

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. 9,301,666

TABLE OF CONTENTS

	Page
I. INTRODUCTION	1
II. BACKGROUND AND QUALIFICATIONS	2
III. DOCUMENTS AND MATERIALS CONSIDERED	10
IV. LEGAL PRINCIPLES.....	11
V. PERSON OF ORDINARY SKILL IN THE ART	14
VI. TECHNOLOGY BACKGROUND.....	15
VII. BACKGROUND OF THE '666PATENT	20
A. Summary of the '666Patent's Specification.....	20
B. Prosecution History of the '666Patent	21
C. Priority Date of the Challenged Claims	22
VIII. BACKGROUND OF THE PRIOR ART	23
A. Schmidt.....	23
B. Liddell.....	23
C. Fester256	24
1. Fester256 Is 102(e) Prior Art As Of April 30, 2004.....	26
D. Lehmann.....	33
E. Fester336	33
1. Fester336 is 102(e) Art As Of Its Provisional Date.....	34
F. Jung.....	39
IX. CLAIM CONSTRUCTION	40
X. INVALIDITY OPINIONS: '666PATENT	40

TABLE OF CONTENTS (CONT'D)

	Page
A. Ground 1: Schmidt, Liddell, and Fester256 Combination Renders Claims 1-13 Obvious.....	41
1. A POSA Would Have Been Motivated to Combine Schmidt, Liddell, and Fester256	41
2. Schmidt, Liddell, and Fester256 Render Claim 1 Obvious	66
3. Schmidt, Liddell, and Fester256 Render Claim 2 Obvious	93
4. Schmidt, Liddell, and Fester256 Render Claim 3 Obvious	95
5. Schmidt, Liddell, and Fester256 Render Claim 4 Obvious	98
6. Schmidt, Liddell, and Fester256 Render Claim 5 Obvious	100
7. Schmidt, Liddell, and Fester256 Render Claim 6 Obvious	103
8. Schmidt, Liddell, and Fester256 Render Claim 7 Obvious	105
9. Schmidt, Liddell, and Fester256 Render Claim 8 Obvious	107
10. Schmidt, Liddell, and Fester256 Render Claim 9 Obvious	111
11. Schmidt, Liddell, and Fester256 Render Claim 10 Obvious	115
12. Schmidt, Liddell, and Fester256 Render Claim 11 Obvious	116
13. Schmidt, Liddell, and Fester256 Render Claim 12 Obvious	119
14. Schmidt, Liddell, and Fester256 Render Claim 13 Obvious	121
B. Ground 2: Lehmann in Combination with Fester336 and Jung Render Claims 1-13 Obvious	123
1. A POSA Would Have Been Motivated to Combine Lehmann, Fester336, and Jung	123
2. Lehmann, Fester336, and Jung Render Claim 1 Obvious	135

TABLE OF CONTENTS (CONT'D)

	Page
3. Lehmann, Fester336, and Jung Render Claim 2 Obvious	162
4. Lehmann, Fester336, and Jung Render Claim 3 Obvious	164
5. Lehmann, Fester336, and Jung Render Claim 4 Obvious	166
6. Lehmann, Fester336, and Jung Render Claim 5 Obvious	167
7. Lehmann, Fester336, and Jung Render Claim 6 Obvious	171
8. Lehmann, Fester336, and Jung Render Claim 7 Obvious	173
9. Lehmann, Fester336, and Jung Render Claim 8 Obvious	174
10. Lehmann, Fester336, and Jung Render Claim 9 Obvious	176
11. Lehmann, Fester336, and Jung Render Claim 10 Obvious	177
12. Lehmann, Fester336, and Jung Render Claim 11 Obvious	177
13. Lehmann, Fester336, and Jung Render Claim 12 Obvious	179
14. Lehmann, Fester336, and Jung Render Claim 13 Obvious	180
XI. SECONDARY CONSIDERATIONS OF NON-OBVIOUSNESS	182

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 that Dyson is challenging the validity of claims 1-13 of U.S. Patent No. 9,301,666 (the “’666Patent”) 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 an employee of Fusion Engineering, LLC. Fusion 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:
 - German Patent 357279C (“DESchmidt,” attached as Ex1021) and its Certified English Translation (“Schmidt,” attached as Ex1007)
 - U.K. Patent Pub. GB2,399,780A (“Liddell,” attached as Ex1005)
 - U.S. Patent No. 7,770,256 (“Fester256,” attached as Ex1012)
 - U.K. Patent Pub. GB194963A (“Lehmann,” attached as Ex1011)
 - U.S. Patent No. 7,547,336 (“Fester336,” attached as Ex1010)

- U.S. Patent Pub. US2005/0198770 (“Jung,” attached as Ex1008)
6. In my opinion, the Challenged Claims are invalid based on the following:
- The combination of Schmidt, Liddell, and Fester256 renders claims 1-13 obvious.
 - The combination of Lehmann, Fester336, and Jung renders claims 1-13 obvious.

II. BACKGROUND AND QUALIFICATIONS

7. I am a Licensed Professional Engineer in Illinois and Oklahoma, with over 20 years of experience in mechanical engineering. My experience in machinery and mechanisms spans numerous industries; I have worked directly designing mechanical systems and machinery, and I have consulted on the operation of machinery in various fields, including consumer products, commercial products, and industrial products.
8. I am employed by Fusion Engineering, LLC, where I have worked since November of 2020. Fusion is an engineering firm that provides multidisciplinary engineering consulting services.
9. I am currently the Senior Vice President at Fusion. In this role, I am responsible for providing engineering consulting services in

mechanical engineering, coordinating client outreach, coordinating marketing materials, and recruiting.

10. I am currently a Member of ASTM (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, which is not a geometrical description, rather a description of the flow pathway, that pressurized two groups of manifolds using computer-controlled valves

in series to pressurize and de-pressurize expandable garden hoses. Developing this system involved, among other things, selecting the appropriate fluid power components and optimizing fluid flow paths.

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

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

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

III. DOCUMENTS AND MATERIALS CONSIDERED

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

below.

31. In preparing this Declaration, I have reviewed the '666Patent and its file history, as well as the Schmidt, Liddell, Fester256, Lehmann, Fester336, and Jung prior art references on which my opinions are based. Other references and documents that I have reviewed are mentioned below and listed in the List of Exhibits included with the Petition. These references and documents reflect the state of the relevant art at the time of the alleged invention and the background knowledge of a POSA.
32. I have also reviewed the Patent Owner ("PO")'s infringement 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 have applied these understandings in my analysis as detailed below. I am not an attorney and offer no legal opinions.
34. I have been informed and understand that a patent claim is invalid if it is obvious, and that obviousness requires that the claim be obvious from the perspective of a person of ordinary skill in the relevant art at the time of the alleged invention. I have been informed and understand that

a claim may be obvious in view of a single prior art reference, or may be obvious in view of a combination of two or more prior art references.

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

doing so; (3) whether the claimed elements represent one of a limited number of known design choices, and would have a reasonable expectation of success by those skilled in the art; (4) whether a person of ordinary skill would have recognized a reason to combine known elements in the manner described in the claim; (5) whether there is some teaching or suggestion in the prior art to make the modification or combination of elements claimed in the patent; and (6) whether the innovation applies a known technique that had been used to improve a similar device or method in a similar way.

38. I further have been informed and understand that while it may be helpful to identify a reason for this combination, common sense should guide and no rigid requirement of finding a teaching, suggestion, or motivation to combine is required.
39. I further have been informed and understand that certain factors called secondary considerations may be considered in evaluating the obviousness of a claim. I understand that such secondary considerations include, among other things, commercial success of the alleged invention, skepticism of those having ordinary skill in the art at the time of the alleged invention, unexpected results of the alleged invention, any long-felt but unsolved need in the art that was satisfied by the

alleged invention, the failure of others to make the alleged invention, praise of the alleged invention by those having ordinary skill in the art, and copying of the alleged invention by others in the field. I have been informed and understand that there must be a nexus—a connection—between any such secondary considerations and the alleged invention. I also have been informed and understand that contemporaneous and independent invention by others is a secondary consideration tending to show obviousness.

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

V. PERSON OF ORDINARY SKILL IN THE ART

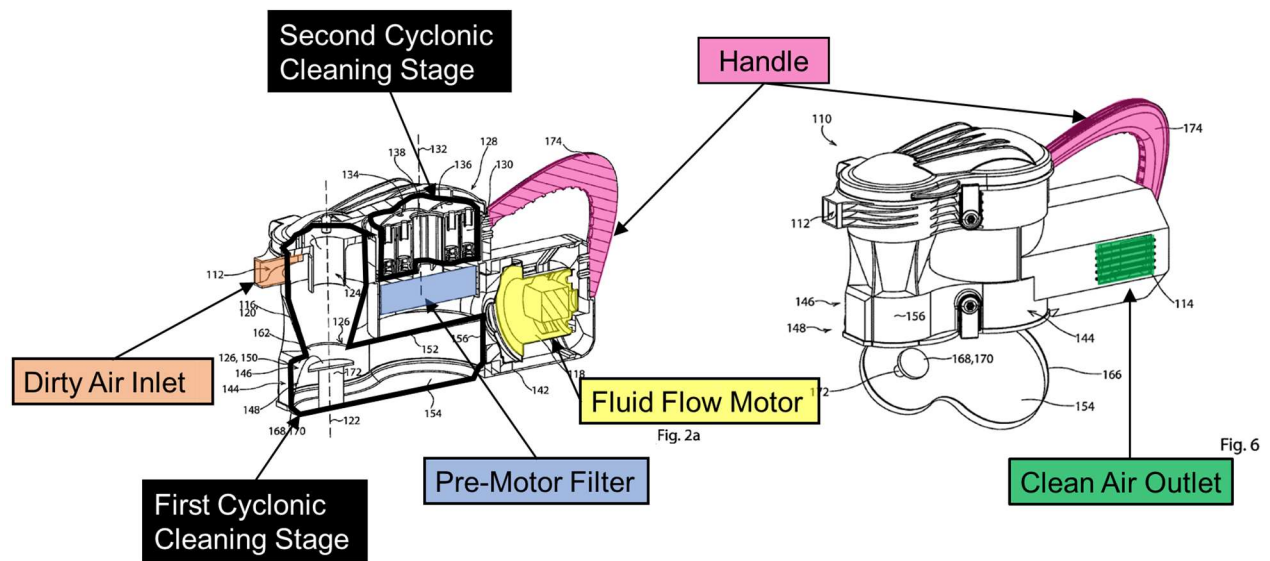
41. In my opinion, a Person of Ordinary Skill in the Art ("POSA") in the subject matter of the '666Patent would have had a bachelor's degree in

mechanical engineering or a similar field and 2-3 years of experience in machine design, including machines that include fluid dynamics or fluid paths, such as vacuum cleaners. Additional education could offset less experience and vice versa, and a POSA could have also obtained similar knowledge and experience through other means.

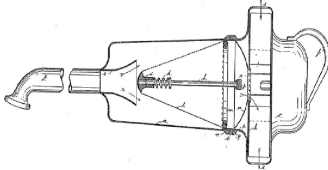
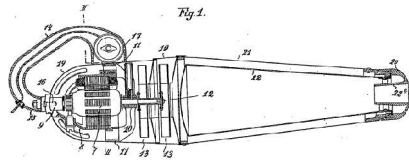
42. I have been a POSA since at least 2003. The opinions I am offering are from the perspective of a POSA at the time of the alleged invention. For the purposes of my opinions below, I have been asked to assume that the time of the alleged invention is the relevant priority date for the Challenged Claims, which I understand to be December 12, 2006.

VI. TECHNOLOGY BACKGROUND

43. The Challenged Claims are directed to hand vacuum cleaners with features such as a dirt collection region with an openable bottom and multi-cyclonic cleaning stages. *See* Ex1001, Claims.
44. The '666Patent explains that the hand vacuum includes an assortment of vacuum cleaner features such as an air inlet and outlet, two cyclonic cleaning stages, a pre-motor filter, a motor, and a handle arranged in a particular configuration according to how three “axes” intersect or extend through other components.



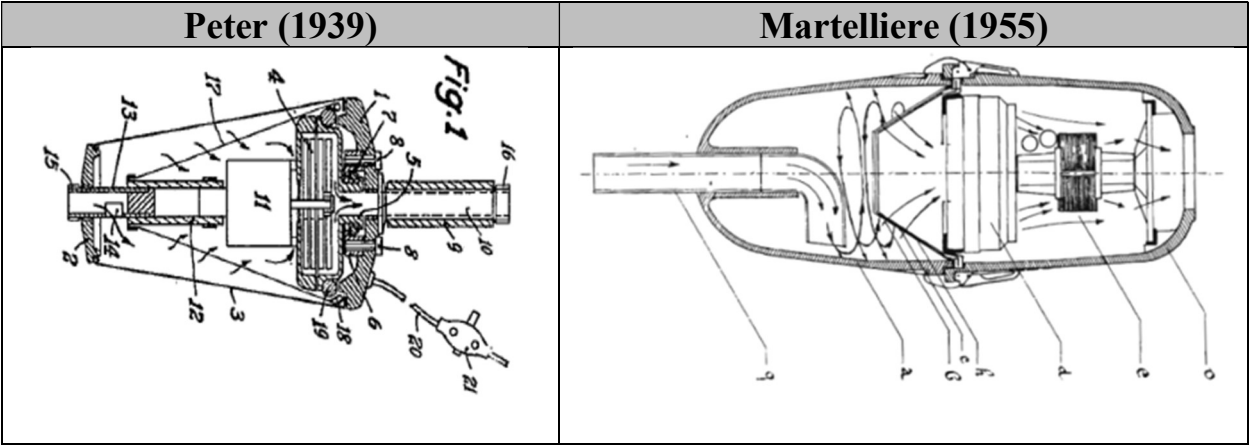
45. In my opinion, these features and their arrangement were well-known, as were the '666Patent's claims' remaining elements.
46. For decades, vacuum cleaners have been using the features described in the '666Patent, such as a fluid flow motor that draws dirty air into a dirty air inlet, cyclonic and media filtration processes that clean the air, and dirty air outlets that exhaust the clean air. Many early vacuum cleaners, such as the vacuum cleaner described in German Patent No. 357279C to Schmidt and U.K. Patent Application GB194963A to Lehmann used filters or dust bags to separate dust from the air, as shown in the figures below.

<u>Schmidt</u>	<u>Lehmann</u>
	

Ex1007, Fig. 1, 1 (“The air flow enters the chamber through the suction pipe *d* and strike centrally against tip of the filter cone *l*, flowing evenly along its conical surfaces.”); Ex1011, Fig. 1, (“The handle, motor, and far are thus combined to form a structure which supports the casing 19 of the appliance, which has a cap 20 at the end of a tapering part 21 enclosing the dust bag 22.”).

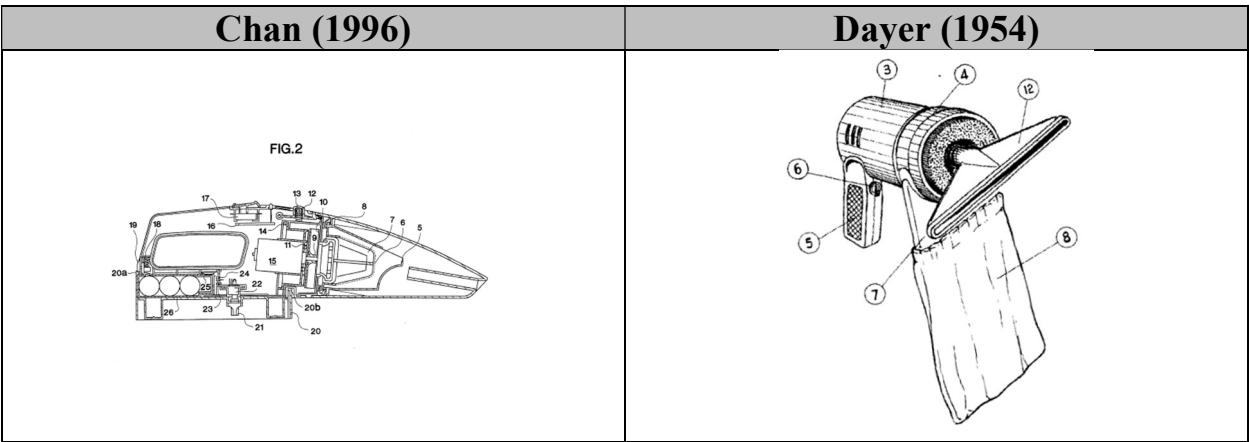
47. Those skilled in the art recognized that this dust-bag or filter dust separator is costly (dust bags and filters must be replaced), loses effectiveness during use (dust-bag and filter vacuums lose suction as they fill), and the dust-bag or filter dust separator prevents the user from seeing how full the bag or filter is, leaving a user to guess when to empty or replace them. However, those skilled in the art also recognized more almost a century ago, that vacuum cleaners that use cyclonic dust separation units—which use cyclonic airflow to separate heavier-than-air dust particles from the dirty air—have advantages over dust bag and filter dust separator elements, as was taught by Swiss Patent No. CH203,675 to Peter in 1939, and French Patent No. 1,094,603 to

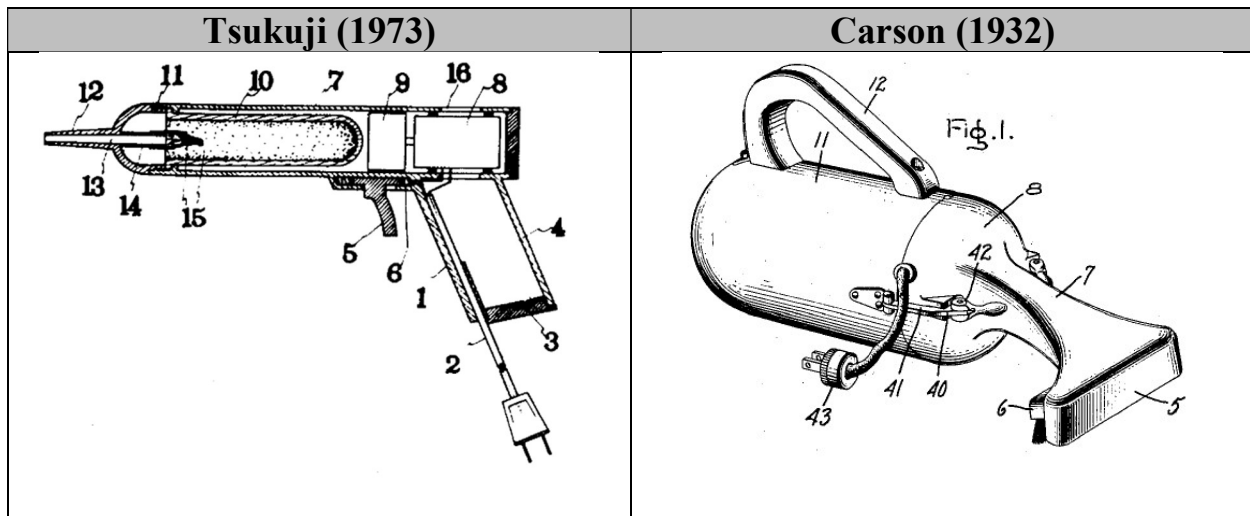
Martelliere in 1955, as shown in the figures below.



Ex1031, Fig. 1; Ex1018, 2.

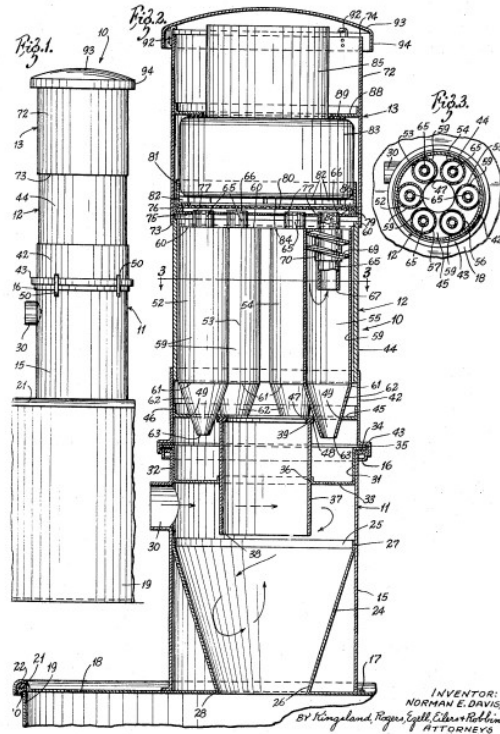
48. Further, vacuum cleaners having features that assist with maneuverability and usability, such as an upwardly extending handle, have also been known in the art for nearly a century, including as taught by U.S. Patent No. 5,504,412 to Chan, Spanish Patent No. ES43816 to Dayer in 1954, Japanese Patent Publication No. JPS48107459U to Tsukuji in 1973, and U.S. Patent No. 1,861,261 to Carson et al. in 1992, as shown in the figures below:





Ex1013, Fig. 2; Ex1014, Fig., 1 (“[T]he casing (3) has a pistol grip (5)”); Ex1027, Fig. 1.; Ex1029, Fig. 1, 1:42-45 (“To the enclosure is rigidly attached a handle 12, usually of wood to reduce the weight, by any suitable means.”).

49. Further, vacuum cleaners having multistage cyclonic cleaning systems with a first stage having a single cyclone and the second stage having a plurality of cyclones have also been known in the art for decades, including as taught by U.S. Patent No. 3,425,192 granted to Davis in 1966:



Ex1030, Figs. 1-3.

VII. BACKGROUND OF THE '666PATENT

50. The '666Patent is titled "Surface cleaning apparatus." Ex1001, Title. The '666Patent states that it issued on April 5, 2016 from U.S. Patent Application No. 14/489,646, which was filed on September 18, 2014. Ex1001, Cover. The '666Patent also states that it claims priority, through multiple applications, to provisional application Nos. 60/893,990 and 60/894,005, which were filed on March 9, 2007, and provisional application No. 60/869,586, which was filed on December 12, 2006. *Id.* at Related U.S. Application Data.

A. Summary of the '666Patent's Specification

51. The '666Patent states that it “relates to surface cleaning apparatuses, which have a dirt bin having an off-centre inlet.” Ex1001, 1:18-20.
52. The '666Patent's large specification identifies the purported advantages of hand vacuum cleaners with a dirt chamber inlet that is “off centre”:

Further, by positioning the inlet off centre, the part of the dirt chamber distal to the inlet is more isolated from any fluid flow effects at the dirt inlet, thereby enhancing dirt retention in the dirt chamber.

Ex1001, 2:9-12.

53. However, the '666Patent's claims do not claim an off-centre inlet. Rather, it claims other vacuum configurations and features, such as a dirt collection region with an openable bottom and multi-cyclonic cleaning stages. Ex.1001, Claims.
54. I have reviewed the '666Patent's specification and these features do not purport to solve a technical problem.

B. Prosecution History of the '666Patent

55. I have reviewed the prosecution history of the '666Patent. The following is my understanding.
56. The prosecution of the '666Patent lasted over a year. The prosecution of the '666Patent included over 100 references. *See generally* Ex1004

at References Cited. The Examiner found that “none of the prior art is considered to make obvious the specific configuration of the claimed invention.”

57. While two of the reference I rely upon, Fester336 and Fester256, were before the United States Patent and Trademark Office during prosecution, they were not substantively discussed or referenced by the Examiner. None of the other references I rely upon were before the United States Patent and Trademark Office during prosecution. Therefore, the Examiner was not presented with the reference combinations I rely upon.

C. Priority Date of the Challenged Claims

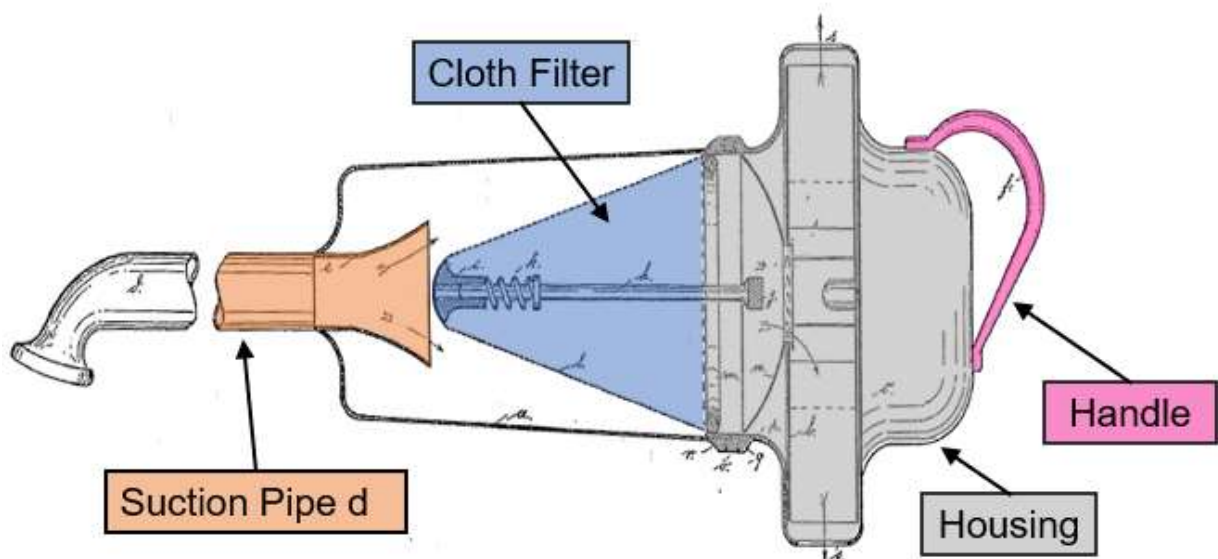
58. I understand that the priority date of a patent is used to judge whether a reference qualifies as prior art for the purposes of anticipation or obviousness. I understand that a patent may rely on the filing date of an earlier application for its priority date only if the earlier application discloses 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 12, 2006, for the Challenged Claims.

VIII. BACKGROUND OF THE PRIOR ART

A. Schmidt

59. Schmidt is a 1922 German patent titled “Vacuum cleaner.” Ex1007, Title, Cover. It generally describes a “vacuum cleaner” with a “filter” and “handle f” in the rear that extends upwardly and away from the motor positioned in the housing, and a “suction pipe d” with an axis that intersects the handle. Ex1007, 1:1-3, Fig. 1, 1:25-29, 1:56-59.

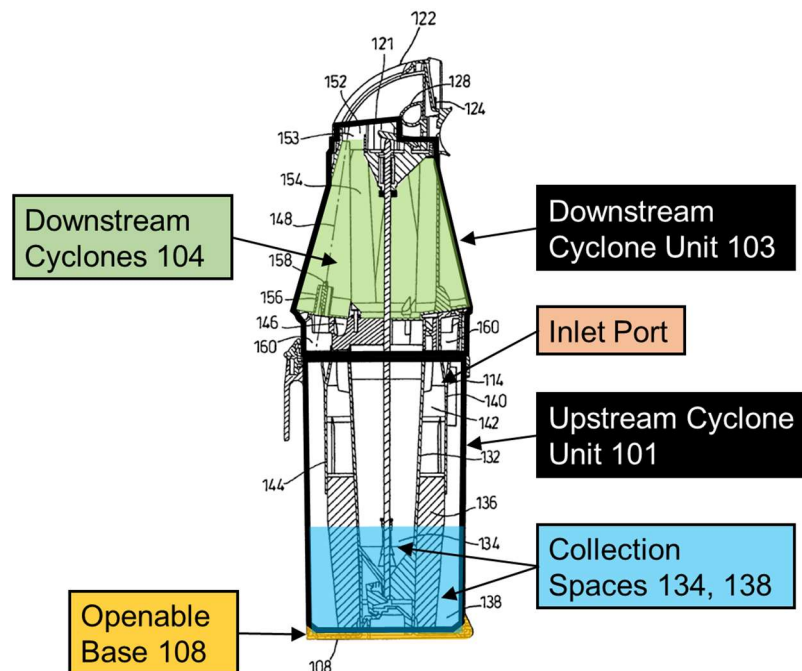


Ex1007, Fig. 1.

B. Liddell

60. Liddell is titled “Arrangement of cyclones for noise dampening.” Ex1005, Title. Liddell is a 2004 United Kingdom published patent application.

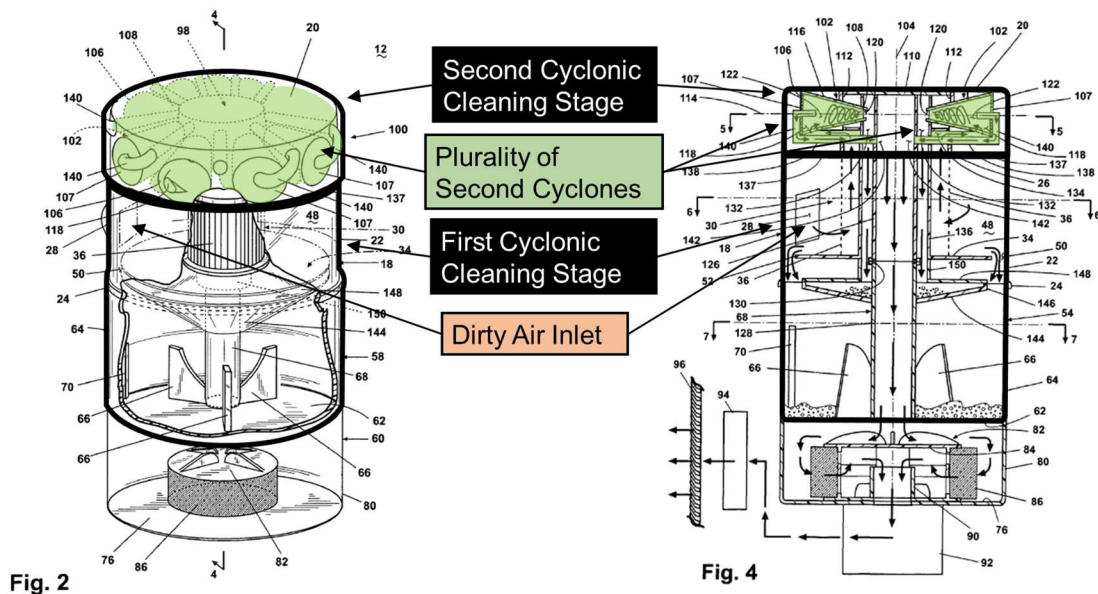
61. Liddell teaches a vacuum cleaner with a cyclonic separation system where the cyclonic separation unit has an “upstream cyclonic unit 101 consisting of a single upstream cyclone 102” stage and a “downstream cyclone unit 103 consisting of a plurality of downstream cyclones 104 arranged in parallel” stage. *Id.* 5:20-22. It also teaches that the cyclones 104 together with upper portion 120 define an axial passageway to the dust collection space 134. *Id.* 7:30-8:2. Liddell also teaches a vacuum cleaner that has a “mechanism for opening the base 108 of the cylindrical bin 106 for emptying purposes.” *Id.* 6:23-25. These features are shown in the annotated figure below:



Ex1005, Fig. 3b.

C. Fester256

62. Fester256 is titled “Vacuum Cleaner with Multiple Cyclonic Dirt Separators and Bottom Discharge Dirt Cup.” Ex1006, Title. Fester256 is a United States patent filed on April 29, 2005, that issued on August 10, 2010, and lists as Related U.S. Application Data a provisional patent application that was filed on April 30, 2004.
63. Fester256 teaches a vacuum cleaner with two cyclonic cleaning stages, where the second cyclonic cleaning stage includes a plurality of second cyclones as shown in annotated figures below. Ex1006, 2:43-3:21, 5:8-11, Figs. 2-5; Ex1012.

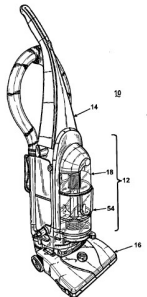


Ex1006, Figs. 2, 4.¹

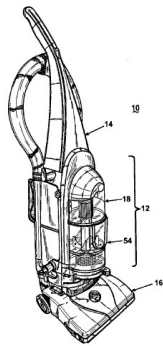
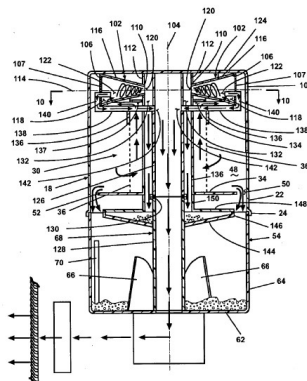
1. Fester256 Is 102(e) Prior Art As Of April 30, 2004

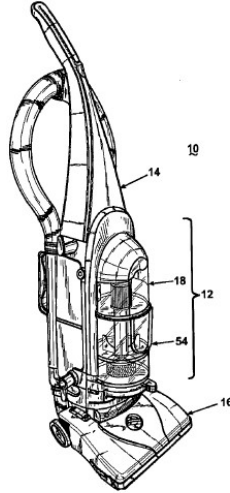
64. Fester256 is 102(e) prior art as of the Fester256 Provisional filing date, April 30, 2004, because in my opinion, the Fester256 Provisional provides written description support for: (1) the subject matter of at least one claim of Fester256 and (2) the subject matter Petitioners rely on in Fester256 to show the unpatentability of the Challenged Claims.

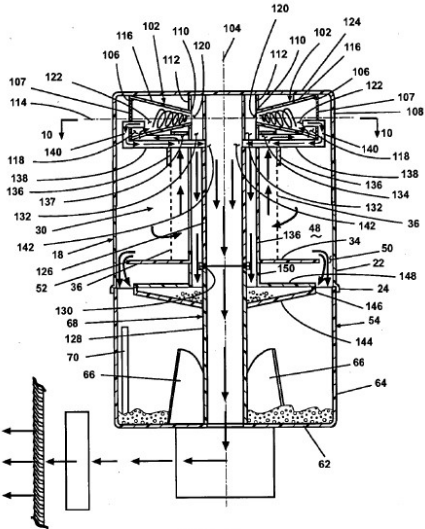
65. The Fester256 Provisional provides support for at least claim 1 of Fester256:

<u>Fester256 Claim 1</u>	<u>Exemplary Disclosures from Fester256 Provisional</u>
1[pre] A vacuum cleaner comprising:	Ex1012, Fig. 1.  Fig. 1

¹ All emphasis, and all coloring and annotations to figures, were added to the figures unless otherwise noted. Where a figure has been otherwise altered to illustrate Petitioners' argument, the citation to the figure is labeled as modified.

<u>Fester256 Claim 1</u>	<u>Exemplary Disclosures from Fester256 Provisional</u>
	“According to the invention, a vacuum cleaner comprises a housing defining a cyclonic airflow chamber for separating contaminants from a dirt-containing air stream and a cyclonic chamber inlet and an air stream outlet in fluid communication with said cyclonic airflow chamber.” <i>See</i> Ex1012, [0008]. <i>See also</i> Ex1012, [0001], [0008].
1[a] a housing defining a first cyclonic airflow chamber for separating contaminants from a dirt-containing air stream as it travels about a first cyclonic axis in the first cyclonic airflow chamber, said housing further comprising a cyclonic chamber inlet and an airstream outlet in fluid communication with said cyclonic airflow chamber;	Ex1012, Fig. 1.  Fig. 1 Ex1012, Fig. 9.  Fig. 9 “According to the invention, a vacuum cleaner comprises a housing defining a

<u>Fester256 Claim 1</u>	<u>Exemplary Disclosures from Fester256 Provisional</u>
	cyclonic airflow chamber for separating contaminants from a dirt-containing air stream and a cyclonic chamber inlet and an air stream outlet in fluid communication with said cyclonic airflow chamber.” <i>See</i> Ex1012, [0008]. <i>See also</i> Ex1012, [0008], [0027-28], [0031-39], [c1].
1[b] a nozzle housing including a suction opening, said suction opening being fluidly connected with said cyclonic chamber inlet;	Ex1012, Fig. 1.  Fig. 1 “The vacuum cleaner includes a nozzle housing having a suction opening fluidly connected with the cyclonic chamber inlet, and an airstream suction source fluidly connected to the main suction opening and to the cyclonic airflow chamber for transporting dirt-containing air from the suction opening to the cyclonic airflow chamber.” <i>See</i> Ex1012, [0008].

<u>Fester256 Claim 1</u>	<u>Exemplary Disclosures from Fester256 Provisional</u>
	<i>See also</i> Ex1012, [0008], [0027], [c1].
1[c] an airstream suction source fluidly connected to said suction opening and to the first cyclonic airflow chamber for transporting dirt-containing air from the suction opening to the cyclonic airflow chamber, said suction source is adapted to establish and maintain a dirt-containing airstream from said suction opening through said first cyclonic airflow chamber inlet and to a first cyclonic airflow chamber outlet;	Ex1012, Fig. 9.  Fig. 9 “The suction source is adapted to establish and maintain a dirt-containing airstream from the suction opening to the cyclonic chamber inlet.” <i>See</i> Ex1012, [0008]. <i>See also</i> Ex1012, [0008], [0010], [0037], [0039], [0045], [c1].
1[d] a dirt-collecting bin mounted to the housing beneath said first cyclonic airflow chamber, the dirt-collecting bin comprising a bottom wall, a sidewall, and an open top;	Ex1012, Fig. 3.

<u>Fester256 Claim 1</u>	<u>Exemplary Disclosures from Fester256 Provisional</u>
	Fig. 3 “A dirt-collecting bin is mounted to the housing beneath the cyclonic airflow chamber and includes a bottom wall and a cylindrical sidewall.” <i>See</i> Ex1012, [0009]. <i>See also</i> Ex1012, Abstract, [0001], [0009], [0033-34], [0037], [c1].
1[e] a plurality of secondary cyclones arranged around the first cyclonic axis, wherein each secondary cyclone comprises: an inlet opening in fluid communication with the first cyclonic airflow chamber outlet;	Ex1012, Fig. 9.

Fester256 Claim 1

a debris outlet positioned radially inward of the inlet opening; and

a second cyclonic axis that is oriented substantially perpendicular to the first cyclonic axis; and

Exemplary Disclosures from Fester256 Provisional

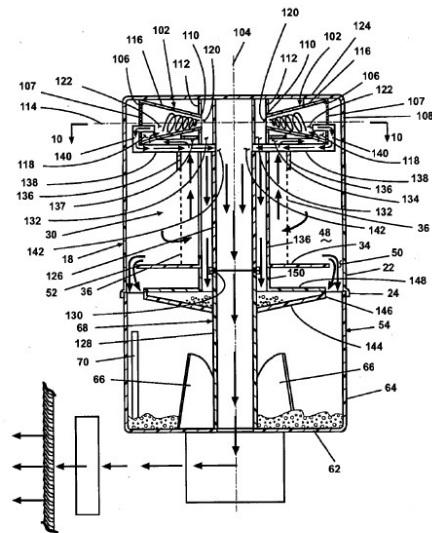


Fig. 9

Ex1012, Fig. 7:

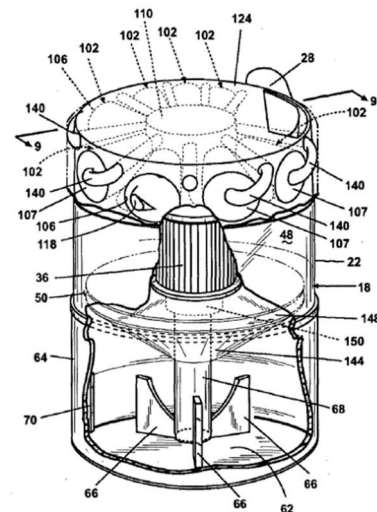
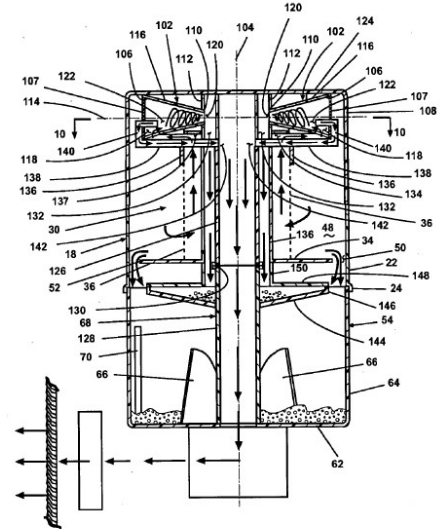


Fig. 7

“In yet another embodiment, a plurality of secondary cyclones are arranged in parallel downstream from the primary cyclonic airflow chamber. The secondary cyclones are arranged in an equi-angular fashion and perpendicular to a central vertical axis of the primary

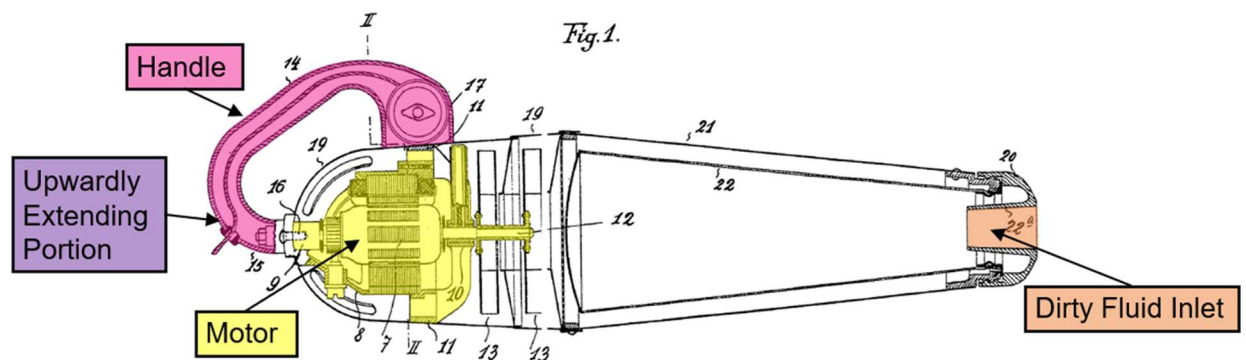
<u>Fester256 Claim 1</u>	<u>Exemplary Disclosures from Fester256 Provisional</u>
	cyclonic airflow chamber.” <i>See</i> Ex1012, [0016]. <i>See also</i> Ex1012, Abstract, [0016], [0039-45], Fig. 10, [c1].
1[f] a secondary debris collector in communication with the debris outlets of the secondary cyclones.	Ex1012, Fig. 9.  Fig. 9 “The fine secondary debris exits the interior of the cone 116 at the debris exhaust 120 and enters the collective secondary debris chamber 132 where it falls, under force of gravity, into the secondary debris collection container 144 located in the dirt cup region 58.” <i>See</i> Ex1012, [0044]. <i>See also</i> Ex1012, [0041], [0044].

66. Further, the Fester256 Provisional provides substantively the same disclosure as Fester256, including the subject matter Petitioners rely on

in Fester256. Compare, e.g., Ex1006, 5:6-31, 6:27-7:13, Figs. 1-5 with Ex1012, [0037-45], Figs. 1-4, 7-10. Throughout this Declaration, there are parallel citations to the Fester256 Provisional.

D. Lehmann

67. Lehmann is titled “Improvements in Vacuum Cleaning and Dusting Apparatus.” Ex1011, Title. Lehmann is a 1923 United Kingdom patent.
68. Lehmann teaches a “portable vacuum” with a “dust bag” and an “arched handle,” where the handle portion extends upwardly and away from “electro-motor 7” and a portion of the handle is intersected by the passage axis of the dirty fluid inlet 22a as shown in the annotated figure below.



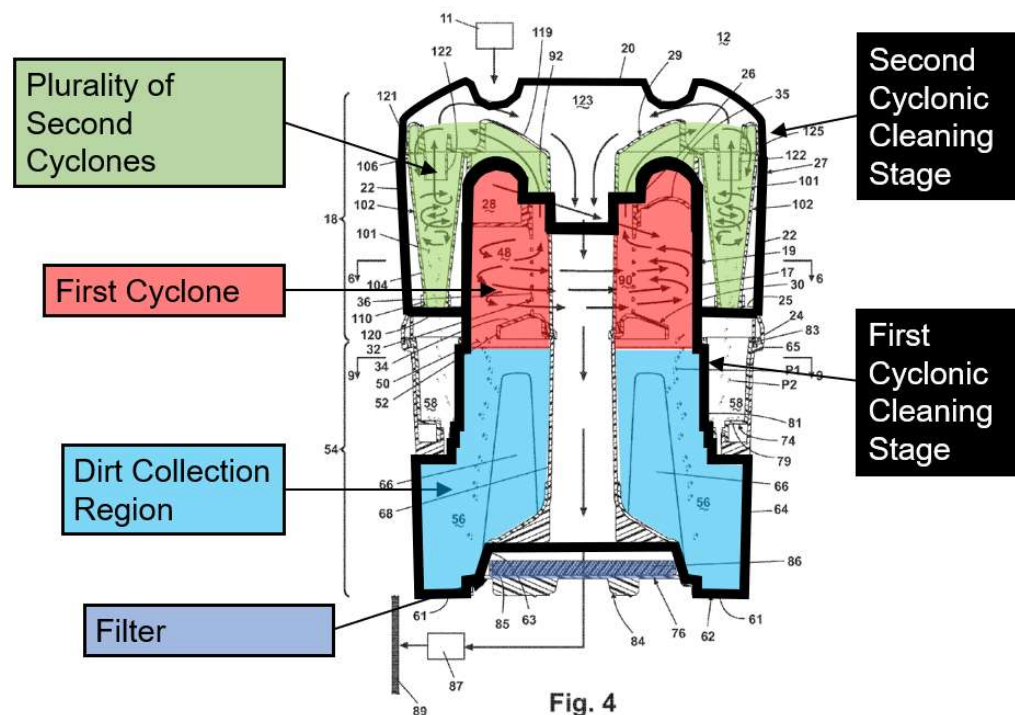
Ex1011, Fig. 1.

E. Fester336

69. Fester336 is titled “Vacuum Cleaner with Multiple Cyclonic Dirt Separators and Bottom Discharge Dirt Cup.” Ex1009, Title. Fester336 is a United States patent filed on December 28, 2005, that issued on

June 16, 2009, and lists as Related U.S. Application Data a provisional patent application filed on December 13, 2004.

70. Fester336 teaches a vacuum cleaner with a first cyclone and plurality of second cyclones where dirty air first enters the **first cyclone**. *Id.* Fig. 4. Fester336 also teaches that the dirty air then enters the **second cyclones**, where it is cleaned, and exits the **second cyclones** downwardly through a central channel to a pre-motor filter, motor, and is then exhausted from the vacuum as shown in the annotated figure below. *Id.* 9:50-10:34, Fig. 4.

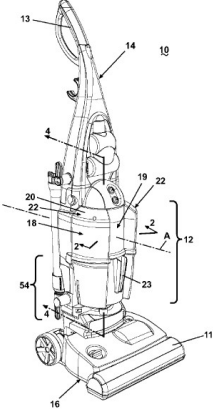


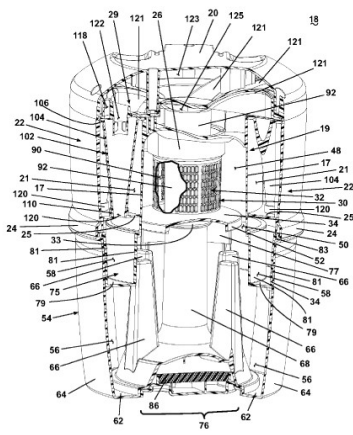
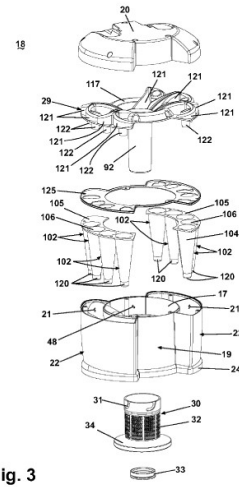
Ex1009, Fig. 4.

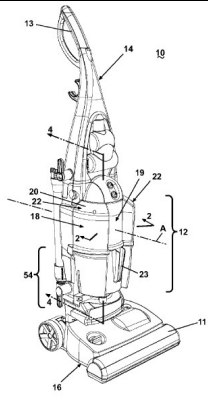
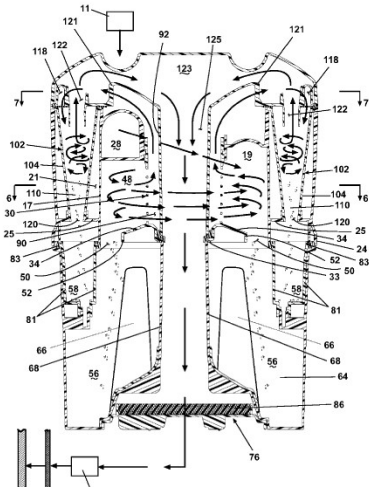
1. Fester336 is 102(e) Art As Of Its Provisional Date

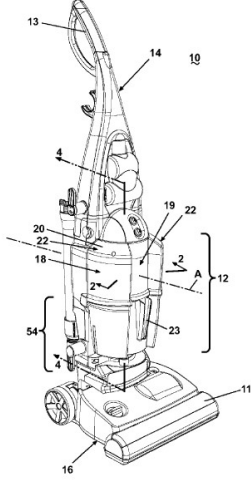
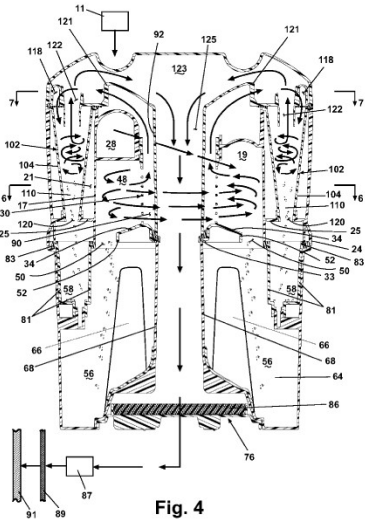
71. Fester336 is 102(e) prior art as of the Fester336 Provisional filing date, December 13, 2004, because the Fester336 Provisional provides written description support for: (1) the subject matter of at least one claim of Fester336 and (2) the subject matter Petitioners rely on in Fester336 to show the unpatentability of the Challenged Claims.

72. The Fester336 Provisional provides support for at least claim 1 of Fester335:

<u>Fester336 Claim 1</u>	<u>Exemplary Disclosures from the Fester336 Provisional</u>
1[pre] A vacuum cleaner comprising:	Ex1010, [Para 1], [Para 8], [Para 20], [Claim 1], Fig. 1.  Fig. 1
1[a] a cyclonic separator comprising: a first cyclone having a side wall defining a first cyclonic chamber for separating contaminants from an air stream as the air stream travels about the first cyclonic chamber from an air inlet to an air outlet; and	Ex1010, Fig. 2.

<u>Fester336 Claim 1</u>	<u>Exemplary Disclosures from the Fester336 Provisional</u>
a plurality of secondary cyclones downstream from the first cyclone, each of the secondary cyclone having a side wall defining a second cyclonic chamber for further separating contaminants from the air stream as the air stream travels about the second cyclonic chamber from an air inlet to an air outlet, and the secondary cyclones are arranged around the first cyclone side wall and form at least one gap between adjacent secondary cyclones to expose the first cyclone side wall to the outside of the cyclonic separator at the at least one gap;	 Fig. 2 Ex1010, Fig. 3.  Fig. 3 See also, [Para 21]-[Para 28], [Para 37], [Para 38], [Claim 1], [Claim 3], Fig. 4.
1[b] a nozzle housing including a suction opening coupled with the air inlet of the first cyclonic chamber; and	Ex1010, Fig. 1.

<u>Fester336 Claim 1</u>	<u>Exemplary Disclosures from the Fester336 Provisional</u>
	 Fig. 1 Ex1010, Fig. 4.  Fig. 4 <i>See also Ex1010, [Para 8], [Para 20], [Para 37], [Claim 1], [Claim 3].</i>
1[c] a suction source coupled to the suction opening and to the first and second cyclonic chambers and adapted to establish and maintain the air stream from the suction opening, through the first cyclonic airflow chamber, and through the second cyclonic airflow chambers.	Ex1010, Fig. 1.

<u>Fester336 Claim 1</u>	<u>Exemplary Disclosures from the Fester336 Provisional</u>
	 Fig. 1 Ex1010, Fig. 4.  Fig. 4 <i>See also Ex1010, [Para 8], [Para 20], [Para 37], [Para 38], [Claim 1].</i>

73. The Fester336 Provisional provides substantively the same disclosure as Fester336, including the subject matter Petitioners rely on in Fester336. *Compare, e.g.,* Ex1009, 5:33-6:10, 9:50-10:35, Figs. 1-7

with Ex1010, [Para 24]-[Para 26], [Para 37]-[Para 38], Figs. 1-7. Throughout the Declaration, there are parallel citations to the Fester336 Provisional.

F. Jung

74. Jung is titled “Vacuum Cleaner.” Ex1008, Title. Jung is a 2005 United States published patent application.
75. Jung teaches a vacuum cleaner with a cyclonic dust collecting system with a pivotably openable bottom to empty the dirt collection region, and an **inner flow tube 57** to direct the downwardly flowing air from the cyclonic separator rearwardly toward ducting in the vacuum body as shown in the annotated figures below. Ex1008, [0097]-[0101], [0128]-[0133], Figs. 3, 6, 8, 11-12.

FIG. 3

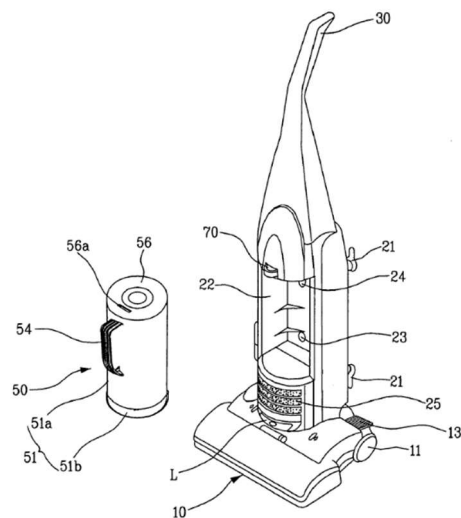


FIG. 6

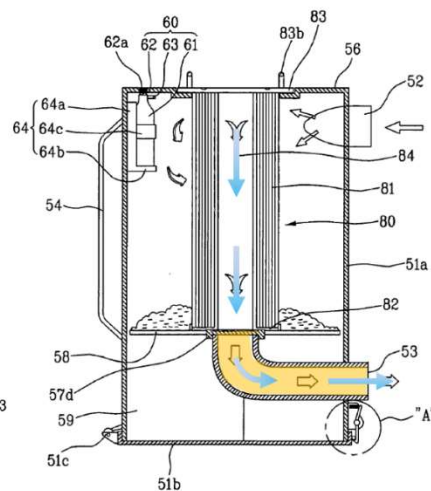
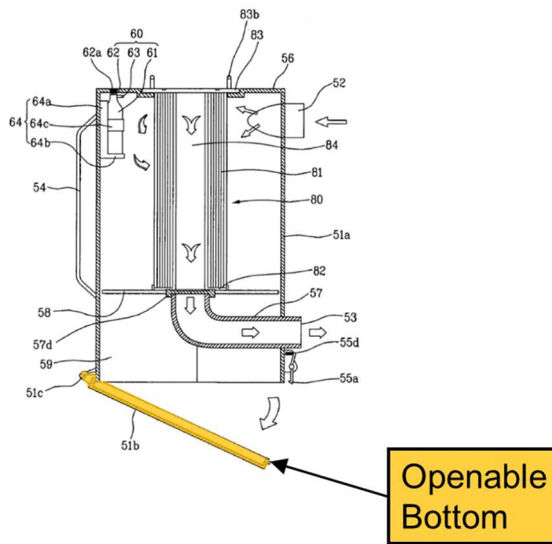


FIG. 8



Ex1008, Figs. 3, 6, 8, 11.

IX. CLAIM CONSTRUCTION

76. I understand that Petitioners and Patent Owner have submitted claim construction briefing for certain terms in the '666Patent. *See* Case No. 1:23-cv-12372, Dkts. 121-122. I am unaware of any claim construction determinations related to the '666Patent.

77. For purposes of this proceeding, I have considered whether the Challenged Claims are invalid as anticipated or obvious under their plain and ordinary meaning. In my opinion, the Challenged Claims are invalid under this construction.

X. INVALIDITY OPINIONS: '666PATENT

78. In my opinion, the Challenged Claims of the '666Patent are invalid based on the following references and combinations: claims 1-13 are

rendered obvious by the combination of Schmidt, Liddell, and Fester256; claims 1-13 are rendered obvious by the combination of Lehmann, Fester336, and Jung.

79. 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 date of the alleged invention for the Challenged Claims of the '666Patent to be December 12, 2006, as discussed above. I have also considered the level of ordinary skill in the pertinent art.

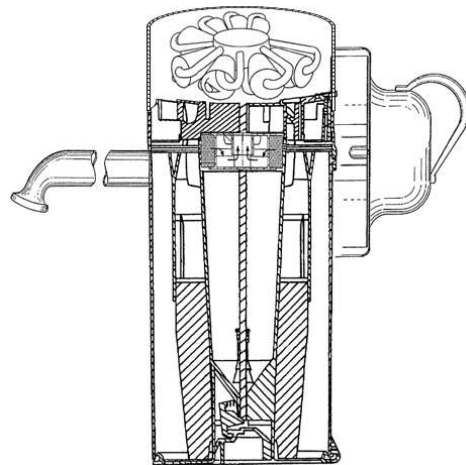
80. I describe in detail below the scope and content of the prior art, as well as any differences between the alleged invention and the prior art, on an element-by-element basis for each Challenged Claim of the '666Patent.

A. Ground 1: Schmidt, Liddell, and Fester256 Combination Renders Claims 1-13 Obvious

1. A POSA Would Have Been Motivated to Combine Schmidt, Liddell, and Fester256

81. In my opinion, a POSA would have been motivated to combine Schmidt, Liddell, and Fester256.

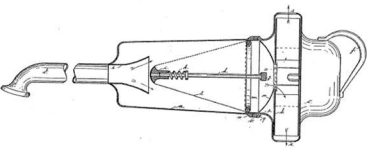
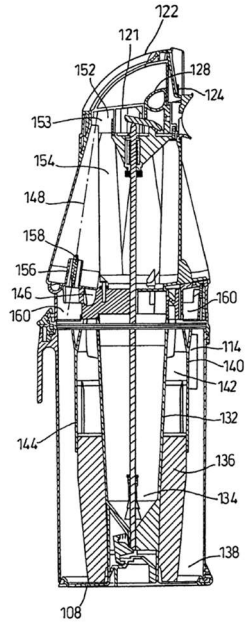
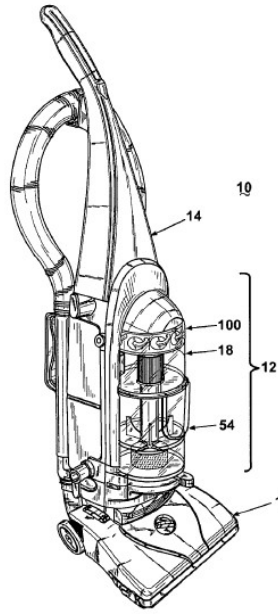
82. Schmidt teaches a hand vacuum that uses a cloth filter as its dust separator. Liddell and Fester²⁵⁶ both teach two-stage cyclonic dust separators.
83. A POSA, in my opinion, would have been motivated to combine Schmidt's hand vacuum with Liddell's two-stage cyclonic dust separator and also substitute Liddell's second cyclonic cleaning stage with Fester²⁵⁶'s second cyclonic dust separation stage, as shown in the modified figure below:



Ex1007, 3(modified); Ex1006, Figs. 3-4; Ex1005, Fig. 3b.

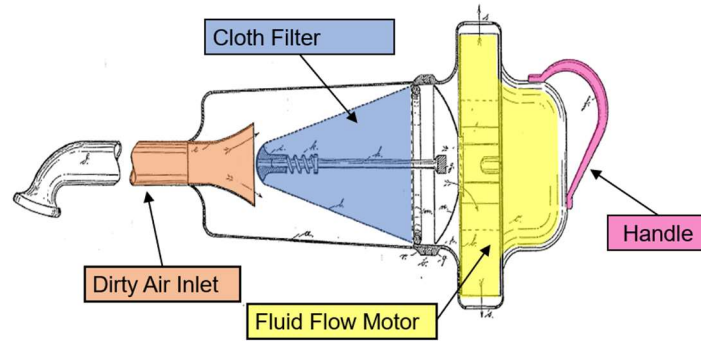
a. Schmidt, Liddell, and Fester²⁵⁶ Are Analogous Prior Art

84. In my opinion, a POSA would have been motivated to combine Schmidt, Liddell and Fester²⁵⁶ because they are analogous art. Specifically, each reference is from the vacuum cleaner field. See Ex1005, 1:3-4; Ex1006, Abstract; Ex1007, 1:1-3.

Schmidt	Liddell	Fester256
	 Fig. 3b	 Fig. 1

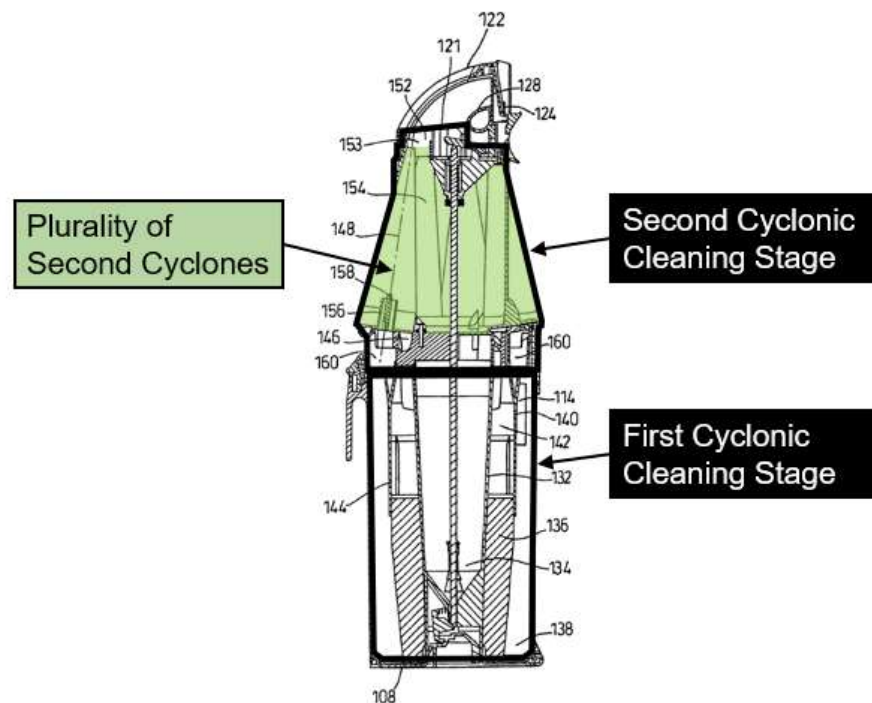
b. A POSA Would Have Been Motivated to Substitute Schmidt's Cloth Filter Dirt Separator with Liddell's Cyclonic Dust Separator

85. In my opinion, a POSA would have been motivated to substitute Schmidt's cloth filter dirt separator with Liddell's cyclonic dust separator.
86. Schmidt teaches a handheld vacuum cleaner with a conically-shaped cloth filter dirt separator. See, e.g., Ex1007, 3.



Ex1007, 3.

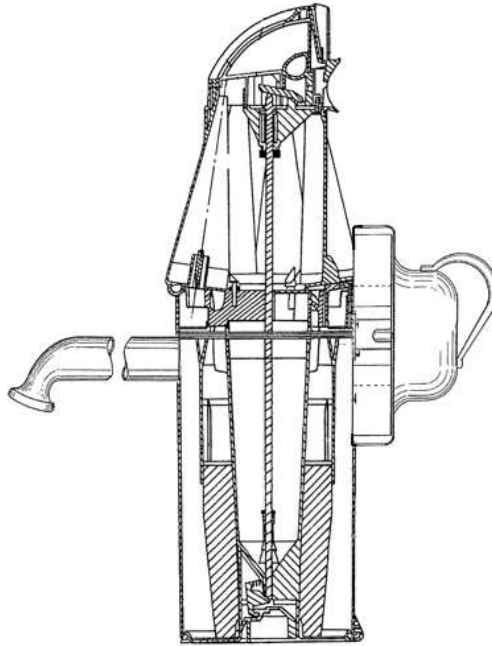
87. Liddell teaches a two-stage “cyclonic separation apparatus,” with a second cyclonic cleaning stage comprised of a plurality of smaller cyclones. Ex1005, 5:20-24.



Ex1005, Fig. 3b.

88. A POSA, in my opinion, would have been motivated to substitute Schmidt’s cloth filter with Liddell’s 2-stage cyclonic dust separator, as

shown below.



Ex1007, 3(modified); Ex1006, Figs. 3-4; Ex1005, Fig. 3b.

89. A POSA, in my opinion, would have been motivated to make this combination because it would have been a simple substitution of one known filtration mechanism (a cloth filter dust separator) with another (a 2-stage cyclonic dust separator) to obtain a predictable result. A POSA, in my opinion, would have recognized that a simple substitution of these dust separator systems would have yielded the predictable result of a handheld vacuum. Further, a POSA would have been motivated to modify the Schmidt hand vacuum to obtain the well-known benefits of cyclonic dust separation technology. In my opinion, it would be obvious to a POSA that they could move the inlet of the

vacuum to the other side without changing the performance or means by which the dust separator operates.

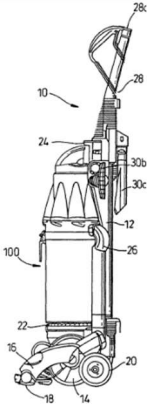
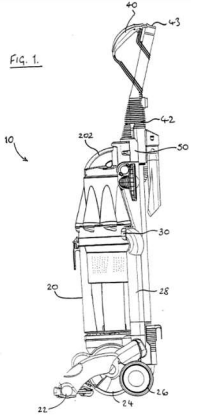
90. For example, the French Patent No. 1,094,603 (“Martelliere”), explains that more than 50 years before the ’666 Patent (at least since 1953), it was known that vacuums with fabric filters lose suction as they fill with dirt:

In common...vacuum cleaners, dust recovery is usually done by forcing the sucked air to pass through the weave of a fabric, which allows the gas to pass through, but retains the dust. This fabric is placed before or after the turbine; in either case, the pores of the fabric become blocked, the material accumulates behind the fabric and slows down the aspiration or evacuation of air. Most often, the container is full and there is nothing to tell, hence poor suction, yet emptying a dust bag is a recognized difficulty.

Ex1018, at 1.

91. Martelliere also teaches that substituting a fabric filter with a cyclonic dirt separator results in “stable suction” and “prevent[s] clogging.” *Id.* Martelliere also recognizes that a cyclonic dust separator can be made of a translucent material, like plastic, to allow a user to “better judge when it must be emptied,” unlike cloth or paper filters. *Id.*
92. U.K. Patent Publication GB2,372,434A (“Organ”), which was

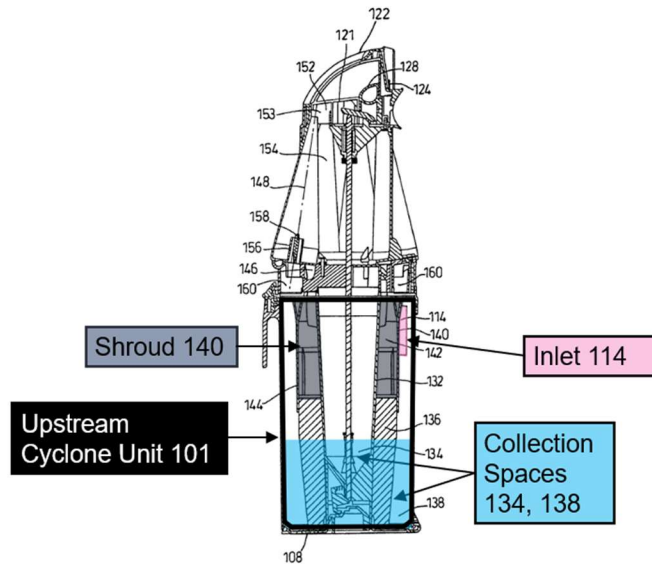
published in 2002 and teaches a similar cyclonic dust separator as Liddell, teaches these same advantages.

Liddell	Organ
 Fig. 1b Ex1005, Fig. 1b.	 Fig. 1 Ex1017, Fig. 1

93. Organ teaches, for example, that bagless vacuums like “cyclonic” vacuums were “becoming increasingly popular” before the ’666Patent 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.” Ex1017, 1:8-13. A POSA, in my opinion, would have been motivated to substitute Schmidt’s cloth filter separation system with Liddell’s cyclonic separator for the same reason.
94. Additionally, a POSA, in my opinion, would also have been motivated to use Liddell’s cyclonic separator because (1) the Liddell separator

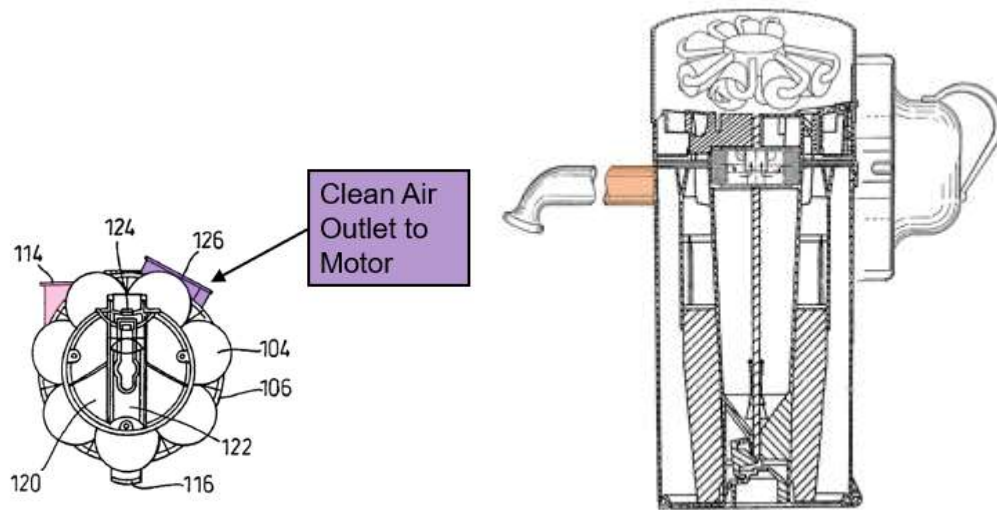
achieved low noise levels and (2) a plurality of small cyclones “has the effect of increasing the centrifugal forces acting on the particles which, in turn, increases the separation efficiency of the separator.” Ex1005, 1:20-24, 2:1-13. A POSA, in my opinion, would have recognized that combining Schmidt’s handheld vacuum with Liddell’s two-stage cyclonic cleaning system would improve Schmidt in the same way with the predictable result of creating a handheld cyclonic vacuum cleaner with low noise and high separation efficiency.

95. Liddell’s cyclonic separator is oriented vertically, and a POSA, in my opinion, would have been motivated to maintain this orientation when combined with Schmidt, as shown below. Liddell’s vertically orientated cyclonic separator causes dirt to aggregate near the bottom of its cyclonic separator 100 in collection spaces 134 and 138 and away from the narrower airways in shroud 140 and inlet port 114. In my opinion, a POSA would have been motivated to maintain Liddell’s vertical orientation to prevent these narrower airways from clogging with debris.



See Ex1005, Fig. 3b.

96. 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) and vertically orienting cyclonic separator 100 would have further motivated a POSA to connect Liddell's **inlet port 114** with Schmidt's **suction pipe d** (Ex1007, 3) to generate tangential airflow into **upstream cyclone unit 101**, as shown below.



Ex1005, Fig. 2c; Ex1007, 3(modified); Ex1006, Figs. 3-4; Ex1005, Fig. 3b.

97. A POSA, in my opinion, would further have been motivated to combine Liddell's 2-stage cyclonic dust separator in a vertical orientation with Schmidt's hand vacuum because other prior art handheld cyclonic suction devices, like U.K. Patent Application No. GB2035787 ("Merritt"), use vertically oriented cyclonic separators. Merritt teaches a suction device where air enters **inlet nozzle 8** and "**suction pipe 7** enters the **cyclone chamber 3** tangentially" generating "normal centrifugal cyclone separation" in **chamber 3** and separated debris falls into the "**container 5** which can be detached and emptied when full:"

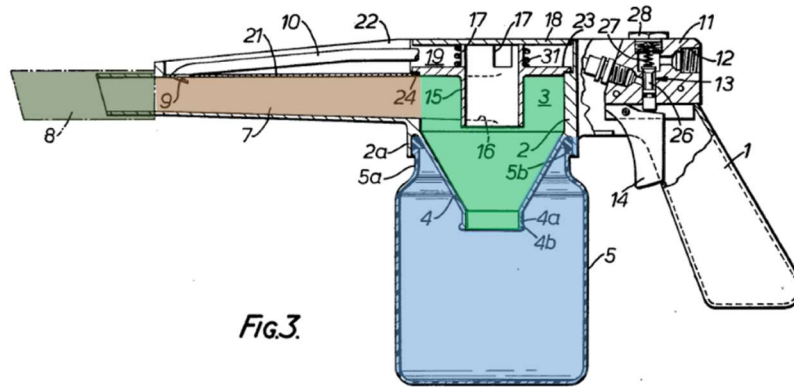
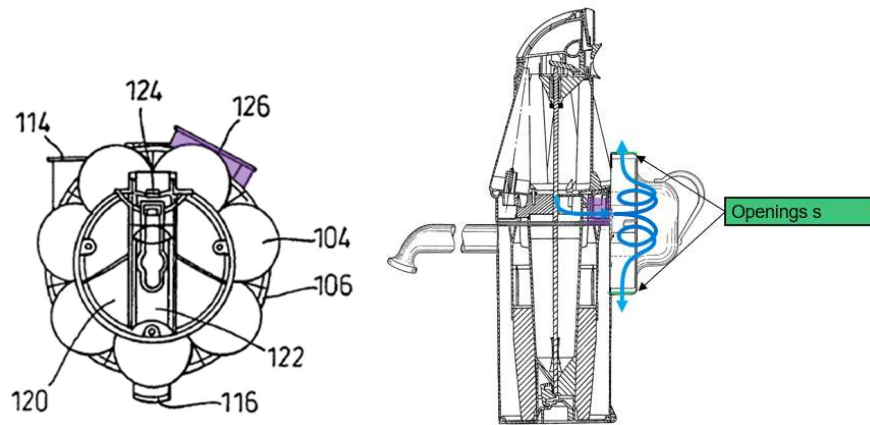


Fig. 3.

Ex1016, 1:97-102, 1:107-118, 2:55-65, Fig. 3.

98. Air exits Liddell's cyclonic separator 100 from **outlet port 126** through downstream ducting 26 to Liddell's motor and out the vacuum at a post-motor outlet as discussed above. Similarly, when substituting Schmidt's cloth filter dust separator with Liddell's 2-stage cyclonic dust separator, a POSA, in my opinion, would have understood that air would flow rearwardly out from Liddell's cyclonic separator into Schmidt's "housing c," through Schmidt's motor, and out Schmidt's **"openings s,"** which preserves the fluid flow paths Liddell and Schmidt teach.

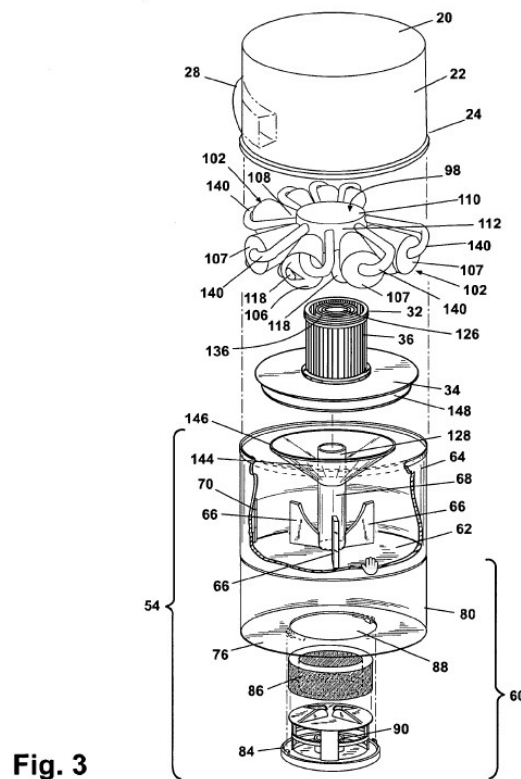


Ex1005 Figs. 2c, 3b

99. Further, in my opinion, this combination would have been at least obvious to try given the nature of the straightforward substitution. A POSA, in my opinion, would have understood that there were a finite number of identified dust separators, including cloth filters (which Schmidt teaches) and cyclonic separators (which Liddell teaches), and a finite number of ways to combine them, accordingly it would have been obvious to try to achieve the known benefits described above through a simple substitution.
100. A POSA, in my opinion, would have had a reasonable expectation of success combining Schmidt's and Liddell's teachings for the reasons above, including because such modification would have involved a simple substitution of known elements that perform similar functions in similar ways, and because of the prior art's express motivations to perform such substitution, such as in Schmidt, Merritt and Liddell.

- c. A POSA Would Have Been Motivated to Substitute Liddell's Second Cyclonic Cleaning Stage and Subsequent Airflow Path with Fester256's and to Add Fester256's Pre-Motor Filter

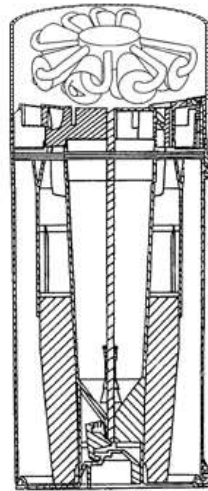
101. Fester256 teaches a vacuum with a two-stage cyclonic dust separator like Liddell, but teaches an alternative configuration of the second cyclonic cleaning stage's plurality of parallel second cyclones and airflow routing from the secondary cyclones, and further teaches a cylindrical or disc-shaped pre-motor filter in the airflow path between the second cyclones and the suction motor. See, e.g., Ex1006, 6:33-43, Fig. 2.



Ex1006, Fig. 3.

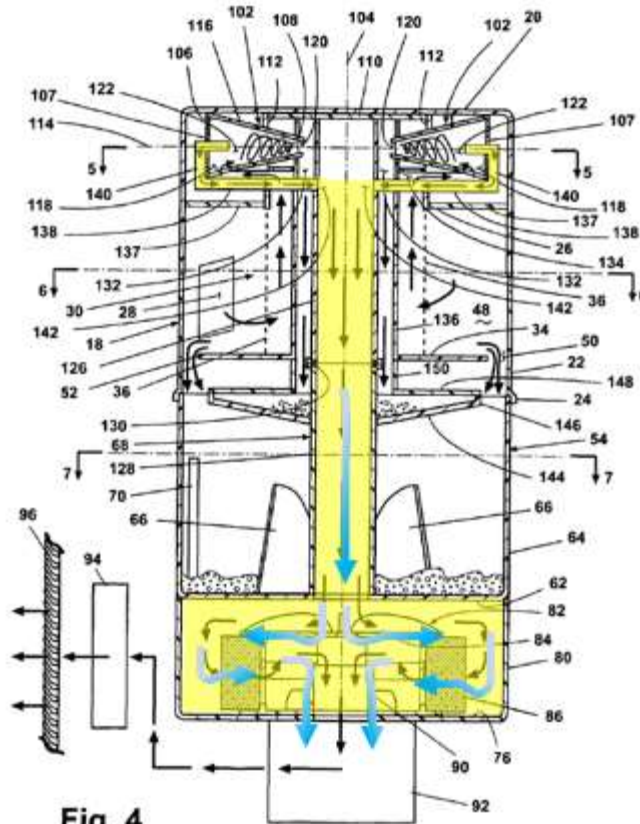
102. A POSA, in my opinion, would have recognized that Fester256's second cyclonic cleaning stage would reduce the device's height because the second cyclones are oriented horizontally rather than vertically. A POSA, in my opinion, would have been motivated to substitute Fester256's second cyclonic cleaning stage for Liddell's second cyclonic cleaning stage because a POSA would have understood that horizontally oriented cyclones would have produced a compact design that would have been beneficial from a comfort, maneuverability, and space saving perspective.
103. In addition, a POSA, in my opinion, would have been motivated to substitute Liddell's secondary cyclonic cleaning stage and subsequent airflow path routing and pre-motor filter with Fester256's. First, a POSA would be motivated to substitute Schmidt/Liddell's second cyclonic cleaning stage and airflow routing to the suction motor with Fester256's because it would have been a simple substitution of one known element for another to obtain a predictable result. A POSA, in my opinion, would have recognized that the substitution of Liddell's second cleaning stage and subsequent airflow routing with Fester256's would have achieved the predictable result of filtering the air and efficiently routing the airflow to the suction motor. Ex1006, Fig. 4,

Ex1005, Fig. 3b.



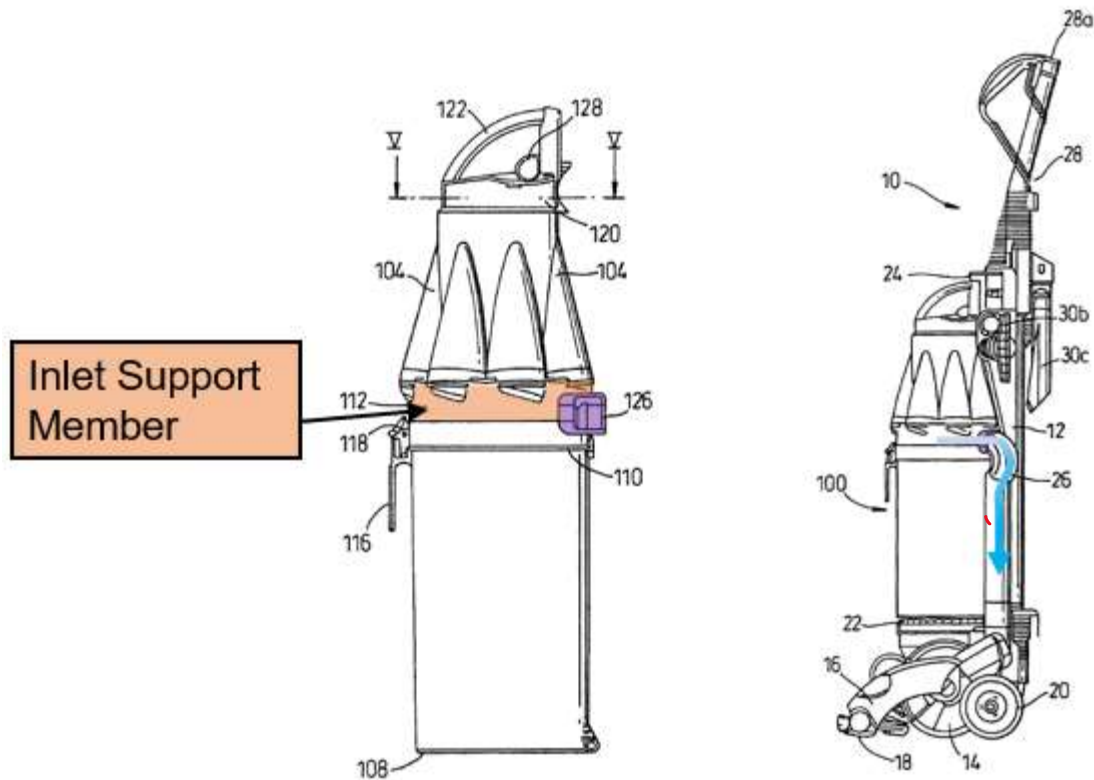
Ex1005, Fig. 3b(modified); Ex1006, Figs. 3-4; Ex1007, 3.

104. Fester256 directs air from its horizontally oriented second cyclones into a central channel, downward through a pre-motor filter, through a suction source, and out of the vacuum, as shown in the shaded airways below.



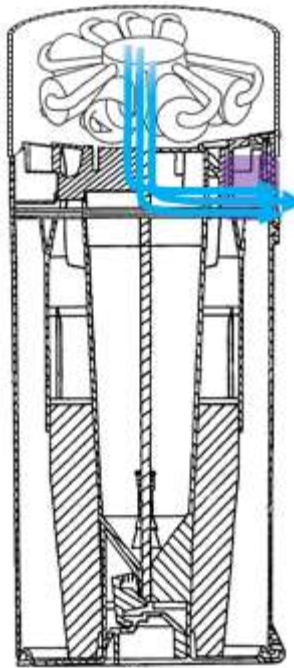
Ex1006, Fig. 4.

105. In Liddell, air from the second cyclones 104 passes through inlet support member 112 and exits the second cyclonic cleaning stage at **outlet port 126** where it is directed downward through upstream ducting 26 to a motor in casing 14. Accordingly, substituting Fester256's second cyclonic stage for Liddell's is a simple substitution of like components both performing the same function and having similar air inlet and outlet air flow paths.



Ex1005, Figs. 1b, 2b.

106. When substituting Liddell's second cyclonic cleaning stage having vertical cyclones with Fester256's second cyclonic cleaning stage having horizontal second cyclones, a POSA would have understood, in my opinion, that air would flow from Fester256's horizontal second cyclones, downward through Fester256's central channel (upper standpipe 126), into Liddell's inlet support member 112 and out from Liddell's second cyclonic cleaning stage via **outlet port 126**, as shown in the below. Ex1006, Fig. 4, Ex1005, Fig. 3b.



Ex1005, Fig. 3b(modified); Ex1006, Figs. 3-4; Ex1007, 3.

107. The resulting short and nearly direct airflow path would have further motivated a POSA, in my opinion, to make this modification. Fester256 teaches that long, “tortuous” airflow pathways present more opportunities for air leaks, reducing suction and cleaning performance. Ex1006, 1:30-44, 2:6-21. Therefore, a POSA would have been motivated to route the air in an efficient manner which minimizes such issues, as shown above.

108. Further, a POSA, in my opinion, would have had a reasonable expectation of success in modifying the Schmidt/Liddell combination according to the Fester256’s teachings. Specifically, a POSA would

have recognized that Fester256's second cyclonic cleaning stage and pathway routing could be straightforwardly integrated into Liddell's cyclonic separator.

109. A POSA, in my opinion, also would have recognized that Fester256's routing, airway in and out of the parallel downstream cyclones as well as the downward pathway via standpipe 126, would be compatible with Liddell's dirt collection process. Liddell's dirt collection path teaches that dust "exits the smaller ends of the **downstream cyclones 104** to pass from the chamber 152 to the **collection space 134** via the **dust channel 154**," as shown below. Ex1005, 8:3-5, Fig. 3b. While Liddell's dirt path is out the top of the small cyclone, the air exits at the bottom at 156/158 which is both similar and compatible with Fester256's airway.

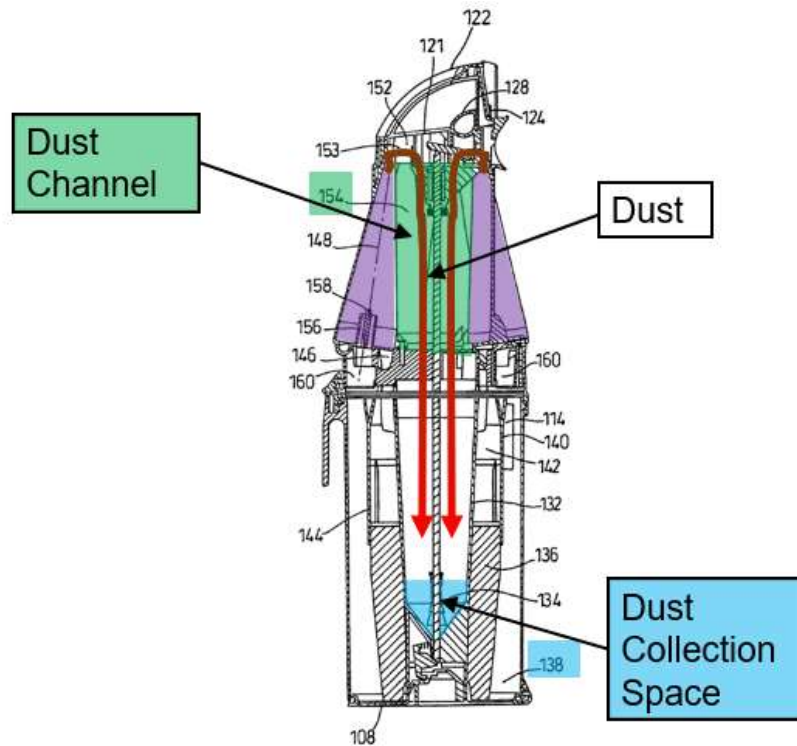


Fig. 3b

Ex1005, Fig. 3b.

110. When Liddell is modified with Fester256's horizontal cyclones of the second cyclonic cleaning stage and standpipe 126, dirt would still follow a similar path as taught in Liddell because Fester256's standpipe 126 has an inner bore (exhaust chamber 142) for cleaned air to travel downwardly from the bottom of Fester256's **secondary cyclones 102** through a common, central, longitudinal duct in the vacuum body (standpipe). Fester256 also includes a **secondary debris chamber 132** to allow dirt to travel downwardly to Fester256's **secondary debris collection chamber 144** via an outlet at the small end of the cyclone

cone:

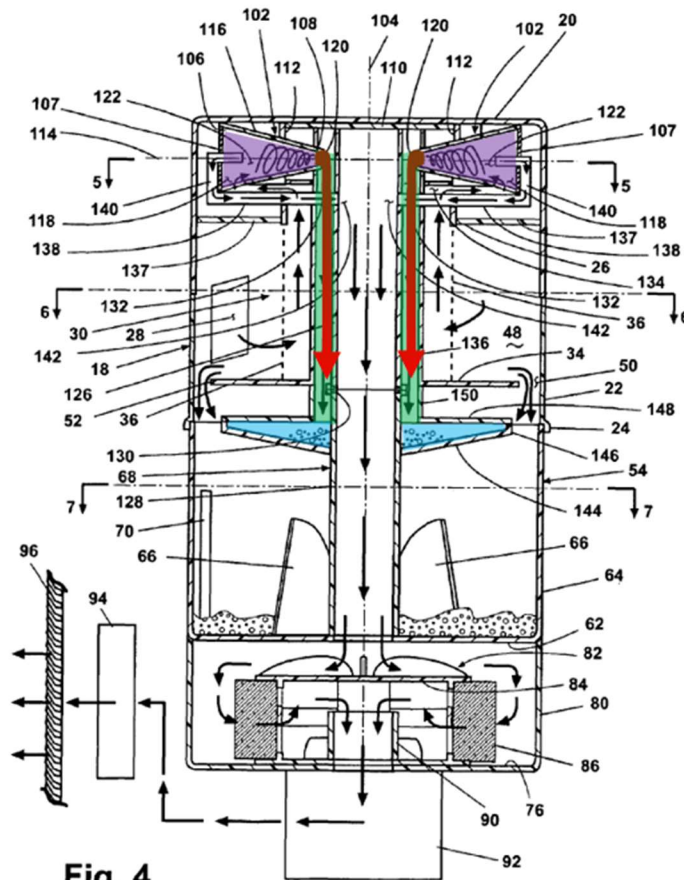
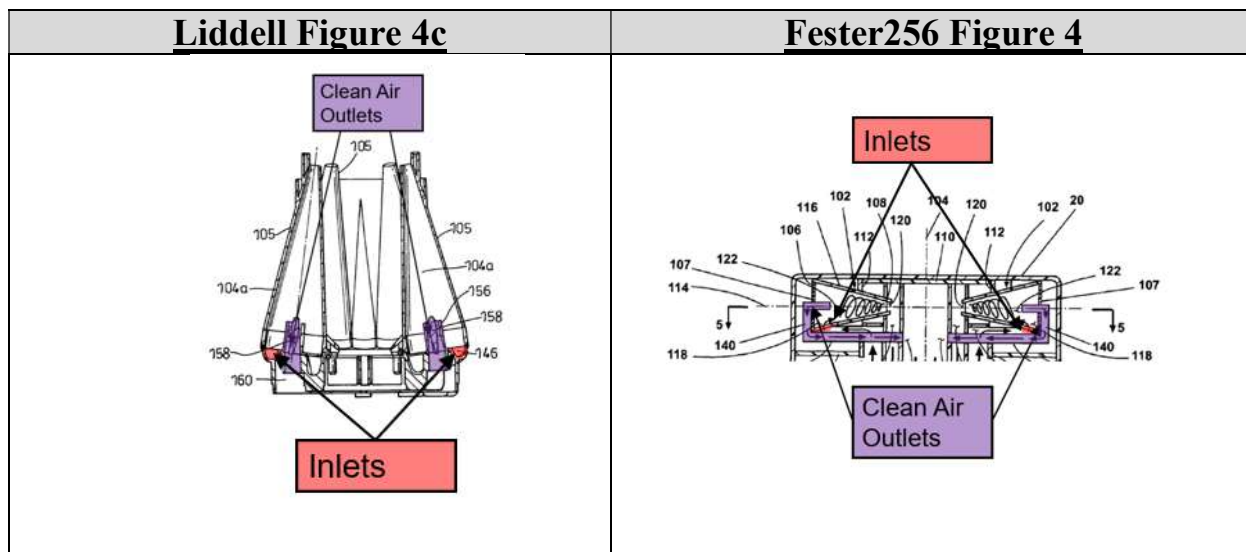


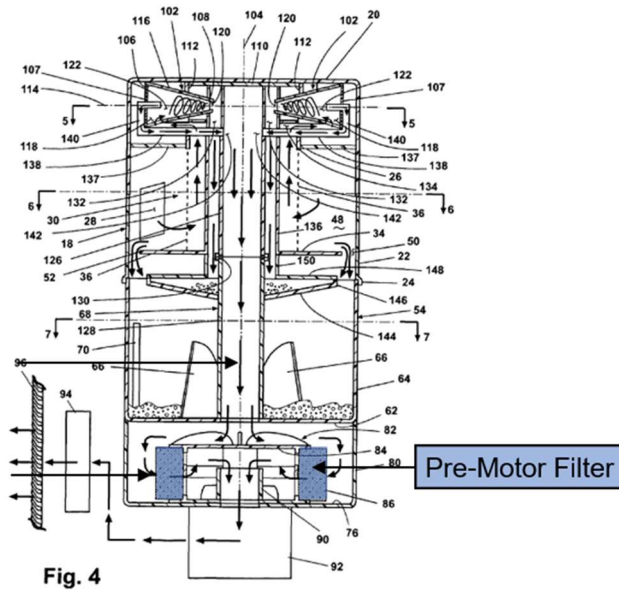
Fig. 4

Ex1006, Fig. 4, 6:46-7:13, 8:53-65.

111. Similarly, both Liddell's and Fester256's plurality of parallel secondary cyclones have air **inlets** and **outlets** on the bottom of the cyclones. The inlets are fed exhaust from the first cyclonic stage below the second stage and the outlets discharge air downwardly allowing for a seamless exchange of the cyclones despite the different orientation of the cyclones. Ex1005, Fig. 4c, 8:9-10; Ex1006, Fig. 4c, 5:22-23.



112. Thus, a POSA, in my opinion, would have had a reasonable expectation of success modifying the Schmidt/Liddell combination according to the teachings of Fester256. Ex1005, Fig. 3b, 8:9-10; Ex1006, Fig. 4c, 5:22-23.
113. In my opinion, it also would have been obvious to try this combination. A POSA, in my opinion, would have understood there were a finite number of identified possible pathways to route air to the suction motor from the second cyclones. It would have been obvious to try this known routing to achieve the known benefits described above.
114. A POSA, in my opinion, also would have been motivated to modify the Schmidt/Liddell handheld vacuum to include the pre-motor filter Fester256 teaches.

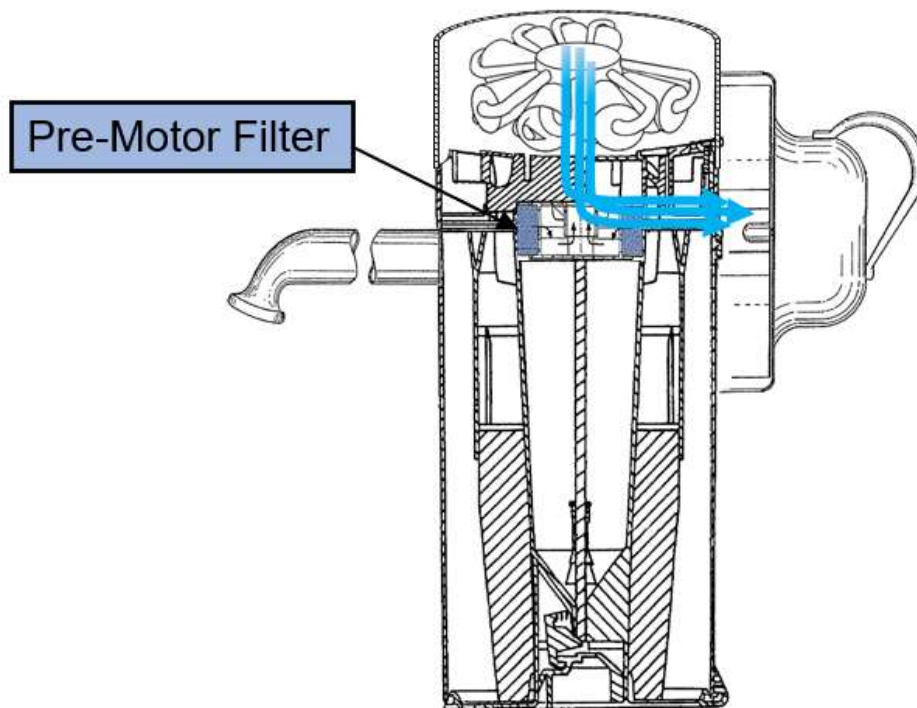


Ex1006, Fig. 4.

115. Fester256 teaches using the well-known technology of a pre-motor filter (filter assembly 82) located in the airflow between the secondary cyclones and the suction motor “to capture[] additional particulate matter before the working air is drawn into the suction source 87.” Ex1006, 10:23-28. A POSA, in my opinion, would have understood that capturing any remaining particulate in the airflow to the motor reduces the quantity of dirt and dust that enters the suction motor thereby increasing the performance and longevity of the suction motor. The pre-motor filter also further reduces the amount of dust ultimately exhausted from the vacuum. A POSA, in my opinion, would have been motivated to incorporate Fester256’s pre-motor filter to achieve these

benefits. Further, Liddell teaches “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), and adding Fester256’s pre-motor filter to the Liddell air separation unit would further Liddell’s goal of using “*cleaned* air...to cool the motor.”

116. In Fester256, the pre-motor filter is aligned with standpipe 126, axially aligned with central vertical axis 104, as shown above. Ex1006, Fig. 4. In the Schmidt/Fester256/Liddell combination, Fester256’s pre-motor filter would be moved upwards into the airflow in standpipe 126, which carries air from the second cyclones to the motor, and would continue to be axially aligned with the vacuum’s central longitudinal axis.



Ex1007, 3(modified); Ex1006, Figs. 3-4; Ex1005, Fig. 3b.

117. A POSA, in my opinion, also would have been motivated to position Fester's pre-motor filter in this location to efficiently utilize the empty "internal space defined by the internal wall 132," in Liddell's cyclonic separator 100. Ex1006, 7:1-8. In my opinion, it also would have been obvious to try positioning Fester256's pre-motor filter in this space because the number of locations to house the filter are limited. It would have been obvious, in my opinion, to try a pre-motor filter located in the space illustrated to achieve the known benefits described above. In addition, in my opinion, it would have been obvious to rotate the Fester256 pre-motor filter in light of the airflow through the filter to align the airflow with Liddell's such that the air flows in through the center of the annular filter and out the side of the filter. Fester256 also discloses a "flat foam filter" as an alternative to the annular pre-motor filter, which would also align with the Liddell airflow. '666Patent at 6:42-43.

118. A POSA, in my opinion, would have had a reasonable expectation of success incorporating Fester256's pre-motor filter in the Schmidt/Liddell/Fester256 combination, including for the reasons above. A POSA, in my opinion, further would have had a reasonable

expectation of success incorporating Fester256’s second cyclonic cleaning stage and airflow into Liddell’s air treatment system. In my opinion, a POSA would have had a reasonable expectation of success in making this simple substitution.

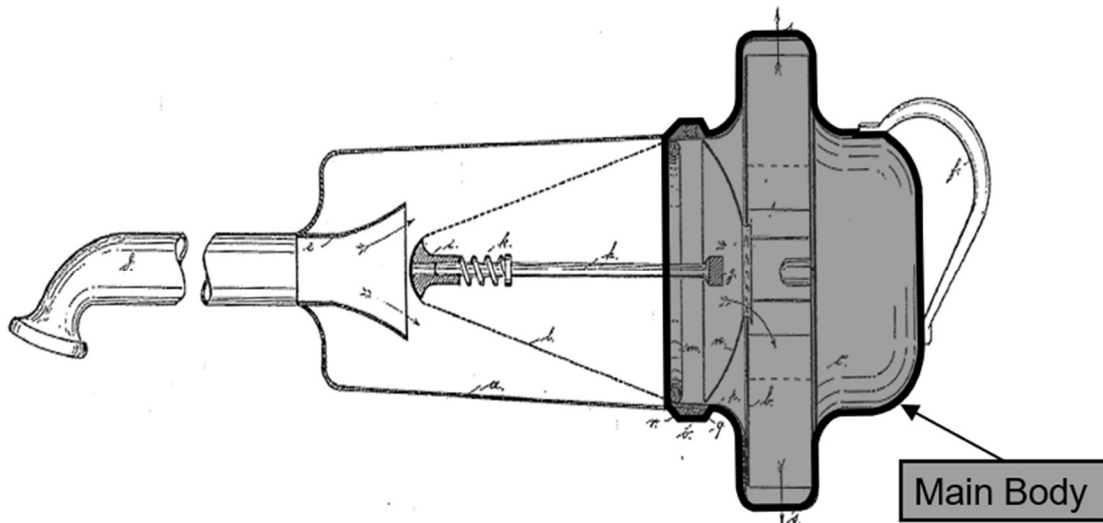
2. Schmidt, Liddell, and Fester256 Render Claim 1 Obvious

a. [1pre]

Reference Number	Claim Limitation
[1pre]	“A hand vacuum cleaner comprising an air treatment portion and a main body, the air treatment portion comprising a first cyclonic cleaning stage, a second cyclonic cleaning stage and a pre-motor filter, the hand vacuum cleaner comprising:”

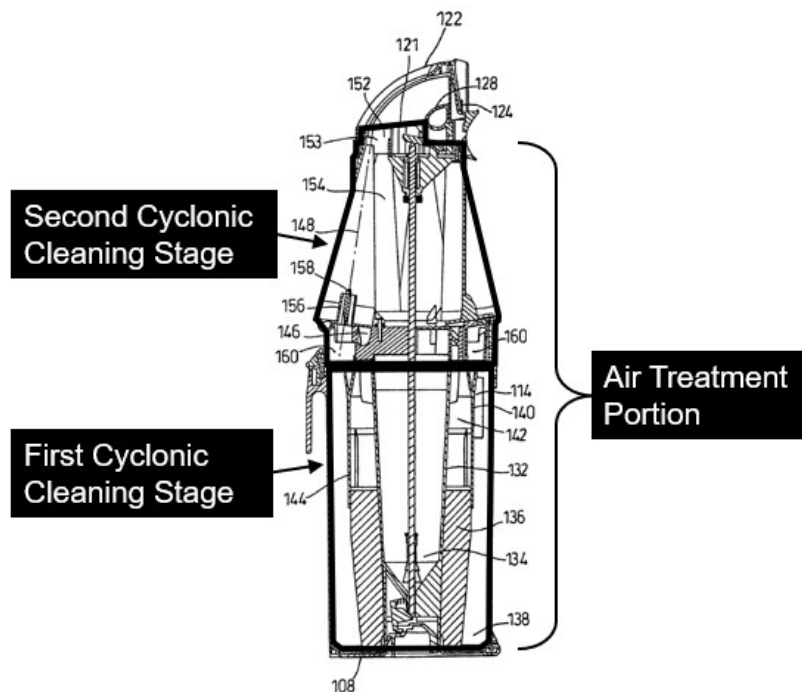
119. To the extent the preambles are limiting, in my opinion, the combined teachings of Schmidt, Liddell, and Fester256 teaches and renders obvious a hand vacuum cleaner comprising an air treatment portion and a main body, the air treatment portion comprising a first cyclonic cleaning stage, a second cyclonic cleaning stage and a pre-motor filter, the hand vacuum cleaner.

120. To start, in my opinion, Schmidt teaches a hand vacuum cleaner with a **main body** (fan housing and housing c) and an air treatment portion (filter cone l and jacket a) to remove dust from the air pulled into the vacuum:



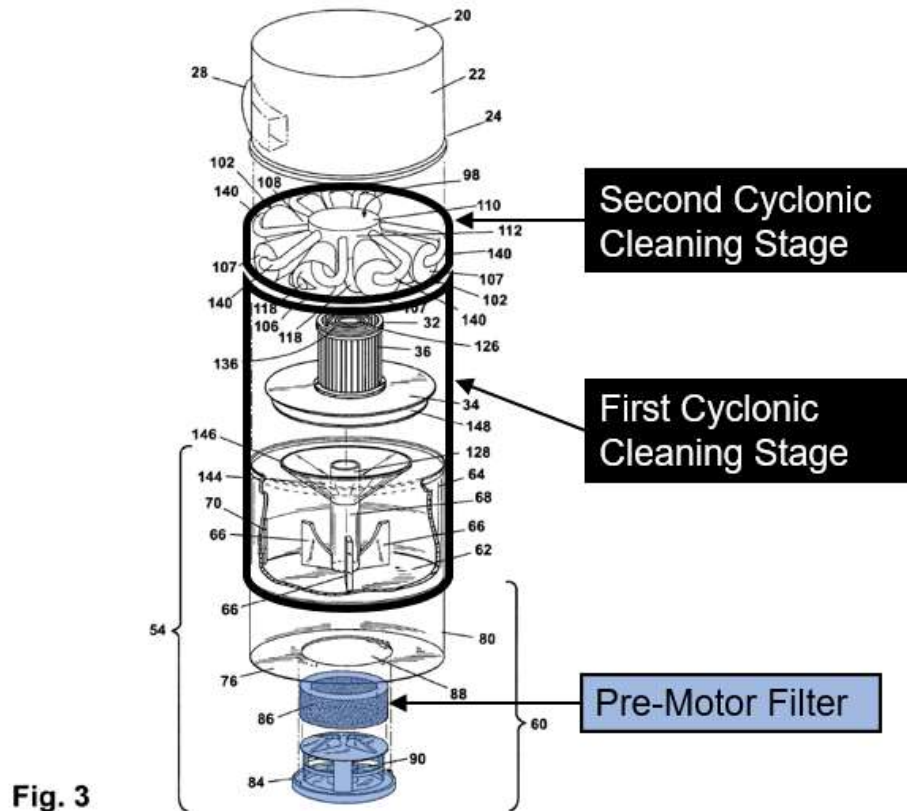
Ex1007, 3.

121. Liddell teaches a vacuum cleaner with an air treatment portion with a first and second cyclonic cleaning stages (“upstream cyclone unit 101” and “downstream cyclone unit 103,” respectively):



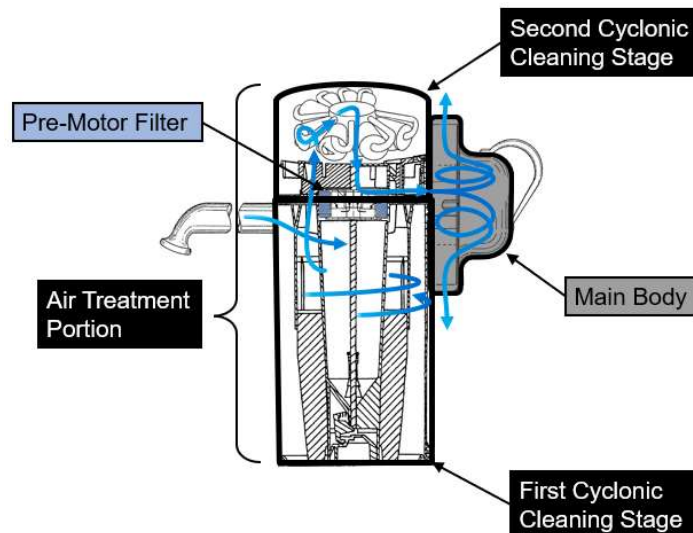
Ex1005, Figs. 2a&3b, 5:20-24.

122. Fester256 also teaches an air treatment portion comprising a first cyclonic cleaning stage (“first cyclone chamber 48” and “dirt cup/filter chamber 54”), a second cyclonic cleaning stages (“secondary cyclone assembly 100”) and a pre-motor filter (“filter assembly 82”):



Ex1006, Fig. 3, 5:6-55.

123. When Schmidt, Liddell, and Fester256 are combined as I have described in Ground 1, Section 1, the combined hand vacuum cleaner includes an air treatment portion, as taught by Liddell and Fester256, and a main body as taught by Schmidt:



Ex1007, 3(modified); Ex1006, Figs. 3-4; Ex1005, Fig. 3b.

124. Thus, in my opinion, a POSA would have understood that the combination of Schmidt, Liddell, and Fester²⁵⁶ teaches a handheld vacuum with an air treatment portion and a main body where the air treatment includes first and second cyclonic cleaning stages and a pre-motor filter.

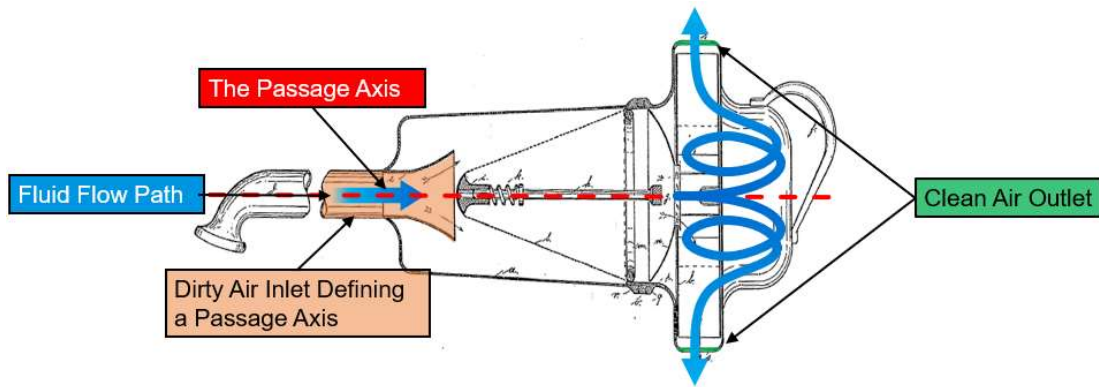
b. [1a]

Reference Number	Claim Limitation
[1a]	“a) a fluid flow path extending from a dirty air inlet to a clean air outlet and the dirty fluid inlet defines a passage extending along a passage axis;”

125. In my opinion, Schmidt in combination with Liddell and Fester²⁵⁶ teaches a fluid flow path extending from a dirty air inlet to a clean air outlet and the dirty fluid inlet defines a passage extending along a

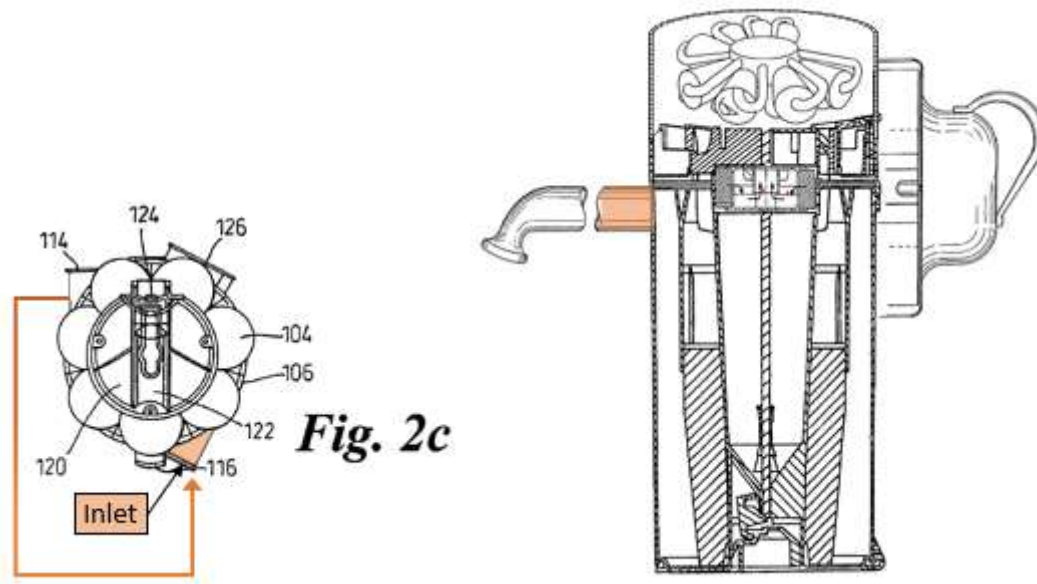
passage axis.

126. Schmidt teaches a fluid flow path from a dirty air inlet (“suction pipe d”) to a clean air outlet (“openings s in the housing”) and the dirty fluid inlet defines a passage extending along a passage axis:



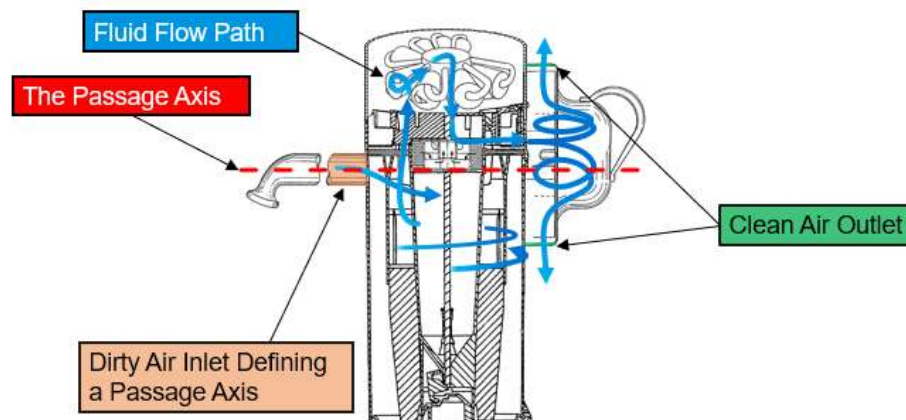
Ex1007, 2-3.

127. As discussed above, a POSA would have been motivated to connect Liddell’s inlet port 114 with Schmidt’s suction pipe d (Ex1007, 3) to generate tangential airflow into upstream cyclone unit 101, as shown below. As discussed above, in my opinion, the location of the inlet and outlet on Liddell are simply a design choice to accommodate the upright handle, there is no technical problem to rotate where they are on the body while keeping the same vertical placement.



Ex1005, Fig. 2c; Ex1007, 3(modified); Ex1006, Figs. 3-4; Ex1005, Fig. 3b.

128. A POSA, in my opinion, would have understood that the combination of Schmidt, Liddell, and Fester256, like all household vacuums, includes a fluid flow path extending from a dirty air inlet to a clean air outlet and the dirty fluid inlet defines a passage extending along a passage axis, as shown below.



Ex1007, 3(modified); Ex1006, Figs. 3-4; Ex1005, Fig. 3b.

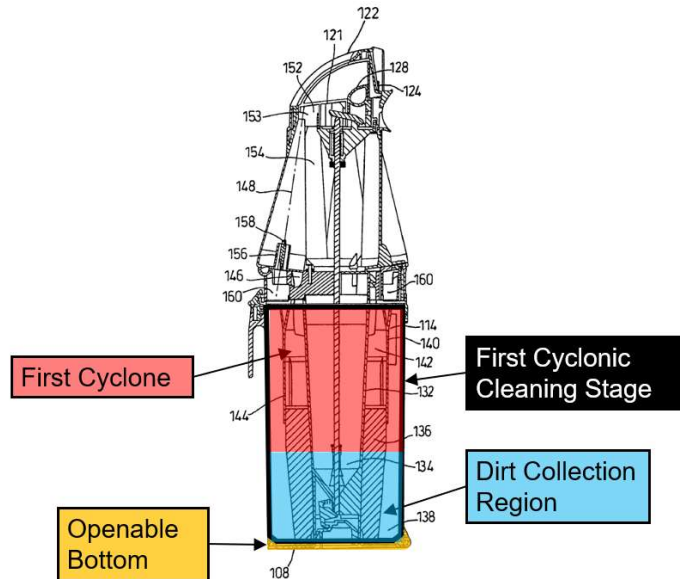
129. Thus, in my opinion, a POSA would have understood that Schmidt in combination with Liddell and Fester256 teaches a fluid flow path extending from a dirty air inlet to a clean air outlet and the dirty fluid inlet defines a passage extending along a passage axis.

c. [1b]

Reference Number	Claim Limitation
[1b]	“b) the first cyclonic cleaning stage is positioned in the fluid flow path and comprises a first cyclone having a dirt collection region wherein the dirt collection region has an openable bottom;”

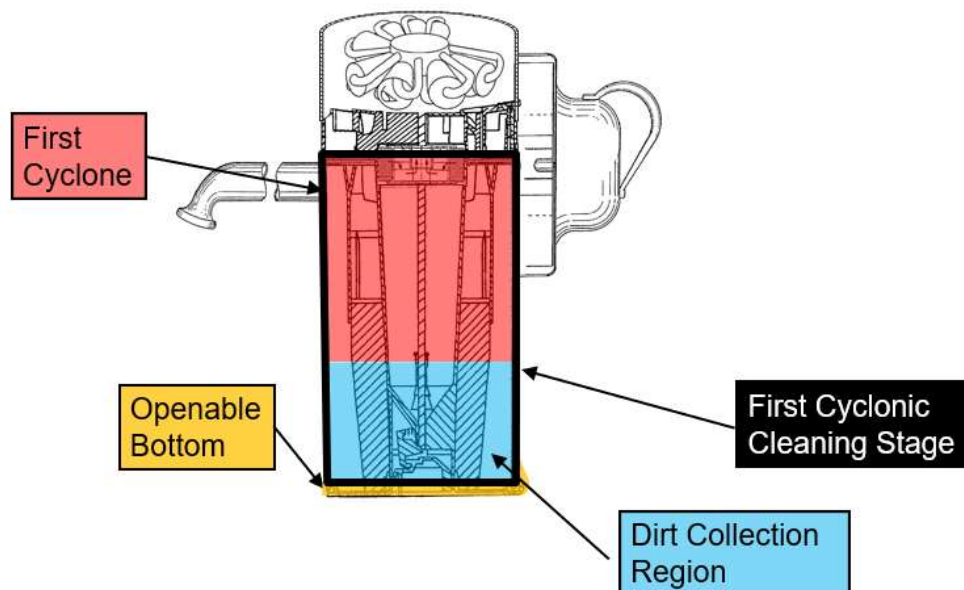
130. In my opinion, Schmidt in combination with Liddell and Fester256 teaches a first cyclonic cleaning stage that is positioned in the fluid flow path and comprises a first cyclone having a dirt collection region wherein the dirt collection region has an openable bottom.

131. Liddell teaches a first cyclonic cleaning stage (upstream cyclone unit 101) positioned in the fluid flow path and comprising a first cyclone (upstream cyclone 102) with a dirt collection region (collection regions 134, 138) with openable bottom (base 108). Ex1005, 5:20-24, 6:23-25 (describing mechanism “for opening the base 108 of the cylindrical bin 106 for emptying purposes”), 7:3-6, 7:12-14, 9:11-14.



Ex1005, Fig. 3b.

132. When Schmidt, Liddell, and Fester256 are combined as I have described in Ground 1, Section 1, the combined hand vacuum cleaner includes Liddell's first cyclonic cleaning stage:



Ex1007, 3(modified); Ex1006, Figs. 3-4; Ex1005, Fig. 3b.

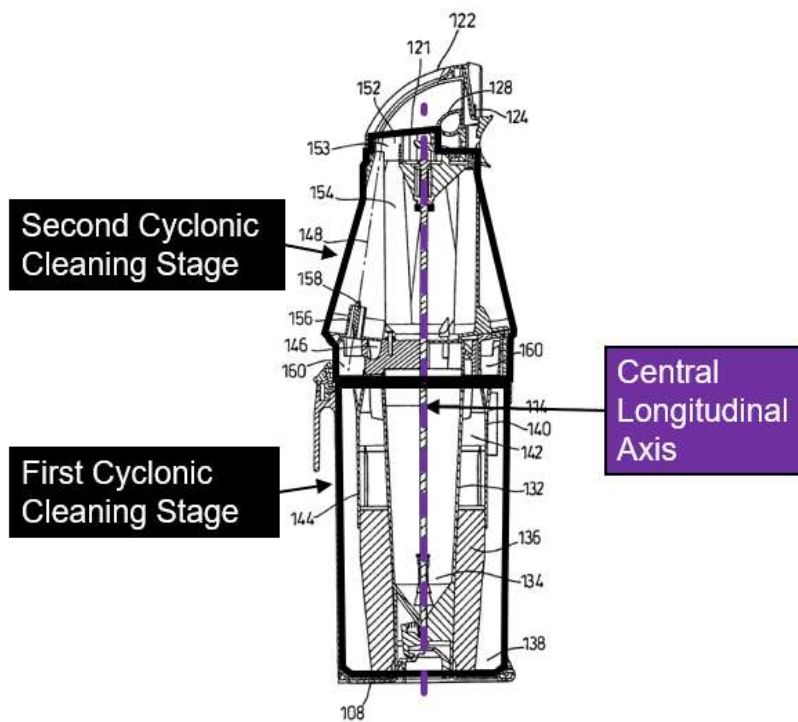
133. Thus, in my opinion, a POSA would have understood that Schmidt in combination with Liddell and Fester²⁵⁶ teaches a first cyclonic cleaning stage positioned in the fluid flow path and comprises a first cyclone having a dirt collection region wherein the dirt collection region has an openable bottom.

d. [1c]

Reference Number	Claim Limitation
[1c]	“c) the second cyclonic cleaning stage is positioned in the fluid flow path downstream from the first cyclonic cleaning stage and comprises a central longitudinal axis, the second cyclonic cleaning stage comprising a plurality of cyclones in parallel that are arranged around a central portion and, after exiting the second stage cyclones, air enters an upper portion of the central portion and exits the central portion at a position below the upper portion where the air enters the central portion;”

134. In my opinion, Schmidt in combination with Liddell and Fester²⁵⁶ teaches a second cyclonic cleaning stage that is positioned in the fluid flow path downstream from the first cyclonic cleaning stage and comprises a central longitudinal axis, the second cyclonic cleaning stage comprising a plurality of cyclones in parallel that are arranged around a central portion and, after exiting the second stage cyclones, air enters an upper portion of the central portion and exits the central portion at a position below the upper portion where the air enters the central portion.

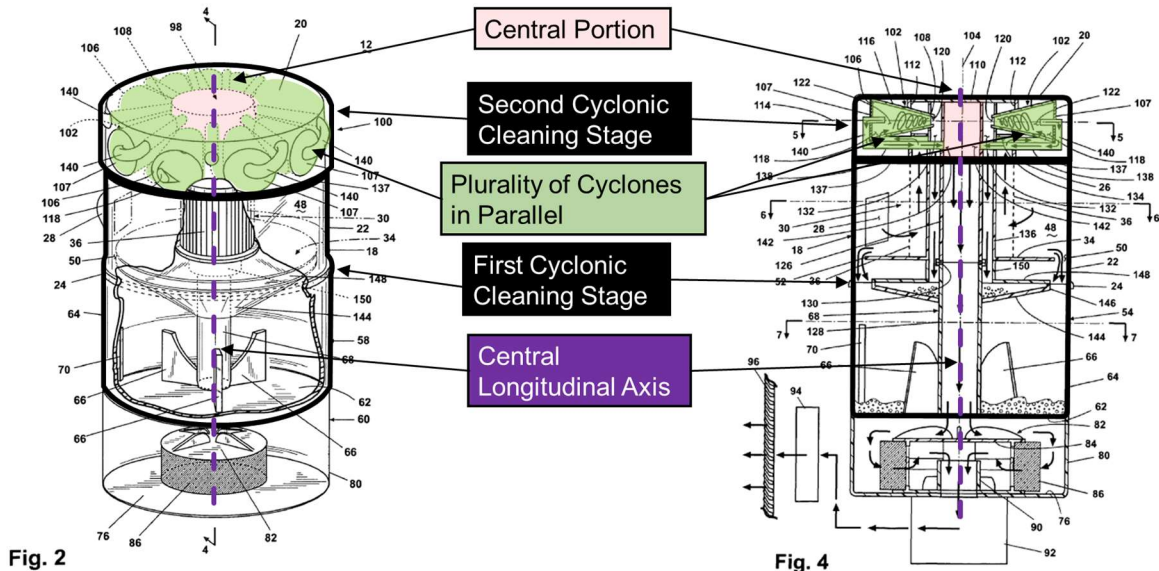
135. Liddell teaches a **second cyclonic cleaning stage** (downstream cyclone unit 103) positioned in the fluid flow path downstream from the **first cyclonic cleaning stage** (upstream cyclone unit 101) that comprises a **central longitudinal axis** (“central longitudinal axis 150”) with a plurality of cyclones in parallel (“downstream cyclones 104,” which are “arranged in parallel with one another”):



Ex1005, Fig. 3b, Abstract, 5:20-24, 6:5-10.

136. Fester256 likewise teaches a second cyclonic cleaning stage (“secondary cyclone assembly 100”) with a **plurality of cyclones** in parallel (secondary cyclones 102) that are arranged around a **central portion** (upper standpipe 126) positioned in the fluid flow path

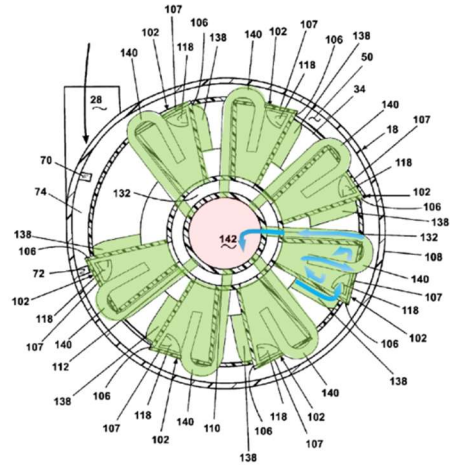
downstream from the first cyclonic cleaning stage (“first cyclone chamber 48” and “dirt cup/filter chamber 54”) that comprises a **central longitudinal axis** (“central vertical axis 104”). Ex1006, 5:6-55, 8:44-47.



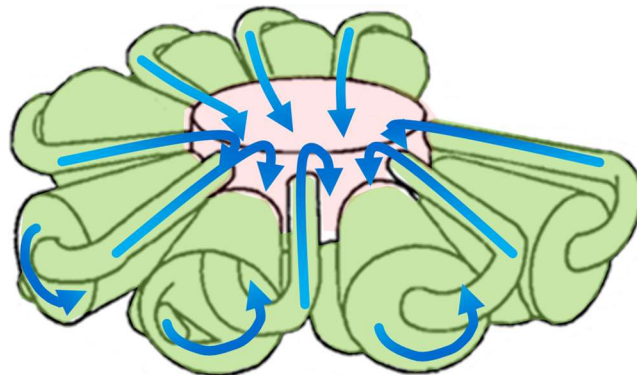
Ex1006, Figs. 2&4.

137. Fester256 teaches that the “secondary cyclones 102 are arranged in parallel” and “spaced about a central vertical axis 104” which extends along upper standpipe 126. *Id.*, 5:8-11, 6:46-52, 7:9-13, 8:44-45.

138. Fester256 further teaches that the air exits the **second stage cyclones** (secondary cyclones 102), enters an upper portion of the **central portion** (upper portion of the upper standpipe 126) and exits the **central portion** at a position below the upper portion where the air enters the **central portion**, as shown below.

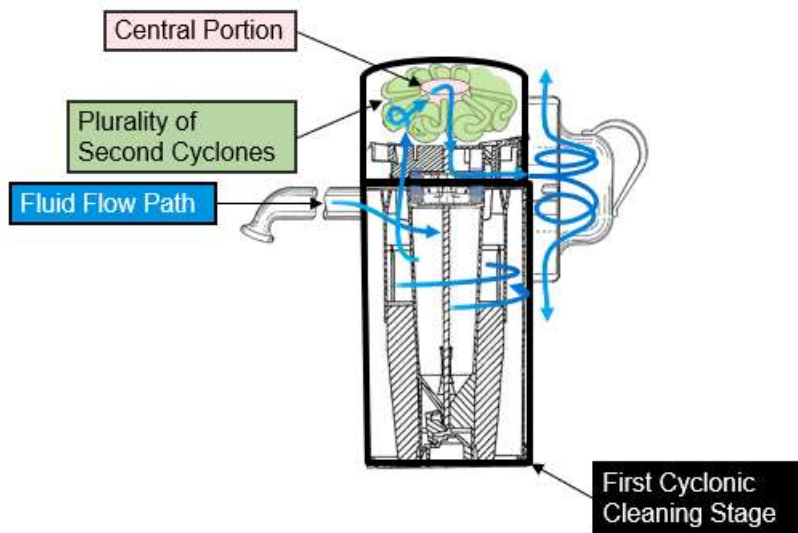


139. Fester²⁵⁶ teaches that air exiting the second cyclones 102 “passes through the working air outlet conduit 140 and enters the collective exhaust chamber 140 within the upper standpipe 126 where it is drawn through exhaust chamber 142 to the filter chamber region 60” near the bottom of the vacuum:



Ex1006, Fig. 2, 8:60-63.

140. When Schmidt, Liddell, and Fester256 are combined as I have described in Ground 1, Section 1, the combined hand vacuum cleaner includes a second cyclonic cleaning stage incorporating the teachings of Liddell and Fester256:



Ex1007, 3(modified); Ex1006, Figs. 3-4; Ex1005, Fig. 3b.

141. Thus, in my opinion, a POSA would have understood that Schmidt in combination with Liddell and Fester256 teaches a second cyclonic cleaning stage that is positioned in the fluid flow path downstream from the first cyclonic cleaning stage and comprises a central longitudinal axis, the second cyclonic cleaning stage comprising a plurality of cyclones in parallel that are arranged around a central portion and, after exiting the second stage cyclones, air enters an upper portion of the

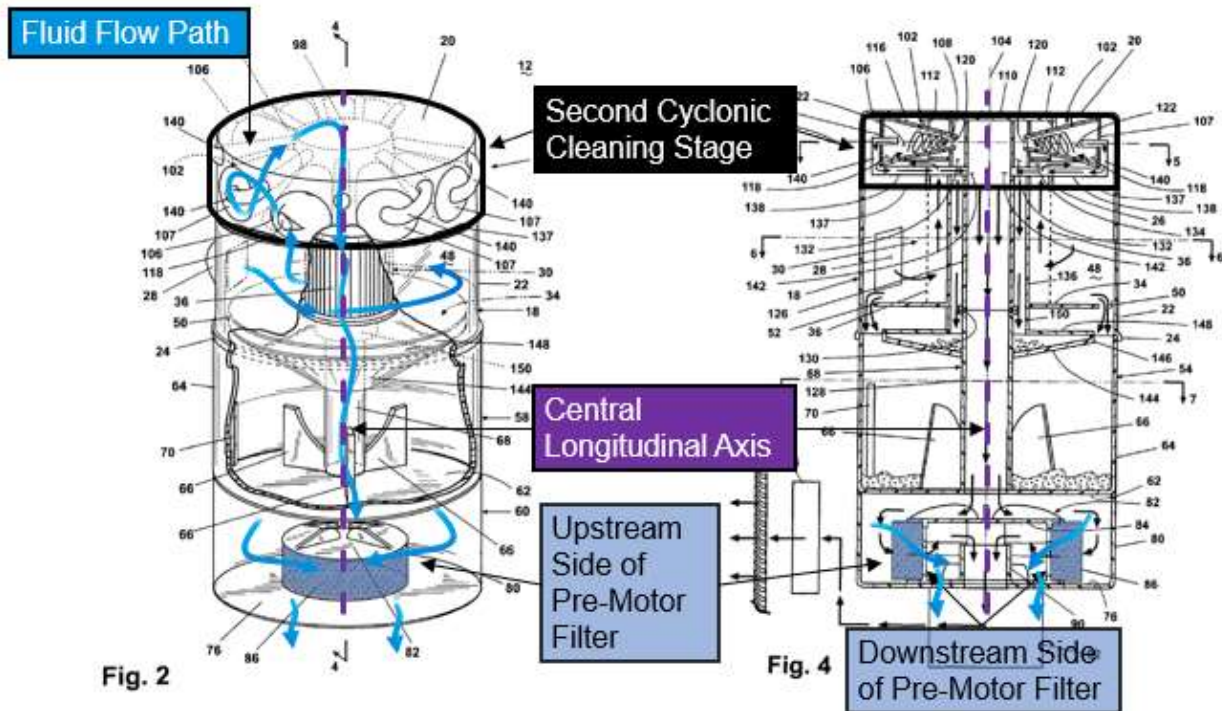
central portion and exits the central portion at a position below the upper portion where the air enters the central portion.

e. [1d]

Reference Number	Claim Limitation
[1d]	“d) the pre-motor filter is positioned in the fluid flow path downstream from the second cyclonic cleaning stage and comprises an upstream side and a downstream side wherein the central longitudinal axis extends through a volume occupied by the pre-motor filter; and,”

142. In my opinion, Schmidt in combination with Liddell and Fester²⁵⁶ teaches a pre-motor filter positioned in the fluid flow path downstream from the second cyclonic cleaning stage and comprises an upstream side and a downstream side, like all other pre-motor filters, but wherein the central longitudinal axis extends through a volume occupied by the pre-motor filter.

143. First, in my opinion, Fester²⁵⁶ teaches a pre-motor filter (**filter assembly 82, including filter 86**) positioned in the fluid flow path downstream from the second cyclonic cleaning stage (**secondary cyclone assembly 100**) and which comprises upstream and downstream sides wherein the central longitudinal axis (**central vertical axis 104**) extends through a volume occupied by the pre-motor filter:

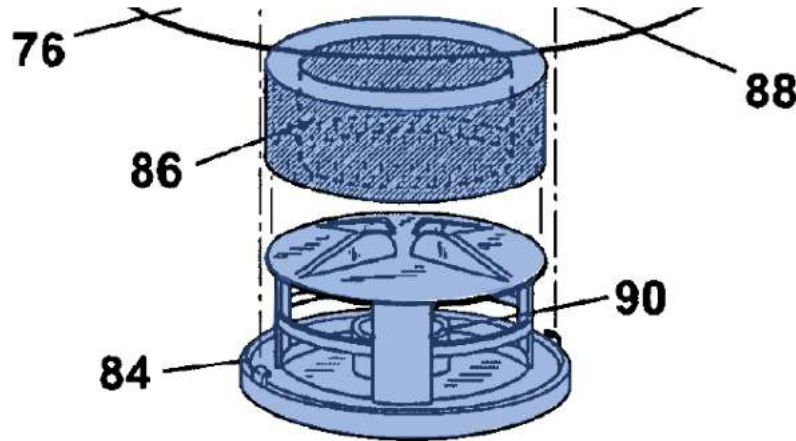


Ex1006, 3:28-32, 6:27-45, 8:60-67, Figs. 2,4.

144. Fester256 teaches “[w]orking air passes through the working air outlet conduit 140 and enters...the upper standpipe 126 where it is drawn...to the filter chamber region 60. The working air passes through **filter 86** where particulate matter is captured and continues through the suction source inlet 90.” Ex1006, 8:60-65. Fester256’s Fig. 4 shows that air enters the **filter assembly 82**, including **pre-motor filter 86**, from its upstream side and exits in through its downstream side. Ex1006, Fig. 4, 6:33-42.

145. Fester256’s Fig. 4 above shows **central vertical axis 104** passes through a volume occupied by **filter assembly 82**. Ex1006, Fig. 4. To

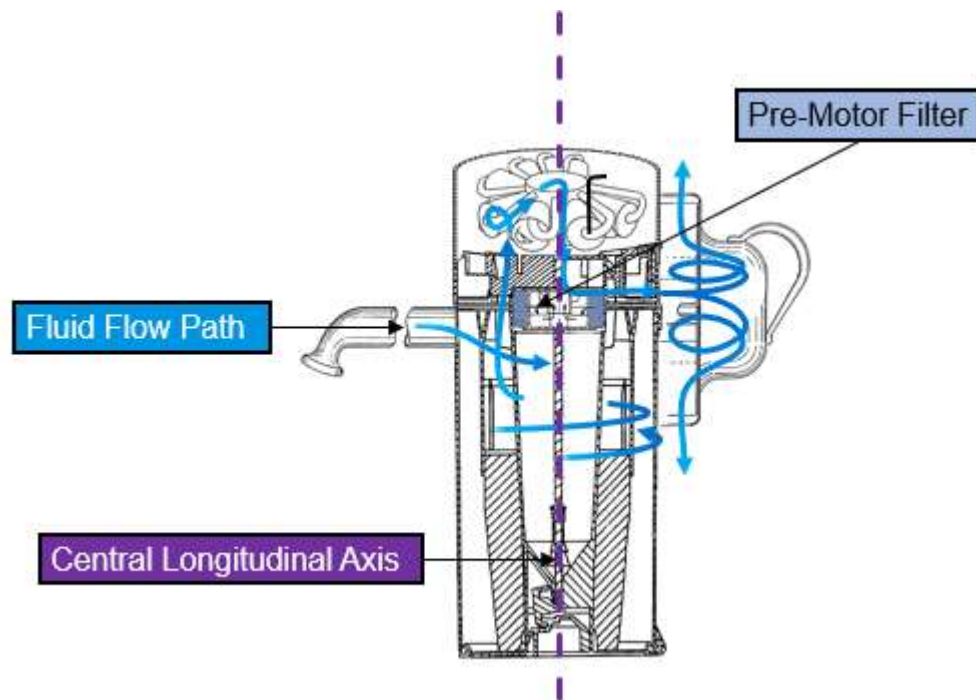
the extent PO argues **central vertical axis 104** does not pass through **filter 86** because it is cylindrical with an annulus, Fester256 teaches **central vertical axis 104** passes directly through the “**filter cage 84**” portion of **filter assembly 82**:



Ex1006, Fig. 3 (excerpted). 6:33-34; *see also* Figs. 1-4.

146. In my opinion, the central longitudinal axis of Fester256 passes through a frame of its pre-motor filter.
147. Further, Fester256 discloses that filter 86 could comprise a “flat foam filter” instead of the annular filter depicted in Figure 4, such that filter 86 would be disk shaped without a hole in its center. Ex1006, 6:42-43. When the “flat foam filter” is implemented, **central vertical axis 104** passes through the **pre-motor filter 86** itself.
148. The combination of Schmidt, Liddell, and Fester256 includes Fester256’s **filter assembly 82**, in either its annular or “flat foam”

configuration, such that the pre-motor filter is positioned downstream from the second cyclonic cleaning stage (Fester's secondary cyclone assembly 100) in the fluid flow path and comprises upstream and downstream sides wherein the central longitudinal axis (Fester256's **central vertical axis 104** or Liddell's central **longitudinal axis 150**, which are coaxial) extends through a volume occupied by the pre-motor filter:



Ex1007, 3(modified); Ex1006, Figs. 3-4; Ex1005, Fig. 3b.

149. A POSA, in my opinion, would have been motivated to arrange Fester256's **filter assembly 82** in rotated orientation in Fester256's standpipe 126 downstream from Fester's second cyclones 102 and

upstream from Liddell's outlet port 126, which leads to Schmidt's motor, as previously explained.

150. A POSA, in my opinion, would have been motivated to route airflow such that air enters the top of **filter assembly 82** and exits the side of the **filter assembly 82** by flipping it upside down so that air can travel as directly as possible through Liddell's outlet port 126, thereby avoiding losses in flow or suction.

151. Thus, in my opinion, a POSA would have understood that Schmidt in combination with Liddell and Fester²⁵⁶ teaches a pre-motor filter positioned in the fluid flow path downstream from the second cyclonic cleaning stage and comprises an upstream side and a downstream side wherein the central longitudinal axis extends through a volume occupied by the pre-motor filter.

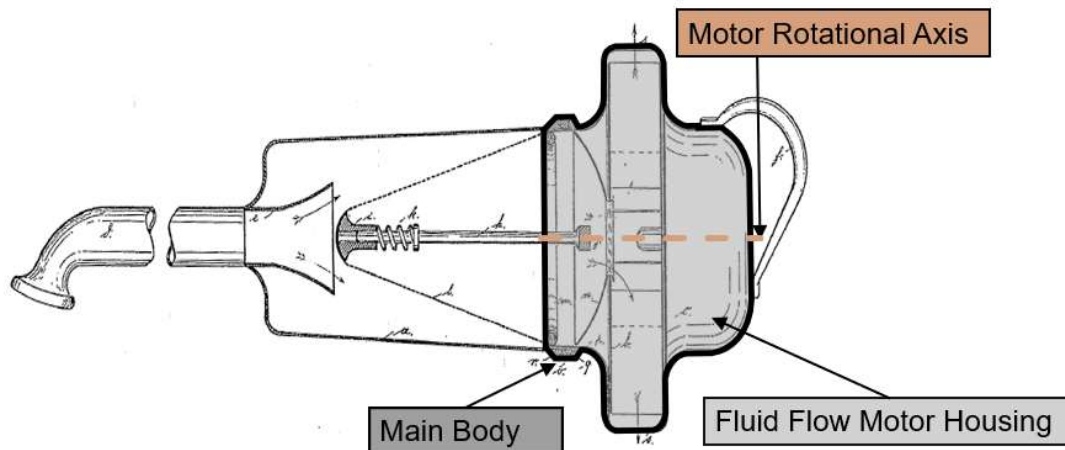
f. [1e]

Reference Number	Claim Limitation
[1e]	"e) the main body comprises a fluid flow motor housing for a fluid flow motor that is disposed in the fluid flow path downstream from the pre-motor filter, wherein the fluid flow motor has a rotational axis and a projection of the rotational axis intersects the central longitudinal axis and the fluid flow motor housing is secured to only a portion of a sidewall of the air treatment portion, wherein"

152. In my opinion, Schmidt in combination with Liddell and Fester²⁵⁶ teaches a main body that comprises a fluid flow motor housing for a

fluid flow motor that is disposed in the fluid flow path downstream from the pre-motor filter, wherein the fluid flow motor has a rotational axis and a projection of the rotational axis intersects the central longitudinal axis and the fluid flow motor housing is secured to only a portion of a sidewall of the air treatment portion.

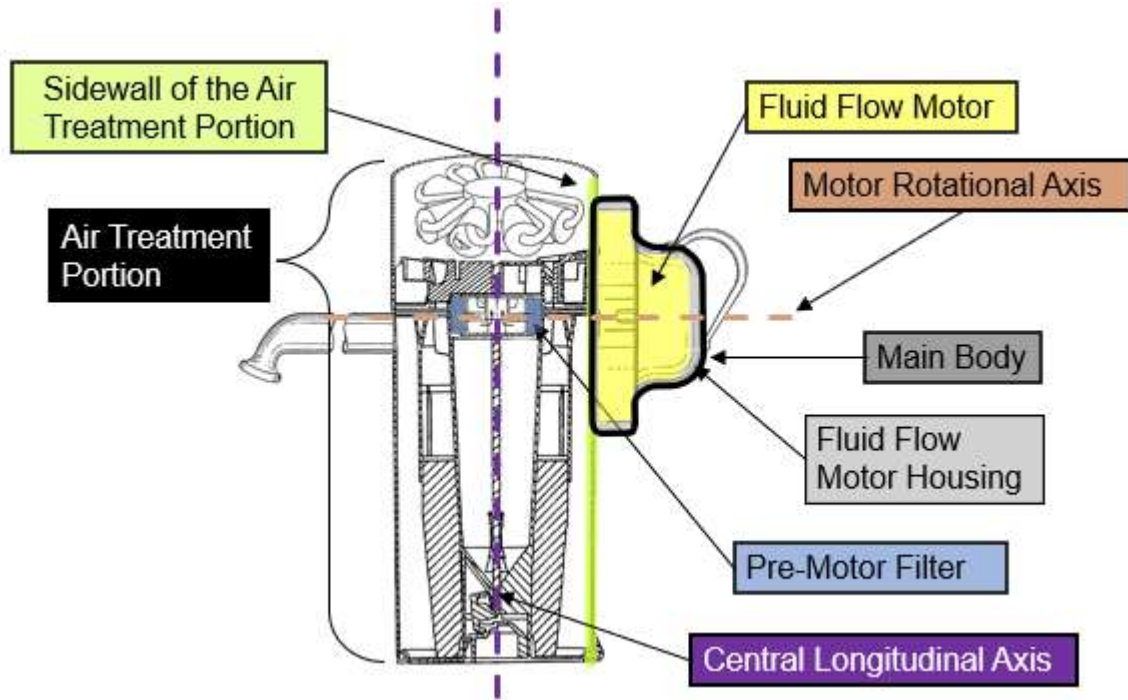
153. Schmidt teaches that the main body (fan housing and housing c) comprises a fluid flow motor housing (housing c) for a fluid flow motor that is disposed in the fluid flow path, wherein the fluid flow motor has a rotational axis. Schmidt teaches that the “housing c encloses the motor, the axis of which carries the turbine b.” Ex1007, 1. A POSA, in my opinion, would have understood that the motor shaft and turbine rotate about this “axis,” defining a rotational axis.



Id., 2, 1.

154. Therefore, the fluid flow motor is downstream of the pre-motor filter

and a projection of the rotational axis of the fluid flow motor intersects the central longitudinal axis. In addition, the housing c is secured to only a portion of the side wall, as shown below:



Ex1007, 3(modified); Ex1006, Figs. 3-4; Ex1005, Fig. 3b.

155. Thus, in my opinion, a POSA would have understood that Schmidt in combination with Liddell and Fester256 teaches a main body that comprises a fluid flow motor housing for a fluid flow motor that is disposed in the fluid flow path downstream from the pre-motor filter, wherein the fluid flow motor has a rotational axis and a projection of the rotational axis intersects the central longitudinal axis and the fluid flow motor housing is secured to only a portion of a sidewall of the air

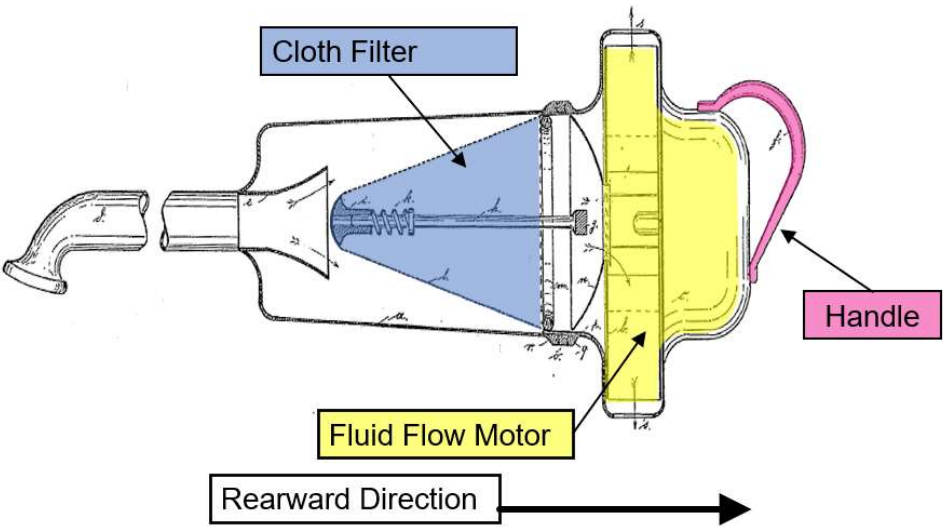
treatment portion.

g. [1f]

Reference Number	Claim Limitation
[1f]	“the fluid flow motor and a handle of the hand vacuum cleaner are positioned rearward of the second cyclonic cleaning stage;”

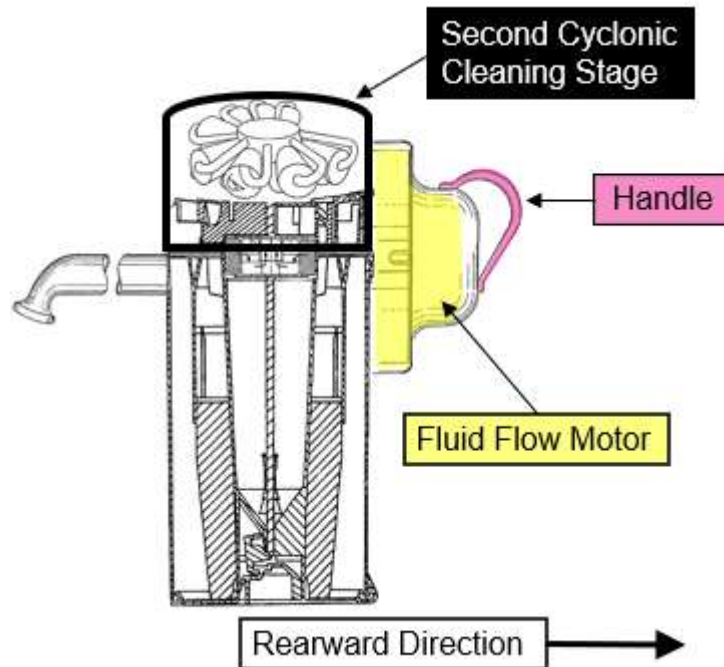
156. In my opinion, Schmidt in combination with Liddell and Fester256 teaches a fluid flow motor and a handle of the hand vacuum cleaner that are positioned rearward of the second cyclonic cleaning stage.

157. Schmidt teaches a hand vacuum with a fluid flow motor and handle f positioned rearward of Schmidt’s cloth dust separation filter:



Ex1007, 2, 3.

158. When Schmidt, Liddell, and Fester256 are combined as I have described in Ground 1, Section 1, the fluid flow motor and handle are positioned rearward of the second cyclonic cleaning stage.



Ex1007, 3(modified); Ex1006, Figs. 3-4; Ex1005, Fig. 3b.

159. Thus, in my opinion, a POSA would have understood that Schmidt in combination with Liddell and Fester256 teaches a fluid flow motor and a handle of the hand vacuum cleaner that are positioned rearward of the second cyclonic cleaning stage.

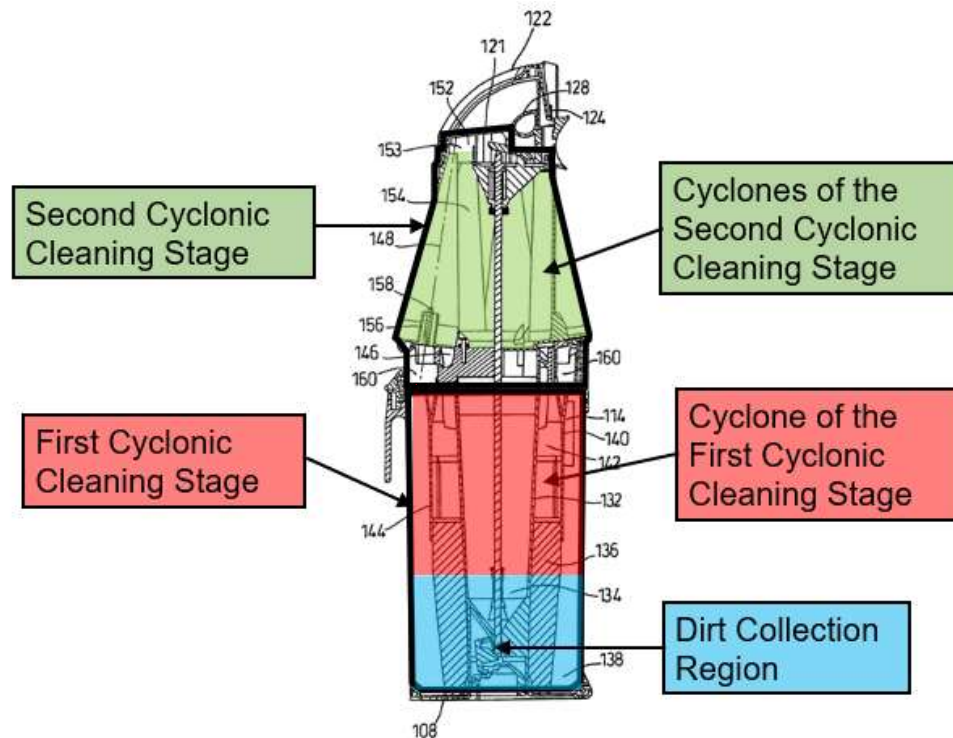
h. [1g]

Reference Number	Claim Limitation
[1g]	“the dirt collection region is positioned beneath and vertically aligned with the cyclones of the first and second cyclonic cleaning stages and the pre-motor filter; and”

160. In my opinion, the combination of Schmidt with Liddell and Fester256 teaches a dirt collection region positioned beneath and vertically aligned with the cyclones of the first and second cyclonic cleaning

stages and the pre-motor filter.

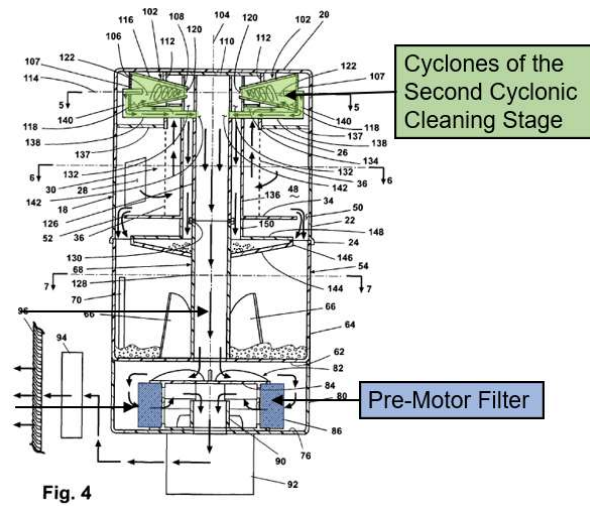
161. Liddell teaches a dirt collection region positioned beneath and vertically aligned with the cyclones of the first and second cyclonic cleaning stages (upstream cyclone 102 and downstream cyclones 104, respectively):



Ex1005 at Fig. 3b, 6:5-10, 7:1-15.

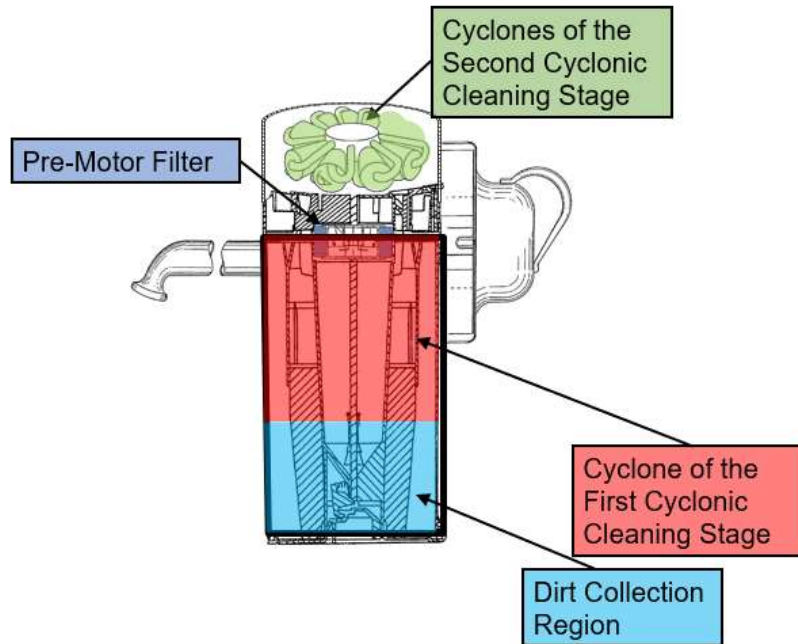
162. Fester256 teaches a **pre-motor filter** (filter assembly 82, with either an annular or disk shaped filter) in the airflow path between **the cyclones of the second cyclonic cleaning stage** and the suction source and upstream from a suction source, such that **the cyclones of the second cyclonic cleaning stage** and **pre-motor filter** are centered on central

vertical axis 104:



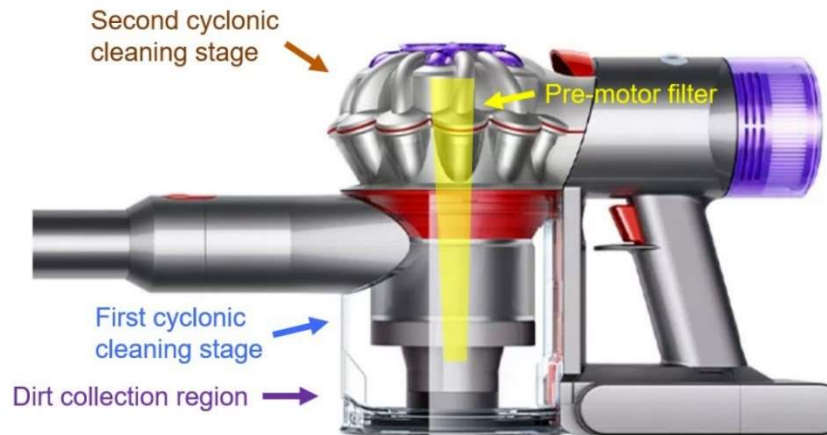
Ex1006, Fig. 4, 5:6-21, 6:33-43.

163. The combination of Schmidt, Liddell, and Fester256 teaches that the dirt collection region (collection spaces 134, 138 of Liddell) is positioned beneath and vertically aligned with the cyclones of the first and second cyclonic cleaning stages (Liddell's upstream cyclone 102 and Fester256's secondary cyclones 102) and the pre-motor filter (Fester256's filter assembly 82):



Ex1007, 3(modified); Ex1006, Figs. 3-4; Ex1005, Fig. 3b.

164. In my opinion, it would have been obvious to a POSA to integrate into the combination a larger pre-motor filter that overlies both of Liddell's collection spaces 134 and 138. A POSA, in my opinion, would have been motivated to use a filter with a large cross-sectional area to minimize the pressure drop across the pre-motor filter and to reduce the frequency of filter cleaning or replacement, and would have had a reasonable expectation of success.
165. In its infringement contentions, PO contends that the accused V8 vacuum meets this limitation despite that the V8's alleged pre-motor filter is narrower than the alleged dirt collection region, which extends to the walls of the alleged first cyclonic cleaning stage:



Ex1019, 19-21, 10-13.

166. To the extent the V8 meets this limitation, the combination here also meets this limitation.

167. Thus, in my opinion, a POSA would have understood that Schmidt in combination with Liddell and Fester256 teaches a dirt collection region positioned beneath and vertically aligned with the cyclones of the first and second cyclonic cleaning stages and the pre-motor filter.

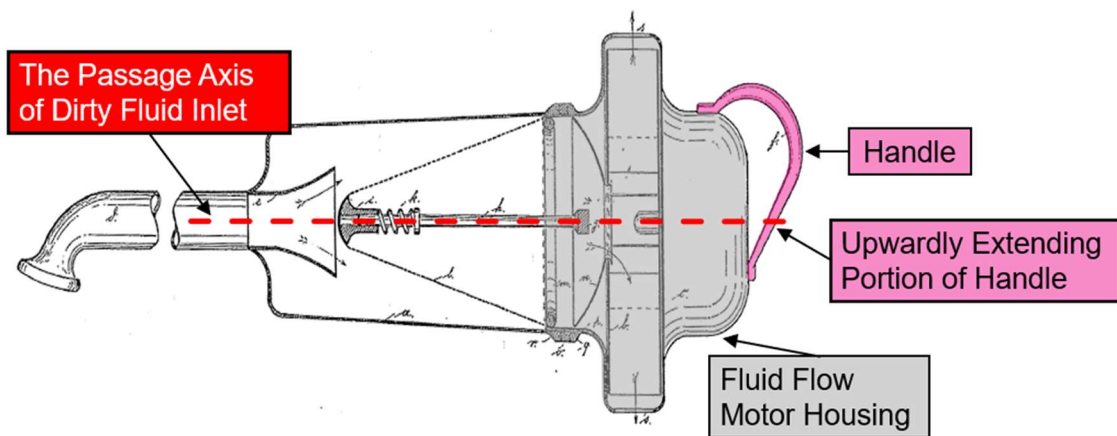
a. [1h]

Reference Number	Claim Limitation
[1h]	“the handle comprises an upwardly extending portion when the hand vacuum cleaner is positioned on a horizontal surface, the upwardly extending portion extends away from the fluid flow motor housing and the passage axis of the dirty fluid inlet intersects the upwardly extending portion of the handle.”

168. In my opinion, the combination of Schmidt, Liddell, and Fester256 teaches a handle comprises an upwardly extending portion when the hand vacuum cleaner is positioned on a horizontal surface, the

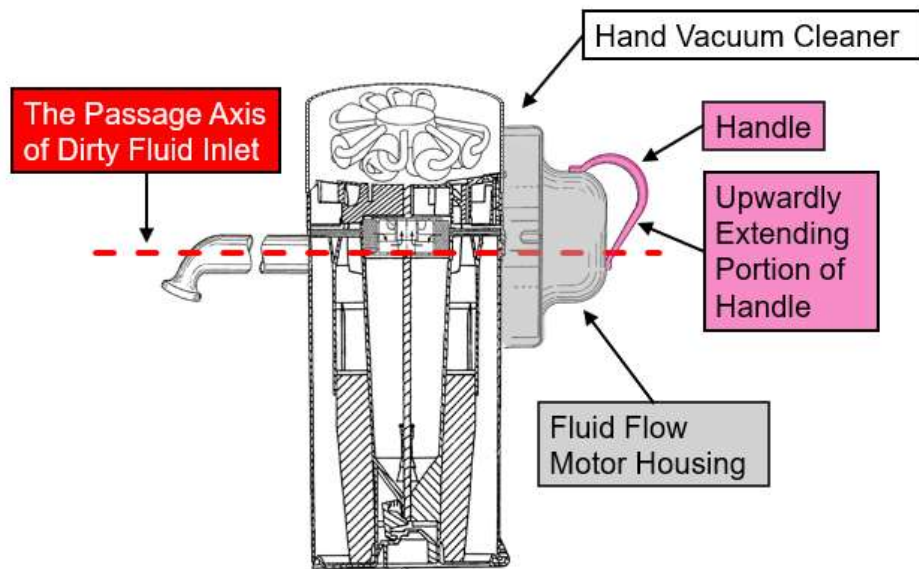
upwardly extending portion extends away from the fluid flow motor housing and the passage axis of the dirty fluid inlet intersects the upwardly extending portion of the handle.

169. Schmidt teaches a handle (handle f) with an upwardly extending portion when the vacuum cleaner is positioned on a horizontal surface is intersected by the passage axis of the dirty fluid inlet:



Ex1007, 2, 3.

170. A POSA, in my opinion, would have understood that the combination of Schmidt, Liddell, and Fester256 has a handle that comprises at least one upwardly extending portion when the hand vacuum cleaner is positioned on a horizontal surface, the upwardly extending portion extends away from the fluid flow motor housing and the passage axis of the dirty fluid inlet intersects the upwardly extending portion of the handle, as shown below.



Ex1007, 2, 3(modified)²; Ex1006, Figs. 3-4; Ex1005, Fig. 3b

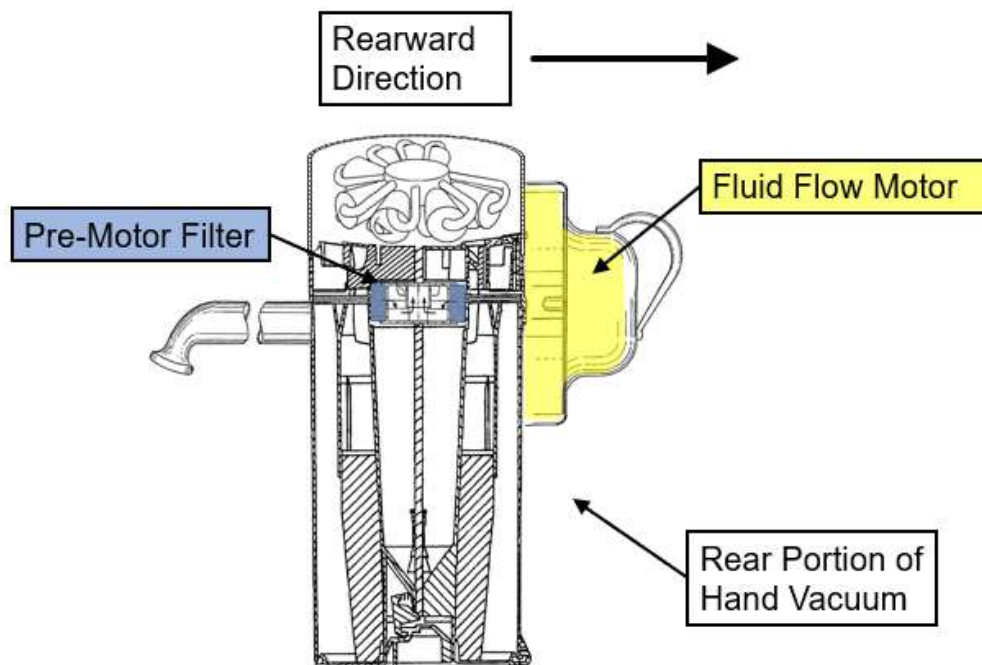
3. Schmidt, Liddell, and Fester²⁵⁶ Render Claim 2 Obvious

² Claim 1 distinguishes between an “axis” and a “projection of” an axis. ’666Patent, Claim 1. PO contends the V8 meets this limitation because a projection of the “passage axis” allegedly intersects the accused V8 vacuum’s handle. Ex1019, 21-23. To the extent the V8 meets this limitation, the combination here does too.



Reference Number	Claim Limitation
[2]	“The hand vacuum cleaner of claim 1, wherein the fluid flow motor is provided in a rear portion of the hand vacuum cleaner and the pre-motor filter is provided forward of the rear portion.”

171. In my opinion, the combination of Schmidt, Liddell, and Fester256 renders the hand vacuum cleaner of claim 1 obvious and further renders obvious a hand vacuum of claim 1 wherein the fluid flow motor is provided in a rear portion of the hand vacuum cleaner and the pre-motor filter is provided forward of the rear portion, and also teaches the limitations of claim 2.
172. In my opinion, the combination of Schmidt, Liddell, and Fester256 renders obvious claim 1. Ground 1, cl. 1.
173. The combination of Schmidt, Liddell, and Fester256 teaches the fluid flow motor (*i.e.*, Schmidt’s motor) is in a rear portion of the combined hand vacuum cleaner and the pre-motor filter (Fester256’s filter assembly 82) is forward of that rear portion:



Ex1007, 2, 3(modified); Ex1006, Figs. 3-4, 5:6-21, 6:33-43; Ex1005, Fig. 3b.

174. In my opinion, a POSA therefore would have understood the combination of Schmidt, Liddell, and Fester²⁵⁶ teaches the limitations of claim 2 and renders the hand vacuum cleaner of claim 1 obvious and further renders obvious that the fluid flow motor is provided in a rear portion of the hand vacuum cleaner and the pre-motor filter is provided forward of the rear portion.

4. Schmidt, Liddell, and Fester²⁵⁶ Render Claim 3 Obvious

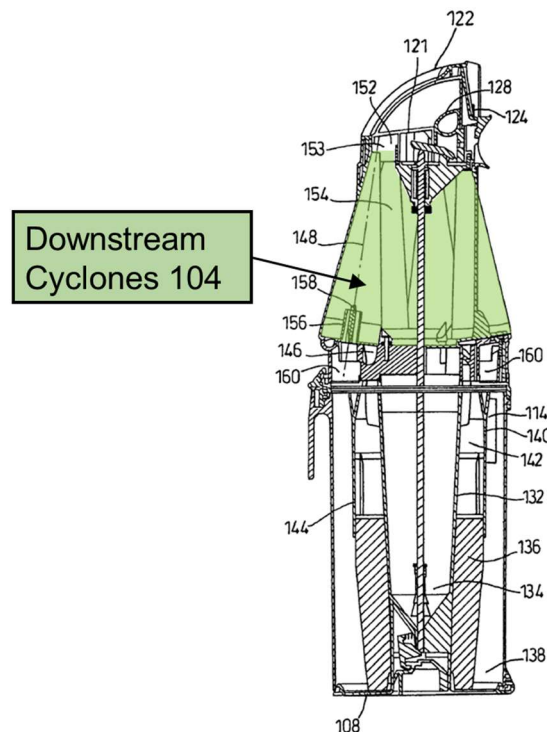
Reference Number	Claim Limitation
[3]	“The hand vacuum cleaner of claim 1, wherein each of the second cyclones are smaller than the first cyclone.”

175. In my opinion, the combination of Schmidt, Liddell, and Fester²⁵⁶

renders the hand vacuum cleaner of claim 1 obvious and further renders obvious a hand vacuum of claim 1 wherein each of the second cyclones are smaller than the first cyclone, and also teaches the limitations of claim 3.

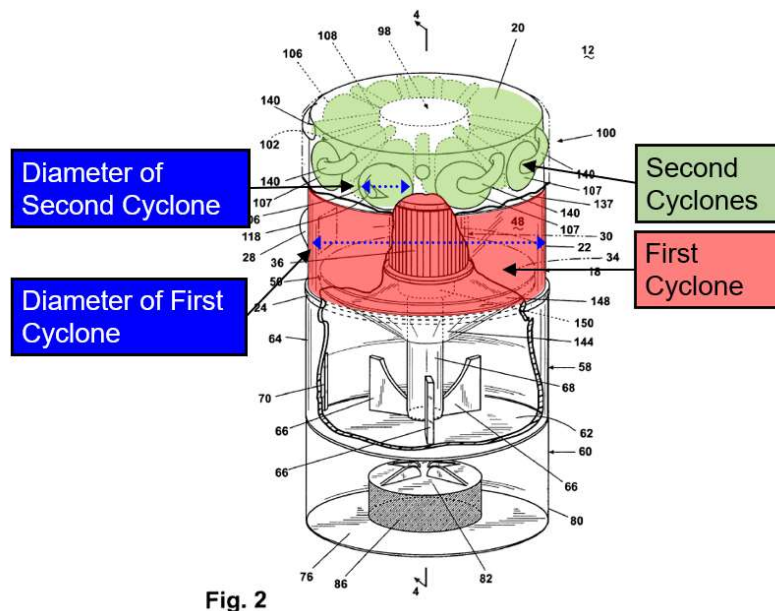
176. In my opinion, the combination of Schmidt, Liddell, and Fester²⁵⁶ renders obvious claim 1. Ground 1, cl. 1.

177. Liddell teaches that each of its second cyclones (downstream cyclones 104) are smaller than its first cyclone (upstream cyclone 102), as there are a plurality of second cyclones and a single first cyclone and each second cyclone has a smaller diameter than the diameter of the first cyclone:



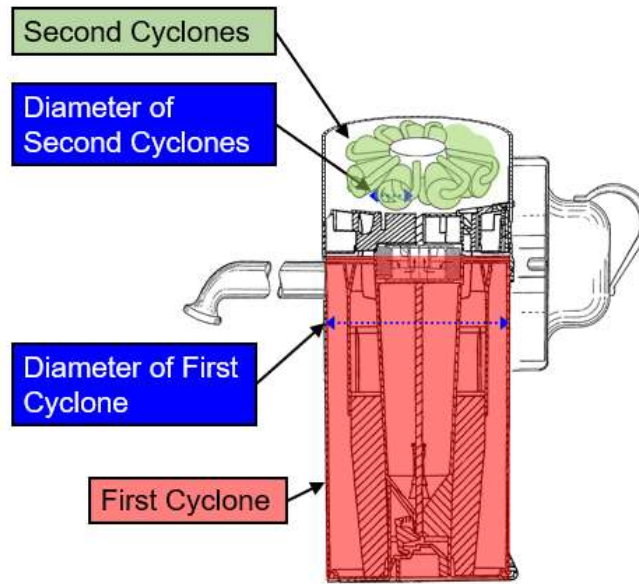
Ex1005, Fig. 3b.

178. Similarly, Fester256 teaches that each of its **second cyclones** (secondary cyclones 102) are smaller than its **first cyclone** (first cyclonic chamber 48), as each second cyclone has a smaller diameter than the first cyclone:



Ex1006, Fig. 2, 5:6-55, Fig. 4.

179. Because both Liddell and Fester256 teach that their second cyclones are smaller than the first cyclone, in my opinion the combination of Schmidt, Liddell, and Fester256 teaches that each of the second cyclones (Fester256's secondary cyclones 102) are smaller than the first cyclone (Liddell's upstream cyclone 102):



Ex1007, 3(modified); Ex1006, Figs. 3-4; Ex1005, Fig.3b.

180. A POSA, in my opinion, therefore would have understood the combination of Schmidt, Liddell, and Fester256 to teach the limitations of claim 3 and to render the hand vacuum cleaner of claim 1 obvious and further renders obvious that each of the second cyclones are smaller than the first cyclone.

5. Schmidt, Liddell, and Fester256 Render Claim 4 Obvious

Reference Number	Claim Limitation
[4]	“The hand vacuum cleaner of claim 1, wherein the fluid flow motor is rearward of the second cyclonic cleaning stage and air travels downwardly through the central portion prior to travelling rearwardly to the fluid flow motor.”

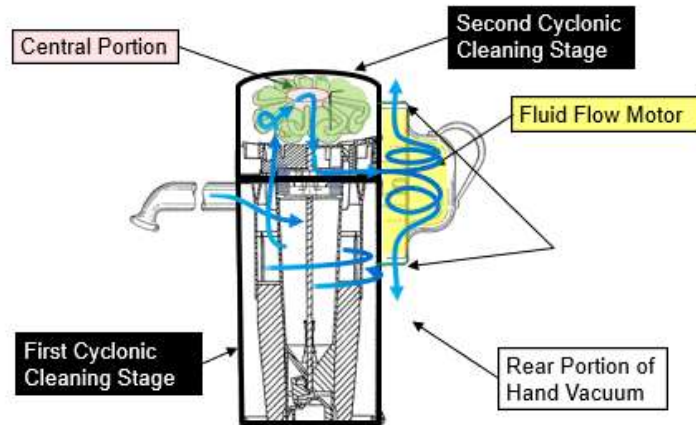
181. In my opinion, the combination of Schmidt, Liddell, and Fester256 renders the hand vacuum cleaner of claim 1 obvious and further renders

obvious a hand vacuum of claim 1 wherein the fluid flow motor is rearward of the second cyclonic cleaning stage and air travels downwardly through the central portion prior to travelling rearwardly to the fluid flow motor, and teaches the limitations of claim 4.

182. In my opinion, the combination of Schmidt, Liddell, and Fester²⁵⁶ renders obvious claim 1. Ground 1, cl. 1.

183. As discussed with regard to Ground 1, [1c], it is my opinion that a POSA would have understood that Schmidt in combination with Liddell and Fester²⁵⁶ teaches a second cyclonic cleaning stage that comprises a plurality of cyclones in parallel arranged around a central portion and, after exiting the second stage cyclones, air enters an upper portion of the central portion and exits the central portion at a position below the upper portion where the air enters the central portion.

184. Further, the combination of Schmidt, Liddell, and Fester²⁵⁶ teaches that the fluid flow motor (Schmidt's motor) is positioned rearward of the second cyclonic cleaning stage and air travels downwardly through the central portion (Fester²⁵⁶'s exhaust chamber 142 of the upper standpipe 126) before traveling rearwardly to the fluid flow motor (Schmidt's motor):



Ex1007, 2, 3(modified); Ex1006, Figs. 3-5, 5:6-31, 8:44-47; Ex1005, Fig. 3b.

185. A POSA, in my opinion, therefore would have understood the combination of Schmidt, Liddell, and Fester256 teaches the limitations of claim 4 and renders the hand vacuum cleaner of claim 1 obvious and further renders obvious that the fluid flow motor is rearward of the second cyclonic cleaning stage and air travels downwardly through the central portion prior to travelling rearwardly to the fluid flow motor.

6. Schmidt, Liddell, and Fester256 Render Claim 5 Obvious

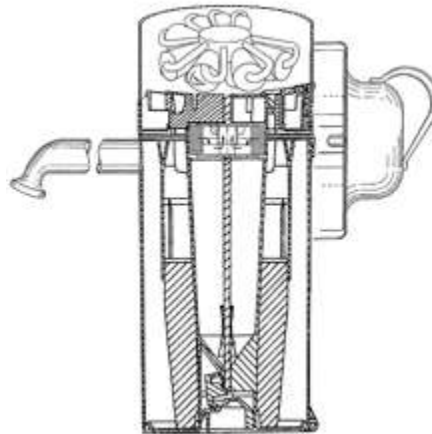
Reference Number	Claim Limitation
[5]	"The hand vacuum cleaner of claim 1, wherein the dirty air inlet has a central longitudinal axis and a projection of the dirty air inlet central longitudinal axis intersects the second cyclonic cleaning stage."

186. In my opinion, the combination of Schmidt, Liddell, and Fester256 renders the hand vacuum cleaner of claim 1 obvious and further renders obvious a hand vacuum of claim 1 wherein the dirty air inlet has a

central longitudinal axis and a projection of the dirty air inlet central longitudinal axis intersects the second cyclonic cleaning stage, and teaches the limitations of claim 5.

187. In my opinion, the combination of Schmidt, Liddell, and Fester²⁵⁶ renders obvious claim 1. Ground 1, cl. 1.

188. As discussed above, in my opinion a POSA would have understood that Schmidt's suction pipe d connects to Liddell's upstream cyclone unit 101 through inlet port 114, which is moved to the front of the of the Liddell dust separator.

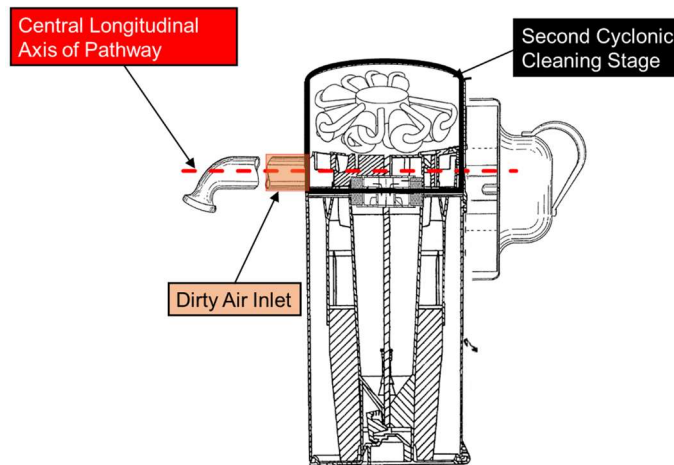


Ex1007, 3(modified); Ex1006, Figs. 3-4; Ex1005, Fig.3b.

189. In my opinion, a POSA, in my opinion, would have been motivated to move the dirty air inlet to a position that would improve ergonomics and usability. In addition, a POSA would have been motivated to improve usability by moving the dirty air inlet upwards because a user

would then be able to maneuver and observe the dirty air inlet while vacuuming. This configuration also allows the shortest dirty air pathway into the first cyclonic stage that accomplishes such usability minimizing cost to manufacture longer pathways. This includes moving the dirty air inlet upwards such that it enters at the level of the second cyclonic cleaning stage. A POSA, in my opinion, would have recognized it would have been a design choice to modify the vacuum to have the Schmidt's main body, including the handle, or the dirty air inlet slightly higher or lower. In my opinion, a POSA would have recognized that, at a minimum, it was obvious to try to the dirty air inlet upwards because there were finite number of identified, predictable positions at which to position the dirty air inlet on the vacuum, and a POSA would have had a reasonable expectation of success selecting a location near the second cyclonic cleaning stage.

190. Thus, the combined teachings of Schmidt, Liddell, and Fester, renders obvious a dirty air inlet with a central longitudinal axis and a projection of the dirty air that intersects the second cyclonic cleaning stage.



Ex1007, 3(modified); Ex1006, Figs. 3-4; Ex1005, Fig.3b.

191. A POSA, in my opinion, therefore would have understood the combination of Schmidt, Liddell, and Fester256 teaches the limitations of claim 5 and renders the hand vacuum cleaner of claim 1 obvious and further renders obvious that the fluid flow motor is rearward of the second cyclonic cleaning stage and air travels downwardly through the central portion prior to travelling rearwardly to the fluid flow motor.

7. Schmidt, Liddell, and Fester256 Render Claim 6 Obvious

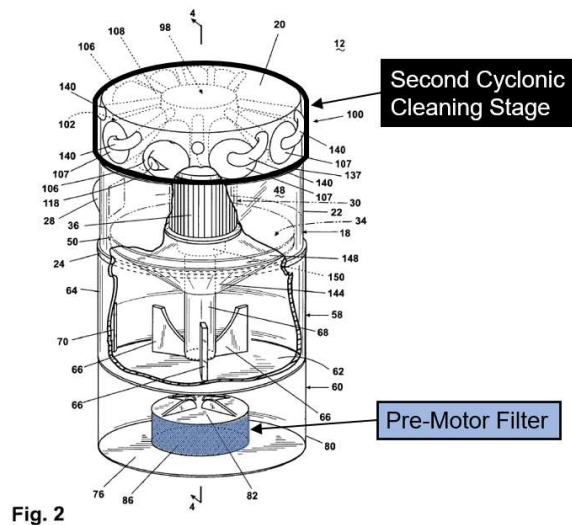
Reference Number	Claim Limitation
[6]	“The hand vacuum cleaner of claim 1, wherein a lower end of the pre-motor filter is located below a lower end of the second cyclonic cleaning stage.”

192. In my opinion, the combination of Schmidt, Liddell, and Fester256 renders the hand vacuum cleaner of claim 1 obvious and further renders obvious a hand vacuum of claim 1 wherein a lower end of the pre-motor

filter is located below a lower end of the second cyclonic cleaning stage, and teaches the limitations of claim 6.

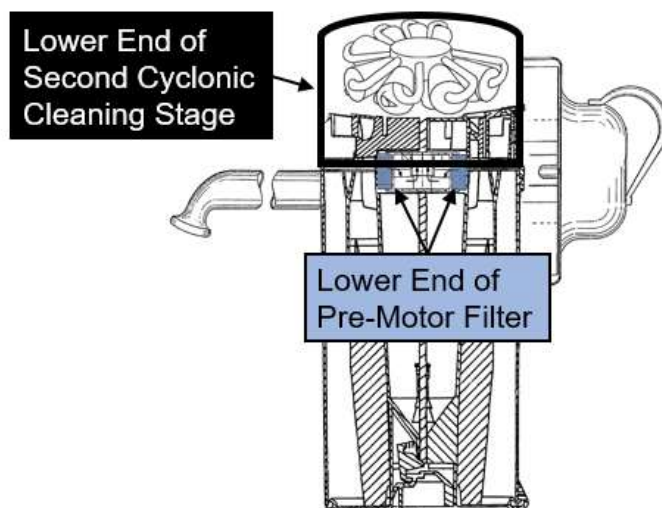
193. In my opinion, the combination of Schmidt, Liddell, and Fester256 renders obvious claim 1. Ground 1, cl. 1.

194. Fester256 teaches a pre-motor filter (filter assembly 82) located below a lower end of the second cyclonic cleaning stage (secondary cyclone assembly 100).



Ex1006, Fig. 2; Ex1006, Fig. 4.

195. When Schmidt, Liddell, and Fester256 are combined as I have described in Ground 1, Section 1, the pre-motor filter (and thus the lower end of the pre-motor filter) is located below the lower end of the second cyclonic cleaning stage:



Ex1007, 3(modified); Ex1006, Figs. 3-4; Ex1005, Fig.3b.

196. A POSA therefore would have understood the combination of Schmidt, Liddell, and Fester256 teaches the limitations of claim 6 and renders the hand vacuum cleaner of claim 1 obvious and further renders obvious that a lower end of the pre-motor filter is located below a lower end of the second cyclonic cleaning stage.

8. Schmidt, Liddell, and Fester256 Render Claim 7 Obvious

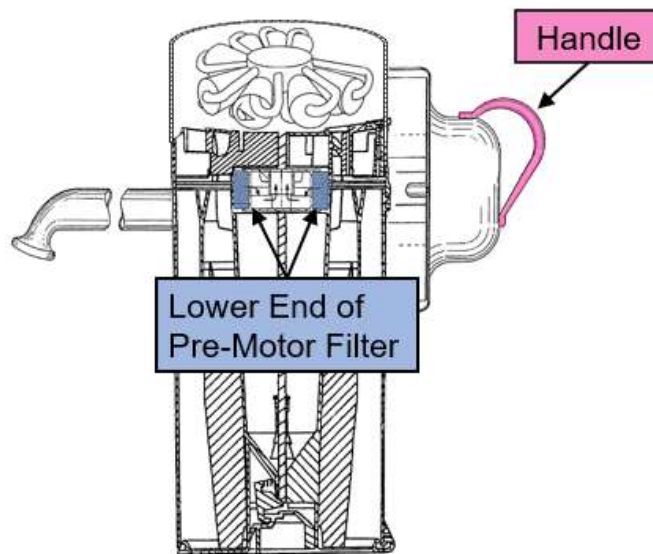
Reference Number	Claim Limitation
[7]	“The hand vacuum cleaner of claim 1, wherein a portion of a handle of the hand vacuum cleaner is located above a lower end of the pre-motor filter.”

197. In my opinion, the combination of Schmidt, Liddell, and Fester256 renders the hand vacuum cleaner of claim 1 obvious and further renders obvious a hand vacuum of claim 1 wherein a portion of a handle of the

hand vacuum cleaner is located above a lower end of the pre-motor filter, and teaches the limitations of claim 7.

198. In my opinion, the combination of Schmidt, Liddell, and Fester256 renders obvious claim 1. Ground 1, cl. 1.

199. The combination of Schmidt, Liddell, and Fester256 teaches that a portion of the hand vacuum cleaner's handle (Schmidt's handle f) is located above a lower end of the pre-motor filter (Fester256's filter assembly 82).



Ex1007, 3(modified); Ex1006, Figs. 3-4; Ex1005, Fig.3b.

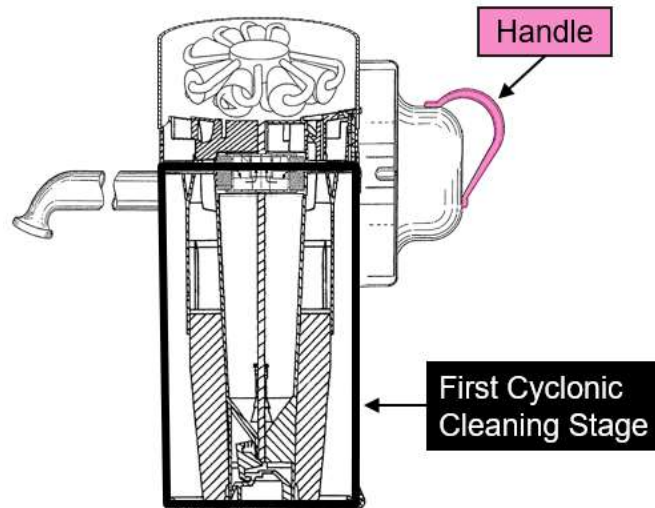
200. A POSA, in my opinion, therefore would have understood the combination of Schmidt, Liddell, and Fester256 teaches the limitations of claim 7 and renders the hand vacuum cleaner of claim 1 obvious and further renders obvious that a portion of a handle of the hand vacuum

cleaner is located above a lower end of the pre-motor filter.

9. Schmidt, Liddell, and Fester²⁵⁶ Render Claim 8 Obvious

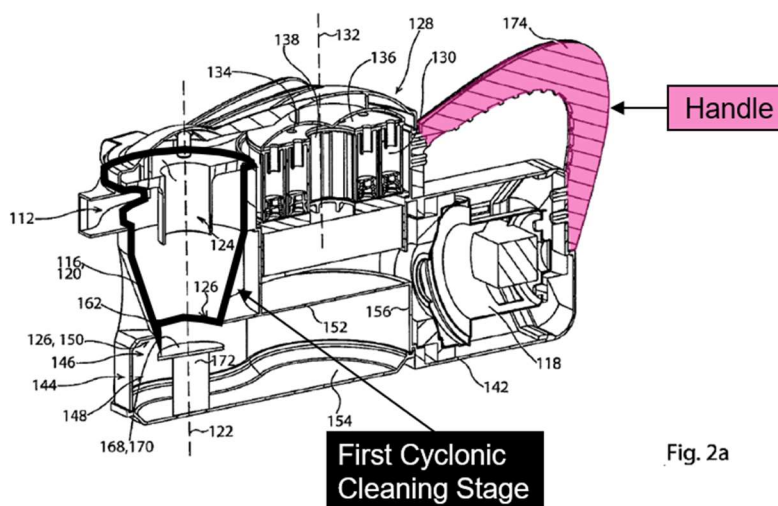
Reference Number	Claim Limitation
[8]	“The hand vacuum cleaner of claim 1 wherein an end of the handle is mounted to the hand vacuum cleaner at a position adjacent an upper end of the first cyclonic cleaning stage.”

201. In my opinion, the combination of Schmidt, Liddell, and Fester²⁵⁶ renders the hand vacuum cleaner of claim 1 obvious and further renders obvious a hand vacuum of claim 1 wherein an end of the handle is mounted to the hand vacuum cleaner at a position adjacent an upper end of the first cyclonic cleaning stage, and teaches the limitations of claim 8.
202. In my opinion, the combination of Schmidt, Liddell, and Fester²⁵⁶ renders obvious claim 1. Ground 1, cl. 1.
203. The combination of Schmidt, Liddell, and Fester²⁵⁶ teaches that an end of the handle (Schmidt’s handle f) is mounted to the hand vacuum cleaner at a position adjacent an upper end of the first cyclonic cleaning stage.



Ex1007, 3(modified); Ex1006, Figs. 3-4; Ex1005, Fig. 3b, 5:20-24.

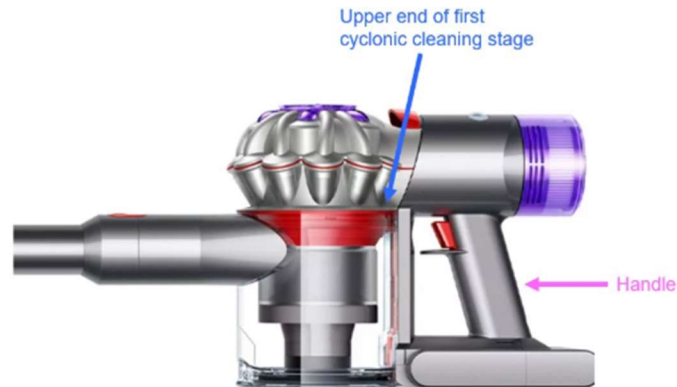
204. This handle (Schmidt's handle f) is adjacent the upper end of the first cyclonic cleaning stage to the same extent as the '666Patent's embodiments, which depict handle 174 mounted to the vacuum at a position displaced from cyclonic cleaning stage 116.



Ex1001, Fig. 2a, 4:1-7, 7:32-34.

205. This handle (Schmidt's handle f) is also adjacent the upper end of the

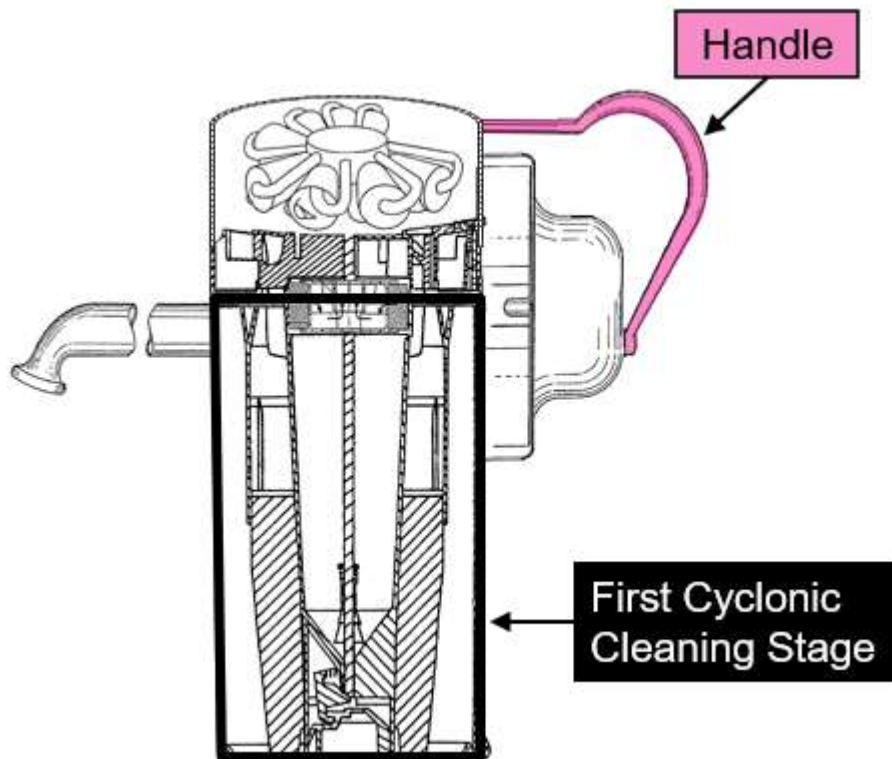
first cyclonic cleaning stage to the same extent as the accused V8 vacuum, in which the alleged handle is mounted on the vacuum at a position that is displaced from the alleged upper end of the alleged first cyclonic cleaning stage:



Ex1019, 30.

206. A POSA, in my opinion, would have found it obvious to mount the handle at a location adjacent an upper end of the first cyclonic cleaning stage. A POSA, in my opinion, would have been motivated to mount the handle a location on the vacuum that would improve the maneuverability, balance and ergonomics of the handle. *Id.* For example, the prior art teaches attaching the handle near the center of gravity of the vacuum to allow a user to easily manipulate the vacuum with one hand. *See* Ex1011, 2:25-29. In this case, the center of gravity of the hand vacuum created when the teachings of Schmidt, Liddell, and Fester²⁵⁶ are combined would be near Schmidt's motor, such that

mounting the handle close to the upper end of the first cyclonic cleaning stage would make the vacuum weight-balanced and easy to carry. Further, in my opinion, a POSA would have recognized that, at a minimum, it was obvious to try to connect the handle adjacent to the upper end of the first cyclonic cleaning stage because there were finite number of identified, predictable positions at which to mount the handle to the vacuum, and a POSA would have had a reasonable expectation of success selecting a location adjacent the upper end of the first cyclonic cleaning stage.



Ex1007, 3(modified); Ex1006, Figs. 3-4; Ex1005, Fig. 3b.

207. A POSA, in my opinion, therefore would have understood the combination of Schmidt, Liddell, and Fester²⁵⁶ teaches the limitations of claim 8 and renders the hand vacuum cleaner of claim 1 obvious and further renders obvious that an end of the handle is mounted to the hand vacuum cleaner at a position adjacent an upper end of the first cyclonic cleaning stage.

10. Schmidt, Liddell, and Fester²⁵⁶ Render Claim 9 Obvious

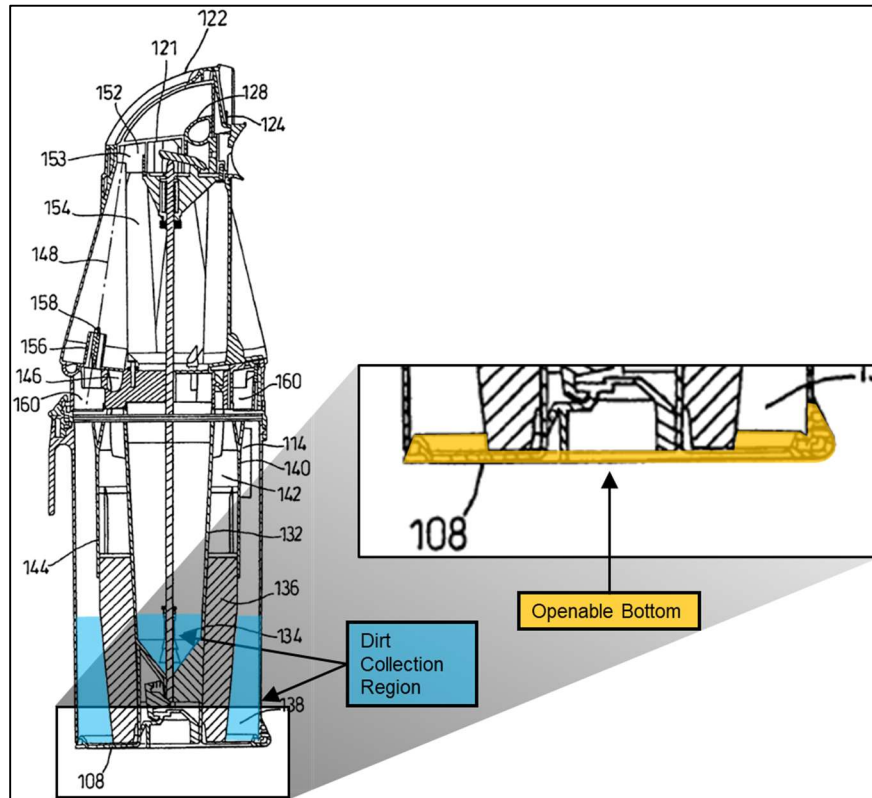
Reference Number	Claim Limitation
[9]	“The hand vacuum cleaner of claim 1 wherein the dirt collection region has a pivotally openable bottom.”

208. In my opinion, the combination of Schmidt, Liddell, and Fester²⁵⁶ renders the hand vacuum cleaner of claim 1 obvious and further renders obvious a hand vacuum of claim 1 wherein the dirt collection region has a pivotally openable bottom, and teaches the limitations of claim 9.

209. In my opinion, the combination of Schmidt, Liddell, and Fester²⁵⁶ renders obvious claim 1. Ground 1, cl. 1.

210. Liddell teaches a dirt collection region with a pivotally openable bottom. Liddell explains that “upstream cyclone 102 consists essentially of a cylindrical bin 106 having a closed base 108,” and that there is “an actuating lever 128 designed to activate a mechanism of opening the base 108 of the cylindrical bin 106 for emptying purposes.”

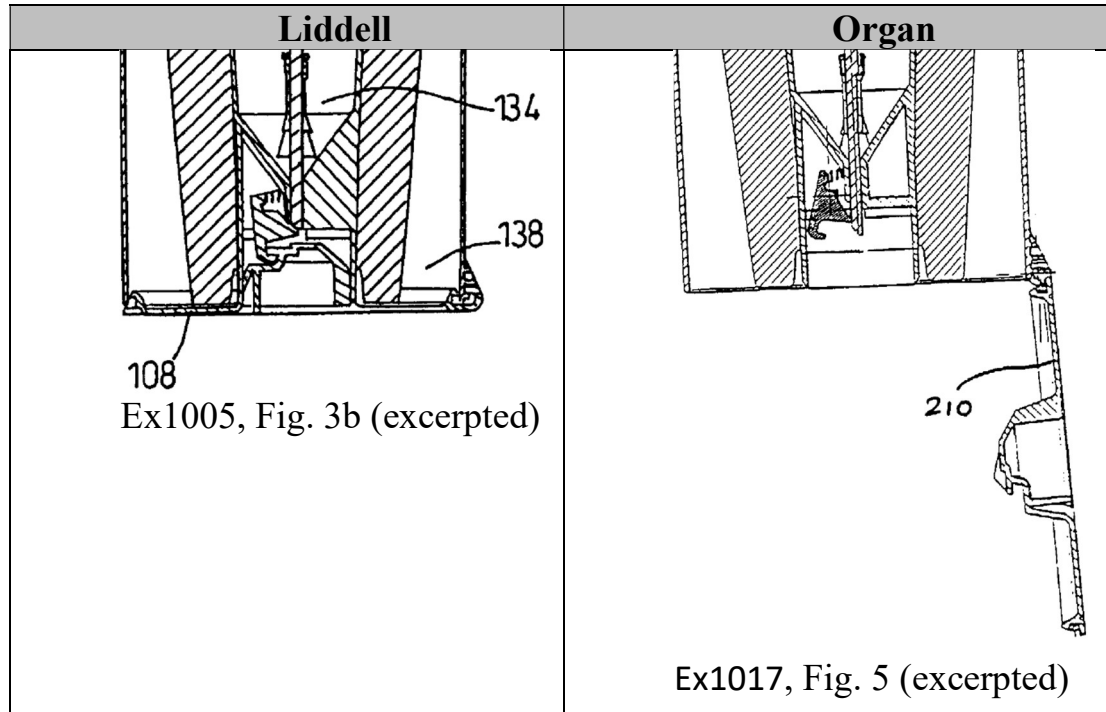
Ex1005, 5:20-24, 6:23-25. Liddell's openable bottom is illustrated in its figures:



Ex1005, Fig. 3b.

211. Liddell does not disclose “the precise details and operation” of the components that “allow[] the base 108 to open when the actuating lever 128 is actuated.” *Id.*, 7:6-8. A POSA, in my opinion, would have understood that base 108 of Liddell is pivotally openable because of their education training and experience but also because other prior art depicts openable bases with the same design as Liddell. For example, Organ teaches an openable base with the same design as Liddell and

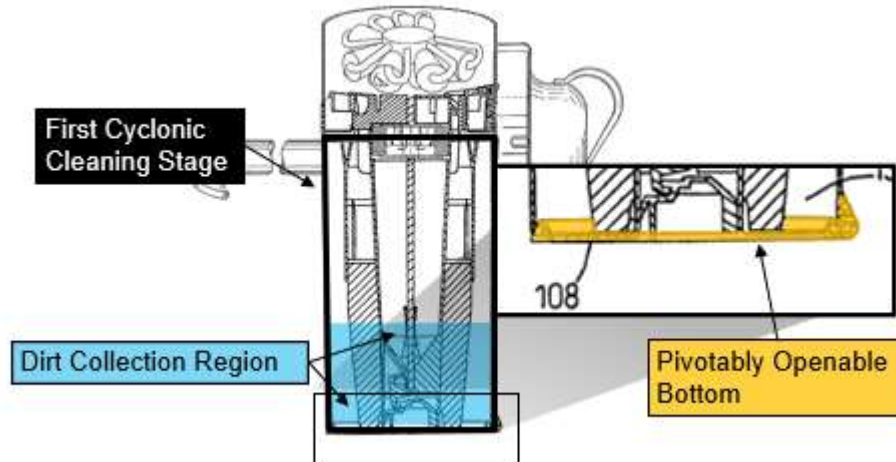
teaches “base 210 is hinged 214 to the cyclone chamber 205 to allow pivotal movement.” Ex1017, 8:10-14.



212. Further, it would be obvious to a POSA, in my opinion, to make the bottom pivotably open. A POSA would have been motivated to make this modification based on Organ’s teachings, which explain that because “dirt collects against the part of the chamber which opens ... the dirt falls out of the chamber [] with little or no additional effort by a user,” and that “[d]ue to the distance between the handle and base, ... a user is not brought into contact with the dirt.” Ex1017, 10:21-24. A POSA would have understood that if Liddell’s base 108 were not pivotably openable, and instead had to be manually opened by a user,

the user would have to undergo additional effort and would be brought in close contact with the dirt that collected against base 108. At a minimum, a POSA would have found it obvious to try to make Liddell's base 108 pivotably openable, in my opinion, because there were finite number of identified, predictable ways to open the bottom, and a POSA would have had a reasonable expectation of success, including based on the teachings of Organ.

213. Thus, a POSA would have understood that the combination of Schmidt, Liddell, and Fester²⁵⁶ teaches that the dirt collection region (Liddell's dirt collection region) has a pivotably openable bottom:



Ex1007, 3(modified); Ex1006, Figs. 3-4; Ex1005, Fig. 3b, 5:19-24.

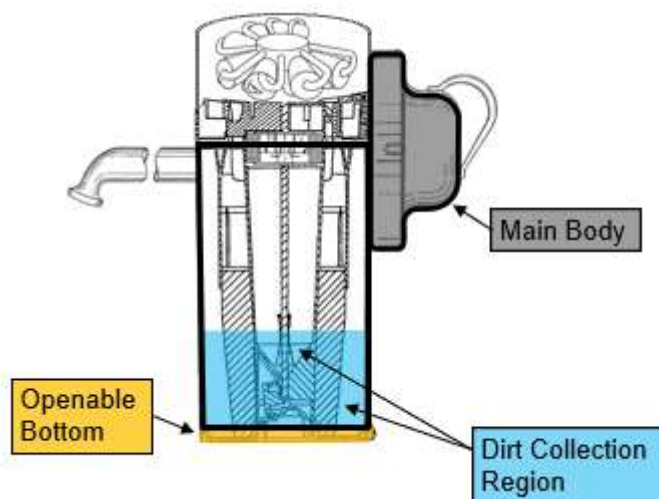
214. A POSA, in my opinion, therefore would have understood the combination of Schmidt, Liddell, and Fester²⁵⁶ teaches the limitations of claim 9 and renders the hand vacuum cleaner of claim 1 obvious and

further renders obvious that the dirt collection region has a pivotally openable bottom.

11. Schmidt, Liddell, and Fester²⁵⁶ Render Claim 10 Obvious

Reference Number	Claim Limitation
[10]	“The hand vacuum cleaner of claim 9 wherein the bottom is openable when the dirt collection region is attached to the main body.”

215. In my opinion, the combination of Schmidt, Liddell, and Fester²⁵⁶ renders the hand vacuum cleaner of claim 9 obvious and further renders obvious a hand vacuum of claim 9 wherein the bottom is openable when the dirt collection region is attached to the main body, and teaches the limitations of claim 10.
216. In my opinion, the combination of Schmidt, Liddell, and Fester²⁵⁶ renders obvious claim 9, including that the dirt collection region has a pivotally openable bottom. Ground 1, cl. 9.
217. When Schmidt, Liddell, and Fester²⁵⁶ are combined as I have described in Ground 1, Section 1, the pivotally openable bottom of the dirt collection region is openable when the dirt collection region is attached to the main body because there is no structure that would prevent the dirt collection region’s openable bottom from opening:



Ex1007, 3(modified); Ex1006, Figs. 3-4; Ex1005, Fig. 3b, 6:23-25.

218. A POSA, in my opinion, therefore would have understood the combination of Schmidt, Liddell, and Fester²⁵⁶ teaches the limitations of claim 10 and renders the hand vacuum cleaner of claim 9 obvious and further renders obvious that the bottom is openable when the dirt collection region is attached to the main body.

12. Schmidt, Liddell, and Fester²⁵⁶ Render Claim 11 Obvious

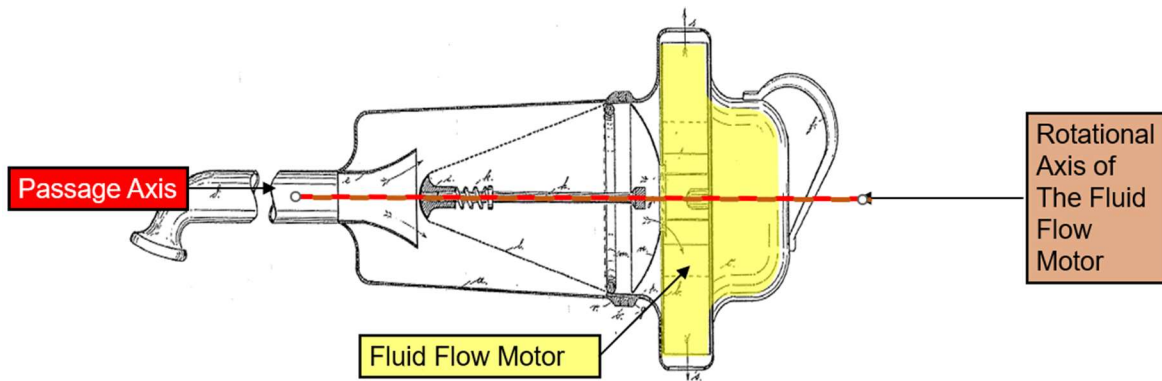
Reference Number	Claim Limitation
[11]	“The hand vacuum cleaner of claim 1 wherein the rotational axis of the fluid flow motor is displaced from the passage axis in a direction parallel to the central longitudinal axis.”

219. In my opinion, the combination of Schmidt, Liddell, and Fester²⁵⁶ renders the hand vacuum cleaner of claim 1 obvious and further renders obvious a hand vacuum of claim 1 wherein the rotational axis of the

fluid flow motor is displaced from the passage axis in a direction parallel to the central longitudinal axis, and teaches the limitations of claim 11.

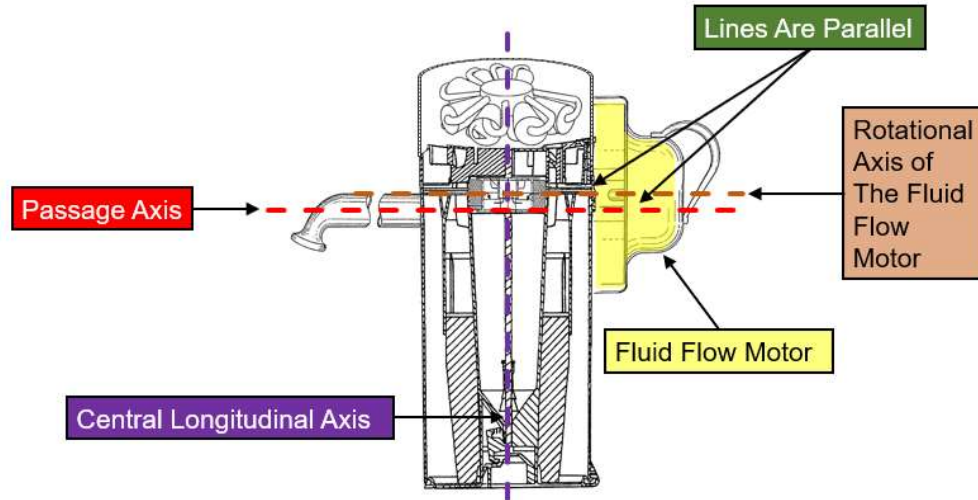
220. In my opinion, the combination of Schmidt, Liddell, and Fester²⁵⁶ renders obvious claim 1. Ground 1, cl. 1.

221. Schmidt teaches a rotational axis of the fluid flow motor that is coaxial with the passage axis.



Ex1007, 3.

222. It would have been obvious to a POSA, in my opinion, to offset the rotational and passage axes such that the rotational axis of the fluid flow motor is displaced from the passage axis in a direction parallel to the central longitudinal axis.



Ex1007, 3(modified); Ex1006, Figs. 3-4; Ex1005, Fig.3b.

223. A POSA, in my opinion, would have been motivated to move Schmidt's suction pipe d (and by extension, the passage axis) close to the top of Liddell's cylindrical bin 106, to reduce the likelihood that Liddell's inlet port 114 would clog with debris when the bin became full. This modification would have been obvious to try. A POSA, in my opinion, would have recognized there were a limited number of ways to arrange the dirty air inlet (and by extension, the passage axis) and the motor (and by extension, the rotational axis), and configurations in which the passage and rotational axes are offset from one another meets the claims.

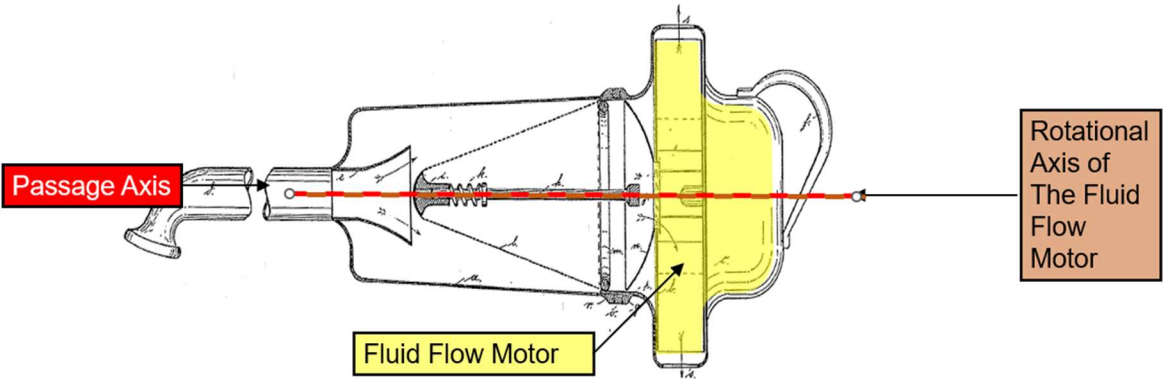
224. A POSA therefore would have understood the combination of Schmidt, Liddell, and Fester²⁵⁶ teaches the limitations of claim 11 and renders the hand vacuum cleaner of claim 1 obvious and further renders obvious

that the rotational axis of the fluid flow motor is displaced from the passage axis in a direction parallel to the central longitudinal axis.

13. Schmidt, Liddell, and Fester256 Render Claim 12 Obvious

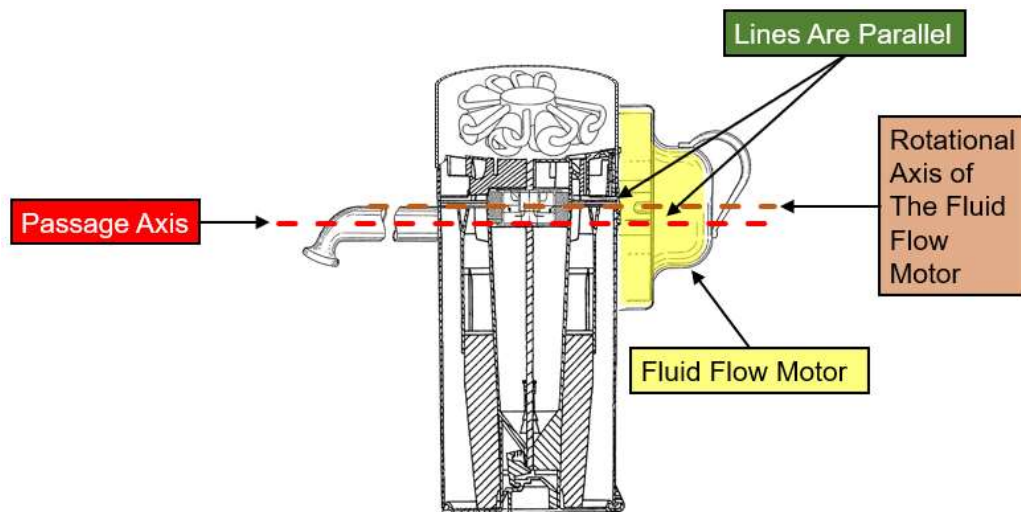
Reference Number	Claim Limitation
[12]	“The hand vacuum cleaner of claim 11 wherein the rotational axis of the fluid flow motor is parallel to the passage axis.”

225. In my opinion, the combination of Schmidt, Liddell, and Fester256 renders the hand vacuum cleaner of claim 11 obvious and further renders obvious a hand vacuum of claim 11 wherein the rotational axis of the fluid flow motor is parallel to the passage axis, and teaches the limitations of claim 12.
226. In my opinion, the combination of Schmidt, Liddell, and Fester256 renders obvious claim 11. Ground 1, cl. 11.
227. As discussed above, Schmidt teaches a rotational axis of the fluid flow motor that is coaxial with its passage axis:



Ex1007, 3.

228. In my opinion, it would have been obvious to a POSA to use a passage axis that is perpendicular to the height of the vacuum to maximize the cyclonic effect created in the cyclone. Because the motor and blower rotate, aligning the axis perpendicularly to the vertical axis of Liddell minimizes the size of the vacuum and maximizes maneuverability and comfort. Such an arrangement corresponds to Schmidt's depiction which aligns the motor and blower axis parallel with the inlet passage axis as well.



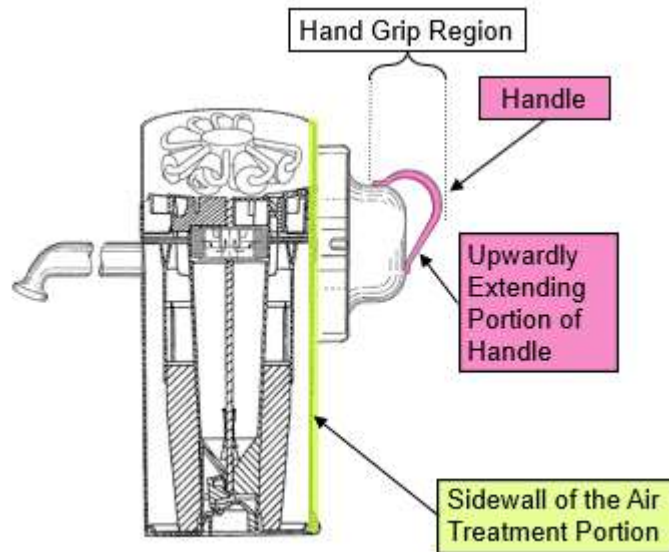
Ex1007, 3(modified); Ex1006, Figs. 3-4; Ex1005, Fig.3b.

229. A POSA, in my opinion, therefore would have understood the combination of Schmidt, Liddell, and Fester²⁵⁶ teaches the limitations of claim 12 and renders the hand vacuum cleaner of claim 11 obvious and further renders obvious that the rotational axis of the fluid flow motor is parallel to the passage axis.

14. Schmidt, Liddell, and Fester²⁵⁶ Render Claim 13 Obvious

Reference Number	Claim Limitation
[13]	“The hand vacuum cleaner of claim 1 further comprising a hand grip region which is positioned between the upwardly extending portion of the handle and a portion of the sidewall of the air treatment portion.”

230. In my opinion, the combination of Schmidt, Liddell, and Fester²⁵⁶ renders the hand vacuum cleaner of claim 1 obvious and further renders obvious a hand vacuum of claim 1 further comprising a hand grip region which is positioned between the upwardly extending portion of the handle and a portion of the sidewall of the air treatment portion, and teaches the limitations of claim 13.
231. In my opinion, the combination of Schmidt, Liddell, and Fester²⁵⁶ renders obvious claim 1. Ground 1, cl. 1.
232. PO contends “the ‘hand grip portion’ is simply the portion of the handle where a hand grips, as opposed to other portions of the handle.” Ex1020, 13-14. Under PO’s interpretation, the combination of Schmidt, Liddell, and Fester²⁵⁶ teaches that a hand grip region is located between the handle’s upwardly extending portion and a portion of the sidewall of the air treatment portion as shown below:



Ex1007, 3(modified); Ex1006, Figs. 3-4; Ex1005, Fig.3b .

233. A POSA, in my opinion, would have understood that a user would grasp the portion of the handle between the upwardly extending portion and the sidewall (*i.e.*, the hand grip region) at least some of the time; *e.g.*, when cleaning underneath furniture.
234. In my opinion, it also would have been obvious to a POSA to add a grip or textured surface to the interior of Schmidt's handle to make it easier for a user to manipulate and hold the vacuum during use.
235. A POSA, in my opinion, therefore would have understood the combination of Schmidt, Liddell, and Fester²⁵⁶ teaches the limitations of claim 13 and renders the hand vacuum cleaner of claim 1 obvious and further renders obvious that the hand vacuum cleaner further comprises a hand grip region which is positioned between the upwardly

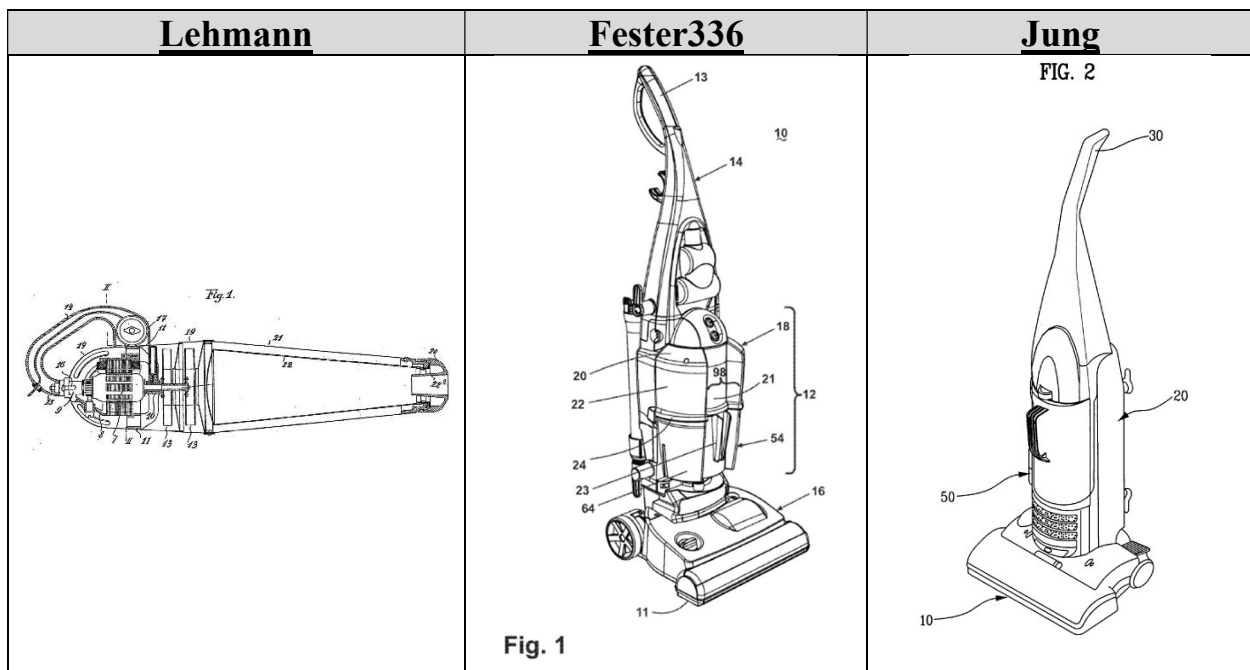
extending portion of the handle and a portion of the sidewall of the air treatment portion.

B. Ground 2: Lehmann in Combination with Fester336 and Jung Render Claims 1-13 Obvious

1. A POSA Would Have Been Motivated to Combine Lehmann, Fester336, and Jung

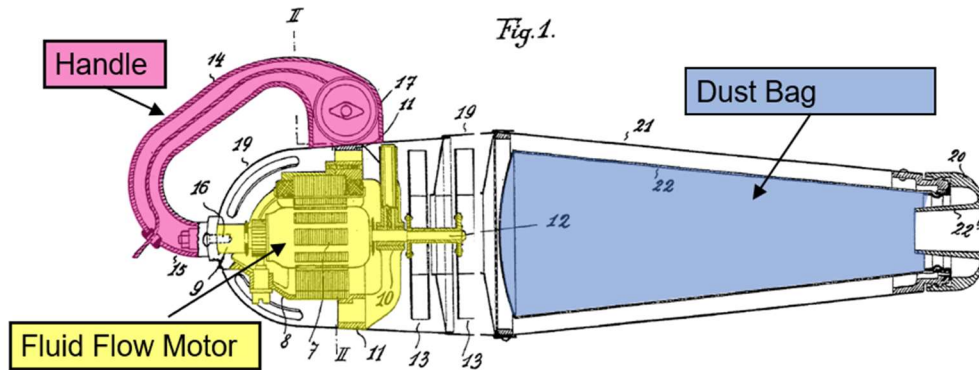
236. In my opinion, a POSA would have been motivated to combine Lehmann, Fester336, and Jung.

237. Lehmann, Fester336, and Jung are analogous art, as each reference is from the vacuum cleaner field and all teach vacuums:



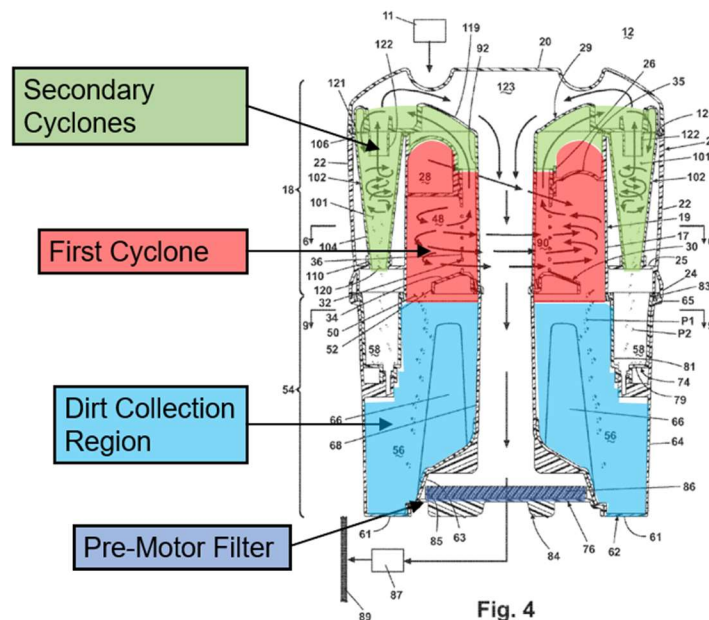
Ex1011, Fig. 1, 1:25-37; Ex1009, Fig. 1, Abstract; Ex1008, Fig. 2, Abstract.

238. Lehmann teaches a handheld vacuum cleaner with a dust bag filter for filtration purposes. See, e.g., Ex1011, Fig.1, 1:63-82.



Ex1011, Fig. 1.

239. Fester336 teaches a “cyclonic dirt separator” with “dirt cup assembly 12” that has a “first cyclone,” a “plurality of downstream secondary cyclones,” a “dirt collection region,” and a pre-motor “filter assembly 76.” Ex1009, Fig. 4, Abstract, 4:20-25, 5:33-54.



Ex1009, Fig. 4.

240. Fester336 teaches that air exits “**cyclonic dirt separator and dirt cup**

assembly 12” vertically through air duct 92 to a suction source below the separator in base housing 16. See, e.g., Ex1009, Figs. 1-4, 9:50-10:36.

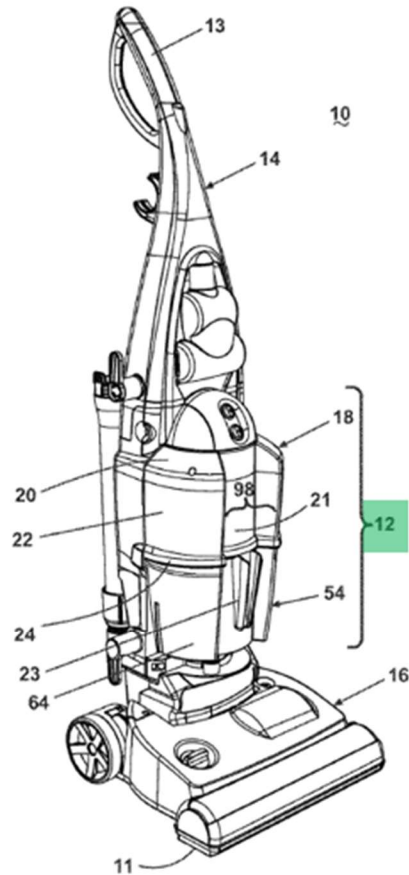


Fig. 1

Ex1009, Figs. 1, 4.

241. Jung teaches a cyclonic dust collecting assembly 50/500. Ex1008, Figs. 3, 12.

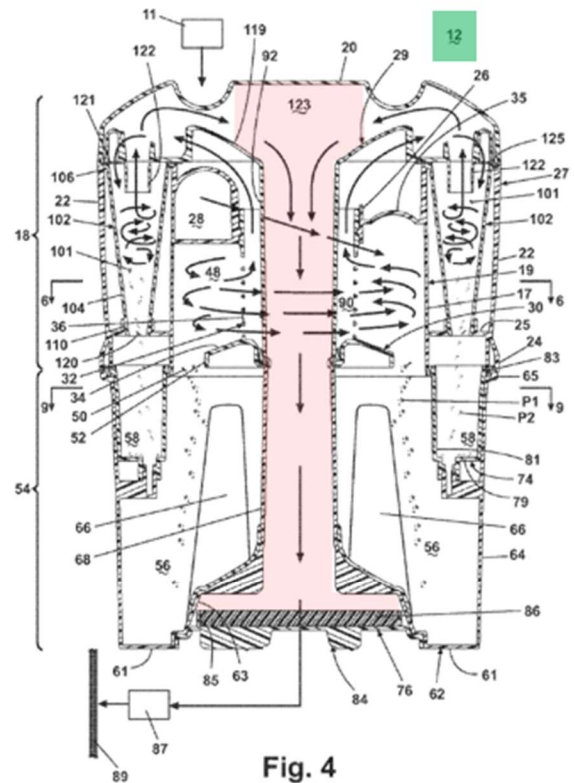
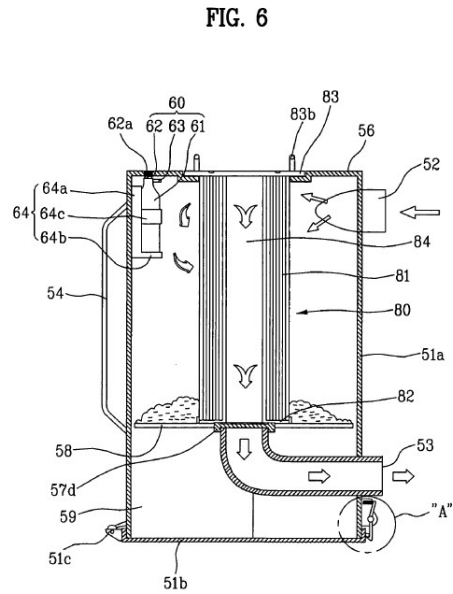
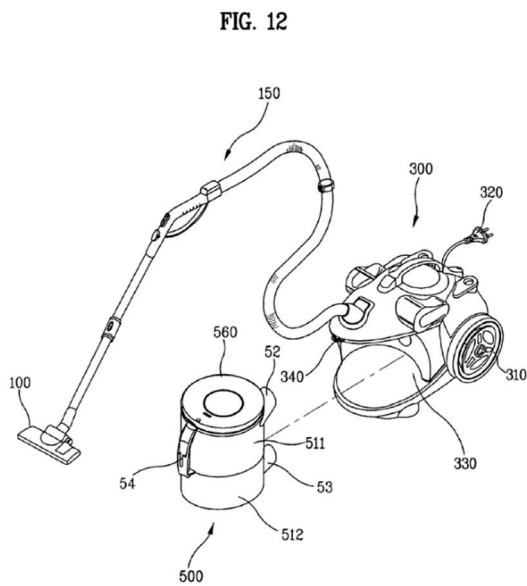


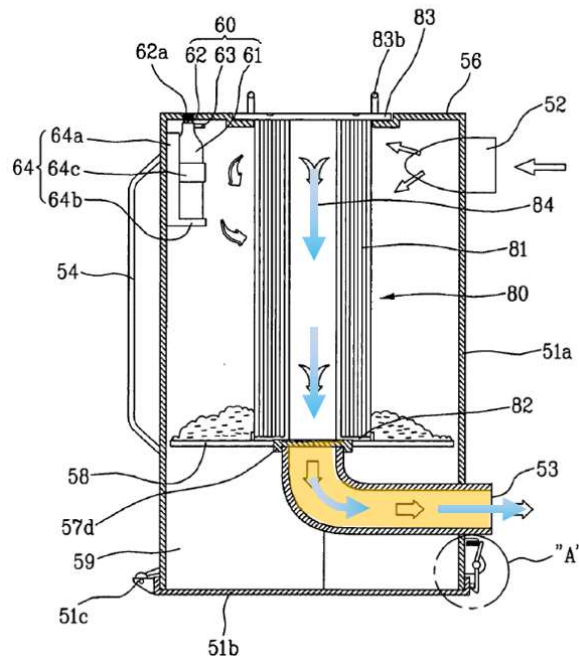
Fig. 4



Ex1008, Figs. 6, 12.

242. Jung also teaches that cleaned air exits the dust collecting assembly 50/500 through **inner flow tube 57**, where the downward airflow is then directed rearwardly toward ducting in the vacuum body. Ex1008, Figs. 3, 6, 12, [0097]-[0101], [0128].

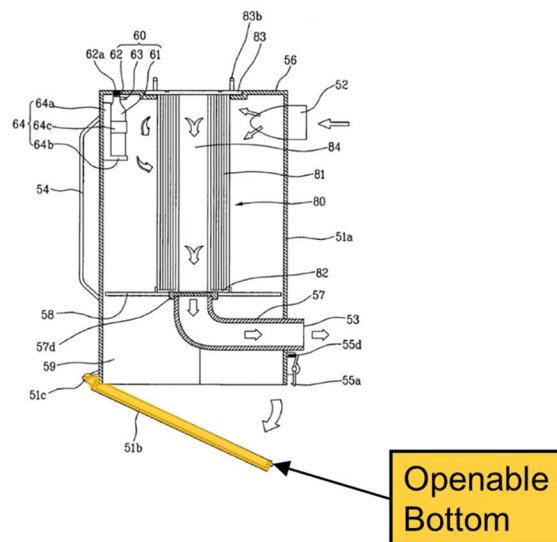
FIG. 6



Ex1008, Fig. 6.

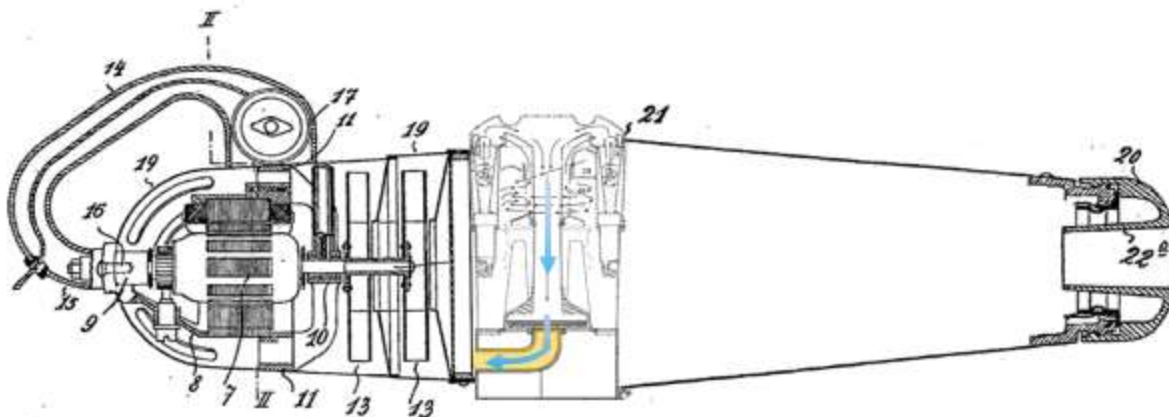
243. Jung also teaches an openable bottom lid 51b for emptying a dirt collection region:

FIG. 8



Ex1008, Figs. 8, 11, [0114-15], [0139].

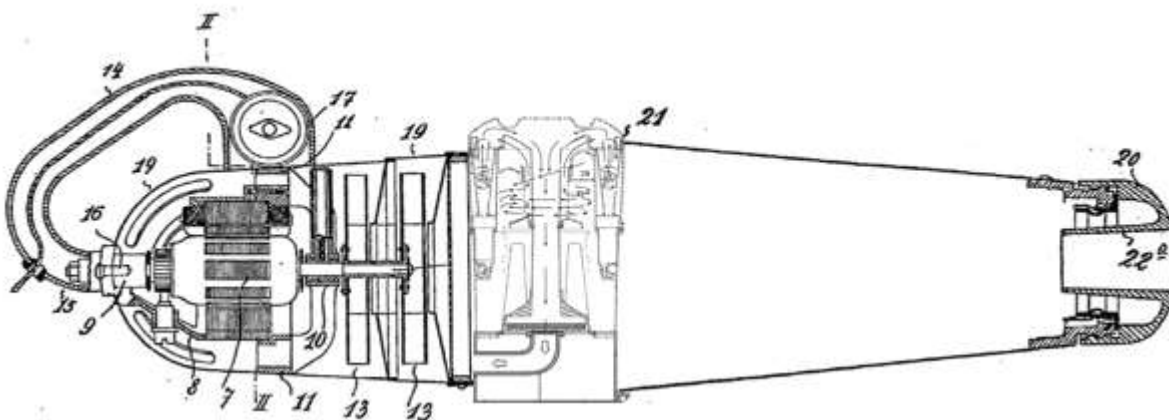
244. A POSA would have been motivated to replace Lehmann's dust bag filter with Fester336's cyclonic filters because of the benefits of cyclonic filtration. Specifically, a POSA would have looked to Fester336 because includes two cyclonic cleaning stages, resulting in a more efficient and effective extraction of the debris from the air, and it includes a pre-motor filter to further clean the air before it enters the fluid flow motor and is exhausted out of the vacuum, as explained below. *See infra* Section X.A.1.b.
245. A POSA would further have been motivated to modify Fester336's airflow routing to maintain the airflow routing from Lehman, with the airflow exiting rearwardly from the cyclonic separator to Lehmann's main body, as explained below. *See infra* Section X.A.1.c.
246. To modify Fester336's airflow routing and dirt collection region, a POSA would have looked to Jung because of their similarities, including that they both teach cyclonic air separators, and to add the benefits of Jung's hinged openable bottom, as explained below. *See infra* Section X.A.1.c.
247. This combination of Lehmann, Fester336, and Jung results in a hand vacuum cleaner as shown below:



Ex1011, Fig. 1(modified); Ex1008, Fig. 6; Ex1009, 4.

- a. A POSA Would Have Been Motivated to Substitute Lehmann's Filter with Fester336's Cyclonic System

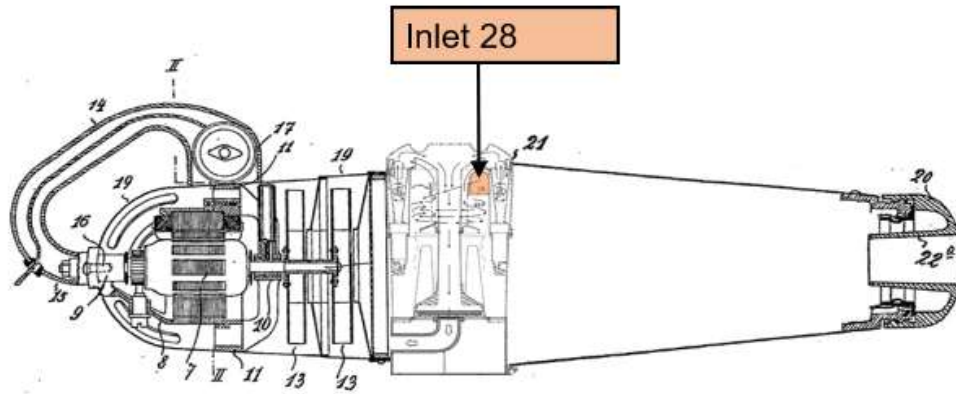
248. A POSA, in my opinion, would have been motivated to substitute Lehmann's dust bag filter with Fester336's two-stage cyclonic cleaning system, as shown below.



Ex1011, Fig. 1(modified); Ex1008, Fig. 6; Ex1009, Fig. 4.

249. A POSA, in my opinion, would have understood that, with Lehmann's

dust bag 22 removed, Lehmann's tapering part 21 would introduce air to Fester336's cyclonic separator 12 through Fester336's **inlet 28**.
Ex1011, Fig. 1, 1:63-82, 2:7-24; Ex1009, Fig. 4, 5:23-6:10, 9:50-10:36.



Ex1011, Fig. 1(modified); Ex1008, Fig. 6; Ex1009, Fig. 4.

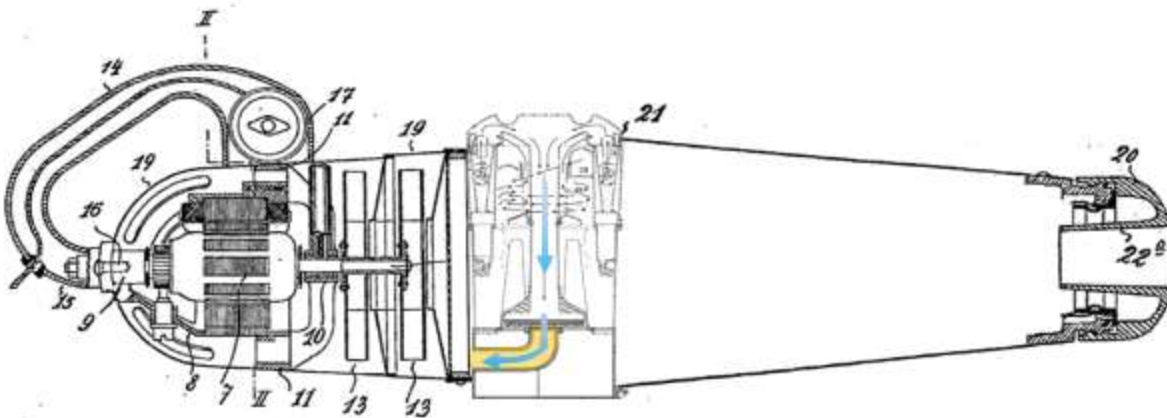
250. A POSA, in my opinion, would have been motivated to make this combination because it would have been a simple substitution of one known filtration mechanism (a dust bag filter) with another (a cyclonic filter) to obtain a predictable result. The benefits of cyclonic separation over a dust bag were well-known in the art. *See* Section X.A.1.b. A POSA, in my opinion, would have recognized that this simple substitution of the filter systems would have yielded the predictable result of a handheld vacuum using cyclonic separation. Further, a POSA, in my opinion, would have been motivated to maintain Fester336's vertical orientation in combination with Lehmann because

a vertically oriented cyclonic separator would cause dirt to aggregate near the bottom of the cyclonic separator rather than clog the airways with debris. Maintaining this orientation minimizes the amount of changes needed while maximizing the expectation of success. *See* Section X.A.1.b.

251. In my opinion, it also would have been at least obvious to try this combination of Lehmann's vacuum with Fester336's two-stage cyclonic filtration system because a POSA would have understood that there were a finite number of identified dust-separation solutions and a finite number of ways to combine them to achieve the known benefits described above and in Section X.A.1.b.
252. A POSA, in my opinion, would have had a reasonable expectation of success combining Lehmann's and Fester336's teachings for the reasons above, including because such modification would have involved a simple substitution of known elements that perform the same function, and because of the prior art's express motivations to perform such substitution, such as in Martelliere, Schmidt and Liddell. *See, e.g.,* Ex1018, at 1; Ex1007 at 1; Ex1005 at 1:28-2:3; *see also* Section X.A.1.b.

- b. A POSA Would Have Been Motivated to Modify Fester336's Cyclonic System with Jung's Airflow Routes and Openable Bottom

253. A POSA, in my opinion, would have been motivated to further modify the combination of Fester336 and Lehmann according to Jung's teaching of the **inner flow tube 57** so the downward flow of air from Fester336's cyclonic separator would be directed rearwardly to Lehmann's motor in alignment with Lehmann's fluid flow path, as shown below. Ex1011, 1:63-2:24.



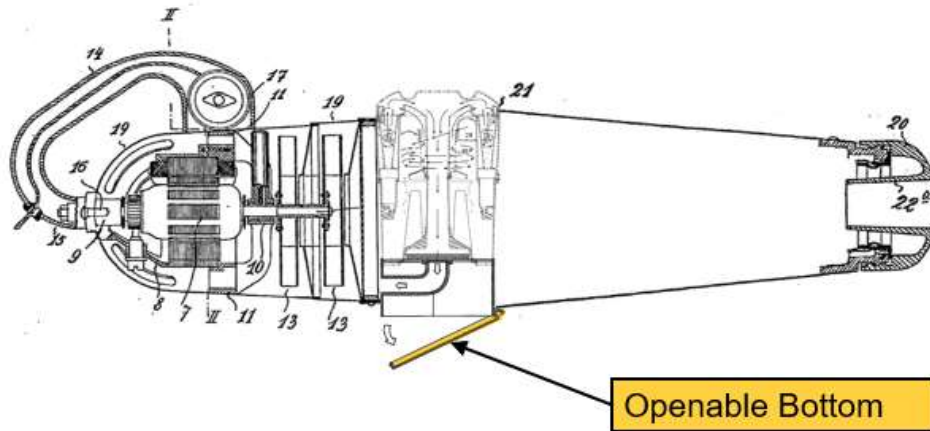
Ex1011, Fig. 1(modified); Ex1008, Fig. 6; Ex1009, Fig. 4.

254. A POSA, in my opinion, would have had a reasonable expectation of success for this modification because Jung uses **inner flow tube 57** in the same manner as the combination of Lehmann and Fester336 does—to direct downward air through a central duct rearwardly to the vacuum body. *See* Ex1008, Figs. 3, 6, 12.

255. A POSA in my opinion would also have understood that when

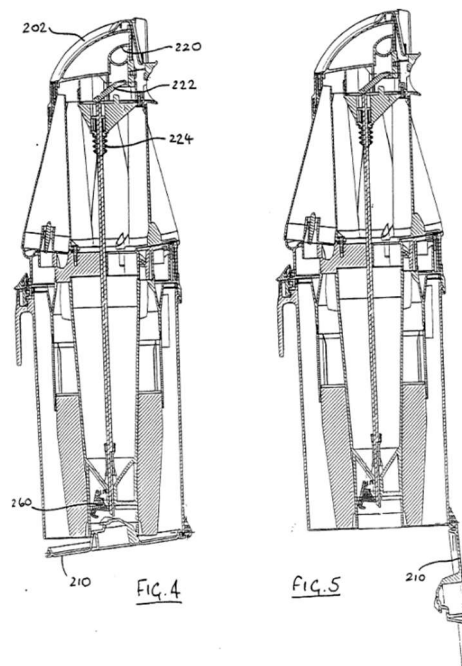
combined, Lehmann's electro motor 7 would pull air through Fester336's cyclonic separator 12, through Jung's airflow routing, and out of the vacuum cleaner at a post-motor clean air outlet on Lehmann's casing 19. Ex1008, Fig. 6, [0097]-[0101], [0128]; Ex1011, 1:63-82, Figs. 1&5.

256. A POSA, in my opinion, also would have been motivated to incorporate Jung's openable bottom lid 51b/512 in combination with Lehmann and Fester336. A POSA would have been motivated to make this modification to make emptying Fester336's dust cup easier. Fester336 teaches that, "to discard accumulated dirt," the dirt cup assembly 54 is "remove[d]...from the cyclone separator" and its contents are dumped out. Ex1009, Figs. 1-4, 9:42-49; Ex1010, Figs. 1-4, [Para 36]. A POSA, in my opinion, would have understood that Jung's openable base would allow Fester336's dirt cup assembly 54 to be emptied before or after cyclone separator assembly 18 is removed from the vacuum body provided that Fester336's dirt cup is opened at the bottom allowing dirt to fall into Lehmann's dirt cup, as shown below. Further, a POSA, in my opinion, would have understood that this would reduce the likelihood of spilling debris while emptying dirt cup assembly 54.



Ex1011, Fig. 1(modified); Ex1008, Figs. 6, 8; Ex1009, Fig. 4.

257. A POSA, in my opinion, would have had a reasonable expectation of success for this modification because cyclonic separators with an openable bottom were well known prior to the '666Patent's alleged invention. For example, the 2002 patent publication Organ shows a cyclonic unit with an openable bottom:



Ex1017, Figs. 4-5.

258. Further, a POSA, in my opinion, would have had a reasonable expectation of success with this combination because Fester336 and Jung both teach that cleaned air from their respective cyclonic separators travels downwardly through a central channel before exiting the vacuum, and that the dust collects at the base of the cyclonic separator. Jung teaches a compatible openable base. Ex1008, Figs. 6, 8, 10, [0087], [0097]-[0101], [0128]; Ex1009, Figs. 1-4, 9:50-10:36

2. Lehmann, Fester336, and Jung Render Claim 1 Obvious

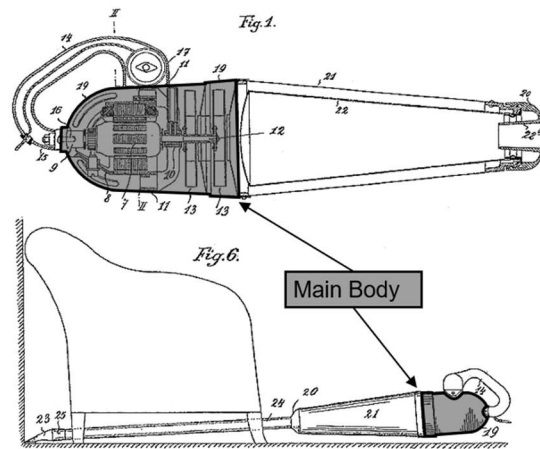
a. [1pre]

Reference Number	Claim Limitation
[1pre]	“A hand vacuum cleaner comprising an air treatment portion and a main body, the air treatment portion comprising a first cyclonic cleaning stage, a second cyclonic cleaning stage and a pre-motor filter, the hand vacuum cleaner comprising:”

259. To the extent the preambles are limiting, in my opinion, the combined teachings of Lehmann, Fester336, and Jung teaches and renders obvious a hand vacuum cleaner comprising an air treatment portion and a main body, the air treatment portion comprising a first cyclonic cleaning stage, a second cyclonic cleaning stage and a pre-motor filter, the hand vacuum cleaner.

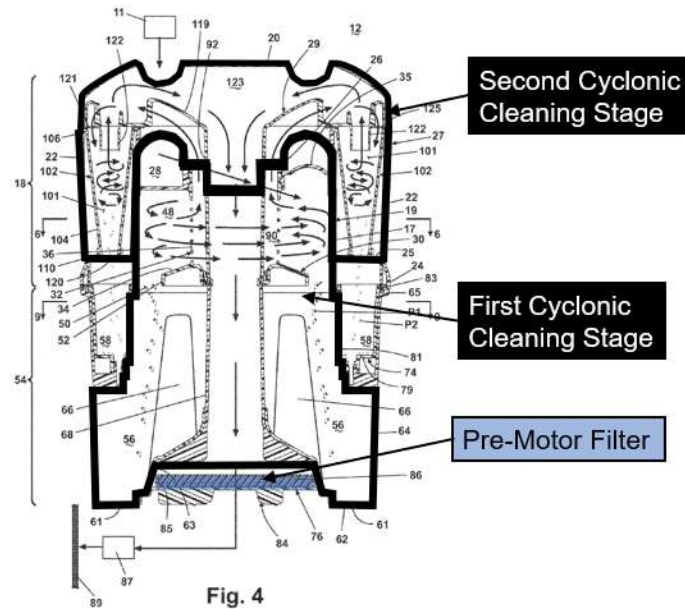
260. To start, in my opinion, Lehmann teaches a hand vacuum cleaner with

a main body (“casing 19”):



Ex1011, Figs. 1 and 6, Claim 1, 1:78-91, 2:25-29.

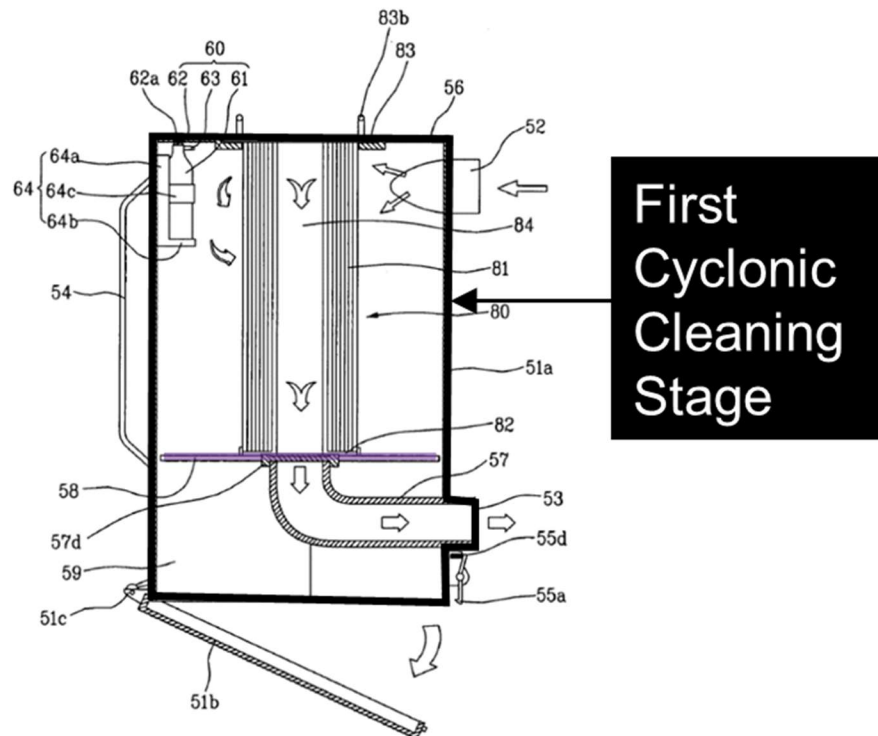
261. In addition, Fester336 teaches an air treatment portion comprising a **first cyclonic cleaning stage** (“primary cyclonic toroidal chamber 48” and “dirt collection region 56”), a **second cyclonic cleaning stage** (“secondary cyclonic chamber 101”) and a **pre-motor filter** (“filter assembly 76”). Ex1009, Fig. 4, 5:33-53, 6:57-66, 9:17-31.



Ex1009, Fig. 4.

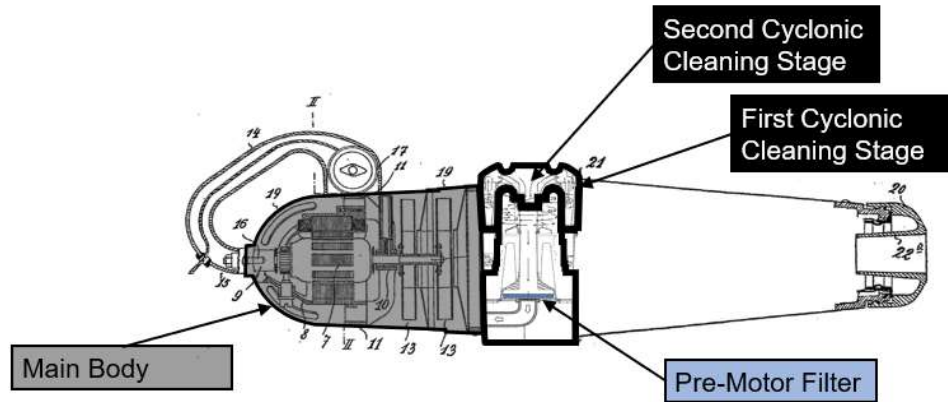
262. Jung teaches an air treatment portion comprising a first cyclonic cleaning stage. This comprises a “dust collecting space” of container 51/511, with an “upper space” above separation plate 58/580 for cleaning air per the “cyclone principle”, and a “lower space” below separation plate 58/580 for collecting debris.

FIG. 8



Ex1008, Fig. 8.

263. In my opinion, a POSA would have understood that the combination of Lehmann with Fester336 and Jung would include a handheld vacuum with an air treatment portion and a **main body** (Lehmann's "casing 19") where the air treatment portion includes **first cyclonic cleaning stage** (Fester336's "primary cyclonic toroidal chamber 48" and "dirt collection region 56" and Jung's "lower space" below separation plate 58/580), a **second cyclonic cleaning stage** (Fester336's "secondary cyclonic chamber 101" and the second dirt collection region 58), and a **pre-motor filter** (Fester336's "filter assembly 76").



Ex1011, Fig. 1(modified); Ex1008, Fig. 6; Ex1009, Fig. 4.

264. In my opinion, a POSA would have understood that the combination of Lehmann, Fester336, and Jung teaches a handheld vacuum with an air treatment portion and a main body where the air treatment includes first and second cyclonic cleaning stages and a pre-motor filter.

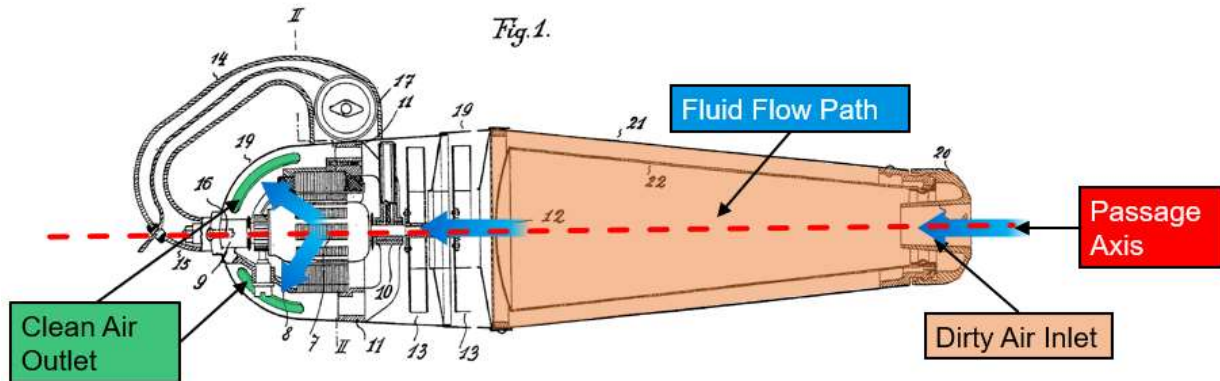
b. [1a]

Reference Number	Claim Limitation
[1a]	“a) a fluid flow path extending from a dirty air inlet to a clean air outlet and the dirty fluid inlet defines a passage extending along a passage axis;”

265. In my opinion, the combination of Lehmann, Fester336, and Jung teaches a fluid flow path extending from a dirty air inlet to a clean air outlet and the dirty fluid inlet defines a passage extending along a passage axis.

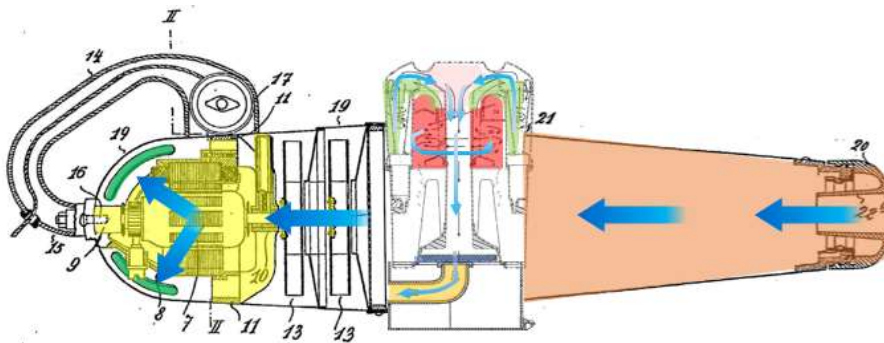
266. Lehmann teaches a fluid flow path that extends from a **dirty air inlet** (“inwardly directed coned socket 22a” and “tapering part 21”) to a

clean air outlet (shown below) where the dirty air inlet defines a passage extending along a passage axis. Ex1011, Fig. 1, 1:63-70, 2:7-24.



Ex1011, Fig. 1.

267. In my opinion, a POSA would have understood that the combination of Lehmann with Fester336 and Jung would include a fluid flow path that extends from a dirty air inlet (“inwardly directed coned socket 22a” and “tapering part 21”) to a clean air outlet (shown below) and the dirty air inlet defines a passage extending along a passage axis.



Ex1011, Fig. 1(modified); Ex1008, Fig. 6; Ex1009, Fig. 4.

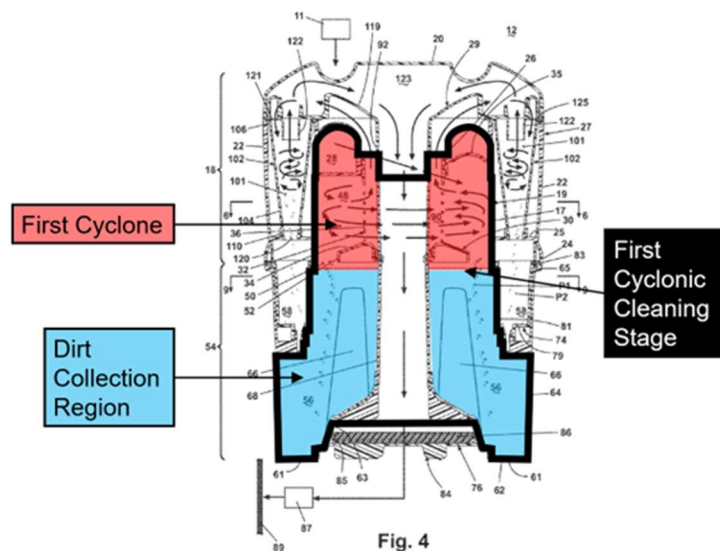
268. In my opinion, a POSA would have understood that air enters the vacuum through Lehmann's commonplace cleaning accoutrements attached to **inwardly directed coned socket 22a**, and enters Fester336's **primary cyclonic toroidal chamber 48** through inlet 28. Ex1011, Fig. 1, 1:63-82, 2:7-24; Ex1009, Fig. 4, 5:23-6:10, 9:50-10:36. Further in my opinion, a POSA would have understood that air then passes through Fester336's **secondary cyclones 102**, through **air duct 92**, and through **filter assembly 76**, after which it passes through Jung's **inner flow tube 57**. Ex1009, Fig. 4, 5:23-6:10, 9:50-10:36. A POSA would have understood, in my opinion, that air exiting Jung's **inner flow tube 57** would pass through Lehmann's fan 13 and electro motor 7 (shown in yellow) and out of the vacuum cleaner at a **post-motor clean air outlet**. Ex1008, Fig. 6, [0097]-[0101], [0128]; Ex1011, 1:63-82, Figs. 1&5.
269. Thus, in my opinion, a POSA would have understood that the combination of Lehmann, Fester336, and Jung teaches a fluid flow path extending from a dirty air inlet to a clean air outlet and the dirty fluid inlet defines a passage extending along a passage axis.

c. [1b]

Reference Number	Claim Limitation
[1b]	“b) the first cyclonic cleaning stage is positioned in the fluid flow path and comprises a first cyclone having a dirt collection region wherein the dirt collection region has an openable bottom;”

270. In my opinion, the combination of Lehmann, Fester336, and Jung teaches a first cyclonic cleaning stage that is positioned in the fluid flow path and comprises a first cyclone having a dirt collection region wherein the dirt collection region has an openable bottom.

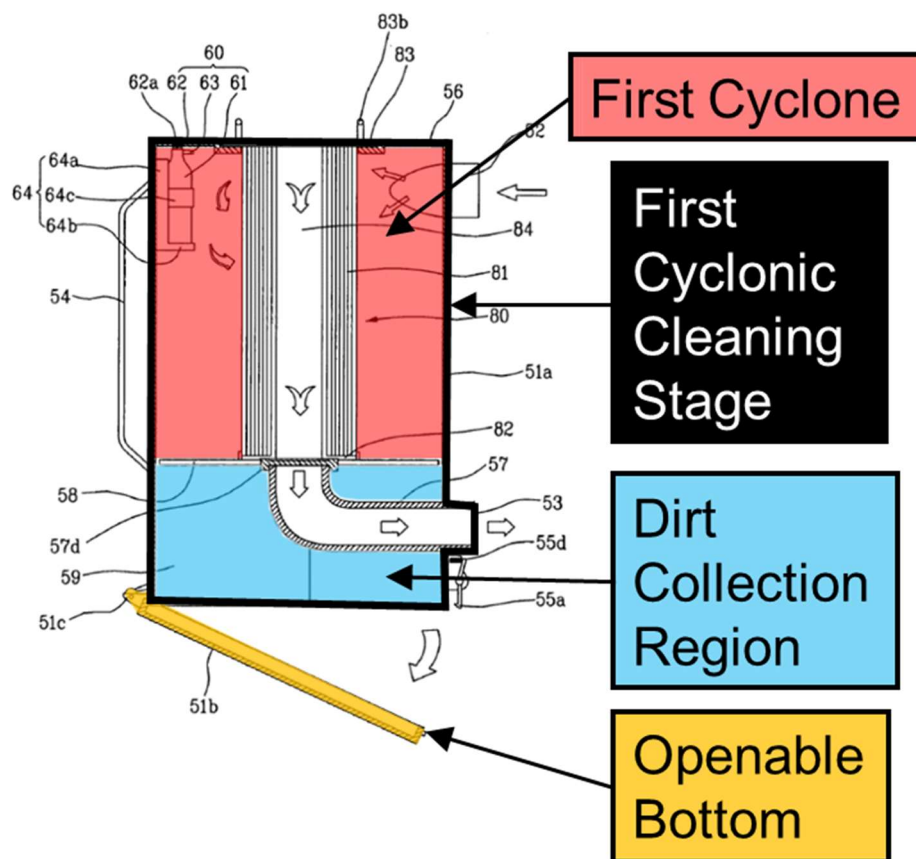
271. Fester336 teaches a **first cyclonic cleaning stage** (“primary cyclonic toroidal chamber 48” and “dirt collection region 56”) positioned in the fluid flow path that comprises a **first cyclone** (“primary cyclonic toroidal chamber 48”), with a **dirt collection region** (“dirt collection region 56”). Ex1009, Figs. 2-4, 5:23-53.



Ex1009, Fig. 4.

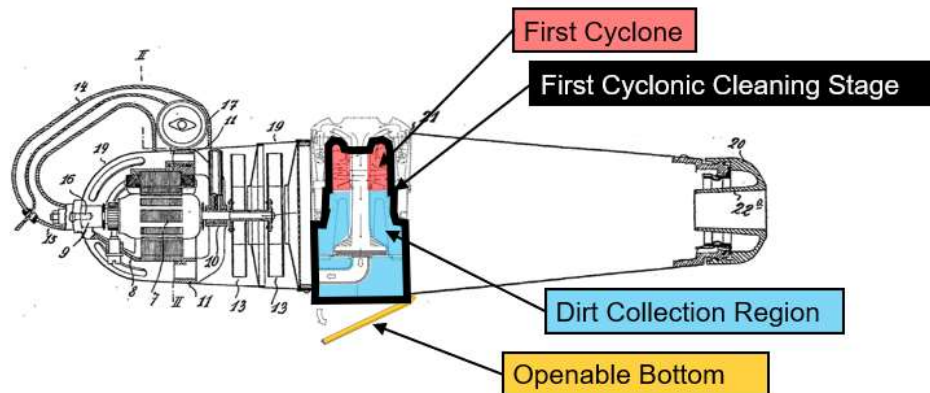
272. Jung teaches a **first cyclonic cleaning stage** (“dust collecting space” of container 51/511) positioned in the fluid flow path that comprises a **first cyclone** (“upper space” above separation plate 58/580), with a **dirt collection region** (“lower space” below separation plate 58/580), wherein the dirt collection region has an **openable bottom** (bottom lid 51b/512). Ex1008, Figs. 8, 11. Jung also teaches that “polluted air flowed into the dust collecting assembly 50[500] is cleaned firstly by separating large and heavy impurities according to the cyclone principle.” *Id.* [0101]-[0104], [0124], [0133].
273. In one embodiment (Fig. 8), Jung teaches a “bottom lid 51b opens the bottom of the dust collecting container 51 while rotating downward about the hinge 51c.” *Id.* [0121].

FIG. 8



Ex1008, Fig. 8.

274. In my opinion, a POSA would have understood that the combination of Lehmann with Fester336 and Jung likewise has a **first cyclonic cleaning stage** in the fluid flow path with a **first cyclone** having a **dirt collection region** with an **openable bottom**.



Ex1011, Fig. 1(modified); Ex1008, Fig. 6; Ex1009, Fig. 4.

275. Thus, in my opinion, a POSA would have understood that the combination of Lehmann, Fester336, and Jung teaches a first cyclonic cleaning stage that is positioned in the fluid flow path and comprises a first cyclone having a dirt collection region wherein the dirt collection region has an openable bottom.

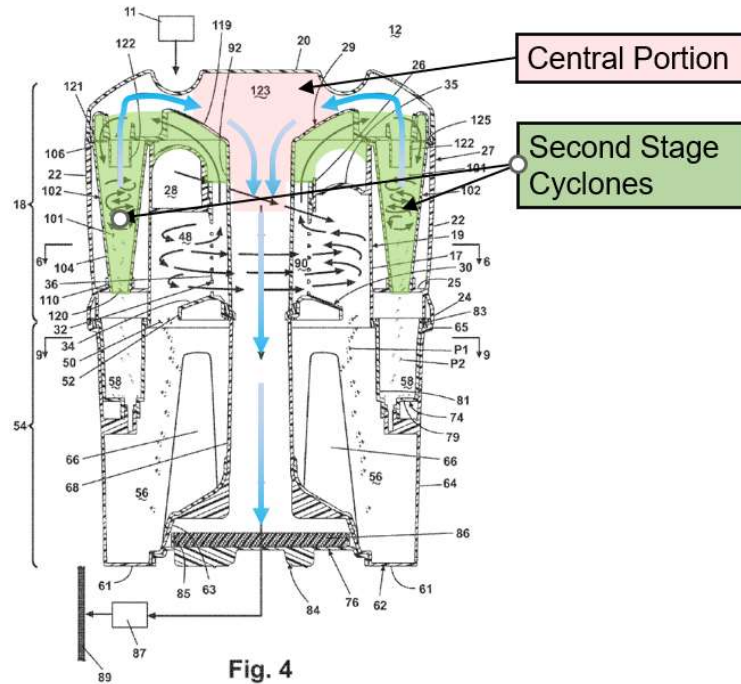
d. [1c]

Reference Number	Claim Limitation
[1c]	“c) the second cyclonic cleaning stage is positioned in the fluid flow path downstream from the first cyclonic cleaning stage and comprises a central longitudinal axis, the second cyclonic cleaning stage comprising a plurality of cyclones in parallel that are arranged around a central portion and, after exiting the second stage cyclones, air enters an upper portion of the central portion and exits the central portion at a position below the upper portion where the air enters the central portion;”

276. In my opinion, the combination of Lehmann, Fester336, and Jung teaches a second cyclonic cleaning stage that is positioned in the fluid

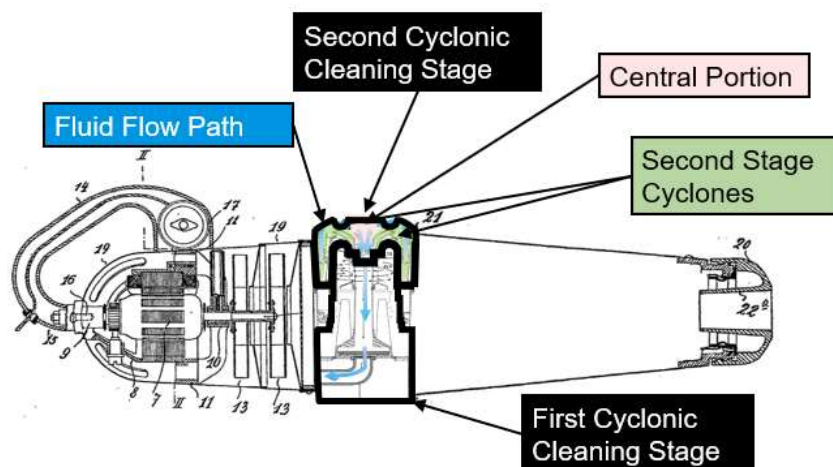
flow path downstream from the first cyclonic cleaning stage and comprises a central longitudinal axis, the second cyclonic cleaning stage comprising a plurality of cyclones in parallel that are arranged around a central portion and, after exiting the second stage cyclones, air enters an upper portion of the central portion and exits the central portion at a position below the upper portion where the air enters the central portion.

277. Fester336 teaches the **second cyclonic cleaning stage** (secondary cyclonic chamber 101) is positioned in the fluid flow path downstream from the first cyclonic cleaning stage (primary cyclonic toroidal chamber 48 and dirt collection region 56) and comprises a **central longitudinal axis** (central longitudinal axis A) where the **second cyclonic cleaning stage** comprises a **plurality of cyclones** (secondary cyclones 102) in parallel that are arranged around a **central portion** (air duct 92). Ex1009, Fig. 4, 5:33-53, 6:57-66, 9:17-31.



Ex1009, Fig. 4.

280. In my opinion, a POSA would have understood that the combination of
Lehmann with Fester336 and Jung, with Fester336's air treatment portion,
likewise teaches this limitation:



Ex1011, Fig. 1(modified); Ex1008, Fig. 6; Ex1009, Fig. 4.

281. Thus, in my opinion, a POSA would have understood that the combination of Lehmann, Fester336, and Jung teaches a second cyclonic cleaning stage that is positioned in the fluid flow path downstream from the first cyclonic cleaning stage and comprises a central longitudinal axis, the second cyclonic cleaning stage comprising a plurality of cyclones in parallel that are arranged around a central portion and, after exiting the second stage cyclones, air enters an upper portion of the central portion and exits the central portion at a position below the upper portion where the air enters the central portion.

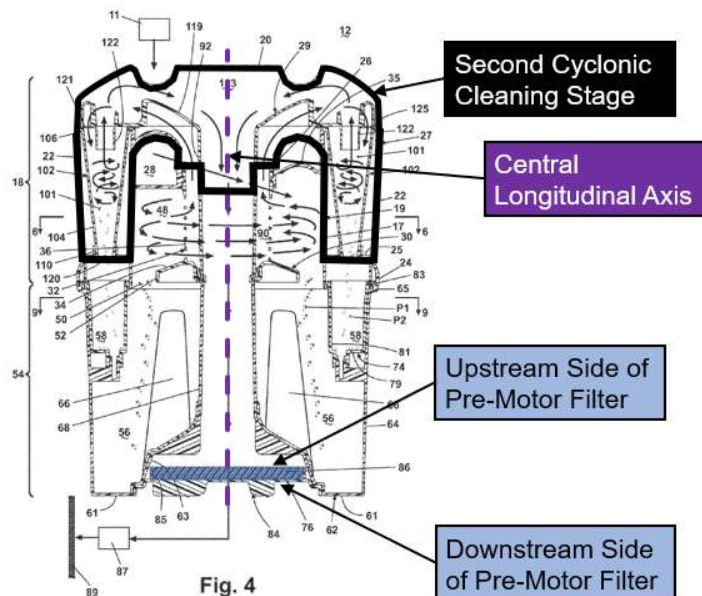
e. [1d]

Reference Number	Claim Limitation
[1d]	“d) the pre-motor filter is positioned in the fluid flow path downstream from the second cyclonic cleaning stage and comprises an upstream side and a downstream side wherein the central longitudinal axis extends through a volume occupied by the pre-motor filter; and,”

282. In my opinion, the combination of Lehmann, Fester336, and Jung teaches a pre-motor filter positioned in the fluid flow path downstream from the second cyclonic cleaning stage and comprises an upstream side and a downstream side wherein the central longitudinal axis extends through a volume occupied by the pre-motor filter.

283. First, in my opinion, Fester336 teaches a **pre-motor filter** (filter

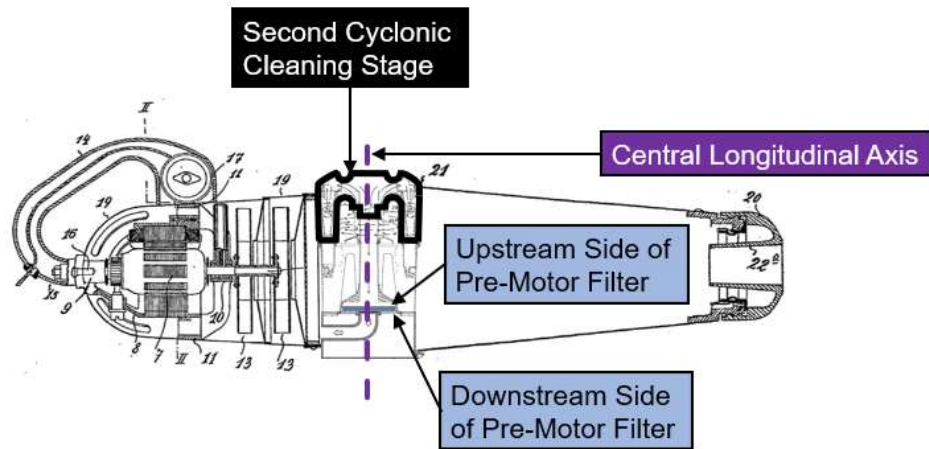
assembly 76) positioned in the fluid flow path downstream from the **second cyclonic cleaning stage** (secondary cyclonic chamber 101) that comprises an upstream side and a downstream side where the **central longitudinal axis** (central longitudinal axis A) extends through a volume occupied by the **pre-motor filter**. Ex1009, Fig. 4, 9:17-30, 10:18-36.



Ex1009, Fig. 4.

284. Fester336 teaches the working air, after exiting secondary cyclones 102, “passes downward through the air outlet duct 92, through the dirt cup standpipe 68, and into the filter assembly 76, where the filter element 86 captures additional particulate material before the working air is drawn into the suction source 87.” *Id.* 10:23-28.

285. In my opinion, a POSA would have understood that the combination of Lehmann, Fester336 and Jung, with Fester336's air treatment portion and pre-motor filter, also teaches this limitation.



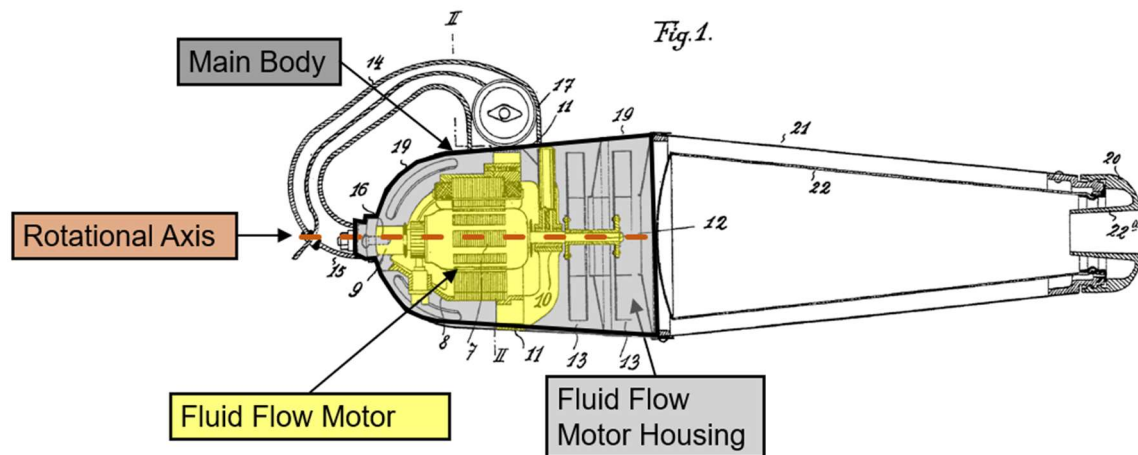
Ex1011, Fig. 1(modified); Ex1008, Fig. 6; Ex1009, Fig. 4.

286. Thus, in my opinion, a POSA would have understood that the combination of Lehmann, Fester336, and Jung teaches a pre-motor filter positioned in the fluid flow path downstream from the second cyclonic cleaning stage and comprises an upstream side and a downstream side wherein the central longitudinal axis extends through a volume occupied by the pre-motor filter.

f. [1e]

Reference Number	Claim Limitation
[1e]	“e) the main body comprises a fluid flow motor housing for a fluid flow motor that is disposed in the fluid flow path downstream from the pre-motor filter, wherein the fluid flow motor has a rotational axis and a projection of the rotational axis intersects the central longitudinal axis and the fluid flow motor housing is secured to only a portion of a sidewall of the air treatment portion, wherein”

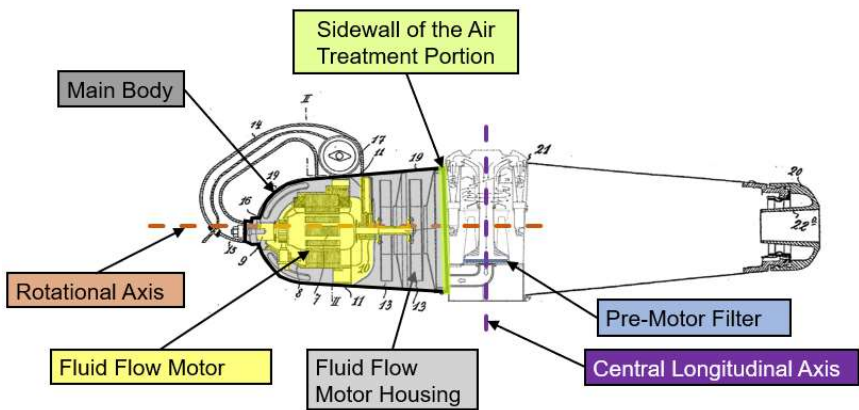
287. In my opinion, the combination of Lehmann, Fester336, and Jung teaches a main body that comprises a fluid flow motor housing for a fluid flow motor that is disposed in the fluid flow path downstream from the pre-motor filter, wherein the fluid flow motor has a rotational axis and a projection of the rotational axis intersects the central longitudinal axis and the fluid flow motor housing is secured to only a portion of a sidewall of the air treatment portion.
288. Lehmann teaches the **main body** (casing 19) that comprises a **fluid flow motor housing** (portion of casing 19 that houses electromotor 7) for a fluid flow motor (electromotor 7) that is placed in the fluid flow path, where the fluid flow motor has a **rotational axis**. Ex1011, Fig. 1, 1:63-87.



Ex1011, Fig. 1.

289. Lehmann teaches a “shaft [12] of the electromotor 7” with “bearings at 9 and 10” and that shaft 12 drives a “two stage centrifugal fan 13.” *Id.* 1:63-87. A POSA, in my opinion, would have understood that the motor rotates about an axis defined by shaft 12.
290. A POSA, in my opinion, would have understood that the combination of Lehmann, Fester336, and Jung teaches a **main body** (casing 19) that comprises a **fluid flow motor housing** (portion of casing 19 housing electromotor 7) for a fluid flow motor (electromotor 7) that is placed in the fluid flow path downstream from the **pre-motor filter** (Fester336’s filter assembly 76). A POSA would further have understood, in my opinion, that this combination would include a fluid flow motor with a **rotational axis** and a projection of the **rotational axis** (axis defined by shaft 12) that intersects the **central longitudinal axis** (Fester336’s

central longitudinal axis A) and where the fluid flow motor housing is secured to only a portion of a sidewall of the air treatment portion.



Ex1011, Fig. 1(modified); Ex1008, Fig. 6; Ex1009, Fig. 4.

291. Thus, in my opinion, a POSA would have understood that the combination of Lehmann, Fester336, and Jung teaches a main body that comprises a fluid flow motor housing for a fluid flow motor that is disposed in the fluid flow path downstream from the pre-motor filter, wherein the fluid flow motor has a rotational axis and a projection of the rotational axis intersects the central longitudinal axis and the fluid flow motor housing is secured to only a portion of a sidewall of the air treatment portion.

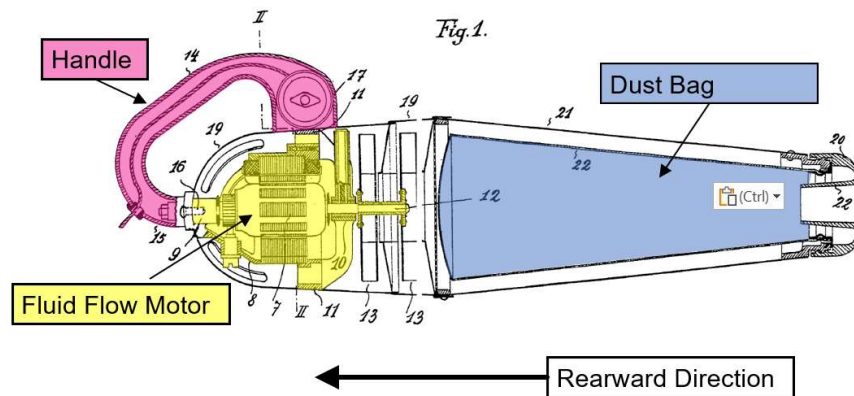
g. [1f]

Reference Number	Claim Limitation
[1f]	“the fluid flow motor and a handle of the hand vacuum cleaner are positioned rearward of the second cyclonic cleaning stage;”

292. In my opinion, the combination of Lehmann, Fester336, and Jung teaches a fluid flow motor and a handle of the hand vacuum cleaner that are positioned rearward of the second cyclonic cleaning stage.

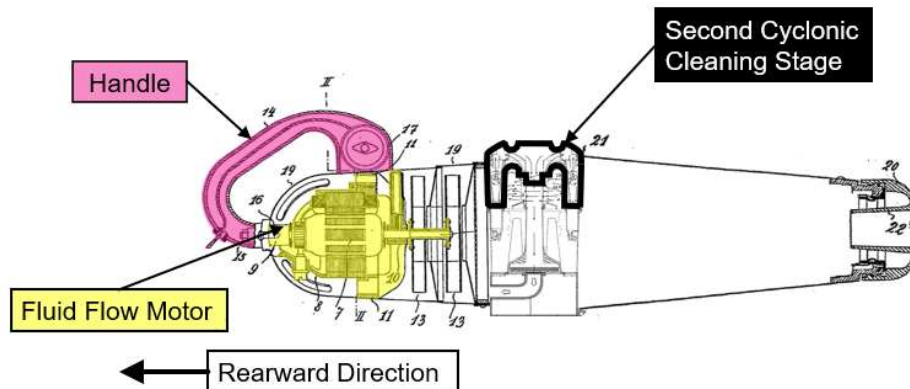
293. Lehmann teaches a fluid flow motor (electromotor 7) and **handle** (handle 14) that are positioned rearward of its **dust bag separator**.

Ex1011, Fig. 1, 1:63-87.



Ex1011, Fig. 1.

294. In my opinion, a POSA would have understood that the combination of Lehmann, Fester336, and Jung teaches the fluid flow motor (electromotor 7) and **handle** (handle 14) of the hand vacuum cleaner are placed rearward of the **second cyclonic cleaning stage** (Fester336's secondary cyclonic chamber 101). Ex1011, Fig. 1, 1:63-87.



Ex1011, Fig. 1(modified); Ex1008, Fig. 6; Ex1009, Fig. 4.

295. Thus, in my opinion, a POSA would have understood that the combination of Lehmann, Fester336, and Jung teaches a fluid flow motor and a handle of the hand vacuum cleaner that are positioned rearward of the second cyclonic cleaning stage.

h. [1g]

Reference Number	Claim Limitation
[1g]	“the dirt collection region is positioned beneath and vertically aligned with the cyclones of the first and second cyclonic cleaning stages and the pre-motor filter; and”

296. In my opinion, the combination of Lehmann, Fester336, and Jung teaches a dirt collection region positioned beneath and vertically aligned with the cyclones of the first and second cyclonic cleaning stages and the pre-motor filter.

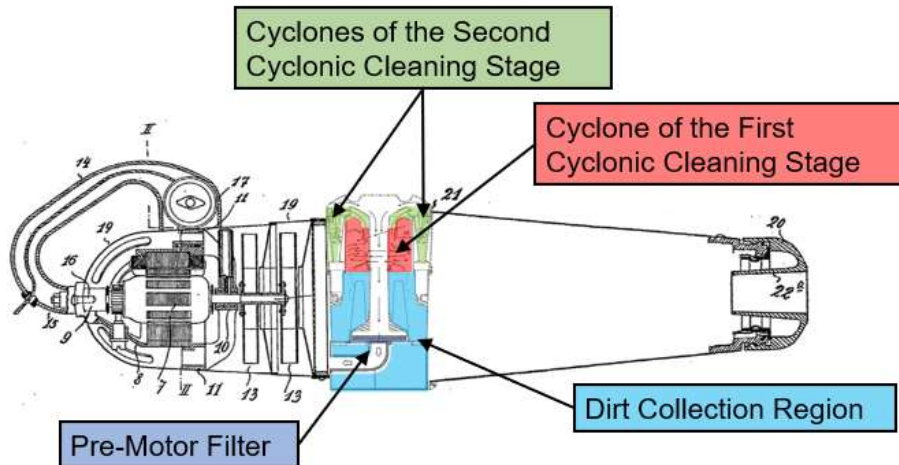
297. Fester336 teaches a **dirt collection region** (dirt collection region 56) that is positioned beneath and also in vertical alignment with the

Fig. 4, 5:33-53, 6:57-66, 9:17-31.



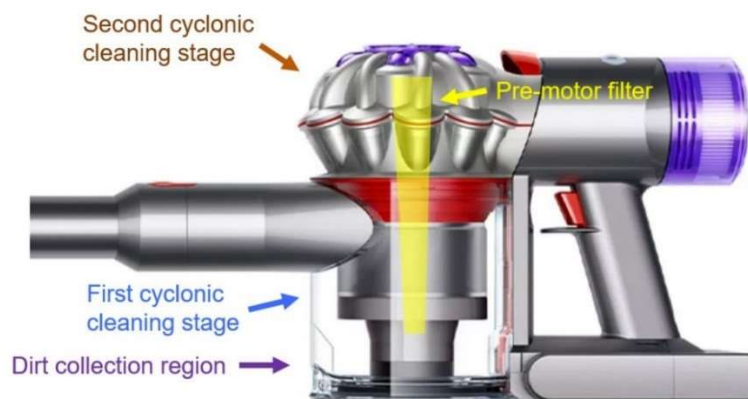
Ex1009, Fig. 4.

298. In my opinion, a POSA would have understood that the combination of
Lehmann, Fester336 and Jung, with Fester336's air treatment portion
and pre-motor filter, teaches this limitation.



Ex1011, Fig. 1(modified); Ex1008, Fig. 6; Ex1009, Fig. 4.

299. PO contends the accused V8 vacuum meets this limitation. However, it is my opinion that the V8's alleged pre-motor filter is narrower than the alleged dirt collection region, which extends to the walls of the alleged first cyclonic cleaning stage. In my opinion, if the V8 meets this limitation, then the combination of Lehmann, Fester336 and Jung, with Fester336's air treatment portion and pre-motor filter also meets this limitation.



Ex1019, 19-21, 10-13.

300. It is my opinion that it would have been obvious to a POSA to incorporate a larger pre-motor filter in the combination that would overlay both of Jung's dirt collection regions. It is also my opinion that A POSA would have been motivated to use a filter with the largest cross-sectional area possible to minimize the pressure drop across the filter and reduce the frequency of filter cleaning or replacement. Similarly, it is my opinion that a POSA would have had a reasonable expectation of success with this implementation.
301. Thus, in my opinion, a POSA would have understood that the combination of Lehmann, Fester336, and Jung teaches a dirt collection region positioned beneath and vertically aligned with the cyclones of the first and second cyclonic cleaning stages and the pre-motor filter.

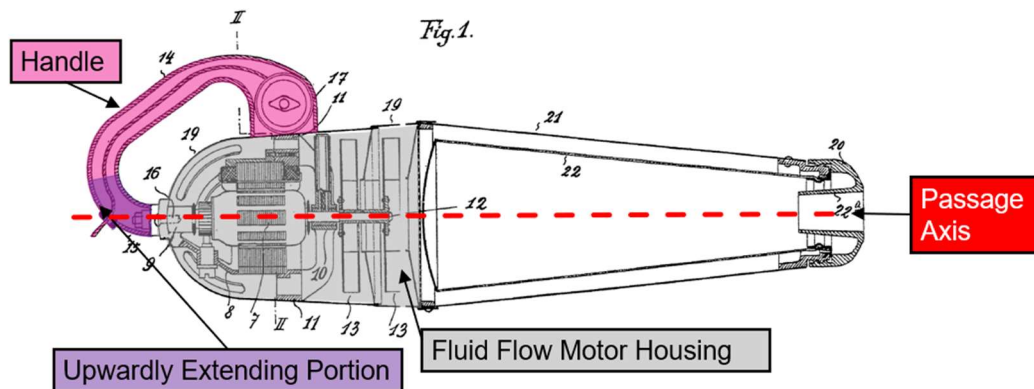
a. [1h]

Reference Number	Claim Limitation
[1h]	"the handle comprises an upwardly extending portion when the hand vacuum cleaner is positioned on a horizontal surface, the upwardly extending portion extends away from the fluid flow motor housing and the passage axis of the dirty fluid inlet intersects the upwardly extending portion of the handle."

302. In my opinion, the combination of Lehmann, Fester336, and Jung teaches a handle comprises an upwardly extending portion when the hand vacuum cleaner is positioned on a horizontal surface, the

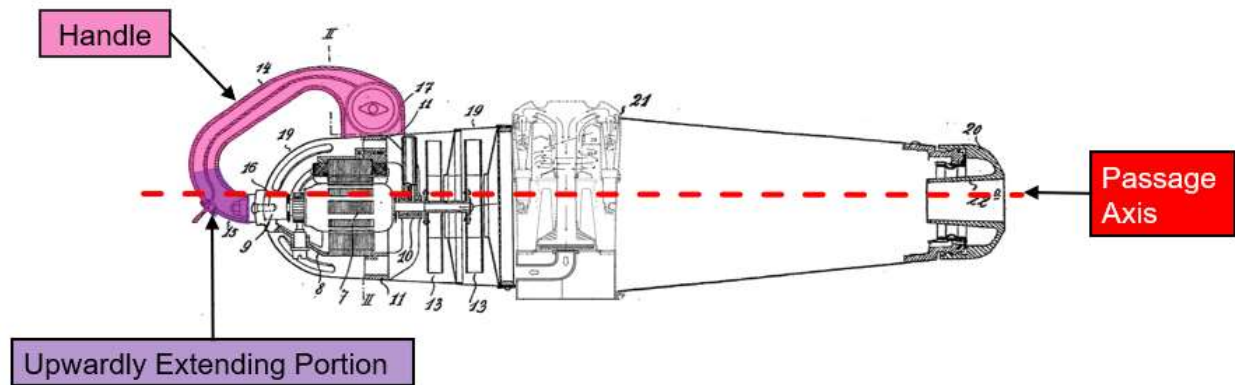
upwardly extending portion extends away from the fluid flow motor housing and the passage axis of the dirty fluid inlet intersects the upwardly extending portion of the handle.

303. Lehmann teaches a **handle** (handle 14) that comprises an **upwardly extending portion** when the hand vacuum cleaner is positioned on a horizontal surface, where the **upwardly extending portion** extends away from the **fluid flow motor housing** and the **passage axis** of the dirty fluid inlet and intersects the **upwardly extending portion** of the **handle**. Ex1011, Fig. 1, 1:63-87.



Ex1011, Fig. 1.

304. In my opinion, a POSA would have understood that the combination of Lehmann, Fester336 and Jung, with Lehmann's **handle**, **fluid flow motor housing**, and dirty fluid inlet (and **passage axis**), also teaches this limitation.



Ex1011, Fig. 1(modified); Ex1008, Fig. 6; Ex1009, Fig. 4.

305. A POSA, in my opinion, therefore would have understood the combination of Lehmann, Fester336, and Jung has a handle that comprises an upwardly extending portion when the hand vacuum cleaner is positioned on a horizontal surface, the upwardly extending portion extends away from the fluid flow motor housing and the passage axis of the dirty fluid inlet intersects the upwardly extending portion of the handle.

3. Lehmann, Fester336, and Jung Render Claim 2 Obvious

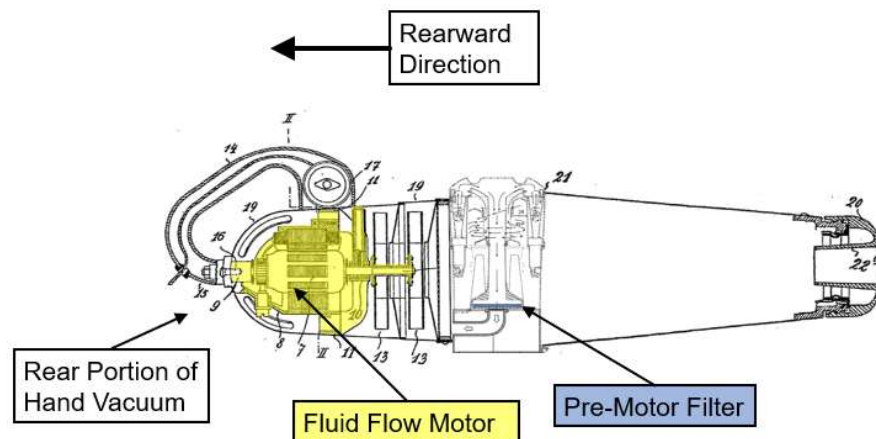
Reference Number	Claim Limitation
[2]	"The hand vacuum cleaner of claim 1, wherein the fluid flow motor is provided in a rear portion of the hand vacuum cleaner and the pre-motor filter is provided forward of the rear portion"

306. In my opinion, the combination of Lehmann, Fester336, and Jung renders the hand vacuum cleaner of claim 1 obvious wherein the fluid flow motor is provided in a rear portion of the hand vacuum cleaner and

the pre-motor filter is provided forward of the rear portion, and teaches the limitations of claim 2.

307. In my opinion, the combination of Lehmann, Fester336, and Jung renders obvious claim 1. Ground 2, cl. 1.

308. In my opinion, a POSA would have understood that the combination of Lehmann, Fester336 and Jung teaches the fluid flow motor (Lehmann's electromotor 7) is positioned in a rear portion of the hand vacuum cleaner and the **pre-motor filter** (Fester336's filter assembly 76) is provided forward of the rear portion. Ex1011, 1:63-70; Ex1009, 10:18-33.



Ex1011, Fig. 1(modified); Ex1008, Fig. 6; Ex1009, Fig. 4.

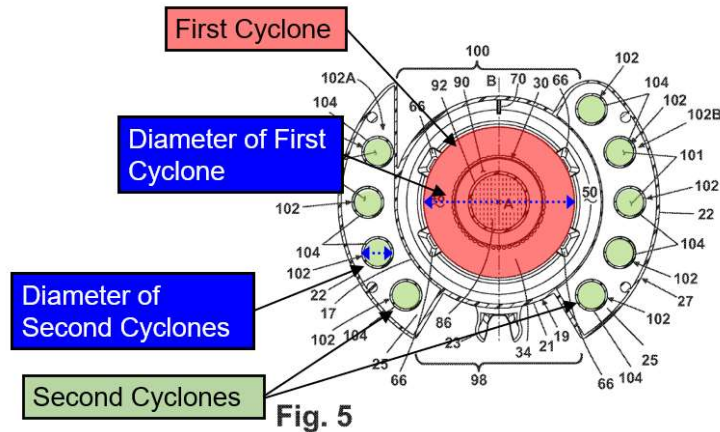
309. A POSA, in my opinion, therefore would have understood the combination of Lehmann, Fester336, and Jung teaches the hand vacuum cleaner of claim 2 and renders obvious the hand vacuum of

claim 1 wherein the fluid flow motor is provided in a rear portion of the hand vacuum cleaner and the pre-motor filter is provided forward of the rear portion.

4. Lehmann, Fester336, and Jung Render Claim 3 Obvious

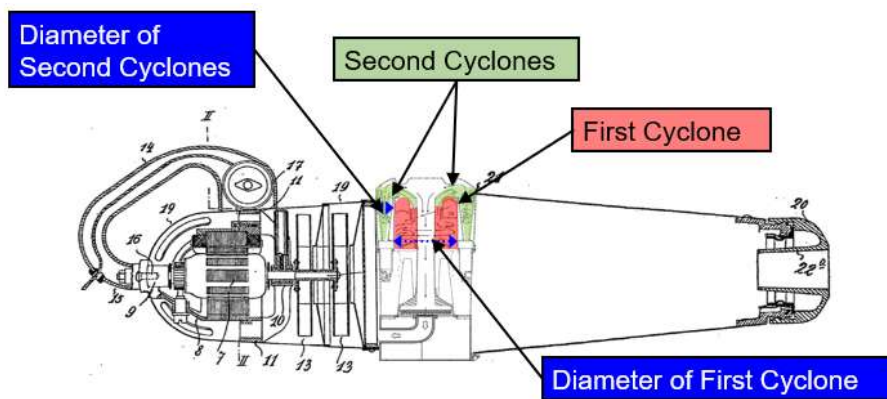
Reference Number	Claim Limitation
[3]	“The hand vacuum cleaner of claim 1, wherein each of the second cyclones are smaller than the first cyclone.”

310. In my opinion, the combination of Lehmann, Fester336, and Jung renders the hand vacuum cleaner of claim 1 obvious and further renders obvious a hand vacuum of claim 1 wherein each of the second cyclones are smaller than the first cyclone, and teaches the limitations of claim 3.
311. In my opinion, the combination of Lehmann, Fester336, and Jung renders obvious claim 1. Ground 2, cl. 1.
312. Fester336 teaches that each **second cyclone** (secondary cyclones 102) is smaller than the **first cyclone** (“primary cyclonic toroidal chamber 48”).



Ex1009, Figs. 2, 4, 5.

313. In my opinion, a POSA would have understood that the combination of Lehmann, Fester336 and Jung, with Fester336's **first** and **second** cyclones, also teaches this limitation.



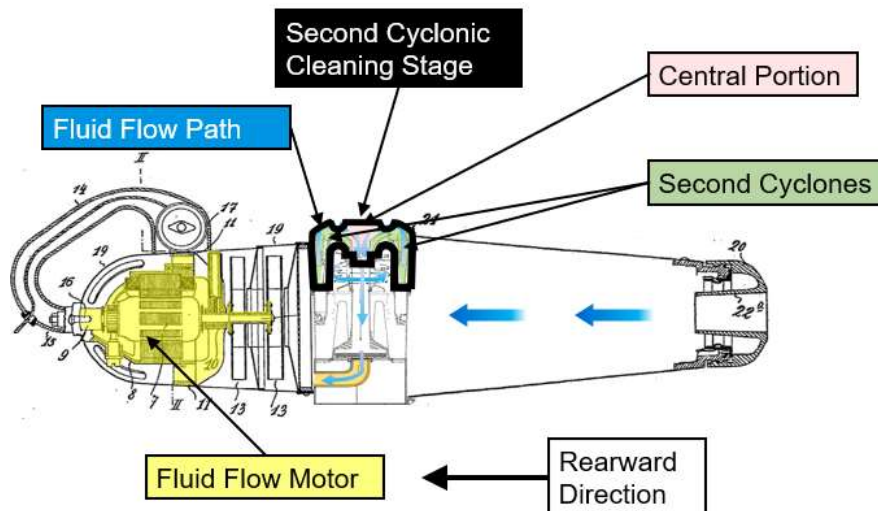
Ex1011, Fig. 1(modified); Ex1008, Fig. 6; Ex1009, Fig. 4.

314. A POSA, in my opinion, therefore would have understood the combination of Lehmann, Fester336, and Jung teaches the limitations of claim 3 and renders the hand vacuum cleaner of claim 1 obvious wherein each of the second cyclones are smaller than the first cyclone

5. Lehmann, Fester336, and Jung Render Claim 4 Obvious

Reference Number	Claim Limitation
[4]	“The hand vacuum cleaner of claim 1, wherein the fluid flow motor is rearward of the second cyclonic cleaning stage and air travels downwardly through the central portion prior to travelling rearwardly to the fluid flow motor.”

315. In my opinion, the combination of Lehmann, Fester336, and Jung renders the hand vacuum cleaner of claim 1 obvious and further renders obvious a hand vacuum of claim 1 wherein the fluid flow motor is rearward of the second cyclonic cleaning stage and air travels downwardly through the central portion prior to travelling rearwardly to the fluid flow motor, and teaches the limitations of claim 4.
316. In my opinion, the combination of Lehmann, Fester336, and Jung renders obvious claim 1. Ground 2, cl. 1.
317. In my opinion, a POSA would have understood that the combination of Lehmann, Fester336 and Jung teaches the fluid flow motor (Lehmann’s electromotor 7) is rearward of the second **cyclonic cleaning stage** (Fester336’s secondary cyclonic chamber 101) and air travels downwardly through the **central portion** (Fester336’s air duct 92) before it travels rearwardly (through Jung’s inner flow tube 57) to the fluid flow motor.



Ex1011, Fig. 1(modified); Ex1008, Fig. 6; Ex1009, Fig. 4.

318. A POSA, in my opinion, therefore would have understood the combination of Lehmann, Fester336, and Jung teaches the limitations of claim 4 and renders the hand vacuum cleaner of claim 1 obvious wherein the fluid flow motor is rearward of the second cyclonic cleaning stage and air travels downwardly through the central portion prior to travelling rearwardly to the fluid flow motor.

6. Lehmann, Fester336, and Jung Render Claim 5 Obvious

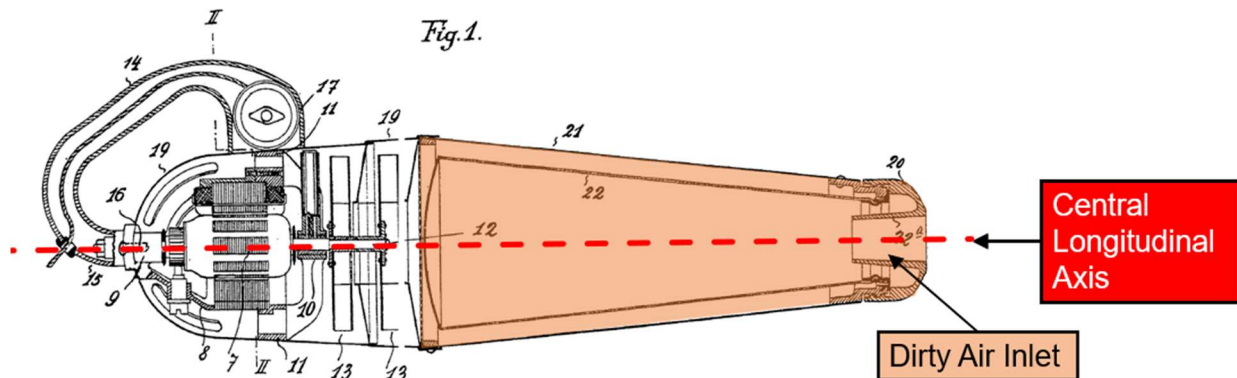
Reference Number	Claim Limitation
[5]	"The hand vacuum cleaner of claim 1, wherein the dirty air inlet has a central longitudinal axis and a projection of the dirty air inlet central longitudinal axis intersects the second cyclonic cleaning stage."

319. In my opinion, the combination of Lehmann, Fester336, and Jung renders the hand vacuum cleaner of claim 1 obvious and further renders

obvious a hand vacuum of claim 1 wherein the dirty air inlet has a central longitudinal axis and a projection of the dirty air inlet central longitudinal axis intersects the second cyclonic cleaning stage, and teaches the limitations of claim 5. (Claim 5).

320. In my opinion, the combination of Lehmann, Fester336, and Jung renders obvious claim 1. Ground 2, cl. 1.

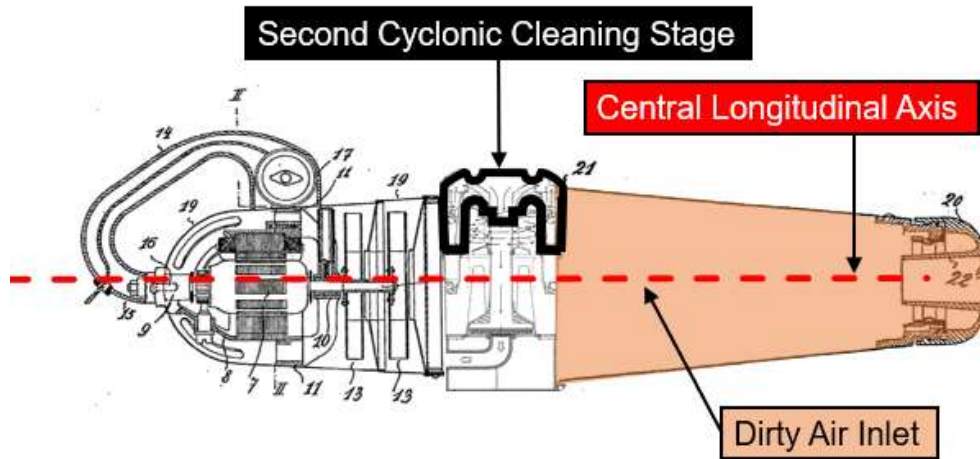
321. Lehmann teaches a **dirty air inlet** (inwardly directed coned socket 22a and tapering part 21) that has a **central longitudinal axis**. Ex1011, Fig. 1, Claim 1, 1:38-44, 1:63-73, 2:7-24, 2:39-41.



Ex1011, Fig. 1.

322. In my opinion, a POSA would have understood that the combination of Lehmann, Fester336 and Jung, would include a **central longitudinal axis** of the **dirty air inlet** that passes beneath Fester336's secondary cyclones 102. However, in my opinion, it would have been obvious to a POSA to modify the combination so that the **dirty air inlet**

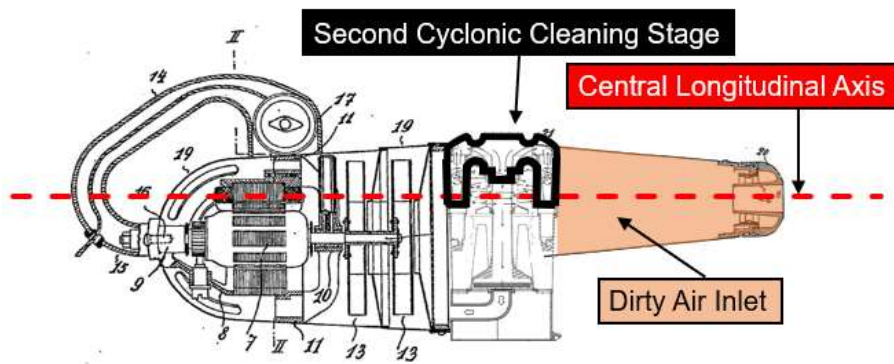
(Lehmann's inwardly directed coned socket 22a) has a **central longitudinal axis** and a projection of the dirty air inlet central longitudinal axis intersects the **second cyclonic cleaning stage** (Fester336's secondary cyclonic chamber 101).



Ex1011, Fig. 1(modified); Ex1008, Fig. 6; Ex1009, Fig. 4.

323. A POSA, in my opinion, would have been motivated to move Lehmann's tapering part 21 and inwardly directed coned socket 22a vertically, as close to Fester336's inlet 28 as possible, to introduce air to the primary cyclonic toroidal chamber 48. Ex1009, 4:65-5:3; 5:23-32. In my opinion, this would have resulted in the intersection of the central longitudinal axis of the dirty air inlet with Fester336's second cyclonic cleaning stage because inlet 28 would extend through secondary cyclonic chamber 101 to reach primary cyclonic toroidal chamber 48. *Id.* Fig. 3, 4:65-5:3.

324. A POSA, in my opinion, would have been motivated to make this change to minimize variances in the direction of airflow and lower the likelihood that debris would clog inlet 28. It also minimizes the number of changes required to attach Lehman to Fester336. A POSA, in my opinion, would have understood that this combination would have produced a more compact design that would have been beneficial from a comfort, maneuverability, and space saving perspective.



Ex1011, Fig. 1(modified); Ex1008, Fig. 6; Ex1009, Fig. 4.

325. This modification, in my opinion, also would have been obvious to try. In my opinion, a POSA would have recognized that there were a limited number of ways to arrange the dirty air inlet, passage axis, and second cyclonic cleaning stage, and configurations in which the passage axis and second cyclonic cleaning stage intersect. A POSA, in my opinion, would have had a reasonable expectation of success by selecting this configuration.

326. In my opinion, a POSA therefore would have understood the combination of Lehmann, Fester336, and Jung teaches the limitations of claim 5 and renders the hand vacuum cleaner of claim 1 obvious wherein the fluid flow motor is rearward of the second cyclonic cleaning stage and air travels downwardly through the central portion prior to travelling rearwardly to the fluid flow motor.

7. Lehmann, Fester336, and Jung Render Claim 6 Obvious

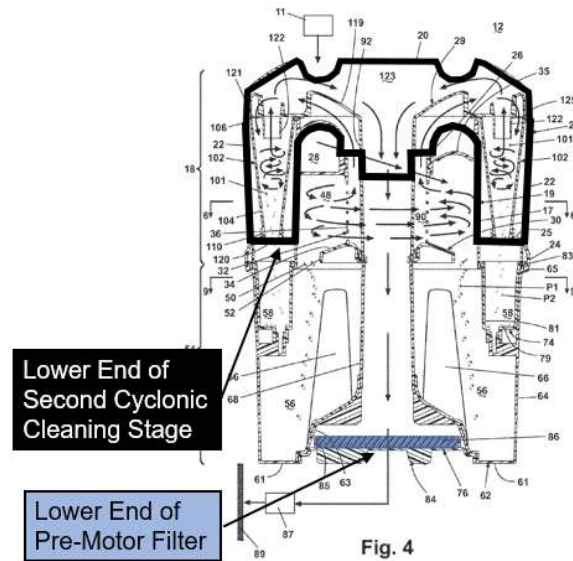
Reference Number	Claim Limitation
[6]	“The hand vacuum cleaner of claim 1, wherein a lower end of the pre-motor filter is located below a lower end of the second cyclonic cleaning stage.”

327. In my opinion, the combination of Lehmann, Fester336, and Jung renders the hand vacuum cleaner of claim 1 obvious and further renders obvious a hand vacuum of claim 1 wherein a lower end of the pre-motor filter is located below a lower end of the second cyclonic cleaning stage, and teaches the limitations of claim 6. (Claim 6).

328. In my opinion, the combination of Lehmann, Fester336, and Jung renders obvious claim 1. Ground 2, cl. 1.

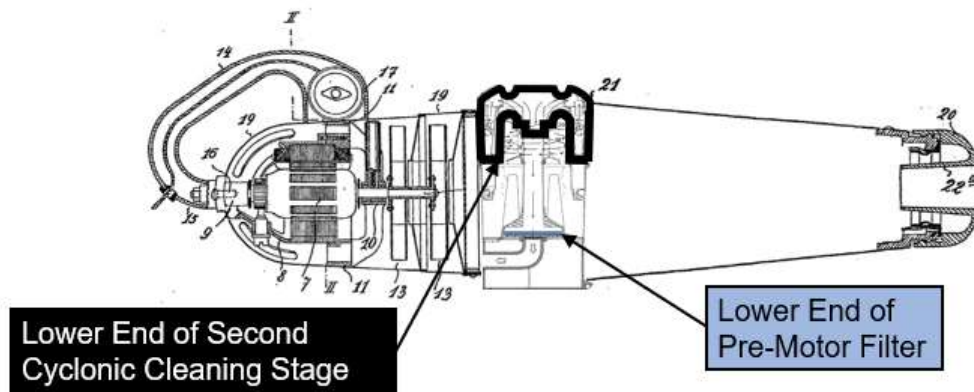
329. Fester336 teaches a lower end of a **pre-motor filter** (filter assembly 76) that is located below a lower end of the **second cyclonic cleaning stage** (secondary cyclonic chamber 101). Ex1009, Figs. 2&4, 5:33-53,

6:57-66, 9:17-31.



Ex1009, Fig. 4.

330. In my opinion, a POSA would have understood that the combination of Lehmann, Fester336 and Jung, with Fester336's **second cyclonic cleaning stage** and **pre-motor filter**, also teaches this limitation.



Ex1011, Fig. 1(modified); Ex1008, Fig. 6; Ex1009, Fig. 4.

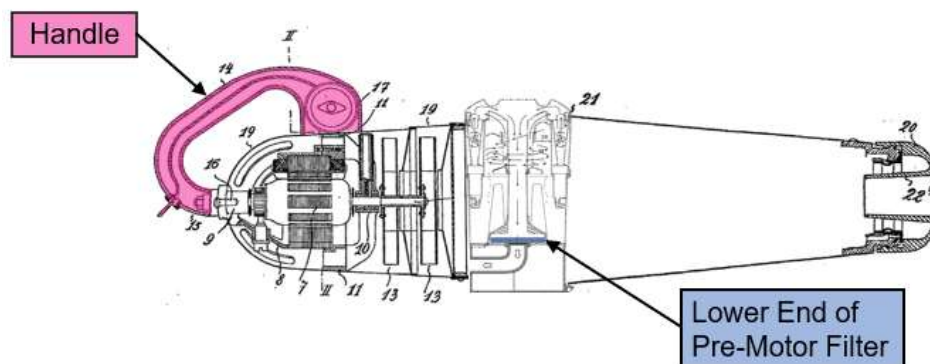
331. A POSA, in my opinion, therefore would have understood the

combination of Lehmann, Fester336, and Jung teaches the limitations of claim 6 and renders the hand vacuum cleaner of claim 1 obvious wherein a lower end of the pre-motor filter is located below a lower end of the second cyclonic cleaning stage.

8. Lehmann, Fester336, and Jung Render Claim 7 Obvious

Reference Number	Claim Limitation
[7]	“The hand vacuum cleaner of claim 1, wherein a portion of a handle of the hand vacuum cleaner is located above a lower end of the pre-motor filter.”

332. In my opinion, the combination of Lehmann, Fester336, and Jung renders the hand vacuum cleaner of claim 1 obvious and further renders obvious a hand vacuum of claim 1 wherein a portion of a handle of the hand vacuum cleaner is located above a lower end of the pre-motor filter, and teaches the limitations of claim 7. (Claim 7).
333. In my opinion, the combination of Lehmann, Fester336, and Jung renders obvious claim 1. Ground 2, cl. 1.
334. In my opinion, a POSA would have understood that the combination of Lehmann, Fester336 and Jung teaches a portion of a **handle** (Lehmann’s handle 14) of the hand vacuum cleaner is positioned above a lower end of the **pre-motor filter** (Fester336’s filter assembly 76).



Ex1011, Fig. 1(modified); Ex1008, Fig. 6; Ex1009, Fig. 4.

335. A POSA therefore, in my opinion, would have understood the combination of Lehmann, Fester336, and Jung teaches the limitations of claim 7 and renders the hand vacuum cleaner of claim 1 obvious wherein a portion of a handle of the hand vacuum cleaner is located above a lower end of the pre-motor filter.

9. Lehmann, Fester336, and Jung Render Claim 8 Obvious

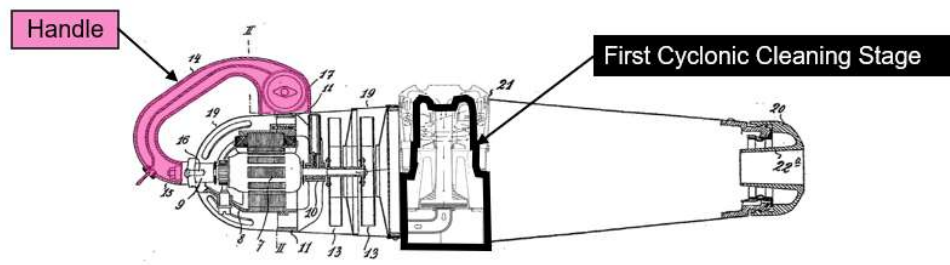
Reference Number	Claim Limitation
[8]	“The hand vacuum cleaner of claim 1 wherein an end of the handle is mounted to the hand vacuum cleaner at a position adjacent an upper end of the first cyclonic cleaning stage.”

336. In my opinion, the combination of Lehmann, Fester336, and Jung renders the hand vacuum cleaner of claim 1 obvious and further renders obvious a hand vacuum of claim 1 wherein an end of the handle is mounted to the hand vacuum cleaner at a position adjacent an upper end of the first cyclonic cleaning stage, and teaches the limitations of claim

8. (Claim 8).

337. In my opinion, the combination of Lehmann, Fester336, and Jung renders obvious claim 1. Ground 2, cl. 1.

338. In my opinion, a POSA would have understood that the combination of Lehmann, Fester336 and Jung teaches an end of the **handle** (Lehmann's handle 14) that is mounted to the vacuum at a position adjacent an upper end of the **first cyclonic cleaning stage** (Fester336's primary cyclonic toroidal chamber 48 and dirt collection region 56).



Ex1011, Fig. 1(modified); Ex1008, Fig. 6; Ex1009, Fig. 4.

339. In my opinion, the handle from this combination is adjacent the upper end of the first cyclonic cleaning stage to the same extent as the embodiments in the '666Patent, which shows a handle 174 mounted to the vacuum at a position displaced from cyclonic cleaning stage 116. Ex1001, Fig. 2a, 4:1-7, 7:32-34.

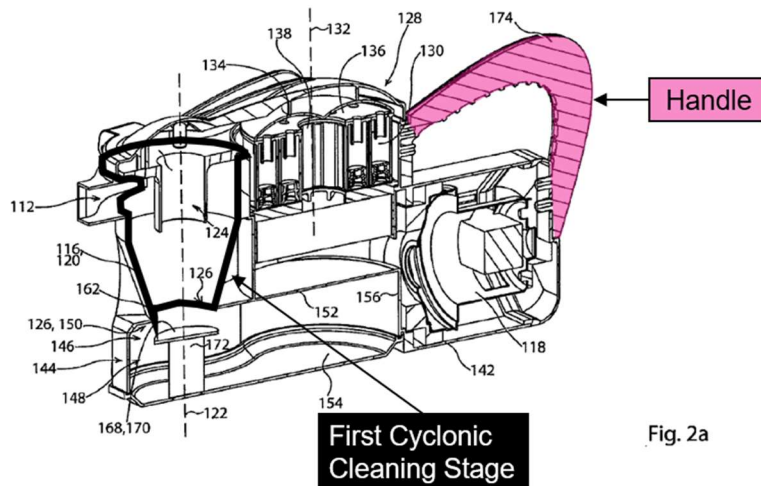


Fig. 2a

Ex1001, Fig. 2a.

340. A POSA therefore, in my opinion, would have understood the combination of Lehmann, Fester336, and Jung teaches the limitations of claim 8 and renders the hand vacuum cleaner of claim 1 obvious wherein an end of the handle is mounted to the hand vacuum cleaner at a position adjacent an upper end of the first cyclonic cleaning stage.

10. Lehmann, Fester336, and Jung Render Claim 9 Obvious

Reference Number	Claim Limitation
[9]	"The hand vacuum cleaner of claim 1 wherein the dirt collection region has a pivotally openable bottom."

341. In my opinion, the combination of Lehmann, Fester336, and Jung renders the hand vacuum cleaner of claim 1 obvious and further renders obvious that the dirt collection region has a pivotally openable bottom, and teaches the limitations of claim 9. (Claim 9). See Section X.B.2.b.

11. Lehmann, Fester336, and Jung Render Claim 10 Obvious

Reference Number	Claim Limitation
[10]	“The hand vacuum cleaner of claim 9 wherein the bottom is openable when the dirt collection region is attached to the main body.”

342. In my opinion, the combination of Lehmann, Fester336, and Jung renders the hand vacuum cleaner of claim 9 obvious and further renders obvious that the bottom is openable when the dirt collection region is attached to the main body, and teaches the limitations of claim 10. (Claim 10). See Section X.B.2.b, I.A.10.

12. Lehmann, Fester336, and Jung Render Claim 11 Obvious

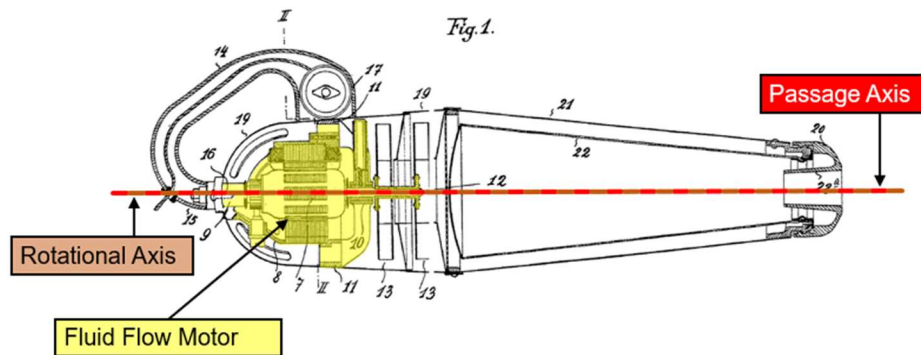
Reference Number	Claim Limitation
[11]	“The hand vacuum cleaner of claim 1 wherein the rotational axis of the fluid flow motor is displaced from the passage axis in a direction parallel to the central longitudinal axis.”

343. In my opinion, the combination of Lehmann, Fester336, and Jung renders the hand vacuum cleaner of claim 1 obvious and further renders obvious a hand vacuum of claim 1 wherein the rotational axis of the fluid flow motor is displaced from the passage axis in a direction parallel to the central longitudinal axis, and teaches the limitations of claim 11. (Claim 11).

344. In my opinion, the combination of Lehmann, Fester336, and Jung

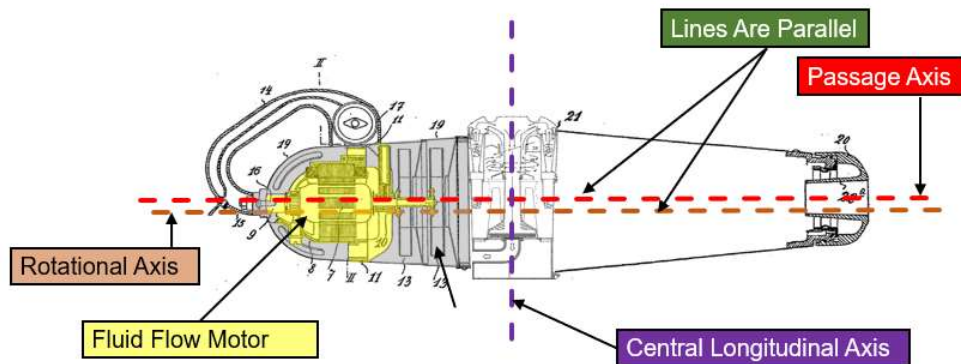
renders obvious claim 1. Ground 2, cl. 1.

345. Lehmann teaches a **rotational axis** of the fluid flow motor that is coaxial with the **passage axis**. In my opinion, Lehmann's rotational axis with its orientation would be maintained in the combination with Fester336 and Jung.



Ex1011, Fig. 1.

346. In my opinion, it would have been obvious to a POSA to position these axes so that the **rotational axis** of the fluid flow motor is displaced from the **passage axis** in a direction parallel to the **central longitudinal axis** and to also align the motor axis with the outlet pipe.



Ex1011, Fig. 1(modified); Ex1008, Fig. 6; Ex1009, Fig. 4.

347. In my opinion, a POSA would have been motivated to move Lehmann's tapering part 21 and inwardly directed coned socket 22a vertically, closer to Fester336's inlet 28, which introduces air to primary cyclonic toroidal chamber 28. *Id.* 4:65-5:3; 5:23-32. In my opinion, this would have minimized variances in the direction of airflow and lowered the likelihood that debris would clog inlet 28.

348. In my opinion, this modification also would have been obvious to try to a POSA. In my opinion, a POSA would have recognized that there were a limited number of ways to arrange the dirty air inlet, passage axis, the motor, and the rotational axis, and configurations in which the passage and rotational axes are offset from one another meets the claims.

349. A POSA therefore, in my opinion, would have understood the combination of Lehmann, Fester336, and Jung teaches the limitations of claim 11 and renders the hand vacuum cleaner of claim 1 obvious wherein the rotational axis of the fluid flow motor is displaced from the passage axis in a direction parallel to the central longitudinal axis

13. Lehmann, Fester336, and Jung Render Claim 12 Obvious

Reference Number	Claim Limitation
[12]	“The hand vacuum cleaner of claim 11 wherein the rotational axis of the fluid flow motor is parallel to the passage axis.”

350. In my opinion, the combination of Lehmann, Fester336, and Jung renders the hand vacuum cleaner of claim 11 obvious and further renders obvious that the rotational axis of the fluid flow motor is parallel to the passage axis, and teaches the limitations of claim 12. (Claim 12). See Section I.A.12. Further, for the same reasons as stated in Ground 1, it reduces the size of the unit and increases maneuverability and comfort. A POSA, in my opinion, would have understood that this combination would have produced a more compact design that would have been beneficial from a comfort, maneuverability, and space saving perspective.

14. Lehmann, Fester336, and Jung Render Claim 13 Obvious

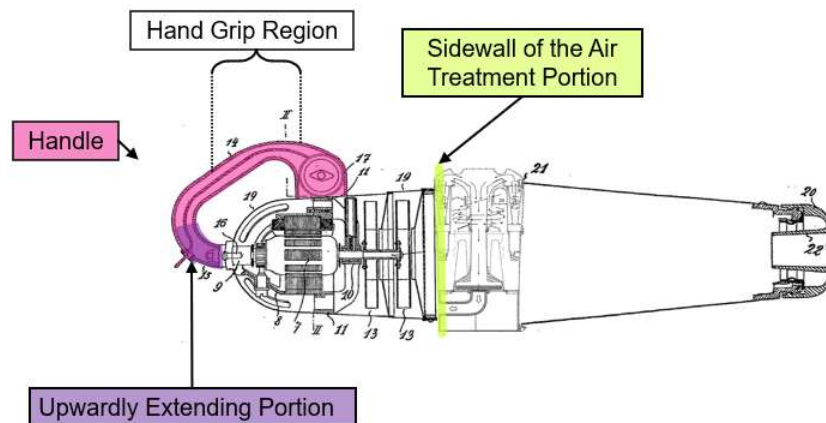
Reference Number	Claim Limitation
[13]	“The hand vacuum cleaner of claim 1 further comprising a hand grip region which is positioned between the upwardly extending portion of the handle and a portion of the sidewall of the air treatment portion.”

351. In my opinion, the combination of Lehmann, Fester336, and Jung renders the hand vacuum cleaner of claim 1 obvious and further renders obvious a hand vacuum of claim 1 further comprising a hand grip

region which is positioned between the upwardly extending portion of the handle and a portion of the sidewall of the air treatment portion, and teaches the limitations of claim 13. (Claim 13).

352. In my opinion, the combination of Lehmann, Fester336, and Jung renders obvious claim 1. Ground 2, cl. 1.

353. In my opinion, a POSA would have understood that the combination of Lehmann, Fester336 and Jung teaches a hand grip region which is located between the upwardly extending portion of the **handle** and a portion of the **sidewall of the air treatment portion**.



Ex1011, Fig. 1(modified); Ex1008, Fig. 6; Ex1009, Fig. 4.

354. A POSA therefore, in my opinion, would have understood the combination of Lehmann, Fester336, and Jung teaches the limitations of claim 13 and renders the hand vacuum cleaner of claim 1 obvious further comprising a hand grip region which is positioned between the upwardly extending portion of the handle and a portion of the sidewall

of the air treatment portion.

XI. SECONDARY CONSIDERATIONS OF NON-OBVIOUSNESS

355. I am unaware of any secondary considerations of non-obviousness that provide evidence that the claims of the '666Patent are not obvious. To the extent PO argue 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: 7/26/24