

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DYSON TECHNOLOGY LIMITED AND DYSON, INC.,

Petitioners,

v.

OMACHRON INTELLECTUAL PROPERTY INC.,

Patent Owner.

DECLARATION OF ROBERT GIACHETTI

REGARDING

U.S. Patent No. 10,478,030

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I. INTRODUCTION

1. My name is Robert Giachetti. I have been retained by Dyson Technology Limited and Dyson, Inc. (collectively “Dyson” or “Petitioners”) as an independent expert in this proceeding.
2. I understand Dyson is challenging the validity of claims 1-13 of U.S. Patent No. 10,478,030 (the “’030 Patent”) in this petition for *inter partes* review (“IPR”). I refer to these as the “Challenged Claims.”
3. I have been asked to consider whether certain references invalidate the Challenged Claims.
4. I am a salaried employee of Fusion Engineering, LLC. Fusion Engineering is being compensated for my time in connection with this matter at the consulting rate of \$410 per hour. My compensation is not affected by the content of my opinions, testimony, or the outcome of this matter.
5. The prior art references on which my opinions are based are:
 - PCT Publication No. 2007/084543 to Butler et al. (“Butler,” attached as Ex1005)
 - Swiss Patent No. CH203,675 to Peter (“PeterCH,” attached as Ex1006)
 - Certified English translation of Swiss Patent No. CH203,675 to Peter (“Peter,” attached as Ex1007)
 - U.S. Patent No. 4,473,923 to Neroni et al. (“Neroni,” attached as Ex1008)

- U.S. Patent Publication No. 2006/0026788 to Fischer et al.
("Fischer," attached as Ex1009)
 - U.K. Patent No. GB194,963 to Lehmann ("Lehmann," attached as Exhibit 1010)
6. In my opinion, the Challenged Claims are invalid based on the following:
- Butler anticipates claims 1-13.
 - Butler renders claims 1-13 obvious.
 - The combination of Peter and Neroni renders claims 1-13 obvious.
 - The combination of Peter, Neroni, and Lehmann renders claims 2, 5, 10, and 11 obvious.

II. BACKGROUND AND QUALIFICATIONS

1. 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.
2. 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.
3. I am currently the Director of Mechanical Engineering at Fusion. In this role, I am responsible for providing engineering consulting services in

- mechanical engineering, coordinating client outreach, coordinating marketing materials, and recruiting.
4. 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.
 5. 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.
 6. 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.

7. 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.
8. 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.
9. 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.
10. 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.
 11. 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.
 12. 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.

13. 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.
14. 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.

15. In approximately 2013-2016, I used industry testing methods and developed and designed novel experiments and testing related to fluid flow analysis for a consumer garden hose. The analysis involved testing the hose's strength, durability, environmental performance (temperature and UV exposure), and material selection in connection with user operation. I further designed computer-controlled pressurization and de-pressurization systems for these garden hoses. The system was initially powered pneumatically with compressed air driven through a manifold in conjunction with a tank of water. When scaled, the system involved two parallel pumps that pressurized two groups of manifolds using computer-controlled valves in series to pressurize and de-pressurize expandable garden hoses. Developing this system involved, among other things, selecting the appropriate fluid power components and optimizing fluid flow paths.
16. 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.
17. 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.
 18. 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.
 19. 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.
20. 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.
21. 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.

22. 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.
23. I have provided my full background in the curriculum vitae that is attached as Ex1003.

III. DOCUMENTS AND MATERIALS CONSIDERED

24. 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.
25. In preparing this Declaration, I have reviewed the '030 patent and its file history, as well as the Butler, Peter, Neroni, and Lehmann prior art references on which my opinions are based. Other references and documents that I have reviewed are mentioned below. These references and documents reflect the state of the relevant art at the time of the alleged invention and the background knowledge of a POSA.
26. 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

27. 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.
28. 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.
29. 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.
30. 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.

31. I have been informed and understand that to determine whether a claim is obvious, it is appropriate to consider, among other factors:
32. (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.
33. 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.

34. 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.
35. 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

36. In my opinion, a Person of Ordinary Skill in the Art (“POSA”) in the subject matter of the ’030 patent would have had a bachelor’s degree in mechanical engineering or a similar field and 2-3 years of experience in machine design, including machines that include fluid dynamics or fluid paths, such as vacuum cleaners. Additional education could offset less experience and vice versa, and a POSA could have also obtained similar knowledge and experience through other means.

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

VI. TECHNOLOGY BACKGROUND

38. The Challenged Claims are directed to vacuum cleaner configurations and features, including alignment of certain vacuum components, “a rigid air flow conduit,” “a surface cleaning head,” “electrical connector[s],” “a

suction motor and fan assembly,” and “an air treatment member provided at the front end.” *See* Ex1001, Claims.

39. I have reviewed the '030 patent's specification, and this claimed configuration does not purport to solve a technical problem.
40. I have also reviewed the file history of the '030 Patent. None of the references I rely upon in forming my invalidity opinions appear to have been before the United States Patent and Trademark Office.
41. In my opinion, as set forth in more detail below, these undisclosed references invalidate every claim of the '030 Patent.

VII. BACKGROUND OF THE '030 PATENT

42. The '030 Patent is titled “Surface Cleaning Apparatus.” Ex1001, Title. The '030 Patent states that it issued on November 19, 2019, from U.S. Patent Application No. 16/156,006, filed on October 10, 2018. Ex1001, Cover. The '030 patent states that it is a continuation of application No. 15/088,876, which was filed on April 1, 2016, which in turn was a continuation of application No. 14/822,211, filed on August 10, 2015. *Id.* It also claims priority to provisional application No. 62/093,189 filed on December 17, 2014. *Id.*

A. Summary of the '030 Patent's Specification

43. The '030 Patent states that it “relates to a type of stick vacuum cleaner

wherein a hand vacuum cleaner is removably mounted to a drive handle and provides motive power to draw dirty air into the surface cleaning head.” *Id.* at 1:18-20.

44. The '030 patent's large specification identifies “limited dirt collection capacity” as a problem with existing hand vacuums and attempts to solve this problem with a “supplemental bin” to “provide enhanced dirt collection capacity”:

In accordance with one aspect of this disclosure, a stick vacuum cleaner is provided which has a removable hand vacuum cleaner and also a supplemental bin which may function as a main dirt collection bin when the hand vacuum cleaner forms part of the stick vacuum cleaners. An advantage of this design is that the supplemental bin may provide enhanced dirt collection capacity for the stick vacuum cleaner. The supplemental bin may be removable so as to reduce the size of the stick vacuum cleaner when a smaller sized stick vacuum cleaner is desired, e.g., for cleaning in small or confined spaces.

Ex1001, 1:32-33, 1:43-53.

45. However, the '030 patent's claims do not claim a supplemental bin. Rather, it claims certain vacuum configurations and features. Ex1001, Claims.
46. However, the '030 patent's claimed combination of features do not solve

any identified problem.

B. Prosecution History of the '030 Patent

47. I have reviewed the prosecution history of the '030 Patent. The following is my understanding:
48. The Examiner did not provide reasons for allowing the claims of the '030 Patent, which issued after only one prior art-based rejection. Ex1004, 252-262 (non-final rejection), 279-283 (notice of allowability).
49. The Examiner did find, however, that certain of the claimed features, including a rigid air flow conduit that is removably mounted to the surface cleaning head, “are standard in the art,” *id.*, 259, and that others would have been obvious, including “provid[ing] an electrical connection at the front of the handheld cleaner” to operate a powered surface cleaning head, and “modify[ing] [a] handle grip” to “make[] it easier for a user to use the cleaner with the surface cleaning head attached,” *id.*, 259-261.
50. In response to the Examiner’s prior art-base rejection, the Applicant argued that the prior art of record failed to teach: (1) a “hand grip portion [that] has a hand grip portion axis that intersects the suction motor,” *id.*, 268-269, 273-275; and (2) an “air inlet . . . [that] is . . . centrally positioned with respect to an air treatment chamber front wall,” *id.*, 272. However, as I describe below, these features—and all of the claimed features—were

disclosed in prior art such as Butler that was not before the Examiner.

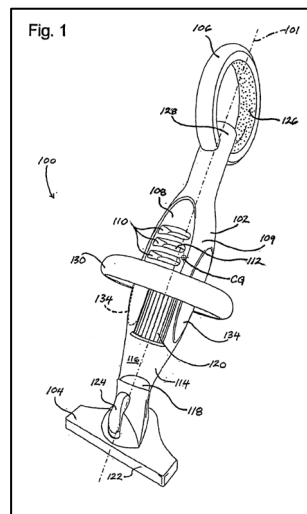
C. Priority Date of the Challenged Claims

51. For the purposes of my analysis, I have been instructed to apply and have applied a priority date of December 17, 2014, for the Challenged Claims.

VIII. BACKGROUND OF THE PRIOR ART

A. Butler

52. Butler is titled “Stair Cleaning Vacuum Cleaner.” Ex1005, Title. It generally describes an “improved vacuum cleaner for cleaning raised and vertical surfaces,” as shown in Butler Figure 1 below. Ex1005, 3:10-12. Butler is a published PCT application that was filed January 17, 2007, and published July 26, 2007.

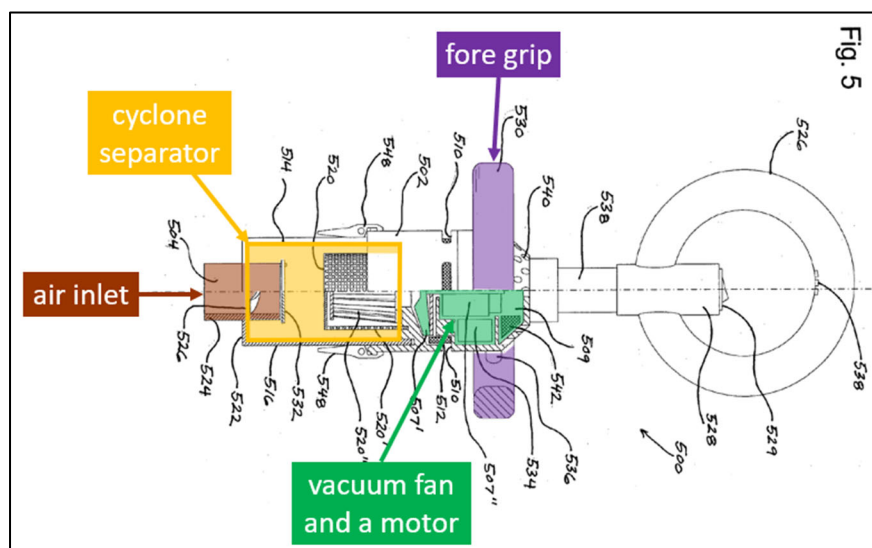


Ex1005, Fig. 1.

53. In my opinion, Butler is a single vacuum cleaner system that is configurable and optimizable for various use cases. Butler explains that

its various components, including handles, grips, dirt receptacles, air filters, and cleaning tools, “may be interchangeable with one another to provide the user with various cleaning options,” and the arrangement of these components may be “used individually or in various other inventive combinations.” *Id.*, 16:25-29, 43:29-44:3; *see also id.*, 4:17-28, 18:22-28, 19:9-15, 34:12-13.

54. Butler’s vacuum cleaner has a “housing” with a “longitudinal axis,” “[a] **fore grip**” with a hand grip portion having a hand grip portion axis that intersects “[a] **vacuum fan and a motor**,” and “an **air inlet**” centrally positioned with respect to a “**cyclone separator**” front wall, as shown in the annotated image below:

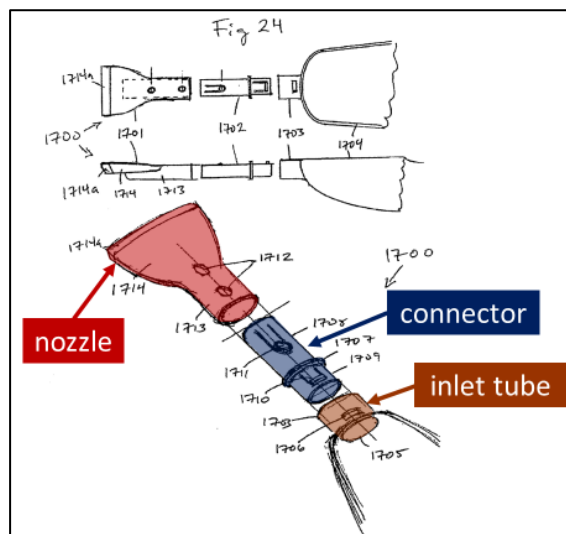


Ex1005, Abstract, 3:10-12, 3:23-4:1, Claim 11, Fig. 5.

55. Butler further teaches various attachments that connect to the air inlet. *Id.*

at 22:7-9.

56. Butler further describes a “**connector 1702**,” with an upstream “inlet portion 1708,” which is “telescopically received within the **nozzle 1701**,” and a downstream “outlet portion 1709,” which is “telescopically received within or around the **inlet tube 1703**,” as shown in the annotated image below:



57. Ex1005, 41:19-29, Fig. 24.

B. Peter¹

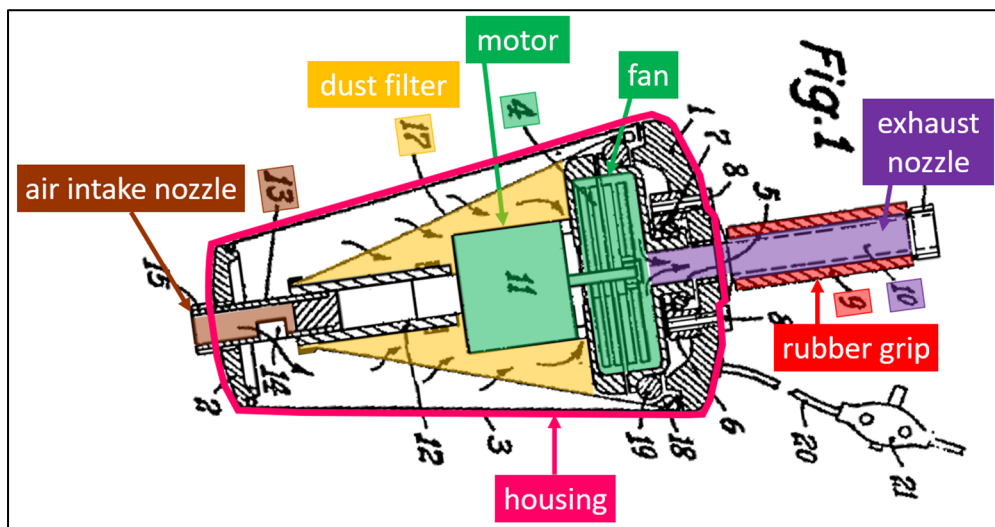
58. Peter is titled “Vacuum Cleaner.” Ex1007, Title. It describes a vacuum cleaner with a detachable extension tube for cleaning “areas that are difficult to access.” Ex1007, 2. Peter is a Swiss patent that was filed May

¹ Ex1007 is a certified English translation of Ex1006, published in German.

Citations to Ex1007 are to the page.

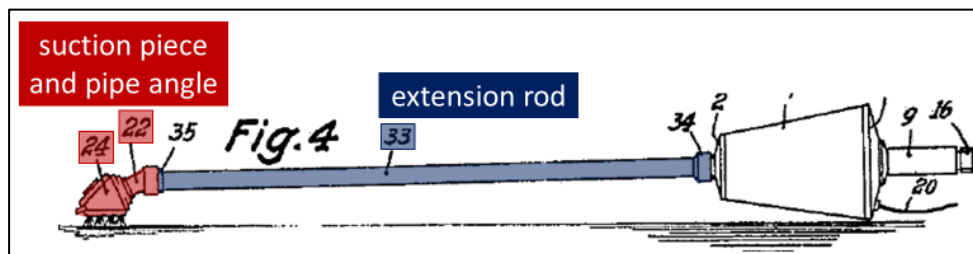
27, 1938, and published June 16, 1939.

59. Peter's vacuum has a “**housing**,” an “**air intake nozzle 13**” centrally positioned with respect to a “**dust filter [17]**” front wall, and an “**exhaust nozzle 10**” “provided with a **rubber grip 9**” that has a hand grip portion axis that intersects “**fan**” and “**motor 11**,” as shown in the annotated image below:



Ex1007, 2, Fig. 1.

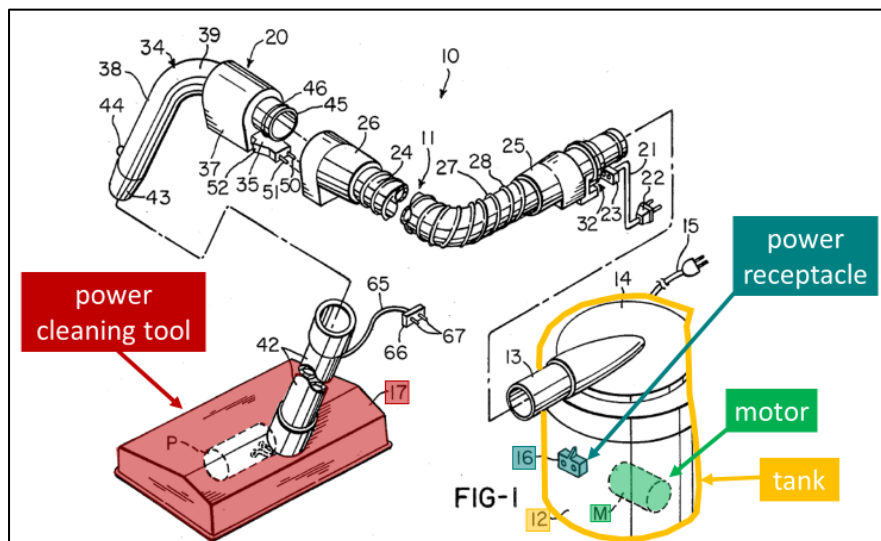
60. Peter also teaches a “**suction piece 24**” connected to a “**pipe angle 22**,” and an “**extension rod 33**” “between the vacuum cleaner housing and the pipe angle,” as shown in the annotated image below:



Id., 3, Fig. 4.

C. Neroni

61. Neroni is titled “Vacuum Cleaning Tool Adapter with Electrical Control Means.” Ex1008, Title. It describes a vacuum cleaner with electrical connectors and cables that provide power to a powered surface cleaning head. Neroni is a U.S. patent that was filed on May 10, 1982, and issued October 2, 1984. Ex1008, Cover.
62. Neroni teaches a vacuum cleaner with a powered cleaning tool. Neroni’s vacuum powers the “**power cleaning tool 17**” by running electricity from the power cleaning tool to power “**receptacle 16A**, and to **motor M**,” located in separation “**tank 12**” as shown in the annotated image below:



Ex1008, 3:34-42, 6:42-45, Fig. 1.

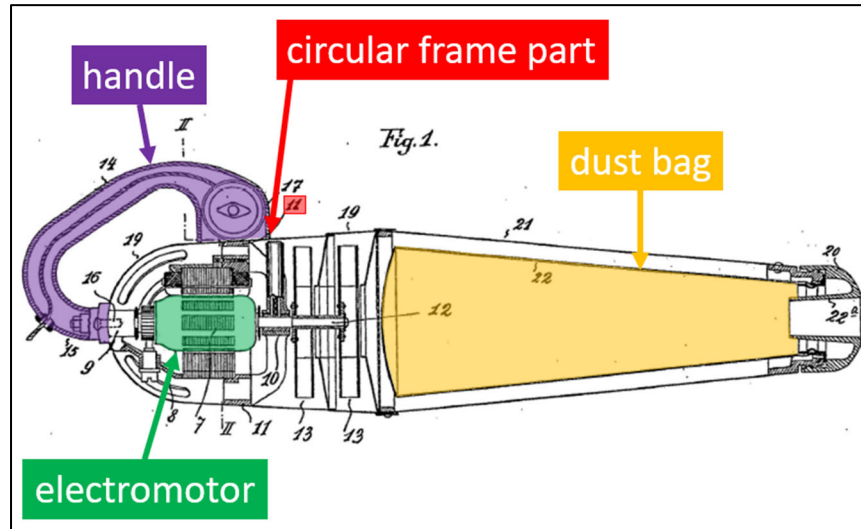
D. Lehmann

63. Lehmann is titled “Improvements in Vacuum Cleaning and Dusting

Apparatus.” Ex1010, Title. It describes a portable vacuum cleaner.

Lehmann is a U.K. patent that was filed on April 21, 1922, and issued March 22, 1923. Ex1010, Cover.

64. Lehmann’s vacuum has an “**electromotor 7**,” a “**dust bag 22**,” and an “**arched handle 14**” having an “end [17]” that “abuts radially against the **circular frame part 11**” of the vacuum cleaner main body, as shown in the annotated image below:



Ex1010, 1:63-67, 1:71-82, Fig. 1.

IX. CLAIM CONSTRUCTION

65. I am unaware of any claim construction determinations related to the '030 patent.
66. For purposes of this proceeding, I have been asked to consider and have considered whether the Challenged Claims are invalid as anticipated or obvious under their plain and ordinary meaning.

X. INVALIDITY OPINIONS: '030 PATENT

67. In my opinion, the Challenged Claims of the '030 patent are invalid based on the following references and combinations: claims 1-13 are anticipated or rendered obvious by Butler; claims 1-13 are rendered obvious by the combination of Peter and Neroni; and claims 2, 5, 10, and 11 are rendered obvious by the combination of Peter, Neroni, and Lehmann.
68. 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, which I have been asked to assume was December 17, 2014, for the Challenged Claims of the '030 patent, as discussed above. I have also considered the level of ordinary skill in the pertinent art.
69. 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 '030 patent.

A. Ground 1: Butler Anticipates Claims 1-13

1. Butler Anticipates Claims 1 and 9

a. [1pre]/[9pre]

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

70. To the extent the preambles are limiting, in my opinion, Butler teaches a surface cleaning apparatus. (Limitations [1pre]/[9pre]). Butler teaches a “vacuum cleaner” for cleaning various common “surfaces”:

The present invention provides a vacuum cleaner that can be used to clean floors and carpets, but is particularly adapted to clean stair treads or other elevated horizontal surfaces, stair risers and other inclined or vertical surfaces, and surfaces located in confines spaces.

Ex1005, Title, 7:2-5.

71. In my opinion a POSA would understand that Butler’s vacuum is a surface cleaning apparatus.

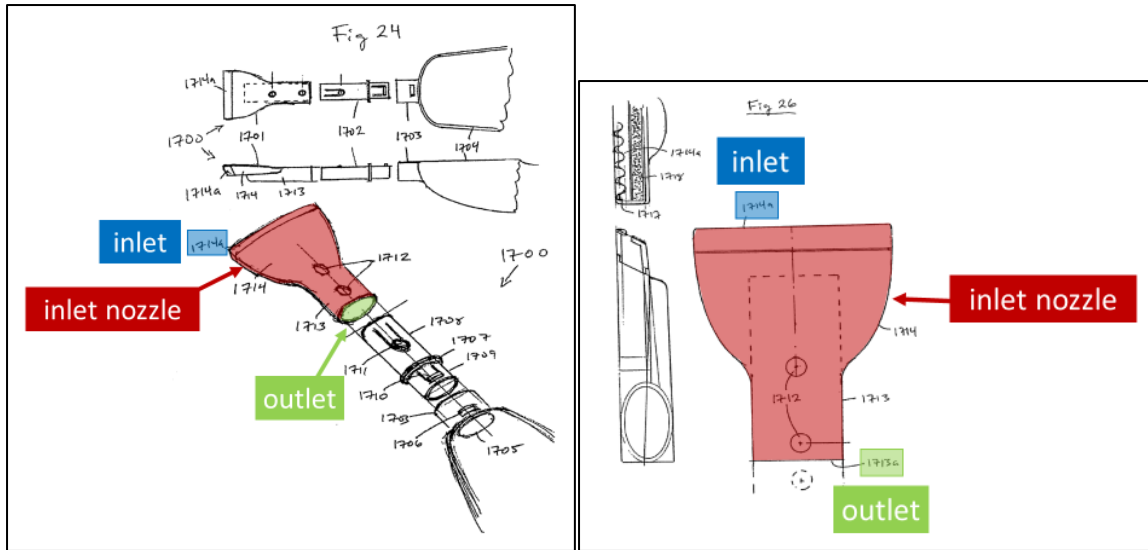
b. [1a]/[9a]

Reference Number	Claim Limitation
[1a]	“(a) a surface cleaning head having a front end, a rear end, a dirt air inlet and a cleaning head air outlet;”
[9a]	“(a) a surface cleaning head having a front end, a rear end, a dirt air inlet and a cleaning head air outlet;”

72. Butler teaches a surface cleaning head having a front end, a rear end, a dirt

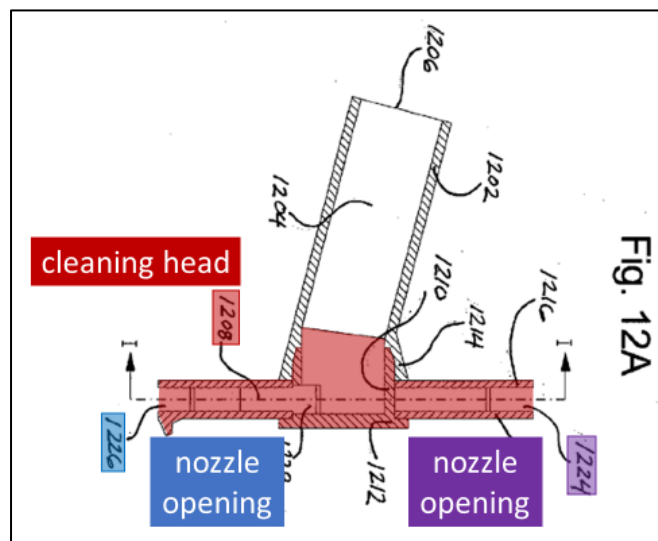
air inlet and a cleaning head air outlet. (Limitations [1a]/[9a]).

73. Butler teaches a variety of surface cleaning heads: “any type of cleaning device may be attached to the entry tube 524, such as an elongated cleaning head ... a crevice tool, a dusting attachment, a so-called powerhead having a rotating agitator” Ex1005, 22:7-9. In my opinion, a POSA would understand that each of these “cleaning device[s],” including an elongated cleaning head, crevice tool, dusting attachment, and powerhead are surface cleaning heads because they are at the end of the vacuum and clean surfaces.
74. In my opinion, each of these surface cleaning heads has a front and rear end. In my opinion, a POSA would understand that because each of these surface cleaning heads are three-dimensional objects, each has a front and rear end. For example, Butler teaches a surface cleaning head, “**inlet nozzle 1701**,” which, in my opinion, has a front end, “**inlet 1714a**,” and a rear end, “**outlet 1713a**,” as shown in the annotated images below:



Ex1005, 42:6-9, Figs. 24, 26.

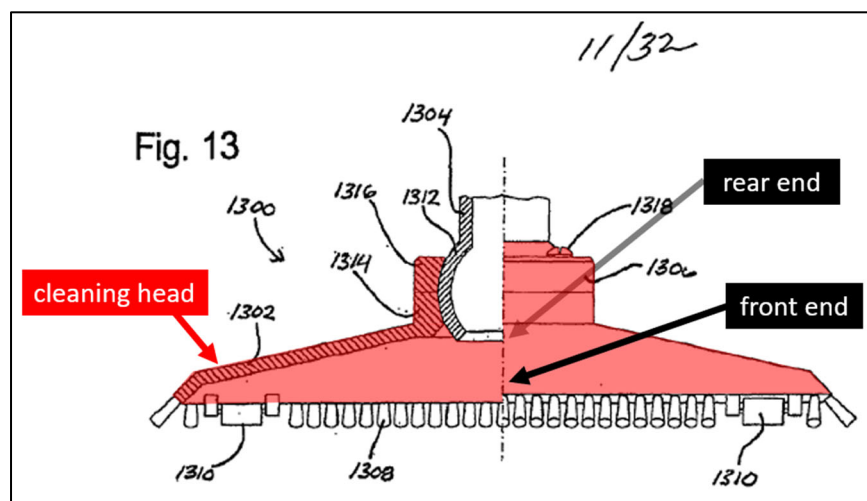
75. Further, Butler teaches another surface cleaning head, “**cleaning head 1208**,” with, in my opinion, a front end, “**nozzle opening 1226**,” and a rear end, “**nozzle opening 1224**,” as shown in the annotated image below:



Ex1005, 31:24-27, Fig. 12A.

76. Butler teaches another “**cleaning head 1302**” that has “a generally

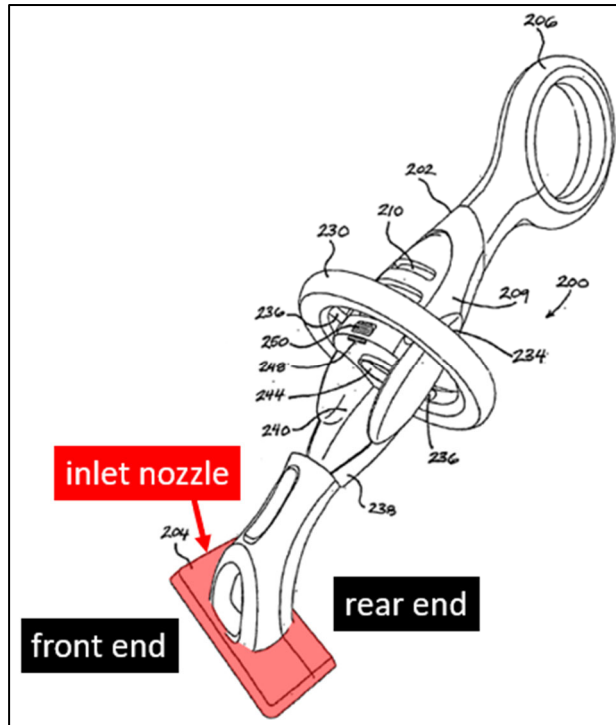
rectangular body” with bristles extending downwards from the “outer perimeter of the **head 1302.**” Ex1005, 32:10-12. In my opinion, Butler’s “**cleaning head 1302**” has a front end and a rear end, with the front end extending out of the page and the rear end extending into the page, as shown in the annotated image below:²



Id., Fig. 13, 32:8-12.

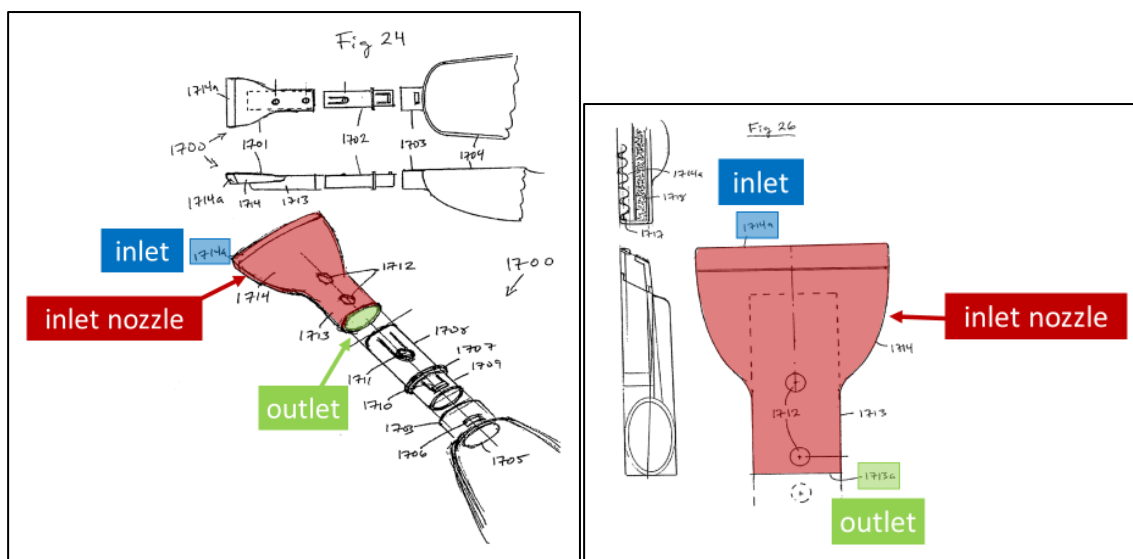
77. Butler teaches another cleaning head, “**inlet nozzle 204.**” Ex1005, 15:19-22. In my opinion, Butler’s “**inlet nozzle 204**” has a front end and a rear end, as shown in the annotated image below:

² Annotated text in black-filled boxes is the '030 patent's claim language, and text in colored boxes is disclosure from the cited reference.



Ex1005, Fig. 1, 15:19-22, 16:4-13.

78. In my opinion, each of Butler’s surface cleaning heads have a dirt air inlet and a cleaning head air outlet. In my opinion, a POSA would understand that each surface cleaning head has a dirt air inlet where dirty air enters the surface cleaning head, and a cleaning head air outlet to deliver that dirty air to the vacuum, which separates the dirt from the air. For example, Butler teaches that air flows into “**inlet nozzle 1701**” at “**inlet 1714a**” and exits “outlet duct 1713” at “**outlet 1713a** for the **inlet nozzle 1701**,” as shown in the annotated images below:



Ex1005, 42:6-9, Figs. 24, 26.

79. In my opinion, a POSA would understand that Butler's "**inlet 1714a**" is a dirt air inlet and that Butler's "**outlet 1713a**" is a cleaning head air outlet.
80. Similarly, for the surface cleaning head shown in Butler Figure 12A, air flows into "**nozzle opening 1226**," through the "**cleaning head 1208**," to an "**end** to a cleaning head 1208" that is "attach[ed]" to "**grip 1202**," as shown in the annotated image below:

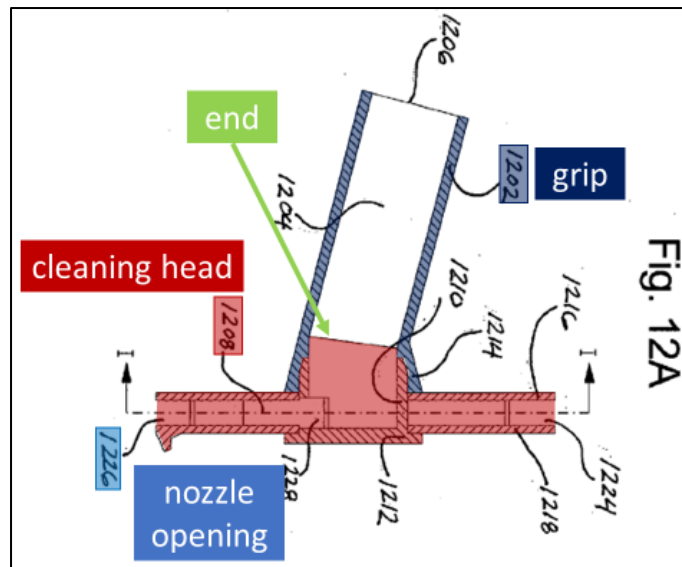
Another embodiment of an inlet nozzle of the present invention is shown in Figures 12A and 12B. Figure 12A is a cut away side view of an inlet nozzle 1200 shown along reference line II-II of Figure 12B, and Figure 12B is a cut away front view of the inlet nozzle 1200 shown along reference line I-I. According to this embodiment, the inlet nozzle 1200 comprises a tubular grip 1202 having a vacuum passage 1204 extending therethrough. The grip

1202 terminates at one end at an opening 1206 for attaching to a vacuum cleaner, and at the other end to a cleaning head 1208.

The cleaning head 1208 is mounted to a boss 1210 located at the end of the grip 1202. The boss 1210 has a cylindrical exterior profile, with a portion of the profile being removed to form a boss opening 1228 that opens into the vacuum passage 1204. The cleaning head 1208 is retained in the axial direction between two flanges 1212 and 1214. As such, the cleaning head 1208 can be rotated about the boss 1214, but the flanges 1212 and 1214 prevent axial movement or inadvertent removal of the cleaning head 1208.

The cleaning head 1208 comprises two generally parallel trapezoidal plates 1216 and 1218 that are held together by sidewalls 1220 and/or interior walls 1222. The sidewalls 1220 and interior walls 1222 are positioned and shaped to form a first nozzle opening 1224 at one end of the cleaning head 1208, and a second nozzle opening 1226 at the opposite end of the cleaning head 1208. Each nozzle opening 1224, 1226 comprises an air passage, formed between the plates 1216, 1218 and interior walls 1222, that leads to the rotational center of the cleaning head 1208. As such, the first and second nozzle openings 1224, 1226 can be selectively placed in communication with the vacuum passage 1204 by rotating the cleaning head 1208 to align the desired nozzle opening air passage with the boss opening 1228.

Ex1005, 31:3-27.

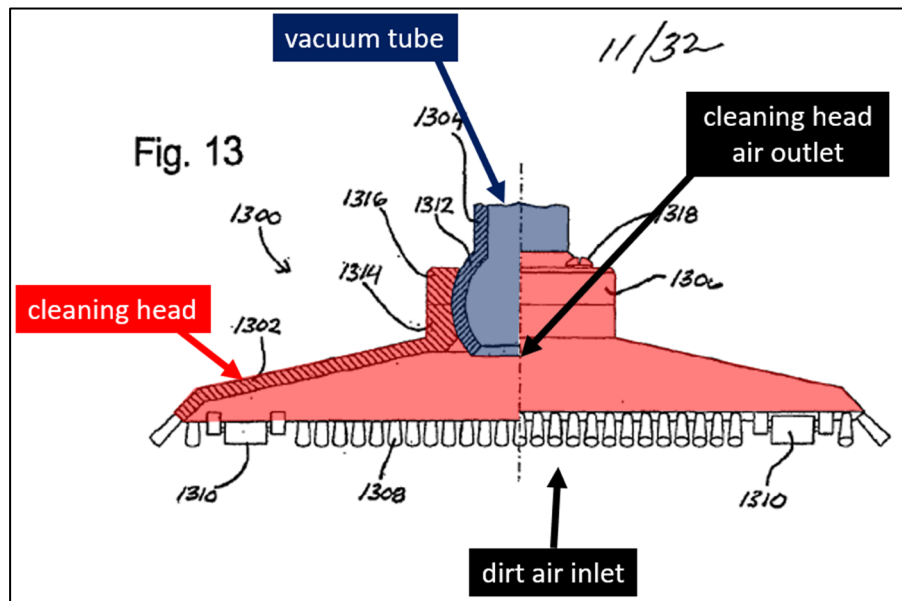


Id., Fig. 12A.

81. In my opinion, a POSA would understand that Butler’s “**nozzle opening 1226**” is also a dirt air inlet and Butler’s “cleaning head 1208” “**end**” is also a cleaning head air outlet.
82. Further, Butler’s “**cleaning head 1302**” has a dirt air inlet (which, in my opinion, is where the bristles are located), and a cleaning head air outlet (which, in my opinion, is where the “**cleaning head 1302**” attaches “to a **vacuum tube 1304**”), as shown in the annotated image below:

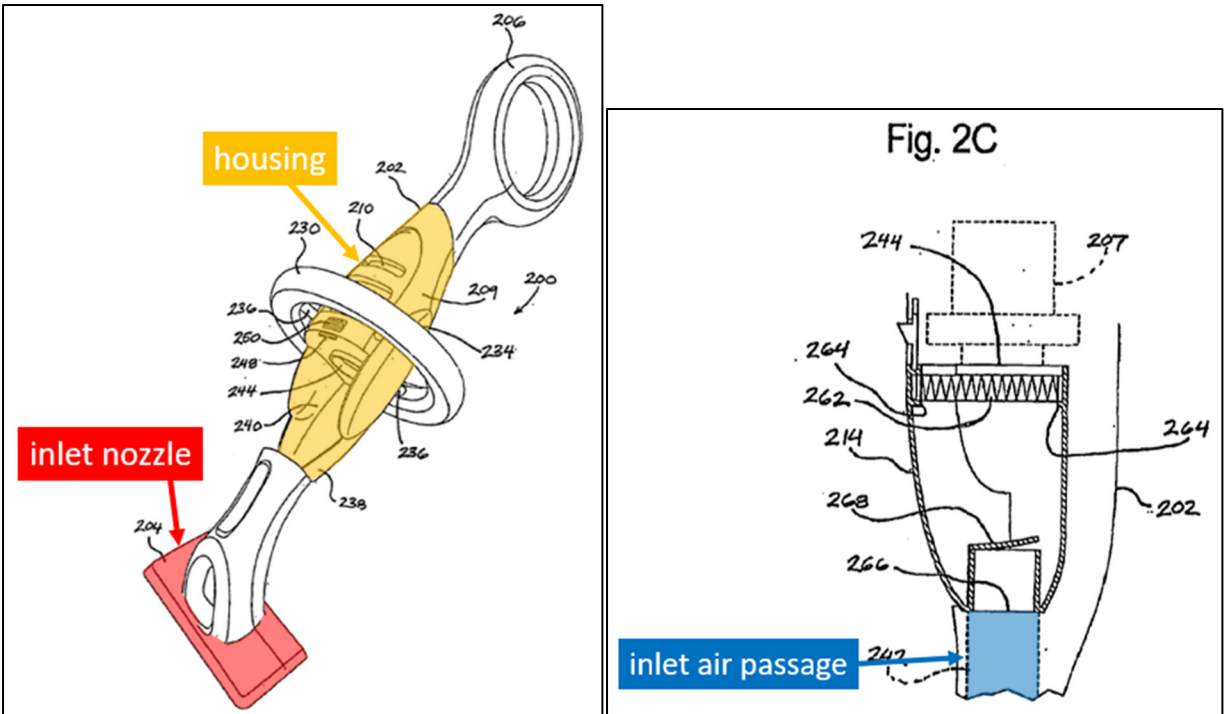
Referring now to Figure 13, still another inlet nozzle 1300 of the present invention comprises a cleaning head 1302 that is pivotally attached to a vacuum tube 1304 by a ball-and-socket joint 1306. In this embodiment, the cleaning head 1302 comprises a generally rectangular body having a number of cleaning bristles 1308 extending downwardly from the outer perimeter of the head 1302.

Ex1005, 32:8-12.



Id., Fig. 13.

83. For the surface cleaning head shown in Figure 2A, in my opinion, a POSA would understand that air flows into the “**inlet nozzle 204**” and exits into “**inlet air passage 242**” that attaches to “**housing 202**.” In my opinion, a POSA would further understand that the opening of the “**inlet nozzle 204**” facing the ground is a dirt air inlet and the area where air flows out of “**inlet nozzle 204**” and into the “**inlet air passage 242**” is a cleaning head air outlet, as shown in the annotated images below:



Ex1005, Figs. 2A, 2C, 15:19-22, 16:4-13.

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

Reference Number	Claim Limitation
[1b.1]	“(b) a rigid air flow conduit having a rigid wand inlet end having an air inlet in communicable with the cleaning head air outlet, a rigid wand outlet end and a longitudinally extending conduit axis”
[9b.1]	“(b) a rigid air flow conduit having a rigid wand inlet end having an air inlet in communicable with the cleaning head air outlet, a rigid wand outlet end and a longitudinally extending conduit axis,”

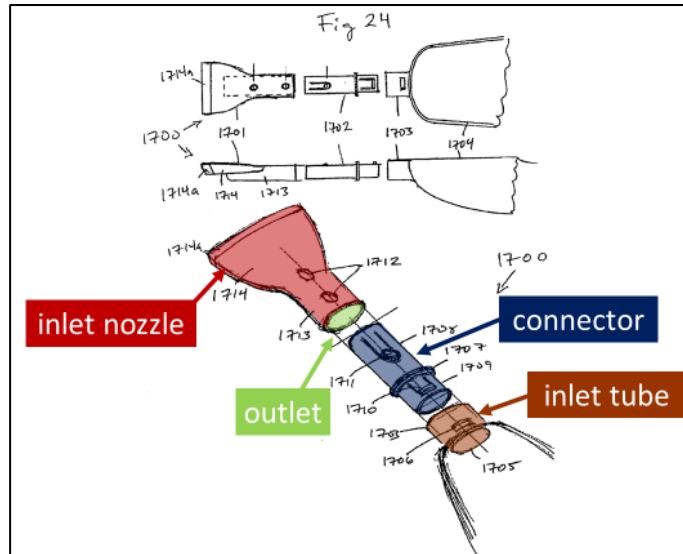
84. Butler teaches a rigid air flow conduit having a rigid wand inlet end having an air inlet in communicable with the cleaning head air outlet, a rigid wand outlet end and a longitudinally extending conduit axis. (Limitations [1b.1]/[9b.1]).

85. In my opinion, Butler teaches rigid tubes that connect Butler’s cleaning

heads and Butler's vacuum cleaner air inlet, which, in my opinion, a POSA would understand are rigid airflow conduits for providing fluid communication between the cleaning head and the dust receptacle. For example, Butler teaches that “**nozzle connector 1702**” connects Butler's “**inlet nozzle 1701**” and “**inlet tube 1703**,” as shown in the annotated image below:

Referring now to Figures 24 -27, an example of a preferred inlet assembly 1700 is illustrated. This inlet assembly 1700 can be used with any combination of the embodiments described herein. The preferred inlet assembly 1700 comprises an inlet nozzle 1701, a nozzle connector 1702, and an inlet tube 1703 located on the housing 1704. The nozzle connector 1702 is secured to the inlet tube 1703 and the inlet nozzle 1701 is selectively secured to the connector 1702. The inlet nozzle 1701 is secured to the connector 1702 in at least one position, but preferably in two or more different axial and/or radial positions.

Ex1005, 41:7-14.



Id., Fig. 24.

86. In my opinion, a POSA would understand that Butler’s **“connector”** is a rigid air flow conduit at least because air passes through it (specifically, from **“outlet 1713a for the inlet nozzle 1701”** to the **“inlet tube 1703”**), and because it is described as being for fluid communication. A POSA would also recognize and understand that Butler’s **“connector”** is made of rigid material, such as a rigid plastic at least because it is depicted that way in Fig. 24 and Fig. 25, since the design as shown would not function if it were not made of a rigid material, like metal or rigid plastic. Butler explains that its **“connector”** comprises a “tab 1711” that secures the nozzle to the connector. Ex1005, 41:26-29. For such a design to be possible, a POSA would understand that Butler’s **“connector”** would be made of a rigid material such that when a user depresses the “tab 1711,”

the “**connector**” could hold its shape and clip into place. In other places, for example, Butler teaches that “[t]he rear grip 106, and any other part of the vacuum cleaner 100, may be made from any suitable material, such as ABS plastic ... other plastics, metal, and so on” and that “[p]lastics are generally preferred as a relatively inexpensive, moldable and structurally rigid material.” Ex1005, 11:3-6.

87. In my opinion, Butler’s “**connector**” has a rigid wand inlet end having an air inlet that communicates with the cleaning head air outlet. In my opinion, the upstream end of Butler’s “**connector**” is a rigid wand inlet end with an air inlet at least because that is where air enters the “**connector**” from “**outlet 1713a** for the **inlet nozzle 1701**” (which, in my opinion, is the cleaning head air outlet), as shown in the annotated images below:

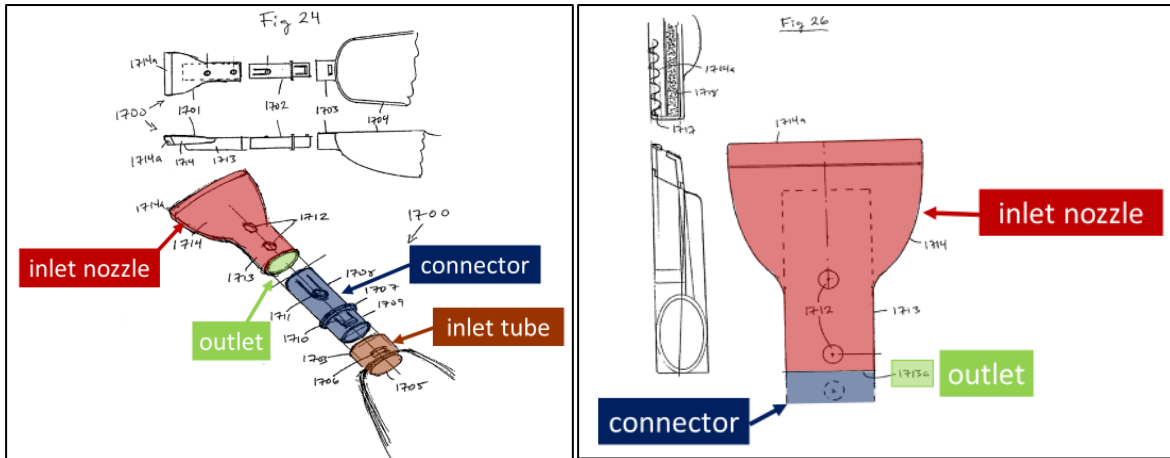
Referring now to Figures 24-27, an example of a preferred inlet assembly 1700 is illustrated. This inlet assembly 1700 can be used with any combination of the embodiments described herein. The preferred inlet assembly 1700 comprises an inlet nozzle 1701, a nozzle connector 1702, and an inlet tube 1703 located on the housing 1704. The nozzle connector 1702 is secured to the inlet tube 1703 and the inlet nozzle 1701 is selectively secured to the connector 1702. The inlet nozzle 1701 is secured to the

connector 1702 in at least one position, but preferably in two or more different axial and/or radial positions.

The inlet tube 1703 comprises a hollow tube 1705 with an aperture 1706 on the side. It is preferably integrally formed with the housing 1704 and provides fluid communication between the vacuum dust receptacle (not shown) and the rest of the nozzle assembly 1700.

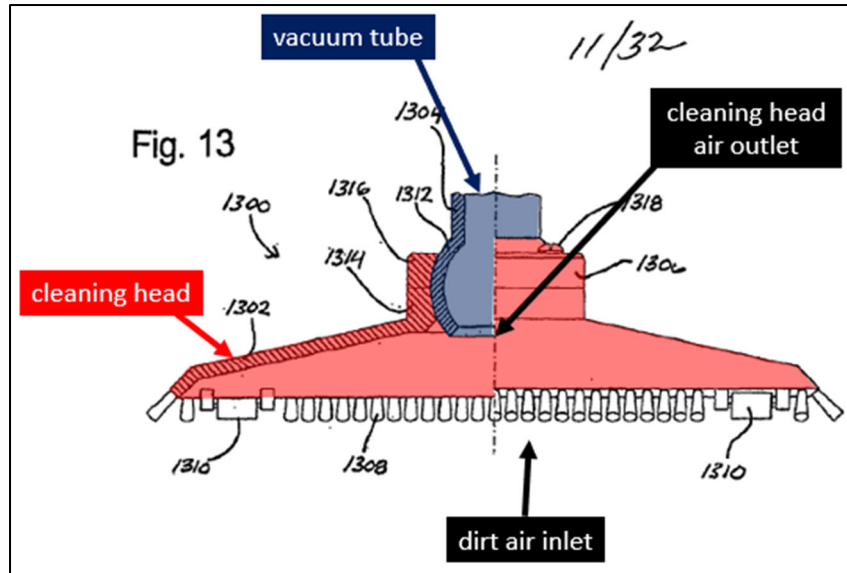
Referring to Figure 25, the connector 1702 is a hollow tube that preferably comprises an oval shaped cross-section to prevent rotation, but may comprise other anti-rotation features, or be allowed to rotate, if desired. The connector 1702 is divided into two portions by a collar 1707: an inlet portion 1708 and an outlet portion 1709. The outlet portion 1709 is telescopically received within or around the inlet tube 1703 and includes a cantilever tab 1710 that fits into the inlet tube aperture 1706. The tab 1710 and aperture 1706 prevent the connector 1702 from backing out of the inlet tube 1703. The inlet portion 1708 of the connector 1702 is telescopically received within the nozzle 1701 and comprises a flexible nozzle-attaching tab 1711 that corresponds to one or more apertures 1712 in the nozzle 1701 to secure the nozzle 1701 to the connector 1702.

Ex1005, 41:8-29.



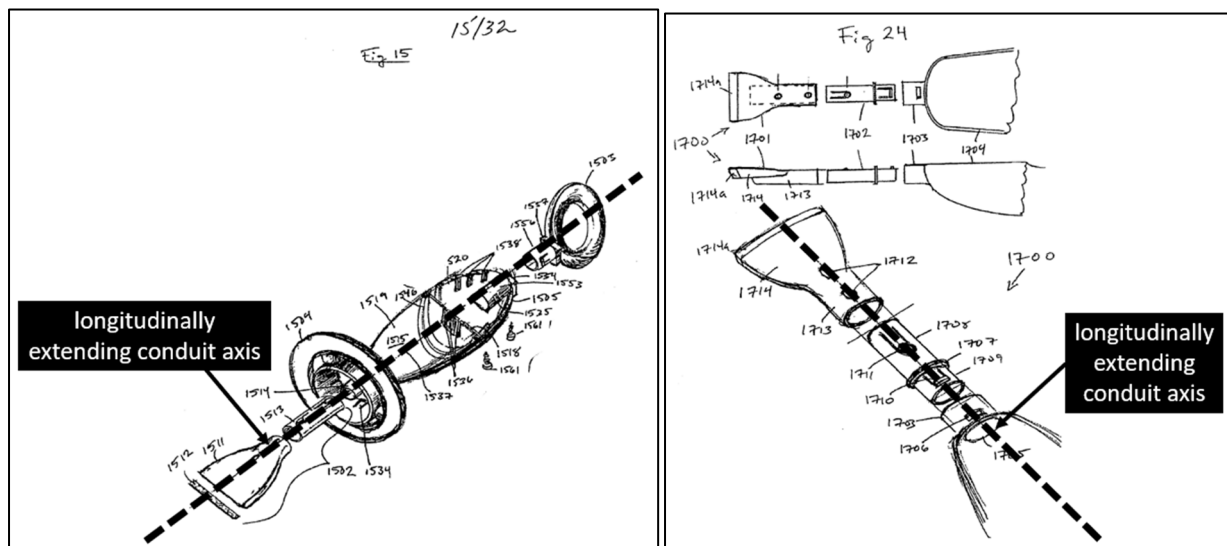
Id., Figs. 24, 26.

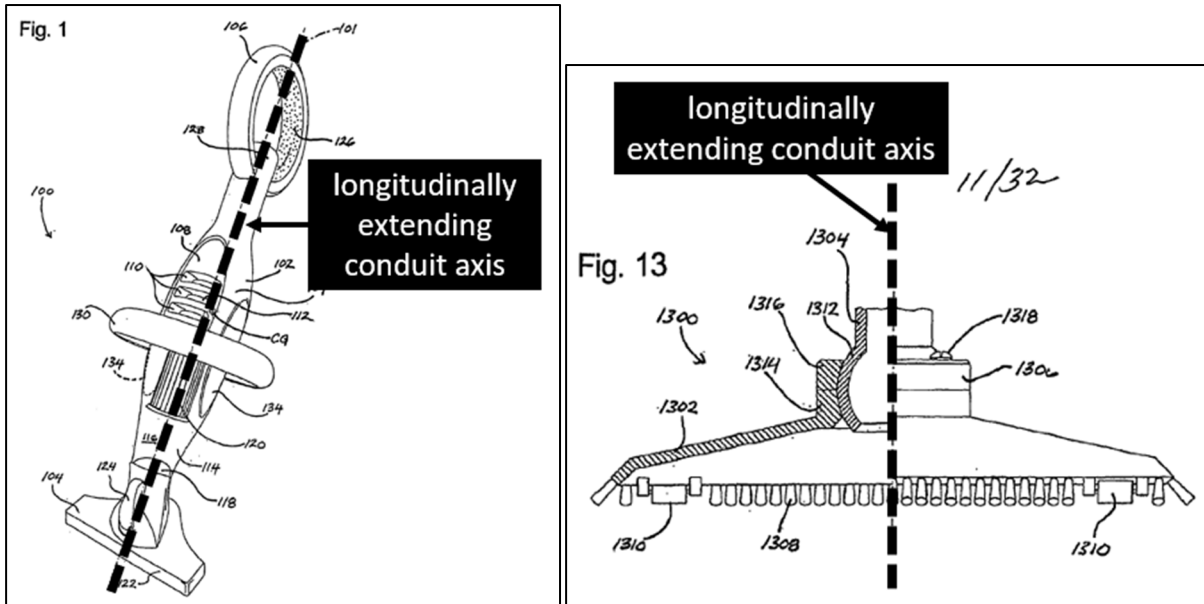
88. In my opinion, Butler’s “**connector**” has a rigid wand outlet end at the downstream end of the “**connector**,” where it connects to the “**inlet tube**,” as shown above, at least because this is where air exits the “**connector**.” Ex1005, Fig. 24.
89. Butler also teaches “**vacuum tube 1304**,” which is attached to “**cleaning head 1302**.” Ex1005, 32:8-10. In my opinion, Butler’s “**vacuum tube 1304**” is also a rigid air flow conduit having a rigid wand inlet that communicates with the cleaning head air outlet and has a rigid wand outlet end, for the same reasons as for Butler’s “**connector**,” as shown in the annotated image below:



Ex1005, 32:8-14, Fig. 13.

90. In my opinion, Butler's **connector/vacuum tube** has a longitudinally extending conduit axis, as shown in the annotated images below:





Ex1005, Figs. 1, 13, 15, 24.

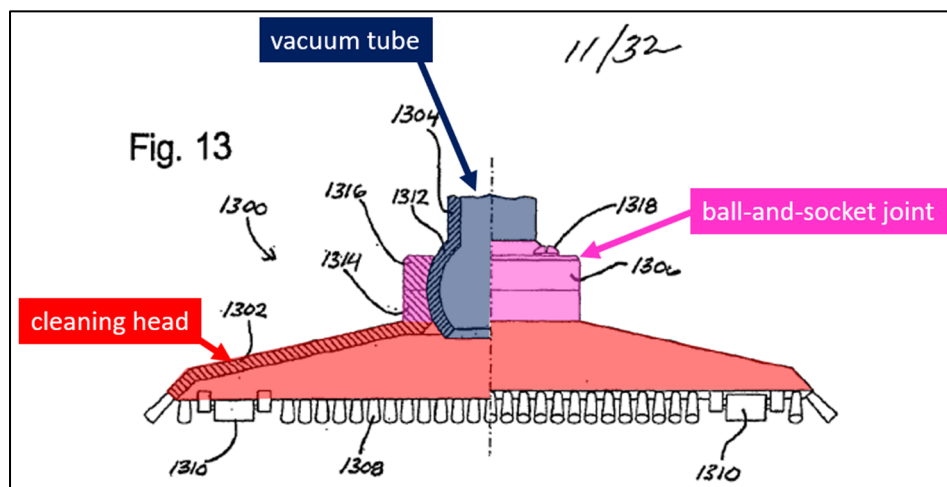
d. [1b.2]/[9b.2]

Reference Number	Claim Limitation
[1b.2]	"the rigid air flow conduit is moveably mountable to the surface cleaning head between an upright position and an in-use floor cleaning position in which the rigid air flow conduit extends at an angle to the vertical,"
[9b.2]	"the rigid air flow conduit is moveably mountable to the surface cleaning head between an upright position and an in-use floor cleaning position in which the rigid air flow conduit extends at an angle to the vertical,"

91. Butler teaches the rigid air flow conduit is moveably mountable to the surface cleaning head between an upright position and an in-use floor cleaning position in which the rigid air flow conduit extends at an angle to the vertical. (Limitations [1b.2]/[9b.2]).

92. In my opinion, Butler teaches that its **connector/vacuum tube** (which, in

my opinion, is the rigid air flow conduit) is moveably mounted to the surface cleaning head using a pivotable joint. For example, Butler's "**cleaning head 1302** ... is pivotally attached to a **vacuum tube 1304**," which includes "a **generally spherical end portion 1312**," by a "**ball-and-socket joint 1306**," as shown in the annotated image below:



Ex1005, Fig. 13, 32:8-10, 32:15-16.

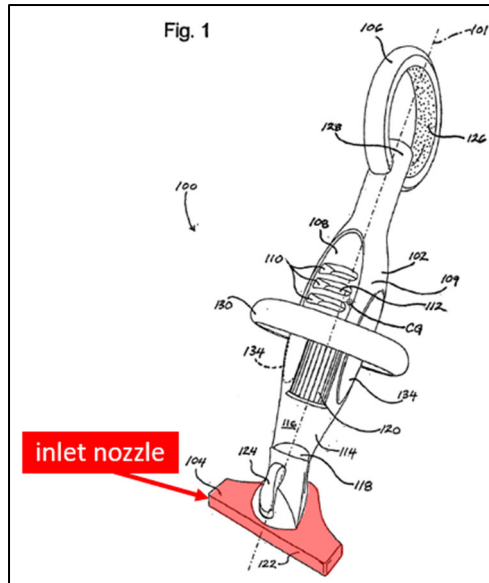
93. Butler explains that, "[u]sing this construction, the **vacuum tube 1304** can be rotated relative to the cleaning head 1302 in any direction" Ex1005, 32:21-22. In my opinion, a POSA would understand that this "ball-and-socket joint" is a moveable mount between Butler's "vacuum tube" (which, in my opinion, is the rigid air flow conduit) and the "cleaning head" (which, in my opinion, is the surface cleaning head) because it allows the vacuum tube and cleaning head to pivot relative to each other while maintaining a physical and an air-flow connection, i.e. they maintain

fluid communication.

94. In my opinion, Butler teaches other moveable mounts between its surface cleaning head and rigid air flow conduit. For example, Butler teaches a “rotatable inlet nozzle,” including “**inlet nozzle 104**” (which, in my opinion, is the surface cleaning head) which is “rotatably mounted to the housing” (in my opinion, via the rigid airflow conduit) to allow for movement between them that is “typically found in conventional upright vacuums,” as shown in the annotated image below:

The inlet nozzle 104 may also be rotatably mounted to the housing 102 so that the angle between its working surface and the housing 102 can be changed. For example, the inlet nozzle 104 may be pivotable about an axis perpendicular to the longitudinal axis 101 of the housing 102. Such pivoting would allow the leading edge of the inlet nozzle 104 to move vertically with respect to the rear edge of the inlet nozzle 104 (or vice-versa), such as typically found in conventional upright vacuums.

Ex1005, 10:3-9.



Id., Fig. 1.

95. Butler further teaches that “various combinations of pivots” may be used for “more complex rotation capabilities,” which, in my opinion, are known in the art. Ex1005, 10:3-15.
96. For example, Butler teaches a “flexible nozzle-attaching tab” to moveably mount the rigid air flow conduit to the surface cleaning head. Ex1005, 41:26-42:1. Butler’s “inlet nozzle 1701” (which, in my opinion, is the surface cleaning head)—and “nozzle connector 1702” (which, in my opinion, is the rigid air flow conduit) may be connected using a “flexible nozzle-attaching tab 1711” that secures the “nozzle 1701 to the connector 1702” and Butler teaches that an “operator can depress this tab 1711 to ... move the nozzle 1701 between multiple axial or radial positions on the connector 1702”:

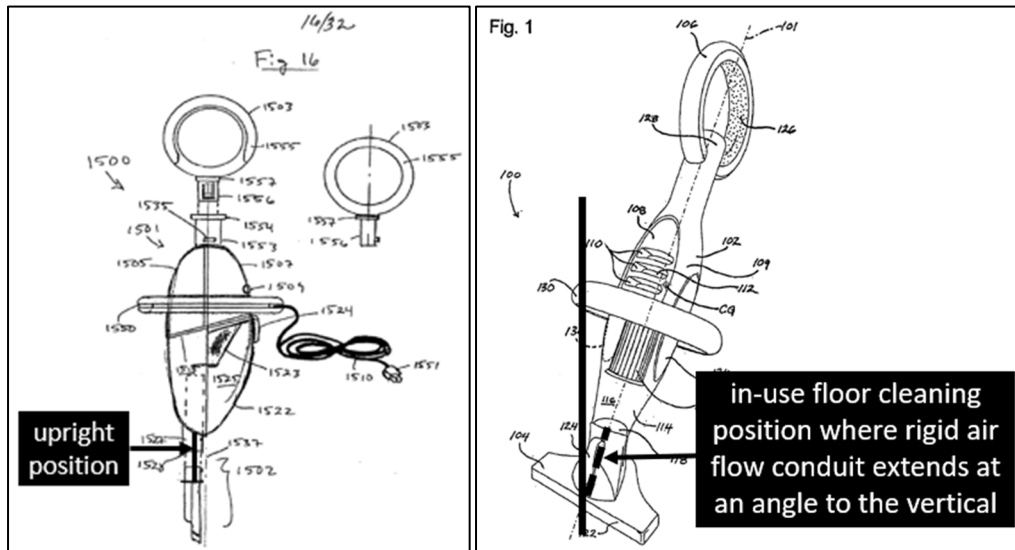
The inlet portion 1708 of the connector 1702 is telescopically received within the nozzle 1701 and comprises a flexible nozzle-attaching tab 1711 that corresponds to one or more apertures 1712 in the nozzle 1701 to secure the nozzle 1701 to the connector 1702. Preferably, the operator can depress this tab 1711 to remove the nozzle 1701 from the connector 1702, or move the nozzle 1701 between multiple axial or radial positions on the connector 1702.

Id., 41:8-11, 41:26-42:1.

97. In my opinion, Butler teaches that the rigid air flow conduit is moveably mountable to the surface cleaning head between an upright position and an in-use floor cleaning position in which the rigid air flow conduit extends at an angle to the vertical. In my opinion, a POSA would understand that each of Butler's moveable mounts, including the "ball-and-socket joint 1306," the "tab 1711," and the moveable mount used in Butler's "rotatable inlet nozzle," allows Butler's rigid air flow conduit to move between an upright position and an in-use floor cleaning position in which the rigid air flow conduit extends at an angle to the vertical.
98. For example, Butler teaches that the connector/vacuum tube can be "rotated relative to the cleaning head 1302 in any direction," which, in my opinion, a POSA would understand includes an upright position and an in-use position in which the rigid air flow conduit extends at an angle to the

- vertical. Ex1005, 10:3-9, 32:15-24, 41:8-11, 41:26-42:1.
99. Butler also teaches a “rotatable inlet nozzle” that is “rotatably mounted to the housing,” and further teaches that the surface cleaning head can take “multiple axial or radial positions on the connector 1702,” which, in my opinion, a POSA would understand includes upright positions, like those “typically found in conventional upright vacuums,” and in-use positions in which the rigid air flow conduit extends at an angle to the vertical. Ex1005, 10:3-9, 32:15-24, 41:8-11, 41:26-42:1.
100. Butler further teaches that a user can “point the inlet nozzle 104 horizontally to clean surfaces such as stair treads, vertically to clean surfaces such as stair risers, or at any angle in between.” Ex1005, 12:3-10. Because Butler’s surface cleaning head can be attached to Butler’s rigid air flow conduit using a ball-and-socket joint, can be “rotated,” and can be used in “multiple axial or radial positions” and at “any angle,” including horizontally and vertically, in my opinion, a POSA would understand that Butler teaches a rigid air flow conduit that is moveably mountable to the surface cleaning head between an upright position and an in-use floor cleaning position in which the rigid air flow conduit extends at an angle to the vertical.
101. Further, in my opinion, Butler teaches that its moveable mounting allows

the cleaner to pivot between an upright position, as depicted, for example, in Butler Figure 16, and the claimed in-use floor cleaning position in which the rigid air flow conduit extends at an angle to the vertical, as Butler depicts in Figure 1, and as shown in the annotated images below:



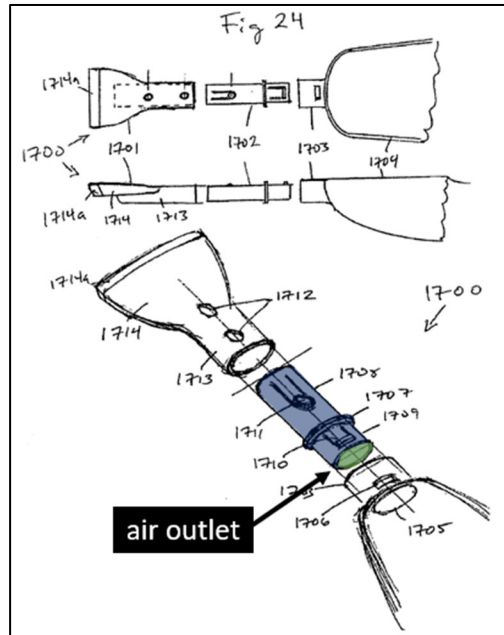
Ex1005, Figs. 1, 16.

e. [1b.3]/[9b.3]

Reference Number	Claim Limitation
[1b.3]	“the rigid wand outlet end having an air outlet and an outlet end electrical connector; and,”
[9b.3]	“the rigid wand outlet end having an air outlet and an outlet end electrical connector; and,”

102. Butler teaches the rigid wand outlet end having an air outlet and an outlet end electrical connector. (Limitations [1b.3]/[9b.3]).

103. In my opinion, a POSA would understand that Butler’s rigid wand outlet end has an air outlet where it connects to the hand vacuum, as shown in



Ex1005, Fig. 24, 41:19-29.

104. In my opinion, a POSA would further understand that Butler’s “vacuum tube” likewise includes a rigid wand outlet end having an air outlet, for the same reasons.

105. Further, in my opinion, Butler teaches that the rigid wand outlet end has an outlet end electrical connector. First, Butler teaches a motorized powerhead with electrical leads: Butler teaches a “powerhead having a rotating agitator” and teaches that “[o]f course, if a powered attachment is provided, suitable power leads can be provided to connect the powered attachment to the electric circuit.” Ex1005, 22:5-13.

106. Second, Butler teaches electrical leads at the hand vacuum cleaner inlet:

“leads may pass around or through the dirt receptacle, or may be integrated into the dirt receptacle body.” *Id.* In my opinion, a POSA would understand that for the power leads to provide power to Butler’s powered attachments, the rigid wand outlet would have an outlet end electrical connector “to connect the powered attachment to the electrical circuit.” *Id.*, 22:5-11. In my opinion, a POSA would understand that Butler’s “entry tube 524” includes an electrical connector adjacent to the hand vacuum cleaner air inlet to connect to “power leads” and provide power to Butler’s powered attachment. Ex1005, 22:6-11.

107. Third, as I explain in Limitation [1c], Butler’s connector/vacuum tube connects this powered attachment to the hand vacuum cleaner. *See* Ground 1, Limitation [1c]. In my opinion, a POSA would therefore understand that to connect a powered attachment to the hand vacuum cleaner, Butler’s connector/vacuum tube would have electrical connectors at both its inlet end (to connect to the electrical connectors of the powered attachment) and at its outlet end (to connect to the hand vacuum cleaner’s electrical connector, located adjacent its air inlet).

f. [1c]/[9c]

Reference Number	Claim Limitation
[1c]	“(c) a hand vacuum cleaner removably mountable to the rigid wand outlet end, the hand vacuum cleaner having a front end and a rear end, the hand vacuum cleaner comprising:”
[9c]	“(c) a hand vacuum cleaner removably mountable to the rigid wand outlet end, the hand vacuum cleaner having a front end and a rear end, the hand vacuum cleaner comprising:”

108. Butler teaches a hand vacuum cleaner removably mountable to the rigid wand outlet end, the hand vacuum cleaner having a front end and a rear end. (Limitations [1c]/[9c]).

109. Butler teaches “a vacuum cleaner” that is designed to be used by hand and is a hand vacuum cleaner. Ex1005, Title, Fig. 1. Butler’s vacuum cleaner includes a “**rear grip**” and “one or more **foregrips**,” and Butler teaches a range of “compact” sizes, including a distance between the foregrip and the rear grip of six inches, and an overall vacuum length of eighteen inches, as shown in the annotated image below:

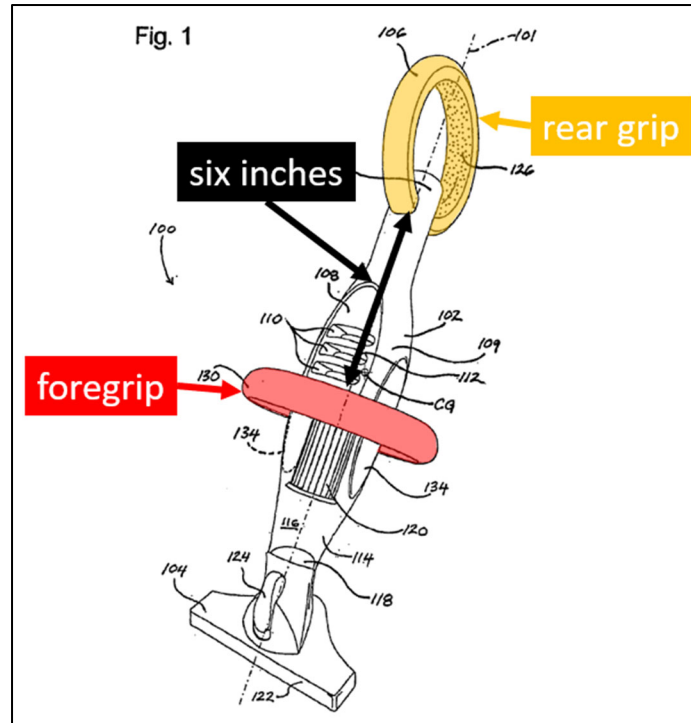
Considering the general build of many users, in one embodiment, the distance between the grips is about six to thirty inches. In a more preferred embodiment, the foregrip 130 is spaced from the most distant graspable portion of the rear grip 106 by about eight to twenty-four inches. These distances are expected to allow the user to comfortably grasp both grips and operate the vacuum cleaner 100 at about a 30 to 60 degree angle on the surface being

cleaned, while remaining in a generally upright, comfortable standing position.

Ex1005, 15:5-11.

Embodiments of the present invention address these shortcomings by providing a relatively compact vacuum cleaner that is long enough to allow typical users to clean elevated stairs without excessive stooping, yet short enough to still provide ergonomic grip and control of the device, and the ability to maneuver in tight spaces, such as enclosed stairwells. As an ancillary benefit, this length may also prove to be better adapted for cleaning in confined spaces, such as closets. In a preferred embodiment, the vacuum cleaner of the present invention has an overall length of about 18 to 46 inches, and more preferably about 20 to 24 inches.

Id., 26:1-10.



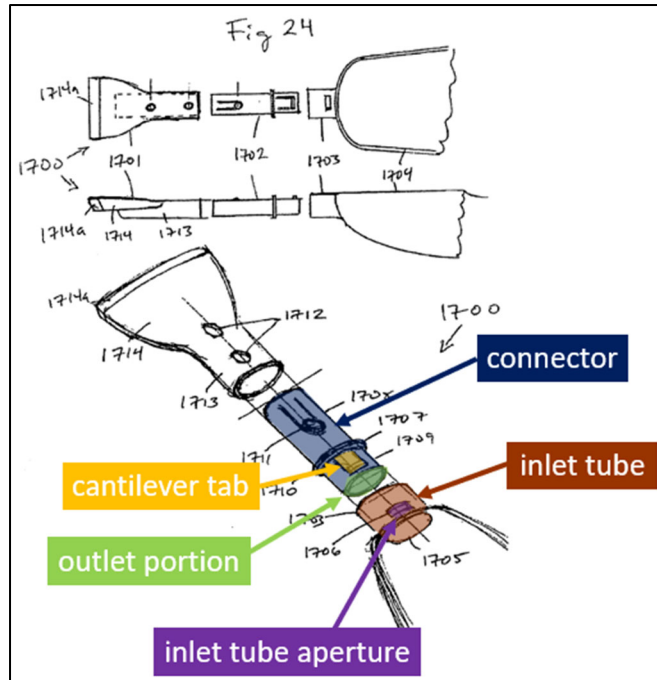
Id., Fig. 1.

110. Further, Butler teaches that its “compact” and “maneuver[able],” “adapted for cleaning ... stairwells and other confined spaces,” and teaches telescoping handgrip members as well as extension tubes to reach the floor. Ex1005, Abstract, 1:2-3, 26:1-5, 27:12-29. These extension members would commonly be used in hand vacuum cleaners. Butler’s vacuum cleaner is also designed to have an optimal “center of gravity” and to “remov[e] excess weight,” Ex1005, 13:1-19, 15:12-18.

111. A POSA would understand that these (center of gravity position, and total weight) are considerations that are crucial to hand vacuum cleaners, particularly since a hand vacuum is expected to be picked up and moved

from place to place during use, not just during storage. Removal of excess weight and optimization of balance are important to minimizing exertion and effort while maximizing comfort. Furthermore, optimization of weight and balance provides the most maneuverability for users of the device. For example, a hand vacuum cleaner that had a sub-optimal center of gravity could disadvantageously create strain on a user's hand and wrist during use. A hand vacuum cleaner that was excessively heavy would be fatiguing for a user. Similarly, a hand vacuum cleaner that has a sub-optimal center of gravity, i.e., one that is far from the hand, can also have the same effect on a user as an excessively heavy vacuum.

112. Butler teaches that its hand vacuum cleaner is removably mountable to the rigid wand outlet end via the hand vacuum cleaner's "**inlet tube**," as shown in the annotated image below:



Ex1005, 41:19-29, Fig. 24.

113. Specifically, Butler teaches that “**connector 1702**”—Butler’s rigid air flow conduit—has “an inlet portion 1708 and an **outlet portion 1709**” (which, in my opinion, is the rigid wand outlet end, *see* Ground 1, Limitation [1b.1]), which is “telescopically received within or around the **inlet tube 1703**” of Butler’s hand vacuum cleaner:

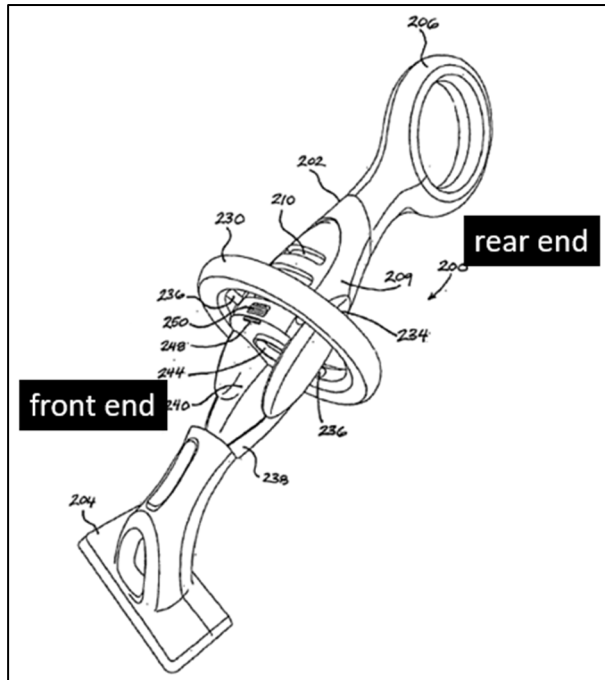
Referring to Figure 25, the connector 1702 is a hollow tube that preferably comprises an oval shaped cross-section to prevent rotation, but may comprise other anti-rotation features, or be allowed to rotate, if desired. The connector 1702 is divided into two portions by a collar 1707: an inlet portion 1708 and an outlet portion 1709. The outlet portion 1709 is telescopically received within or around the inlet tube 1703 and includes a cantilever tab

1710 that fits into the inlet tube aperture 1706. The tab 1710 and aperture 1706 prevent the connector 1702 from backing out of the inlet tube 1703. The inlet portion 1708 of the connector 1702 is telescopically received within the nozzle 1701 and comprises a flexible nozzle-attaching tab 1711 that corresponds to one or more apertures 1712 in the nozzle 1701 to secure the nozzle 1701 to the connector 1702.

Ex1005, 41:19-29.

114. Butler further teaches that this mounting is removable: in my opinion, a POSA would understand that the mounting includes a “cantilever tab 1710” that fits into the “inlet tube aperture 1706” of the hand vacuum cleaner and a user can depress the “cantilever tab 1710” clicking it out of the “inlet tube aperture 1706” to remove the “connector 1702” from the hand vacuum cleaner. Ex1005, 41:19-26. In my opinion, a POSA would further understand that Butler’s “vacuum tube” has the same functionality and therefore satisfies these limitations for the same reasons. Ex1005, Fig. 13.

115. In my opinion, Butler’s hand vacuum cleaner has a front end and a rear end, as shown in the annotated image below:



Ex1005, Fig. 2A.

116. In my opinion, a POSA would understand that Butler’s hand vacuum cleaner includes a “housing 102 having an inlet nozzle 104 at a first end of the housing 102,” which is at the front end, and “a rear grip 106 at a second end of the housing 102,” which is at the rear end of the hand vacuum cleaner.

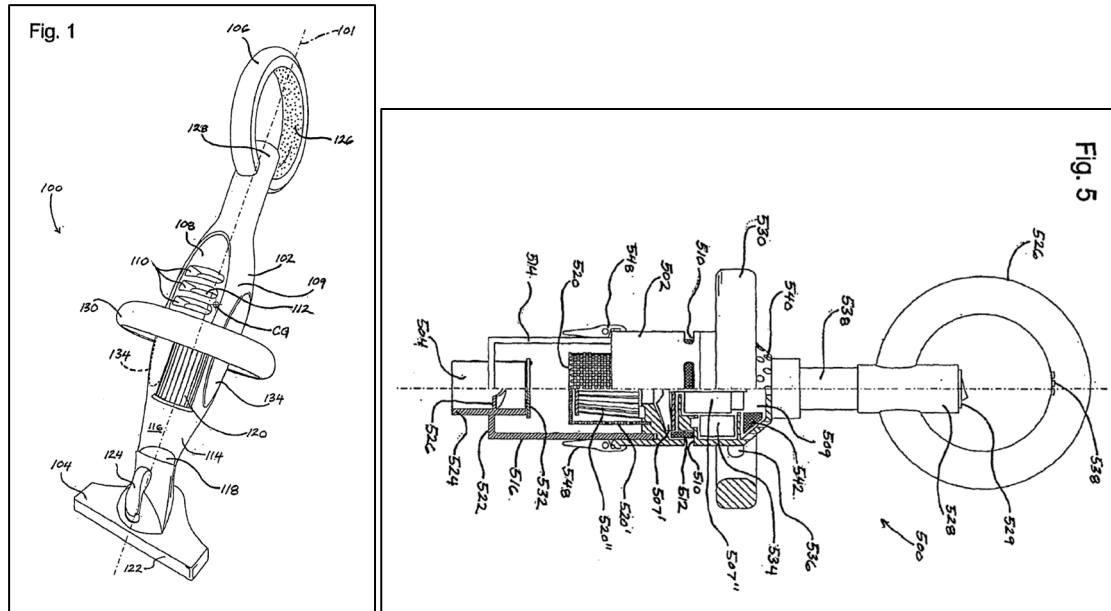
g. [1c.i]/[9c.i]

Reference Number	Claim Limitation
[1c.i]	“(i) a main body comprising a handle and a suction motor and fan assembly, the suction motor and fan assembly having a suction motor axis of rotation, the handle having a hand grip portion;”
[9c.i]	“(i) a main body comprising a handle and a suction motor and fan assembly, the suction motor and fan assembly having a suction motor axis of rotation, the handle having a hand grip portion;”

117. Butler teaches the hand vacuum cleaner comprising a main body comprising a handle and a suction motor and fan assembly, the suction motor and fan assembly having a suction motor axis of rotation, the handle having a hand grip portion. (Limitations [1c.i]/[9c.i]).

118. In my opinion, Butler teaches the hand vacuum cleaner has a main body.

For example, Butler teaches that its “vacuum cleaner ha[s] a generally elongated housing,” as shown in Butler Figures 1 and 5 below:



Ex1005, Abstract, Figs. 1, 5.

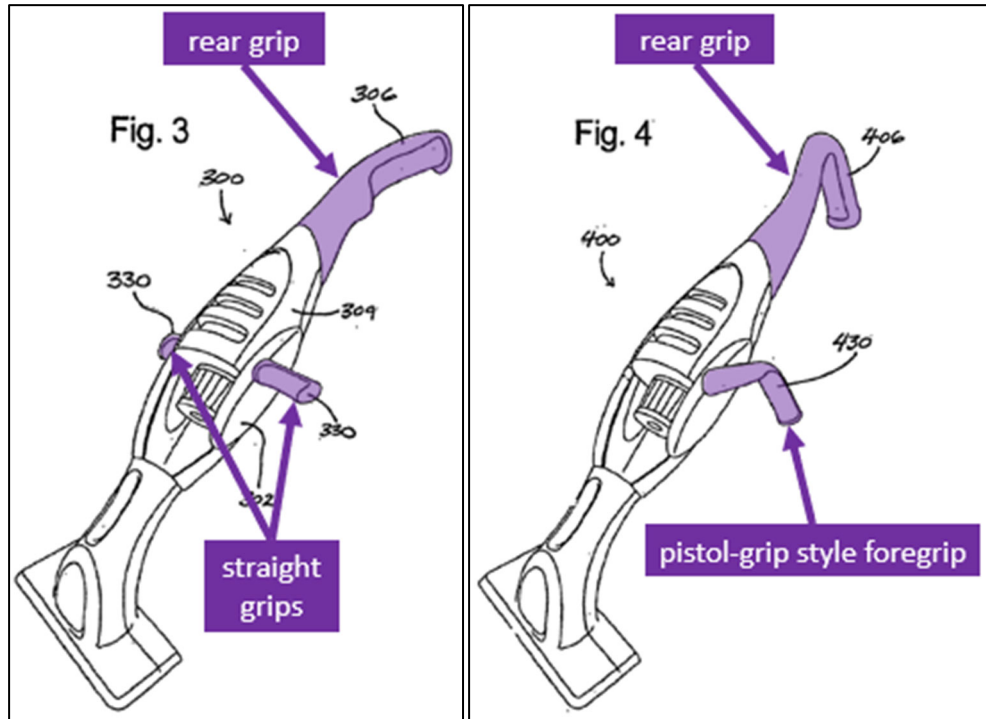
119. In my opinion, a POSA would understand that Butler’s vacuum cleaner main body includes Butler’s “generally elongated housing.”

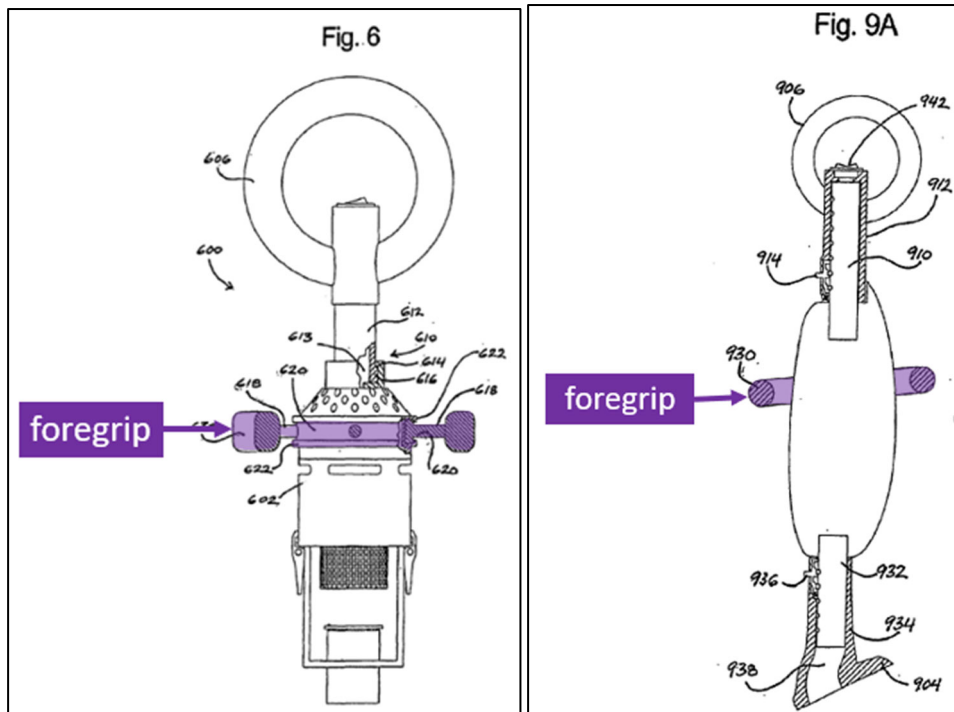
120. In my opinion, Butler’s vacuum cleaner main body comprises a handle.

For example, Butler teaches “one or more foregrips located on the

housing,” which, in my opinion a POSA would understand are each a handle because a user would hold the foregrip(s) to “handl[e] the device” when cleaning surfaces. Ex1005, Abstract, 3:28-4:1, 11:21-22, 12:3-13.

121. Butler also teaches that its main body comprises other handles, including “straight grips 330,” “pistol-grip style foregrips 430,” and a “rotatable foregrip 630,” and “rear grip[s],” as shown in the annotated images below:



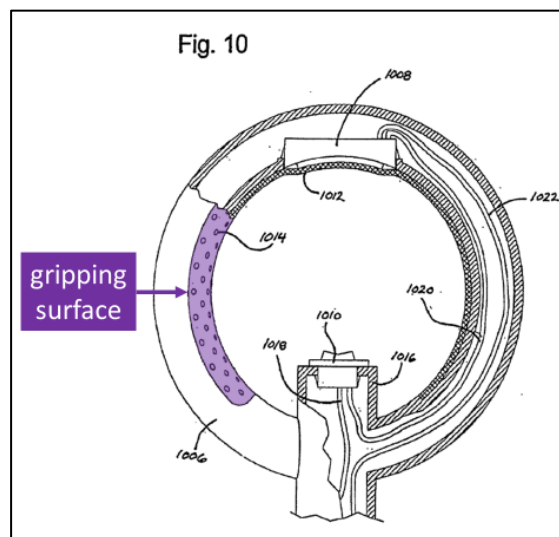


Ex1005, Figs. 3-4, 6, 9A.

122. In my opinion, each of Butler’s handles includes a hand grip portion. Butler teaches that its handles may “include gripping surfaces or surface treatments to enhance the user’s grip and feel.” Ex1005, 12:3-7; 11:21-24, Figs. 1, 3-4, 10, 16; *see also id.*, 11:3-11, 38:25-28, Figs. 10, 16. In my opinion, a POSA would understand that Butler’s handle “gripping surfaces” and “surface treatments” are hand grip portions. Further, Butler explains that its “gripping surface[s]” may be placed on any or all portions of any of Butler’s disclosed handles: “**rear grip** ... may be made from any suitable material” and “include[s] one or more **gripping surfaces** ... comprising a material that is more particularly adapted to provide a

favorable tactile feel and/or enhanced gripping friction,” such as “dimples, checkering, ridges or bumps,” as shown in the annotated images below:

The rear grip 106, and any other part of the vacuum cleaner 100, may be made from any suitable material, such as ABS plastic (i.e., acrylonitrile-butadiene-styrene copolymers), other plastics, metal, and so on. Plastics are generally preferred as a relatively inexpensive, moldable and structurally rigid material. The rear grip 106 may also include one or more gripping surfaces 126 comprising a material that is more particularly adapted to provide a favorable tactile feel and/or enhanced gripping friction. The gripping surfaces 126 may be formed by treating the surface of the material that forms the rear grip 106, such as by including dimples, checkering, ridges or bumps, or may be provided as a separate tactile material applied to the rear grip 106 itself by mechanical or adhesive attachment, overmolding, or the like. Of course, surface treatments and a separate tactile material may both be used, if desired.



Ex1005, 11:3-14, Fig. 10.

123. Butler explains that, “[a]s with the rear grip, the foregrip 130 may be made from any suitable material, and may also include gripping surfaces or surface treatments to enhance the user’s grip and feel.” Ex1005, 11:22-24.

124. Butler teaches another grip with a hand grip portion:

The rear grip 1503 provides the second of two main gripping surfaces for the vacuum 1500, and comprises a generally toroidal shaped gripping surface 1555 and an attachment tube 1556 having a square shoulder 1557 extending from the gripping surface 1555.

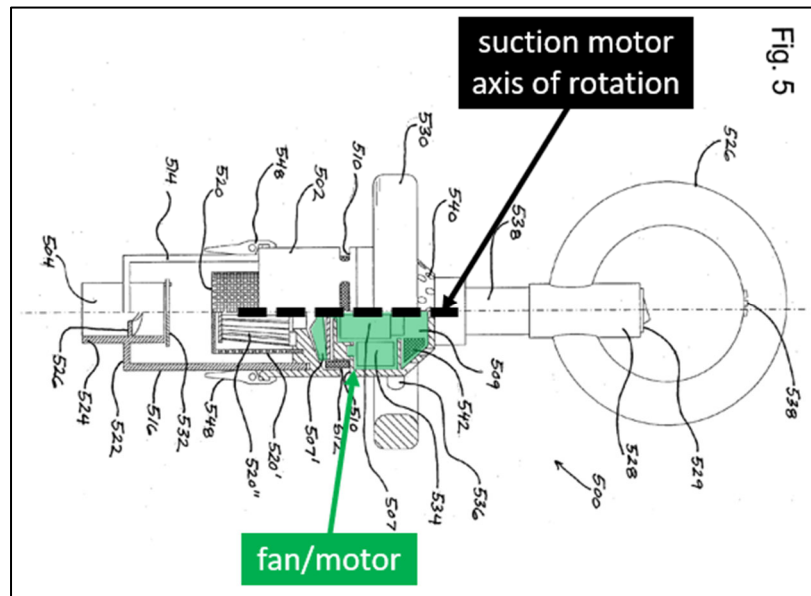
Ex1005, 38:25-28, Fig. 16.

125. In my opinion, a POSA would understand that Butler’s “gripping surfaces” are hand grip portions because they enhance the users grip while grasping the handle.

126. In my opinion, Butler’s main body further comprises a suction motor and fan assembly. Butler teaches that its vacuum cleaner main body includes “**fan/motor 507**,” which, in my opinion is a suction motor and fan assembly, and which, in my opinion, a POSA would understand has a suction motor axis of rotation as shown in the annotated image below:

The foregrip 530 surrounds a fan/motor chamber 509 in which the fan/motor 507 is located. The impeller fan 507' is adjacent the bottom end of the housing 502, and the motor 507" located

between the fan 507' and the rear grip 506. If motor cooling is required, the motor 507" may be cooled by the working airflow after it is cleaned by the filtration system, by a separate flow of air, or by simple ventilation. In the embodiment of Figure 5, the housing includes a number of vents 540 for allowing air to pass through the housing 502 to cool the motor 507". A foam ring 542 may also be provided to prevent particles from the motor from exiting the vents 540 and obstruct the user's view into the fan/motor chamber 509.



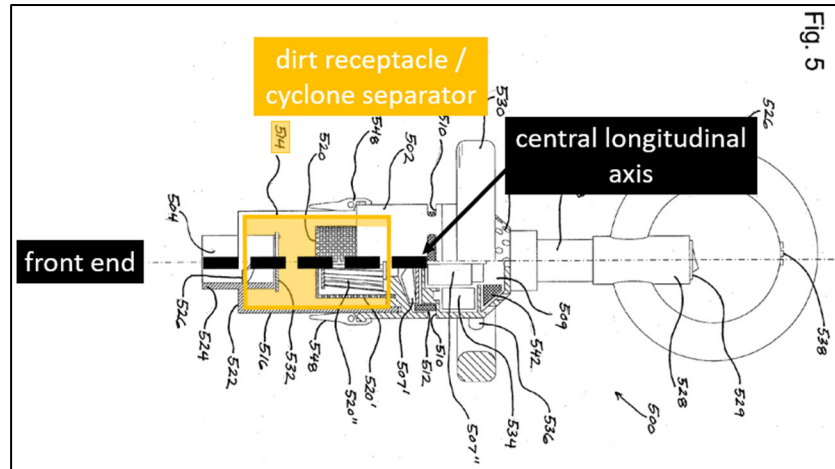
Ex1005, 20:12-20, Fig. 5.

127. In my opinion, a POSA would understand that the suction motor axis of rotation is the axis through the center of Butler's "**fan/motor 507**," around which Butler's "**fan**" rotates, including because Butler teaches that the "fan/motor 1539" is "centered generally about the vacuum centerline 1537." Ex1005, 35:12-14, 37:3.

h. [1c.ii]/[9c.ii]

Reference Number	Claim Limitation
[1c.ii]	“(ii) an air treatment member provided at the front end of the hand vacuum cleaner, the air treatment member having a central longitudinal axis and an air treatment chamber having a front wall;”
[9c.ii]	“(ii) an air treatment member provided at the front end of the hand vacuum cleaner, the air treatment member having a central longitudinal axis;”

128. Butler teaches an air treatment member provided at the front end of the hand vacuum cleaner, the air treatment member having a central longitudinal axis and an air treatment chamber having a front wall. (Limitation [1c.ii]).
129. Butler teaches an air treatment member provided at the front end of the hand vacuum cleaner, the air treatment member having a central longitudinal axis. (Limitation [9c.ii]).
130. In my opinion, Butler teaches an air treatment member provided at the front end of the hand vacuum cleaner having a central longitudinal axis. Butler teaches a “**dirt receptacle** compris[ing] a **cyclone separator**” provided at the front end of the hand vacuum cleaner body, as shown in the annotated image below:



Ex1005, Claim 11, Fig. 5.

131. In my opinion, a POSA would understand that Butler’s “**dirt receptacle** compris[ing] a **cyclone separator**” is an air treatment member at least because it treats the air by separating dirt from it:

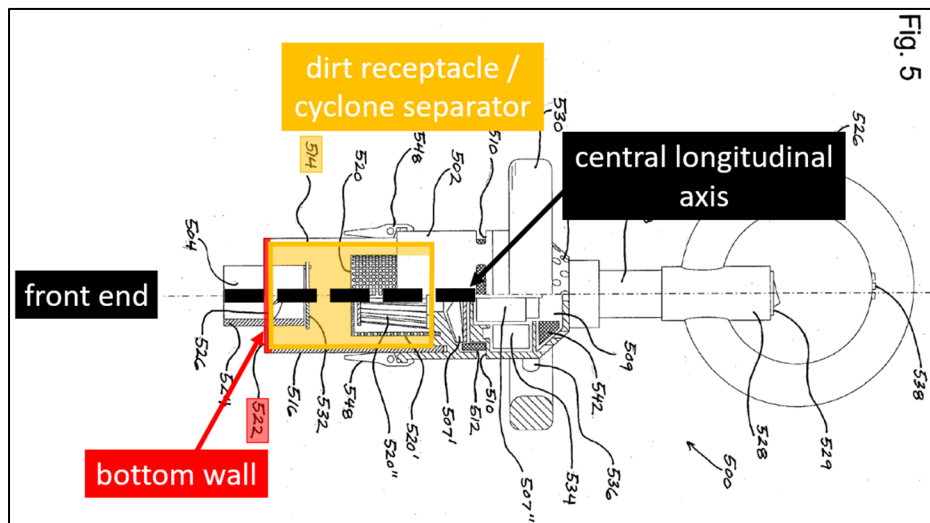
While the foregoing cyclonic arrangement for the dirt receptacle 514 is preferred, other types of dirt separation system may alternatively be used, as will be appreciated by those of ordinary skill in the art in view of the present disclosure.

Ex1005, 22:23-25.

132. In my opinion, a POSA would further understand it has a central longitudinal axis as depicted above, which, like Butler’s fan/motor axis is “centered generally about the vacuum centerline 1537.” Ex1005, 35:12-14; 37:3.
133. Regarding Limitation [1c.ii], in my opinion, Butler teaches an air treatment chamber having a front wall. In my opinion, a POSA would understand

that Butler's "**dirt receptacle** compris[ing] a **cyclone separator**" has an air treatment chamber, at least because it has a "receptacle" in which air is treated using a "cyclonic separator." Ex1005, Claim 11.

134. Further, Butler's "**dirt receptacle** compris[ing] a **cyclone separator**" has a "**bottom wall 522**," which, in my opinion, a POSA would understand is an air treatment chamber front wall at least because it is the air treatment chamber wall that is at the upstream end, or, the inlet end, where air enters the air treatment member, as shown in the annotated image below:

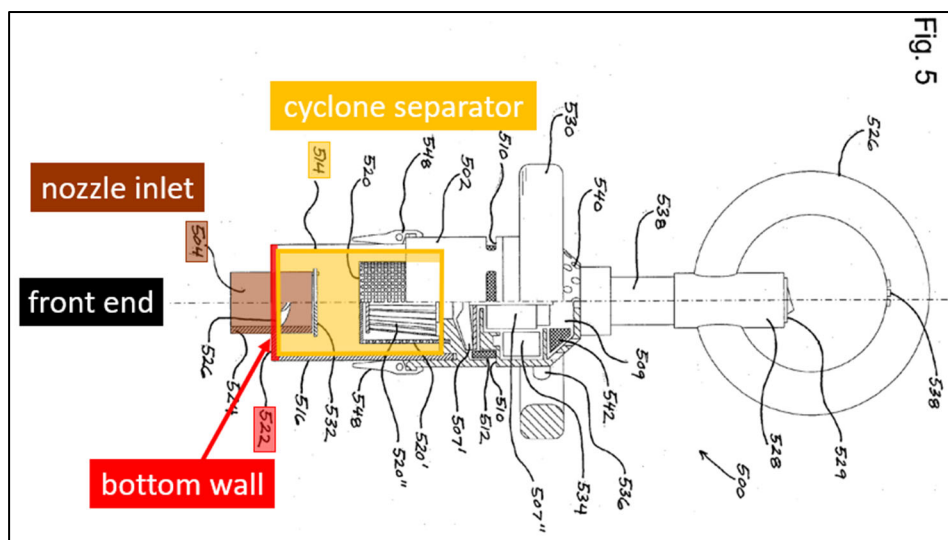


Ex1005, 21:21-23, Fig. 5.

i. [1c.iii]/[9c.iii]

Reference Number	Claim Limitation
[1c.iii]	“(iii) a hand vacuum cleaner air inlet centrally positioned with respect to the air treatment chamber front wall and releasably connectable with the air outlet of the rigid wand; and,”
[9c.iii]	“(iii) a hand vacuum cleaner air inlet provided on the front end of the air treatment member and releasably connectable with the air outlet of the rigid wand, the hand vacuum cleaner air inlet having an inlet axis that is coaxial with the central longitudinal axis; and,”

135. Butler teaches a hand vacuum cleaner air inlet centrally positioned with respect to the air treatment chamber front wall and releasably connectable with the air outlet of the rigid wand. (Limitation [1c.iii]).
136. Butler teaches a hand vacuum cleaner air inlet provided on the front end of the air treatment member and releasably connectable with the air outlet of the rigid wand, the hand vacuum cleaner air inlet having an inlet axis that is coaxial with the central longitudinal axis (Limitation [9c.iii]).
137. In my opinion, Butler teaches a hand vacuum cleaner air inlet. In Butler, air enters the cleaner via “**nozzle inlet 504**,” which “comprises an entry tube 524 that passes through the dirt receptacle **bottom wall 522**,” as shown in the annotated image below:

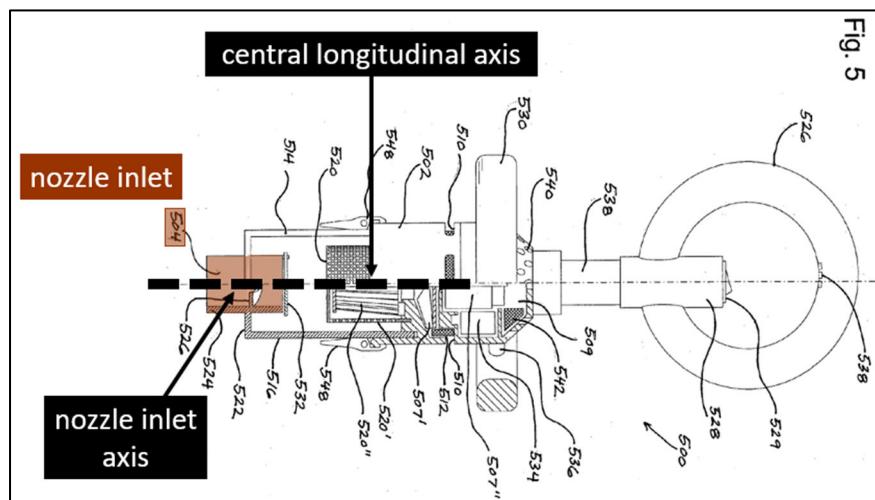


Ex1005, 22:5-6, Fig. 5.

138. In my opinion, a POSA would understand that Butler's "**nozzle inlet 504**" is a hand vacuum cleaner air inlet.
139. Regarding Limitation [1c.iii], in my opinion, Butler teaches that its hand vacuum cleaner air inlet is centrally positioned with respect to the air treatment chamber front wall. As I show above, in my opinion, a POSA would understand that Butler's "**nozzle inlet 504**" is centrally positioned (radially and top-to-bottom) with respect to Butler's "**bottom wall 522**" (which, in my opinion, is the air treatment chamber front wall).
140. Regarding Limitation [9c.iii], in my opinion, Butler teaches that the hand vacuum cleaner air inlet is provided on the front end of the air treatment member. As I show above, in my opinion, a POSA would understand that Butler's "**nozzle inlet 504**" is provided on the front end of Butler's air

treatment member, because it is provided on Butler's air treatment chamber front wall (which, in my opinion, is the “**bottom wall 522**”) and because it is provided at the upstream end of Butler's air treatment member.

141. For the reasons I explained for Limitations [1c]/[9c], in my opinion, Butler teaches that the hand vacuum cleaner air inlet is releasably connectable with the air outlet of the rigid wand. *See* Ground 1, Limitations [1c]/[9c].
142. Regarding Limitation [9c.iii], in my opinion, Butler teaches that the hand vacuum cleaner air inlet has an inlet axis that is coaxial with the central longitudinal axis. In my opinion, a POSA would understand that Butler's “**nozzle inlet 504**” has an inlet axis, and that it is coaxial with Butler's central longitudinal axis, as shown in the annotated image below:



Ex1005, Fig. 5.

j. [1c.iv]/[9c.iv]

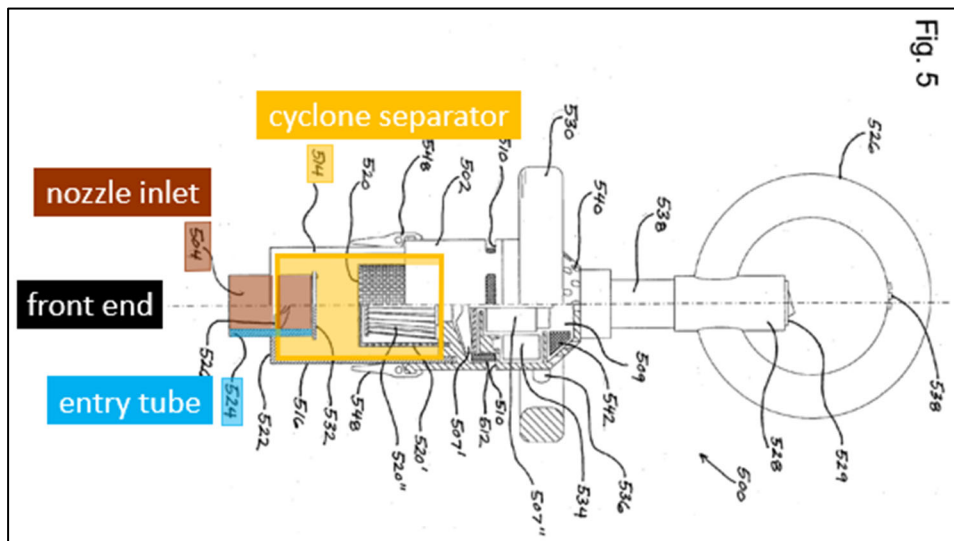
Reference Number	Claim Limitation
[1c.iv]	“(iv) a hand vacuum cleaner electrical connector provided on the front end of the air treatment member adjacent the hand vacuum cleaner air inlet, the hand vacuum cleaner electrical connector is releasably connectable with the outlet end electrical connector,”
[9c.iv]	“(iv) a hand vacuum cleaner electrical connector provided on the front end of the air treatment member adjacent the hand vacuum cleaner air inlet, the hand vacuum cleaner electrical connector is releasably connectable with the outlet end electrical connector,”

143. Butler teaches a hand vacuum cleaner electrical connector provided on the front end of the air treatment member adjacent the hand vacuum cleaner air inlet, the hand vacuum cleaner electrical connector is releasably connectable with the outlet end electrical connector. (Limitations [1c.iv]/[9c.iv]).

144. For the reasons I explained for Limitations [1b.3]/[9b.3], in my opinion, Butler teaches a hand vacuum cleaner electrical connector provided on the front end of the air treatment member to provide power to a powered attachment. *See* Ground 1, Limitations [1b.3]/[9b.3].

145. Further, in my opinion, Butler teaches that the hand vacuum cleaner electrical connector is provided on the front end of the air treatment member adjacent the hand vacuum cleaner air inlet. For example, Butler teaches that Butler’s “**nozzle inlet 504** ... comprises an **entry tube 524** that passes through the dirt receptacle bottom wall 522,” “any type of

cleaning device may be attached to the **entry tube 524**,” and “[o]f course, if a powered attachment is provided, suitable power leads can be provided to connect the powered attachment to the electric circuit,” as shown in the annotated image below:



Ex1005, 22:5-11, Fig. 5.

146. In my opinion, a POSA therefore would understand that Butler’s **“entry tube 524”** includes an electrical connector provided on the front end of the cyclone separator to connect to “power leads” and power Butler’s powered attachment. Ex1005, 22:6-11. As I depict above, Butler’s **“entry tube 524”** is positioned adjacent the hand vacuum cleaner air inlet.
147. Further, in my opinion, a POSA would understand that the hand vacuum cleaner electrical connector is releasably engageable with the rigid wand outlet end electrical connector to provide electrical circuitry to Butler’s

powered attachments, because Butler teaches a releasably engageable connector/vacuum tube, as I explained for Limitations [1c]/[9c]. See Ground 1, Limitations [1c]/[9c].

k. [1c.iv.1]/[9c.iv.1]³

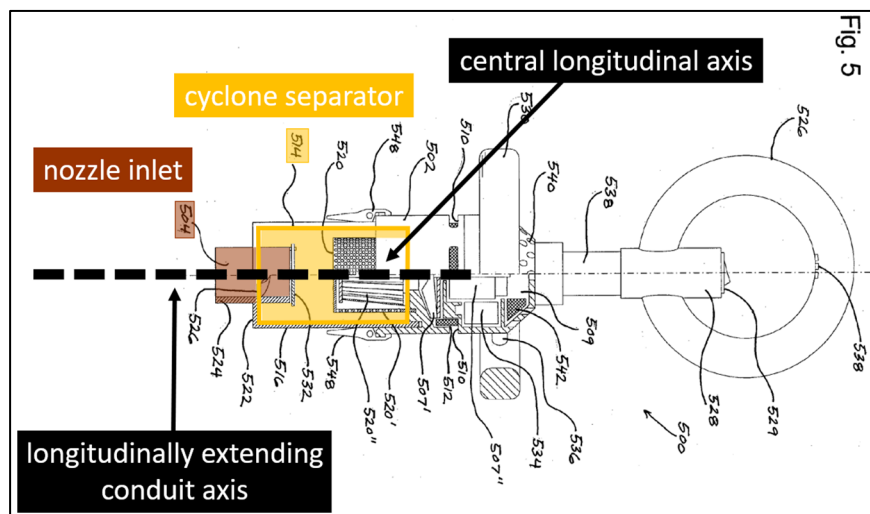
Reference Number	Claim Limitation
[1c.iv.1]	“wherein, when the hand vacuum cleaner is mounted to the rigid wand outlet end, the longitudinally extending conduit axis extends in a same direction as the central longitudinal axis”
[9c.iv.1]	“wherein, when the hand vacuum cleaner is mounted to the rigid wand outlet end, the longitudinally extending conduit axis extends in a same direction as the central longitudinal axis of the air treatment member, and”

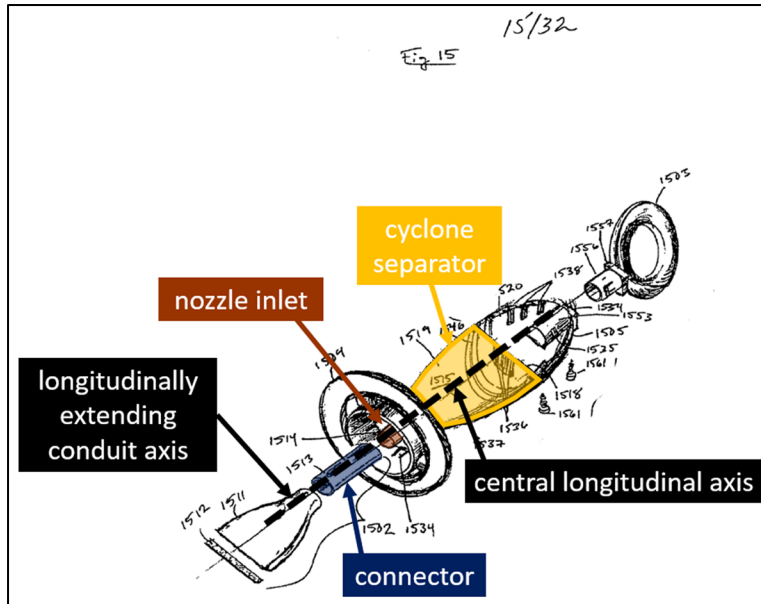
148. Butler teaches wherein, when the hand vacuum cleaner is mounted to the rigid wand outlet end, the longitudinally extending conduit axis extends in a same direction as the central longitudinal axis. (Limitation [1c.iv.1]).

149. Butler teaches wherein, when the hand vacuum cleaner is mounted to the rigid wand outlet end, the longitudinally extending conduit axis extends in a same direction as the central longitudinal axis of the air treatment member. (Limitation [9c.iv.1]).

³ While the '030 Patent's face recites “central longitudinal axis of rotation,” the USPTO issued a Certificate of Correction on 02/18/2020 changing this language to read “central longitudinal axis.” Ex1004, 298.

150. In my opinion, Butler teaches that, when the hand vacuum cleaner is mounted to the rigid wand outlet end, the longitudinally extending conduit axis extends in a same direction as the central longitudinal axis. Butler depicts its **connector/vacuum tube** axis (which, in my opinion, is the longitudinally extending conduit axis) and its “**cyclone separator**” axis (which, in my opinion, is the central longitudinal axis) as extending in the same direction when Butler’s **connector/vacuum tube** is connected to Butler’s “**nozzle inlet 504**,” as shown in the annotated images below:





Ex1005, Figs. 5, 15.

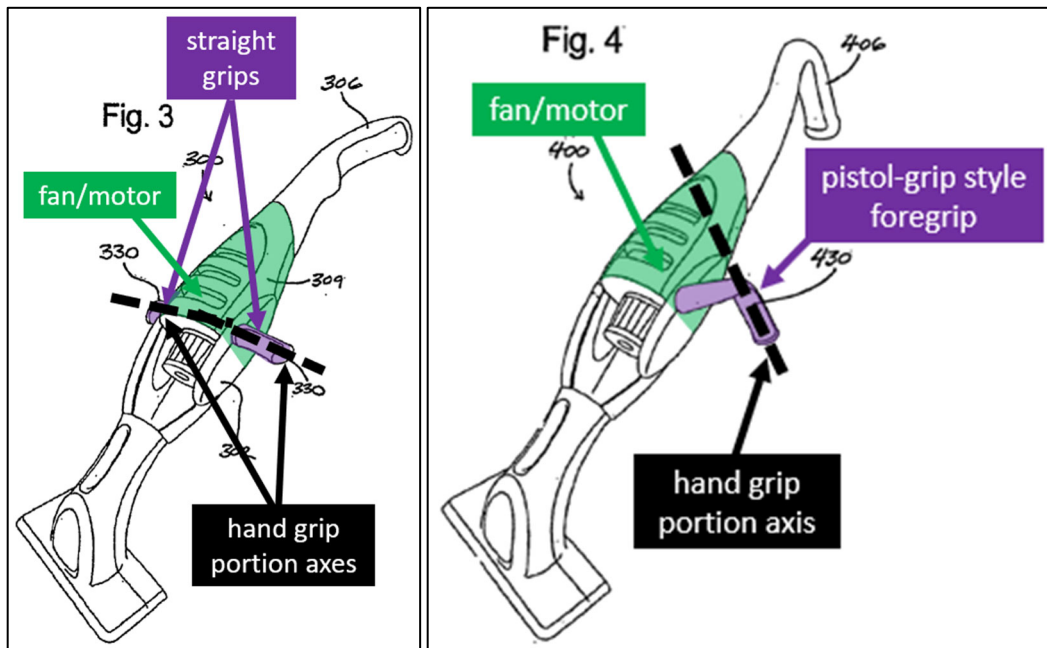
151. Regarding Limitation [1c.iv.1], in my opinion, a POSA would understand that Butler's air treatment member central longitudinal axis is a central longitudinal axis (and a central longitudinal axis of rotation) at least because, in Butler's "**cyclone separator**," air rotates cyclonically around that axis to separate dust. For example, Butler teaches "initiat[ing] tangential airflow" using "a diverting member" or by using "a helical ramp ... to establish a cyclonic airflow pattern within the dirt receptacle 514." Ex1005, 18:15-21, 22:14-22. For these same reasons, regarding Limitation [9c.iv.1], in my opinion, a POSA would understand that Butler's air treatment member central longitudinal axis is a central longitudinal axis of the air treatment member.

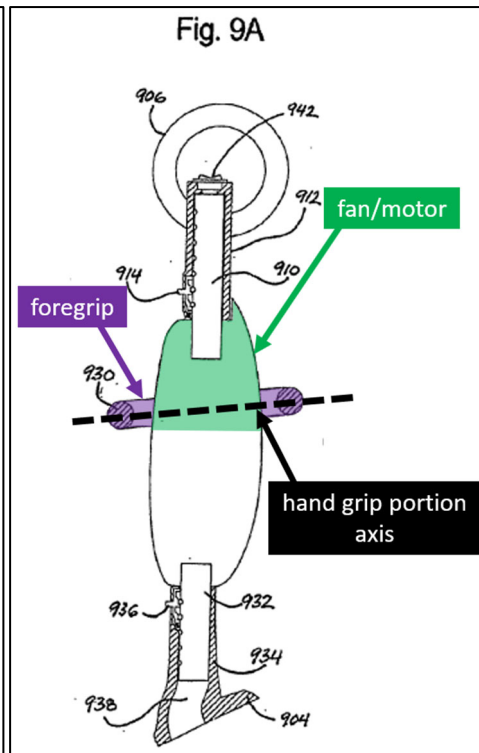
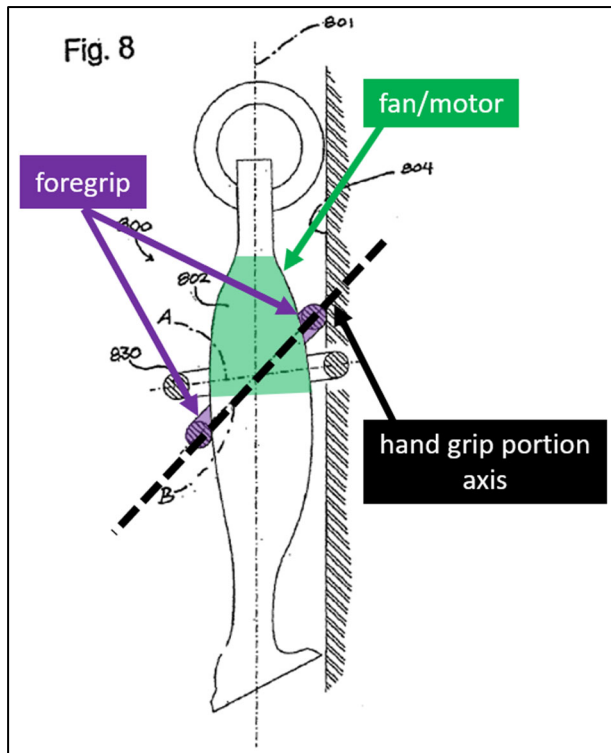
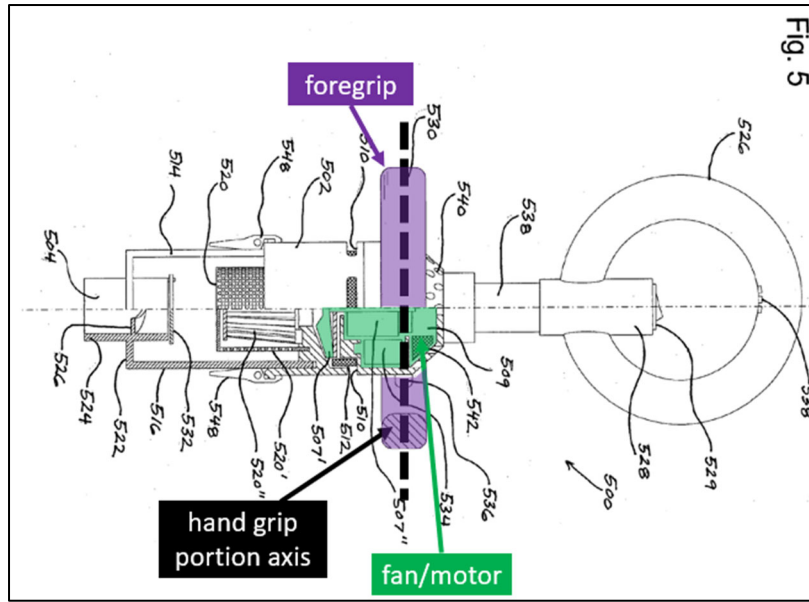
I. [1c.iv.2]/[9c.iv.2]

Reference Number	Claim Limitation
[1c.iv.2]	“wherein the hand grip portion has a hand grip portion axis that intersects the suction motor.”
[9c.iv.2]	“wherein the hand grip portion has a hand grip portion axis that intersects the suction motor.”

152. Butler teaches wherein the hand grip portion has a hand grip portion axis that intersects the suction motor. (Limitations [1c.iv.2]/[9c.iv.2]).

153. In my opinion, Butler teaches that the hand grip portion has a hand grip portion axis that intersects the suction motor. For example, Butler depicts that what, in my opinion, a POSA would understand is a hand grip portion axis for Butler’s foregrips intersects Butler’s suction motor, as shown in the annotated images below:

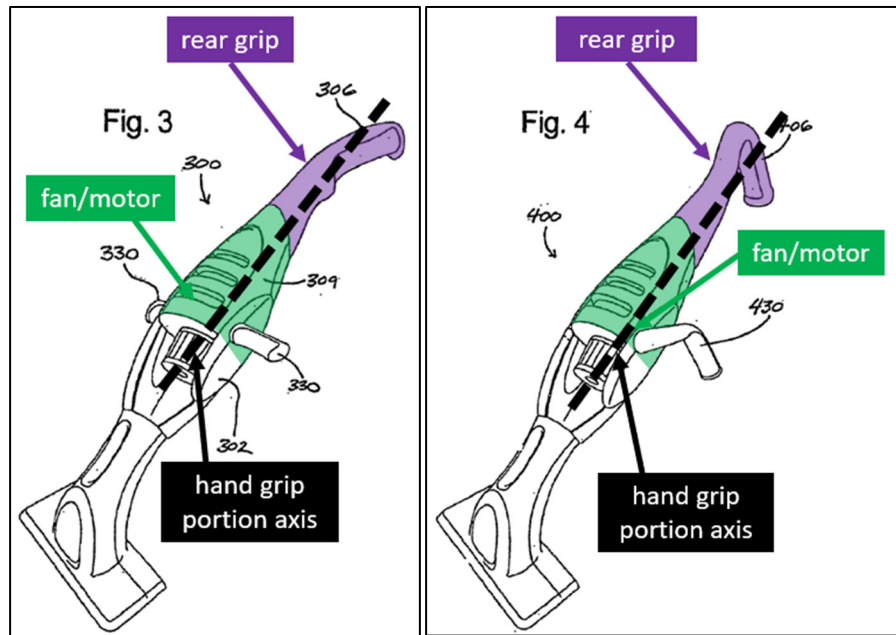




Ex1005, Figs. 3-4, 5, 8, 9A.

154. Further, in my opinion, a POSA would understand that Butler's hand grip portion on each of Butler's rear grips has a hand grip portion axis that

intersects the suction motor, as shown in the annotated images below:



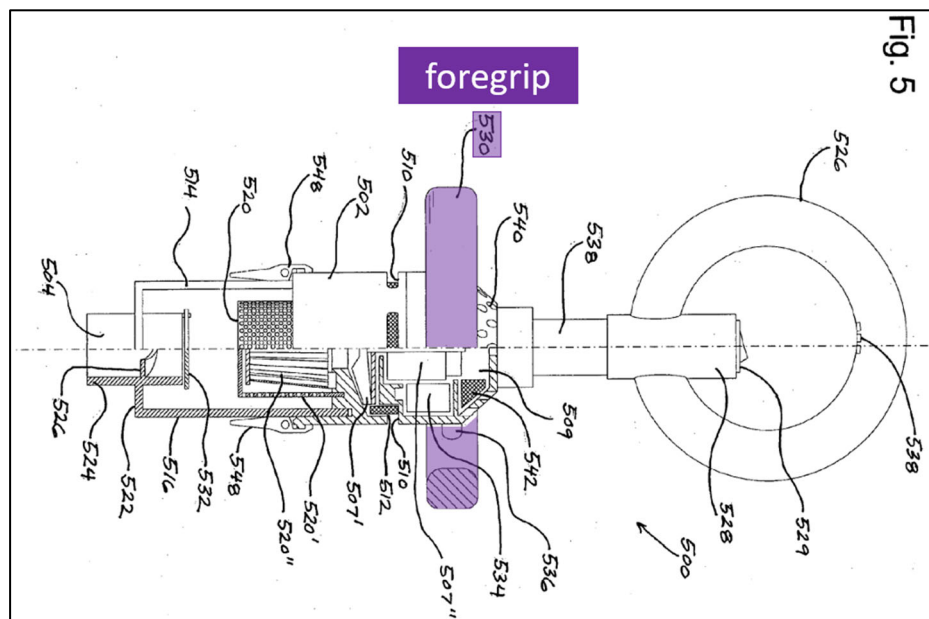
Ex1005, Figs. 3-4.

155. As I explained for Limitation [1c.i], Butler’s “gripping surfaces” (which, in my opinion, are hand grip portions) can be applied to any and all portions of each of Butler’s handles. *See* Ground 1, Limitation [1c.i]. Thus, in my opinion, at least one hand grip portion axis of Butler’s handles intersects Butler’s suction motor, as depicted above.

2. Butler Anticipates Claims 2 and 10

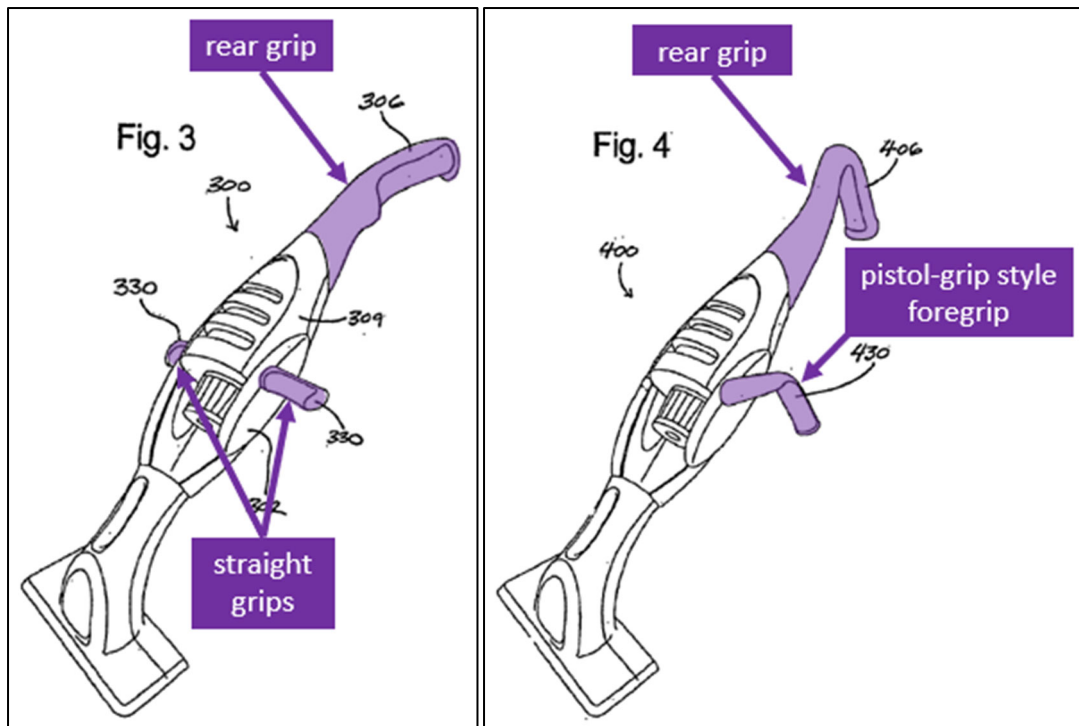
Reference Number	Claim Limitation
[2]	“The surface cleaning apparatus of claim 1 wherein the hand grip portion extends linearly outwardly from a sidewall of the main body.”
[10]	“The surface cleaning apparatus of claim 9 wherein the hand grip portion extends linearly outwardly from a sidewall of the main body.”

156. As I explained in Section X.A.1, Butler anticipates Claims 1 and 9 of the '030 patent.
157. Butler anticipates the surface cleaning apparatus of claim 1 and teaches wherein the hand grip portion extends linearly outwardly from a sidewall of the main body. (Claim 2).
158. Butler anticipates the surface cleaning apparatus of claim 9 and teaches wherein the hand grip portion extends linearly outwardly from a sidewall of the main body. (Claim 10).
159. In my opinion, Butler teaches that the hand grip portion extends linearly outwardly from a sidewall of the main body. Butler's "cylindrical housing 502 [has] a ... circular or looped **foregrip 530**," as shown in the annotated image below:



Ex1005, 20:4-6, Fig. 5.

160. Butler explains that the “foregrip 530 is attached to the housing 502 by a number of radially extending posts 536.” Ex1005, 20:7-11, 20:28-30. As I explained for Limitation [1c.i], Butler’s hand grip portion (which, in my opinion, are Butler’s “gripping surfaces”) can be applied to any portion of any of Butler’s grips. *See* Ground 1, Limitation [1c.i].
161. In my opinion, a POSA would understand that Butler’s “cylindrical housing 502” is a sidewall of the main body, at least because it is an external wall, and that Butler’s “foregrip 530” is a handle that has a hand grip portion that extends linearly outwardly from a sidewall of the main body, as depicted above.
162. Further, Butler teaches that its other types of grips having hand grip portions that, in my opinion, a POSA would understand extend linearly outwardly from a sidewall of the main body, as shown in the annotated images below:



Ex1005, Figs. 3-4.

3. Butler Anticipates Claim 3

Reference Number	Claim Limitation
[3]	“The surface cleaning apparatus of claim 1 wherein the rigid air flow conduit is removably mounted to the surface cleaning head.”

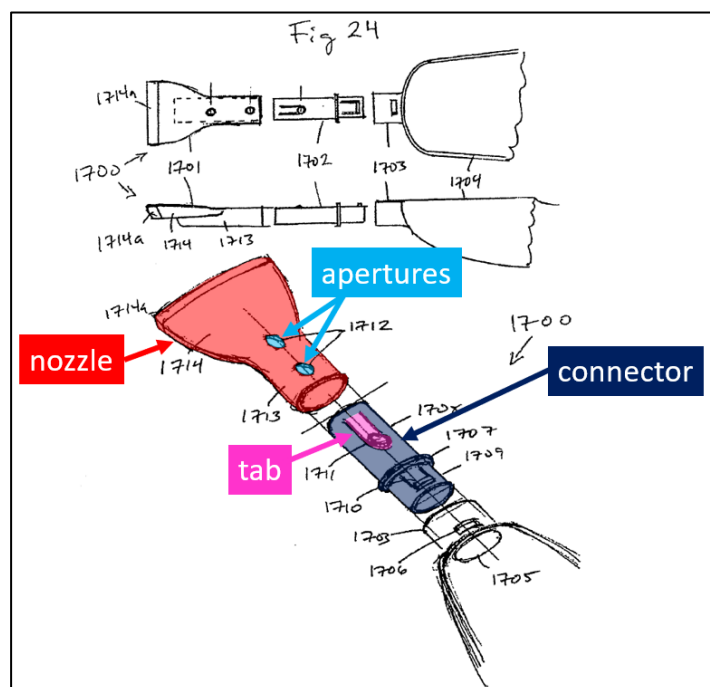
163. As I explained in Section X.A.1, Butler anticipates Claim 1 of the '030 patent.

164. Butler anticipates the surface cleaning apparatus of claim 1 and teaches wherein the rigid air flow conduit is removably mounted to the surface cleaning head. (Claim 3).

165. In my opinion, Butler teaches that the rigid air flow conduit is removably mounted to the surface cleaning head. For example, Butler teaches that

“[t]he inlet nozzle 104 may also be removable,” and “[o]nce removed, other types of inlet nozzle (such as dusters, crevice tools, and so on) may be attached to the vacuum cleaner 100, as known in the art.” Ex1005, 9:21-25.

166. Butler also teaches that “[t]he inlet portion 1708 of the **connector 1702** is telescopically received within the **nozzle 1701** and comprises a flexible nozzle-attaching **tab 1711** that corresponds to one or more **apertures 1712** in the **nozzle 1701** to secure the **nozzle 1701** to the **connector**. Preferably, the operator can depress this **tab 1711** to remove the **nozzle 1701** from the **connector 1702**, or move the **nozzle 1701** between multiple axial or radial positions on the **connector 1702**,” as shown in the annotated image below:

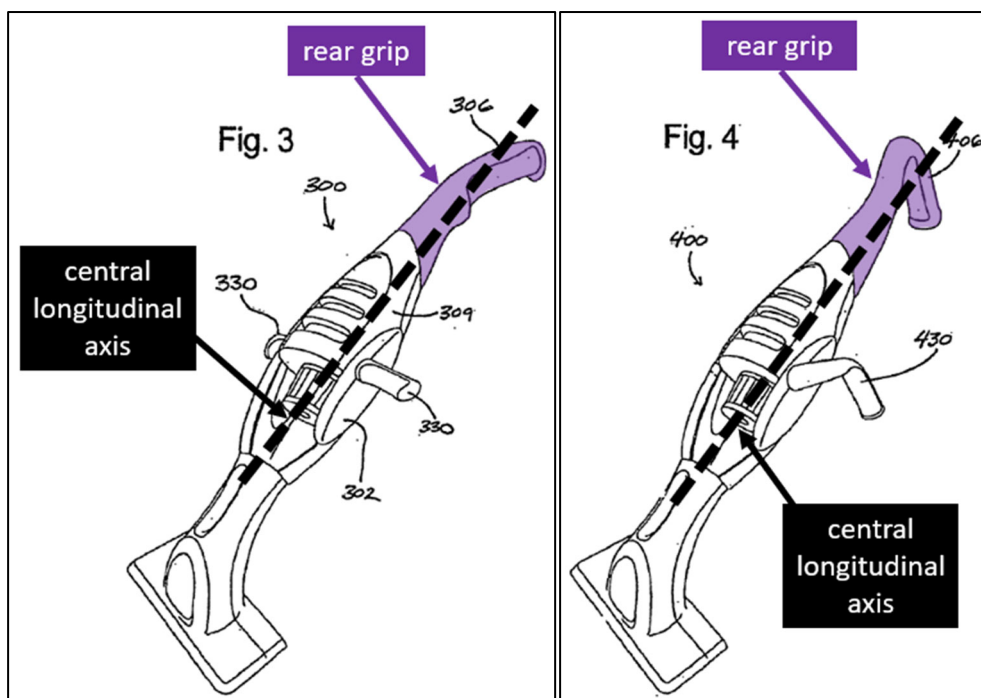


Ex1005, 41:26-42:1, Fig. 24.

4. Butler Anticipates Claims 4 and 11

Reference Number	Claim Limitation
[4]	“The surface cleaning apparatus of claim 1 wherein the central longitudinal axis intersects that hand grip portion.”
[11]	“The surface cleaning apparatus of claim 9 wherein the central longitudinal axis intersects that hand grip portion.”

167. As I explained in Section X.A.1, Butler anticipates Claims 1 and 9 of the '030 patent.
168. Butler anticipates the surface cleaning apparatus of claim 1 and teaches wherein the central longitudinal axis intersects that hand grip portion (Claim 4).
169. Butler anticipates the surface cleaning apparatus of claim 9 and teaches wherein the central longitudinal axis intersects that hand grip portion (Claim 11).
170. In my opinion, Butler teaches that the central longitudinal axis intersects the hand grip portion, as shown in the annotated images below:



Ex1005, Figs. 3-4.

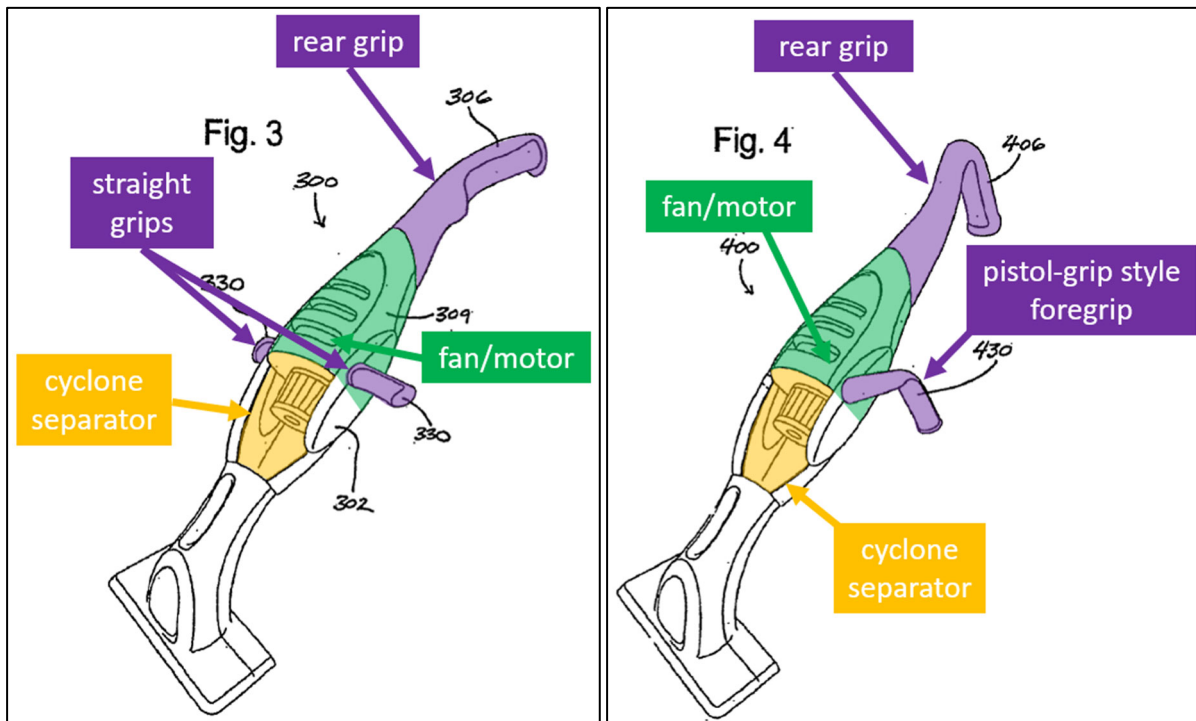
171. As I explained for Limitation [1c.i], Butler’s hand grip portion (which, in my opinion, are Butler’s “gripping surfaces”) can be applied to any portion of any of Butler’s grips. See Ground 1, Limitation [1c.i].

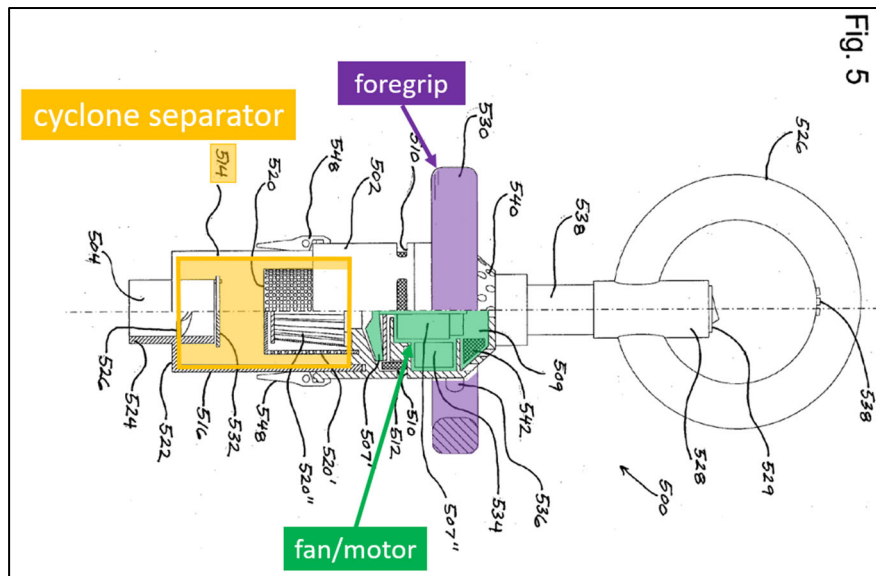
5. Butler Anticipates Claims 5 and 12

Reference Number	Claim Limitation
[5]	“The surface cleaning apparatus of claim 1 wherein the suction motor and the handle are positioned rearward of the air treatment member.”
[12]	“The surface cleaning apparatus of claim 9 wherein the suction motor and the handle are positioned rearward of the air treatment member.”

172. As I explained in Section X.A.1, Butler anticipates Claims 1 and 9 of the ’030 patent.

173. Butler anticipates the surface cleaning apparatus of claim 1 and teaches wherein the suction motor and the handle are positioned rearward of the air treatment member. (Claim 5).
174. Butler anticipates the surface cleaning apparatus of claim 9 and teaches wherein the suction motor and the handle are positioned rearward of the air treatment member. (Claim 12).
175. In my opinion, Butler teaches that the suction motor and the handle are positioned rearward of the air treatment member, as shown in the annotated images below:





Ex1005, Figs. 3-5.

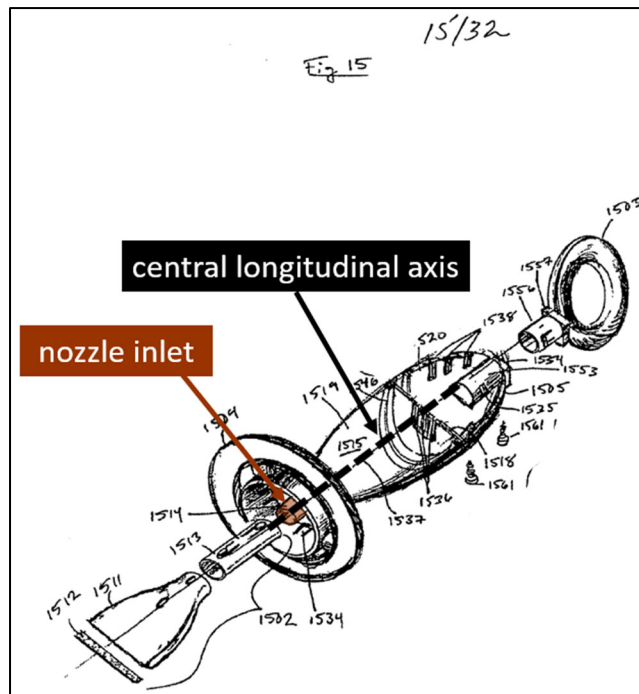
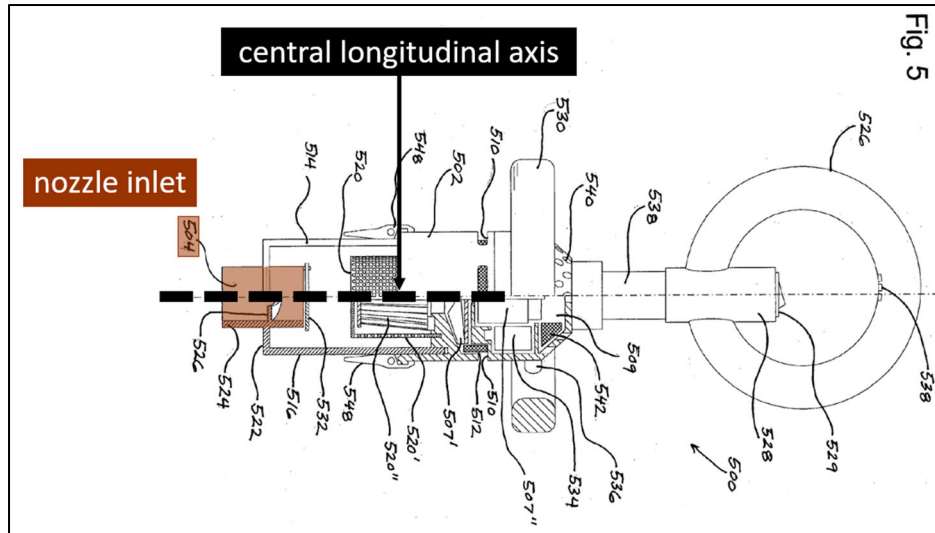
6. Butler Anticipates Claim 6

Reference Number	Claim Limitation
[6]	"The surface cleaning apparatus of claim 1 wherein the central longitudinal axis extends through the hand vacuum cleaner air inlet."

176. As I explained in Section X.A.1, Butler anticipates Claim 1 of the '030 patent.

177. Butler anticipates the surface cleaning apparatus of claim 1 and teaches wherein the central longitudinal axis extends through the hand vacuum cleaner air inlet. (Claim 6).

178. In my opinion, Butler teaches that the central longitudinal axis extends through the hand vacuum cleaner air inlet, as shown in the annotated images below:

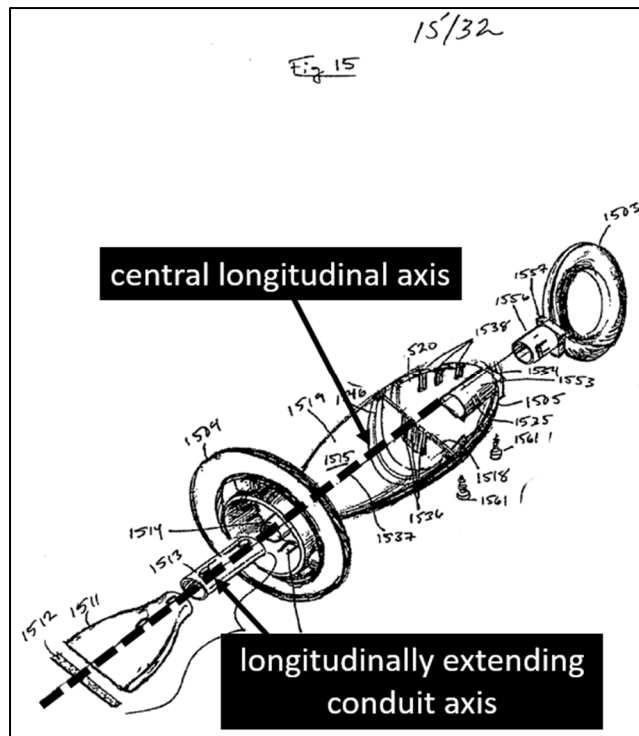
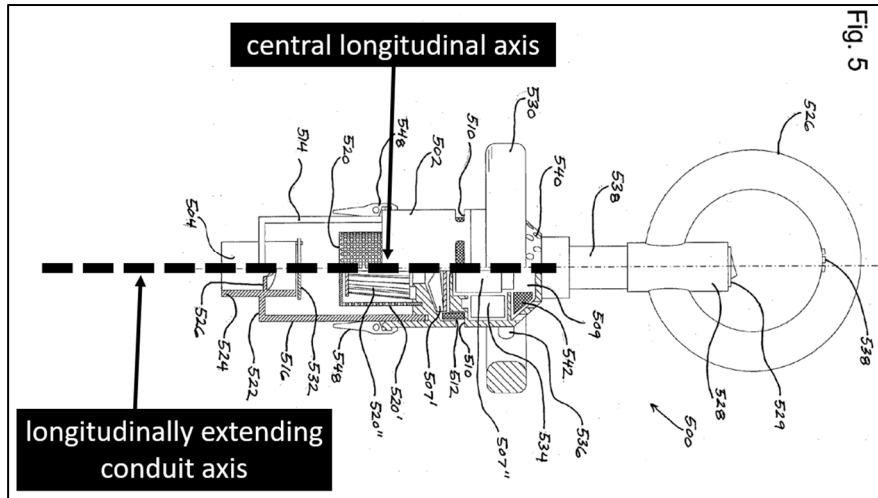


Ex1005, Figs. 5, 15.

7. Butler Anticipates Claim 7

Reference Number	Claim Limitation
[7]	“The surface cleaning apparatus of claim 1 wherein, when the hand vacuum cleaner is mounted to the rigid wand outlet end, the longitudinally extending conduit axis extends in the same direction as the central longitudinal axis of the air treatment member.”

179. As I explained in Section X.A.1, Butler anticipates Claim 1 of the '030 patent.
180. Butler anticipates the surface cleaning apparatus of claim 1 and teaches wherein, when the hand vacuum cleaner is mounted to the rigid wand outlet end, the longitudinally extending conduit axis extends in the same direction as the central longitudinal axis of the air treatment member. (Claim 7).
181. In my opinion, Butler teaches that, when the hand vacuum cleaner is mounted to the rigid wand outlet end, the longitudinally extending conduit axis extends in the same direction as the central longitudinal axis of the air treatment member, as shown in the annotated images below:



Ex1005, Figs. 5, 15.

8. Butler Anticipates Claims 8 and 13

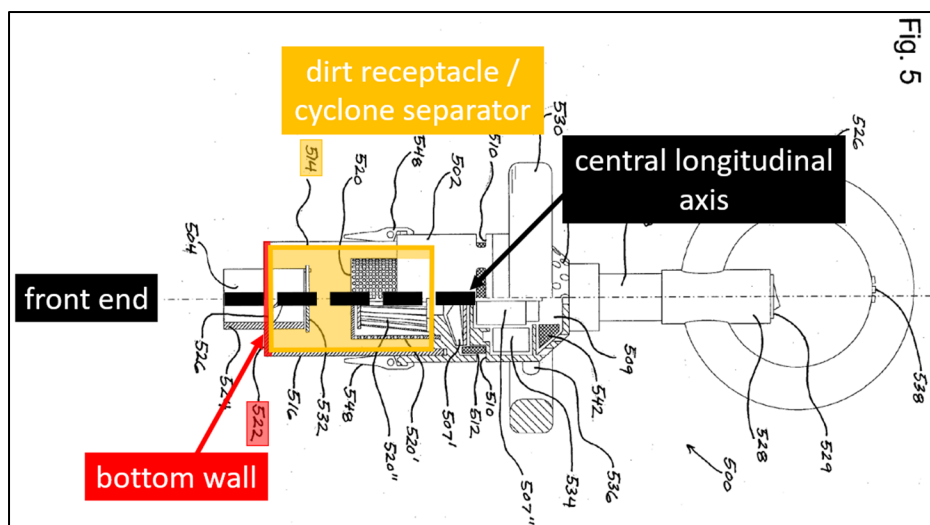
Reference Number	Claim Limitation
[8]	“The surface cleaning apparatus of claim 1 wherein the air treatment member has a front face and the hand vacuum cleaner electrical connector is positioned forward of the front face.”
[13]	“The surface cleaning apparatus of claim 9 wherein the air treatment member has a front face and the hand vacuum cleaner electrical connector is positioned forward of the front face.”

182. As I explained in Section X.A.1, Butler anticipates Claims 1 and 9 of the '030 patent.

183. In my opinion, Butler anticipates the surface cleaning apparatus of claim 1 and teaches wherein the air treatment member has a front face and the hand vacuum cleaner electrical connector is positioned forward of the front face. (Claim 8).

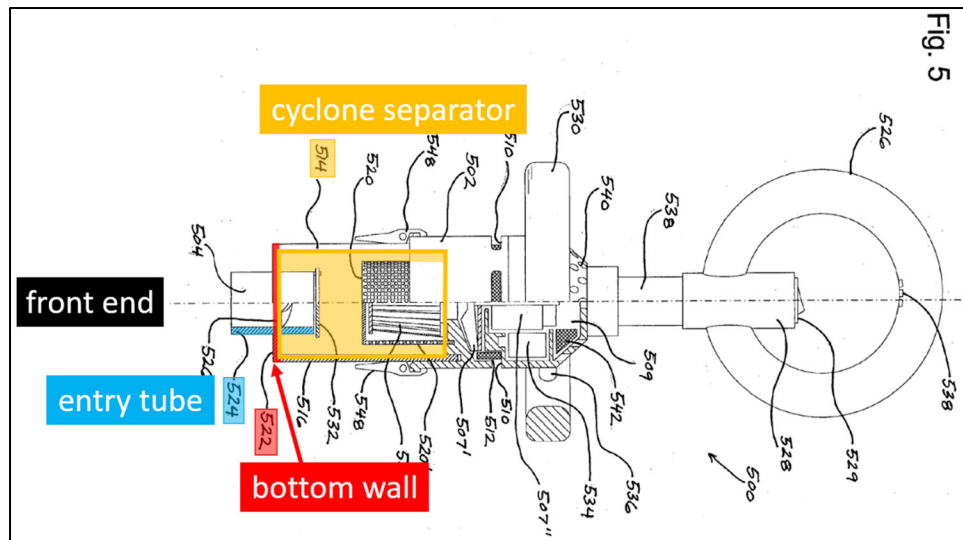
184. In my opinion, Butler anticipates the surface cleaning apparatus of claim 9 wherein the air treatment member has a front face and the hand vacuum cleaner electrical connector is positioned forward of the front face. (Claim 13).

185. In my opinion, Butler teaches that the air treatment member has a front face. As I explained for Limitation [1c.ii], Butler’s “**dirt receptacle** compris[ing] a **cyclone separator**” has a “**bottom wall 522**,” which, in my opinion, a POSA would understand is a front face of the air treatment chamber, as shown in the annotated image below:



Ex1005, 21:21-23, Fig. 5.

186. In my opinion, a POSA would further understand that the bottom wall of Butler’s dirt receptacle is the air treatment member front face, at least because it is the frontmost, most upstream surface of Butler’s “**dirt receptacle** compris[ing] a **cyclone separator**.”
187. In my opinion, Butler also teaches that the hand vacuum cleaner electrical connector is positioned forward of the front face. As I explained for Limitations [1c.iv]/[9c.iv], in my opinion, a POSA would understand that Butler’s “**entry tube 524**” includes an electrical connector provided on the front end of the cyclone separator to connect to “power leads” and power Butler’s powered attachment, as shown in the annotated image below:



Ex1005, 22:6-11, Fig. 5.

188. In my opinion, a POSA would therefore understand that Butler's hand vacuum cleaner electrical connector is positioned forward of the front face, as depicted above.

B. Ground 2: Butler Renders Claims 1-13 Obvious

189. To the extent PO argues that Butler does not anticipate claims 1-13, in my opinion, Butler alone also renders them obvious.

1. Butler Teaches A Single System, But If Not, A POSA Would Have Combined Butler's Teachings

190. In my opinion, a POSA would understand that Butler teaches a single vacuum system that is configurable and optimizable such that a POSA would immediately envisage all elements arranged as in the challenged claims, and therefore anticipates. *See* Ground 1.

191. To the extent PO argues that any of Butler's disclosures are not arranged

as in the claims, in my opinion, a POSA would have had the expertise, the information from Butler's disclosure, and the motivation to have combined them. Butler explains that its various components are combinable and "may be interchangeable with one another to provide the user with various cleaning options," *id.*, 16:25-29; and that "the present invention includes embodiments in which the features described herein are used individually or in various other inventive combinations." *id.*, 43:29-44:3.

192. For example, Butler identifies several interchangeable and combinable arrangements when describing its figures:

Figure 3 is a perspective view of a first alternative handle arrangement of the present invention.

Figure 4 is a perspective view of a second alternative handle arrangement of the present invention.

Figure 5 is a partially cut away side view of still another embodiment of a vacuum cleaner of the present invention.

Figure 6 is a partially cut away side view of another alternative handle arrangement of the present invention.

Figure 7 is a partially cut away side view of another alternative handle arrangement of the present invention.

Figure 8 is a schematic view of another alternative handle arrangement of the present invention.

Ex1005, 4:17-28

193. Butler also explains that its dirt receptacles are interchangeable and reconfigurable: “[t]he dirt receptacle 214 may also be omitted and replaced by a non-removable chamber within the housing.” Ex1005, 18:27-28.

194. Butler further explains that its grips are interchangeable to optimize vacuum ergonomics and efficiency:

In still other embodiments, the loop-shaped grips may be replaced by any combination of rear grip and foregrip that provide the user with hand positions to ergonomically maneuver the device and rotate it into different positions for cleaning horizontal and inclined surfaces. The looped foregrip may also be replaced by a grip having a single hand position that is suited to conveniently apply, in conjunction with the rear grip, a bending moment on the vacuum cleaner housing.

Ex1005, 19:9-15.

195. Butler explains that “[v]arious alternatives to the embodiments of Figures 14A and 14B are envisioned.” Ex1005, 34:12-13.

196. Butler further teaches that its components are readily optimizable and reconfigurable: “any other suitable variation to the foregoing embodiments may be practiced with the present invention.” Ex1005, 18:22-24.

197. In my opinion, combining Butler’s components would have been obvious because it would have involved combining prior art elements (e.g., hand vacuum handles, grips, filters, cleaning tools, and dust chambers)

according to known methods to yield predictable results (ergonomic and efficient cleaning for different use cases), it would have involved a straight forward substitution of these known parts, which Butler expressly teaches are interchangeable, Ex1005, 16:25-29, and it would have involved applying known techniques that were well understood (e.g., air filtration, attaching grips to a hand vacuum housing, and attaching cleaning tools to a hand vacuum air inlet).

198. Further, in my opinion optimizing Butler's cleaner for different use cases by reconfiguring Butler's interchangeable components would have at least been obvious to try as there are a finite number of identified, predictable solutions for arranging Butler's well-known and interchangeable hand vacuum components.
199. Also, in my opinion a POSA would have reasonably expected success, because these simple components (e.g., hand vacuum handles, grips, filters, cleaning tools, and dust chambers) were well-known in the art, and because Butler expressly teaches that they are interchangeable and that Butler's hand vacuum can be optimally reconfigured based on use case.

2. In My Opinion, Butler Renders Obvious The Hand Vacuum Cleaner (Limitations [1c]/[9c])

200. To the extent PO argues that the preambles are limiting and that Butler does not teach "a hand vacuum," in my opinion, it would have been

obvious for a POSA to further reduce Butler's size. *See* Ground 1. *See* Ground 1, Limitations [1c]/[9c]; Ex1005, Abstract, 1:2-3, 13:1-19, 15:12-18, 26:1-10, 27:12-29.

201. As such, in my opinion, Butler's cleaner would be even more "maneuver[able]" and "compact," to achieve its purpose of cleaning "stairwells and other confined spaces." In my opinion, a POSA would have at least a reasonable expectation of success, because it would involve straightforward changes in proportion, such as: reducing the size of components, for example Butler's "cylindrical housing 502," "dirt receptacle 514," or "nozzle inlet 504," which would make Butler's cleaner smaller. Increasing the length of "connector 1702" would ensure that a user could clean the floor and other surfaces while holding Butler's cleaner. These modifications are straightforward.
202. In my opinion, by reducing the component parts of Butler, a POSA would have found reasonable success in creating a vacuum cleaner that could be comfortably held in a user's hand without the additional weight and bulkiness. It would have been obvious for a POSA to try this modification because Butler describes the faults of various vacuum styles including upright vacuums, canister vacuums, stick vacuums, and hand-held vacuums with handles located too close to the inlet nozzle. Ex1005, 1:5-

3:9. In my opinion, it would have been obvious for a POSA to recognize the benefits of Butler's design over other vacuums for cleaning surfaces such as "stairwells and other confined spaces," and seek to modify Butler's vacuum in a way that would be more easily manipulated by the user's hand.

3. In My Opinion, Butler Renders Obvious The Electrical Connector And Cable Limitations (Limitations [1b.3]/[9b.3], [1c.iv]/[9c.iv], and Claims 8/13)

203. To the extent PO argues that Butler does not teach the limitations regarding electrical connectors and cables, in my opinion, Butler renders them obvious.
204. In my opinion, a POSA reading Butler's disclosures that "any type of cleaning device may be attached to the entry tube 524," and if a "powered attachment is provided, suitable power leads can be provided to connect the powered attachment to the electric circuit" would have been motivated to place an electrical connector on entry tube 524, at a location on the front end of the cyclone separator provided at a location adjacent the hand vacuum cleaner air inlet. This location would be aligned with and connected to a rigid air flow conduit electrical connector when the hand vacuum cleaner is mounted to the rigid air flow conduit, which would have a corresponding rigid air flow conduit electrical connector. *See* Ground 1, Limitations [1b.3]/[9b.3], [1c.iv]/[9c.iv], Claims 8/13; Ex1005, 22:5-13,

Fig. 5.

205. In my opinion, using electrical connectors was a well-known technique to predictably connect power leads, and it would have been obvious to try, as—if not the only solution—at most one of a finite number of solutions for doing so. In my opinion, locating an electrical connector at the rigid wand outlet end, locating a hand vacuum cleaner electrical connector on the front end of the air treatment member, adjacent the hand vacuum cleaner air inlet and forward of the air treatment member front face, and making the hand vacuum cleaner electrical connector releasably connectable with the outlet end electrical connector would have been obvious. It is obvious since it is at least the only reasonable location while at most, one of a finite number of identified locations for these connectors in light of Butler’s disclosure, and they would have been the most logical locations to releasably connect the powered attachment to Butler’s power leads, because that is where the powered attachment (and connecting rigid airflow conduit) connects to Butler’s cleaner. *See* Ex1005, 22:6-11 (“any type of cleaning device may be attached to the entry tube 524,” which is located adjacent Butler’s hand vacuum cleaner air inlet, “nozzle inlet 504,” and if a “powered attachment is provided, suitable power leads can be provided to connect the powered attachment to the electric circuit”); *id.*

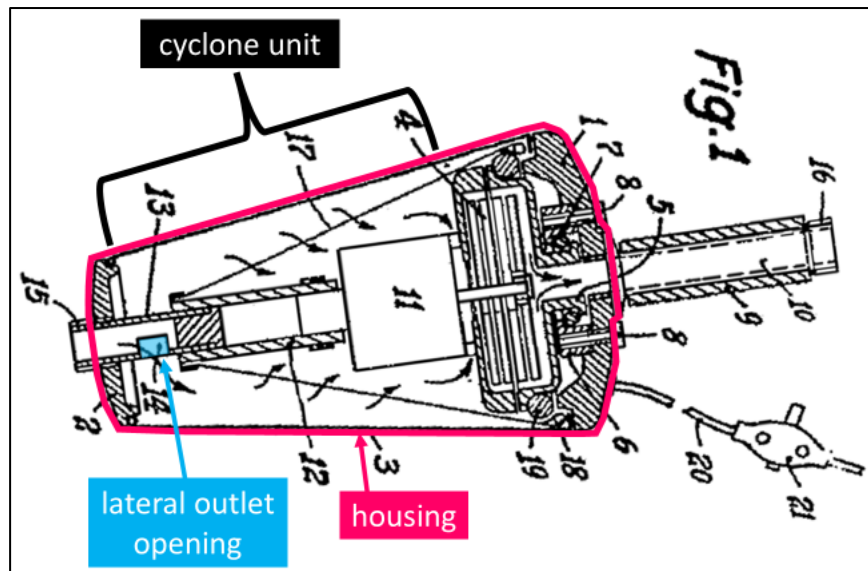
Fig. 5 (depicting “entry tube 524” as adjacent to “nozzle inlet 504”).

206. In my opinion, by locating electrical connectors in this manner, a POSA would have had a reasonable expectation of success powering the surface head cleaner in a way that channeled power from the main body without requiring additional or external electrical cords.
207. Further, in my opinion, it would have been obvious to modify Butler’s electrical connectors (if necessary, although unlikely) to make them releasably connectable because Butler teaches that its connector/vacuum tube are releasably connectable to Butler’s air inlet and are releasably connectable to Butler’s surface cleaning heads. *See* Ground 1, Limitation [1c], Claim 3. In my opinion, a POSA would have at least reasonably expected success because it would have involved incorporating a well-known feature (electrical connectors) at locations where Butler teaches such a feature should be incorporated.

C. Ground 3: Peter In Combination With Neroni Renders Claims 1-13 Obvious

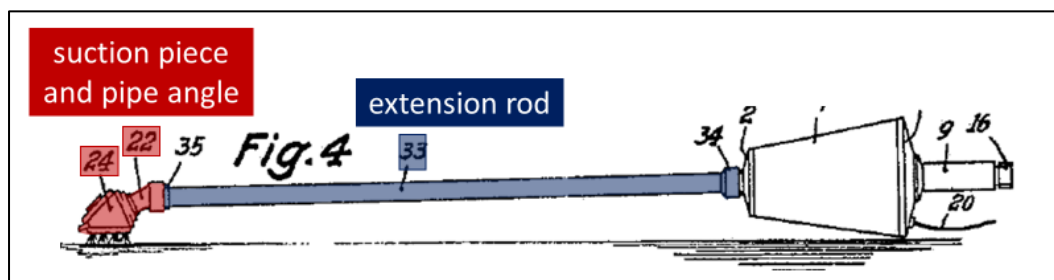
1. Motivation To Combine Peter And Neroni

208. Peter’s cleaner has a conical “**housing**” with a tangential “**lateral outlet opening 14**,” which creates cyclonic airflow within a **cyclone unit**, as shown in the annotated image below:



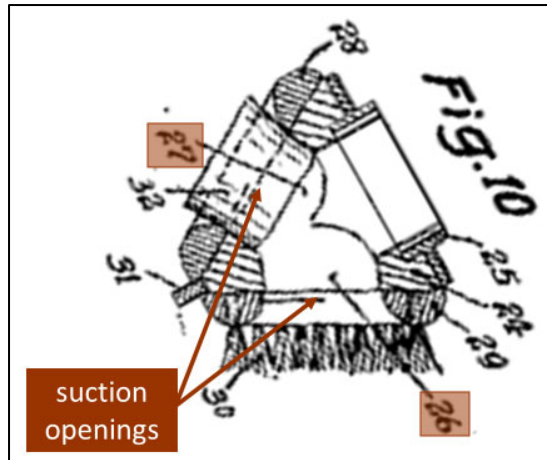
Ex1007, 2, Fig. 1.

209. Peter describes “an **extension rod 33**,” which can be “inserted between the vacuum cleaner housing and the **pipe angle [22]**,” which is “[t]he main accessory of the vacuum cleaner,” in conjunction with “**suction piece 24**,” as shown in the annotated image below:



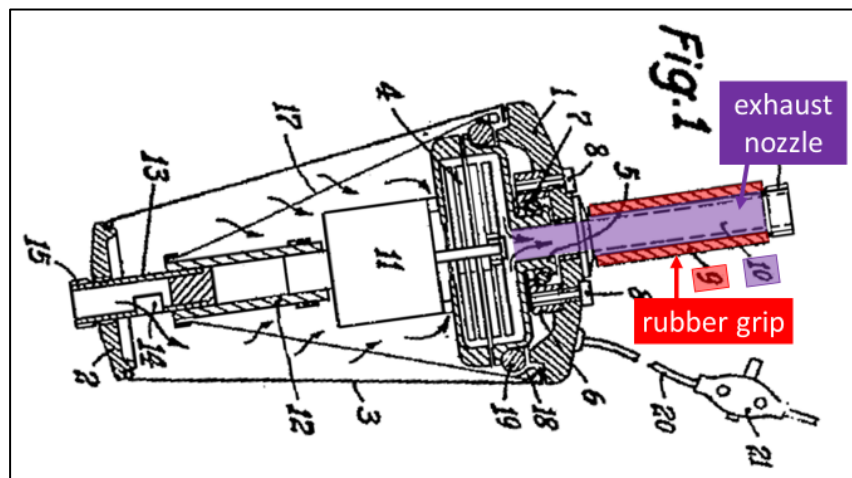
Ex1007, 2-3.

210. Peter’s “suction piece 24” has “**suction opening[s] 26, 27**,” which enable multi-directional cleaning from its top and bottom, as shown in the annotated image below:



Ex1007, 2, Fig. 10.

211. Peter further describes a “**rubber grip 9**” on “**exhaust nozzle 10**,” as shown in the annotated image below:



Ex1007, 2, Fig. 1.

212. Neroni teaches a vacuum cleaner with an electrically-powered tool. Neroni’s vacuum runs electricity from the power cleaning tool to power “**receptacle 16A**, and to **motor M**,” located in separation “**tank 12**,” as shown in the annotated image below:

cleaning tool) and to incorporate Neroni's teachings of a power cleaning tool adaptor. In my opinion, a POSA would have understood that powered cleaning tools were common, as Neroni explains. Ex1008, 1:17-49. In my opinion, a POSA would have also understood that powered cleaning tools can improve cleaning including by agitating the surface being cleaned, which frees dust that was otherwise trapped on that surface, including surfaces such as upholstery and carpet where dust can accumulate in the upholstery/carpet fibers, which would further Peter's stated purpose of "effortlessly" cleaning "upholstered furniture," "floors, carpets, and the like," and would have reasonably expected success. Ex1007, 1-2.

216. For example, in 2006, US2006/0026788 to Fischer explained that "simple brushes or crevice tools without electrically powered features or accessories" are "limit[ed]" in "both their cleaning power and usefulness," but "a powered cleaning tool attachment including a motor driven rotary agitator, a headlight and/or a booster fan" can provide benefits such as "additional cleaning power" and "greater cleaning efficiency," including by "scrub[bing] and beat[ing] dirt and debris from the nap of an underlying carpet being cleaned." Ex1009 ¶¶5, 6, 20, 22. In my opinion, a POSA would have understood the well-known benefits of a powered floor tool and would have been motivated to incorporate Neroni's electrical system

into Peter to achieve these benefits.

217. In my opinion, a POSA would have reasonably expected success incorporating Neroni's teachings into Peter's. In my opinion, a POSA would understand that Neroni's power cleaning tool adaptor teachings, including power leads and power connectors, were well-known, as Neroni explains (Ex1008, 1:17-49), that their incorporation would have required the addition of well-known and common parts—namely, Neroni's "female power receptacle 16," which "is used to supply electrical power" and "electrical cord assembly," which is used to transfer electrical power and "which is provided with a male fitting 22"—and that they would predictably result in delivering power to the surface cleaning tool. Ex1008, 3:34-49. Further, they would have been obvious to try as there were a finite number of predictable solutions for transferring power to a powered surface cleaning accessory.

2. The Combined Teachings of Peter and Neroni Render Obvious Claims 1 and 9

a. [1pre]/[9pre]

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

218. To the extent the preambles are limiting, in my opinion, Peter teaches a

surface cleaning apparatus.

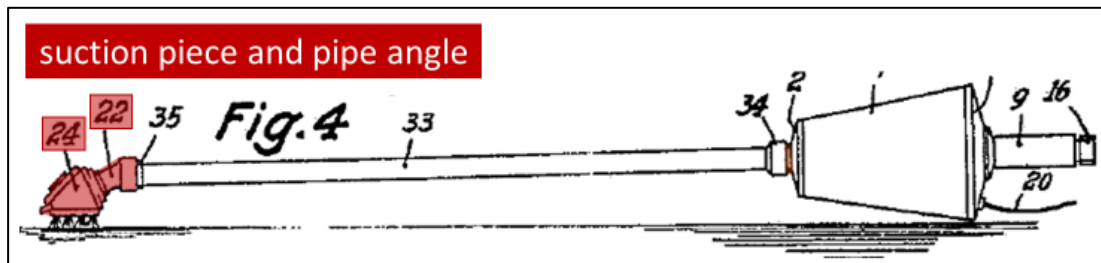
219. Peter teaches a “vacuum cleaner” for “cleaning floors, carpets” and other “surface[s] to be cleaned.” Ex1007, Title, 2.

b. [1a]/[9a]

Reference Number	Claim Limitation
[1a]	“(a) a surface cleaning head having a front end, a rear end, a dirt air inlet and a cleaning head air outlet;”
[9a]	“(a) a surface cleaning head having a front end, a rear end, a dirt air inlet and a cleaning head air outlet;”

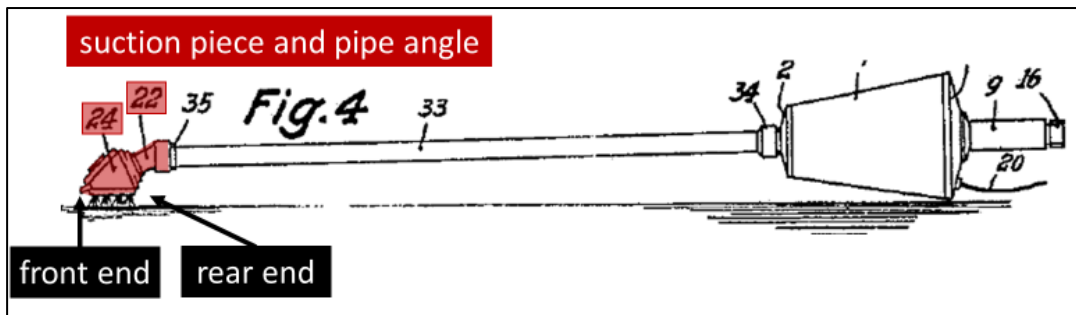
220. Peter teaches a surface cleaning head having a front end, a rear end, a dirt air inlet and a cleaning head air outlet. (Limitations [1a]/[9a]).

221. In my opinion, Peter teaches a surface cleaning head: “**suction piece 24**” connected to “**pipe angle 22**,” as shown in the annotated image below:



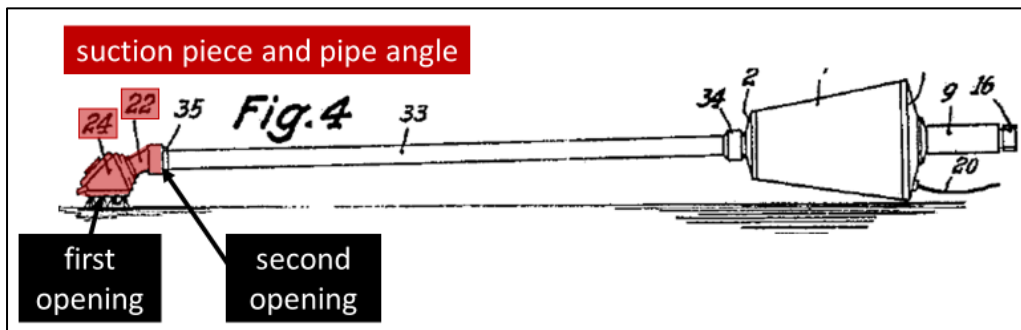
Ex1007, 2, Fig. 4.

222. In my opinion, a POSA would understand that, together, “suction piece 24” and “pipe angle 22” are a surface cleaning head.
223. In my opinion, Peter’s “**suction piece 24**” and “**pipe angle 22**” assembly has a front end and a rear end, as shown in the annotated image below:



Ex1007, Fig. 4.

224. In my opinion, Peter’s surface cleaning head has a dirt air inlet and a cleaning head outlet. In Peter, air flows into the “**suction piece 24**” via a **first opening**, and exits “**pipe angle 22**” via a **second opening**, as shown in the annotated image below:



Ex1007, Fig. 4.

225. In my opinion, a POSA would understand that Peter’s first opening is a dirt air inlet, and Peter’s second opening is a cleaning head air outlet.

226. In my opinion, a POSA would have been motivated to incorporate a powered surface cleaning head with Peter, including by modifying Peter’s surface cleaning head (which, in my opinion, is “suction piece 24” and “pipe angle 22”). *See* Ground 3, §1. When so modified, in my opinion,

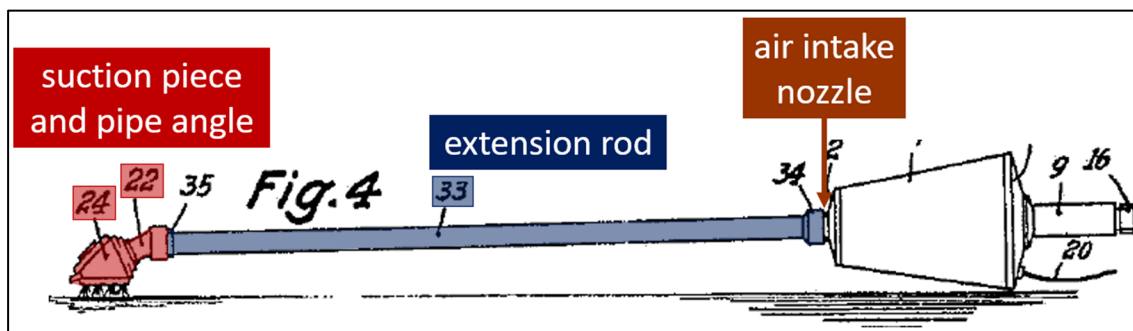
Peter likewise meets these limitations.

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

Reference Number	Claim Limitation
[1b.1]	“(b) a rigid air flow conduit having a rigid wand inlet end having an air inlet in communicable with the cleaning head air outlet, a rigid wand outlet end and a longitudinally extending conduit axis”
[9b.1]	“(b) a rigid air flow conduit having a rigid wand inlet end having an air inlet in communicable with the cleaning head air outlet, a rigid wand outlet end and a longitudinally extending conduit axis,”

227. Peter teaches a rigid air flow conduit having a rigid wand inlet end having an air inlet in communicable with the cleaning head air outlet, a rigid wand outlet end and a longitudinally extending conduit axis. (Limitations [1b.1]/[9b.1]).

228. In my opinion, Peter teaches a rigid air flow conduit: “**extension rod 33**” can be “inserted between the vacuum cleaner housing,” at “**air intake nozzle 13**,” and “**pipe angle 22**,” as shown in the annotated image below

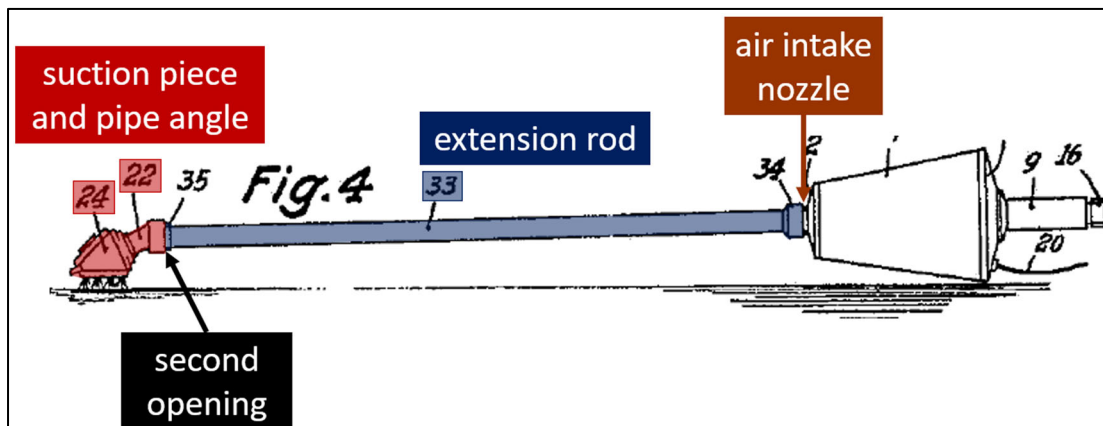


Ex1007, 2-3, Fig. 4.

229. In my opinion, a POSA would understand that Peter’s “**extension rod 33**”

is rigid, as Peter depicts, shown above.

230. In my opinion, Peter’s “**extension rod 33**” has a rigid wand inlet end having an air inlet that communicates with the cleaning head air outlet: the upstream end of Peter’s “**extension rod 33**” is a rigid wand inlet end with an air inlet at least because that is where air enters the “**extension rod 33**” from the **second opening** of Peter’s “**suction piece 24**” and “**pipe angle 22**” (which, in my opinion, is the cleaning head air outlet), as shown in the annotated image below:

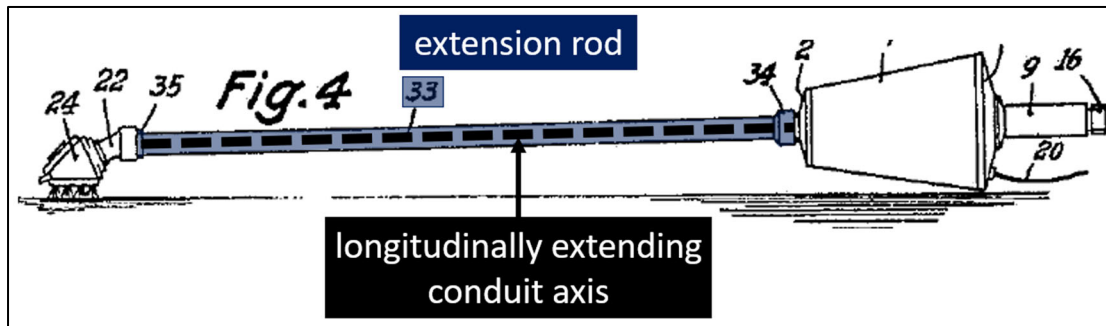


Ex1007, 2, Fig. 4.

231. In my opinion, a POSA would understand that Peter’s “**extension rod 33**” has a rigid wand outlet end at the downstream end of the “**extension rod 33**,” where it connects to the “**air intake nozzle 13**,” as shown above, at least because this is where air exits the “**extension rod 33**.” Ex1007, Fig. 4.

232. In my opinion, Peter’s “**extension rod 33**” has a longitudinally extending

conduit axis, as shown in the annotated image below:



Ex1007, Fig. 4.

d. [1b.2]/[9b.2]

Reference Number	Claim Limitation
[1b.2]	“the rigid air flow conduit is moveably mountable to the surface cleaning head between an upright position and an in-use floor cleaning position in which the rigid air flow conduit extends at an angle to the vertical,”
[9b.2]	“the rigid air flow conduit is moveably mountable to the surface cleaning head between an upright position and an in-use floor cleaning position in which the rigid air flow conduit extends at an angle to the vertical,”

233. Peter teaches the rigid air flow conduit is moveably mountable to the surface cleaning head between an upright position and an in-use floor cleaning position in which the rigid air flow conduit extends at an angle to the vertical. (Limitations [1b.2]/[9b.2]).

234. In my opinion, Peter teaches the rigid air flow conduit is moveably mountable to the surface cleaning head. In my opinion, a POSA would understand that Peter’s extension rod 33 (which, in my opinion, is the rigid

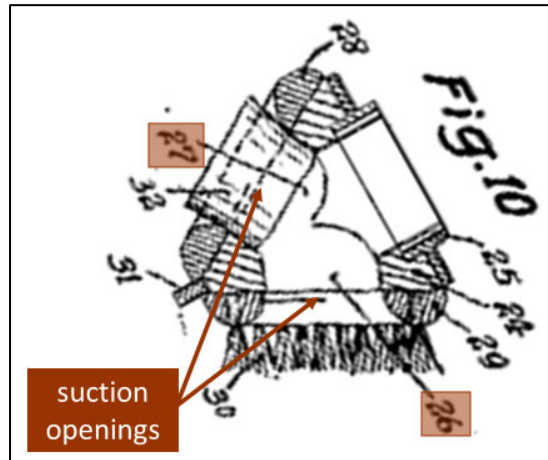
air flow conduit) is moveably mounted to the surface cleaning head using rotatable connecting threads. Peter teaches that the “connecting threads between the pipe angle 22 and the suction piece 24 are not fully tightened but can still rotate slightly,” which “allows the suction edges of the suction piece to always rest well on the surface to be cleaned, whereby the inclination of the extension rod in relation to the floor can be changed.”

Ex1007, 2. In my opinion, a POSA would understand that this is a moveable mount between Peter’s “extension rod 33” (which, in my opinion, is the rigid air flow conduit) and “pipe angle 22” / “suction piece 24” (which, in my opinion, are together the surface cleaning head) because it allows the extension rod and surface cleaning head to pivot relative to each other while maintaining a physical and an air-flow connection.

235. Further, in my opinion, Peter teaches that the rigid air flow conduit is moveably mountable to the surface cleaning head between an upright position and an in-use floor cleaning position in which the rigid air flow conduit extends at an angle to the vertical. For example, Peter teaches that the “connecting threads between the pipe angle 22 and the suction piece 24” allow the “inclination of the extension rod in relation to the floor [to] be changed,” which “makes it easy to work under tables, chairs, and similar furniture,” and enables “effortless[]” cleaning of “the floor or walls.”

Ex1007, 2. In my opinion, a POSA would understand that such “extension rod” “inclination” positions include an upright position and an in-use floor cleaning position in which the rigid air flow conduit extends at an angle to the vertical.

236. Further, Peter’s “suction piece 24” has “**suction opening[s] 26, 27,**” which enable multi-directional cleaning from its top and bottom, as shown in the annotated image below:



Ex1007, 2, Fig. 10.

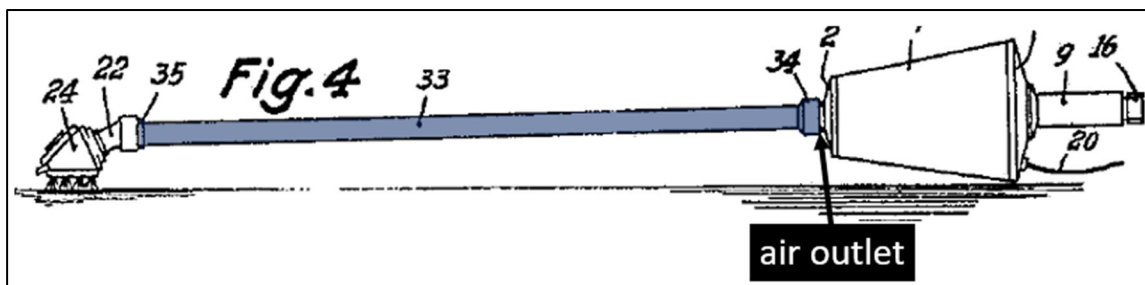
237. In my opinion, a POSA would understand that, to utilize suction piece 24’s multi-directional cleaning, Peter’s extension rod 33 would be moveable between an upright position and an in-use floor cleaning position in which the rigid air flow conduit extends at an angle to the vertical.

e. [1b.3]/[9b.3]

Reference Number	Claim Limitation
[1b.3]	“the rigid wand outlet end having an air outlet and an outlet end electrical connector; and,”
[9b.3]	“the rigid wand outlet end having an air outlet and an outlet end electrical connector; and,”

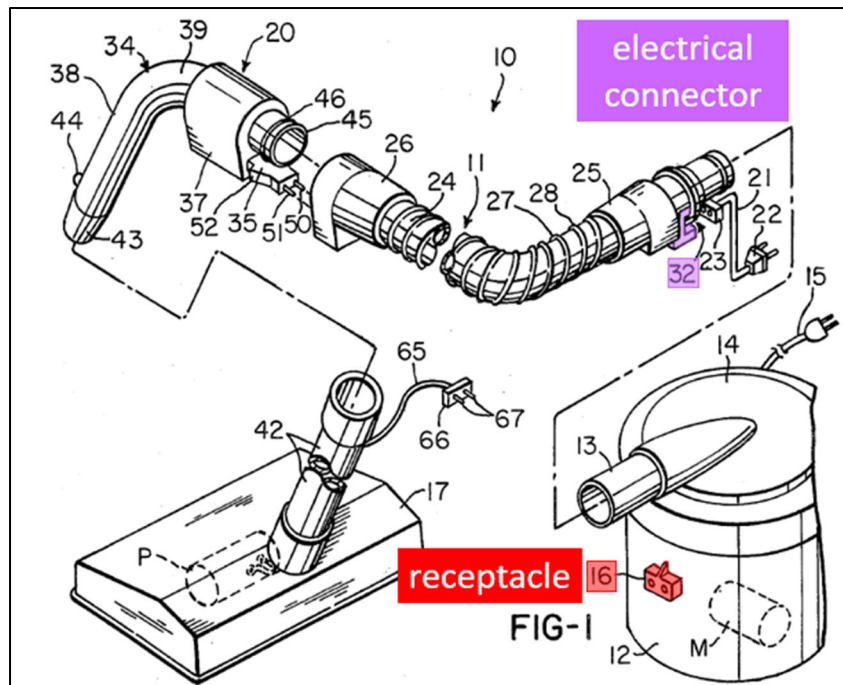
238. Peter in combination with Neroni teaches the rigid wand outlet end having an air outlet and an outlet end electrical connector. (Limitations [1b.3]/[9b.3]).

239. In my opinion, a POSA would understand that Peter’s rigid wand outlet end has an air outlet where it connects to the hand vacuum, as shown in the annotated image below:



Ex1007, Fig. 4.

240. Further, in my opinion, Neroni teaches an air flow conduit outlet end electrical connector: “hose assembly 11” with “**electrical connector 32**” attaches to “female fitting 23,” and “male fitting 22 ... for connection to the **receptacle 16**,” as shown in the annotated image below:



Ex1008, 3:34-49; 4:7-10, Fig. 1.

241. Neroni explains that “[t]he **receptacle 16** is used to supply electrical power through the hose assembly 11 into the adapter 20, and then to motor P of the power cleaning tool 17.” *Id.*, 3:36-42. In my opinion, a POSA would understand that Neroni’s “electrical connector 32,” “female fitting 23,” and “male fitting 22” are individually (and together) an air flow conduit electrical connector, and that they are located at the outlet end of Neroni’s air flow conduit, at least because that is where air exits the “hose assembly 11.”

242. Further, in my opinion, a POSA would have been motivated to incorporate Neroni’s “electrical connector 32” teachings, including “female fitting 23” and “male fitting 22,” into Peter’s rigid extension rod 33 to power its floor

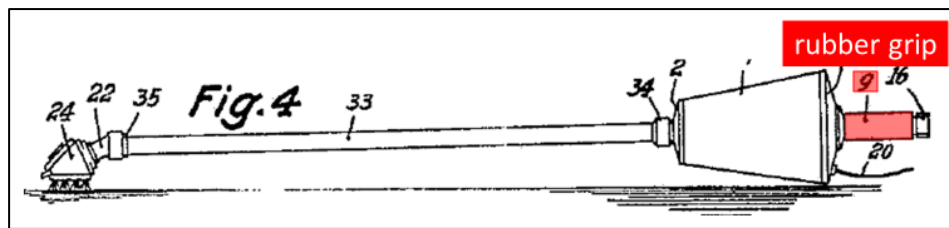
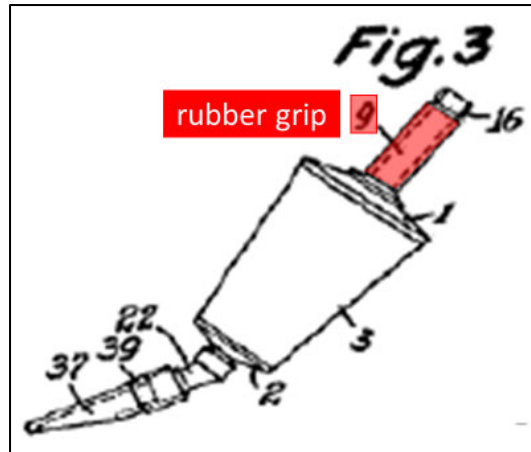
tool and would have a reasonable expectation of success. *See* Ground 3, §1. Thus, in my opinion, the combined teachings of Peter and Neroni teach these limitations.

f. [1c]/[9c]

Reference Number	Claim Limitation
[1c]	“(c) a hand vacuum cleaner removably mountable to the rigid wand outlet end, the hand vacuum cleaner having a front end and a rear end, the hand vacuum cleaner comprising:”
[9c]	“(c) a hand vacuum cleaner removably mountable to the rigid wand outlet end, the hand vacuum cleaner having a front end and a rear end, the hand vacuum cleaner comprising:”

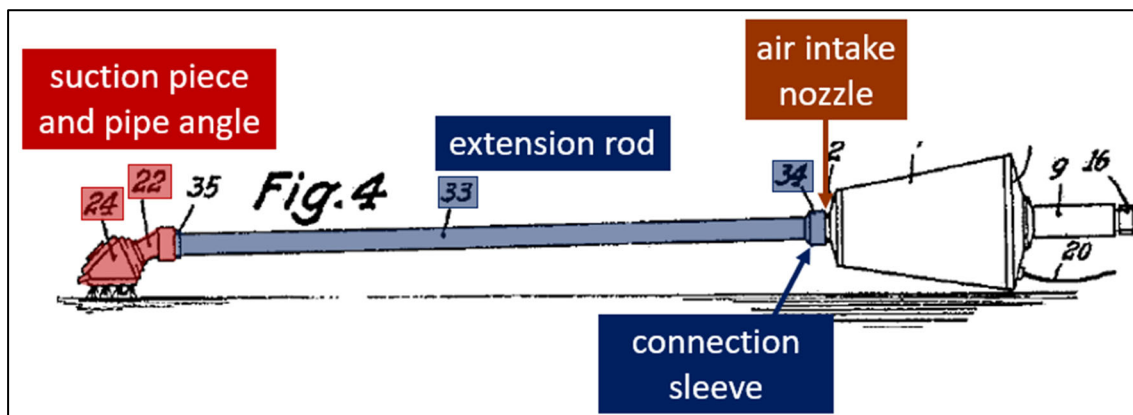
243. Peter teaches a hand vacuum cleaner removably mountable to the rigid wand outlet end, the hand vacuum cleaner having a front end and a rear end. (Limitations [1c]/[9c]).

244. In my opinion, Peter teaches a “vacuum cleaner” that is designed to be used by hand and is a hand vacuum cleaner. Ex1007, 1. Peter’s hand vacuum cleaner includes “exhaust nozzle 10” surrounded by “**rubber grip 9**” for handling, as shown in the annotated images below:



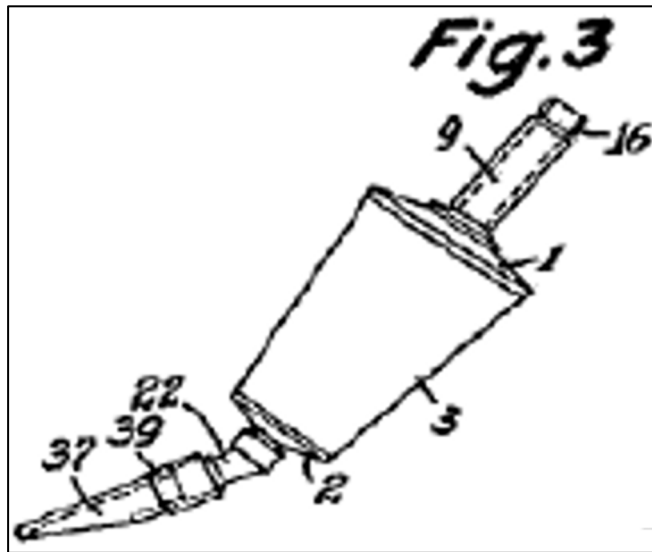
Ex1007, 1, Figs. 3-4.

245. In my opinion, Peter's hand vacuum cleaner is removably mountable to the rigid wand outlet end: "**extension rod 33**" can be "inserted between the vacuum cleaner housing," at "**air intake nozzle 13**," and "**pipe angle 22**," as shown in the annotated image below:



Ex1007, 2-3, Fig. 4.

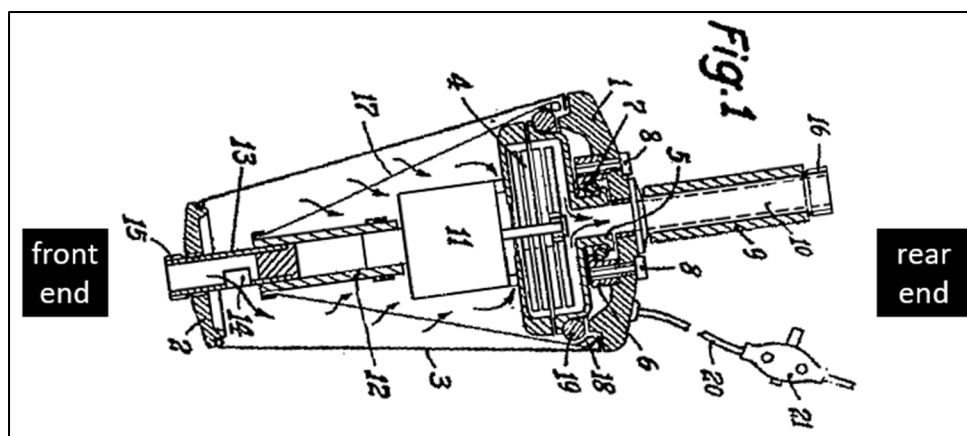
246. Peter explains that “**extension rod 33** [] has a **connection sleeve 34** at one end,” i.e., the rigid wand outlet end, that connects to “connecting thread 15 of the **air intake nozzle 13**.” Ex1007, 2. Peter further explains that, when desired, “[t]he extension rod 33 can be omitted,” as shown in Peter Figure 3 below:



Ex1007, 3, Fig. 3.

247. In my opinion, a POSA would understand that Peter’s hand vacuum cleaner is thus removably mounted to “extension rod 33’s” outlet end.

248. In my opinion, Peter’s hand vacuum cleaner has a front end and a rear end, as shown in the annotated image below:



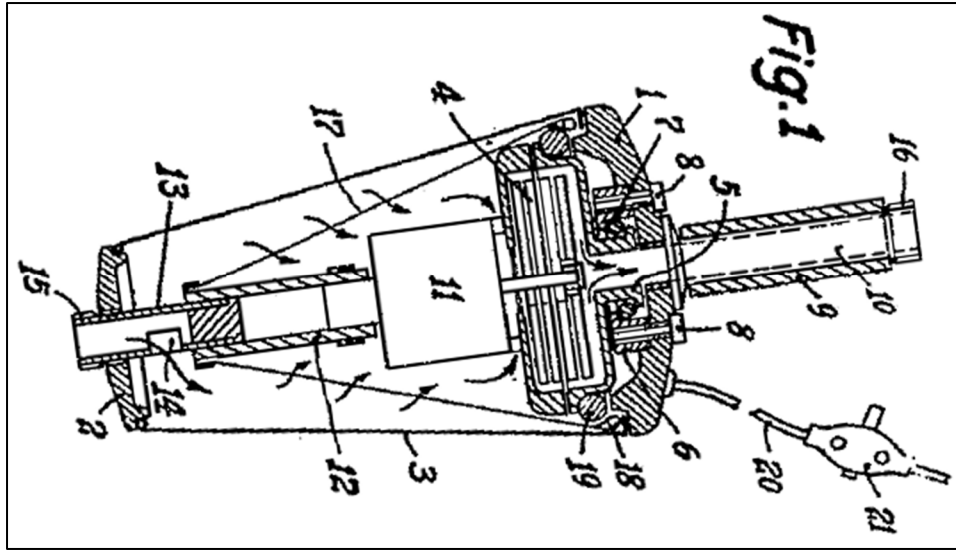
Ex1007, Fig. 1.

g. [1c.i]/[9c.i]

Reference Number	Claim Limitation
[1c.i]	“(i) a main body comprising a handle and a suction motor and fan assembly, the suction motor and fan assembly having a suction motor axis of rotation, the handle having a hand grip portion;”
[9c.i]	“(i) a main body comprising a handle and a suction motor and fan assembly, the suction motor and fan assembly having a suction motor axis of rotation, the handle having a hand grip portion;”

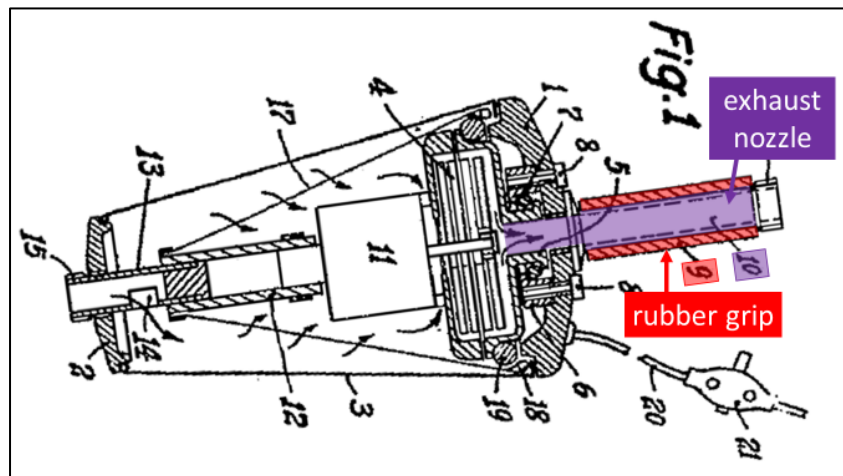
249. Peter teaches the hand vacuum cleaner comprising a main body comprising a handle and a suction motor and fan assembly, the suction motor and fan assembly having a suction motor axis of rotation, the handle having a hand grip portion. (Limitations [1c.1]/[9c.1]).

250. In my opinion, Peter’s hand vacuum cleaner has a main body, as shown in Figure 1 below:



Ex1007, Fig. 1.

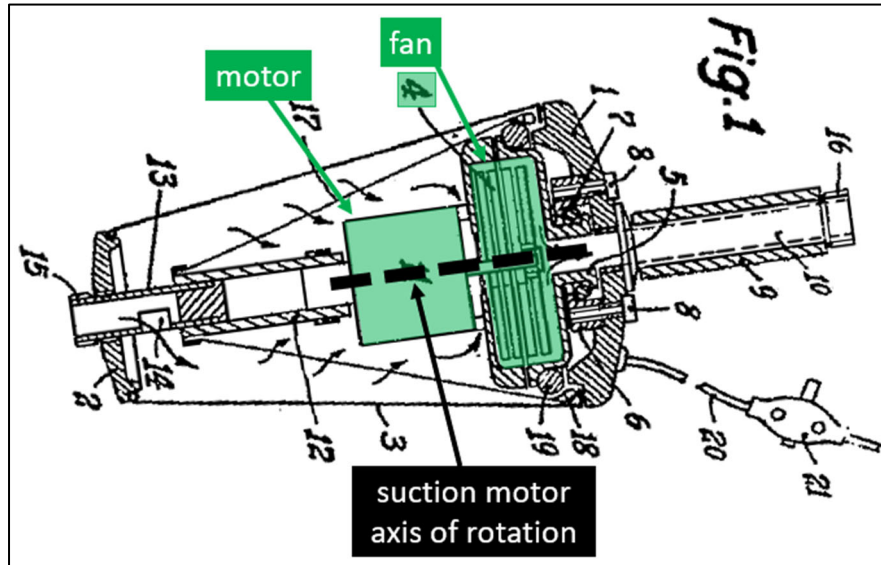
251. In my opinion, Peter's main body comprises a handle having a hand grip portion: "**exhaust nozzle 10**," which is covered by "**rubber grip 9**," as shown in the annotated image below:



Ex1007, 2, Fig. 1.

252. In my opinion, a POSA would understand that Peter's "**exhaust nozzle 10**" is a handle, and Peter's "**rubber grip 9**" is a hand grip portion.

253. In my opinion, Peter’s main body further comprises a suction motor and fan assembly. Peter’s body comprises a “fan” and a “motor 11,” which, in my opinion, a POSA would understand includes a suction motor axis of rotation, as shown in the annotated image below:



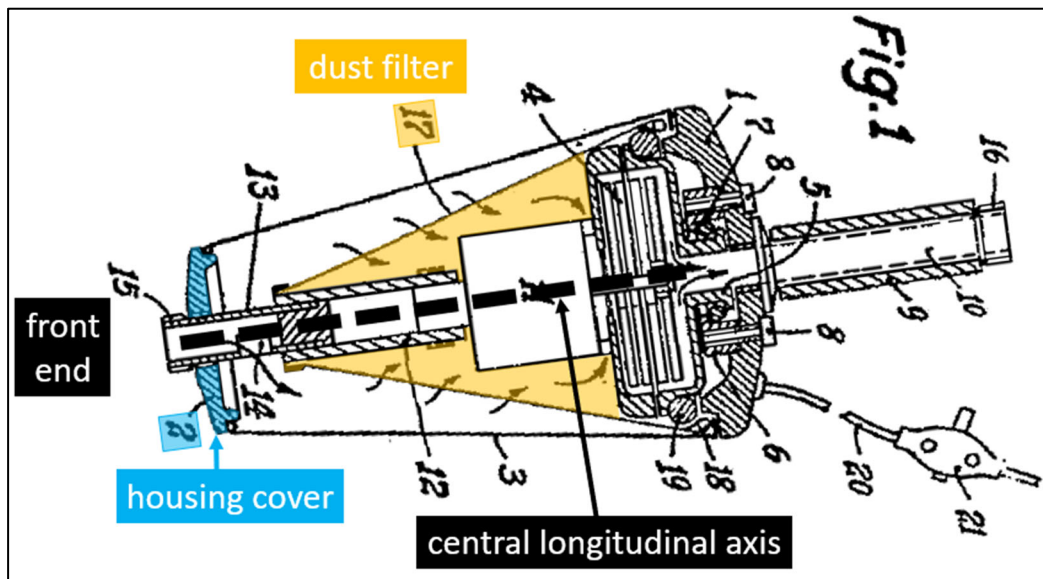
Ex1007, 2, Fig. 1.

254. In my opinion, a POSA would understand that the suction motor axis of rotation is the axis through the center of Peter’s “fan” and “motor 11,” around which Peter’s “fan” rotates.

h. [1c.ii]/[9c.ii]

Reference Number	Claim Limitation
[1c.ii]	“(ii) an air treatment member provided at the front end of the hand vacuum cleaner, the air treatment member having a central longitudinal axis and an air treatment chamber having a front wall;”
[9c.ii]	“(ii) an air treatment member provided at the front end of the hand vacuum cleaner, the air treatment member having a central longitudinal axis;”

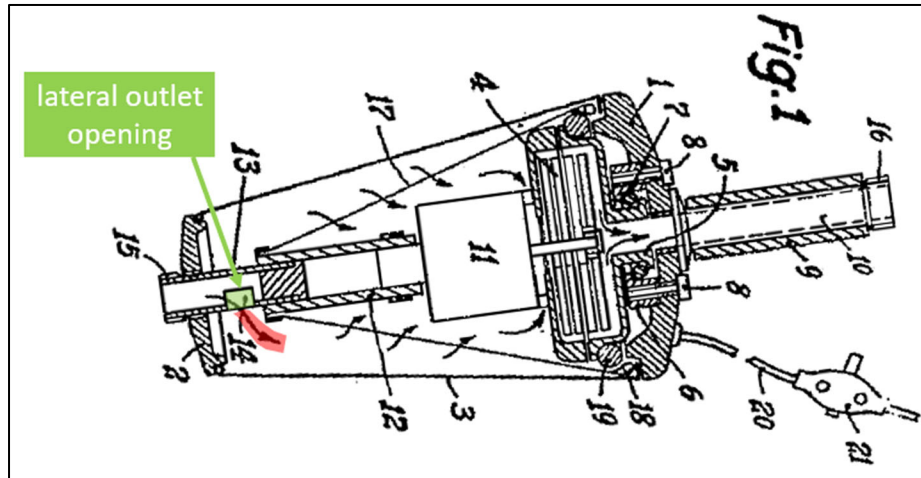
255. Peter teaches an air treatment member provided at the front end of the hand vacuum cleaner, the air treatment member having a central longitudinal axis and an air treatment chamber having a front wall. (Limitation [1c.ii]).
256. Further, in my opinion, Peter teaches an air treatment member provided at the front end of the hand vacuum cleaner, the air treatment member having a central longitudinal axis. (Limitation [9c.ii]).
257. In my opinion, Peter teaches an air treatment member provided at the front end of the hand vacuum cleaner, “dust filter [17],” with a central longitudinal axis as shown in the annotated image below:



Ex1007, 2, Fig. 1.

258. Additionally, Peter’s vacuum has an “air intake nozzle 13” with a “lateral outlet opening 14” at the front end that, in my opinion, a POSA would

understand creates cyclonic airflow within the conical “housing”:



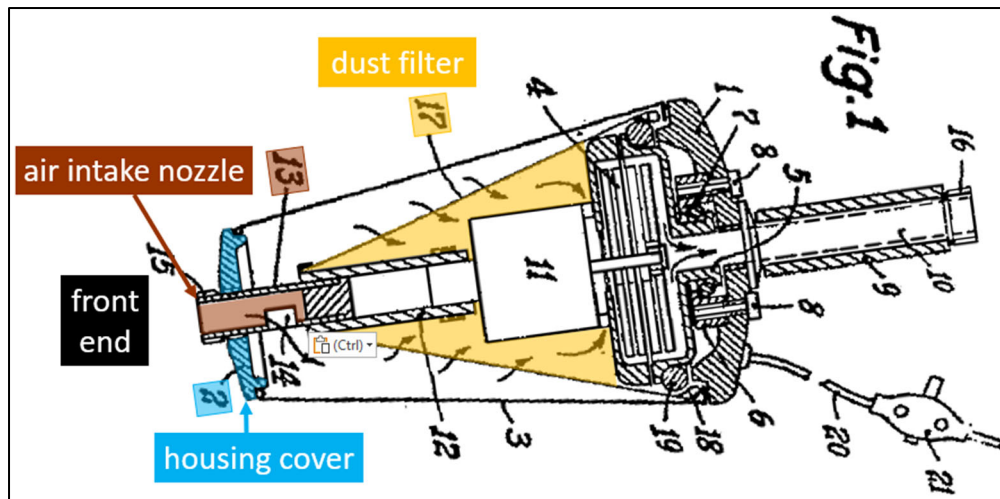
Ex1007, 2, Fig. 1.

259. In my opinion, a POSA would understand that this cyclonic airflow is also an air treatment member provided at the front end because it treats air by separating dust from the air using cyclonic airflow.
260. In my opinion, Peter’s “**dust filter [17]**” is located in an air treatment chamber, which includes “casing 3” and a front wall: “**housing cover 2**,” as shown above. Further, in my opinion, a POSA would understand that Peter’s “**dust filter [17]**” is an air treatment member at least because it treats the air by filtering dust.

i. [1c.iii]/[9c.iii]

Reference Number	Claim Limitation
[1c.iii]	“(iii) a hand vacuum cleaner air inlet centrally positioned with respect to the air treatment chamber front wall and releasably connectable with the air outlet of the rigid wand; and,”
[9c.iii]	“(iii) a hand vacuum cleaner air inlet provided on the front end of the air treatment member and releasably connectable with the air outlet of the rigid wand, the hand vacuum cleaner air inlet having an inlet axis that is coaxial with the central longitudinal axis; and,”

261. Peter teaches a hand vacuum cleaner air inlet centrally positioned with respect to the air treatment chamber front wall and releasably connectable with the air outlet of the rigid wand. (Limitation [1c.iii]).
262. In my opinion, Peter teaches a hand vacuum cleaner air inlet provided on the front end of the air treatment member and releasably connectable with the air outlet of the rigid wand, the hand vacuum cleaner air inlet having an inlet axis that is coaxial with the central longitudinal axis. (Limitation [9c.iii]).
263. In my opinion, Peter teaches a hand vacuum cleaner air inlet. In Peter, air enters the cleaner via “**air intake nozzle 13** ... which passes through the **housing cover 2**,” as shown in the annotated image below:



Ex1007, 2, Fig. 1.

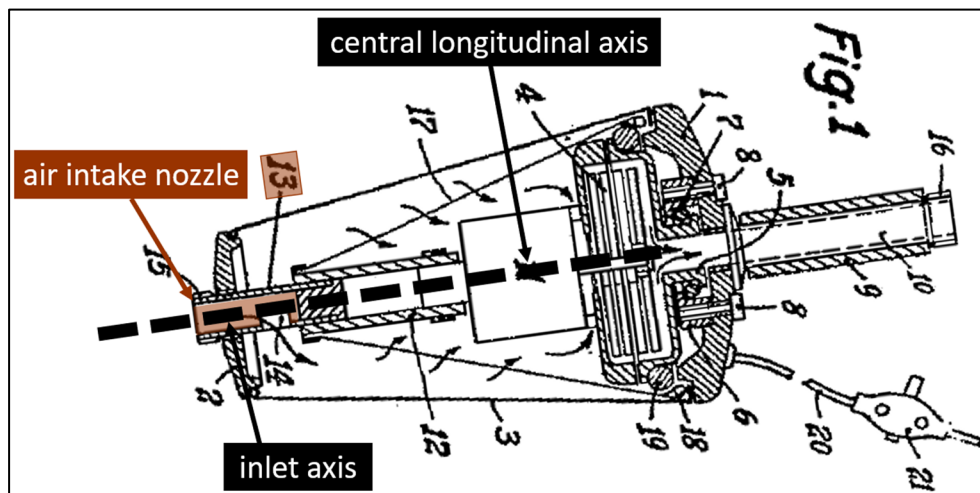
264. In my opinion, a POSA would understand that Peter’s “**air intake nozzle 13**” is a hand vacuum cleaner air inlet.

265. Regarding Limitation [1c.iii], in my opinion, Peter teaches that its hand vacuum cleaner air inlet is centrally positioned with respect to the air treatment chamber front wall. As shown above, in my opinion, Peter’s “**air intake nozzle 13**” is centrally positioned (radially and top-to-bottom) with respect to Peter’s “**housing cover 2**” (which, in my opinion, is the air treatment chamber front wall).

266. Regarding Limitation [9c.iii], in my opinion, Peter teaches that the hand vacuum cleaner air inlet is provided on the front end of the air treatment member. As shown above, in my opinion, Peter’s “**air intake nozzle 13**” is provided on the front end of Peter’s air treatment member, because it is provided on Peter’s air treatment chamber front wall (which, in my

opinion, is Peter's "**housing cover 2**") and because it is provided at the upstream end of Peter's air treatment member.

267. For the reasons I explained for Limitations [1c]/[9c], in my opinion, Peter teaches that the hand vacuum cleaner air inlet is releasably connectable with the air outlet of the rigid wand. *See* Ground 3, Limitations [1c]/[9c].
268. Regarding Limitation [9c.iii], in my opinion, Peter teaches that the hand vacuum cleaner air inlet has an inlet axis that is coaxial with the central longitudinal axis. In my opinion, a POSA would understand that Peter's "**air intake nozzle 13**" has an inlet axis, and that it is coaxial with Peter's central longitudinal axis, as shown in the annotated image below:



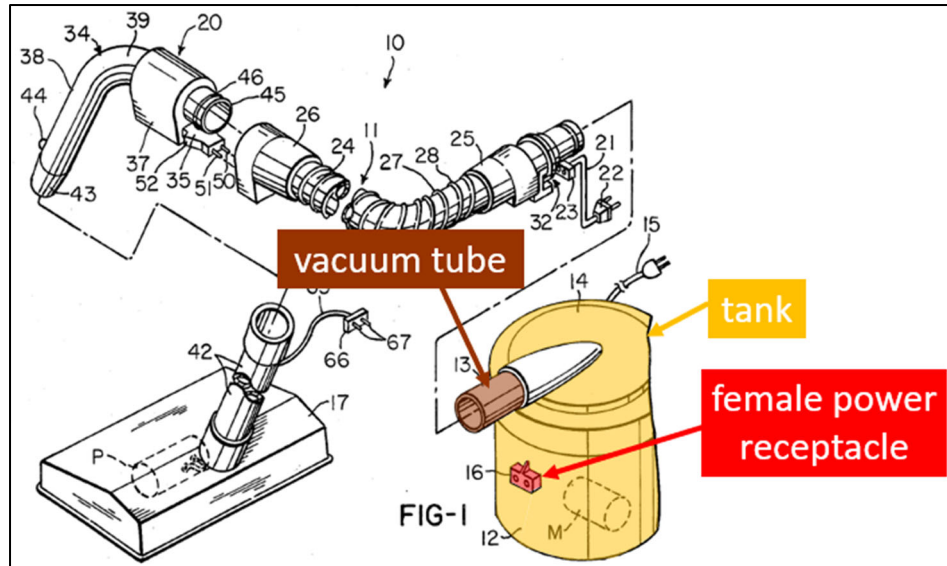
Ex1007, Fig. 1.

j. [1c.iv]/[9c.iv]

Reference Number	Claim Limitation
[1c.iv]	“(iv) a hand vacuum cleaner electrical connector provided on the front end of the air treatment member adjacent the hand vacuum cleaner air inlet, the hand vacuum cleaner electrical connector is releasably connectable with the outlet end electrical connector,”
[9c.iv]	“(iv) a hand vacuum cleaner electrical connector provided on the front end of the air treatment member adjacent the hand vacuum cleaner air inlet, the hand vacuum cleaner electrical connector is releasably connectable with the outlet end electrical connector,”

269. Peter in combination with Neroni teaches a hand vacuum cleaner electrical connector provided on the front end of the air treatment member adjacent the hand vacuum cleaner air inlet, the hand vacuum cleaner electrical connector is releasably connectable with the outlet end electrical connector. (Limitations [1c.iv]/[9c.iv]).

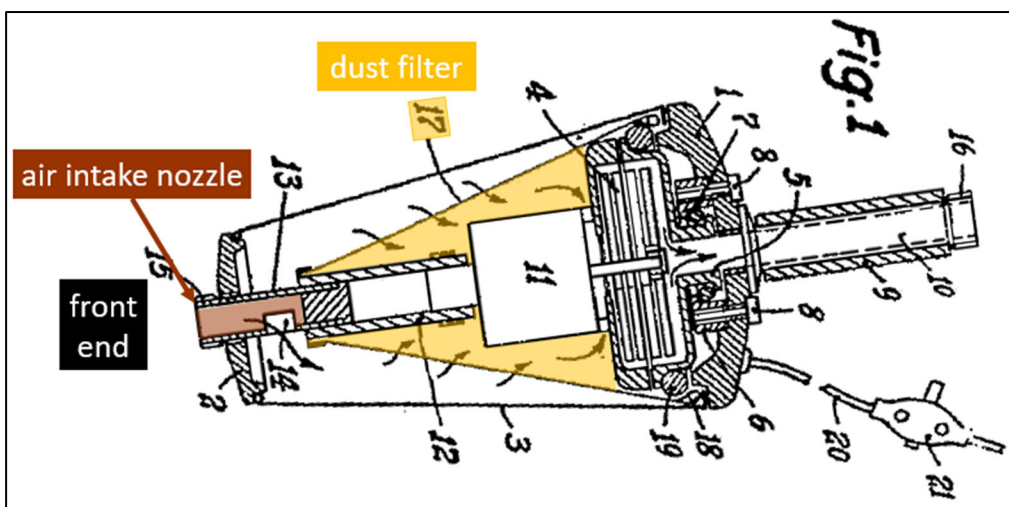
270. In my opinion, Neroni teaches an electrical connector provided on the front end of a separation unit, adjacent the air inlet. Neroni’s vacuum has a “**female power receptacle 16** disposed on the outside surface of its **tank 12**,” adjacent “**vacuum tube 13**,” as shown in the annotated image below:



Ex1008, 1:22-24, 3:34-49; *see also* Ground 3, Limitations [1b.3]/[9b.3].

271. Neroni explains that “[t]he **receptacle 16** is used to supply electrical power through the hose assembly 11 into the adapter 20, and then to motor P of the power cleaning tool 17.” Ex1008, 3:36-42. In my opinion, a POSA would have understood that Neroni’s “power receptacle 16” is an electrical connector, and that it is disposed on the front end of the separation unit, adjacent “vacuum tube 13” (which, in my opinion, is the air inlet).

272. In my opinion, like Neroni, Peter’s “**air intake nozzle 13**” is at the front of the air treatment member, as shown in the annotated image below:



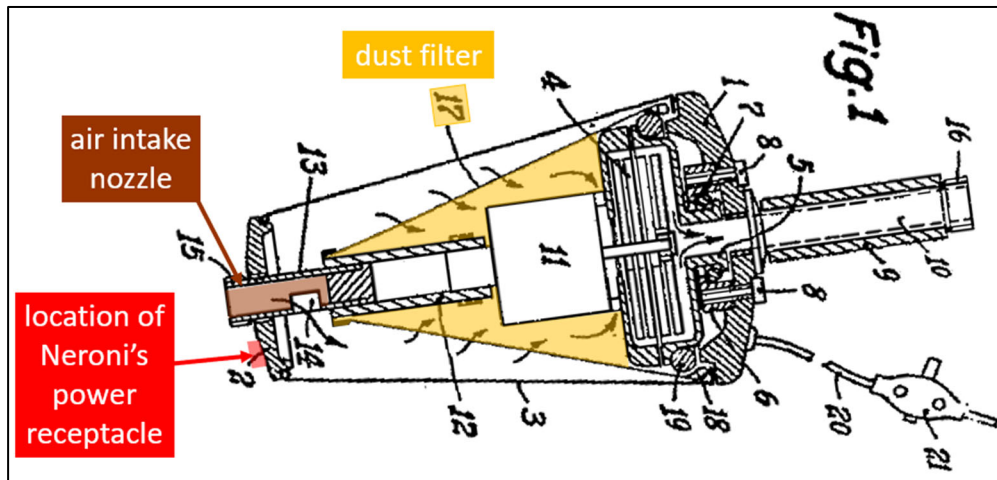
Ex1007, 1, Fig. 1; *see also* Ground 3, Limitations [1c.iii]/[9c.iii].

273. In my opinion, a POSA would have been motivated to implement Neroni's "power receptacle 16" on the front end of Peter's air treatment member adjacent the hand vacuum cleaner air inlet, and would have reasonably expected success.

274. This location one of a finite number of identified locations for the connector, and it would have been the most suitable location to connect a powered attachment to Neroni's "cord assembly 21A," because that is immediately adjacent to where the powered attachment (and rigid airflow conduit connecting the powered attachment to the vacuum cleaner) connects to Peter's cleaner. *See* Ground 3, Limitations [1b.3]/[9b.3].

275. In my opinion, in the combined teachings of Peter and Neroni, a hand vacuum cleaner electrical connector is provided on the front end of the air treatment member, adjacent the hand vacuum cleaner air inlet, as shown in

the annotated image below:



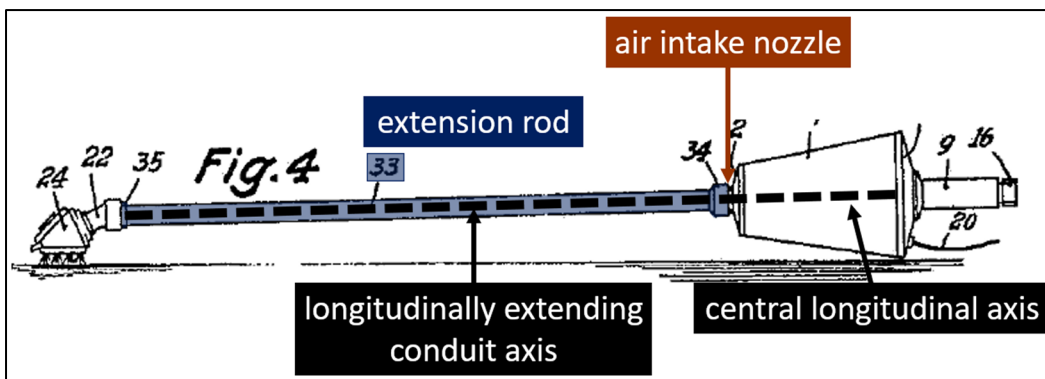
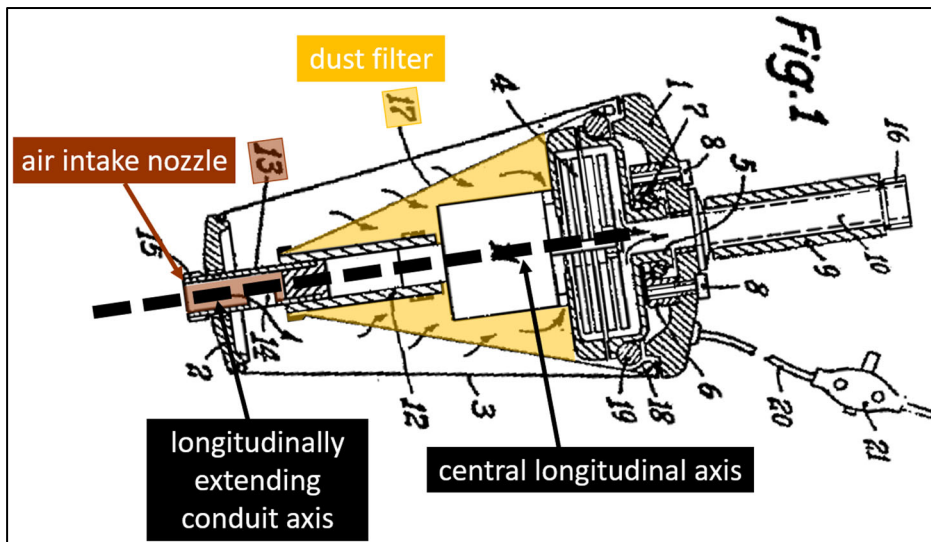
Ex1007, Fig. 1.

276. Further, in my opinion, a POSA would understand that in the combined teachings of Peter and Neroni, the hand vacuum cleaner electrical connector is releasably connectable with the rigid wand outlet end electrical connector to provide electrical circuitry to Peter's powered attachment, because Peter teaches a releasably engageable extension rod, as I explained for Limitations [1c]/[9c]. See Ground 3, Limitations [1c]/[9c]; *see also* Ground 3, Limitations [1b.3]/[9b.3].

k. [1c.iv.1]/[9c.iv.1]

Reference Number	Claim Limitation
[1c.iv.1]	“wherein, when the hand vacuum cleaner is mounted to the rigid wand outlet end, the longitudinally extending conduit axis extends in a same direction as the central longitudinal axis”
[9c.iv.1]	“wherein, when the hand vacuum cleaner is mounted to the rigid wand outlet end, the longitudinally extending conduit axis extends in a same direction as the central longitudinal axis of the air treatment member, and”

277. Peter teaches wherein, when the hand vacuum cleaner is mounted to the rigid wand outlet end, the longitudinally extending conduit axis extends in a same direction as the central longitudinal axis. (Limitation [1c.iv.1]).
278. Peter teaches wherein, when the hand vacuum cleaner is mounted to the rigid wand outlet end, the longitudinally extending conduit axis extends in a same direction as the central longitudinal axis of the air treatment member. (Limitation [9c.iv.1]).
279. In my opinion, Peter teaches that, when the hand vacuum cleaner is mounted to the rigid wand outlet end, the longitudinally extending conduit axis extends in a same direction as the central longitudinal axis. In my opinion, Peter’s longitudinally extending conduit axis and central longitudinal axis extend in the same direction when Peter’s “**extension rod 33**” is connected to Peter’s “**air intake nozzle 13**,” as shown in the annotated images below:



Ex1007, Figs. 1, 4.

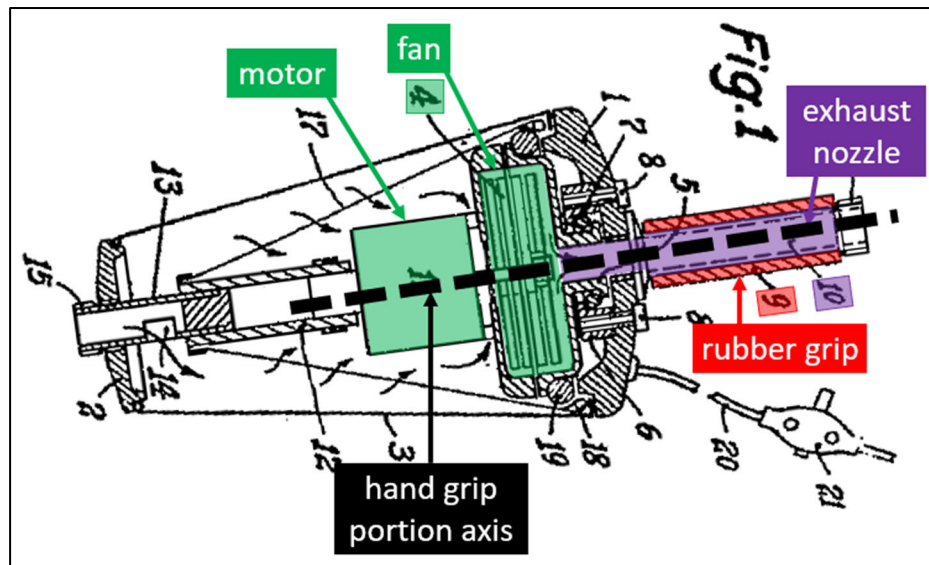
280. Regarding Limitation [9c.iv.1], in my opinion, a POSA would understand that Peter’s air treatment member central longitudinal axis is a central longitudinal axis of the air treatment member.

I. [1c.iv.2]/[9c.iv.2]

Reference Number	Claim Limitation
[1c.iv.2]	“wherein the hand grip portion has a hand grip portion axis that intersects the suction motor.”
[9c.iv.2]	“wherein the hand grip portion has a hand grip portion axis that intersects the suction motor.”

281. Peter teaches wherein the hand grip portion has a hand grip portion axis that intersects the suction motor. (Limitations [1c.iv.2]/[9c.iv.2]).

282. As I explained, in my opinion, Peter teaches a handle with a hand grip portion. *See* Ground 3, Limitations [1c.i]/[9c.i]. Further, Peter's hand grip portion has what, in my opinion, a POSA would understand is a hand grip portion axis that intersects Peter's suction motor, as shown in the annotated image below:



Ex1007, 2, Fig. 1.

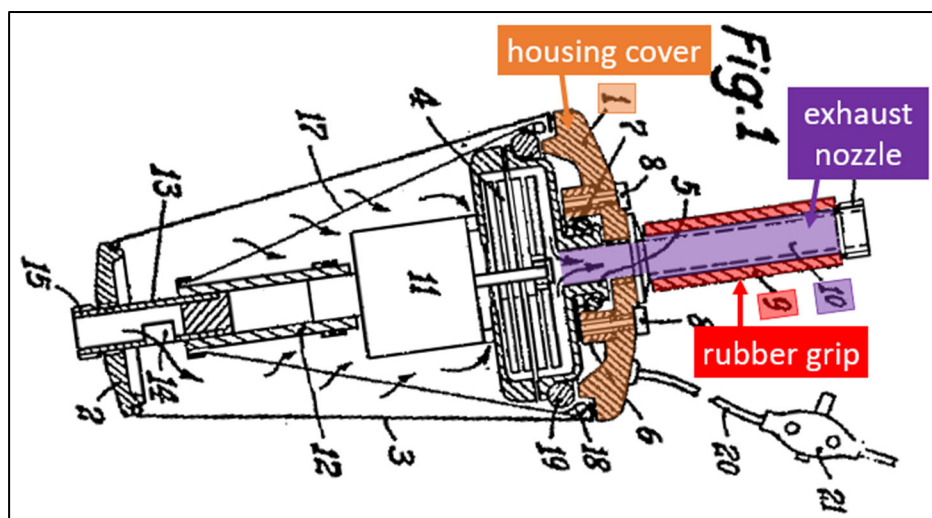
3. The Combined Teachings of Peter and Neroni Render Obvious Claims 2 and 10

Reference Number	Claim Limitation
[2]	“The surface cleaning apparatus of claim 1 wherein the hand grip portion extends linearly outwardly from a sidewall of the main body.”
[10]	“The surface cleaning apparatus of claim 9 wherein the hand grip portion extends linearly outwardly from a sidewall of the main body.”

283. As explained above in Section X.C, Peter in combination with Neroni renders obvious claim 1.

284. Peter in combination with Neroni renders obvious wherein the hand grip portion extends linearly outwardly from a sidewall of the main body (Claims 2 and 10).

285. In my opinion, Peter’s handle with a hand grip portion extends linearly outwardly from a sidewall of the main body: Peter’s “**exhaust nozzle 10**” with “**rubber grip 9**” is “inserted into the **housing cover 1**,” as shown in the annotated image below:

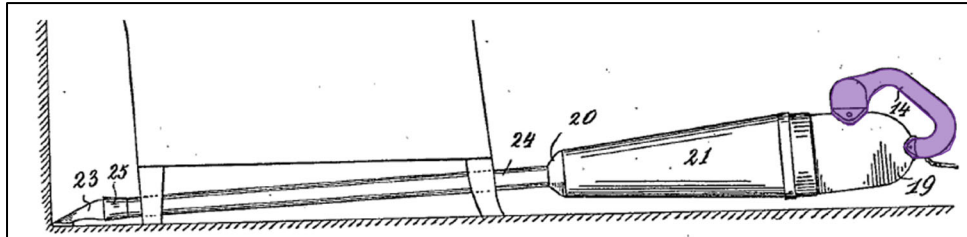
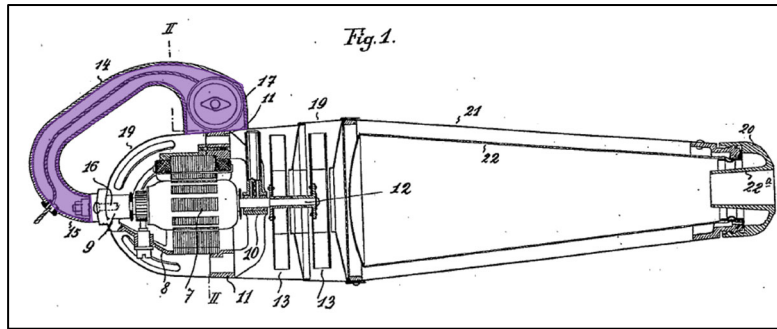


Ex1007, 2, Fig. 1.

286. In my opinion, a POSA would understand that “**housing cover 1**” is a sidewall of the main body from which “**rubber grip 9**” extends.

287. Alternatively, in my opinion, a POSA would have been motivated to modify Peter’s handle and hand grip portion by relocating it, extending it, (or by placing a second handle) on the top side of Peter’s main body. In my opinion this would further Peter’s purpose of providing “easy” and “effortless[]” cleaning “under tables, chairs,” and “[p]articularly hard-to-reach areas,” because a user would not need to bend down as far, and would be especially beneficial for users with less flexibility or mobility. Ex1007, 2.

288. Further, **handles** with hand grip portions extending from the top of the vacuum main body have existed for over a century, as shown in the annotated images below:



Ex1010, Figs. 1, 6.

289. In my opinion, modifying Peter's handle and hand grip portion would have involved adding or substituting one known feature (a handle with a hand grip portion extending from the top of the housing and into the back) for another to achieve the predictable result of ergonomic handling. Because there were only a finite number of possible handle positions, in my opinion, it would have at least been obvious to try. Further, in my opinion, a POSA would have a reasonable expectation of success implementing such a handle because it would involve a straightforward addition of a handle or a simple substitution of one handle for another, and as shown above, provides the benefit of ergonomic cleaning in low areas, such as below furniture.

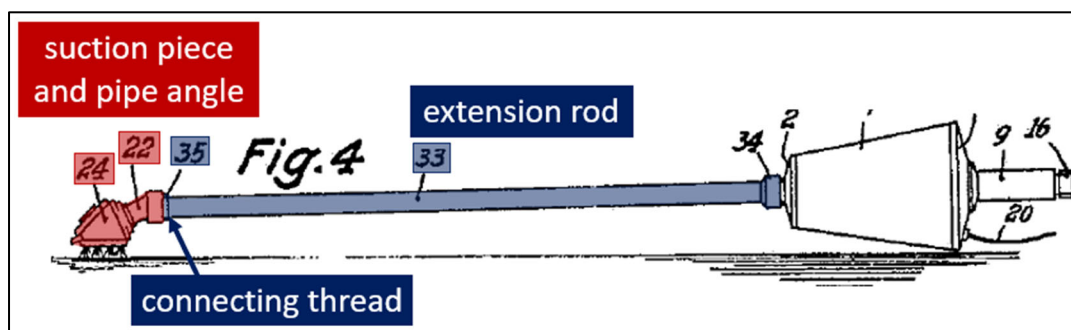
4. The Combined Teachings of Peter and Neroni Render Obvious Claim 3

Reference Number	Claim Limitation
[3]	“The surface cleaning apparatus of claim 1 wherein the rigid air flow conduit is removably mounted to the surface cleaning head.”

290. As explained above in Section X.C, Peter in combination with Neroni renders obvious claim 1.

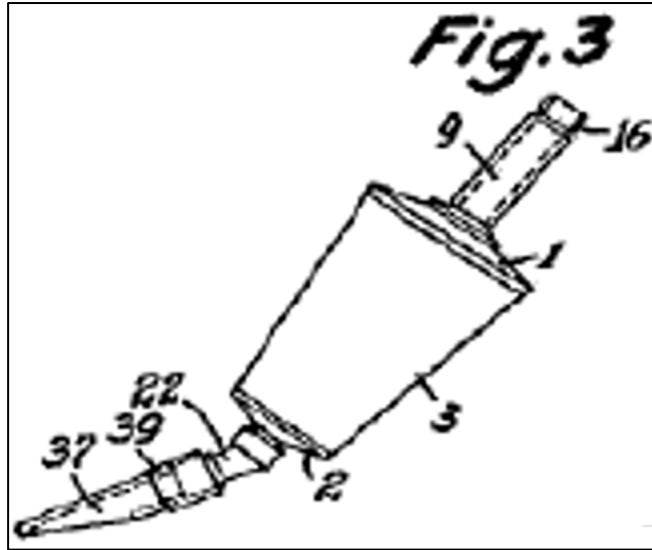
291. Peter in combination with Neroni renders obvious the surface cleaning apparatus of claim 1 and teaches wherein the rigid air flow conduit is removably mounted to the surface cleaning head. (Claim 3).

292. In my opinion, Peter teaches that the rigid air flow conduit is removably mounted to the surface cleaning head: Peter’s “**extension rod 33**” has a “**connecting thread 35**” that connects to “**pipe angle 22** ... connection sleeve 23,” as shown in the annotated image below:



Ex1007, 2, Fig. 4.

293. Peter explains that, when desired, “[t]he extension rod 33 can be omitted,” as shown in Peter Figure 3 below:



Ex1007, 3, Fig. 3.

294. In my opinion, a POSA would understand that Peter’s “**extension rod 33**” is removably mounted to the surface cleaning head.

5. The Combined Teachings of Peter and Neroni Render Obvious Claims 4 and 11

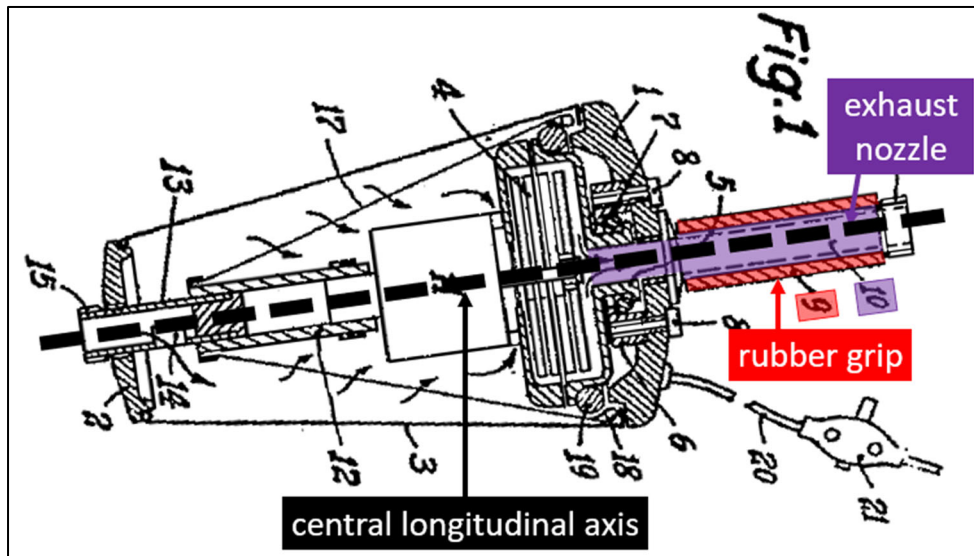
Reference Number	Claim Limitation
[4]	“The surface cleaning apparatus of claim 1 wherein the central longitudinal axis intersects that hand grip portion.”
[11]	“The surface cleaning apparatus of claim 9 wherein the central longitudinal axis intersects that hand grip portion.”

295. As explained above in Section X.C, Peter in combination with Neroni renders obvious claims 1 and 9.

296. Peter in combination with Neroni renders obvious wherein the central longitudinal axis intersects that hand grip portion (Claims 4 and 11).

297. In my opinion, Peter teaches the central longitudinal axis intersects the

hand grip portion, as shown in the annotated image below:



Ex1007, Fig. 1.

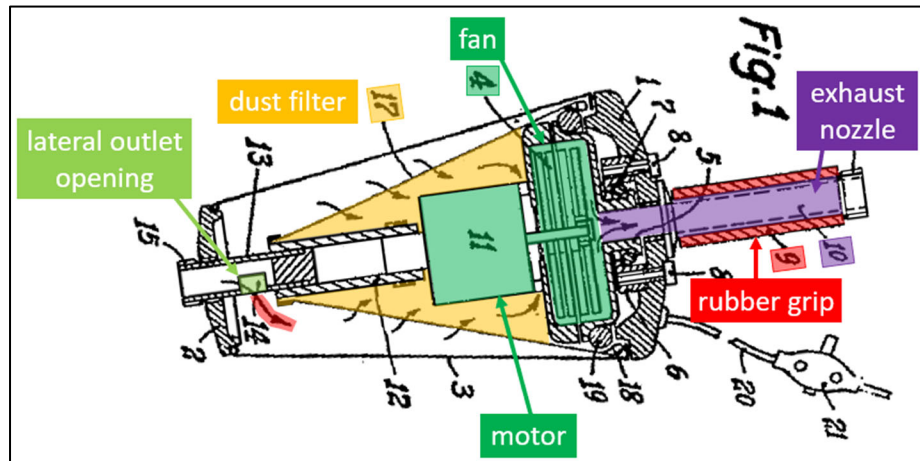
6. The Combined Teachings of Peter and Neroni Render Obvious Claims 5 and 12

Reference Number	Claim Limitation
[5]	"The surface cleaning apparatus of claim 1 wherein the suction motor and the handle are positioned rearward of the air treatment member."
[12]	"The surface cleaning apparatus of claim 9 wherein the suction motor and the handle are positioned rearward of the air treatment member."

298. As explained above in Section X.C, Peter in combination with Neroni renders obvious claims 1 and 9.

299. Peter in combination with Neroni renders obvious wherein the suction motor and the handle are positioned rearward of the air treatment member (Claims 5 and 12).

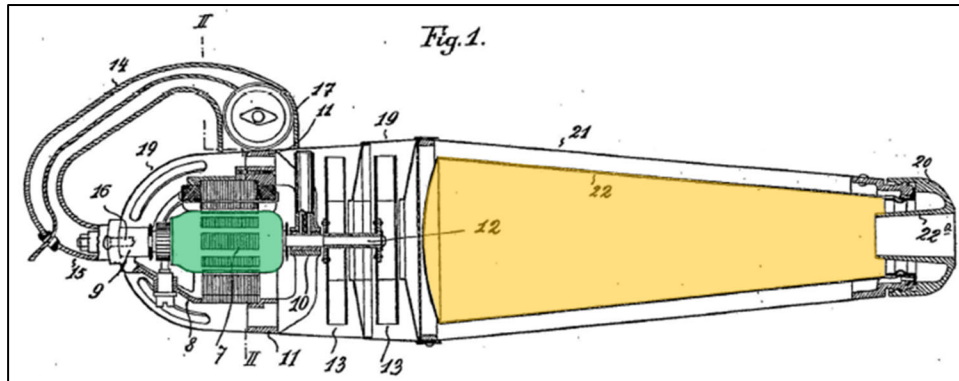
300. In my opinion, a POSA would understand that Peter’s “**motor 11**” with a “**fan,**” and “**exhaust nozzle 10**” with a “**rubber grip 9**” are positioned rearward of “**dust filter [17]**” and the cyclonic airflow created by “**lateral outlet opening 14,**” as shown in the annotated image below:



Ex1007, Fig. 1.

301. Alternatively, in my opinion, a POSA would have been motivated to modify Peter’s suction motor by relocating it further rearward of Peter’s air treatment member. In my opinion, this would further Peter’s purpose of providing “easy” and “effortless[.]” cleaning and would reduce user wrist strain because the vacuum’s center of gravity would be moved closer to Peter’s handle. Ex1007, 2.

302. Further, hand vacuum cleaners with the **suction motor** positioned rearward of the **air treatment member** have existed for over a century, as shown in the annotated image below:



Ex1010, Fig. 1.

303. In my opinion, modifying Peter's suction motor would have involved moving it from one known location to another to achieve the predictable result of ergonomic handling. Further, in my opinion, because there were only a finite number of possible suction motor locations, it would have at least been obvious to try.

304. In my opinion, a POSA would have a reasonable expectation of success modifying Peter's motor because it would involve the simple relocation of the motor to a further rearward position.

305. When so modified, in my opinion, Peter renders obvious the suction motor and the handle are positioned rearward of the air treatment member.

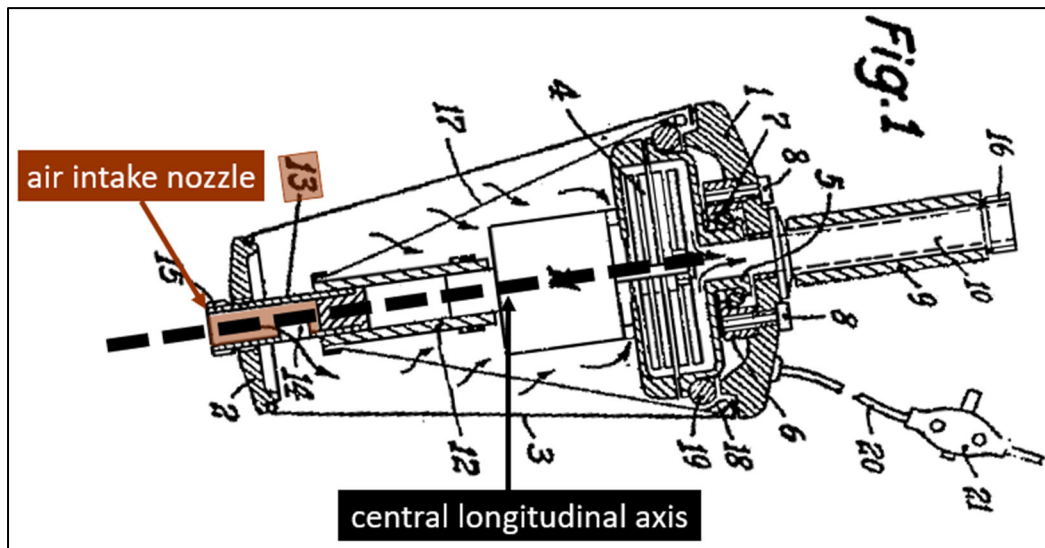
7. The Combined Teachings of Peter and Neroni Render Obvious Claim 6

Reference Number	Claim Limitation
[6]	"The surface cleaning apparatus of claim 1 wherein the central longitudinal axis extends through the hand vacuum cleaner air inlet."

306. As explained above in Section X.C, Peter in combination with Neroni renders obvious claim 1.

307. Peter in combination with Neroni renders obvious wherein the central longitudinal axis extends through the hand vacuum cleaner air inlet.

308. In my opinion, Peter teaches the central longitudinal axis extends through the hand vacuum cleaner air inlet, as shown in the annotated image below:



Ex1007, Fig. 1.

8. The Combined Teachings of Peter and Neroni Render Obvious Claim 7

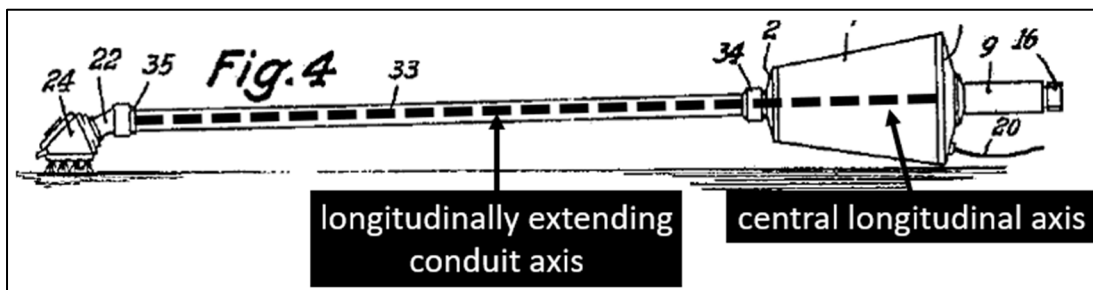
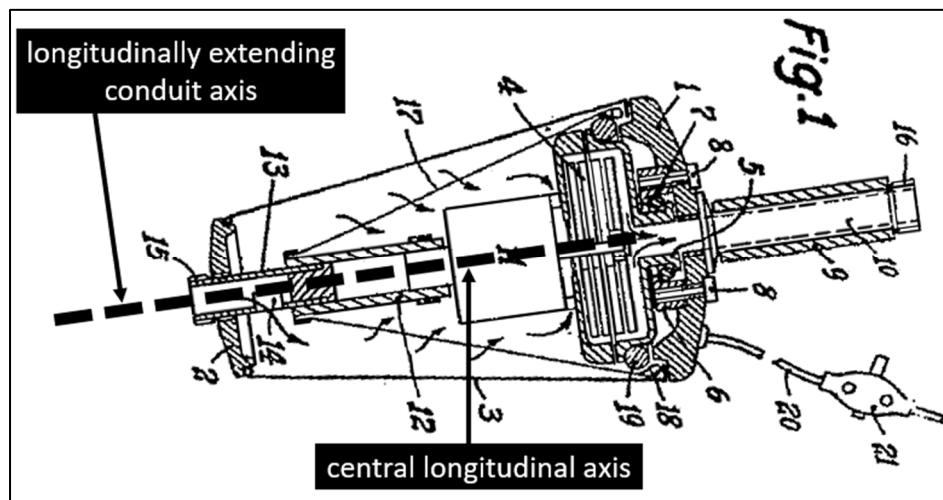
Reference Number	Claim Limitation
[7]	"The surface cleaning apparatus of claim 1 wherein, when the hand vacuum cleaner is mounted to the rigid wand outlet end, the longitudinally extending conduit axis extends in the same direction as the central longitudinal axis of the air treatment member."

309. As explained above in Section X.C, Peter in combination with Neroni

renders obvious claim 1.

310. Peter in combination with Neroni renders obvious wherein, when the hand vacuum cleaner is mounted to the rigid wand outlet end, the longitudinally extending conduit axis extends in the same direction as the central longitudinal axis of the air treatment member.

311. In my opinion, Peter teaches that, when the hand vacuum cleaner is mounted to the rigid wand outlet end, the longitudinally extending conduit axis extends in the same direction as the central longitudinal axis of the air treatment member, as shown in the annotated images below:

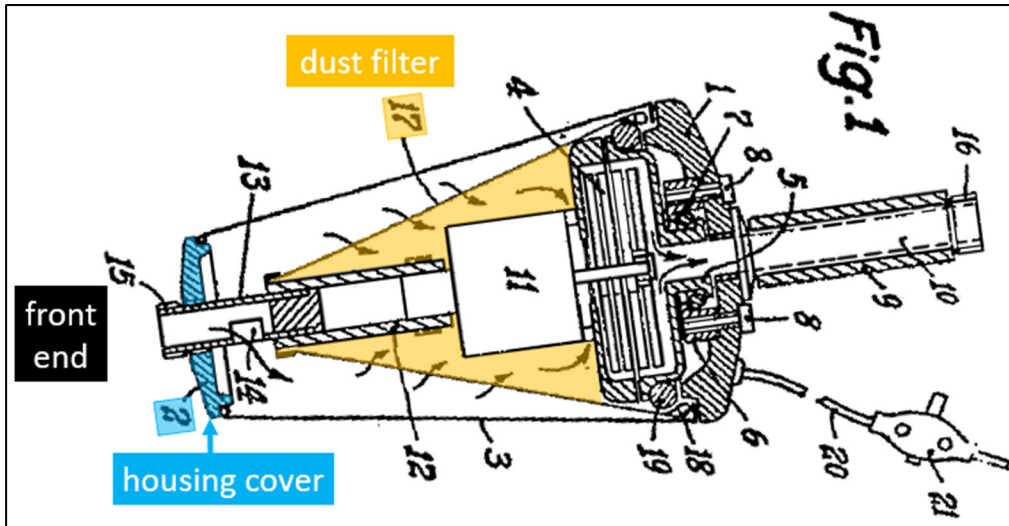


Ex1007, Figs. 1, 4.

9. The Combined Teachings of Peter and Neroni Render Obvious Claims 8 and 13

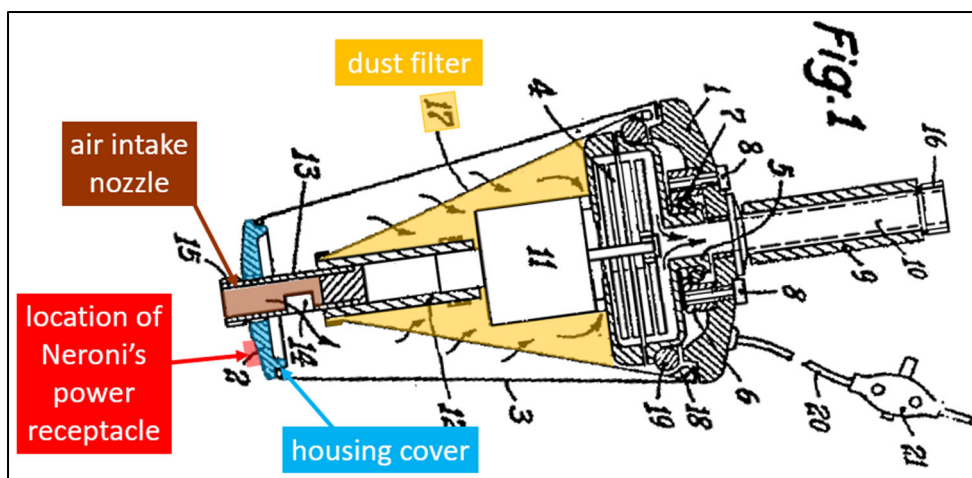
Reference Number	Claim Limitation
[8]	“The surface cleaning apparatus of claim 1 wherein the air treatment member has a front face and the hand vacuum cleaner electrical connector is positioned forward of the front face.”
[13]	“The surface cleaning apparatus of claim 9 wherein the air treatment member has a front face and the hand vacuum cleaner electrical connector is positioned forward of the front face.”

312. As explained above in Section X.C, Peter in combination with Neroni renders obvious claims 1 and 9.
313. Peter in combination with Neroni renders obvious the surface cleaning apparatus of claim 1 and teaches wherein the air treatment member has a front face and the hand vacuum cleaner electrical connector is positioned forward of the front face. (Claims 8 and 13).
314. In my opinion, Peter teaches that the air treatment member has a front face. As I explained for Limitation [1c.ii], Peter’s “**dust filter [17]**” positioned within “casing 3” has a “**housing cover 2**,” which, in my opinion, a POSA would understand is a front wall of the air treatment chamber, as shown in the annotated image below:



Ex1007, 2, Fig. 1.

315. In my opinion, a POSA would further understand that the front face of Peter’s air treatment chamber front wall is the air treatment member front face, at least because it is the frontmost, most upstream surface of Peter’s “casing 3” comprising a “**dust filter [17]**.”
316. As I explained for Limitations [1c.iv]/[9c.iv], in my opinion, Peter in combination with Neroni renders obvious a hand vacuum cleaner electrical connector provided on the front end of the air treatment member. *See* Ground 3, Limitations [1c.iv]/[9c.iv]. For the same reasons, in my opinion, a POSA would understand that in the combined teachings of Peter and Neroni, the hand vacuum cleaner electrical connector is positioned forward of the front face, as shown in the annotated image below:



Ex1007, Fig. 1.

317. In my opinion, a POSA would have been motivated to integrate Neroni's electrical connector teachings into Peter and would have had a reasonable expectation of success. *See* Ground 3, §1. For these reasons, in my opinion, the combined teachings meet these limitations.

D. Ground 4: Peter In Combination With Neroni and Lehmann Renders Claims 1-13 Obvious

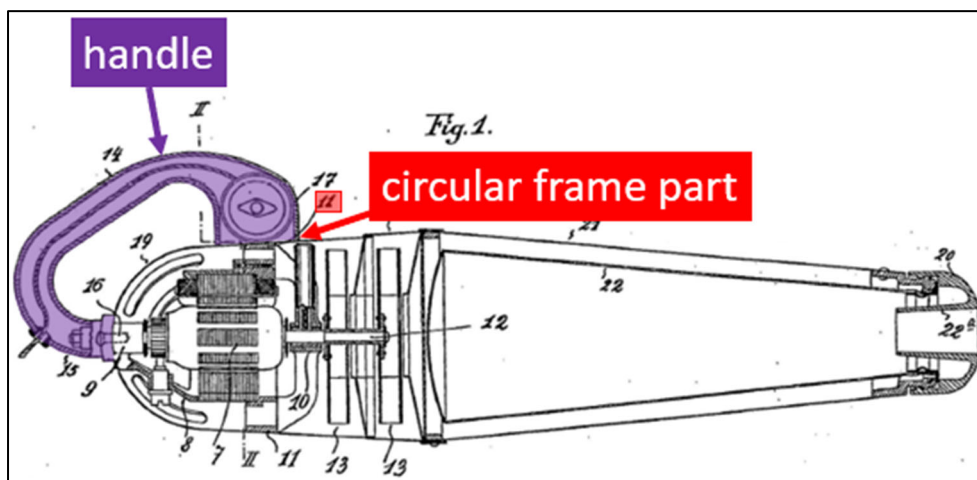
1. In My Opinion, Lehmann Teaches A Handle That Extends Linearly Outwardly From A Sidewall Of The Main Body That A POSA Would Have Been Motivated to Incorporate Into Peter (Claims 2 and 10)

318. Peter in combination with Neroni renders claims 1 and 9 obvious. *See* Ground 3, Claims 1/9. In my opinion, Peter in combination with Lehmann teaches the remaining limitations of these claims.

319. While, in my opinion, Peter teaches a handle with a hand grip portion, "rubber grip 9," that extends linearly outwardly from a sidewall of Peter's

main body, it also would have been obvious, in my opinion, to incorporate Lehmann's linearly extending handle teachings into Peter. See Ground 3, Claims 2/10.

320. Lehmann teaches a portable vacuum cleaner from 1922 with an “**arched handle 14**” that has an “end [17]” that “abuts radially against the **circular frame part 11**” of the vacuum cleaner main body, as shown in the annotated image below:



Ex1010, 1:71-78, Fig. 1.

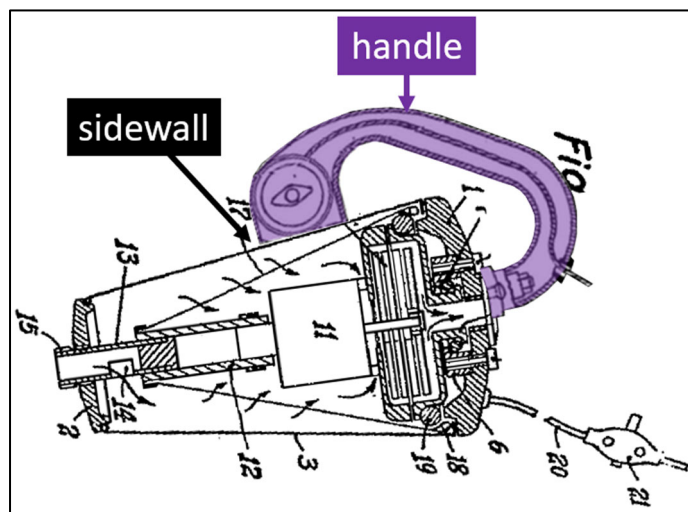
321. In my opinion, a POSA would have been motivated to modify Peter's handle having a hand grip portion, “exhaust nozzle 10” having “rubber grip 9,” to have an “arched” shape as Lehmann teaches. Ex1007, 2, Figs. 1-4; Ex1010, 1:71-78, Figs. 1, 5-6. Like Lehmann, Peter teaches a lightweight vacuum with a handle that “makes it easy to work under tables, chairs, and similar furniture,” as well as “hard-to-reach areas of the floor or walls.”

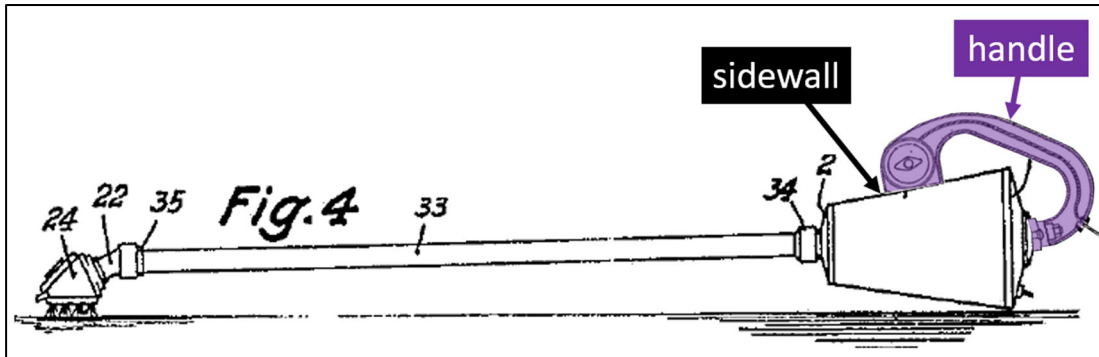
Ex1007, 2.

322. Further, as Lehmann explains, because “the handle is near the centre of gravity the appliance can easily be manipulated with one hand, leaving the other hand free for using a brush or shifting furniture or the like.” Ex1010, 2:25-29. In my opinion, a POSA would recognize this increased user comfort and vacuum maneuverability would have certain advantages over Peter’s straight “exhaust nozzle 10” with a “rubber grip 9.”
323. For example, in my opinion, the user would be able to grip the arched handle more loosely, which would reduce strain on the wrist, and clean under low furniture more easily, as they would not need to bend down as far.
324. In my opinion, a POSA would have found this to be a simple modification of the shape of a known element (Peter’s straight “exhaust nozzle 10” having “rubber grip 9”) into another (Lehmann’s “arched handle 14” shape) to obtain the predictable result of allowing a user to manipulate Peter’s vacuum cleaner comfortably in different use cases.
325. In my opinion, a POSA would understand that when Peter’s “exhaust nozzle 10” was modified to use this arched shape, it would still allow airflow through it, as it would remain hollow and would retain an air outlet, and it would still be “provided with a rubber grip 9” along its surface as

Peter teaches. Ex1007, 2, Figs. 1-4.

326. In my opinion, a POSA would have reasonably expected success because it would have only involved substituting one known handle and grip shape (Lehmann's "arched handle 14") for another (Peter's straight "exhaust nozzle 10" having "rubber grip 9," Ex1007, 2, Fig. 1). In my opinion, a POSA would also be further motivated by Peter's teaching that its vacuum cleaner "parts," including "rubber grip 9," can be "rotated, individually exchanged and combined." Ex1007, 1-2.
327. In my opinion, when so modified, Peter's arched handle "provided with a rubber grip 9" along its surface (not shown) is a handle with a hand grip portion that extends linearly outwardly from a sidewall of the main body, as shown in the annotated images below:





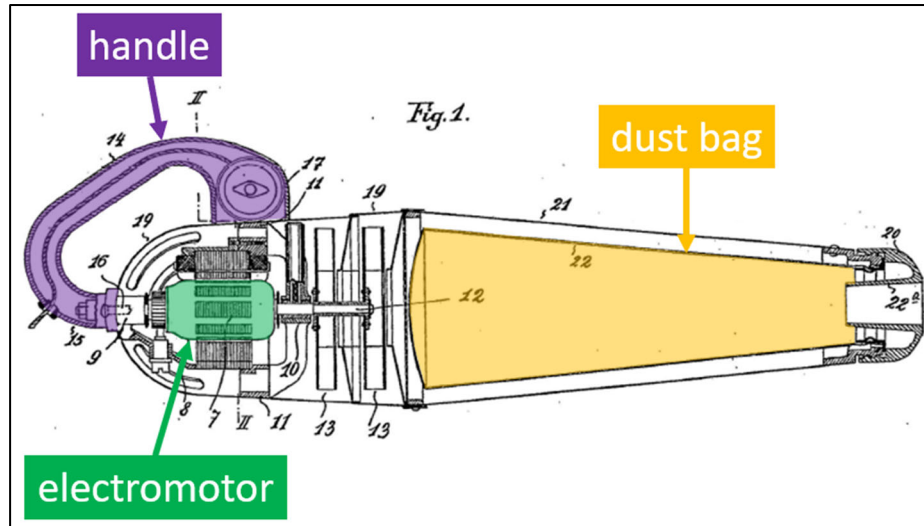
Ex1007, Figs. 1, 4; Ex1010, Fig. 1.

2. In My Opinion, Lehmann Teaches The Suction Motor Is Positioned Rearward Of The Air Treatment Member That A POSA Would Have Been Motivated To Incorporate Into Peter (Claims 5 and 12)

328. As explained above in Section X.C, Peter in combination with Neroni renders obvious claims 1 and 9.

329. In my opinion, Peter in combination with Lehmann teaches the remaining limitations of these claims.

330. Lehmann teaches the suction motor and the handle are positioned rearward of the air treatment member: Lehmann's "**electromotor 7**" and "**arched handle 14**" are positioned rearward of Lehmann's "**dust bag 22**," as shown in the annotated image below:



Ex1010, 1:63-67, 1:71-82, Fig. 1.

331. In my opinion, a POSA would have been motivated to combine Peter and Lehmann's teachings such that Peter's "motor 11" is positioned rearward of Peter's "dust filter [17]," as Lehmann teaches. Ex1007, 2, Fig. 1; Ex1010, 1:63-91, Fig. 1.
332. In addition to the similarities noted above, *see* Ground 4, §1, Peter, like Lehmann, teaches vacuum components that are aligned along a central axis: "air intake nozzle 13," a conically shaped housing with a "dust bag or dust filter" that separates dust from air, and a "fan" and "motor 11." Ex1007, 2, Fig. 1.
333. As Lehmann explains, locating the "electromotor 7" rearward of the "dust bag 22" and under the "arched handle 14" results in "a considerable saving of weight ... and the centre of gravity is near the rear end, which is of

considerable advantage in manipulating the appliance.” Ex1010, 1:63-91.

In my opinion, a POSA would have recognized the ergonomic advantages of this motor location compared to the location of Peter’s “motor 11,” including those described above. *See* Ground 4, §1; Ex1007, 2, Fig. 1.

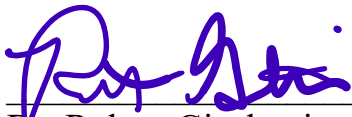
334. In my opinion, a POSA would have reasonably expected success in implementing Lehmann’s teachings because it would have only involved moving Peter’s suction motor from one well known location to another. Furthermore, in my opinion, a POSA would be also motivated by Peter’s teaching that its vacuum cleaner “parts,” including “motor 11,” can be “rotated, individually exchanged and combined.” Ex1007, 1-2.

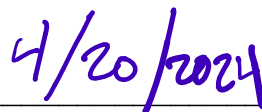
335. In my opinion, in the combined teachings of Peter and Lehmann, the suction motor and the handle are positioned rearward of the air treatment member.

XI. SECONDARY CONSIDERATIONS OF NON-OBVIOUSNESS

336. I am unaware of any secondary considerations of non-obviousness that provide evidence that the claims of the ’030 patent are not obvious. To the extent PO argues that 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.

Signed: 
Dr. Robert Giachetti

Dated: 
4/20/2024