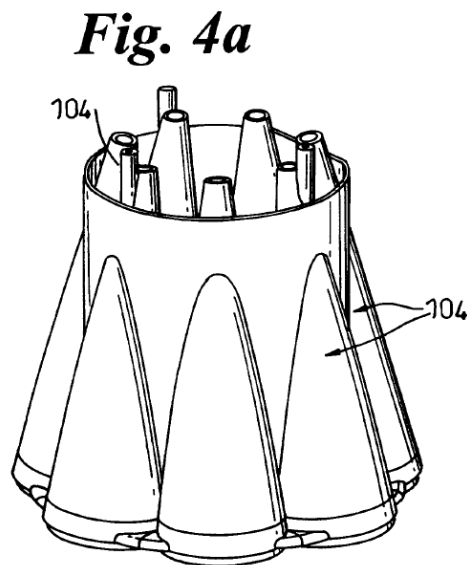
148. In my opinion, Liddell anticipates the hand carriable surface cleaning apparatus of claim 1 and further teaches an openable lid that is moveable between a closed position, in which the lid overlies the second cyclonic cleaning stage, and an open position in which the second cyclonic cleaning stage is accessible.
149. In my opinion, Liddell teaches an openable lid (**upper portion 120**) that is moveable between a closed position, in which the lid overlies the second cyclonic cleaning stage (**downstream cyclone unit 103**), and an open position in which the second cyclonic cleaning stage is accessible.
150. Liddell teaches that the “uppermost ends of the downstream cyclones 104[/204] project inside an **upper portion 120** which extends upwardly from the surfaces of the downstream cyclones 104[/204].” Ex1005, 6:14-16, Figs. 2c, 3b, 4a-4c.
151. Liddell also teaches fastener holes in **upper portion 120**, and in my opinion, a POSA would have understood that **upper portion 120** could be

opened via these fasteners to provide access to the downstream cyclones
104/204 of the **downstream cyclone unit 103**.



Ex1005, Figs. 2a&2c.

152. This is further shown in Fig. 4a, which shows Liddell's downstream cyclone unit 103 with upper portion 120 removed:



Id., Fig. 4a.

153. In my opinion, a POSA would also understand that Liddell’s openable lid is moveable between a closed position when the fasteners are engaged, in which **upper portion 120** overlies the **downstream cyclone unit 103**, and an open position when the fasteners are removed, in which the **downstream cyclone unit 103** is accessible.

9. **Liddell Anticipates Claim [11]**

Reference Number	Claim Limitation
[11]	“The hand carriable surface cleaning apparatus of claim 1, wherein the second cyclonic cleaning stage is removable from the first cyclonic cleaning stage.”

154. In my opinion, Liddell anticipates the hand carriable surface cleaning apparatus of claim 1 and further teaches the second cyclonic cleaning stage is removable from the first cyclonic cleaning stage.

155. In my opinion, Liddell teaches that the second cyclonic cleaning stage (downstream cyclone unit 103) is removable from the first cyclonic cleaning stage (upstream cyclone unit 101).

156. As I explained previously, Liddell “provide[s] means for releasing the cylindrical bin 106” (which houses upstream cyclone unit 101) from downstream cyclone unit 103 such that downstream cyclone unit can be removed from upstream cyclone unit 101. *See* Ground 1, Limitation [1c]/[12c]/[13c].

**B. Ground 2: Liddell Alone Or In Combination With Organ
Renders Obvious Claims 1 and 3-13**

157. In my opinion, Liddell anticipates the majority of the challenged claims.

See Ground 1.

158. However, to the extent PO argues that Liddell does not anticipate these claims, in my opinion, a POSA would have understood that Liddell at a minimum renders them obvious, for the reasons I provide below.

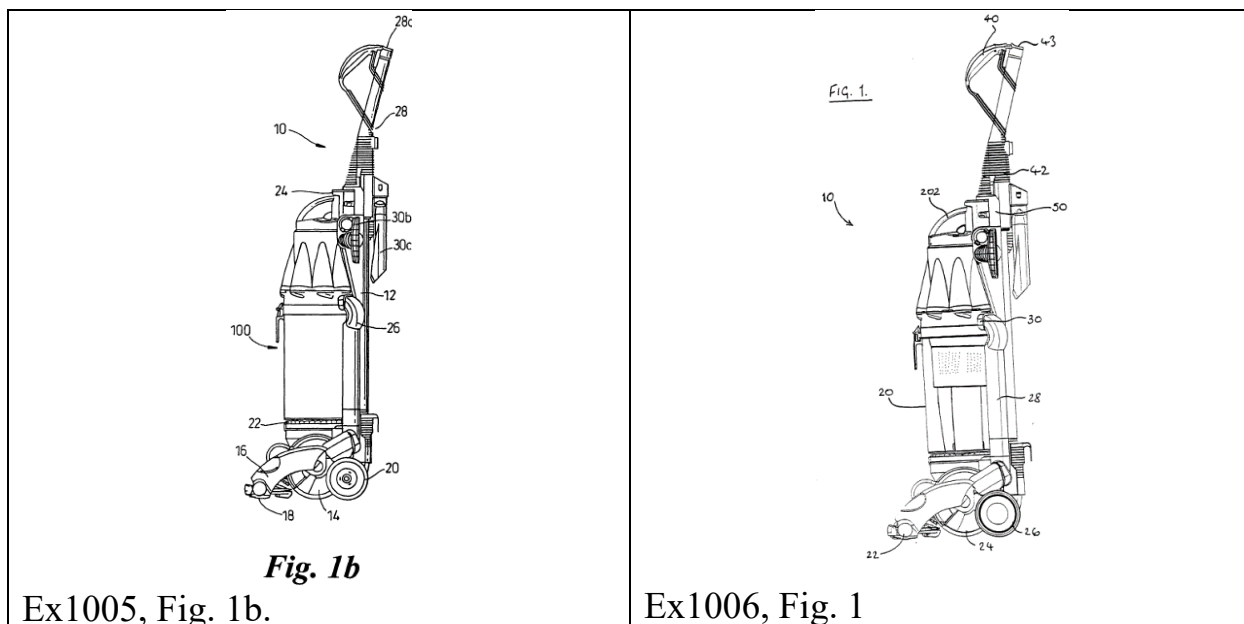
159. Also, in my opinion, a POSA would have been motivated to make certain modifications to Liddell, based on their knowledge and the teachings of Liddell, that would render additional claims obvious for the reasons I provide below.

1. Motivation To Combine

160. In my opinion, the combination of Liddell and Organ also renders obvious claims 1 and 3-13, and a POSA would have been motivated combined these references.

161. Organ is a Dyson patent describing a similar vacuum configuration as Liddell that provides additional details about certain features.

Liddell	Organ
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162. In my opinion, to the extent PO argues that Liddell does not teach a moveable second cyclonic cleaning stage and screen, or the ability to move a second cyclonic cleaning stage while a bottom door on a first cyclonic cleaning stage is open, Organ teaches these limitations. In my opinion, a POSA would have been motivated to combine these functions with Liddell.

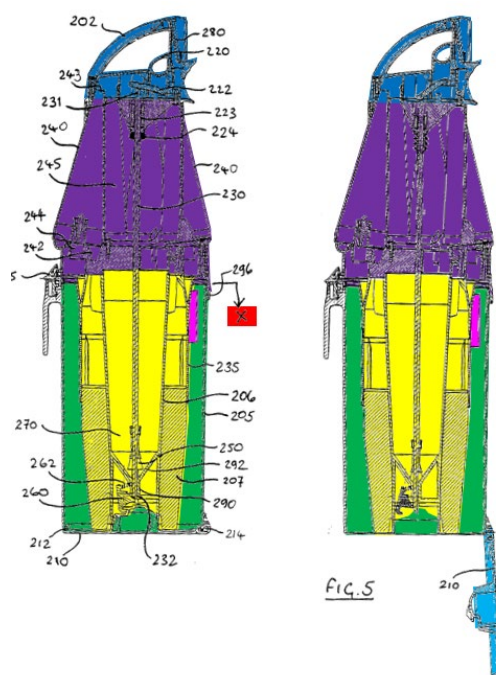
163. Further, in my opinion, Organ teaches a pre-motor filter that a POSA would have been motivated to combine with Liddell.

a. **Organ's Moveable Second Cyclonic Cleaning Stage and Screen**

164. In my opinion, Liddell teaches a moveable second cyclonic cleaning stage and screen that are moveable relative to the sidewall of the first cyclonic cleaning stage. See Ground 1, Limitations [1c]/[12c]/[13c] and [12f].

However, to the extent PO argues Liddell does not teach these features, Organ also teaches them.

165. Organ teaches a separator unit 20 having a **chamber 205** (which is a “first separation stage”), a “**second separation stage**,” and a **shroud 235**, which has “an apertured annular wall mounted coaxially inside the **chamber 205**.” Ex1006, 6:23-30, 7:11-26.
166. Organ teaches “**chamber 205** [] is removable from the **remainder of the separator unit 20**,” but that the “[t]ube-shaped part 206 together with the fins 207 and shroud 235 all form part of the **remainder of the separator unit 20** and thus are not removable with the **chamber 205**....**Chamber 205** is removable in the direction shown by the **arrow X**,” shown in Fig. 3:



Ex1006, Figs. 3 (left), 5 (right).

167. In my opinion, a POSA would have been motivated to modify Liddell with Organ's moveable second cyclonic cleaning stage and screen because, as explained by Organ, a "user may wish to remove chamber 205 in order to thoroughly clean the chamber 205, to gain access to the shroud 235 to remove any fibrous material or to remove any debris which has become trapped between the chamber 205 and the tube 206 or shroud 235."

Ex1006, 12:4-7, 3:1-2.

168. In my opinion, a POSA would have had a reasonable expectation of success incorporating this feature into Liddell because Liddell describes similar components as Organ, and modifying Liddell (if it is even a modification) merely required applying a known technique to improve a similar device in the same way.

b. Organ's Second Cyclonic Cleaning Stage That Can Move When The Bottom Door Is Open

169. As I explained above in Ground 1, in my opinion, Liddell teaches that the second cyclonic cleaning stage that is moveable relative to the sidewall of the first cyclonic cleaning stage when its bottom door is open. *See* Ground 1, Limitation [4].

170. However, to the extent PO argues Liddell does not teach this feature, Organ also teaches that the second cyclonic cleaning stage is moveable

- relative to the sidewall of the first cyclonic cleaning stage while a bottom door is open.
171. Organ teaches that “**chamber 205** [] has a **door 210** at its base which can be opened” and that “**chamber [205]** is also separable from the separating apparatus...where i[t] connects with the **lower end of the cyclone assembly**.” Ex1006, Abstract, 8:23-25. Organ goes on to explain that “the **chamber [205]** cannot be removed unless the **door 210** is open” because “the latch for the door is hooked and is attached to the cyclone assembly.” *Id.*; 3:7-19, 12:7-16. Thus, “[a] user must first release the closure member [for **base 210**] to deposit the dust...before separating the **collecting chamber [205]** from the remainder of the apparatus.” *Id.*, 3:21-25, Claim 1, 3:10-25.
172. In my opinion, a POSA would have been motivated to modify Liddell’s cylindrical bin 106 and its base 108 so that cylindrical bin 106 cannot be removed from the cyclonic separation apparatus 100 unless base 108 is open, as taught by Organ.
173. Organ teaches this is beneficial because “a user cannot accidentally open the closure member and deposit dust on the floor if they decide to remove the collecting chamber from the remainder of the apparatus.” Ex1006, 3:21-23, Abstract.

174. In my opinion, a POSA would have had a reasonable expectation of success incorporating this feature into Liddell because Liddell describes similar components as Organ, and modifying Liddell (if it is even a modification) merely required applying a known technique to improve a similar device in the same way.

c. **Organ's Pre-Motor Filter**

175. Organ also teaches a pre-motor filter. Organ teaches that “[e]ach of the cleaned air outlets 244 of the cyclonic chambers 240 communicate with an outlet conduit such that...[c]leaned air...is recombined into a single flow and is channelled...through a *pre-motor filter*, fan and post-motor filter before finally being exhausted from the cleaner.” Ex1006, 7:3-5, 7:23-26.

176. In my opinion, a POSA would have been motivated to incorporate Organ's pre-motor filter in the fluid flow path between Liddell's downstream cyclones 104/204 and the motor located in the motor casing 14 for its known benefits: to further clean the air from the downstream cyclones and to otherwise prevent particles from interfering with the operation of the motor.

177. Liddell's design is configured such that “cleaned air is used to cool the motor located in the motor casing 14 before being exhausted from the vacuum cleaner 10.” Ex1005, 5:12-14. In my opinion, a POSA would have

had a reasonable expectation of success incorporating this feature into Liddell because Liddell already teaches a pre-motor chamber, including chambers in downstream ducting and motor casing 14 (*id.*, 4:26-5:14, 8:7-14). In my opinion, incorporating Organ’s pre-motor filter into that chamber merely required applying a known technique for its known functions of cleaning air prior to it reaching the motor. In my opinion, this would also further Liddell’s goal of using “cleaned air...to cool the motor.” *Id.*, 5:12-14.

2. **Liddell Alone Or In Combination With Organ Renders Obvious Claims [1]/[12]/[13]/[11]**

a. **[1pre]/[12pre]/[13pre]**

Reference Number	Claim Limitation
[1pre]	“A hand carriable surface cleaning apparatus comprising:”
[12pre]	“A hand carriable surface cleaning apparatus comprising:”
[13pre]	“A hand carriable surface cleaning apparatus comprising:”

178. In my opinion, to the extent the preambles are found limiting, Liddell teaches a hand carriable surface cleaning apparatus. *See* Ground 1, Limitations [1pre]/[12pre]/[13pre].

179. However, to the extent PO argues that Liddell does not teach a “hand carriable” surface cleaning apparatus, it is my opinion that Liddell renders obvious this limitation.

180. In my opinion, it would have been obvious for a POSA to reduce Liddell’s

weight to be even more “maneuver[able],” further promote “above-the-floor cleaning function, eg on stairs, upholstery, etc.,” and make it even easier for the “cyclonic separation apparatus 100 [to] be carried.” Ex1005, 4:16-23, 5:20-31, 6:16-18. A POSA would have had a reasonable expectation of success, because it would involve straightforward adjustments such as manufacturing Liddell’s vacuum with lightweight materials and/or reducing the size of certain components, such as Liddell’s “cylindrical bin 106,” “downstream cyclone unit 103,” “motor casing 14,” and “upstanding body 12.” All of this would make Liddell’s cleaner lighter and/or more easily hand carried.

b. [1a]/[12a]/[13a]

Reference Number	Claim Limitation
[1a]	“a fluid flow path extending between a dirty air inlet and a clean air outlet;”
[12a]	“a fluid flow path extending between a dirty air inlet and a clean air outlet;”
[13a]	“a fluid flow path extending between a dirty air inlet and a clean air outlet;”

181. In my opinion, Liddell teaches a fluid flow path extending between a dirty air inlet and a clean air outlet. *See* Ground 1, Limitations [1a]/[12a]/[13a]. Therefore, Liddell alone or in combination with Organ also teaches this limitation.

c. [1b]/[12b]/[13b]

Reference Number	Claim Limitation
[1b]	“a first cyclonic cleaning stage positioned in the fluid flow path downstream from the dirty air inlet, the first cyclonic cleaning stage comprising an upper end, a bottom end spaced longitudinally below the upper end and a side wall extending therebetween, the first cyclonic cleaning stage having a dirt collection region with a bottom door that is openable to empty the dirt collection region;”
[12b]	“a first cyclonic cleaning stage positioned in the fluid flow path downstream from the dirty air inlet, the first cyclonic cleaning stage comprising an upper end, a bottom end spaced longitudinally below the upper end and a side wall extending therebetween, the first cyclonic cleaning stage having a dirt collection region with a bottom door that is openable to empty the dirt collection region;”
[13b]	“a first cyclonic cleaning stage positioned in the fluid flow path downstream from the dirty air inlet, the first cyclonic cleaning stage comprising an upper end, a bottom end spaced longitudinally below the upper end and a side wall extending therebetween, the first cyclonic cleaning stage having a dirt collection region with a bottom door that is openable to empty the dirt collection region;”

182. In my opinion, Liddell teaches a first cyclonic cleaning stage positioned in the fluid flow path downstream from the dirty air inlet, the first cyclonic cleaning stage comprising an upper end, a bottom end spaced longitudinally below the upper end and a side wall extending therebetween, the first cyclonic cleaning stage having a dirt collection region with a bottom door that is openable to empty the dirt collection region. *See* Ground 1, Limitations [1b]/[12b]/[13b]. Therefore, Liddell alone or in combination with Organ also teaches this limitation.

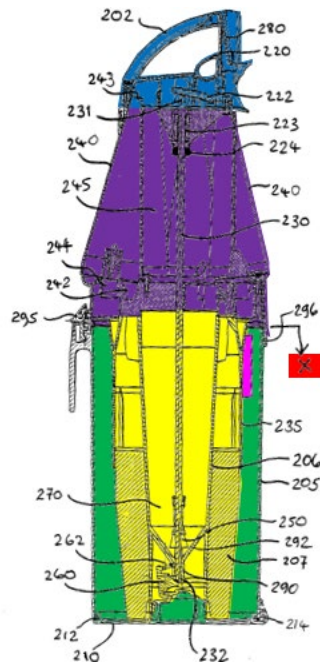
d. [1c]/[12c]/[12f]/[13c]/[11]

Reference Number	Claim Limitation
[1c]	“a second cyclonic cleaning stage positioned in the fluid flow path downstream from the first cyclonic cleaning stage, the second cyclonic cleaning stage having an upper end which is positioned above the upper end of the first cyclonic cleaning stage, the second cyclonic cleaning stage is longitudinally moveable relative to all of the sidewall of the first cyclonic cleaning stage;”
[12c]	“a second cyclonic cleaning stage positioned in the fluid flow path downstream from the first cyclonic cleaning stage, the second cyclonic cleaning stage having an upper end which is positioned above the upper end of the first cyclonic cleaning stage, the second cyclonic cleaning stage is longitudinally moveable relative to all of the sidewall of the first cyclonic cleaning stage;”
[13c]	“a second cyclonic cleaning stage positioned in the fluid flow path downstream from the first cyclonic cleaning stage, the second cyclonic cleaning stage having an upper end which is positioned above the upper end of the first cyclonic cleaning stage, the second cyclonic cleaning stage is longitudinally moveable relative to all of the sidewall of the first cyclonic cleaning stage;”
[12f]	wherein the first cyclonic cleaning stage has a first stage air inlet, each cyclone of the second cyclonic cleaning stage has a second stage air inlet downstream from the first stage air inlet and the hand carriable surface cleaning apparatus further comprises a screen positioned in the fluid flow path between the first stage air inlet and the second stage air inlet, wherein the screen is longitudinally moveable relative to the sidewall.
[11]	“The hand carriable surface cleaning apparatus of claim 1, wherein the second cyclonic cleaning stage is removable from the first cyclonic cleaning stage.”

183. In my opinion, Liddell teaches a second cyclonic cleaning stage positioned in the fluid flow path downstream from the first cyclonic cleaning stage, the second cyclonic cleaning stage having an upper end which is positioned above the upper end of the first cyclonic cleaning stage, the second

- cyclonic cleaning stage is longitudinally moveable relative to all of the sidewall of the first cyclonic cleaning stage. *See* Ground 1, Limitations [1c]/[12c]/[13c]. Therefore, Liddell alone or in combination with Organ also teaches this limitation.
184. In my opinion, Liddell teaches the first cyclonic cleaning stage has a first stage air inlet, each cyclone of the second cyclonic cleaning stage has a second stage air inlet downstream from the first stage air inlet and the hand carriable surface cleaning apparatus further comprises a screen positioned in the fluid flow path between the first stage air inlet and the second stage air inlet, wherein the screen is longitudinally moveable relative to the sidewall. *See* Ground 1, Limitation [12f]. Therefore, Liddell alone or in combination with Organ also teaches this limitation.
185. In my opinion, Liddell teaches the hand carriable surface cleaning apparatus of claim 1 and further teaches the second cyclonic cleaning stage is removable from the first cyclonic cleaning stage. *See* Ground 1, Limitation [11]. Therefore, Liddell alone or in combination with Organ also teaches this limitation.
186. However, to the extent PO argues Liddell does not teach these features, it is my opinion they are obvious in view of Liddell combined with Organ.
187. Like Liddell, Organ teaches “**chamber 205** [] is removable from the

remainder of the separator unit 20,” and that “[c]hamber 205 is removable in the direction shown by the **arrow X**,” shown in Fig. 3:



Id., 12:1-9, Fig. 3, 6:24-25, Abstract, 2:29-3:2, Claims 1-3.

188. Therefore, in my opinion, Organ teaches that “**remainder of the separator unit 20**,” which includes “**second separation stage**” is moveable in any direction, including longitudinally, relative to the **chamber 205** (which is the sidewall of the “**first separation stage**”) and that the “**second separation stage**” is removable from the “**first separation stage**.” *Id.*

189. With respect to the claimed “screen” of claim 13, like Liddell, Organ teaches a **shroud 235** with “an apertured annular wall” between the “**first separation stage**” and the “**second separation stage**.” *Id.*, 6:22-31. Organ

teaches that “**chamber 205** [] is removable from the remainder of the separator unit 20,” but that the “[t]ube-shaped part 206 together with the fins 207 and shroud 235 all form part of the remainder of the separator unit 20 and thus are not removable with the chamber 205.” *Id.*, 12:1-4, Fig. 3.

190. Therefore, in my opinion, Organ teaches that the “apertured annular wall” (which is a screen) of **shroud 235** is moveable in any direction, including longitudinally, relative to the **chamber 205** (which is the sidewall of the “**first separation stage**”). *Id.*, 6:22-31, 7:11-26. 12:1-16, Fig. 3.

191. As I explained above in my analysis of motivation to combine, in my opinion, a POSA would have been motivated to combine Organ’s teaching of these feature with Liddell, and would have had a reasonable expectation of success. *See* Ground 2, Motivation to Combine.

e. [1d]/[12d]/[13d]

Reference Number	Claim Limitation
[1d]	“a suction motor positioned in the fluid flow path downstream from the second cyclonic cleaning stage;”
[12d]	“a suction motor positioned in the fluid flow path downstream from the second cyclonic cleaning stage;”
[13d]	“a suction motor positioned in the fluid flow path downstream from the second cyclonic cleaning stage;”

192. In my opinion, Liddell teaches a suction motor positioned in the fluid flow path downstream from the second cyclonic cleaning stage. *See* Ground 1,

Limitations [1d]/[12d]/[13d]. Therefore, Liddell alone or in combination with Organ also teaches this limitation.

f. [1e]/[12e]/[13e]

Reference Number	Claim Limitation
[1e]	“a handle;”
[12e]	“a handle;”
[13e]	“a handle;”

193. In my opinion, Liddell teaches a handle. *See* Ground 1, Limitations [1e]/[12e]/[13e]. Therefore, Liddell alone or in combination with Organ also teaches this limitation.

g. [1f]

Reference Number	Claim Limitation
[1f]	“wherein the second cyclonic cleaning stage comprises a plurality of second cyclones connected fluidly in parallel with each other,”

194. In my opinion, Liddell teaches the second cyclones are positioned around a central longitudinal axis that extends through the first cyclonic cleaning stage and the openable bottom door. *See* Ground 1, Limitation [1f]. Therefore, Liddell alone or in combination with Organ also teaches this limitation.

h. [1g]

Reference Number	Claim Limitation
[1g]	“wherein the second cyclones are positioned around a central longitudinal axis that extends through the first cyclonic cleaning stage and the openable bottom door,”

195. In my opinion, Liddell teaches the second cyclonic cleaning stage comprises a plurality of second cyclones connected fluidly in parallel with each other. *See* Ground 1, Limitation [1g]. Therefore, Liddell alone or in combination with Organ also teaches this limitation.

i. [1h]

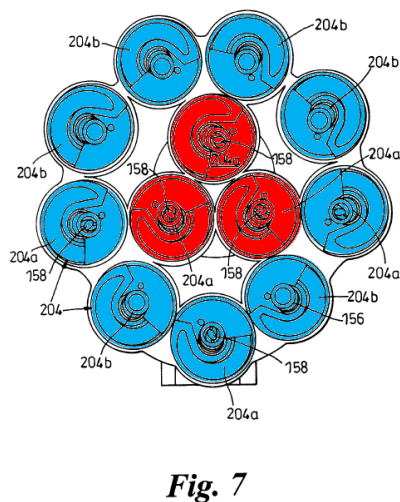
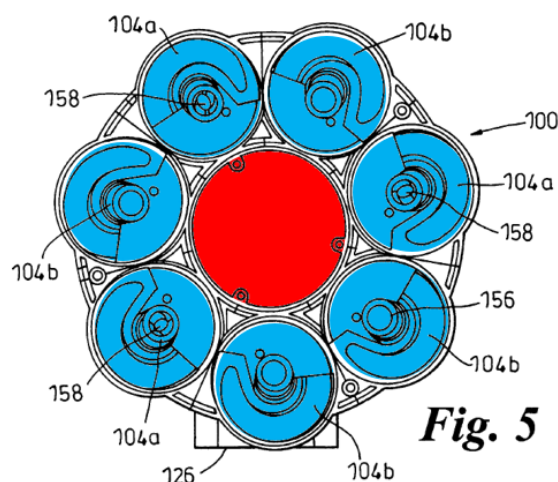
Reference Number	Claim Limitation
[1h]	“wherein the plurality of second cyclones includes a first set of second cyclones arranged in an inner ring and a second set of second cyclones arranged in an outer ring laterally surrounding the inner ring.”

196. In my opinion, Liddell teaches the plurality of second cyclones includes a first set of second cyclones arranged in an inner ring and a second set of second cyclones arranged in an outer ring laterally surrounding the inner ring. *See* Ground 1, Limitation [1h]. Therefore, Liddell alone or in combination with Organ also teaches this limitation.

197. In my opinion, Liddell teaches a single vacuum system, with all elements arranged as in the challenged claims, and therefore anticipates all limitations of claim 1, including limitation [1h].

198. However, to the extent PO argues that Liddell's teachings regarding cyclones 104 are somehow different than embodiments depicting cyclones 204, it is my opinion that a POSA would have found it obvious to apply Liddell's teachings about cyclones 204 to the embodiment describing cyclones 104 and vice versa.
199. Liddell teaches that its invention is not "limited to the precise features of the embodiments described" and that "[o]ther variations and modifications will be apparent to a skilled reader." Ex1005, 10:22-24. In my opinion, a POSA would have been motivated to incorporate Liddell's "inner ring" and "outer ring" of cyclones 204 with Liddell's teachings regarding cyclones 104 because using an inner ring of cyclones is a space-efficient arrangement of increasing the number of downstream cyclones, which enhances the cleaning productivity of small debris from dirty air, that is, it optimizes the size of the downstream cyclone unit for cleaning efficiency. Ex1005, 1:20-24. It is also my opinion that it would have been obvious because these embodiments were known techniques for arranging secondary cyclones downstream from a first cyclone. Ex1005, 1:28-31, 10:5-12; Ex1011, 6, Figs. 5-14 (showing arrangements of inner and outer rings of parallel cyclones).
200. In my opinion, a POSA would have had a reasonable expectation of

success because each embodiment incorporates similar components (*e.g.*, centrebody 158, vortex finder 156), and Liddell's embodiments lacking an inner ring of cyclones (Figs. 5-6) have a **vacant space** in the middle of cyclones 104 which could incorporate an **inner ring** of cyclones in a straightforward arrangement, as shown in Fig. 7.



Ex1005, Figs. 5&7.

201. Liddell teaches that, in Fig. 7, **first cyclones 204a** are in the “inner ring,” and **second cyclones 204b** are in the “outer ring,” and explains that “the number of first and second cyclones” can be changed. Ex1005, 10:10-25.
202. Further, to the extent PO argues Liddell’s “inner ring” or “outer ring” of cyclones 204 are not a “ring” as claimed, in my opinion, it would have been obvious to increase the number of cyclones in Liddell’s “inner ring” or “outer ring.”
203. The prior art taught arrangements with even more cyclones arranged in an

inner ring of cyclones. For example, Liddell notes that the “inner ring” and “outer ring” of cyclones 204 “is described in more detail in co-pending application GB0203723 2” (published as GB2,385,292A to Dummelow et al.) which is attached as Ex1011. Dummelow teaches several arrangements of inner and outer rings of cyclones, including one with five cyclones arranged in an inner ring (and depicted with their respective centers lying on a ring), as shown below:

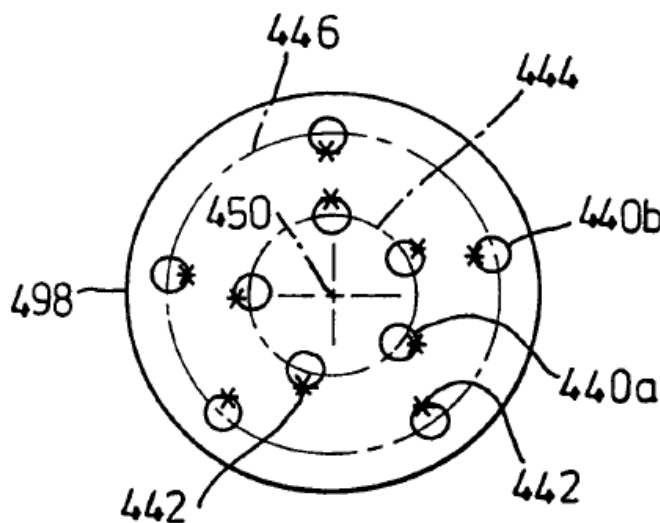


Fig. 13

Ex1011, Fig. 13, 6.

204. Further, Liddell teaches “the number of first cyclones can be significantly higher than the number of second cyclones or vice versa.” Ex1005, 10:25-26. A POSA would have understood that smaller cyclones are more efficient at separating smaller dust particles, and that by shrinking the size

of Liddell's cyclones and increasing their number, they would achieve more efficient separation of finer dust particles. For example, Liddell teaches "in this type of [parallel] arrangement, each individual cyclone is small in comparison to an equivalent single cyclone separator. This has the effect of increasing the centrifugal forces acting on the particles which, in turn, increases the separation efficiency of the separator." *Id.*, 1:20-24.

205. Accordingly, in my opinion, a POSA would have been motivated to modify Liddell to use a larger number of smaller cyclones to optimize fine dust collection for environments with higher levels of fine dust, such as a garage where surfaces are more exposed to deposits of fine airborne dust such as pollen, smoke/emissions, fine dirt/sand, and other similar particles. And in my opinion, a POSA would have had a reasonable expectation of success because Liddell already teaches an inner ring of cyclones and other arrangements with even more cyclones arranged in an inner ring were taught by the prior art.

j. [13f]

Reference Number	Claim Limitation
[13f]	"wherein the second cyclonic cleaning stage further comprises a second stage handle."

206. In my opinion, Liddell teaches the second cyclonic cleaning stage further comprises a second stage handle. *See* Ground 1, Limitation [13f].

Therefore, Liddell alone or in combination with Organ also teaches this limitation.

3. Liddell Alone Or In Combination With Organ Renders Obvious Claim [3]

Reference Number	Claim Limitation
[3]	“The hand carriable surface cleaning apparatus of claim 1, wherein the upper end of the second cyclonic cleaning stage overlies the entire upper end of the first cyclonic cleaning stage.”

207. In my opinion, Liddell alone and in combination with Organ renders obvious the hand carriable surface cleaning apparatus of claim 1 and Liddell teaches the upper end of the second cyclonic cleaning stage overlies the entire upper end of the first cyclonic cleaning stage. *See* Ground 1, Limitation [3].

208. However, to the extent that PO argues the upper end of Liddell’s downstream cyclone unit 103 does not overlie the entire upper end of Liddell’s upstream cyclone unit 101, it is my opinion that it would have been obvious to modify Liddell so that it does.

209. In my opinion, a POSA would have been motivated to make Liddell’s downstream cyclone unit larger, for example to incorporate more secondary cyclones to increase cleaning efficiency. A POSA would have understood that using a larger second cyclonic cleaning stage was one of a limited number of options for arranging first and second cyclones in a

vertical configuration.

210. The upper end of the second cyclonic cleaning stage could be smaller, larger, or the same size as the upper end of the first cyclonic cleaning stage.

The two latter options meet the claims.

211. In my opinion, this would have at least been obvious to try and a POSA would have had a reasonable expectation of success because it simply involved increasing the size of Liddell's downstream cyclone unit 103 to achieve known benefits.

4. Liddell Alone Or In Combination With Organ Renders Obvious Claim [4]

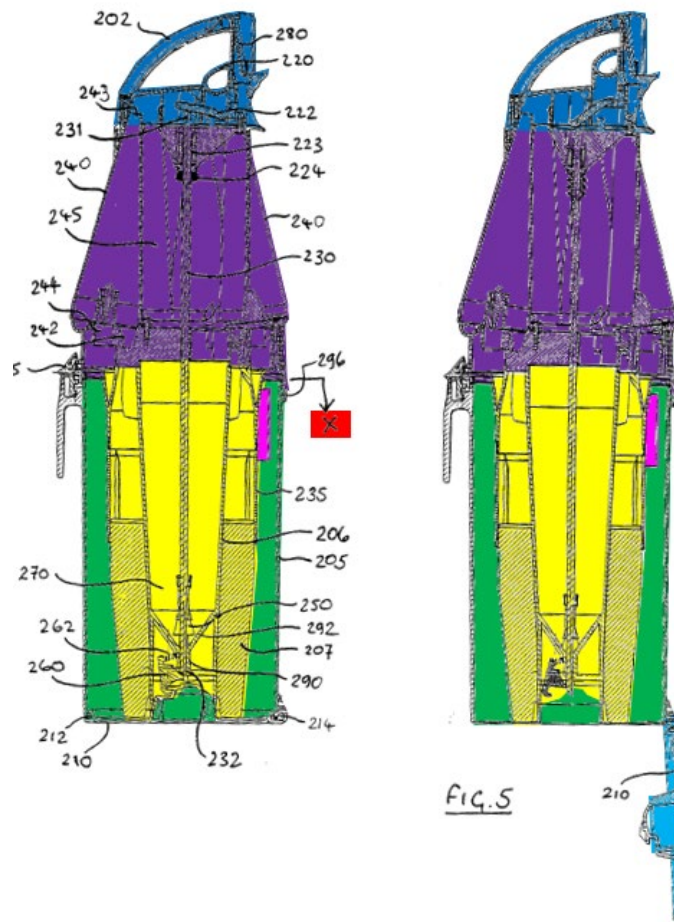
Reference Number	Claim Limitation
[4]	"The hand carriable surface cleaning apparatus of claim 1, wherein the second cyclonic cleaning stage is moveable relative to the sidewall while the bottom door is open."

212. In my opinion, Liddell alone and in combination with Organ renders obvious the hand carriable surface cleaning apparatus of claim 1 and Liddell teaches the second cyclonic cleaning stage is moveable relative to the sidewall while the bottom door is open. *See* Ground 1, Limitation [4].

213. However, to the extent that PO argues Liddell does not expressly teach that the second cyclonic cleaning stage is moveable relative to the sidewall while the bottom door is open, it is my opinion that this limitation is obvious in view of Liddell in combination with Organ, which expressly

teaches this function.

214. Organ teaches a second cyclonic cleaning stage (**second separation stage**) is moveable relative to the sidewall (side wall of **cyclonic chamber 205 of first separation stage**) while the bottom door (**base 210**) is open by releasing the chamber 205 in the direction of the **letter x**:



Ex1006, Figs. 3&5, 12:1-16.

215. Organ teaches that “**chamber 205** [] has a **door 210** at its base which can be opened” and that “**chamber [205]** is also separable from the separating apparatus...where i[t] connects with the **lower end of the cyclone**

assembly.” *Id.*, Abstract, 8:23-25. However, “the **chamber [205]** cannot be removed unless the **door 210** is open” because “the latch for the door is hooked and is attached to the cyclone assembly.” *Id.*; 3:7-19, 12:7-16. Thus, “[a] user must first release the closure member [**base 210**] to deposit the dust, in the usual manner that they will be conditioned to doing, before separating the **collecting chamber [205]** from the remainder of the apparatus.” *Id.*, 3:21-25, Claim 1, 3:10-25.

216. As I explained in my analysis regarding motivation to combine, it is my opinion that a POSA would have been motivated to combine Organ’s teaching of this feature with Liddell, and would have had a reasonable expectation of success. *See* Ground 2, Motivation to Combine.

5. Liddell Alone Or In Combination With Organ Renders Obvious Claim [5]

Reference Number	Claim Limitation
[5]	“The hand carriable surface cleaning apparatus of claim 1, further comprising a pre-motor filter chamber positioned in the fluid flow path between the second cyclonic cleaning stage and the suction motor, and wherein each second cyclone has a respective air outlet that is in fluid communication with the pre-motor filter chamber.”

217. In my opinion, Liddell alone and in combination with Organ renders obvious the hand carriable surface cleaning apparatus of claim 1. *See* Ground 2, Claim [1].

218. In my opinion, Liddell in combination with Organ teaches a pre-motor

filter chamber positioned in the fluid flow path between the second cyclonic cleaning stage and the suction motor, and wherein each second cyclone has a respective air outlet that is in fluid communication with the pre-motor filter chamber.

219. In my opinion, Liddell teaches each second cyclone (downstream cyclones 104/204) has a respective air outlet (fluid outlet 156) that is in fluid communication (via outlet port 126 and downstream ducting 26) with a pre-motor chamber (chambers in downstream ducting 26 and motor casing 14). Ex1005, Abstract, Figs. 6-7, 4:26-5:14, 8:7-14.
220. While Liddell is silent as to the presence of a pre-motor filter, Organ teaches one.
221. Organ teaches that “each of the cleaned air outlets 244 of the cyclonic chambers 240 communicate with an outlet conduit such that...[c]leaned air...is recombined into a single flow and is channelled out of the separator unit 20...through a pre-motor filter, fan and post-motor filter before finally being exhausted from the cleaner.” Organ 7:3-5, 7:23-26, 6:3-4.
222. As I described in my analysis of motivation to combine, a POSA would have been motivated to combine Organ’s pre-motor filter into Liddell’s pre-motor chamber and would have had a reasonable expectation of success. *See* Ground 2, Motivation to Combine.

**6. Liddell Alone Or In Combination With Organ Renders
Obvious Claim [6]**

Reference Number	Claim Limitation
[6]	“The hand carriable surface cleaning apparatus of claim 1, wherein each second cyclone comprises a respective cyclone axis about which air circulates within the second cyclone, wherein the cyclone axes are generally longitudinal.”

223. In my opinion, Liddell alone and in combination with Organ renders obvious the hand carriable surface cleaning apparatus of claim 1 and Liddell teaches each second cyclone comprises a respective cyclone axis about which air circulates within the second cyclone, wherein the cyclone axes are generally longitudinal. *See* Ground 1, Limitation [6]. Therefore, Liddell alone or in combination with Organ also teaches this limitation.

**7. Liddell Alone Or In Combination With Organ Renders
Obvious Claim [7]**

Reference Number	Claim Limitation
[7]	“The hand carriable surface cleaning apparatus of claim 1, wherein the dirty air inlet comprises a conduit extending forwardly from the first cyclonic cleaning stage, and wherein the second cyclonic cleaning stage is longitudinally moveable relative to the conduit.”

224. In my opinion, Liddell alone and in combination with Organ renders obvious the hand carriable surface cleaning apparatus of claim 1 and Liddell teaches the dirty air inlet comprises a conduit extending forwardly from the first cyclonic cleaning stage, and wherein the second cyclonic cleaning stage is longitudinally moveable relative to the conduit. *See*

Ground 1, Limitation [7]. Therefore, Liddell alone or in combination with Organ also teaches this limitation.

8. Liddell Alone Or In Combination With Organ Renders Obvious Claim [8]

Reference Number	Claim Limitation
[8]	“The hand carriable surface cleaning apparatus of claim 7, wherein the dirty air inlet is located at a front end of the hand carriable surface cleaning apparatus and the upper end of the second cyclonic cleaning stage is located above the dirty air inlet.”

225. In my opinion, Liddell alone and in combination with Organ renders obvious the hand carriable surface cleaning apparatus of claim 7 and Liddell teaches the dirty air inlet is located at a front end of the hand carriable surface cleaning apparatus and the upper end of the second cyclonic cleaning stage is located above the dirty air inlet. *See* Ground 1, Limitation [8]. Therefore, Liddell alone or in combination with Organ also teaches this limitation.

9. Liddell Alone Or In Combination With Organ Renders Obvious Claim [9]

Reference Number	Claim Limitation
[9]	“The hand carriable surface cleaning apparatus of claim 7, wherein the conduit defines an axis that intersects the first cyclonic cleaning stage.”

226. In my opinion, Liddell alone and in combination with Organ renders obvious the hand carriable surface cleaning apparatus of claim 1 and

Liddell teaches the conduit defines an axis that intersects the first cyclonic cleaning stage. *See* Ground 1, Limitation [9]. Therefore, Liddell alone or in combination with Organ also teaches this limitation.

10. Liddell Alone Or In Combination With Organ Renders Obvious Claim [10]

Reference Number	Claim Limitation
[10]	“The hand carriable surface cleaning apparatus of claim 1, further comprising an openable lid that is moveable between a closed position, in which the lid overlies the second cyclonic cleaning stage, and an open position in which the second cyclonic cleaning stage is accessible.”

227. In my opinion, Liddell alone and in combination with Organ renders obvious the hand carriable surface cleaning apparatus of claim 1 and Liddell teaches an openable lid that is moveable between a closed position, in which the lid overlies the second cyclonic cleaning stage, and an open position in which the second cyclonic cleaning stage is accessible. *See* Ground 1, Limitation [10]. Therefore, Liddell alone or in combination with Organ also teaches this limitation.

228. However, to the extent PO argues that Liddell does not expressly teach an openable lid moveable between closed and open positions as claimed, it is my opinion that it would have been obvious to modify Liddell with such an openable lid so that the downstream cyclones 104/204 could be accessed for cleaning and maintenance.

229. Liddell states that “[t]he upper portion 120 and the surfaces of the downstream cyclones 104[204] together define an axially extending passageway or dust channel 154....It is thus possible for dirt and dust which exits the smaller ends of the downstream cyclones 104[204] to pass from the chamber 152 to the collection space 134 via the dust channel 154.” Ex1005, 7:28-8:5. Liddell also explains that, when cyclones are arranged in parallel, “there is an increased likelihood of dust accumulating in the parallel cyclones because the dimensions of the cyclones are comparatively small.” *Id.*, 1:24-26.

230. In my opinion, a POSA would have been motivated to make **upper portion 120** openable so the downstream cyclones 104/204 can be serviced and the dust channel 154 can be cleaned of dirt and dust. Further, a POSA would have had a reasonable expectation of success because Liddell already provides fastener holes by which the **upper portion 120** can be secured and released from **downstream cyclone unit 103**. *See* Ground 1, Limitation [10].

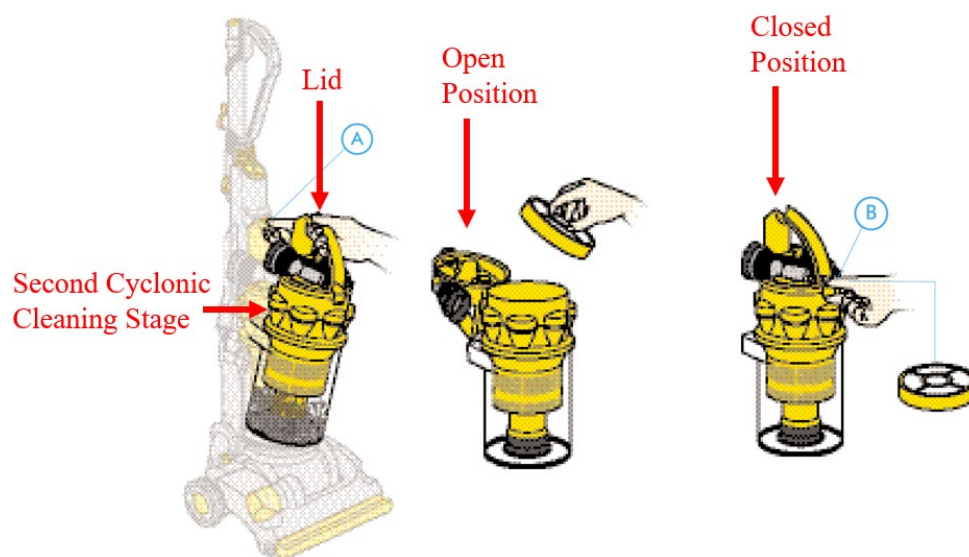
C. Ground 3: The Liddell, Organ, And DC14 Manual Combination Renders Obvious Claim 10

231. To the extent PO argues that Liddell does not teach the claimed openable lid of claim 10, in my opinion, a POSA would have combined Liddell with

DC14Manual's openable lid.

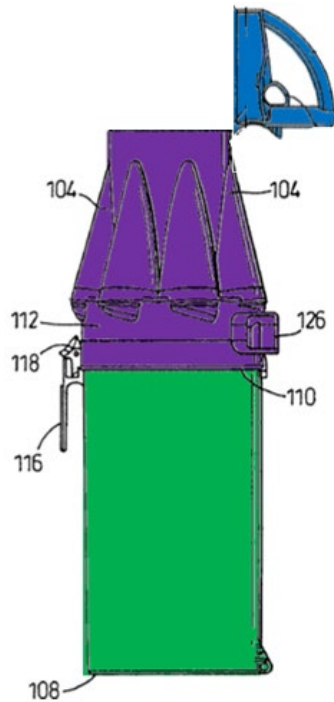
1. Motivation to Combine

232. In my opinion, a POSA would have been motivated to modify Liddell's "upper portion 120" with DC14Manual's openable lid. DC14Manual teaches a cyclonic vacuum with a lid on a "cyclone pack" that can be opened and closed as shown below:



Ex1009, 10.

233. As I explained in Ground 1, Liddell teaches an openable lid. *See* Ground 1, Limitation [10].
234. However, to the extent PO argues otherwise, it is my opinion that a POSA would have been motivated to modify Liddell's "**upper portion 120**" with DC14Manual's openable lid such that it can open and provide access to **downstream cyclone unit 103**, as illustrated below:



Ex1005, Fig. 2b(modified).

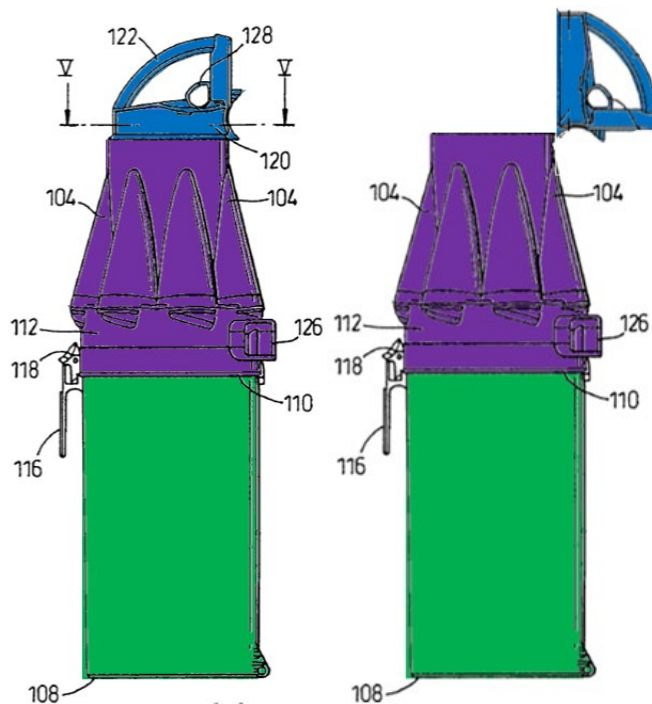
235. In my opinion, a POSA would have been motivated to make this combination so that Liddell's **downstream cyclone unit 103** is accessible for cleaning and maintenance, including as taught by DC14Manual, which teaches that one benefit of its openable lid is for accessing its filter for washing. Ex1009, 10. In my opinion, a POSA also would have had a reasonable expectation of success combining the teachings of Liddell and DC14Manual, since both references describe vacuums with similar cyclonic cleaning stage designs and incorporating an openable lid merely required applying a known technique to improve a similar device in the same way. *Id.*

**2. Liddell In Combination With Organ And DC14Manual
Renders Obvious Claim [10]**

Reference Number	Claim Limitation
[10]	“The hand carriable surface cleaning apparatus of claim 1, further comprising an openable lid that is moveable between a closed position, in which the lid overlies the second cyclonic cleaning stage, and an open position in which the second cyclonic cleaning stage is accessible.”

236. It is my opinion that Liddell anticipates the hand carriable surface cleaning apparatus of claim 1 and the further limitation of claim 10. *See* Ground 1, Limitation [10].
237. It is also my opinion that Liddell alone and in combination with Organ renders obvious the hand carriable surface cleaning apparatus of claim 1 and the further limitation of claim 10. *See* Ground 2, Limitation [10].
238. In my opinion, Liddell in combination with Organ and DC14Manual also teaches an openable lid that is moveable between a closed position, in which the lid overlies the second cyclonic cleaning stage, and an open position in which the second cyclonic cleaning stage is accessible, as required by claim 10.
239. Liddell teaches that “uppermost ends of the downstream cyclones 104 project inside an **upper portion 120** which extends upwardly from the surfaces of the downstream cyclones 104.” Ex1005, 6:14-16, Figs. 2c, 3b, 4a-4c. Thus, in my opinion, Liddell in combination with Organ and

DC14Manual teach a lid (DC14Manual's openable lid) that is moveable between a closed position, in which the lid overlies a second cyclonic cleaning stage (**downstream cyclone unit 103**), and an open position in which the second cyclonic cleaning stage is accessible, as shown below.



Ex1005, Fig. 2b(modified).

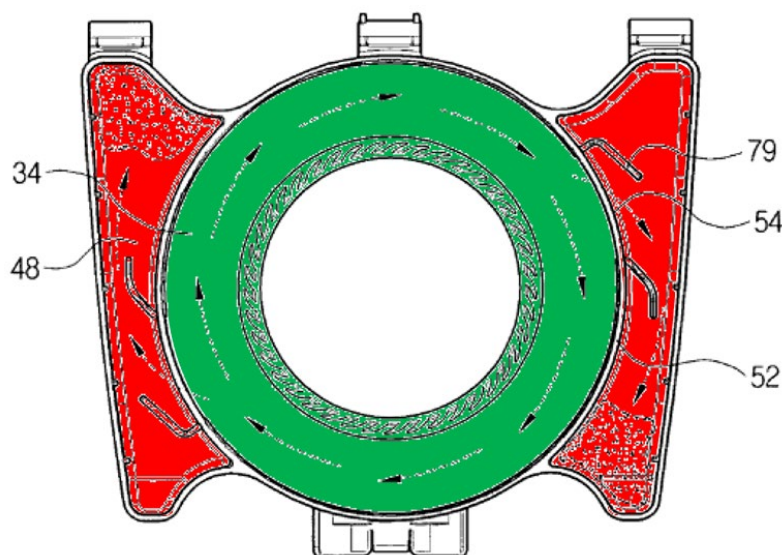
D. Ground 4: The Liddell And Lim Combination Renders Obvious Claim 14; And The Liddell, Organ, And Lim Combination Renders Obvious Claim 14

Reference Number	Claim Limitation
[14pre]	“A hand carriable surface cleaning apparatus comprising:”
[14a]	“a fluid flow path extending between a dirty air inlet and a clean air outlet;”
[14b]	“a first cyclonic cleaning stage positioned in the fluid flow path downstream from the dirty air inlet, the first cyclonic cleaning stage comprising an upper end, a bottom end spaced longitudinally below the upper end and a side wall extending therebetween, the first cyclonic cleaning stage having a dirt collection region with a bottom door that is openable to empty the dirt collection region;”
[14c]	“a second cyclonic cleaning stage positioned in the fluid flow path downstream from the first cyclonic cleaning stage, the second cyclonic cleaning stage having an upper end which is positioned above the upper end of the first cyclonic cleaning stage, the second cyclonic cleaning stage is longitudinally moveable relative to all of the sidewall of the first cyclonic cleaning stage;”
[14d]	“a suction motor positioned in the fluid flow path downstream from the second cyclonic cleaning stage; and,”
[14e]	“a handle;”
[14f]	“wherein the first cyclonic cleaning stage comprises a first cyclone chamber and a first dirt collection chamber that comprises the dirt collection region and is external to the first cyclone chamber.”

240. In my opinion, Liddell alone and in combination with Organ teaches all of the limitations of claim 14, except for limitation [14f]. That limitation requires that the first cyclonic cleaning stage have “a first cyclone chamber and a first dirt collection chamber that comprises the dirt collection region and is external to the first cyclone chamber.”

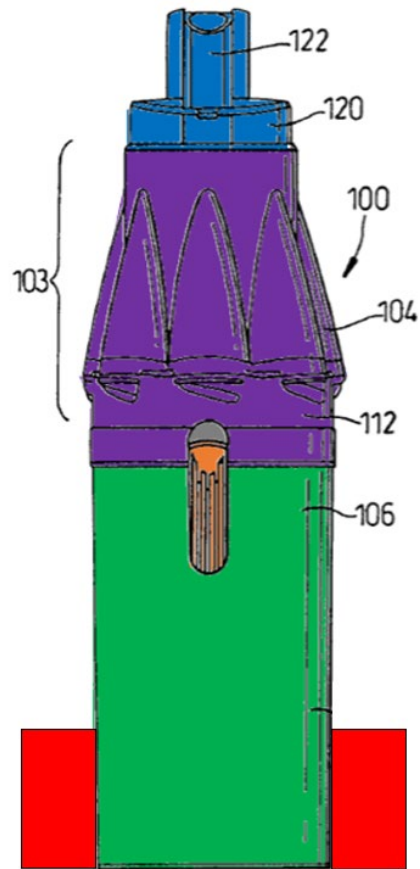
241. Limitations [14pre]-[14e] are identical to limitations [1pre]-[1e]/[12pre]-

- [12e]/[13pre]-[13e]. In my opinion, Limitations [14pre]-[14e] are satisfied for the same reasons that I provided for Liddell alone and in combination with Organ. *See* Grounds 1-2.
242. Lim teaches the “dirt collection chamber” of limitations [14b] and [14f] and it is my opinion that a POSA would have been motivated to combine Lim’s “dirt collection chamber” with Liddell in combination with Organ.
243. Lim teaches a cyclone dust-collecting apparatus where “**dust-collecting chambers 48** are partitioned off from the **cyclone chamber 34** by a partition 52.” Ex1010 [0053]. Lim also teaches that dirt is “subjected to the centrifugal force” of the cyclone and “the dirt flows into the plurality of **dust-collecting chamber 48** formed in both sides of the lower casing 40 of the cyclone body 20 through the connecting port 54.” *Id.* [0066].



Ex1010, Fig. 5.

244. In my opinion, a POSA would have been motivated to combine Lim's external **dust-collecting chambers 48** with Liddell's cyclonic separating apparatus 100, as illustrated below:



Ex1005, Fig. 2a(modified).

245. In my opinion, a POSA would have been motivated to make this combination to achieve Lim's stated benefits of its external dust collection chamber. Lim teaches that in conventional cyclonic vacuums, a "dust-collecting chamber [] must be disposed right under" the cyclone, increasing the "height of the dust-collecting apparatus, the total height of

- a cleaner [], and it is even worse when the dust-collecting apparatus is employed in a canister type vacuum cleaner or an upright type vacuum cleaner.” *Id.* [0016]-[0018].
246. Lim teaches that, with its external **dust-collecting chambers 48**, the “total height [of the vacuum] is reduced” and “a compact-sized product can be realized.” *Id.* [0069], [0071]. Thus, it is my opinion that a POSA would have been motivated to combine Lim’s external **dust-collecting chambers 48** with Liddell and Organ to create a more compact-sized vacuum, as taught by Lim.
247. Further, as taught by Lee769, a 2005 publication, it was known that when dust collects in a cyclone chamber, “there is a problem that the impurities such as dust piled up at a lower part of the dust collecting container [] is risen by spiraled air in a process of spiral flow of the polluted air entered into the dust collecting assembly, and thereby lowering dust collecting efficiency.” Ex1031 [0090]. In my opinion, a POSA would have been motivated to combine Lim’s external **dust-collecting chambers 48** with Liddell and Organ to increase dust collecting efficiency by preventing dust piled up on the lower part of **cylindrical bin 106** from being risen or rotated by air flow in **upstream cyclone unit 101**.
248. It is my opinion that a POSA would have had a reasonable expectation of

success combining Liddell's **cylindrical bin 106** and Lim's **dust-collecting chamber 48**, since both references describe vacuums with a cylindrical cyclone chamber and adding this feature merely required applying a known technique to improve a similar device in the same way.

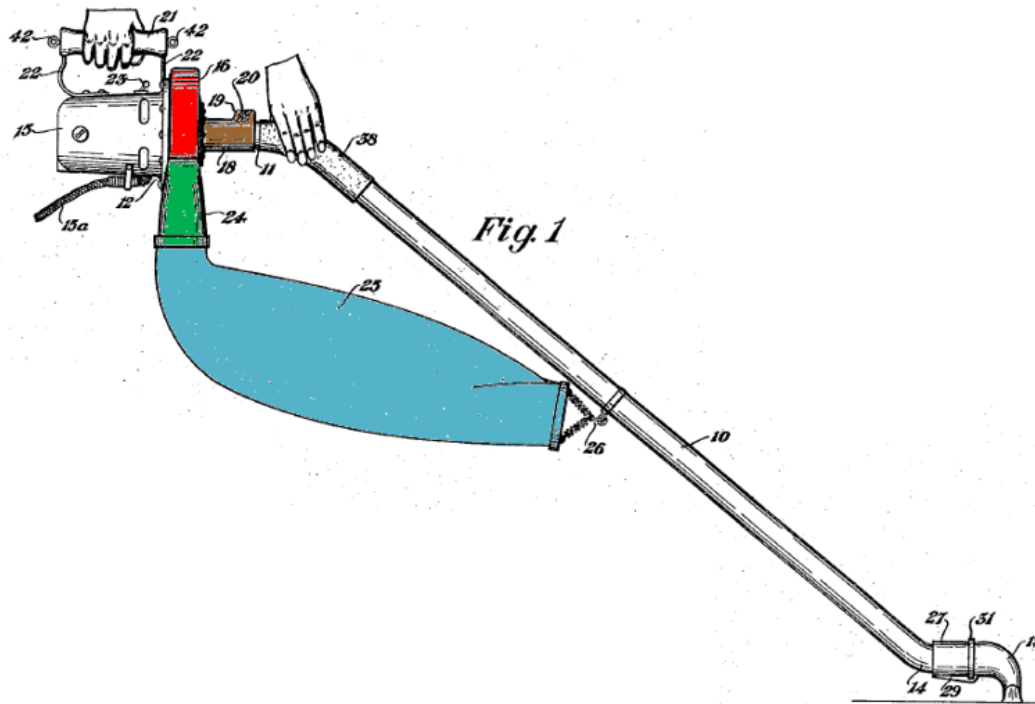
Id.

249. Therefore, in combination, Liddell, Organ, and Lim teach a first cyclonic cleaning stage (Liddell's **upstream cyclone unit 101**) having a first cyclone chamber (Liddell's **upstream cyclone 102**) and a first dirt collection chamber (Lim's **dust-collecting chamber 48**) that has a dirt collection region that is external to the first cyclone chamber.

E. Ground 5: The Simpson and Liddell Combination Renders Obvious Claims 1-4 and 6-13

1. Motivation to Combine

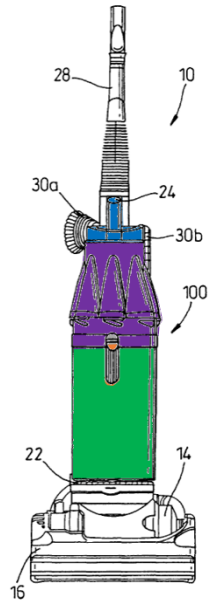
250. In my opinion, a POSA would have been motivated to combine Simpson with Liddell.
251. Simpson teaches a handheld vacuum with a vertically-oriented separation unit that deposits dust vertically into a dust bag, as shown below:



Ex1007, Fig. 1, 1:45-58, 2:65-84.

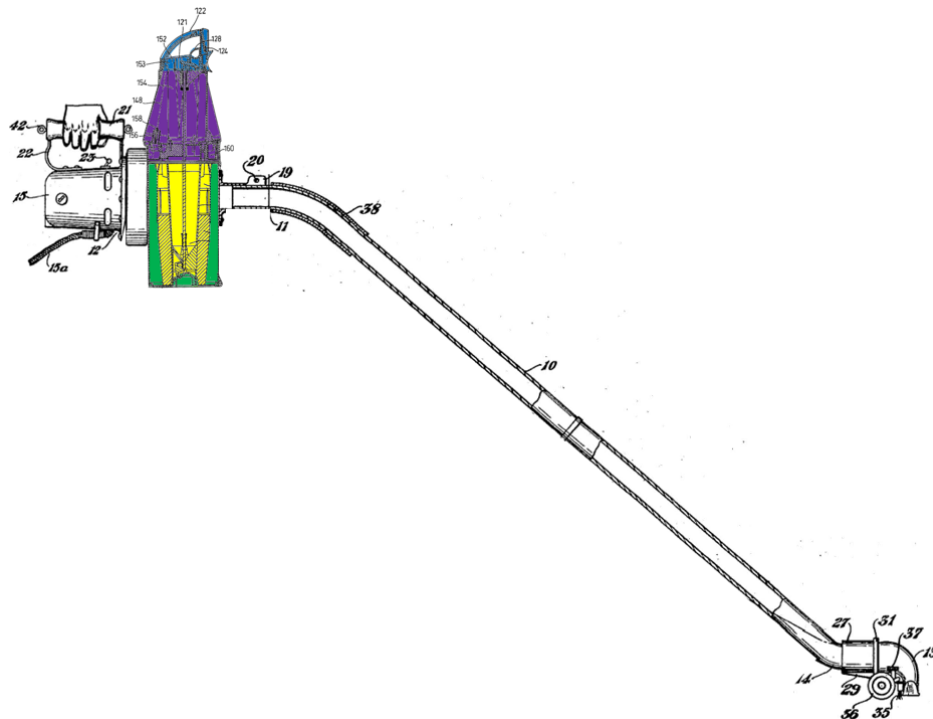
252. In operation, Simpson teaches that air entering **inlet neck 18** is directed through **fan casing 16** and **outlet neck 24** where it is filtered through “**dust collecting bag 25**.” *Id.*, 3:46-52, 1:101-107, 2:17-23.

253. Liddell teaches a vertically-oriented cyclonic separation unit and dirt collection bin, as shown below:



Ex1005, Fig. 1a, 4:26-28.

254. In my opinion, a POSA would have been motivated to modify Simpson to use Liddell's cyclonic separating apparatus, as shown below:



Ex1007, Fig. 1(modified).

255. In my opinion, a POSA would have been motivated to substitute Simpson's dust separation and collection system with Liddell's cyclonic dirt separator and collection bin.
256. In my opinion, a POSA would have understood that there were a finite number of methods for separating dirt from air and that Simpson's non-cyclonic dirt separator and Liddell's cyclonic separator were interchangeable solutions for separating dirt from air. For example, European Patent Publication EP1,652,457 to Lee, published May 3, 2005, teaches a "canister vacuum cleaner" with "a dust bag [151] as the dust collecting assembly in its inside so that foreign particles included in a sucked air may be filtered while the air is passing through the dust bag," as shown below in Fig. 3. Ex1025, [0005]. Lee teaches that "[o]f course, [an]other type [of] dust collecting structure such as a cyclone dust collecting unit may be mounted [inside] of the dust bag 151." *Id.* [0025].

Id., Fig. 3.

257. Similarly, International Patent Publication WO2006/008451 to Genn, published January 26, 2006, teaches a cyclonic vacuum with a similar configuration as Liddell and explains “the dirt- and dust- separating apparatus 3 comprises a cyclonic arrangement but this could readily be replaced by a filter, a bag or a combination of different known separation devices:”

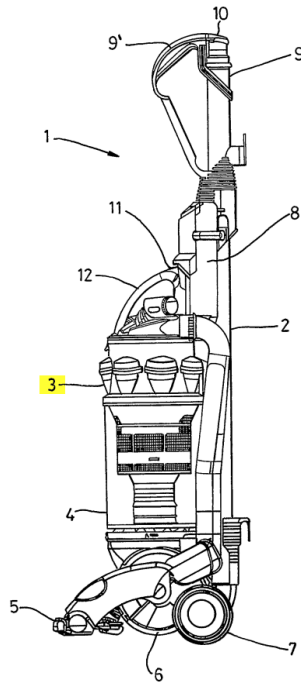


Fig. 1

Ex1018, 5:6-8, Fig. 1.

258. Further still, U.K. Publication GB2413103 to Oh et al., published October 19, 2005, observed that “[v]arious types of vacuum cleaners, such as an upright type...and a stick type are available” and that, recently, cyclonic separators were replacing dust bags in these cleaners:

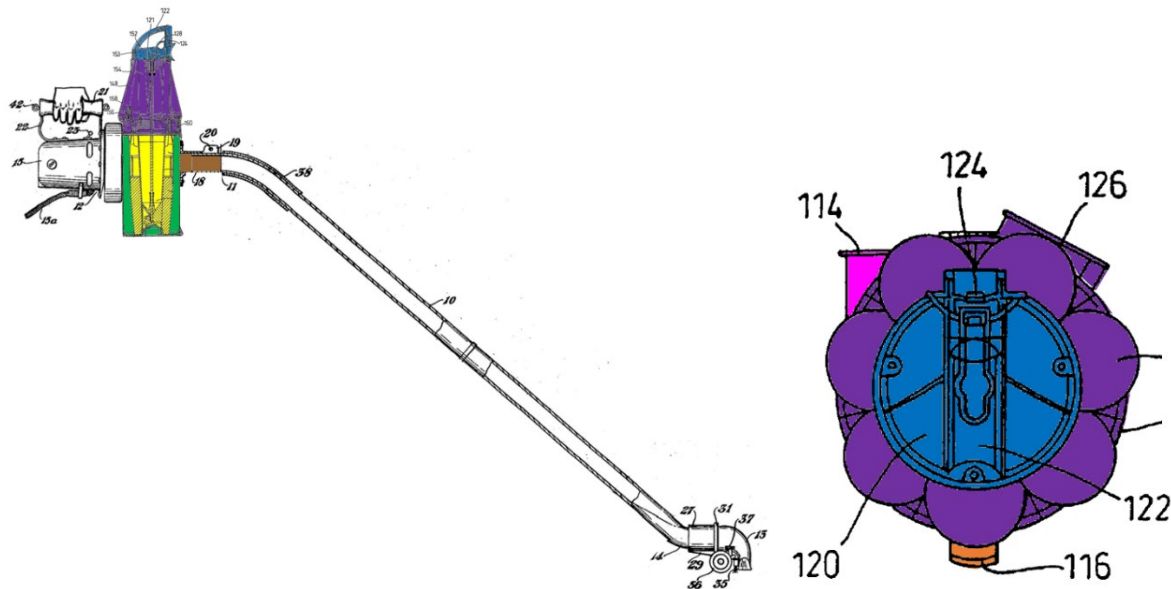
Recently, vacuum cleaners using a cyclone du[s]t collecting apparatus having a semi-permanent life span are experiencing increased use. These types of cyclone vacuum cleaner dust collecting apparatus are used instead of a dust bag, which have a relatively short life span.

Ex1026, 1:14-19.

259. Thus, a POSA would have been motivated to substitute Liddell's cyclonic separation unit in place of Simpson's outlet neck 24 and dust collector bag 25 for its known ability to separate dust from air, and for the benefits of cyclonic separation. One known benefit of cyclonic separating was its ability to maintain steady suction power even as it fills with dirt, as discussed further below.
260. In my opinion, at the time of the '607Patent, a POSA would have understood the well-known benefits of cyclonic separation. For example, as taught by Organ, prior to the '607Patent, bagless vacuums such as "cyclonic" vacuums were "becoming increasingly popular" because "[b]y avoiding the use of a filter bag as the primary form of separation, it [was] found possible to maintain a consistently high level of suction, even as the collecting chamber fills with dirt." Ex1006, 1:8-13.
261. In my opinion, a POSA would have understood this benefit and would have been motivated to substitute Simpson's dust separation and collection system with a bagless cyclonic separator and dirt collector to yield the same benefit.
262. Further, in my opinion, a POSA would have been further motivated to substitute Simpson's dust separation system for Liddell's because of their common vertical orientation, which Simpson teaches is beneficial.

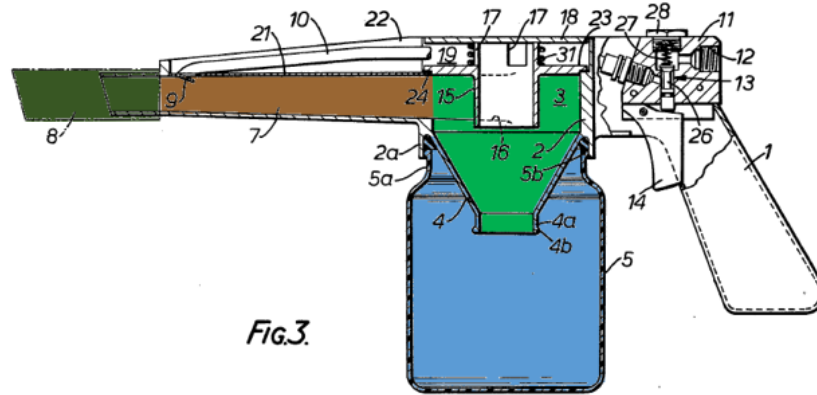
Simpson teaches this vertical orientation is advantageous because it causes “dirt and foreign matter picked up by the cleaner to accumulate by the action of gravity in the lower portions of the bag away from the outlet neck 24 leaving the same unrestricted,” and the same benefit extends to Liddell’s cyclonic separating apparatus 100. By orienting cyclonic separating apparatus 100 vertically, accumulated debris is prevented from clogging inlet port 114 on cylindrical bin 106. Ex1007, 3:53-72.

263. Further, Liddell’s **inlet port 114** is oriented tangentially to cylindrical bin 106 to generate cyclonic airflow within **upstream cyclone unit 101** (Ex1005, 9:7-14). In my opinion, orienting cyclonic separating apparatus 100 vertically would have further motivated a POSA to make the simple substitution of connecting Liddell’s **inlet port 114** with Simpson’s **inlet neck 18** to introduce tangential airflow into **upstream cyclone unit 101**, as shown below:



Ex1007, Fig. 1(modified); Ex1005, Fig. 2c; Ex1005, Fig. 3b.

264. In my opinion, a POSA also would have been motivated to make this combination because vertically oriented cyclonic separators were used in other prior art handheld cyclonic suction devices. For example, the prior art reference Merritt teaches a suction device where air entering **inlet nozzle 8** and “**suction pipe 7** enters the **cyclone chamber 3** tangentially,” which creates “normal centrifugal cyclone separation” in the **chamber 3** such that separated debris falls into the “**container 5** which can be detached and emptied when full.”



Ex1021, 1:97-102, 1:107-118, 2:55-65, Fig. 3.

265. In my opinion, Merritt's teaching of this orientation would further motivate a POSA to combine Liddell's cyclonic separating apparatus 100 with Simpson's handheld design in a vertical orientation.

266. Clean air exits Liddell's cyclonic separating apparatus 100 from outlet port 126 through downstream ducting 26 to Liddell's motor and out of the vacuum at a post-motor outlet. *See* Ground 1, Limitations [1a]/[12a]/[13a]. Similarly, as part of the substitution of Liddell's separation unit in place of Simpson's, in my opinion, a POSA would understand that air would flow rearwardly from Liddell's cyclonic separating apparatus 100 into Simpson's motor 15 casing and out of the vacuum at a post-motor outlet, thereby preserving the fluid flow path taught by Liddell.

267. In my opinion, a POSA would have been motivated to make this modification "[i]n order for the cyclonic separation apparatus 100 to be brought into operation." *Id.*; Ex1005, 5:5-14. Further, positioning the

motor in Liddell’s fluid flow path would allow “[t]he cleaned air [] to cool the motor,” as taught by Liddell, which would have prevented overheating and extended the life of the motor. Ex1005, 5:9-14.

2. **Simpson In Combination With Liddell Renders Obvious Claims [1]/[12]/[13]**

a. **[1pre]/[12pre]/[13pre]**

Reference Number	Claim Limitation
[1pre]	“A hand carriable surface cleaning apparatus comprising:”
[12pre]	“A hand carriable surface cleaning apparatus comprising:”
[13pre]	“A hand carriable surface cleaning apparatus comprising:”

268. To the extent the preambles are limiting, it is my opinion that the combination of Simpson and Liddell teaches a hand carriable surface cleaning apparatus.

269. Simpson’s figures show its vacuum being hand carried and teaches that “the handle 21 may be grasped in the right hand and the left hand placed upon the grip 38” such that the “weight of the motor-fan exhausting unit is freely carried by the handle.” Ex1007, 2:65-84, 1:45-58, Figs. 1&10.

270. Simpson also explains that its vacuum can be hand carried in a “vertical position and supported by the operator grasping the handle 21 in one hand, the other hand grasping the tubular shank” “[i]n order to clean draperies, walls or the like,” as shown in Fig. 10:

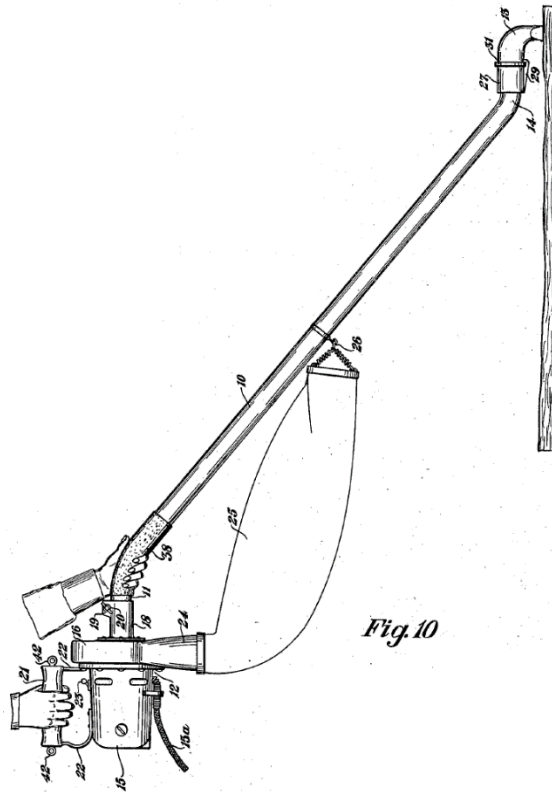
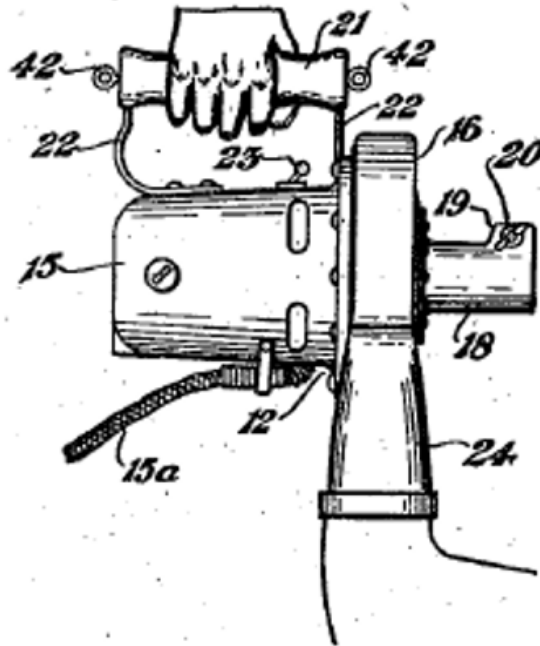


Fig. 10

Id., Fig. 10, 2:78-84.

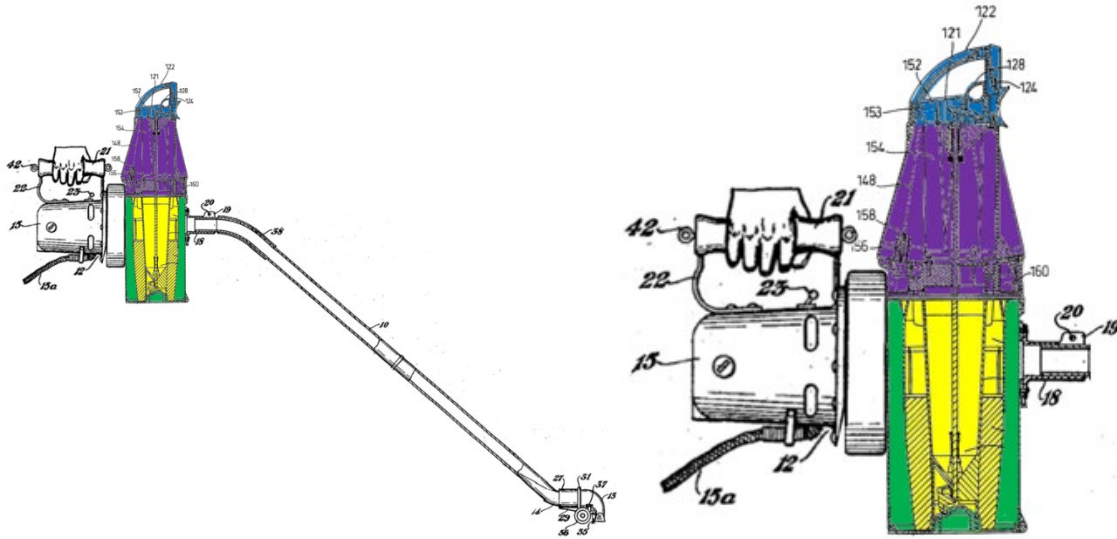
271. Simpson also teaches that “tubular shank [10] may be detached from the inlet neck [18],” as illustrated below, making it even more portable and allowing an operator “to clean upholstered furniture or the like”. Ex1007, 2:99-107, 2:150-3:4.



Id., Fig. 1(excerpted).

272. Simpson further teaches that its “portable electric cleaner” is an improvement over “ordinary stationary cleaning systems,” and can be used “in place of stationary cleaners which require piping, installation and expensive exhausting equipment” and can be “difficult to properly manipulate.” *Id.*, 1:16-26, 2:139-149.

273. In my opinion, the combination of Simpson and Liddell would remain hand-carriable, with or without tube 10, as illustrated below:



Ex1007, Fig. 1(modified).

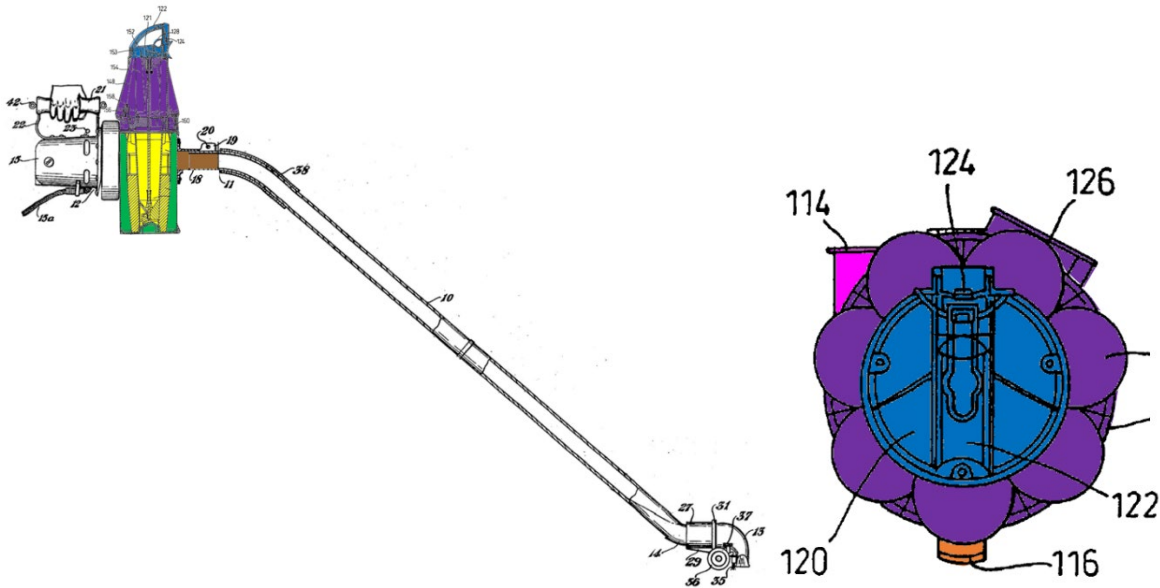
274. For example, the combination of Simpson and Liddell would still allow “the handle 21 [to] be grasped in the right hand and the left hand placed upon the grip 38” such that the “weight of the motor-fan exhausting unit is freely carried by the handle.” Ex1007, 2:65-84, 1:45-58, Figs. 1&10. Further, the combined vacuum could still be hand carried in a “vertical position and supported by the operator grasping the handle 21 in one hand, the other hand grasping the tubular shank” “[i]n order to clean draperies, walls or the like,” as shown in Fig. 10. *Id.*, Fig. 10, 2:78-84.

b. [1a]/[12a]/[13a]

Reference Number	Claim Limitation
[1a]	“a fluid flow path extending between a dirty air inlet and a clean air outlet;”
[12a]	“a fluid flow path extending between a dirty air inlet and a clean air outlet;”
[13a]	“a fluid flow path extending between a dirty air inlet and a clean air outlet;”

275. In my opinion, Simpson in combination with Liddell renders obvious a fluid flow path extending between a dirty air inlet and a clean air outlet.

276. In my opinion, when Simpson and Liddell are combined, Simpson’s **inlet neck 18** and Liddell’s **inlet port 114** collectively form a dirty air inlet for introducing dirty air into **upstream cyclone unit 101**. Ex1007, 1:101-107, 3:53-58; Ex1005, 5:26-30.



Ex1007, Fig. 1(modified); Ex1005, Fig. 2c.

277. Further, in my opinion, when Simpson and Liddell are combined, Simpson (modified with Liddell's post-motor clean air outlet) has a fluid flow path extending from Simpson's **inlet neck 18** and Liddell's **inlet port 114** to the post-motor outlet. *See* Ground 5, Motivation to Combine.

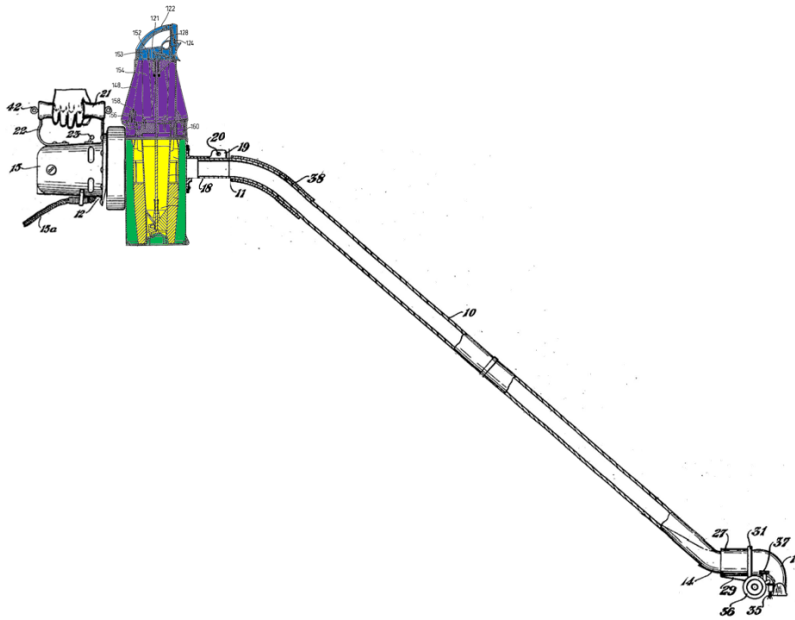
c. [1b]/[12b]/[13b]/[1c]/[12c]/[13c]/[1f]/[1g]/[1h]/[12f]/[13f]

Reference Number	Claim Limitation
[1b]/[12b]/[13b]	“a first cyclonic cleaning stage positioned in the fluid flow path downstream from the dirty air inlet, the first cyclonic cleaning stage comprising an upper end, a bottom end spaced longitudinally below the upper end and a side wall extending therebetween, the first cyclonic cleaning stage having a dirt collection region with a bottom door that is openable to empty the dirt collection region;”
[1c]/[12c]/[13c]	“a second cyclonic cleaning stage positioned in the fluid flow path downstream from the first cyclonic cleaning stage, the second cyclonic cleaning stage having an upper end which is positioned above the upper end of the first cyclonic cleaning stage, the second cyclonic cleaning stage is longitudinally moveable relative to all of the sidewall of the first cyclonic cleaning stage;”
[1f]	“wherein the second cyclonic cleaning stage comprises a plurality of second cyclones connected fluidly in parallel with each other,”
[1g]	“wherein the second cyclones are positioned around a central longitudinal axis that extends through the first cyclonic cleaning stage and the openable bottom door,”
[1h]	“wherein the plurality of second cyclones includes a first set of second cyclones arranged in an inner ring and a second set of second cyclones arranged in an outer ring laterally surrounding the inner ring.”
[12f]	wherein the first cyclonic cleaning stage has a first stage air inlet, each cyclone of the second cyclonic cleaning stage has a second stage air inlet downstream from the first stage air inlet and the hand carriable surface cleaning apparatus further comprises a screen positioned in the fluid flow path between the first stage air inlet and the second stage air inlet, wherein the screen is longitudinally moveable relative to the sidewall.
[13f]	“wherein the second cyclonic cleaning stage further comprises a second stage handle.”

278. In my opinion, Liddell teaches or renders obvious these limitations and the

combination of Simpson and Liddell also teaches or renders obvious these limitations. *See* Grounds 1-2.

279. In the Simpson and Liddell combination, Simpson's dust separator is replaced with Liddell's cyclonic separating apparatus and post-motor air outlet:

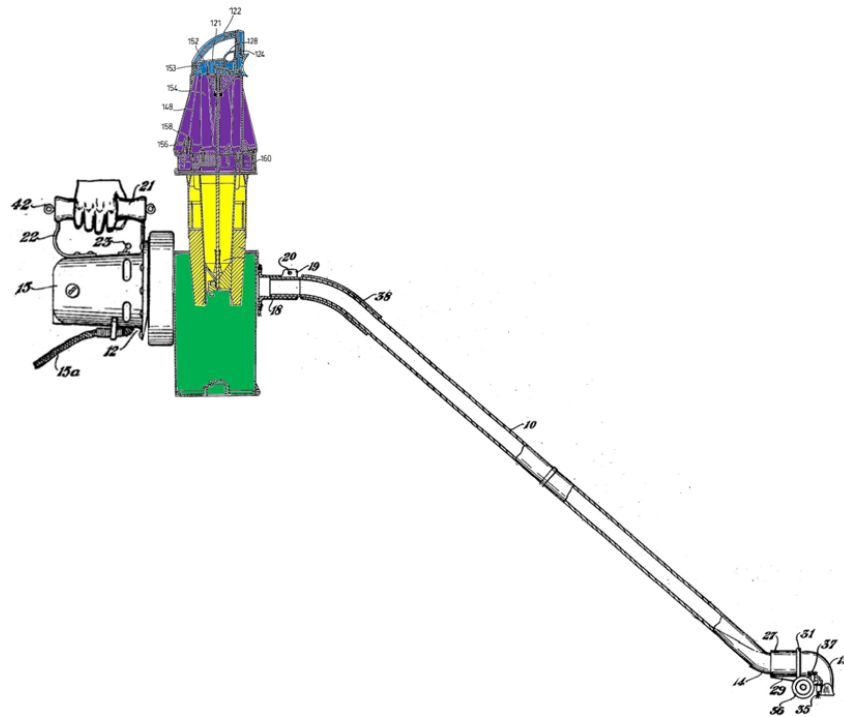


Ex1007, Fig. 1(modified); *see* Ground 5, Motivation to Combine.

280. In my opinion, Liddell's teachings apply equally when combined with Simpson, when incorporating Liddell's separator apparatus and post-motor air outlet into Simpson.
281. With respect to limitations [1c]/[12c]/[13c]/[13f], it is my opinion that a POSA would understand that the second cyclonic cleaning stage and screen remain moveable relative to (and removable from) the sidewall of

the first cyclonic cleaning stage, as taught by Liddell and its separator apparatus. This is at least because the Simpson and Liddell combination retains Liddell's components that perform these functions.

282. In the combination, when a user disengages **handle 116** and **catch 118**, **downstream cyclone unit 103** and **shroud 140** (with perforated portion 144) are released from the sidewall of **upstream cyclone unit 101** and the remainder of the vacuum, as illustrated below:



Ex1007, Fig. 1(modified).

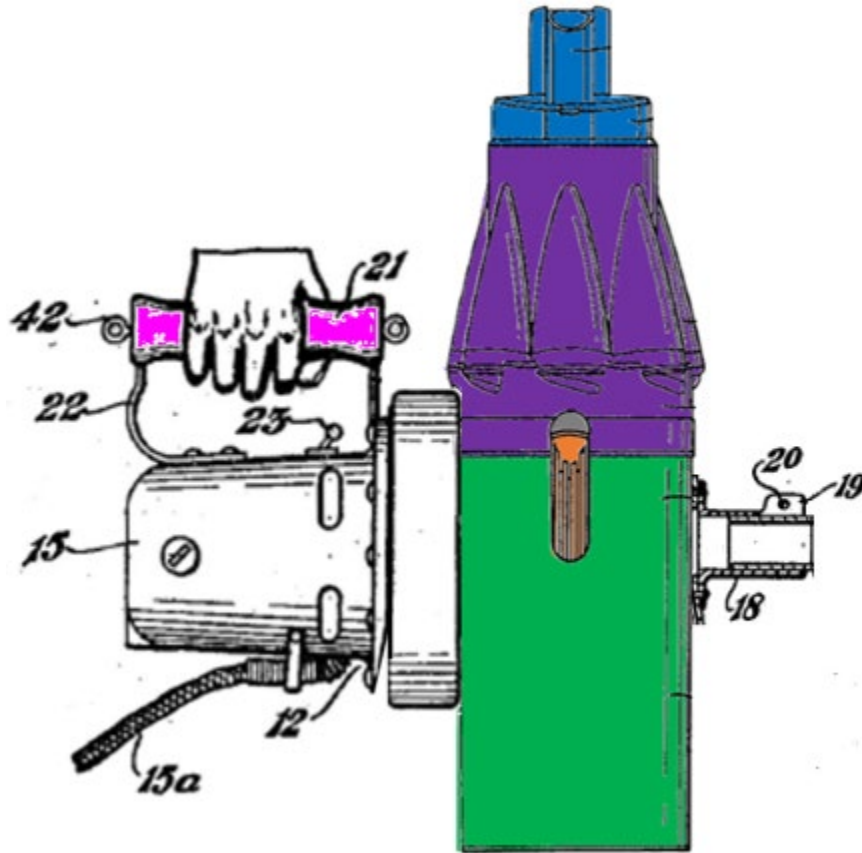
d. [1d]/[12d]/[13d]

Reference Number	Claim Limitation
[1d]	“a suction motor positioned in the fluid flow path downstream from the second cyclonic cleaning stage;”
[12d]	“a suction motor positioned in the fluid flow path downstream from the second cyclonic cleaning stage;”
[13d]	“a suction motor positioned in the fluid flow path downstream from the second cyclonic cleaning stage;”

283. In my opinion, Simpson in combination with Liddell teaches a suction motor positioned in the fluid flow path downstream from the second cyclonic cleaning stage.

284. Simpson teaches a suction motor 15. Ex1007, 1:101-107, 2:7-10. When Simpson and Liddell are combined, Simpson’s motor 15 is positioned in the fluid flow path downstream from Liddell’s second cyclonic cleaning stage (**downstream cyclone unit 103**) and upstream from a post-motor outlet, as taught by Liddell:

287. Simpson teaches a “**handle 21**” and Liddell teaches a “**handle 116**,” as does the combination of Simpson and Liddell:



Ex1007, 2:65-84, Fig. 1(modified); Ex1005, 5:30-6:2.

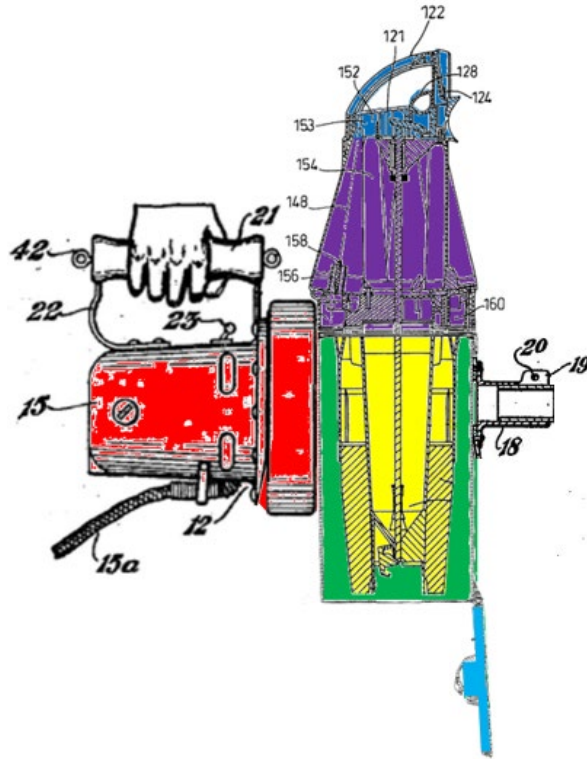
288. Further, for limitations [1e] and [12e], it is my opinion that Liddell's **handle 122** also satisfies this limitation. *See* Ground 1, Limitation [1e]/[12e]/[13e].

3. **Simpson In Combination With Liddell Renders Obvious Claim [2]**

Reference Number	Claim Limitation
[2]	“The hand carriable surface cleaning apparatus of claim 1, further comprising a housing containing the suction motor and the clean air outlet, wherein the bottom door is openable while the sidewall of the first cyclonic cleaning stage is connected to the housing.”

289. In my opinion, Simpson in combination with Liddell renders obvious the hand carriable surface cleaning apparatus of claim 1 and a housing containing the suction motor and the clean air outlet, wherein the bottom door is openable while the sidewall of the first cyclonic cleaning stage is connected to the housing.

290. In my opinion, Simpson in combination with Liddell, as illustrated below, has a housing containing the suction motor (casing for **motor 15 and fan casing 16**) and clean air outlet (post-motor outlet, as taught by Liddell), wherein the bottom door (**base 108**) is openable while the sidewall of the first cyclonic cleaning stage (**upstream cyclone unit 101**) is connected to the housing, as shown below:



Ex1007, 1:101-107, Fig. 1(modified); Ex1005, 6:23-25, 7:5-6; *see also* Ground 1, Limitations [1b]-[1c], [2].

291. In my opinion, when Simpson is modified with Liddell's cyclonic separating apparatus, as illustrated, Liddell's base is unobstructed, and would have been openable while the sidewall of **upstream cyclone unit 101** is attached to the **motor 15 and fan casing 16**.

4. Simpson In Combination With Liddell Renders Obvious Claim [3]

Reference Number	Claim Limitation
[3]	"The hand carriable surface cleaning apparatus of claim 1, wherein the upper end of the second cyclonic cleaning stage overlies the entire upper end of the first cyclonic cleaning stage."

292. In my opinion, Simpson in combination with Liddell renders obvious the hand carriable surface cleaning apparatus of claim 1.

293. Further, in my opinion, Liddell teaches or renders obvious the upper end of the second cyclonic cleaning stage overlies the entire upper end of the first cyclonic cleaning stage and therefore the combination of Simpson and Liddell also teaches or renders obvious this limitation. *See* Ground 1, Limitation [3]; Ground 2, Limitation [3].

5. Simpson In Combination With Liddell Renders Obvious Claim [4]

Reference Number	Claim Limitation
[4]	“The hand carriable surface cleaning apparatus of claim 1, wherein the second cyclonic cleaning stage is moveable relative to the sidewall while the bottom door is open.”

294. In my opinion, Simpson in combination with Liddell renders obvious the hand carriable surface cleaning apparatus of claim 1.

295. Further, in my opinion, Liddell teaches the second cyclonic cleaning stage is moveable relative to the sidewall while the bottom door is open and therefore the combination of Simpson and Liddell also teaches this limitation. *See* Ground 1, Limitation [4].

6. **Simpson In Combination With Liddell Renders Obvious Claim [6]**

Reference Number	Claim Limitation
[6]	“The hand carriable surface cleaning apparatus of claim 1, wherein each second cyclone comprises a respective cyclone axis about which air circulates within the second cyclone, wherein the cyclone axes are generally longitudinal.”

296. In my opinion, Simpson in combination with Liddell renders obvious the hand carriable surface cleaning apparatus of claim 1.

297. Further, in my opinion, Liddell teaches each second cyclone comprises a respective cyclone axis about which air circulates within the second cyclone, wherein the cyclone axes are generally longitudinal and therefore the combination of Simpson and Liddell also teach this limitation. *See* Ground 1, Limitation [6].

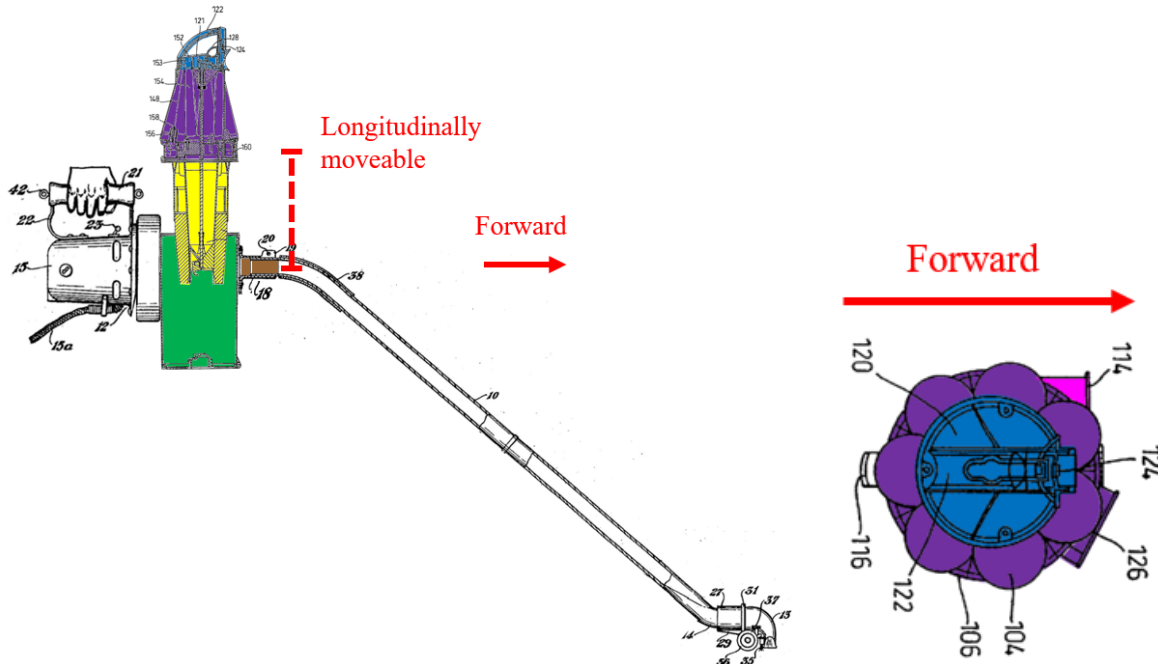
7. **Simpson In Combination With Liddell Renders Obvious Claim [7]**

Reference Number	Claim Limitation
[7]	“The hand carriable surface cleaning apparatus of claim 1, wherein the dirty air inlet comprises a conduit extending forwardly from the first cyclonic cleaning stage, and wherein the second cyclonic cleaning stage is longitudinally moveable relative to the conduit.”

298. In my opinion, Simpson in combination with Liddell teaches the hand carriable surface cleaning apparatus of claim 1 and further teaches the dirty air inlet comprises a conduit extending forwardly from the first cyclonic cleaning stage and the second cyclonic cleaning stage is longitudinally

moveable relative to the conduit.

299. In my opinion, the combination of Simpson and Liddell has a dirty air inlet (Simpson's **inlet neck 18** and Liddell's **inlet port 114**) that has a conduit (airways within **inlet neck 18** and **inlet port 114**) extending forwardly from the first cyclonic cleaning stage (**upstream cyclone unit 101**), and wherein the second cyclonic cleaning stage (**downstream cyclone unit 103**) is longitudinally moveable relative to the conduit, as shown below:



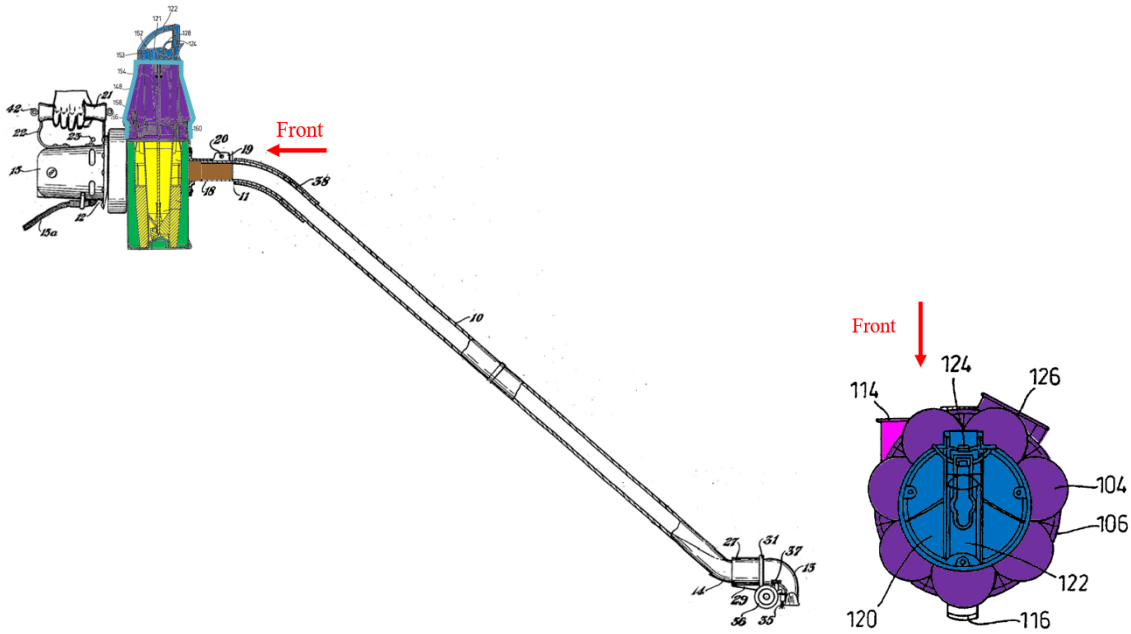
Ex1007, Fig. 1(modified), Ex1005, Fig. 2c; *see also* Ground 1, Limitations [1c]/[12c]/[13c].

8. **Simpson In Combination With Liddell Renders Obvious Claim [8]**

Reference Number	Claim Limitation
[8]	“The hand carriable surface cleaning apparatus of claim 7, wherein the dirty air inlet is located at a front end of the hand carriable surface cleaning apparatus and the upper end of the second cyclonic cleaning stage is located above the dirty air inlet.”

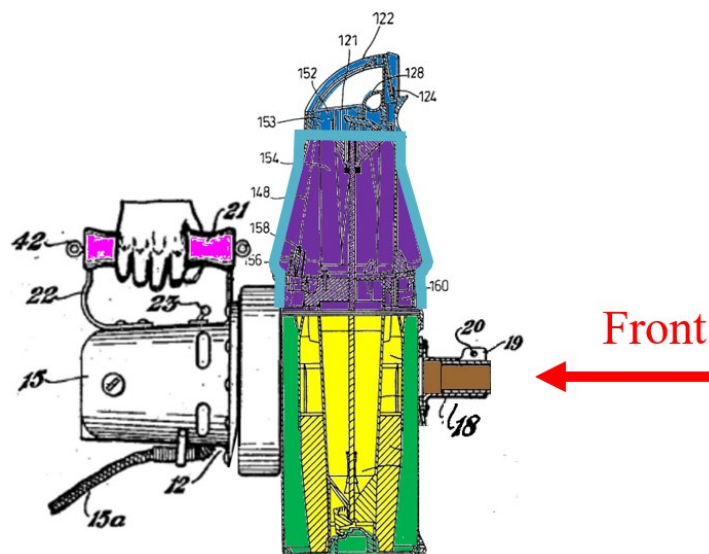
300. In my opinion, Soler in combination with Liddell teaches the hand carriable surface cleaning apparatus of claim 7 and further teaches the dirty air inlet is located at a front end of the hand carriable surface cleaning apparatus and the upper end of the second cyclonic cleaning stage is located above the dirty air inlet.

301. In my opinion, the combination of Simpson and Liddell has a dirty air inlet (Simpson's **inlet neck 18** and Liddell's **inlet port 114**) that is located at a front end of the hand carriable surface cleaning apparatus and the upper end of the second cyclonic cleaning stage (**upper surface** of **downstream cyclone unit 103**) is located above the dirty air inlet, as shown below:



Ex1007, Fig. 1(modified); Ex1005, Fig. 2c.

302. Simpson also teaches that “tubular shank [10 along with cleaning tool 13] may be detached from the inlet neck [18]” such that **inlet neck 18** is the front of the vacuum, as illustrated below. Ex1007, 2:99-107, 2:150-3:5.



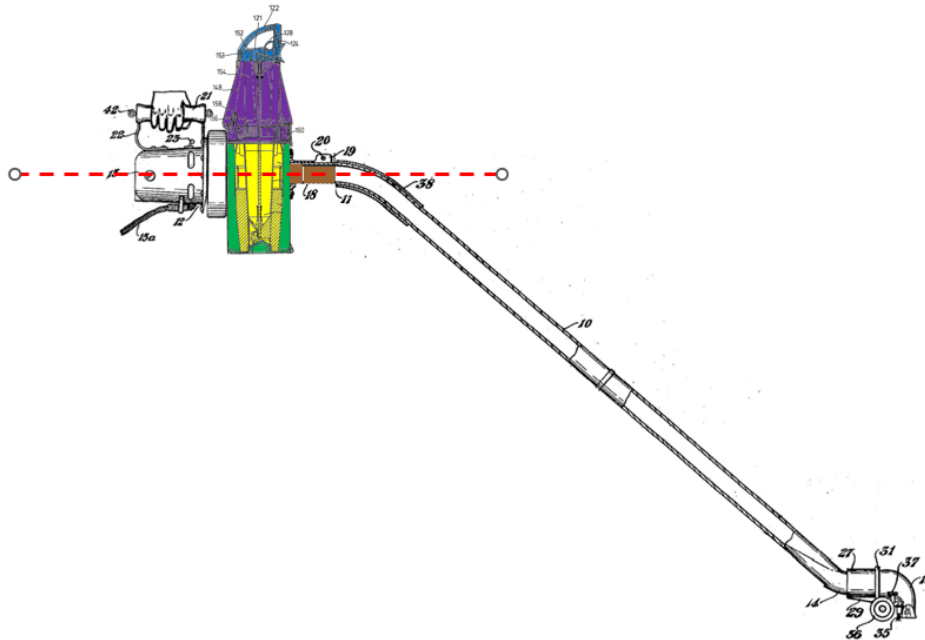
Ex1007, 2:99-107, 2:150-3:5, Fig. 1(modified).

9. Simpson In Combination With Liddell Renders Obvious Claim [9]

Reference Number	Claim Limitation
[9]	“The hand carriable surface cleaning apparatus of claim 7, wherein the conduit defines an axis that intersects the first cyclonic cleaning stage.”

303. In my opinion, Soler in combination with Liddell teaches the hand carriable surface cleaning apparatus of claim 7 and further teaches the conduit defines an axis that intersects the first cyclonic cleaning stage.

304. The combination of Simpson and Liddell has a conduit (airways within Simpson’s **inlet neck 18** and Liddell’s **inlet port 114**) that defines an **axis** that intersects Liddell’s **upstream cyclone unit 101**:



Ex1007, Fig. 1(modified).

10. Simpson In Combination With Liddell Renders Obvious Claim [10]

Reference Number	Claim Limitation
[10]	“The hand carriable surface cleaning apparatus of claim 1, further comprising an openable lid that is moveable between a closed position, in which the lid overlies the second cyclonic cleaning stage, and an open position in which the second cyclonic cleaning stage is accessible.”

305. In my opinion, Simpson in combination with Liddell renders obvious the hand carriable surface cleaning apparatus of claim 1.

306. Further, in my opinion, Liddell teaches or renders obvious an openable lid that is moveable between a closed position, in which the lid overlies the second cyclonic cleaning stage, and an open position in which the second cyclonic cleaning stage is accessible and therefore the combination of Simpson and Liddell also teaches this limitation. *See* Ground 1, Limitation [10]; Ground 2, Limitation [10].

11. Simpson In Combination With Liddell Renders Obvious Claim [11]

Reference Number	Claim Limitation
[11]	“The hand carriable surface cleaning apparatus of claim 1, wherein the second cyclonic cleaning stage is removable from the first cyclonic cleaning stage.”

307. In my opinion, Simpson in combination with Liddell renders obvious the hand carriable surface cleaning apparatus of claim 1.

308. Further, in my opinion, Liddell teaches the second cyclonic cleaning stage

is removable from the first cyclonic cleaning stage and therefore the combination of Simpson and Liddell also teach this limitation. *See* Ground 1, Limitation [11].

F. Ground 6: The Simpson, Liddell, And Organ Combination Renders Obvious Claims 1 and 3-13

1. Motivation to Combine

309. In my opinion, Organ teaches certain features that a POSA would have been motivated to combine with Simpson and Liddell: i) Organ's ability to move a second cyclonic cleaning stage and screen relative to a first cyclonic cleaning stage, ii) Organ's ability to move a second cyclonic cleaning stage while a bottom door on a first cyclonic cleaning stage is open, and iii) Organ's pre-motor filter chamber.
310. In my opinion, a POSA would have been motivated to incorporate each of these features in the combination of Simpson and Liddell for the same reasons a POSA would have been motivated to combine Organ and Liddell. *See* Ground 2, Motivation to Combine.

2. Simpson In Combination With Liddell and Organ Renders Obvious Claims [1]/[2]/[3]/[6]/[7]/[8]/[9]/[10]/[11]/[12]/[13]

311. In my opinion, the combination of Simpson and Liddell renders obvious these claims. *See* Ground 5.
312. However, to the extent PO argues Simpson in combination with Liddell does not render obvious a moveable second cyclonic cleaning stage

(limitations [1c]/[12c]/[13c]/[7]/[11]) or screen (limitation 12[f]), in my opinion, these limitations are obvious in view of the combination of Simpson, Liddell, and Organ for the same reason Liddell in combination with Organ renders these limitations obvious. *See* Ground 2, Limitations [1c]/[12c]/[13c]/[7]/[11].

3. Simpson In Combination With Liddell Renders Obvious Claim [4]

Reference Number	Claim Limitation
[4]	“The hand carriable surface cleaning apparatus of claim 1, wherein the second cyclonic cleaning stage is moveable relative to the sidewall while the bottom door is open.”

313. In my opinion, the combination of Simpson and Liddell and the combination of Simpson, Liddell, and Organ renders obvious the hand carriable surface cleaning apparatus of claim 1.

314. In my opinion, Simpson in combination with Liddell and Organ teaches the second cyclonic cleaning stage is moveable relative to the sidewall while the bottom door is open.

315. As I explained in Ground 2, a POSA would have been motivated to modify Liddell’s cyclonic separating apparatus 100 with Organ’s teachings of a second cyclonic cleaning stage that is moveable relative to the sidewall while the bottom door is open. *See* Ground 2, Limitation [4], Motivation to Combine. In my opinion, a POSA would have been equally motivated

to make those modifications when Liddell's cyclonic separating apparatus is combined with Simpson's vacuum.

4. Simpson In Combination With Liddell Renders Obvious Claim [5]

Reference Number	Claim Limitation
[5]	"The hand carriable surface cleaning apparatus of claim 1, further comprising a pre-motor filter chamber positioned in the fluid flow path between the second cyclonic cleaning stage and the suction motor, and wherein each second cyclone has a respective air outlet that is in fluid communication with the pre-motor filter chamber."

316. In my opinion, the combination of Simpson and Liddell and the combination of Simpson, Liddell, and Organ renders obvious the hand carriable surface cleaning apparatus of claim 1.

317. In my opinion, Simpson in combination with Liddell and Organ teaches a pre-motor filter chamber positioned in the fluid flow path between the second cyclonic cleaning stage and the suction motor, and wherein each second cyclone has a respective air outlet that is in fluid communication with the pre-motor filter chamber.

318. In my opinion, the combination of Simpson, Liddell, and Organ teaches a pre-motor filter chamber (chamber housing Organ's pre-motor filter) positioned in the fluid flow path between the second cyclonic cleaning stage (Liddell's downstream cyclone unit 103) and the suction motor (motor 15), and wherein each second cyclone (downstream cyclones

104/204) has a respective air outlet that is in fluid communication with the pre-motor filter chamber. *See* Ground 2, Limitation [5].

319. In my opinion, a POSA would have been motivated to add Organ's pre-motor filter at or after Liddell's outlet port 126, but before the motor to further clean the air before reaching the motor. It is also my opinion that a POSA would have had a reasonable expectation of success because it would have involved using a known technique (using a filter to further clean air before it reaches the motor) to improve a similar device in the same way.

320. In my opinion, a POSA would have been motivated to make this modification to the combination of Simpson and Liddell for the same reason that a POSA would have been motivated to make this modification to Liddell alone. *See* Ground 2, Limitation [5].

G. Ground 7: The Simpson, Liddell, And DC14Manual Combination Renders Obvious Claim 10; And The Simpson, Liddell, Organ, And DC14Manual Combination Renders Obvious Claim 10

1. Motivation to Combine

321. The combination of Simpson and Liddell and the combination of Simpson, Liddell, and Organ use Liddell's cyclonic separating apparatus, including upper portion 120 and downstream cyclone unit 103. *See* Grounds 5-6.

322. As I previously explained, a POSA would have been motivated to modify

Liddell’s cyclonic separating apparatus with DC14Manual’s openable lid and would have had a reasonable expectation of success doing it. *See* Ground 3. The combination of Simpson and Liddell and the combination of Simpson, Liddell and Organ have Liddell’s cyclonic separating apparatus and my prior analyses of motivation to combine Liddell with DC14Manual as well as Liddell, Organ, and DC14Manual applies equally when these references are further combined with Simpson.

2. Simpson In Combination With Liddell And DC14Manual; and Simpson In Combination With Liddell, Organ, And DC14Manual Renders Obvious Claim [10]

Reference Number	Claim Limitation
[10]	“The hand carriable surface cleaning apparatus of claim 1, further comprising an openable lid that is moveable between a closed position, in which the lid overlies the second cyclonic cleaning stage, and an open position in which the second cyclonic cleaning stage is accessible.”

323. In my opinion, the combination of Simpson and Liddell and the combination of Simpson, Liddell, and Organ render obvious the hand carriable surface cleaning apparatus of claim 1.

324. In my opinion, Liddell teaches or renders obvious an openable lid that is moveable between a closed position, in which the lid overlies the second cyclonic cleaning stage, and an open position in which the second cyclonic cleaning stage is accessible and therefore the combinations of Simpson and

Liddell and Simpson, Liddell and Organ also teach this limitation. *See* Ground 1, Limitation [10]; Ground 2, Limitation [10], Ground 3, Limitation [10].

325. In my opinion, the further limitation of claim 10 is also taught by the combination of Simpson, Liddell, and DC14Manual.
326. The combination of Simpson, Liddell, and DC14Manual and the combination of Simpson, Liddell, Organ, and DC14Manual teaches a lid (DC14Manual's openable lid) that is moveable between a closed position, in which the lid overlies a second cyclonic cleaning stage (downstream cyclone unit 103), and an open position in which the second cyclonic cleaning stage is accessible. *See* Ground 3, Limitation [10].

H. Ground 8: The Simpson, Liddell, And Lim Combination Renders Obvious Claim 14; And The Simpson, Liddell, Organ, And Lim Combination Renders Obvious Claim 14

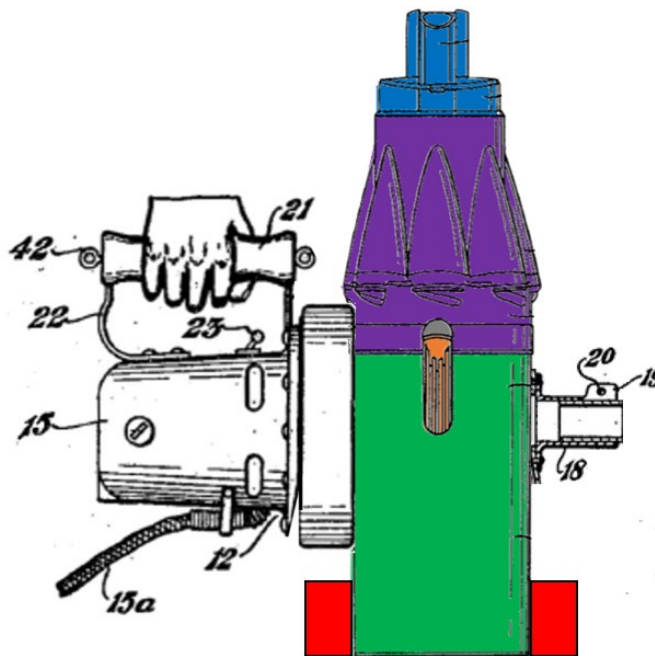
Reference Number	Claim Limitation
[14pre]	“A hand carriable surface cleaning apparatus comprising:”
[14a]	“a fluid flow path extending between a dirty air inlet and a clean air outlet;”
[14b]	“a first cyclonic cleaning stage positioned in the fluid flow path downstream from the dirty air inlet, the first cyclonic cleaning stage comprising an upper end, a bottom end spaced longitudinally below the upper end and a side wall extending therebetween, the first cyclonic cleaning stage having a dirt collection region with a bottom door that is openable to empty the dirt collection region;”
[14c]	“a second cyclonic cleaning stage positioned in the fluid flow path downstream from the first cyclonic cleaning stage, the second cyclonic cleaning stage having an upper end which is positioned above the upper end of the first cyclonic cleaning stage, the second cyclonic cleaning stage is longitudinally moveable relative to all of the sidewall of the first cyclonic cleaning stage;”
[14d]	“a suction motor positioned in the fluid flow path downstream from the second cyclonic cleaning stage; and,”
[14e]	“a handle;”
[14f]	“wherein the first cyclonic cleaning stage comprises a first cyclone chamber and a first dirt collection chamber that comprises the dirt collection region and is external to the first cyclone chamber.”

327. In my opinion, the combination of Simpson and Liddell and the combination of Simpson, Liddell, and Organ teach all limitations of claim 14 except limitation [14f].

328. Lim teaches the “dirt collection chamber” of limitations [14b] and [14f] and, in my opinion, a POSA would have been motivated to combine Lim with Simpson and Liddell, and Simpson, Liddell, and Organ for the same

reasons that a POSA would have been motivated to combine Lim with Liddell's upstream cyclone unit 101. *See* Ground 4.

329. The combination of Simpson, Liddell, and Lim and the combination of Simpson, Liddell, Organ, and Lim teaches a first cyclonic cleaning stage (Liddell's **upstream cyclone unit 101**) having a first cyclone chamber (Liddell's **upstream cyclone 102**) and a first dirt collection chamber (Lim's **chambers 48**) that has a dirt collection region and is external to the first cyclone chamber, as shown:



Ex1007, Fig. 1(modified); *see also* Ground 4.

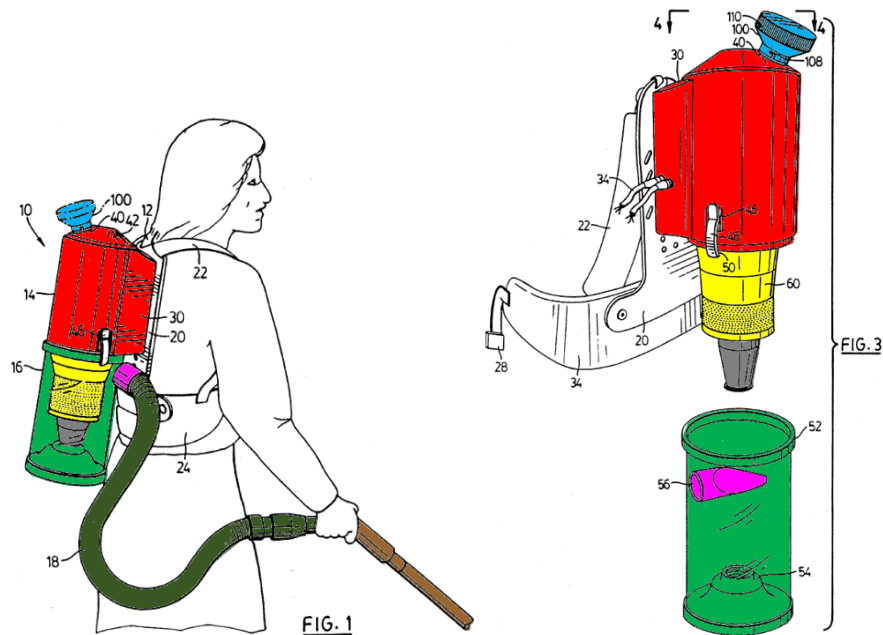
I. Ground 9: The Soler And Liddell Combination Renders Obvious Claims 1-4, 6-9, And 11-13

1. Motivation to Combine

330. It is my opinion that a POSA would have been motivated to combine Soler

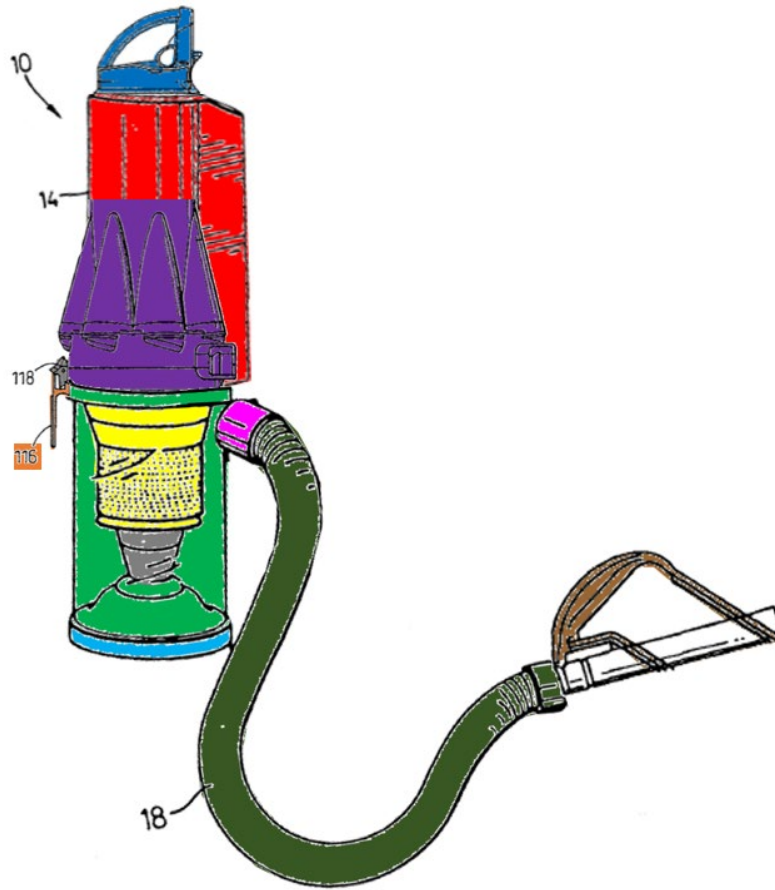
and Liddell.

331. Soler teaches a backpack vacuum cleaner with “a **first cyclone** and a second cyclone in series.” Ex1008, 1:9-11, 3:18-19. Soler teaches a “**lower casing 16**,” which contains “**first cyclone chamber 62**,” “is releasably mounted on **upper casing 14**,” which contains “**second cyclone chamber 64**,” such that **second cyclone chamber 64** is moveable relative to **first cyclone chamber 62**:



Id., 5:46-47, 6:5-37, Figs. 1, 3.

332. In my opinion, a POSA would have been motivated to combine certain features taught by Liddell with Soler, including: Liddell’s openable **base 108**, **downstream cyclone unit 103**, and **handles 28, 116, and 122**, as shown below:

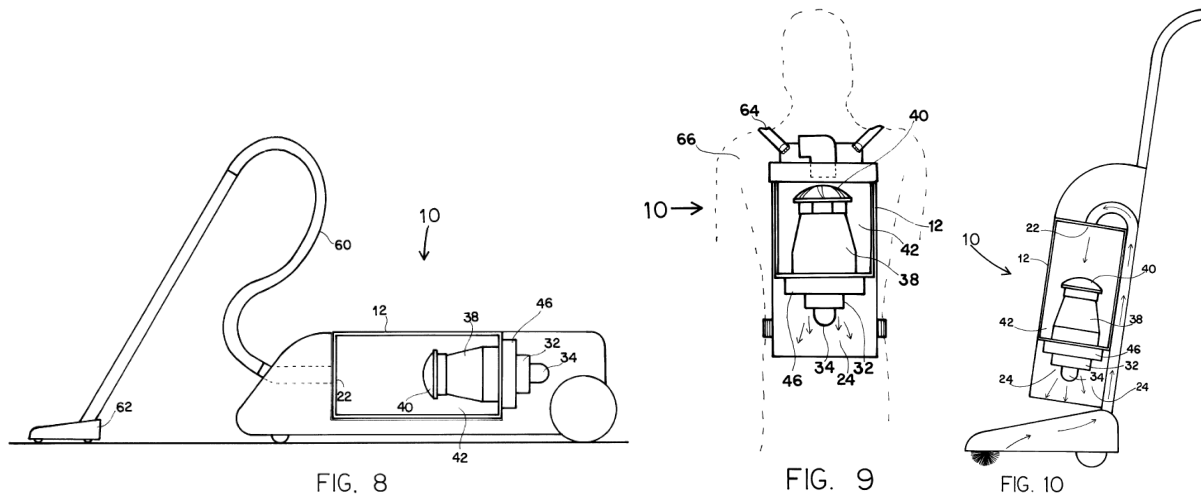


Ex1008, Fig. 1(modified).

333. In the sections that follow, I explain why a POSA would have been motivated to combine each of these features from Liddell with Soler. It is my opinion that a POSA would have been motivated to look to the features and configurations of upright vacuum cleaners like Liddell when improving a backpack vacuum cleaner like Soler. My opinion is based on my experience, training, and education, and is further supported by the prior art.

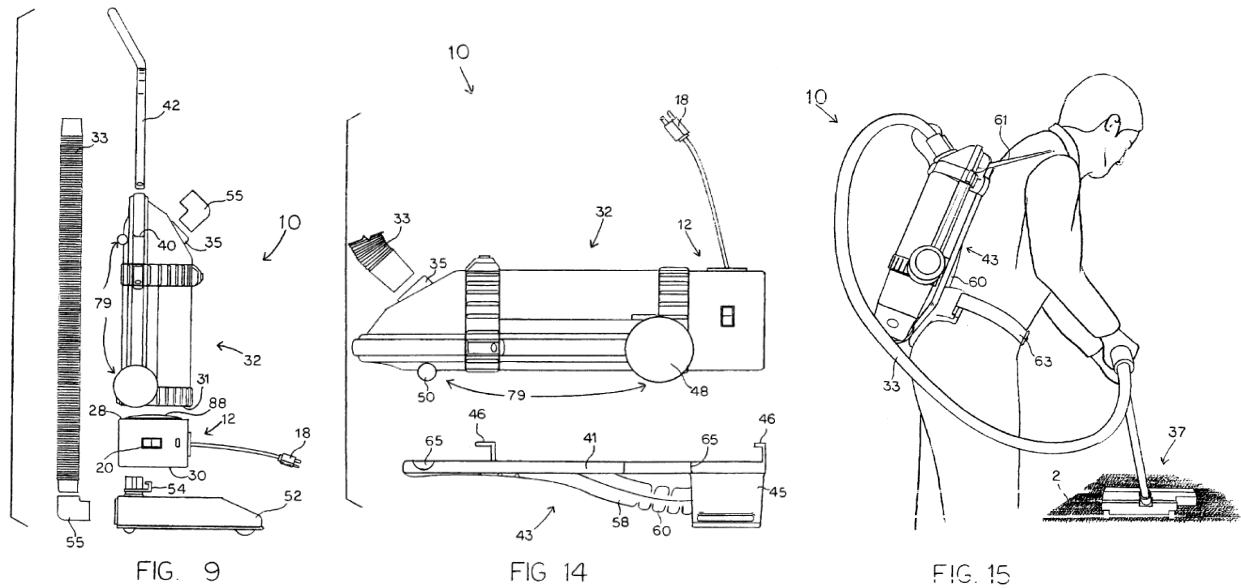
334. For example, US Patent No. 6,485,536 to Masters teaches a cyclonic

“Vortex Particle Separator” that can be used interchangeably in upright, canister, or backpack vacuum cleaner configurations, as illustrated in the figures below:



Ex1022, Title, 7:40-56, Figs. 8-10.

335. Similarly, US Patent No. 6,295,692 to Shideler teaches a “Convertible Vacuum Cleaner” that is “convertible between a backpack mode, a canister mode and an upright mode,” as illustrated below:

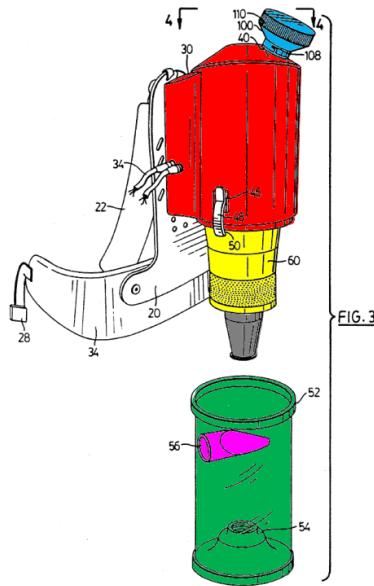


Ex1023, Title, Abstract, Figs. 9, 14, 15.

336. In my opinion, Masters' and Shideler's interchangeable use of cyclonic separators in upright and backpack vacuum cleaners would have motivated a POSA to look to Liddell's upright vacuum when improving Soler's backpack vacuum.

a. Liddell's Openable Base

337. Liddell teaches "[t]he **upper portion 120** [] carries an **actuating lever 128** designed to activate a mechanism for opening the **base 108** of the **cylindrical bin 106** for emptying purposes." Ex1005, 6:23-6:25, 7:3-6, 9:11-14.



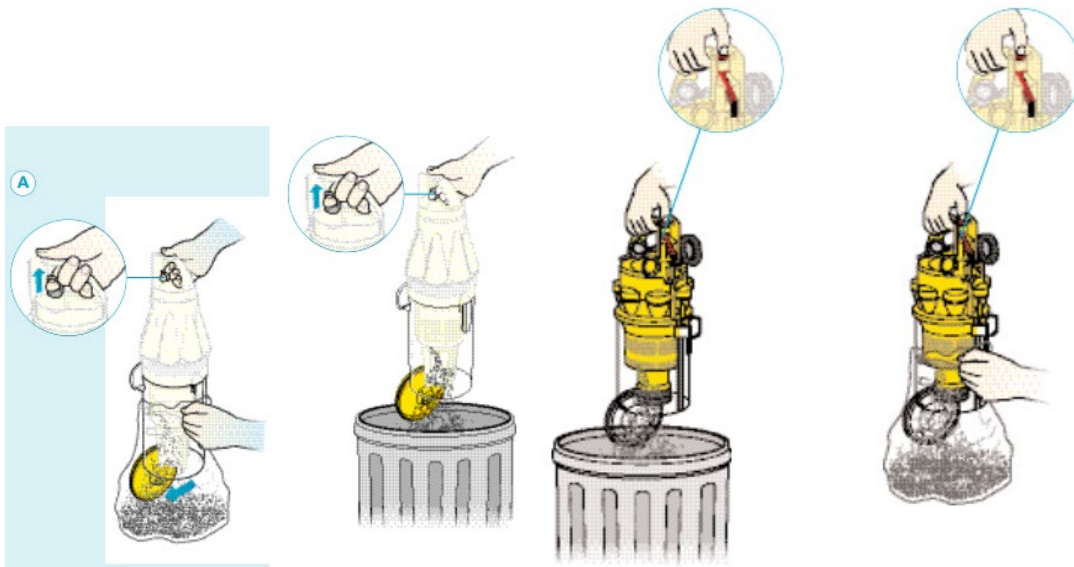
Ex1008, Figs. 1, 3.

339. As explained by Organ, this method of emptying a dust container had shortcomings that would have motivated a POSA to look to solutions like Liddell's openable base to make dust disposal easier and cleaner:

When the separating chamber of a bagless cleaner becomes full, a user typically removes the collecting chamber from the chassis of the machine, carries the chamber to a dust bin or refuse sack and tips the chamber upside down. Often dirt and dust is densely packed inside the collecting chamber and it may be necessary for a user to manually dislodge the dirt by reaching into the chamber and pulling at the collected mass of dust and fibres, or to shake or bang the collecting chamber against the side of a dustbin. In some cases, this can cause a fair amount of mess.

Ex1006, 1:28-4.

340. In my opinion, a POSA would have understood that adding Liddell's openable base would provide a convenient means for emptying lower casing 16 with or without removing it from **upper casing 14**. This technique was well known in the art, and depicted prior to the '607 Patent in product manuals for Dyson vacuums:



Ex1014, 9; Ex1009, 8; *see also* Ex1006, Fig. 5.

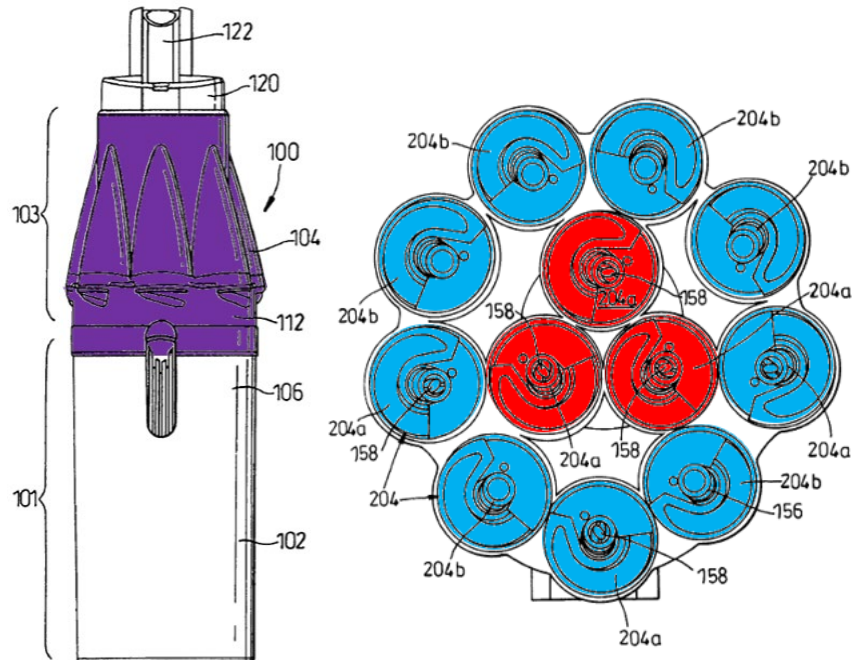
341. In my opinion, a POSA would have understood this would reduce the likelihood of spilling debris while carrying **lower casing 16** to a trash receptacle.

342. In my opinion, a POSA also would have had a reasonable expectation of success combining these features, since Soler describes similar

components as Liddell, and incorporating Liddell's openable base and associated mechanism merely required applying a known technique to improve similar devices in the same way.

b. Liddell's Downstream Cyclone Unit 103

343. Liddell teaches a **downstream cyclone unit 103** having a plurality downstream cyclones 104/204 arranged in an **inner** and **outer** ring, as shown below. Ex1005, 10:5-10:20.



Id., Figs. 2a&7; see Ground 1, Limitation [1h].

344. In my opinion, a POSA would have been motivated to incorporate Liddell's downstream cyclone unit containing cyclones 104/204 in Soler's cyclonic vacuum 10 to improve the cleaning efficiency of the vacuum.

345. A POSA would have known that cyclones of different sizes could be

arranged in series to effectively remove different sized dirt particles from the air. *Id.* For example, Soler teaches that its “first or outer cyclone is designed to remove the larger and heavier dirt particles which are entrained in the intake air and the second or inner cyclone [which is smaller than the outer cyclone] is used to remove the finer and lighter particles which are entrained in the exhaust air from the first cyclone.” Ex1008, 2:29-35. It was also known that arranging smaller cyclones in parallel could help remove even finer particles of dust while maintaining a high volume of airflow and overall suction while also decreasing the likelihood of clogs. Ex1005, 1:20-24.

346. For example, UK Patent Publication GB2,385,292 (“Dummelow”), a 2003 Dyson publication cited by Liddell (Ex1005, 10:9) describes these known advantages of arranging cyclones in parallel:

It is a known advantage to have a number of cyclones working in parallel within cyclonic separating apparatus. Each individual cyclone is small in comparison to that used in an equivalent single cyclone apparatus. The relatively small size of each individual cyclone has the effect of increasing the centrifugal force acting on particles entrained in the airflow passing through the cyclone body. This increase in the force results in an increase

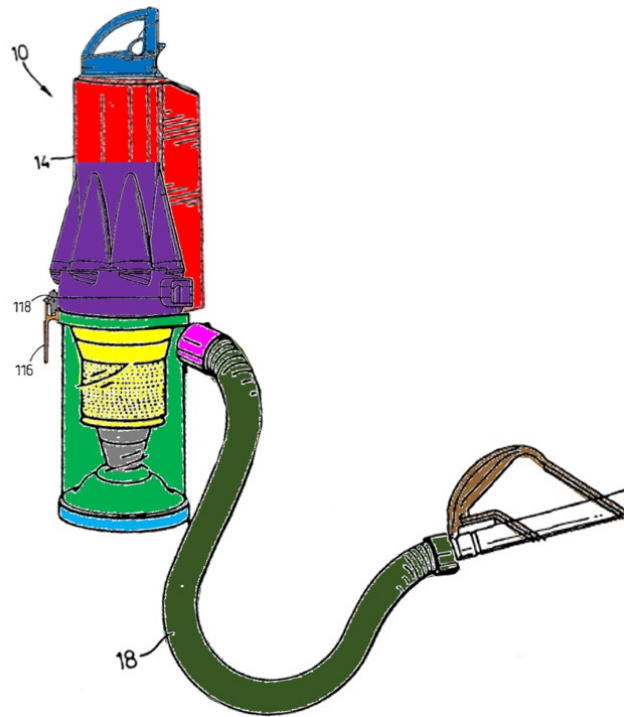
in the separation efficiency of the apparatus.

Ex1011, 1.

347. In my opinion, a POSA would have had a reasonable expectation of success in making this modification because, like Liddell, Soler already teaches first and second cyclone chambers arranged in series, and incorporating Liddell's inner and outer ring of second cyclones 104/204 merely required applying a known technique to improve similar devices in the same way.

348. In my opinion, to combine Liddell's **downstream cyclone unit 103** with Soler, as illustrated below, a POSA would have directed air from Soler's **first cyclone chamber 62** passing through **perforations 69** to Liddell's **downstream cyclones 104/204**. Also, in my opinion, a POSA would have simply directed cleaned air exiting Liddell's **downstream cyclone unit 103** from **outlet port 126** through a straightforward extension of **upper casing 14** to motor 80 so that it could be exhausted from Soler's air exit port 40, thereby maintaining Soler's fluid flow path. Soler's **second cyclone chamber 64/74** would therefore no longer perform cyclonic separation, but would continue to provide a path for dust separated by **downstream cyclone unit 103** to Soler's **receiving chamber 54** in a manner similar to Liddell's collection space 134 so that the dust could be

disposed of when Liddell's **base 108** is opened.

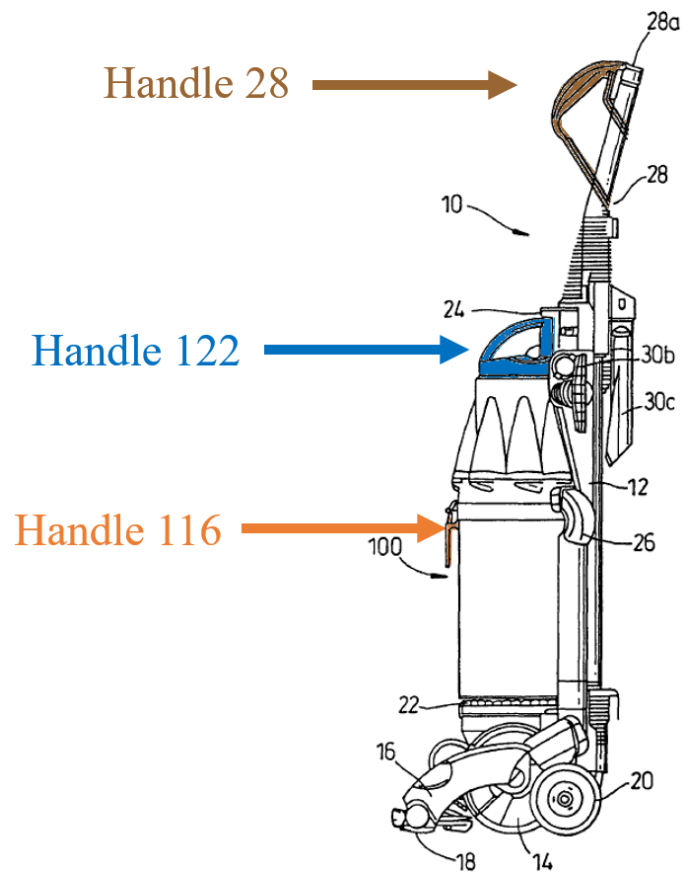


Ex1008, Fig. 1(modified); Ex1005, 7:2-6, 7:30-8:5.

c. Liddell's Handles 28, 116, 122

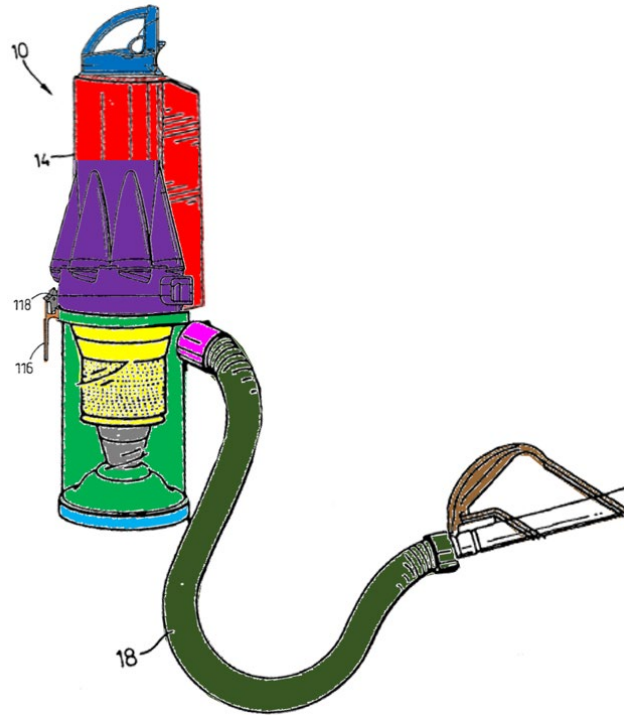
349. Liddell teaches handles: **hose and wand assembly 28**, **handle 116** and catch 118 on cylindrical bin 106, and **handle 122** on upper portion 120.

Ex1005, 4:16-21, 5:30-6:2, 6:16-18.



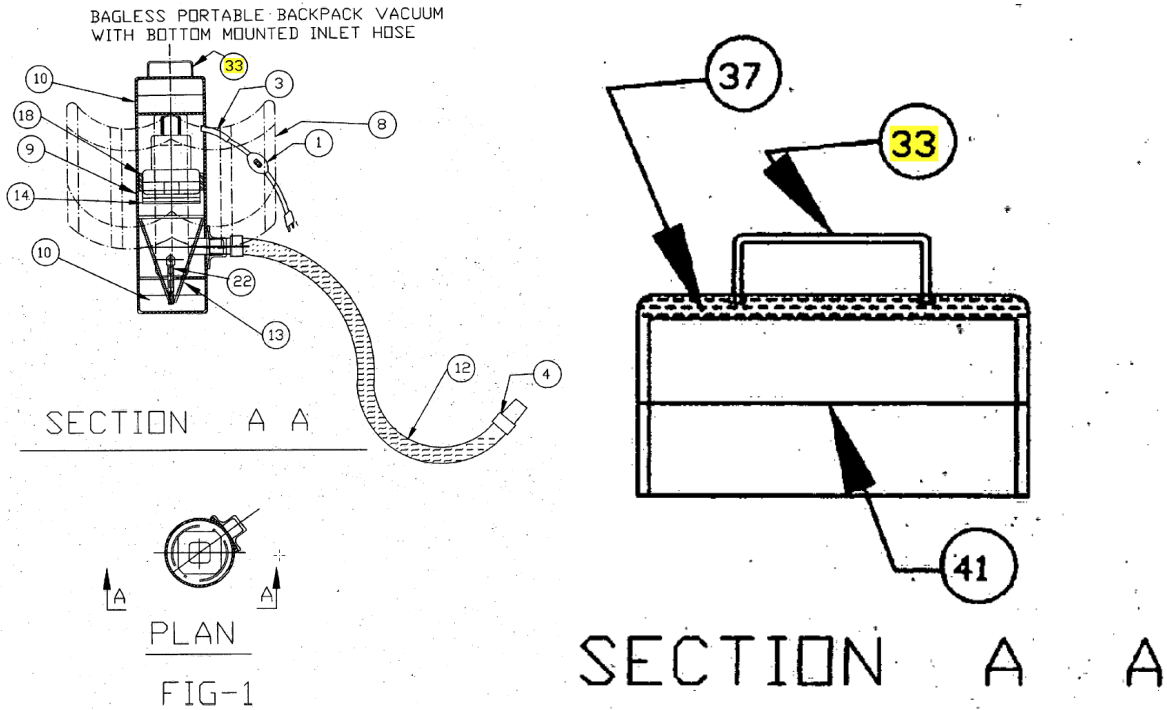
Ex1005, Fig. 1b.

350. In my opinion, a POSA would have been motivated to incorporate each of these handles on Soler's vacuum 10 (as shown below) to improve the ergonomics and useability of the vacuum.



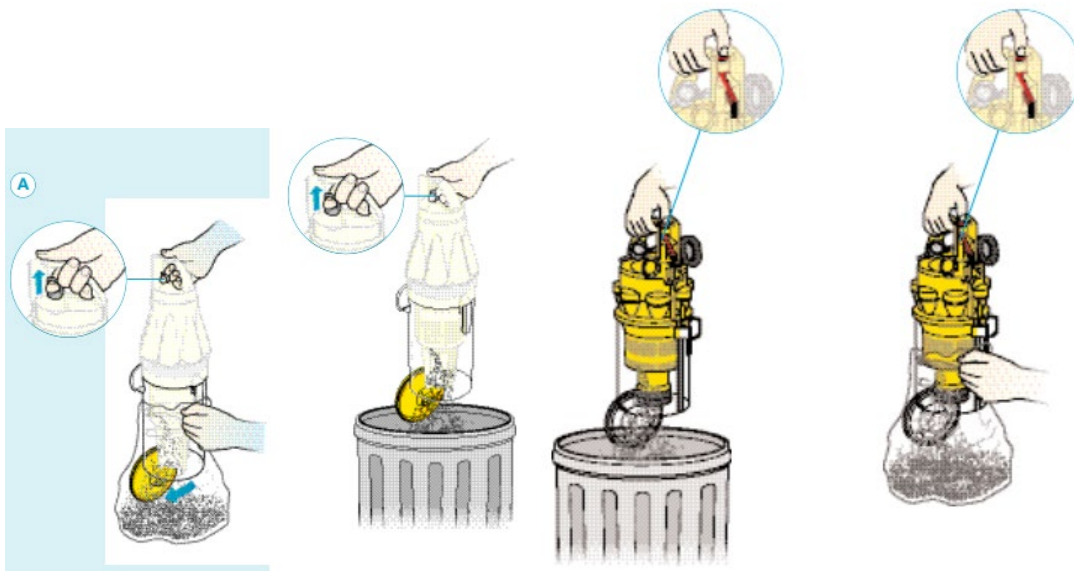
Ex1008, Fig. 1(modified).

351. In my opinion, a POSA would have been motivated to incorporate **upper portion 120** (which includes **handle 122**) to provide an alternative means of carrying Soler's vacuum 10, such that **handle 122** could be held with one hand and the cleaning head on **hose 18** could be held with another.
352. The prior art reference US20050086762A1 to Paris teaches a cyclonic backpack cleaner with a "vacuum transport handle 33" that would have further motivated a POSA to add Liddell's **handle 122** held on top of Soler's backpack cleaner as an alternative means of carrying or picking up the apparatus:



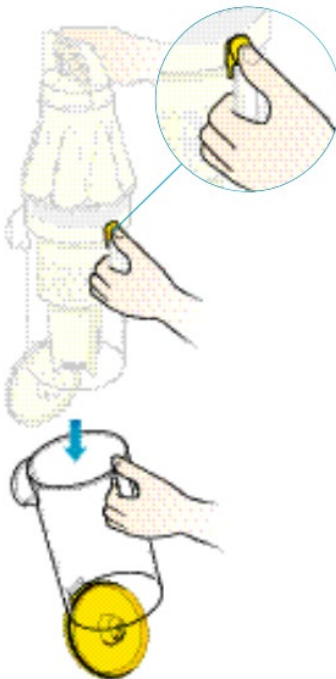
Ex1024, [0024], Figs. 1, 5 (excerpted).

353. Further, in my opinion, combining Liddell's [handle 122](#) with Soler's backpack vacuum would have made it easier to empty the vacuum by opening the base, for example as shown below in product manuals for Dyson vacuums that were available prior to the '607Patent:



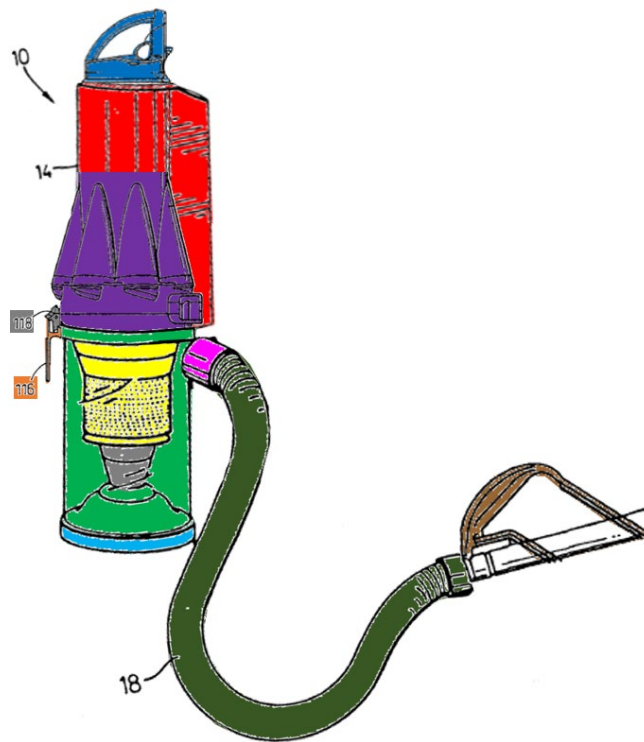
Ex1014, 9; Ex1009, 8.

354. In my opinion, a POSA would have been motivated to incorporate **handle 116** on Soler's **lower casing 16** so that **lower casing 16** can be easily carried by one hand, as was commonly done in the art, and shown below:



Ex1014, 10.

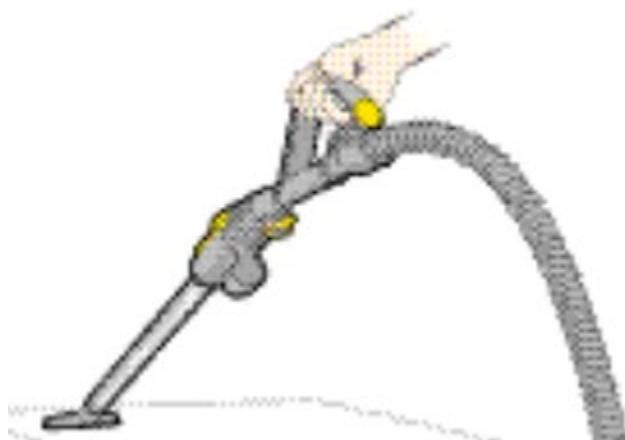
355. Further, when Soler and Liddell are combined, it is my opinion that a POSA would have been motivated to use **handle 116** to secure Soler's **lower casing 16** to the **catch 118** on Liddell's **downstream cyclone unit 103** so that Soler's **lower casing 16** can continue to be releasably secured to the remainder of the vacuum, as shown below.



Ex1008, Fig. 1(modified).

356. In my opinion, a POSA also would have been motivated to incorporate **handle 28** at the end of **hose 18** to provide an ergonomic means of manipulating the vacuum's cleaning head or suction inlet, including from a standing posture. Liddell explains "**hose and wand assembly 28** [] may

be retained in the configuration shown in the drawings so as to function as a handle” and “may be released to allow the distal end 28a of the wand to be used in conjunction with a floor tool (not shown) to perform an above-the-floor cleaning function, eg on stairs, upholstery, etc.” Ex1005, Figs. 1a-1b, 4:16-21. Incorporating handles at the end of a suction hose was known in the art prior to the ’607 patent, as shown in Dyson’s DC07Manual, and in my opinion, this would have motivated a POSA to make such a combination:



Ex1014, 8.

357. Soler teaches that “[h]ose 18 may be of any desired length and, preferably, is designed to receive a variety of interchangeable cleaning heads.” Ex1008, 4:14-16.

358. In my opinion, a POSA would have had a reasonable expectation of success in adding **handle 28** at the end of **hose 18** because, like Liddell,

Soler describes a hose that can be manipulated by an operator's hand and incorporating Liddell's **handle 28** merely required applying a known technique to improve a similar device in the same way.

2. **Soler In Combination With Liddell Renders Obvious Claims [1]/[12]/[13]**

a. **[1pre]/[12pre]/[13pre]**

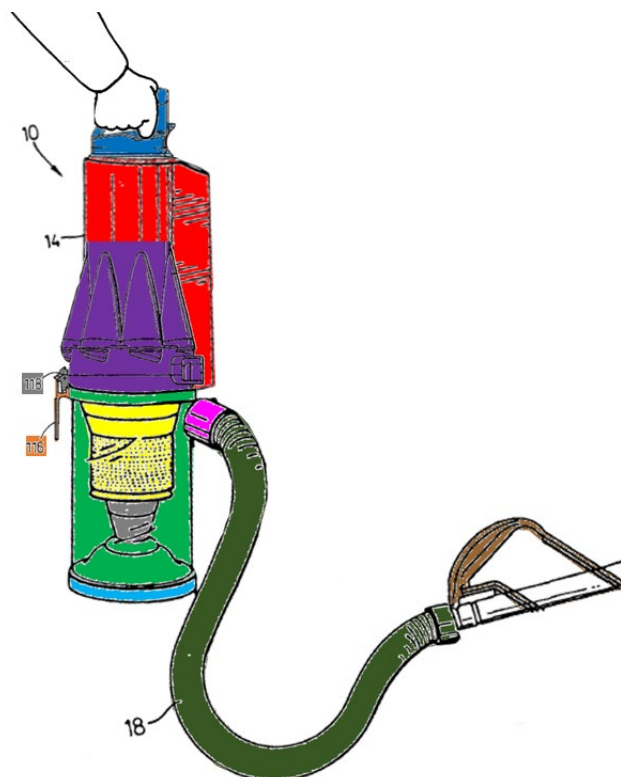
Reference Number	Claim Limitation
[1pre]	"A hand carriable surface cleaning apparatus comprising:"
[12pre]	"A hand carriable surface cleaning apparatus comprising:"
[13pre]	"A hand carriable surface cleaning apparatus comprising:"

359. To the extent the preambles are construed as limiting, in my opinion, Soler combined with Liddell teaches a hand carriable surface cleaning apparatus.

360. Soler teaches a "light weight" backpack vacuum design "so that it may be worn for an extended period of time by the operator." Ex1008, 3:49-52. In my opinion, a POSA would understand that Soler's vacuum is hand carriable, for example, by hand carrying Soler's vacuum by the harness 12, just like an ordinary backpack can be hand carried by the strap. In my opinion, the combination of Liddell and Soler would likewise remain hand carriable in the same way.

361. A POSA would also understand the combined vacuum could be hand carried with two hands, for example, by gripping opposite sides of the vacuum. In use, an operator would lift **upper casing 14** with two hands on

opposite sides to remove it from **lower casing 16** (or vice versa). Ex1008, Fig. 3; 5:46-58. **Lower casing 16** would not add significant weight to the vacuum, and so **upper casing 14** and **lower casing 16** could similarly be lifted when connected by gripping opposite sides of the vacuum with two hands and carried. Further, in my opinion, when Liddell's **handle 122** is combined with Soler, it would have provided a convenient means by which Soler's cleaner 10 can be hand carried, as shown below:



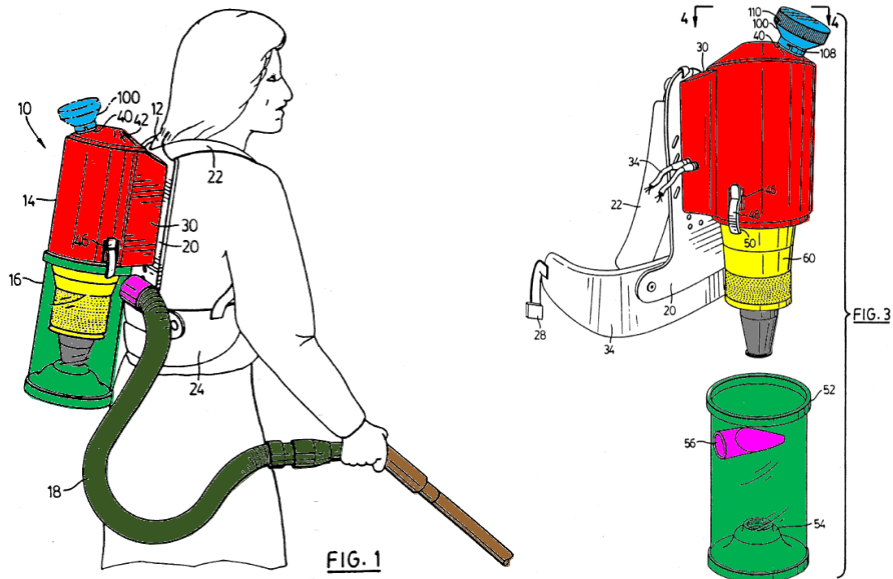
Ex1008, Fig. 1(modified).

b. [1a]/[12a]/[13a]

Reference Number	Claim Limitation
[1a]	“a fluid flow path extending between a dirty air inlet and a clean air outlet;”
[12a]	“a fluid flow path extending between a dirty air inlet and a clean air outlet;”
[13a]	“a fluid flow path extending between a dirty air inlet and a clean air outlet;”

362. In my opinion, Soler in combination with Liddell teaches a fluid flow path extending between a dirty air inlet and a clean air outlet.

363. In my opinion, Soler teaches that vacuum cleaner 10 has a dirty air inlet (collectively, **hose assembly 18** and **air entry port 56**), a clean air outlet (**air exit port 40** and an “**after filter**”), and a fluid flow path therebetween. Ex1008, 4:14-16, 5:60-65, 4:63-65, 6:65-7:5, Figs. 1, 3-4.



Id., Figs. 1&3.

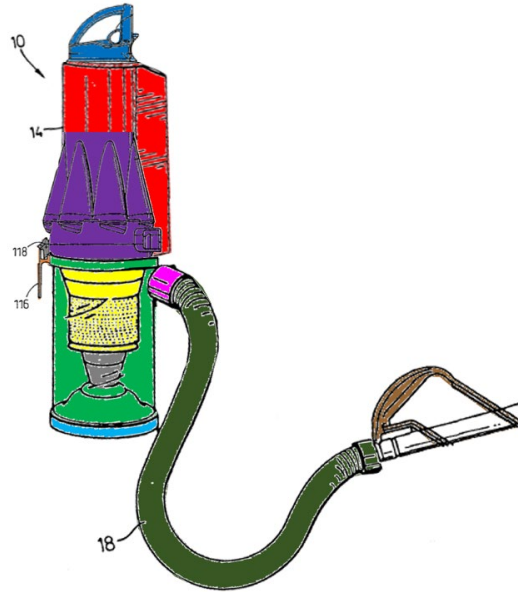
6:65-7:5.



Ex1008, Fig. 4.

365. Soler teaches **air exit port 40** may receive an “after-filter” “positioned

- external to the **upper casing [14]**” to further clean the air before it is exhausted from the vacuum. *Id.*, 5:8-35.
366. In my opinion, the combination of Soler and Liddell maintains Soler’s fluid flow path. To start, modifying Soler with Liddell’s handles and openable base 108 do not change Soler’s fluid flow path. *See* Ground 9, Motivation to Combine.
367. Further, as I explained in my analysis of motivation to combine Soler and Liddell, to combine Liddell’s **downstream cyclone unit 103** with Soler, a POSA simply would have directed air from Soler’s **first cyclone chamber 62** passing through **perforations 69** to Liddell’s **downstream cyclones 104/204**. Also, in my opinion, a POSA would have directed cleaned air exiting Liddell’s **downstream cyclone unit 103** from **outlet port 126** through a straightforward extension of **upper casing 14** to motor 80 so that it could be exhausted from Soler’s air exit port 40, thereby maintaining Soler’s fluid flow path.
368. Soler’s **second cyclone chamber 64/74** would no longer perform cyclonic separation, but would continue to provide a pathway for dust separated by **downstream cyclone unit 103** to Soler’s **receiving chamber 54** in a manner similar to Liddell’s collection space 134 so that the dust could be disposed of when Liddell’s **base 108** is opened.

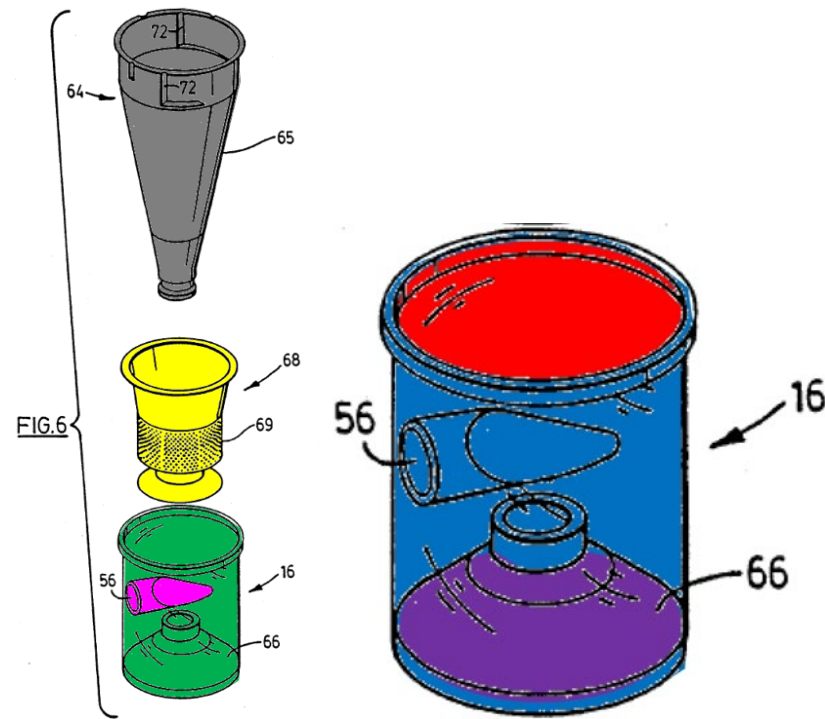


Ex1008, Fig. 1(modified); Ex1005, Fig. 3b, 7:2-6, 7:30-8:5.

c. [1b]/[12b]/[13b]

Reference Number	Claim Limitation
[1b]	“a first cyclonic cleaning stage positioned in the fluid flow path downstream from the dirty air inlet, the first cyclonic cleaning stage comprising an upper end, a bottom end spaced longitudinally below the upper end and a side wall extending therebetween, the first cyclonic cleaning stage having a dirt collection region with a bottom door that is openable to empty the dirt collection region;”
[12b]	“a first cyclonic cleaning stage positioned in the fluid flow path downstream from the dirty air inlet, the first cyclonic cleaning stage comprising an upper end, a bottom end spaced longitudinally below the upper end and a side wall extending therebetween, the first cyclonic cleaning stage having a dirt collection region with a bottom door that is openable to empty the dirt collection region;”
[13b]	“a first cyclonic cleaning stage positioned in the fluid flow path downstream from the dirty air inlet, the first cyclonic cleaning stage comprising an upper end, a bottom end spaced longitudinally below the upper end and a side wall extending therebetween, the first cyclonic cleaning stage having a dirt collection region with a bottom door that is openable to empty the dirt collection region;”

369. In my opinion, Soler in combination with Liddell teaches a first cyclonic cleaning stage positioned in the fluid flow path downstream from the dirty air inlet, the first cyclonic cleaning stage comprising an upper end, a bottom end spaced longitudinally below the upper end and a side wall extending therebetween, the first cyclonic cleaning stage having a dirt collection region with a bottom door that is openable to empty the dirt collection region.
370. In my opinion, Soler teaches a first cyclonic cleaning stage (**first cyclone chamber 62**) positioned in the fluid flow path downstream from the dirty air inlet (**air entry port 56** and **hose assembly 18**), the first cyclonic cleaning stage having an upper end (**upper end** of **lower casing 16**), a bottom end (**bottom end** of **lower casing 16**) spaced longitudinally below the upper end and a side wall (**side wall** of **lower casing 16**) extending therebetween, and a dirt collection region (**lower portion 66** of **lower casing 16**).



Ex1008, Fig. 6, Fig. 6 (excerpted), 6:21-25.

371. Soler teaches “**air entry port 56**...receive[s] **hose assembly 18**” and “suppl[ies] dirt laden air tangentially to the interior surface of **lower casing 16**” where “larger and heavier dirt is deposited in the **lower portion** of **lower casing 16** (denoted by reference numeral 66).” *Id.*, 5:59-65, 6:20-25.

372. In my opinion, Liddell teaches a bottom door (base 108) that is openable to empty the dirt collection region, and as described above, a POSA would have been motivated to incorporate Liddell’s openable base 108 on the bottom of Soler’s casing 16 along with Liddell’s mechanism for opening it. *See* Ground 1, Limitations [1b]/[12b]/[13b]; Ground 9, Motivation to

Combine.

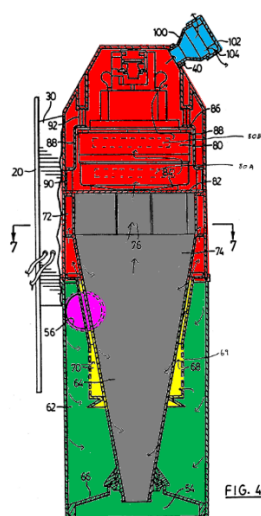
d. [1c]/[12c]/[13c]

Reference Number	Claim Limitation
[1c]	“a second cyclonic cleaning stage positioned in the fluid flow path downstream from the first cyclonic cleaning stage, the second cyclonic cleaning stage having an upper end which is positioned above the upper end of the first cyclonic cleaning stage, the second cyclonic cleaning stage is longitudinally moveable relative to all of the sidewall of the first cyclonic cleaning stage;”
[12c]	“a second cyclonic cleaning stage positioned in the fluid flow path downstream from the first cyclonic cleaning stage, the second cyclonic cleaning stage having an upper end which is positioned above the upper end of the first cyclonic cleaning stage, the second cyclonic cleaning stage is longitudinally moveable relative to all of the sidewall of the first cyclonic cleaning stage;”
[13c]	“a second cyclonic cleaning stage positioned in the fluid flow path downstream from the first cyclonic cleaning stage, the second cyclonic cleaning stage having an upper end which is positioned above the upper end of the first cyclonic cleaning stage, the second cyclonic cleaning stage is longitudinally moveable relative to all of the sidewall of the first cyclonic cleaning stage;”

373. In my opinion, Soler alone, Liddell alone, and the combination of Soler and Liddell teach a second cyclonic cleaning stage positioned in the fluid flow path downstream from the first cyclonic cleaning stage, the second cyclonic cleaning stage having an upper end which is positioned above the upper end of the first cyclonic cleaning stage, the second cyclonic cleaning stage is longitudinally moveable relative to all of the sidewall of the first cyclonic cleaning stage.

374. In my opinion, Soler teaches a second cyclonic cleaning stage (**second**

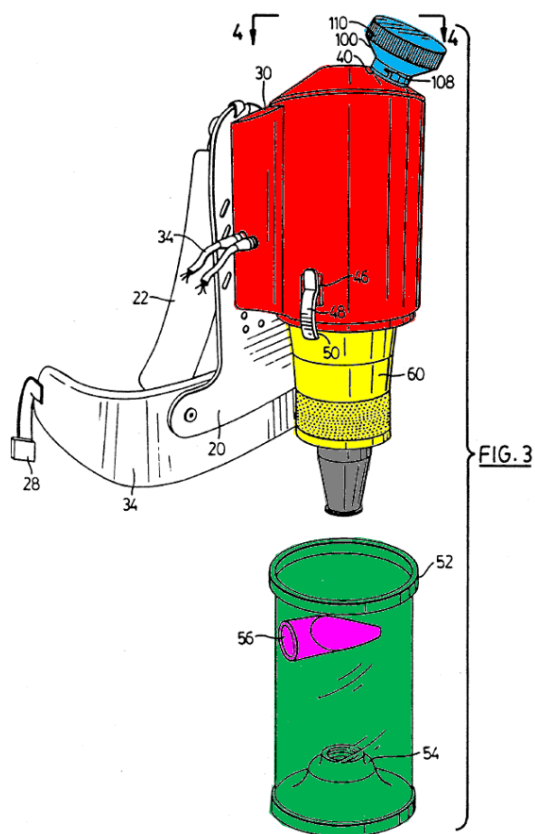
cyclone chamber 64/74) that is positioned in the fluid flow path downstream from the first cyclonic cleaning stage (**first cyclone chamber 62**). Ex1008, 4:14-16, 5:60-65, 4:63-65, 6:65-7:5, Fig. 4. Soler further teaches the second cyclonic cleaning stage (**second cyclone chamber 64/74**) has an upper end which is positioned above the upper end of the first cyclonic cleaning stage (**first cyclone chamber 62**), as shown below:



Id., Fig. 4.

375. In my opinion, Soler teaches that the second cyclonic cleaning stage (**second cyclone chamber 64/74**) is longitudinally moveable relative to all of the sidewall of the first cyclonic cleaning stage (side wall of lower casing 16 of **first cyclone chamber 62**). Soler teaches that “[l]ower casing 16 [which houses **first cyclone chamber 62**] is releasably mounted on **upper casing 14** [which houses **second cyclone chamber 64/74**]” using latches 46 on “the lower portion of **upper casing 14**,” which “engage with

rim 52 of lower housing 16.” Ex1008, 5:46-54. When **latches 46** are disengaged from rim 52, the lower casing 16 is released from the **upper casing 14**, and **second cyclone chamber 64/74** is longitudinally moveable relative to all of the side wall of the **first cyclone chamber 62**, as shown in Fig. 3:

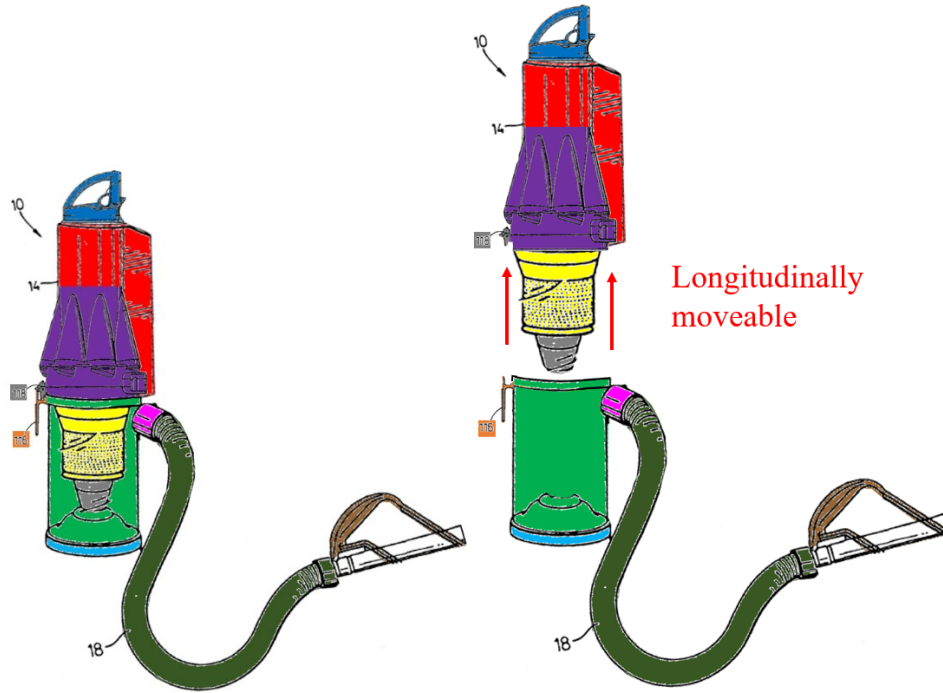


Id., Fig 3.

376. Liddell also teaches this limitation. See Ground 1, Limitations [1c]/[12c]/[13c].

377. In my opinion, the combination of Soler and Liddell also teaches this limitation. For example, Liddell’s **downstream cyclone unit 103** is

longitudinally moveable relative to sidewall of Soler's **lower casing 16** when **handle 116** is disengaged from **catch 118**, as illustrated below:



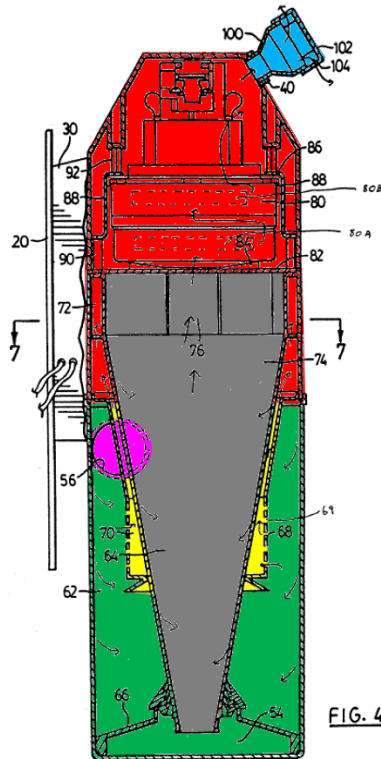
Ex1008, Fig. 1(modified).

e. [1d]/[12d]/[13d]

Reference Number	Claim Limitation
[1d]	“a suction motor positioned in the fluid flow path downstream from the second cyclonic cleaning stage;”
[12d]	“a suction motor positioned in the fluid flow path downstream from the second cyclonic cleaning stage;”
[13d]	“a suction motor positioned in the fluid flow path downstream from the second cyclonic cleaning stage;”

378. In my opinion, Soler alone and in combination with Liddell teaches a suction motor positioned in the fluid flow path downstream from the second cyclonic cleaning stage.

379. In my opinion, Soler teaches a suction motor (**motor 80**) positioned in the fluid flow path downstream from the second cyclonic cleaning stage (**second cyclone chamber 64/74**). Ex1008, 6:57-64.



Id., Fig. 4.

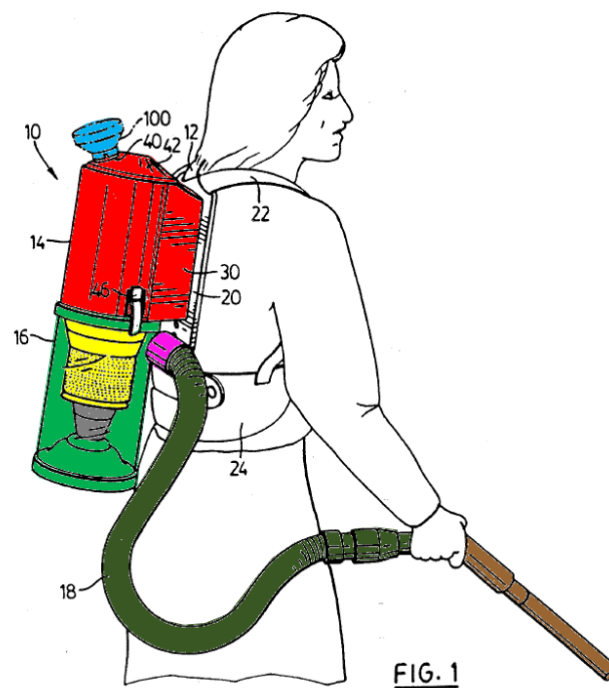
380. Further, in my opinion, when Liddell is combined with Soler, Soler's motor 80 is downstream from Liddell's downstream cyclone unit 103. *See* Ground 9, Limitations [1a]/[12a]/[13a].

f. **[1e]/[12e]/[13e]**

Reference Number	Claim Limitation
[1e]	“a handle;”
[12e]	“a handle;”
[13e]	“a handle;”

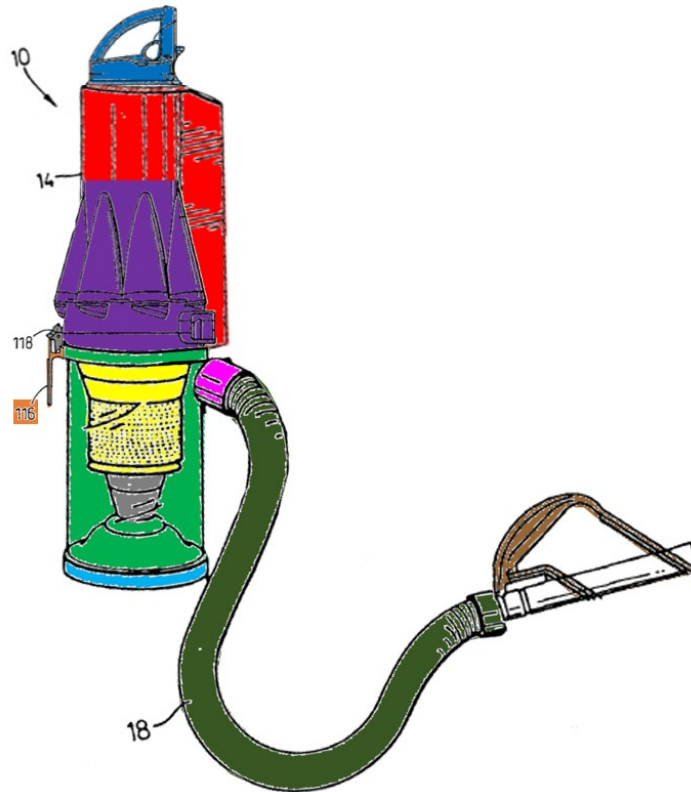
381. In my opinion, Soler alone, Liddell alone, and the combination of Soler and Liddell teach a handle.

382. In my opinion, Soler teaches a **hose assembly 18**, which receives a cleaning head, either of which is a handle by which users manipulate the **suction inlet** of the vacuum 10, as shown below. Ex1008, 4:13-16.



Id., Fig. 1.

383. Liddell also teaches a “handle;” **handle 28** and **handle 116** (see Ground 1, Limitations [1e]/[12e]/[13e]), which are both retained in the combination with Soler, as shown below:



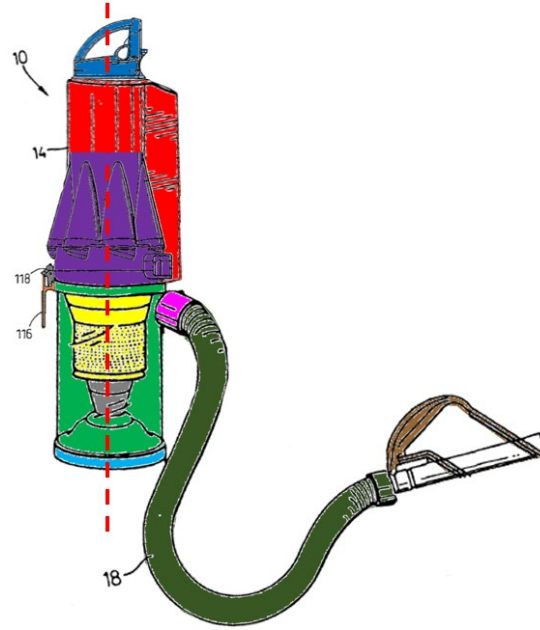
Ex1008, Fig. 1(modified).

384. Further, in my opinion, Liddell’s [handle 122](#) also satisfies this limitation for limitations [1e] and [12e]. *See* Ground 1, Limitation [1e]/[12e]/[13e].

g. [1f]/[1g]/[1h]

Reference Number	Claim Limitation
[1f]	“wherein the second cyclonic cleaning stage comprises a plurality of second cyclones connected fluidly in parallel with each other,”
[1g]	“wherein the second cyclones are positioned around a central longitudinal axis that extends through the first cyclonic cleaning stage and the openable bottom door,”
[1h]	“wherein the plurality of second cyclones includes a first set of second cyclones arranged in an inner ring and a second set of second cyclones arranged in an outer ring laterally surrounding the inner ring.”

385. In my opinion, the combination of Soler and Liddell teaches the second cyclonic cleaning stage comprises a plurality of second cyclones connected fluidly in parallel with each other (Limitation [1f]).
386. In my opinion, the combination of Soler and Liddell teaches the second cyclones are positioned around a central longitudinal axis that extends through the first cyclonic cleaning stage and the openable bottom door (Limitation [1g]).
387. In my opinion, the combination of Soler and Liddell teaches the plurality of second cyclones includes a first set of second cyclones arranged in an inner ring and a second set of second cyclones arranged in an outer ring laterally surrounding the inner ring (Limitation [1h]).
388. In my opinion, Liddell teaches the second cyclonic cleaning stage comprises a plurality of second cyclones connected fluidly in parallel with each other. *See* Ground 1, Limitation [1f]. Therefore, Soler in combination with Liddell also teaches this limitation.
389. In my opinion, when combined, Liddell's downstream cyclone unit 103 has an inner and outer ring of **second cyclones 104/204** arranged in parallel around a central longitudinal axis that extends through Liddell's openable **base 108** on Soler's **lower casing 16**, as shown:



Ex1008, Fig. 1(modified); *see* Ground 1, Limitation [1g].

390. In my opinion, Liddell teaches or renders obvious the plurality of second cyclones includes a first set of second cyclones arranged in an inner ring and a second set of second cyclones arranged in an outer ring laterally surrounding the inner ring. *See* Ground 1, Limitation [1h]; Ground 2, Limitation [1h]. Therefore, Soler in combination with Liddell also teaches this limitation.

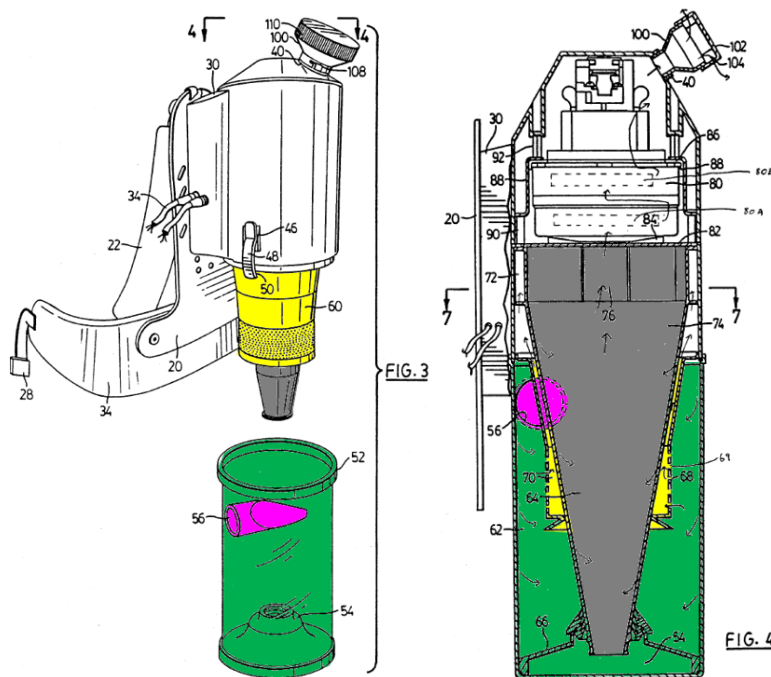
h. [12f]

Reference Number	Claim Limitation
[12f]	wherein the first cyclonic cleaning stage has a first stage air inlet, each cyclone of the second cyclonic cleaning stage has a second stage air inlet downstream from the first stage air inlet and the hand carriable surface cleaning apparatus further comprises a screen positioned in the fluid flow path between the first stage air inlet and the second stage air inlet, wherein the screen is longitudinally moveable relative to the sidewall.

391. In my opinion, Soler alone and in combination with Liddell teaches the first cyclonic cleaning stage has a first stage air inlet, each cyclone of the second cyclonic cleaning stage has a second stage air inlet downstream from the first stage air inlet and the hand carriable surface cleaning apparatus further comprises a screen positioned in the fluid flow path between the first stage air inlet and the second stage air inlet, wherein the screen is longitudinally moveable relative to the sidewall.

392. In my opinion, Soler teaches the first cyclonic cleaning stage (**first cyclone chamber 62**) has a first stage air inlet (**air entry port 56**) and that each cyclone of the second cyclonic cleaning stage (**second cyclone chamber 64/74**) has a second stage air inlet (**second air entry port 72**) downstream from the first stage air inlet, and that the hand carriable surface cleaning apparatus (vacuum cleaner 10) further has a screen (**plurality of perforations 69** in first cyclone air exit 68) positioned in the fluid flow

path between the first stage air inlet and the second stage air inlet, wherein the screen is longitudinally moveable relative to the sidewall (side wall of lower casing 16 of **first cyclone chamber 62**), as shown in Figs. 3&4:



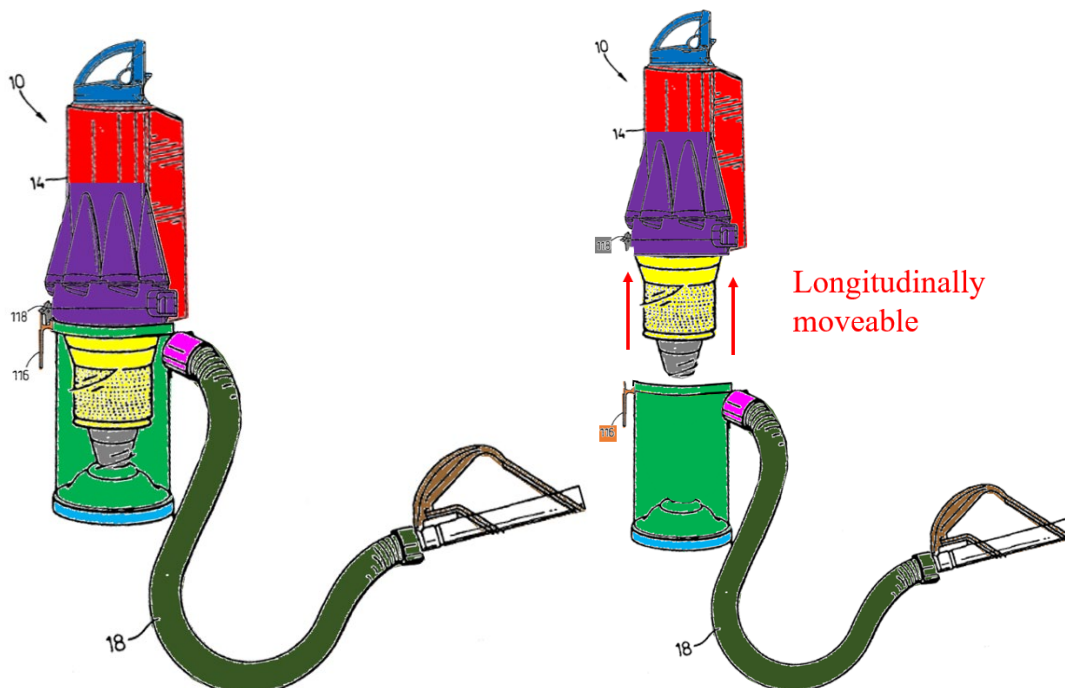
Id., Figs. 3&4, 6:65-7:5, 5:59-67, 6:16-34.

393. As I explained previously, Soler's **plurality of perforations 69** is positioned in the fluid flow path between **air entry port 56** and the **second air entry port 72**. *See* Ground 9, Limitations [1a]/[12a]/[13a]. Soler teaches air passes "through **air entry port 56**, through the **first cyclone chamber 62**, via **perforations 69** through first cyclone air exit 68, through passage 70 to second air entry port 72...." Ex1008, 6:65-7:5.

394. Further, in my opinion, Soler's **plurality of perforations 69** is longitudinally moveable relative to the sidewall of **first cyclone chamber**

62 when latches 46 are disengaged from lower casing 16, as is shown in Fig. 3. *Id.*, Fig. 3, 5:46-58 (“Lower casing 16 is releasably mounted on upper casing 14 by any means known in the art” including using “latches 45 [] provided adjacent the lower portion of upper casing 14”).

395. Also, Soler in combination with Liddell’s **downstream cyclone unit 103** has a second cyclonic cleaning stage (**downstream cyclone unit 103**) with a second stage air inlet (Liddell’s inlets 146 to downstream cyclones 104/204) downstream from the **air entry port 56** on **first cyclone chamber 62**. See Ground 1, Limitation [12f]; Ex1005, 7:17-33, 8:7-14, 9:7-10:3. When combined, Soler’s **plurality of perforations 69** is positioned in the fluid flow path between the inlets 146 in **downstream cyclone unit 103** and **air entry port 56** as illustrated below:



Ex1008, Fig. 1(modified); *see* Grounds 1&9, Limitations [1a]/[12a]/[13a] (describing fluid flow path).

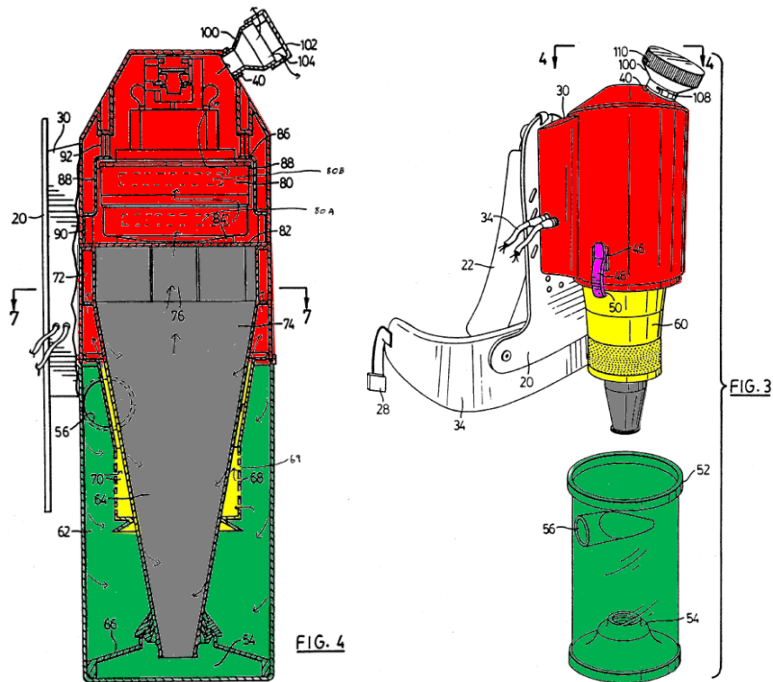
396. In my opinion, Soler's **plurality of perforations 69** remain longitudinally moveable relative to **lower casing 16** when Soler is combined with Liddell's **downstream cyclone unit 103** because **lower casing 16** remains releasable from **downstream cyclone unit 103** and **upper casing 14**, which are attached to **plurality of perforations 69**. *See* Ground 9, Limitations [1c]/[12c]/[13c]).

i. [13f]

Reference Number	Claim Limitation
[13f]	"wherein the second cyclonic cleaning stage further comprises a second stage handle."

397. In my opinion, Soler alone, Liddell alone, the combination of Soler and Liddell teaches the second cyclonic cleaning stage further comprises a second stage handle.

398. In my opinion, Soler's **latches 46** are a second stage handle because they are on the housing of the **second cyclone chamber 64/74** and are pulled by an operator's hands to release **upper casing 14** from **lower casing 16**.
Ex1008, 5:46-58.



Id., Figs. 4&3.

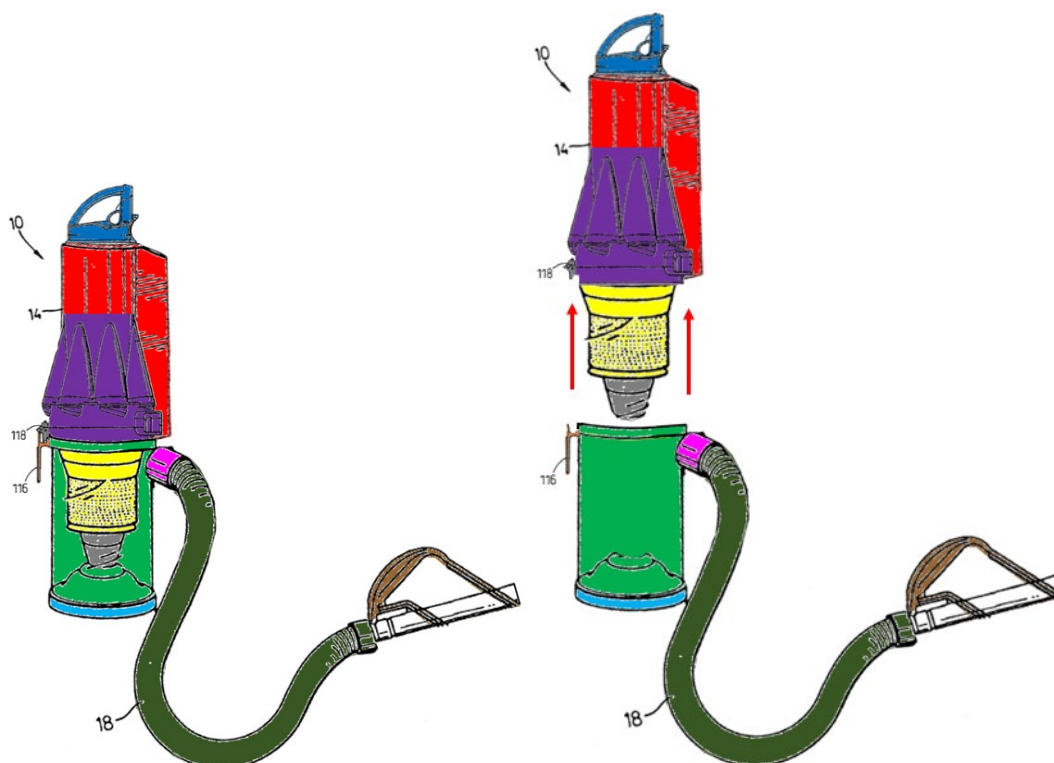
399. Like Soler, the accused Dyson V8 vacuum has a bin release catch that, when pulled, releases the alleged second cyclonic cleaning stage from the first cyclonic cleaning stage, as shown below in PO's infringement contentions in the parallel district court litigation:



Ex1017, 28-29; Ex1016.

400. In my opinion, to the extent the accused Dyson V8 vacuum's bin release catch is a second stage handle, Soler's latches 46 are also a second stage handle.

401. Further, in my opinion, Liddell's **handle 122** is a second stage handle when combined with Soler because it is on the housing containing Liddell's **downstream cyclone unit 103** (Soler's **upper casing 14**) and is pulled to release **upper casing 14** from **lower casing 16**. See Ground 9, Limitations [1c]/[12c]/[13c].



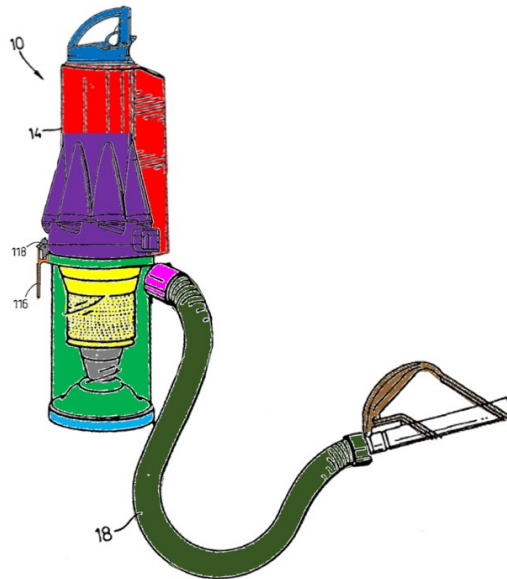
Ex1008, Fig. 1(modified).

3. Soler In Combination With Liddell Renders Obvious Claim [2]

Reference Number	Claim Limitation
[2]	“The hand carriable surface cleaning apparatus of claim 1, further comprising a housing containing the suction motor and the clean air outlet, wherein the bottom door is openable while the sidewall of the first cyclonic cleaning stage is connected to the housing.”

402. In my opinion, Soler in combination with Liddell teaches the hand carriable surface cleaning apparatus of claim 1 and further teaches a housing containing the suction motor and the clean air outlet, wherein the bottom door is openable while the sidewall of the first cyclonic cleaning stage is connected to the housing.

403. In my opinion, Soler in combination with Liddell has a housing (**upper casing 14**) containing the suction motor (motor 80) and clean air outlet (**air exit port 40 and “after filter”**), wherein the bottom door (Liddell’s **base 108**) is openable while the sidewall of the first cyclonic cleaning stage (**first cyclone chamber 62**) is connected to the housing:



Ex1008, Fig. 1(modified).

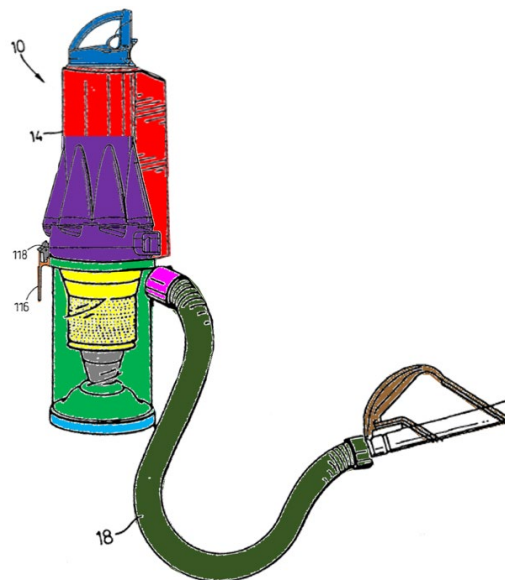
404. In my opinion, this limitation is also met when **first cyclone chamber 62** is connected to Liddell’s **downstream cyclone unit 103** because **upper casing 14** houses **downstream cyclone unit 103** in the combined configuration.

4. **Soler In Combination With Liddell Renders Obvious Claim [3]**

Reference Number	Claim Limitation
[3]	“The hand carriable surface cleaning apparatus of claim 1, wherein the upper end of the second cyclonic cleaning stage overlies the entire upper end of the first cyclonic cleaning stage.”

405. In my opinion, Soler in combination with Liddell teaches the hand carriable surface cleaning apparatus of claim 1 and further teaches the upper end of the second cyclonic cleaning stage overlies the entire upper end of the first cyclonic cleaning stage.

406. In my opinion, Soler in combination with Liddell teaches that the upper end of the second cyclonic cleaning stage (Liddell’s **downstream cyclone unit 103**) overlies the entire upper end of the first cyclonic cleaning stage (Soler’s **first cyclone chamber 62**), as shown below.



Ex1008, Fig. 1(modified).

407. Like Liddell alone, when Soler and Liddell are combined, the upper surface of Liddell's **downstream cyclone unit 103** is an upper end of the second cyclonic cleaning stage that completely overlies the top of **first cyclone chamber 62**, such that **first cyclone chamber 62** is completely covered when viewed from above.
408. To the extent PO argues Liddell's **downstream cyclone unit 103** does not meet this limitation, in my opinion, it would have been obvious to modify Liddell's **downstream cyclone unit 103** so that it does for the same reasons I provided in Ground 2. *See* Ground 2, Limitation [3].

5. Soler In Combination With Liddell Renders Obvious Claim [4]

Reference Number	Claim Limitation
[4]	"The hand carriable surface cleaning apparatus of claim 1, wherein the second cyclonic cleaning stage is moveable relative to the sidewall while the bottom door is open."

409. In my opinion, Soler in combination with Liddell teaches the hand carriable surface cleaning apparatus of claim 1 and further teaches the second cyclonic cleaning stage is moveable relative to the sidewall while the bottom door is open.
410. In my opinion, Soler in combination with Liddell teaches the second cyclonic cleaning stage (**downstream cyclone unit 103**) is moveable relative to the sidewall (**lower casing 16**) while the bottom door (**base 108**)

is open.

411. As I explained in Ground 1, Liddell teaches means for releasing **cylindrical bin 106** from **downstream cyclone unit 103** such that **downstream cyclone unit 103** is longitudinally movable relative to **cylindrical bin 106** while Liddell's **base 108** is open. *See* Ground 1, Limitations [1c]/[12c][13c], Limitations [1b]/[12b][13b], Limitation [4]. The combination of Soler and Liddell has the same components for performing this function, including Liddell's **base 108**, **upper portion 120** (and associated mechanism for opening **base 108**), **handle 116**, and **catch 118** on **downstream cyclone unit 103**. *See id.*; Ground 9, Motivation to Combine.

412. Therefore, in my opinion, the combination of Soler and Liddell teaches this limitation for the same reason that Liddell teaches this limitation.

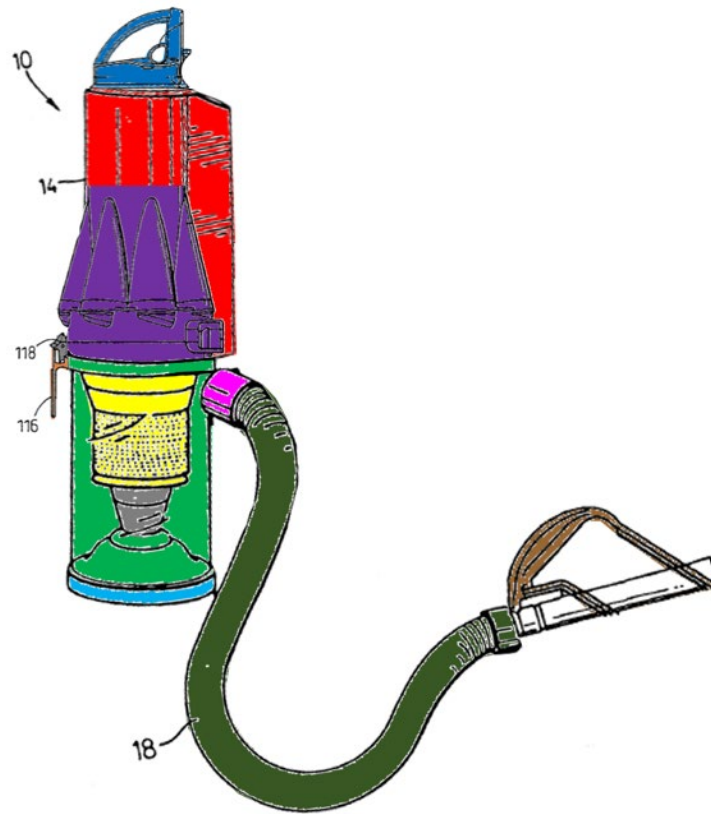
6. Soler In Combination With Liddell Renders Obvious Claim [6]

Reference Number	Claim Limitation
[6]	"The hand carriable surface cleaning apparatus of claim 1, wherein each second cyclone comprises a respective cyclone axis about which air circulates within the second cyclone, wherein the cyclone axes are generally longitudinal."

413. In my opinion, Soler in combination with Liddell teaches the hand carriable surface cleaning apparatus of claim 1 and further teaches each

second cyclone comprises a respective cyclone axis about which air circulates within the second cyclone, wherein the cyclone axes are generally longitudinal.

414. In my opinion, Soler in combination with Liddell, as illustrated, has Liddell's **downstream cyclone unit 103** (containing downstream cyclones 104/204), which meets this claim:



Ex1008, Fig. 1(modified).

415. Liddell's **downstream cyclone unit 103**, when combined with Soler, satisfies this limitation for the same reason it satisfies this limitation when considered alone. *See* Ground 1, Limitation [6].

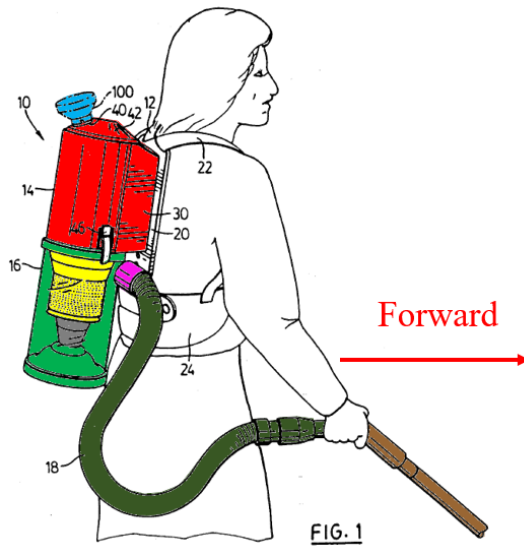
7. **Soler In Combination With Liddell Renders Obvious Claim [7]**

Reference Number	Claim Limitation
[7]	“The hand carriable surface cleaning apparatus of claim 1, wherein the dirty air inlet comprises a conduit extending forwardly from the first cyclonic cleaning stage, and wherein the second cyclonic cleaning stage is longitudinally moveable relative to the conduit.”

416. In my opinion, Soler in combination with Liddell teaches the hand carriable surface cleaning apparatus of claim 1 and further teaches the dirty air inlet comprises a conduit extending forwardly from the first cyclonic cleaning stage and the second cyclonic cleaning stage is longitudinally moveable relative to the conduit.

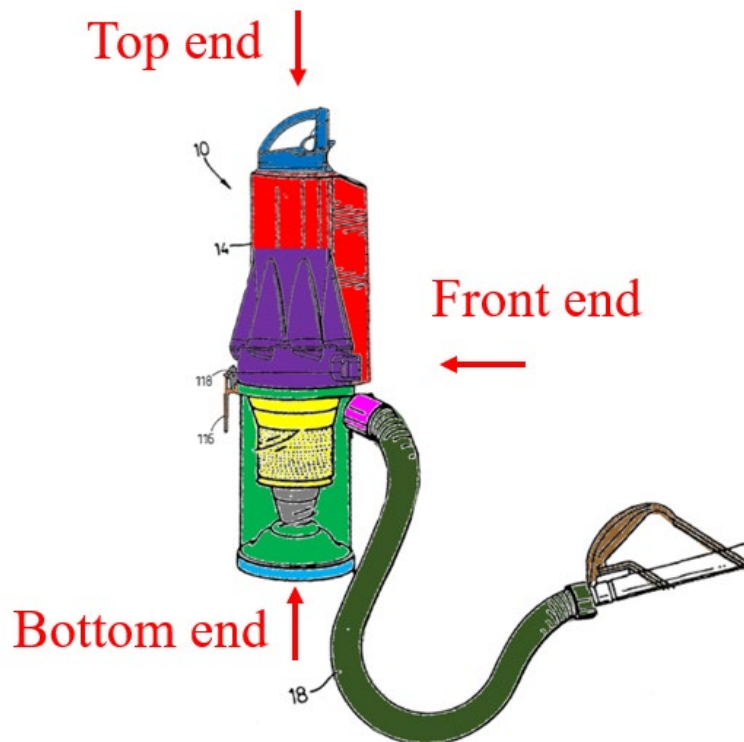
417. In my opinion, Soler in combination with Liddell teaches the dirty air inlet (**air entry port 56** and **hose assembly 18**) has a conduit (airways formed by **air entry port 56** and **hose assembly 18**) extending forwardly from the first cyclonic cleaning stage (**first cyclone chamber 62**), and wherein the second cyclonic cleaning stage (Liddell’s **downstream cyclone unit 103**) is longitudinally moveable relative to the conduit.

418. Soler’s Fig. 1 shows the operator extending **entry port 56** and **hose assembly 18** forwardly from the **first cyclone chamber 62**:



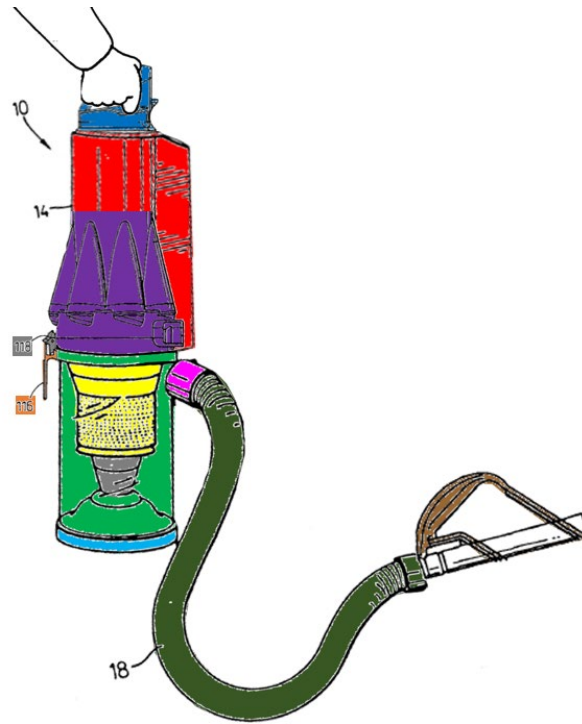
Ex1008, Fig. 1.

419. In my opinion, Soler in combination with Liddell has a cylindrical shape and has a top end, a bottom end, and a front end in between, as shown below:



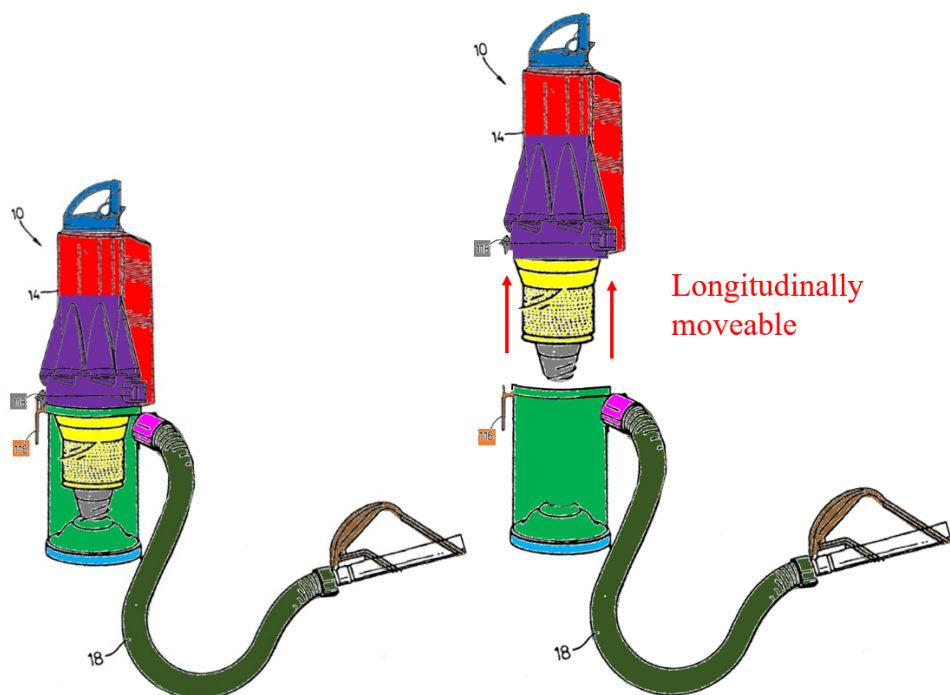
Ex1008, Fig. 1(modified).

420. In my opinion, a POSA would understand that the side extending from the top to the bottom is the front end of the vacuum because it is the side air enters the vacuum, the side with which a user primarily interacts, and the side that faces a surface to be cleaned. The airways formed by **entry port 56** and **hose assembly 18** extend from this front end and thus extend forwardly from the vacuum. *Id.*
421. To the extent PO argues this is not “extending forwardly,” in my opinion, a POSA would understand that, in operation, **entry port 56** and **hose assembly 18** are manipulated in variety of orientations as different surfaces are cleaned, including forwardly from the **first cyclone chamber 62**.
422. Further, when the vacuum is held by Liddell’s **handle 122**, as illustrated below, in my opinion, a POSA would have been motivated to design the vacuum such that **entry port 56** and **hose assembly 18** point in the direction of the surface being cleaned because doing so would have been ergonomic, with both handles oriented in the same direction.



Ex1008, Fig. 1(modified).

423. Further, in my opinion, when combined, Liddell's **downstream cyclone unit 103** is longitudinally moveable relative to the conduit extending through Soler's **hose 18** to **air entry port 56**, as shown:



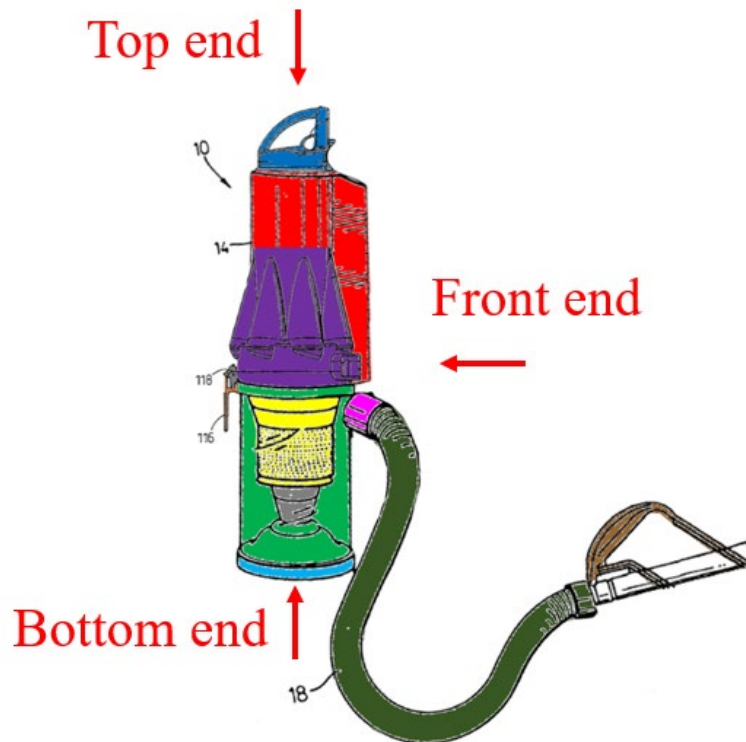
Ex1008, Fig. 1(modified); *see also* Ground 9, Limitations [1c]/[12c]/[13c].

8. Soler In Combination With Liddell Renders Obvious Claim [8]

Reference Number	Claim Limitation
[8]	“The hand carriable surface cleaning apparatus of claim 7, wherein the dirty air inlet is located at a front end of the hand carriable surface cleaning apparatus and the upper end of the second cyclonic cleaning stage is located above the dirty air inlet.”

424. In my opinion, Soler in combination with Liddell teaches the hand carriable surface cleaning apparatus of claim 7 and further teaches the dirty air inlet is located at a front end of the hand carriable surface cleaning apparatus and the upper end of the second cyclonic cleaning stage is located above the dirty air inlet.

425. In my opinion, Soler in combination with Liddell teaches the dirty air inlet (air entry port 56 and hose assembly 18) is located at a front end of the hand carriable surface cleaning apparatus (vacuum cleaner 10) and the upper end of the second cyclonic cleaning stage (Liddell's downstream cyclone unit 103) is located above the dirty air inlet.
426. In my opinion, the combination of Soler and Liddell has a cylindrical shape and has a top end, a bottom end, and a front end in between, as shown:



Ex1008, Fig. 1(modified).

427. In my opinion, a POSA would understand that the side extending from the top to the bottom is the “front end” of the vacuum because it is the side air enters the vacuum, the side with which a user primarily interacts, and the

side that faces a surface to be cleaned.

428. Further, when the vacuum is held by Liddell's **handle 122**, a POSA would have been motivated to design the vacuum such that **entry port 56** and **hose assembly 18** point in the direction of the surface being cleaned, as I described for claim 7.

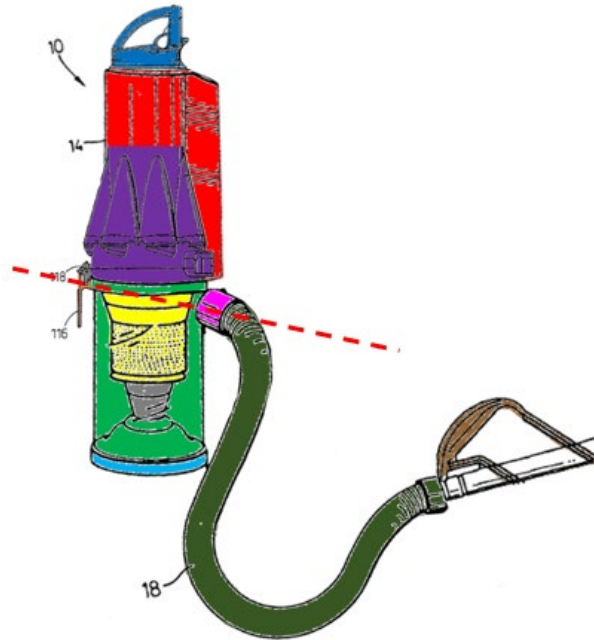
429. Further, in my opinion, when combined, the upper end of Liddell's **downstream cyclone unit 103** is located above **air entry port 56** and **hose assembly 18**, as shown in the illustration above.

9. **Soler In Combination With Liddell Renders Obvious Claim [9]**

Reference Number	Claim Limitation
[9]	"The hand carriable surface cleaning apparatus of claim 7, wherein the conduit defines an axis that intersects the first cyclonic cleaning stage."

430. In my opinion, Soler in combination with Liddell teaches the hand carriable surface cleaning apparatus of claim 7 and further teaches the conduit defines an axis that intersects the first cyclonic cleaning stage.

431. In my opinion, Soler in combination with Liddell teaches the dirty air inlet conduit (airways in **hose 18** and **air entry port 56**) defines an axis that intersects the first cyclonic cleaning stage (**first cyclone chamber 62**), as shown below:



Ex1008, 5:62-64, Fig. 1(modified); Ex1008, 5:62-64; *see also* Ground 9, Limitations [1a]/[12a]/[13a].

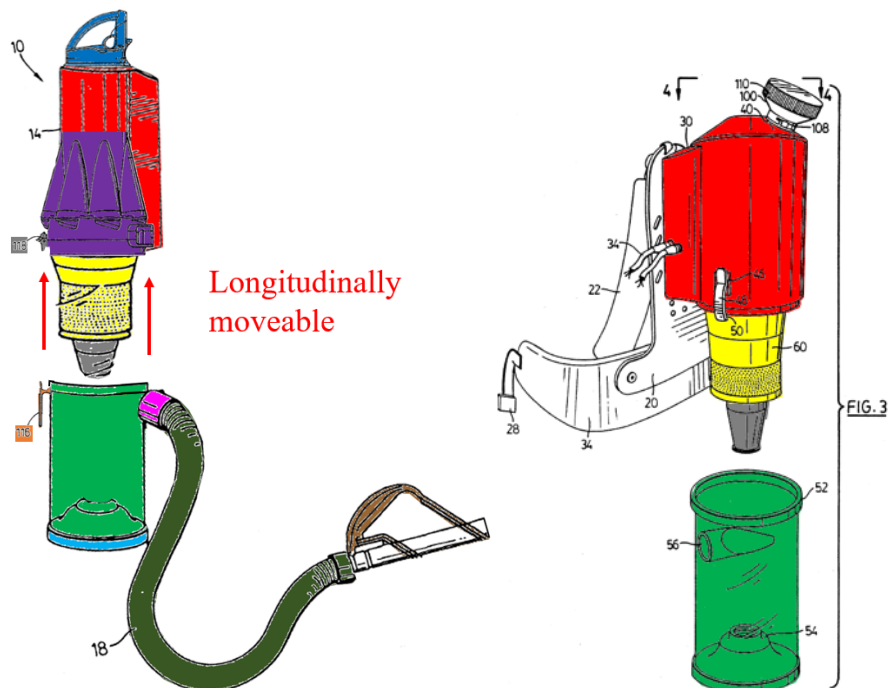
10. Soler In Combination With Liddell Renders Obvious Claim [11]

Reference Number	Claim Limitation
[11]	“The hand carriable surface cleaning apparatus of claim 1, wherein the second cyclonic cleaning stage is removable from the first cyclonic cleaning stage.”

432. In my opinion, Soler in combination with Liddell teaches the hand carriable surface cleaning apparatus of claim 1 and further teaches the second cyclonic cleaning stage is removable from the first cyclonic cleaning stage.

433. In my opinion, Soler in combination with Liddell teaches that the second cyclonic cleaning stage (Liddell’s **downstream cyclone unit 103**, which

is integrated with **upper casing 14**) is removable from the first cyclonic cleaning stage (**first cyclone chamber 62**, which is within **lower casing 16**). See Ground 9, Limitations [1c]/[12c]/[13c].; Ex1008, 5:46-48 (“Lower casing 16 is releasably mounted on **upper casing 14**.”)



Ex1008, Figs. 1(modified), 3.

J. Ground 10: The Soler, Liddell, And Organ Combination Renders Obvious Claims 4-5

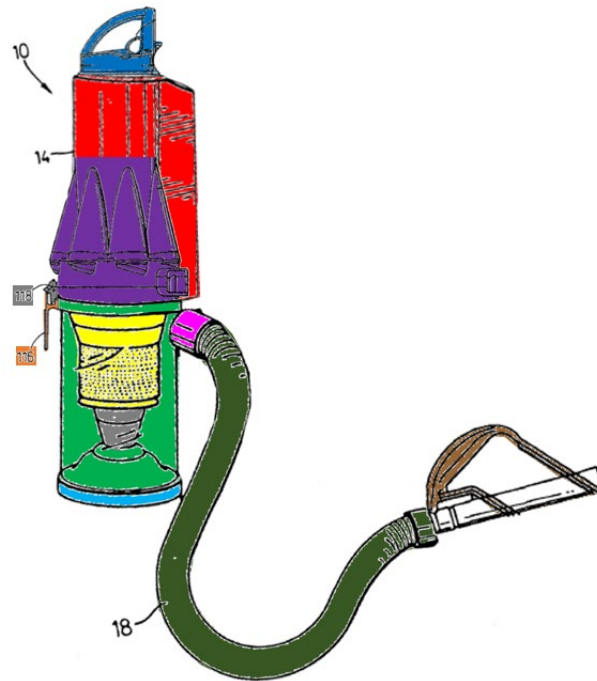
1. Motivation to Combine

434. To the extent PO argues that Soler in combination with Liddell does not teach the ability to move a second cyclonic cleaning stage while a bottom door on a first cyclonic cleaning stage is open, it is my opinion that Organ teaches this limitation, and a POSA would have been motivated to combine

Organ's teachings with Soler and Liddell.

435. Further, in my opinion, Organ teaches a pre-motor filter chamber that a POSA would have been motivated to add to the combination of Soler and Liddell.

436. The combination of Soler and Liddell, as illustrated, has Liddell's openable **base 108** and associated mechanism as well as Liddell's **handle 116** and catch **118**:



Ex1008, Fig. 1(modified).

437. In my opinion, a POSA would have been motivated to combine Organ's ability to move a second cyclonic cleaning stage relative to a first stage while a bottom door is open with Soler and Liddell for the same reasons a

POSA would have been motivated to add this feature to Liddell alone because the combination of Soler and Liddell uses the same components to release **lower casing 16** and open **base 108** as Liddell alone. *See* Ground 1, Limitation [4], Motivation to Combine.

438. Similarly, in my opinion, a POSA would have been motivated to incorporate Organ's pre-motor filter chamber between Liddell's downstream cyclone unit 103 and Soler's motor 18 for the same reason a POSA would be motivated to combine this feature with Liddell alone. *See* Ground 1, Limitation [5], Motivation to Combine.

2. Soler In Combination With Liddell And Organ Renders Obvious Claim [4]

Reference Number	Claim Limitation
[4]	"The hand carryable surface cleaning apparatus of claim 1, wherein the second cyclonic cleaning stage is moveable relative to the sidewall while the bottom door is open."

439. In my opinion, Soler in combination with Liddell teaches the hand carryable surface cleaning apparatus of claim 1 and Soler in combination with Liddell and Organ further teaches the second cyclonic cleaning stage is moveable relative to the sidewall while the bottom door is open.

440. In my opinion, the combination of Soler, Liddell, Organ has a second cyclonic cleaning stage (Liddell's **downstream cyclone unit 103**) that is moveable relative to the sidewall (**lower casing 16**) while the bottom door

(base 108) is open. See Ground 2, Limitation [4].

3. **Soler In Combination With Liddell And Organ Renders Obvious Claim [5]**

Reference Number	Claim Limitation
[5]	“The hand carriable surface cleaning apparatus of claim 1, further comprising a pre-motor filter chamber positioned in the fluid flow path between the second cyclonic cleaning stage and the suction motor, and wherein each second cyclone has a respective air outlet that is in fluid communication with the pre-motor filter chamber.”

441. In my opinion, Soler in combination with Liddell teaches the hand carriable surface cleaning apparatus of claim 1 and Soler in combination with Liddell and Organ further teaches a pre-motor filter chamber positioned in the fluid flow path between the second cyclonic cleaning stage and the suction motor, and wherein each second cyclone has a respective air outlet that is in fluid communication with the pre-motor filter chamber.

442. In my opinion, the combination of Soler, Liddell, Organ teaches a pre-motor filter chamber (chamber housing Organ’s pre-motor filter) positioned in the fluid flow path between the second cyclonic cleaning stage (Liddell’s downstream cyclone unit 103) and the suction motor (Soler’s motor 18), and wherein each second cyclone (Liddell’s downstream cyclones 104/204) has a respective air outlet that is in fluid communication with the pre-motor filter chamber. See Ground 2,

Limitation [5]; Ground 9, Limitations [1a]/[12a]/[13a].

K. Ground 11: The Soler, Liddell, And Lim Combination Renders Obvious Claim 14

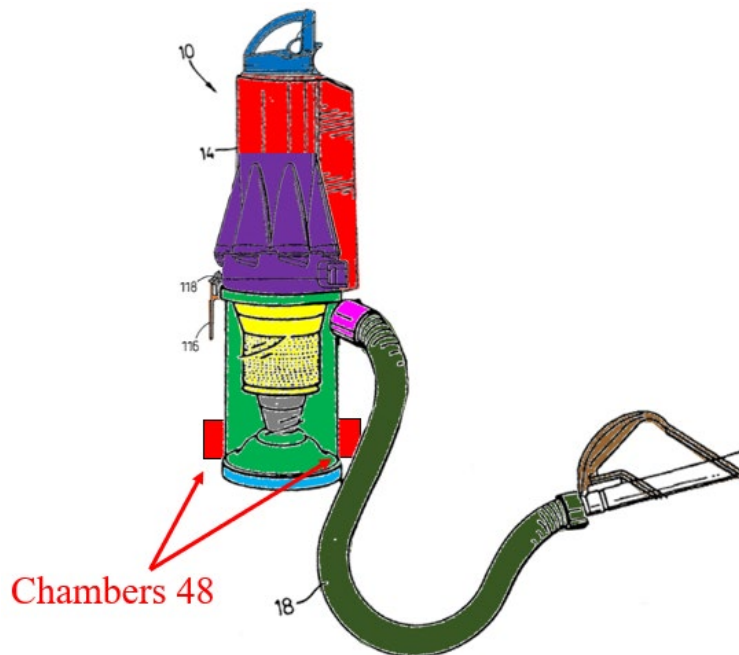
Reference Number	Claim Limitation
[14pre]	“A hand carriable surface cleaning apparatus comprising:”
[14a]	“a fluid flow path extending between a dirty air inlet and a clean air outlet;”
[14b]	“a first cyclonic cleaning stage positioned in the fluid flow path downstream from the dirty air inlet, the first cyclonic cleaning stage comprising an upper end, a bottom end spaced longitudinally below the upper end and a side wall extending therebetween, the first cyclonic cleaning stage having a dirt collection region with a bottom door that is openable to empty the dirt collection region;”
[14c]	“a second cyclonic cleaning stage positioned in the fluid flow path downstream from the first cyclonic cleaning stage, the second cyclonic cleaning stage having an upper end which is positioned above the upper end of the first cyclonic cleaning stage, the second cyclonic cleaning stage is longitudinally moveable relative to all of the sidewall of the first cyclonic cleaning stage;”
[14d]	“a suction motor positioned in the fluid flow path downstream from the second cyclonic cleaning stage; and,”
[14e]	“a handle;”
[14f]	“wherein the first cyclonic cleaning stage comprises a first cyclone chamber and a first dirt collection chamber that comprises the dirt collection region and is external to the first cyclone chamber.”

443. In my opinion, Soler in combination with Liddell teaches all limitations of claim 14 except limitation [14f]. *See* Ground 9.

444. Lim teaches the “dirt collection chamber” of limitations [14b] and [14f] and, in my opinion, a POSA would have been motivated to combine Lim’s external “dirt collection chamber” with Soler and Liddell for the same reasons that a POSA would have been motivated to combine it with

Liddell's upstream cyclone unit 101. *See* Ground 4.

445. In my opinion, the combination of Soler, Liddell, and Lim teaches a first cyclonic cleaning stage (Soler's **first cyclone chamber 62**) having a first cyclone chamber and a first dirt collection chamber (Lim's **chambers 48**) that has a dirt collection region and is external to the first cyclone chamber, as illustrated below:



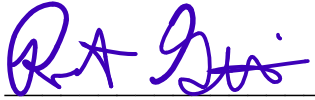
Ex1008, Fig. 1(modified).

XI. SECONDARY CONSIDERATIONS OF NON-OBVIOUSNESS

446. I am unaware of any secondary considerations of non-obviousness that provide evidence that the claims of the '607Patent are not obvious. To the contrary, PO admits that no licensed patent-practicing product has ever been sold (Related Litigation Dkt. 58 ¶107; Dkt. 93 at 18). To the extent

PO argues there are secondary considerations of non-obviousness, I reserve the right to respond.

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. I declare under penalty of perjury that the foregoing is true and correct.

Signature: 
Dr. Robert Giachetti

Dated: 3/25/24