

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DYSON TECHNOLOGY LIMITED AND DYSON, INC.,
Petitioners,

v.

OMACHRON INTELLECTUAL PROPERTY INC.,
Patent Owner.

Case No. IPR2024-01317

U.S. PATENT NO. 11,910,983

PETITION FOR *INTER PARTES* REVIEW

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LIST OF EXHIBITS

Exhibit No.	Description
1001	U.S. Patent No. 11,910,983 (“’983Patent”)
1002	Declaration of Robert Giachetti
1003	<i>Curriculum Vitae</i> of Robert Giachetti
1004	Excerpted File History of U.S. 11,910,983 (App. No. 17/830,507)
1005	PCT Publication No. 2007/084543 to Butler et al. (“Butler”)
1006	German Patent Publication No. 1,680,208 to Rebel (“RebelDE”)
1007	Certified English translation of German Patent Publication No. 1,680,208 to Rebel (“Rebel”)
1008	German Patent Publication No. 1,213,967 to Berg (“BergDE”)
1009	Certified English translation of German Patent Publication No. 1,213,967 to Berg (“Berg”)
1010	German Patent Publication No. 1,691,786 to Böhmler (“BöhmlerDE”)
1011	Certified English translation of German Patent Publication No. 1,691,786 to Böhmler (“Böhmler”)
1012	German Patent Publication No. 6,942,662 to Knipping (“KnippingDE”)
1013	Certified English translation of German Patent Publication No. 6,942,662 to Knipping (“Knipping”)
1014	Chinese Patent Publication No. 101,061,932 to Jianan (“JiananCN”)
1015	Certified English Translation of Chinese Patent Publication No. 101,061,932 to Jianan (“Jianan”)
1016	U.S. Patent Publication No. 2007/0209335 to Conrad (“Conrad335”)
1017	PCT Publication No. 2013/117901 to Sunderland et al. (“Sunderland”)

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1018	U.S. Patent Publication No. 2013/0160232 to Peace (“Peace”)
1019	French Patent No. 1,094,603 to Martelliere (“MartelliereFR”)
1020	Certified English Translation of French Patent No. 1,094,603 to Martelliere (“Martelliere”)
1021	<i>Certain Surface Cleaning Devices and Components Thereof</i> , Dkt. No. 337-TA-1404, Ex.28 to Complaint
1022	U.S. Patent Publication No. 2006/0090290 to Lau (“Lau”)
1023	U.S. Patent No. 9,204,769 to Conrad (“Conrad769”)
1024	U.S. Patent No. 2,768,707 to Campbell (“Campbell”)
1025	U.S. Patent No. 5,078,761 to Dyson (“Dyson761”)
1026	U.K. Patent Publication No. 2,484,146 to Dyson et al. (“Dyson146”)
1027	Spanish Patent No. ES43816 to Dayer SA (“ESDayer”)
1028	Certified English Translation of Spanish Patent No. ES43816 to Dayer SA (“Dayer”)
1029	Korean Patent Publication No. KR19980020751 to Moon (“KRMoon”)
1030	Certified English Translation of Korean Patent Publication No. KR19980020751 to Moon (“Moon”)
1031	U.S. Patent Publication No. 2011/0219570 to Conrad (“Conrad570”)
1032	Swiss Patent No. 203,675 to Peter (“PeterCH”)
1033	Certified English translation of Swiss Patent No. 203,675 to Peter (“Peter”)
1034	U.S. Patent No. 1,908,834 to Engberg et al. (“Engberg”)
1035	U.S. Patent No. 2,099,172 to McCabe et al. (“McCabe”)

LIST OF CHALLENGED CLAIMS

Reference Number	Claim Limitation
Claim 1	
[1pre]	A surface cleaning apparatus comprising:
[1a.1]	a hand vacuum cleaner having a front end having a dirty air inlet, a rear end, a clean air outlet, an upper end, a lower end,
[1a.2]	a cyclone unit comprising a cyclone chamber having a cyclone axis of rotation that extends in a forward/rearward direction, a suction motor and fan assembly having a suction motor axis of rotation and a pistol grip handle;
[1b]	a surface cleaning head having a front end, a rear end, a dirty air inlet and a surface cleaning head air outlet; and,
[1c.1]	a rigid air flow conduit which, when mounted to the surface cleaning head and the hand vacuum cleaner, extends between the surface cleaning head air outlet and the dirty air inlet of the hand vacuum cleaner,
[1c.2]	wherein the pistol grip handle has a pistol grip portion and an end that is mounted to an outer wall of the hand vacuum cleaner at a location rearward of the front end and forward of a rear end of the suction motor and
[1c.3]	wherein a plane that is transverse to the cyclone axis of rotation extends through the pistol grip portion and the hand vacuum cleaner at a location rearward of the front end and forward of a rear end of the suction motor,
[1c.4]	wherein the dirty air inlet of the hand vacuum cleaner is removably drivingly mountable to a downstream end of the rigid air flow conduit whereby when the hand vacuum cleaner is mounted to the downstream end of the rigid air flow conduit, the pistol grip handle is a driving handle for the surface cleaning apparatus, and
[1c.5]	wherein when the hand vacuum cleaner is positioned with the front end of the hand vacuum cleaner in front of the rear end of the hand vacuum cleaner and the dirty air inlet faces forwardly, the cyclone axis of rotation is generally horizontal.
Claim 2	
[2]	The surface cleaning apparatus of claim 1 wherein the cyclone unit is removably mountable as part of the hand vacuum cleaner.
Claim 3	
[3]	The surface cleaning apparatus of claim 1 wherein the cyclone

Reference Number	Claim Limitation
	chamber has a sidewall extending between front and rear walls of the cyclone chamber and, when the hand vacuum cleaner is positioned with the front end of the hand vacuum cleaner in front of the rear end of the hand vacuum cleaner, the cyclone axis of rotation positioned horizontally, and the dirty air inlet faces forwardly, the sidewall extends generally horizontally and a dirt outlet is provided in a lower portion of the sidewall and is in communication with a dirt collection chamber that is exterior to the cyclone chamber.
Claim 4	
[4]	The surface cleaning apparatus of claim 1 wherein the cyclone axis of rotation is generally parallel to the suction motor axis of rotation.
Claim 5	
[5]	The surface cleaning apparatus of claim 1 wherein, when the hand vacuum cleaner is positioned with the front end of the hand vacuum cleaner in front of the rear end of the hand vacuum cleaner the cyclone axis of rotation is positioned horizontally, the pistol grip handle extends upwardly and forwardly from the location.
Claim 6	
[6]	The surface cleaning apparatus of claim 1 wherein an enclosed finger grip area is provided on a forward side of the pistol grip handle.
Claim 7	
[7]	The surface cleaning apparatus of claim 1 wherein a projection of the pistol grip handle in a direction transverse to the cyclone axis of rotation intersects the suction motor and fan assembly.
Claim 8	
[8]	The surface cleaning apparatus of claim 1 wherein a projection of the pistol grip handle in a direction transverse to the cyclone axis of rotation intersects a housing of the suction motor and fan assembly.
Claim 9	
[9]	The surface cleaning apparatus of claim 2 further comprising a pre-motor filter, wherein the pre-motor filter is accessible when the cyclone unit is removed.
Claim 10	
[10]	The surface cleaning apparatus of claim 9 wherein the pre-motor filter has a height in a direction transverse to the cyclone axis and the height is larger than a diameter of the cyclone.

Reference Number	Claim Limitation
Claim 11	
[11]	The surface cleaning apparatus of claim 10 further comprising a dirt collection chamber that is exterior to the cyclone chamber and a line that is parallel to the cyclone axis extends through the dirt collection chamber and the pre-motor filter.
Claim 12	
[12pre]	A surface cleaning apparatus comprising:
[12a.1]	a hand vacuum cleaner having a front end having a dirty air inlet, a rear end, a clean air outlet, an upper end, a lower end,
[12a.2]	a cyclone unit comprising a cyclone chamber having a cyclone axis of rotation that extends in a forward/rearward direction when the dirty air inlet faces forwardly, a suction motor and fan assembly having a suction motor axis of rotation and a pistol grip handle wherein the suction motor axis of rotation is generally parallel to the cyclone axis of rotation;
[12b]	a surface cleaning head having a front end, a rear end, a dirty air inlet and a cleaning head air outlet; and
[12c.1.i]	a rigid air flow conduit which is mountable between the cleaning head air outlet and a hand vacuum cleaner air inlet,
[12c.1.ii]	the rigid air flow conduit having a longitudinally extending conduit axis, wherein, when the hand vacuum cleaner is mounted to the downstream end of the rigid air flow conduit, the handle is a driving handle for the surface cleaning apparatus and the longitudinally extending conduit axis of the rigid air flow conduit is parallel to the cyclone axis of rotation, and
[12c.2]	wherein the pistol grip handle extends generally radially away from an outer wall of the hand vacuum cleaner at a location rearward of the front end and forward of a rear end of the suction motor.
Claim 13	
[13]	The surface cleaning apparatus of claim 12 further comprising a pre-motor filter, wherein, when the hand vacuum cleaner is mounted to the downstream end of the rigid air flow conduit, a projection of the longitudinally extending conduit axis intersects the pre-motor filter.
Claim 14	
[14]	The surface cleaning apparatus of claim 12 wherein the cyclone unit is removably mountable as part of the hand vacuum cleaner.

Reference Number	Claim Limitation
Claim 15	
[15]	The surface cleaning apparatus of claim 12 wherein, when the hand vacuum cleaner is mounted to the downstream end of the rigid air flow conduit and when the hand vacuum cleaner is positioned with the front end of the hand vacuum cleaner in front of the rear end of the hand vacuum cleaner, the suction motor axis of rotation is vertically spaced from the longitudinally extending conduit axis.
Claim 16	
[16]	The surface cleaning apparatus of claim 12 wherein the cyclone chamber has a sidewall extending between front and rear walls of the cyclone chamber and, when the hand vacuum cleaner is positioned with the front end of the hand vacuum cleaner in front of the rear end of the hand vacuum cleaner, the cyclone axis of rotation is positioned horizontally, and the dirty air inlet faces forwardly, the sidewall extends generally horizontally and a dirt outlet is provided in a lower portion of the sidewall and is in communication with a dirty collection chamber that is exterior to the cyclone chamber.
Claim 17	
[17]	The surface cleaning apparatus of claim 1 wherein an enclosed finger grip area is provided on a forward side of the pistol grip handle.
Claim 18	
[18]	The surface cleaning apparatus of claim 1 wherein a projection of the pistol grip handle in a direction transverse to the cyclone axis of rotation intersects the suction motor and fan assembly.
Claim 19	
[19]	The surface cleaning apparatus of claim 1 wherein a projection of the pistol grip handle in a direction transverse to the cyclone axis of rotation intersects a housing of the suction motor and fan assembly.
Claim 20	
[20]	The surface cleaning apparatus of claim 14 further comprising a pre-motor filter, wherein the pre-motor filter is accessible when the cyclone unit is removed.
Claim 21	
[21]	The surface cleaning apparatus of claim 20 wherein the pre-motor filter has a height in a direction transverse to the cyclone axis and the height is larger than a diameter of the cyclone.

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Reference Number	Claim Limitation
Claim 22	
[22]	The surface cleaning apparatus of claim 21 further comprising a dirt collection chamber that is exterior to the cyclone chamber and a line that is parallel to the cyclone axis extends through the dirt collection chamber and the pre-motor filter.

I. INTRODUCTION

The '983Patent concerns “surface cleaning apparatus[es],” and, specifically, a hand/stick vacuum cleaner configuration. Ex1001, 1:23-24. It identifies “limited dirt collection capacity” as an alleged problem it purports to solve with “an external dirt collection chamber.” *Id.* at 1:52-56. However, just two dependent claims ([11]/[22]), claim an “exterior” dirt-collection chamber—the rest do not concern dirt-collection capacity at all, but instead cobble together well-known vacuum cleaner configurations and features without solving any technical problem. Ex1001, Claims; Ex1002 ¶¶56-58. That is because Patent Owner (“PO”) wrote its claims in a failed attempt to read on Petitioners’ products, not to solve technical problems. There is nothing inventive about PO’s claims, which arrange generic vacuum components in ways that were well-known in the prior art.

II. STANDING (§42.104(A))

Petitioners certify that the '983Patent is available for IPR, and that Petitioners are not barred or estopped from requesting IPR to challenge the claims on the grounds herein.

III. RELIEF REQUESTED (§42.104(B))

Petitioners respectfully request review and cancellation under §311 of claims 1-22 as follows¹:

Prior Art	Publication	Basis
PCT Pub. 2007/084543 (“Butler”)	07/26/2007	AIA
Chinese Pub. 101,061,932 (“Jianan”)	10/31/2007	102(a)(1),
German Patent Pub. 1,680,208 (“Rebel”)	12/23/1971	102(a)(2)
French Patent 1,094,603 (“Martelliere”)	05/23/1955	

Grounds	Claims	Basis
1	1-2, 4-10, 12-15, 17-21	§103; Butler
2	3, 10-11, 16, 21-22	§103; Butler and Jianan
3	1-2, 4-10 12-15, 17-21	§103; Rebel and Martelliere
4	3, 10-11, 16, 21-22	§103; Rebel, Martelliere, and Jianan

¹ Petitioners do not concede that any claims satisfy other patentability requirements that cannot be raised in IPR, including §§101/112.

IV. '983PATENT OVERVIEW

The '983Patent issued from Application 17/830,507, filed 06/02/2022, and claims priority to Provisional Application 62/093,189, filed 12/17/2014. Ex1001, Cover.

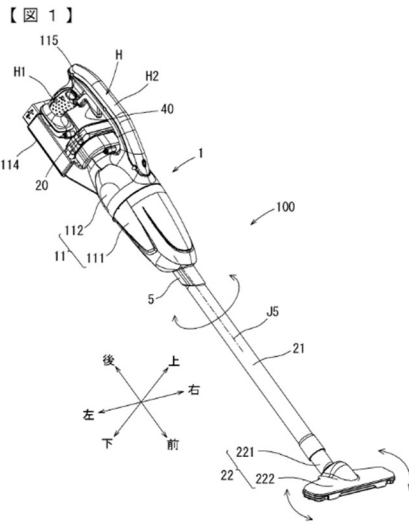
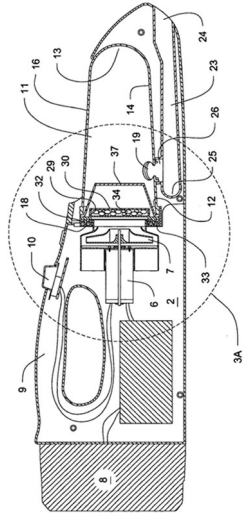
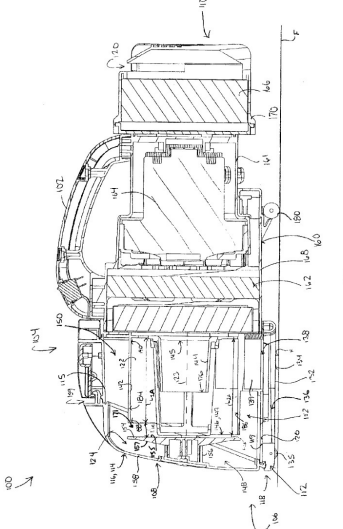
A. Specification

The '983Patent identifies “limited dirt collection capacity” as a problem it purports to solve with an “external dirt collection chamber.” Ex1001, 1:36-40, 1:50-56. However, the '983Patent’s claims are instead directed to well-known features, including a “dirty air inlet,” “cyclone unit,” “surface cleaning head,” “rigid air flow conduit,” and a “pistol grip,” oriented in well-known configurations that solve no purported problem. Ex1002 ¶¶56-58.

B. Prosecution History

During prosecution, PO disclosed 460+ references, but not the most relevant prior art, including the Butler, Rebel, and Martelliere references in this Petition. Ex1001, 2-5.

The Examiner rejected certain then-pending claims as obvious over JP2014083241 (“Mori”) in combination with US2006/0090290 (“Lau”) or US9,204,769 (“Conrad769”):

Mori, Fig. 1	Ex1022 (Lau), Fig. 3	Ex1023 (Conrad769), Fig. 6
		

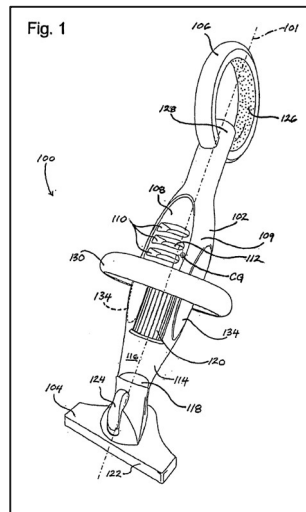
Ex1004, 258-267.

The Examiner found, and PO did not dispute, it would have been obvious to replace non-cyclonic separators in prior-art vacuums with cyclonic separators because “the cyclone unit...is used for the same purpose of separating dust particles from air.” Ex1004, 260-261, 263-265, 276-281; Ex1002 ¶¶59-63. PO amended then-pending independent claims 1 and 12 to include limitations regarding the handle’s location and orientation and argued the Examiner-identified combinations failed to teach such a handle. Ex1004, 270-280; Ex1002 ¶62. The Examiner then allowed the claims without providing reasons for allowance. Ex1004, 282-286; Ex1002 ¶¶63-64.

V. PRIOR ART OVERVIEW

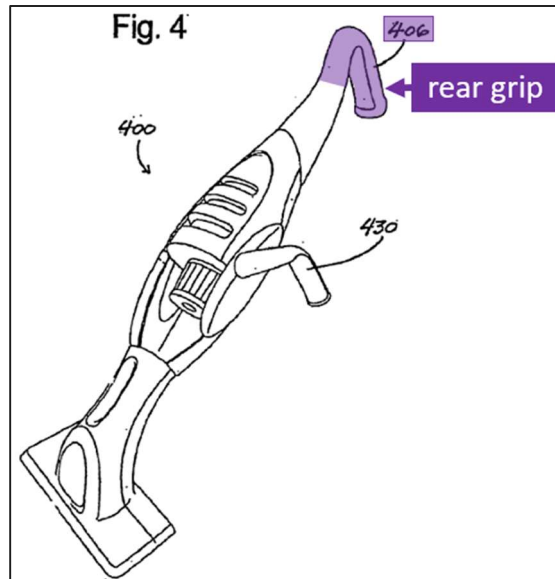
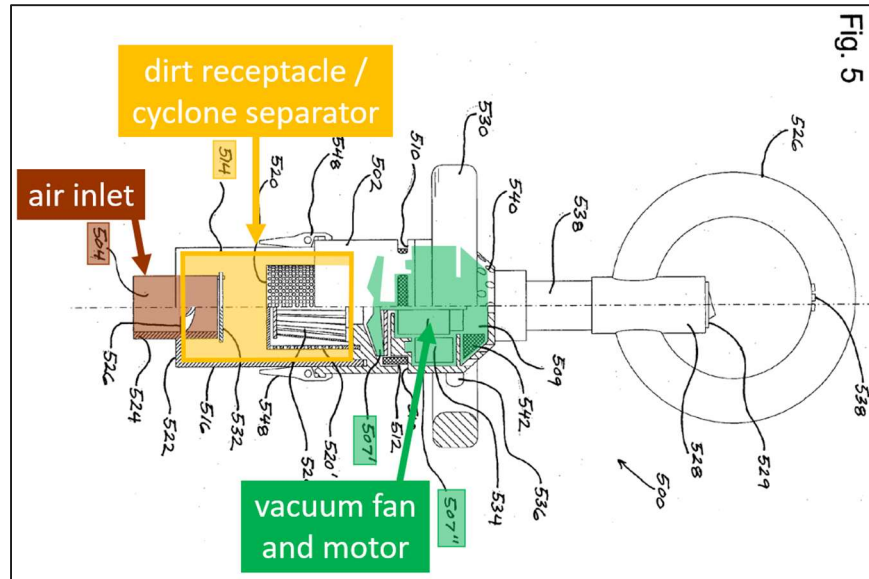
A. Butler

Butler is a 2007 PCT publication for “an improved vacuum cleaner for cleaning raised and vertical surfaces” including stairs:



Ex1005, 3:10-12, Fig. 1.

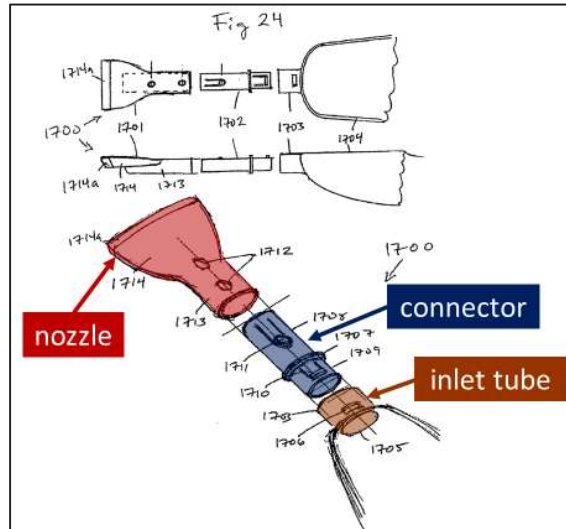
Butler’s cleaner includes a “housing” with a “longitudinal axis,” an “**air inlet**,” a “**dirt receptacle** compris[ing] a **cyclone separator**,” a “**vacuum fan and a motor**,” and a “**pistol-grip style rear grip**”:



Ex1005, Abstract, 3:20-28, 19:22-24, 22:14-22, Figs. 4-5²; Ex1002 ¶¶66-68.

² All emphasis, and all coloring/annotations to figures, added unless otherwise noted. Where a figure has been otherwise altered, the figure citation is labeled “modified.”

Butler's “**connector 1702**” comprises 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**”:

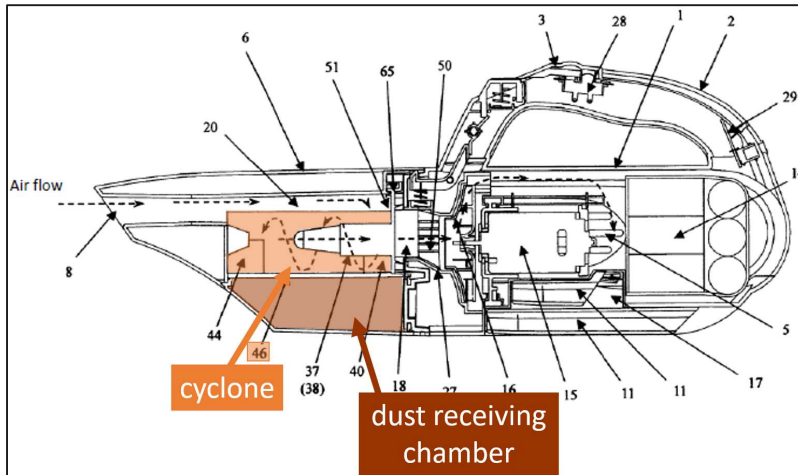


Ex1005, 41:19-29, Fig. 24; Ex1002 ¶69.

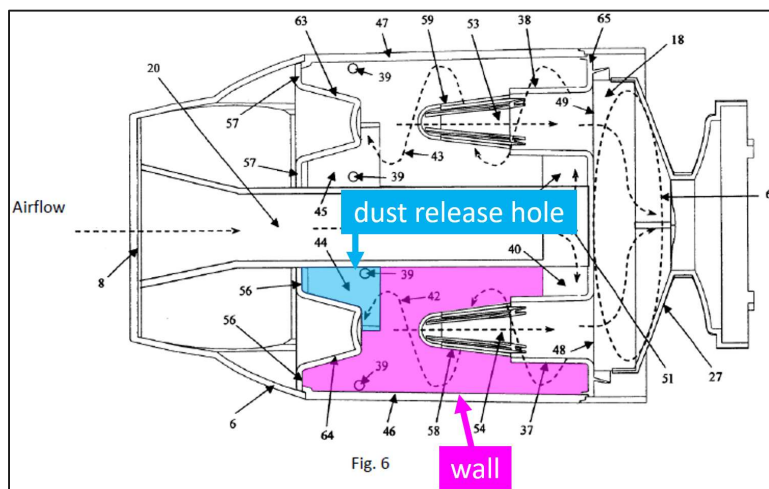
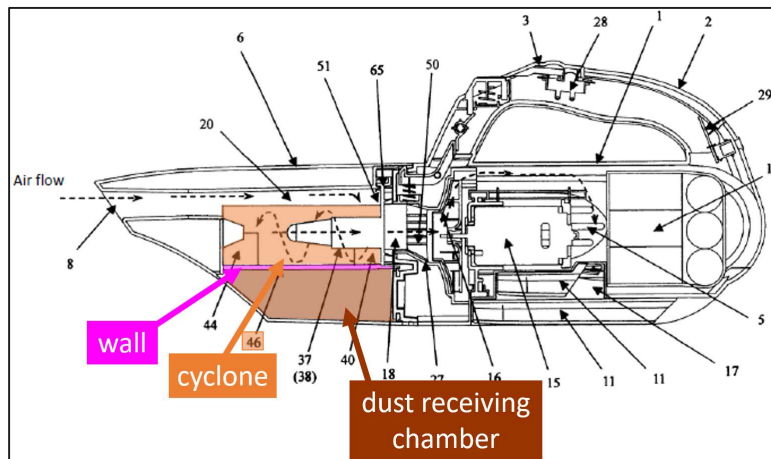
B. Jianan³

Jianan is a 2007 Chinese patent publication for a “handheld vacuum” with a “detachable dust cup” with “two parallel **cyclones** and separate **dust receiving chambers**”:

³ Citations to translated documents are by page, as the English translations do not include column/line numbers.



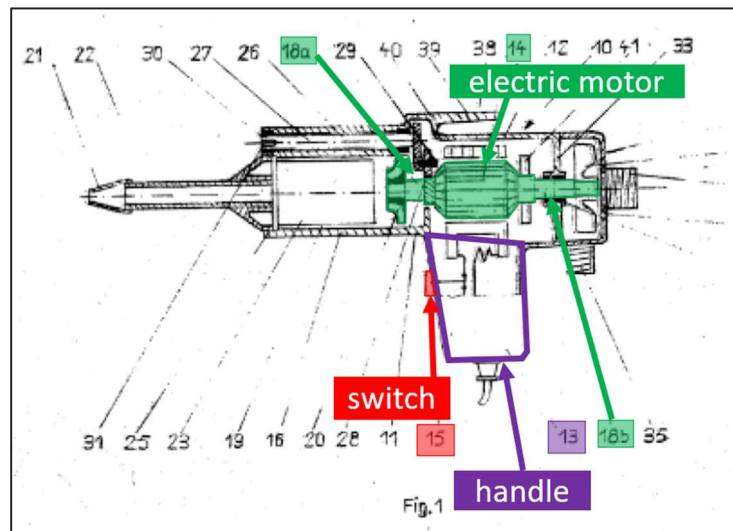
Ex1015, Abstract, 4, Fig. 3; Ex1002 ¶70. “[W]all 55” with “dust release hole” separates “cyclone 46” and “independent dust collection chamber 9”:



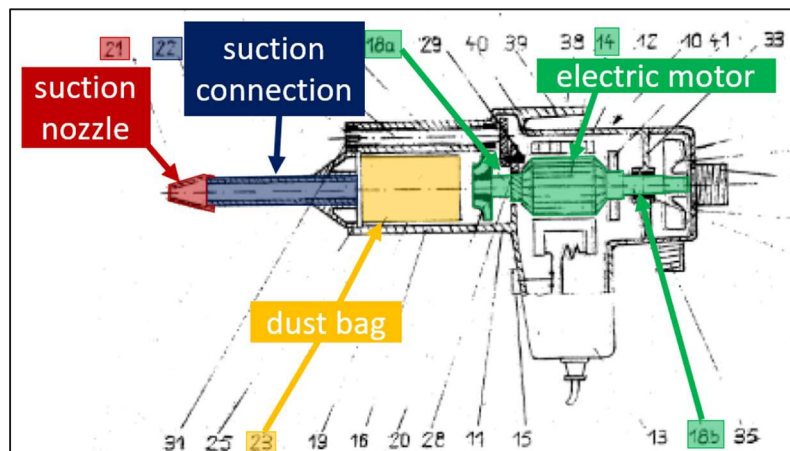
Ex1015, 9-10, Figs. 3, 6; Ex1002 ¶71.

C. Rebel

Rebel is a 1971 German Patent Publication for a “[m]ultipurpose device” including “a vacuum cleaner” having a “**handle 13**,” “**electric motor 14**” (including “**shaft 18**”), and “**switch 15**” for operating the vacuum:



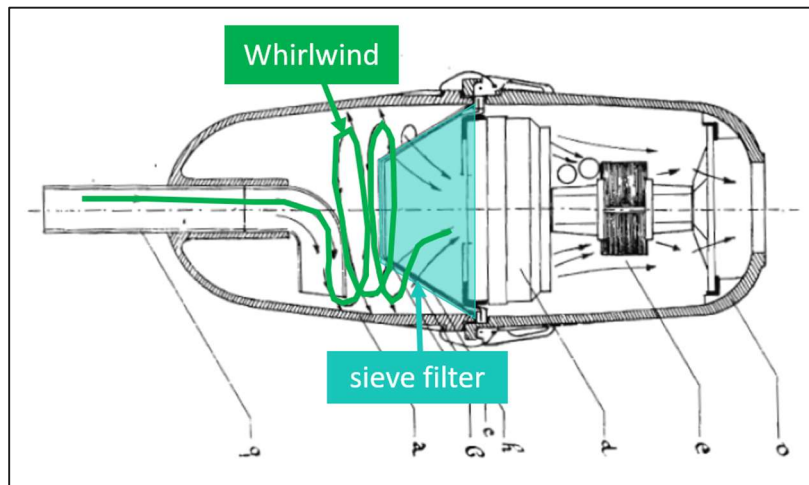
Ex1007, 1, 4, Fig. 1; Ex1002 ¶72. A “**suction fan**...sucks in the air and the dust through the **suction nozzle 21** and the **suction connection 22**” to “**dust bag 23**”:



Ex1007, 4, Fig. 1; Ex1002 ¶73.

D. Martelliere

Martelliere is a 1954 French patent for a cyclonic vacuum, which uses “tangential[]” airflow to separate dust using the “‘Whirlwind’ principle” and “interchangeable sieve filter *b*” to further filter dust:



Ex1020, 1, Fig. 1; Ex1002 ¶74.

VI. LEVEL OF ORDINARY SKILL IN THE ART

A POSA would have had a bachelor’s degree in mechanical engineering or a similar field and 2-3 years of experience in fluid dynamics and/or machine design for devices related to fluid dynamics, 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.

VII. CLAIM CONSTRUCTION

Petitioners are unaware of any “prior claim construction determination” related to the ’983Patent. 37 C.F.R. §42.100(b). “[C]laim terms need only be

construed to the extent necessary to resolve the controversy.” *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011) (internal citation omitted). Petitioners do not believe any claim construction is necessary to resolve the parties’ controversy in this Petition, and the claims should be given their plain and ordinary meaning for purposes of this IPR.⁴

VIII. THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. Ground 1: Butler Renders Obvious Claims 1-2, 4-10, 12-15, and 17-21

1. Butler Teaches A Single Vacuum Cleaner System With Interchangeable Components, But If PO Argues Otherwise, A POSA Would Have Been Motivated To Combine Them

Butler teaches a single, configurable vacuum system. Butler’s components, including its dirt receptacle, “may be interchangeable with one another to provide the user with various cleaning options,” and their arrangement may be “used individually or in various other inventive combinations.” Ex1005, 16:25-29, 43:29-44:3, 4:17-28, 18:22-28, 19:9-15, 34:12-13.

A POSA would have found it obvious to combine Butler’s components, including because it would have involved combining known prior-art elements (handles, grips, filters, tools, and dust chambers) according to known

⁴ Petitioners reserve all rights to raise claim-construction arguments and other arguments in litigation.

methods/techniques (simple component rearrangement) to yield predictable results (effective cleaning for different uses). Ex1002 ¶¶80-85. This would have involved simple substitution of these known elements taught by Butler, which Butler expressly teaches are interchangeable. Ex1002 ¶86. Configuring Butler’s interchangeable components for different uses would have at least been obvious to try as there were a finite number of identified, predictable solutions for arranging Butler’s well-known, interchangeable components. Ex1002 ¶86.

A POSA would have reasonably expected success: these components—all taught by Butler—were well known, and Butler expressly teaches they are interchangeable/reconfigurable for various uses. Ex1002 ¶87.

2. [1]/[12]

a. [1pre]/[12pre]

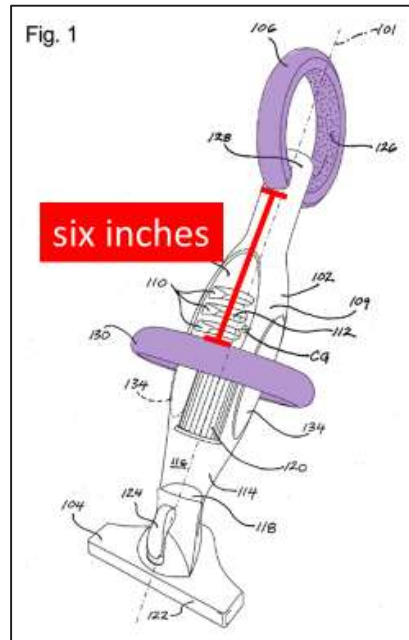
If the preambles are limiting, Butler teaches them. Ex1002 ¶¶88-90. Butler teaches a “vacuum cleaner” for cleaning surfaces, including “floors and carpets,” “horizontal surfaces,” and “vertical surfaces.” Ex1005, Title, 7:2-5. This is a surface cleaning apparatus. Ex1002 ¶90.

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

Butler teaches these limitations. Ex1002 ¶¶91-99.

Butler’s “vacuum cleaner” is designed to be used by hand and is a hand vacuum cleaner. Ex1005, Title, Fig. 1; Ex1002 ¶92. Butler’s cleaner includes a “**rear grip**” and “one or more **foregrips**,” and Butler teaches a range of “compact”

sizes, including a **six-inch** distance between the foregrip and the rear grip **s**, and an overall length of eighteen inches:

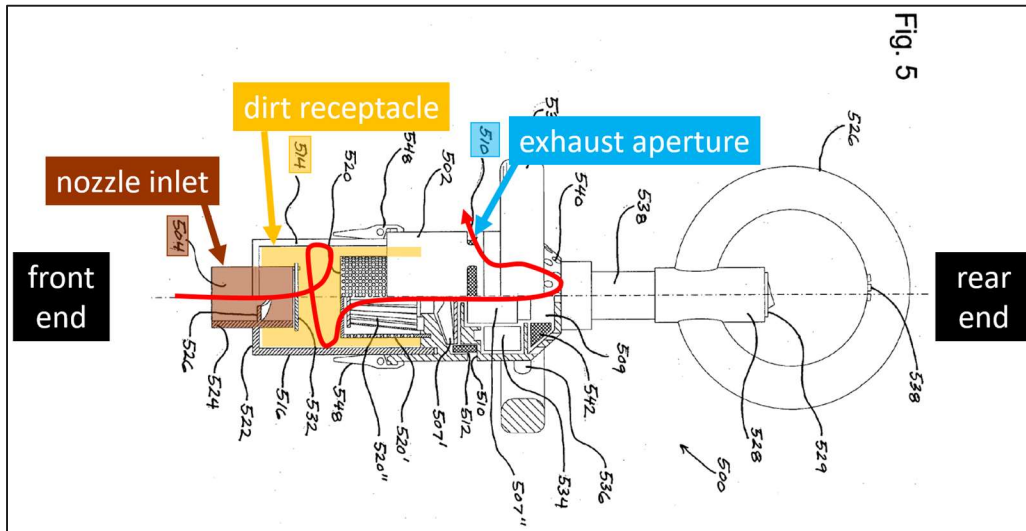


Ex1005, 15:5-6, 26:1-10, Fig. 1; Ex1002 ¶92.

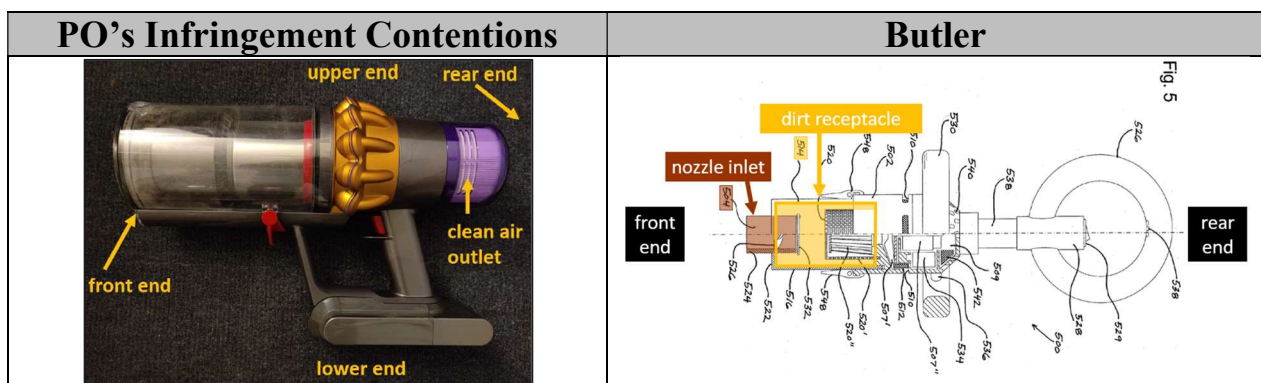
Butler’s “compact” design is “adapted for cleaning...stairwells and other confined spaces,” and Butler teaches telescoping handgrip members and extension tubes to reach the floor. Ex1005, Abstract, 1:2-3, 26:1-5, 27:12-29. Butler’s cleaner is designed with a comfortable “center of gravity” and to “remov[e] excess weight,” Ex1005, 13:1-19, 15:12-18, which are considerations a POSA would have understood apply to hand vacuum cleaners. Ex1002 ¶93.

Butler’s hand vacuum cleaner has a front end having a dirty air inlet, a rear end, and a clean air outlet. Ex1002 ¶¶94-98. In Butler, **air** enters the hand vacuum

cleaner **front end** via “**nozzle inlet 504**,” is cleaned by “a cyclonic airflow pattern within the **dirt receptacle 514**,” and exits via “**exhaust apertures 510**”:

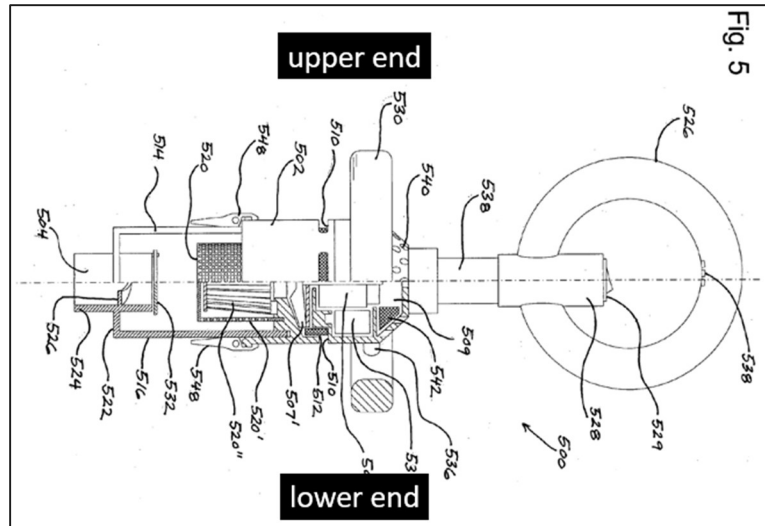


Ex1005, 22:5-6, Fig. 5; Ex1002 ¶95. Butler’s “nozzle inlet 504” is a dirty air inlet at Butler’s front end, “exhaust apertures 510” are clean air outlets, and Butler’s rear end is depicted above. Ex1002 ¶¶96-97. This is at least as much disclosure as PO contends infringes:



Ex1021 (Ex.28 to Complaint), 3(PO’s annotations); Ex1005, Fig. 5; Ex1002 ¶98.

Butler’s hand vacuum has an **upper end** and a **lower end**:

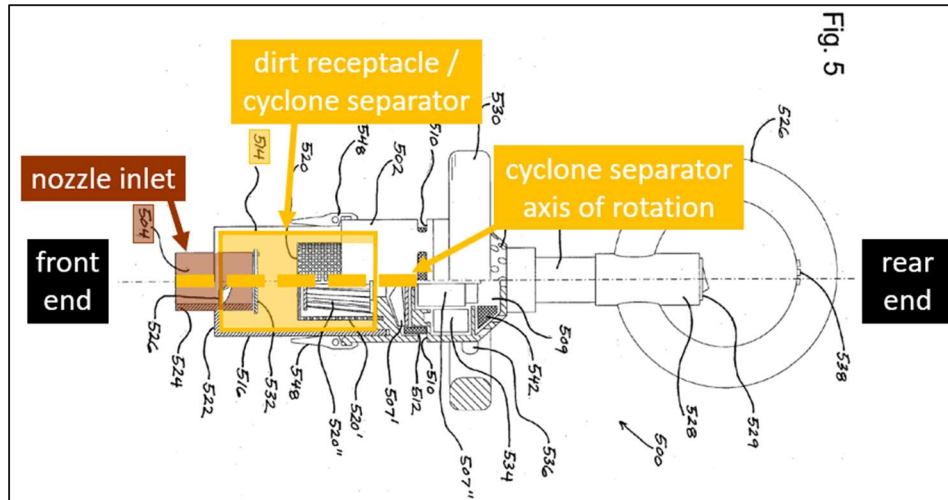


Ex1005, Fig. 5; Ex1002 ¶¶99.

c. [1a.2]/[12a.2]

Butler teaches these limitations. Ex1002 ¶¶100-113.

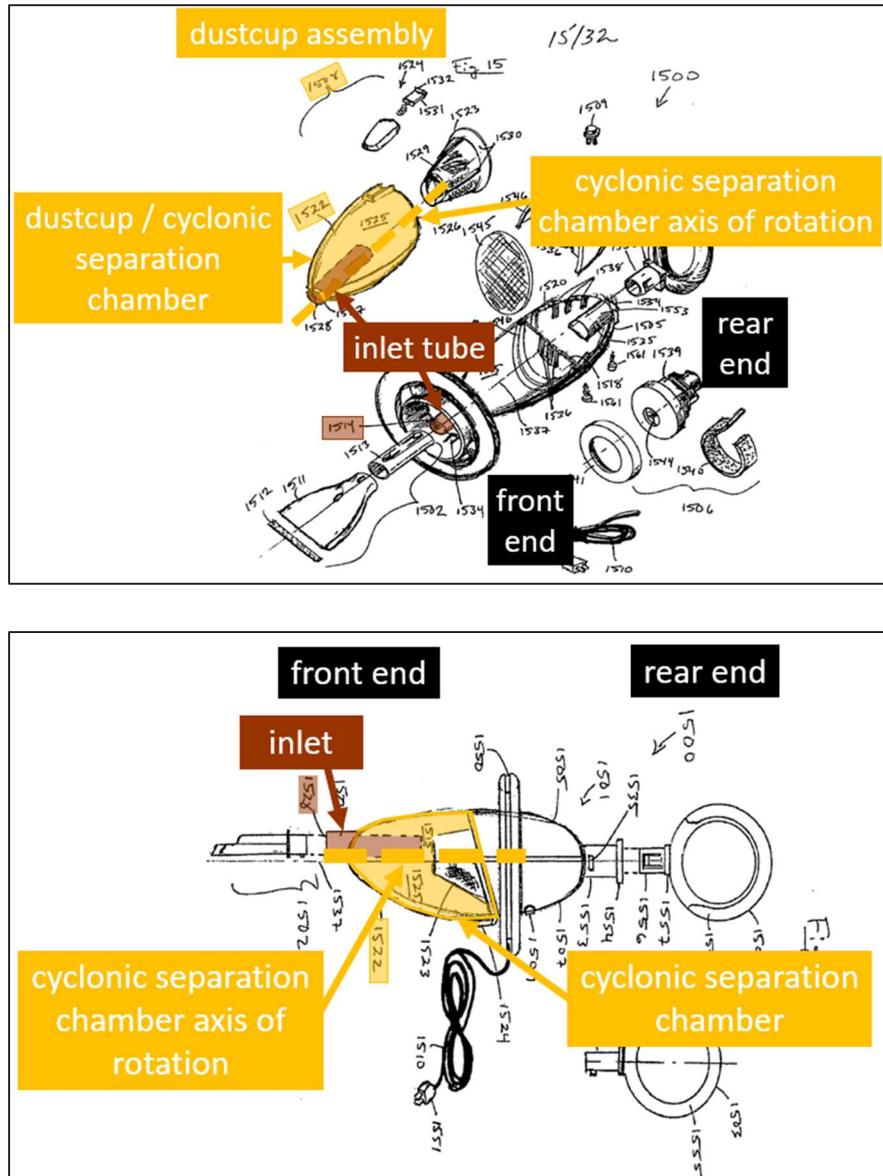
Butler teaches a cyclone unit comprising a cyclone chamber having a cyclone axis of rotation that extends in a forward/rearward direction. Ex1002 ¶102. Butler’s “**dirt receptacle** comprises a **cyclone separator**,” which a POSA would have understood is a cyclone unit comprising a cyclone chamber with a **cyclone separator axis of rotation** that extends in a forward/rearward direction between the **front** and **rear ends**:



Ex1005, Claim 11, Fig. 5; Ex1002 ¶102; Ground 1, [1a.1]/[12a.1].

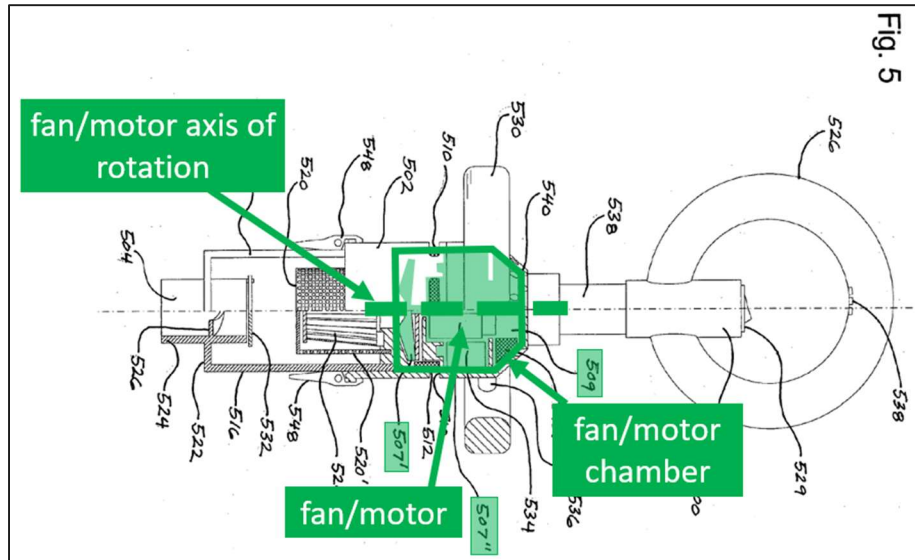
Regarding [12a.2], as shown above, Butler’s cyclone axis of rotation extends in a forward/rearward direction when the dirty air inlet faces forwardly. Ex1002 ¶¶102-103.

Butler teaches a “**dustcup assembly 1508** compris[ing] a **dustcup 1522**” that “may comprise...a **cyclonic separation chamber**,” which a POSA would have understood is also a cyclone unit comprising a cyclone chamber with a **cyclonic separation chamber axis of rotation** that extends in a forward/rearward direction, including when the dirty air inlet (“**inlet tube 1514**”/“**inlet 1528**”) faces forwardly:



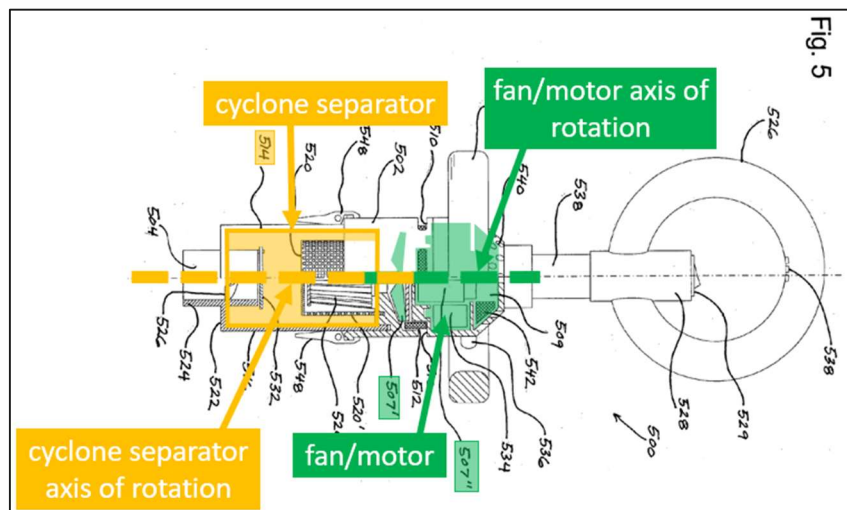
Ex1005, 35:27-36:4, Figs. 15-16; Ex1002 ¶¶104-105. Butler’s cyclonic separation units are interchangeable: “[t]he present invention may be used with any type of dirt separation system,” and “different types of dirt receptacle...may be interchangeable with one another.” Ex1005, 16:25-28.

Butler teaches a suction motor and fan assembly (“**fan/motor chamber 509** in which the **fan/motor 507** is located”) having a suction motor axis of rotation:

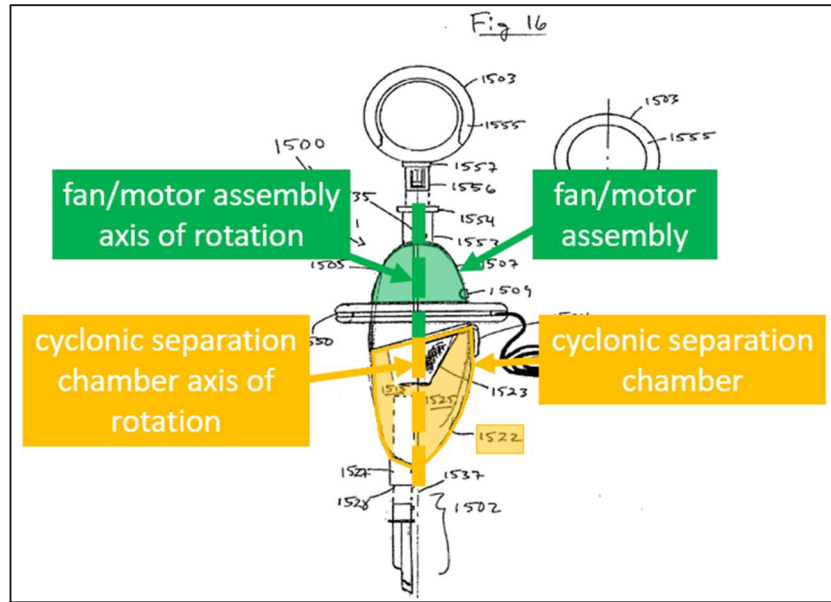


Ex1005, 20:12-14, Fig. 5; Ex1002 ¶106.

Regarding [12a.2], Butler's suction motor axis of rotation is generally parallel to the cyclone axis of rotation (**cyclone separator axis of rotation**):

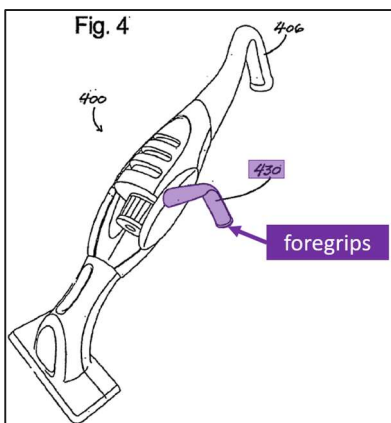


Ex1005, Fig. 5; Ex1002 ¶107. Butler's “**fan/motor assembly 1506[s]**” **axis of rotation** is generally parallel to the **cyclonic separation chamber axis of rotation**:

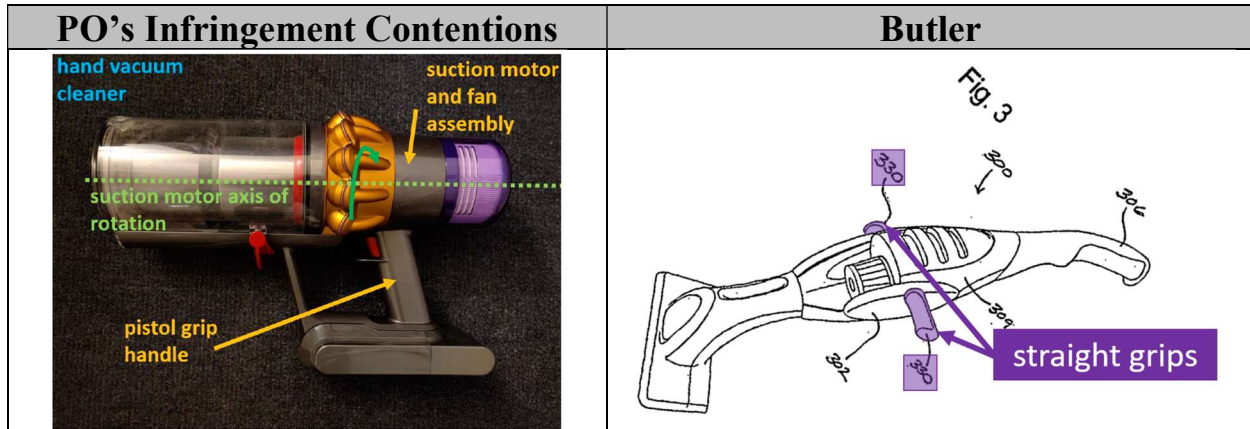


Ex1005, 35:4-6, Fig. 16; Ex1002 ¶108. If these axes are depicted as co-axial, a POSA would have understood they are generally parallel because they extend in the same direction and maintain the same (zero) distance between them. Ex1002 ¶109. PO apparently contends co-axial axes meet this limitation. Ex1021 (Ex.28 to Complaint) at 5-6.

Butler teaches a pistol-grip handle. Ex1002 ¶¶110-113. Butler’s hand vacuum cleaner includes “pistol-grip style **foregrips 430**”:



Ex1005, 19:22-24, Fig. 4; Ex1002 ¶111. Butler also teaches “two separate **straight grips 330**,” which a POSA would have understood are pistol-grip handles, at least to the same extent as PO contends infringes:



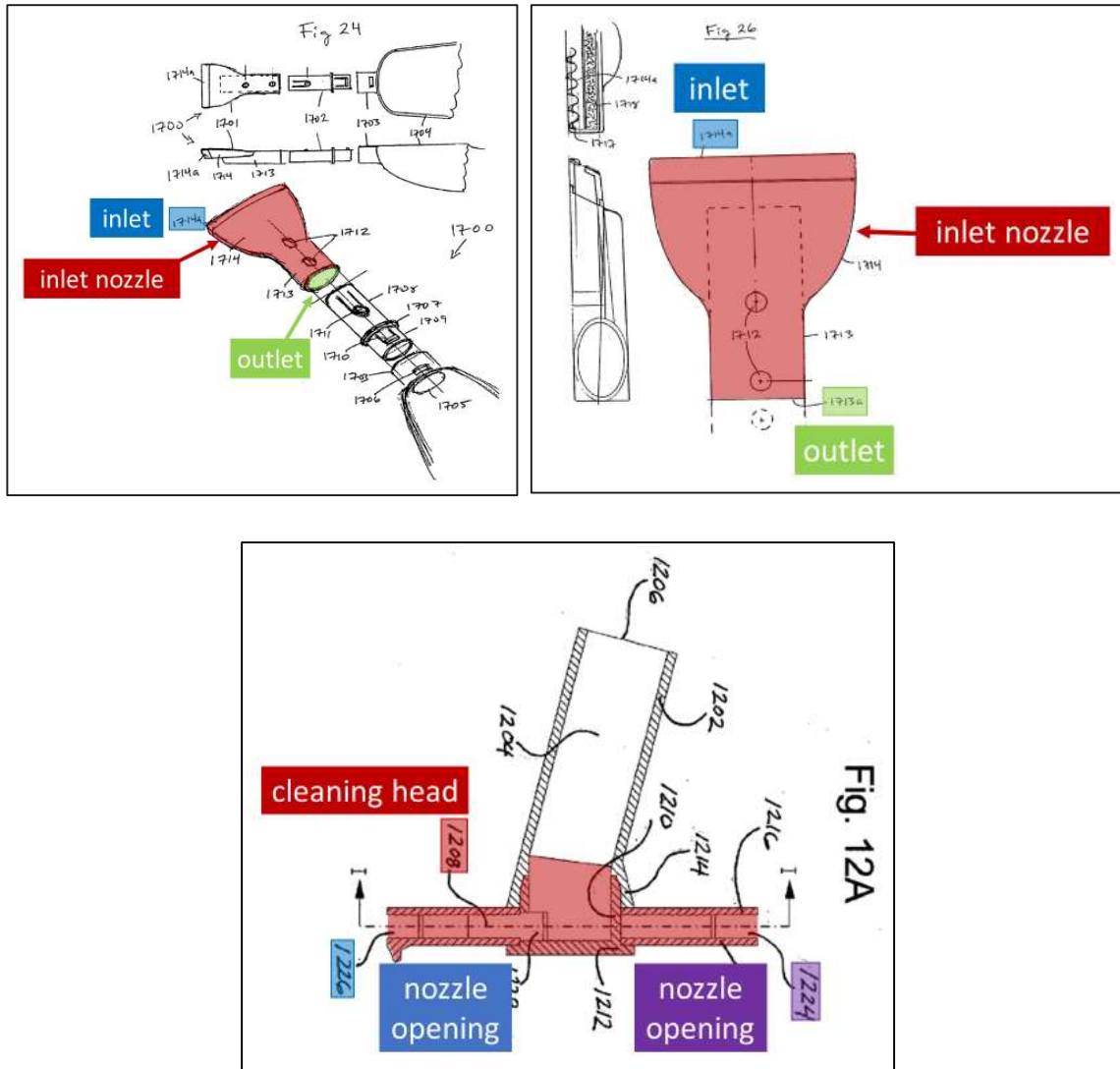
Ex1021 (Ex.28 to Complaint), 6(PO's annotations); Ex1005, 19:19-21, Fig. 3; Ex1002 ¶112.

“[A]ny combination of rear grip and foregrip that provide the user with hand positions to ergonomically maneuver the device” may be used, which a POSA would have understood include pistol-grip handles. Ex1005, 19:9-12, 19:18-24; Ex1002 ¶113.

d. [1b]/[12b]

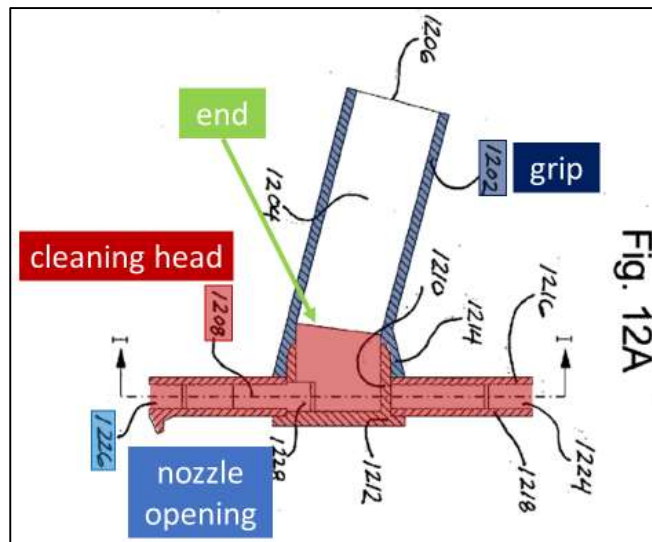
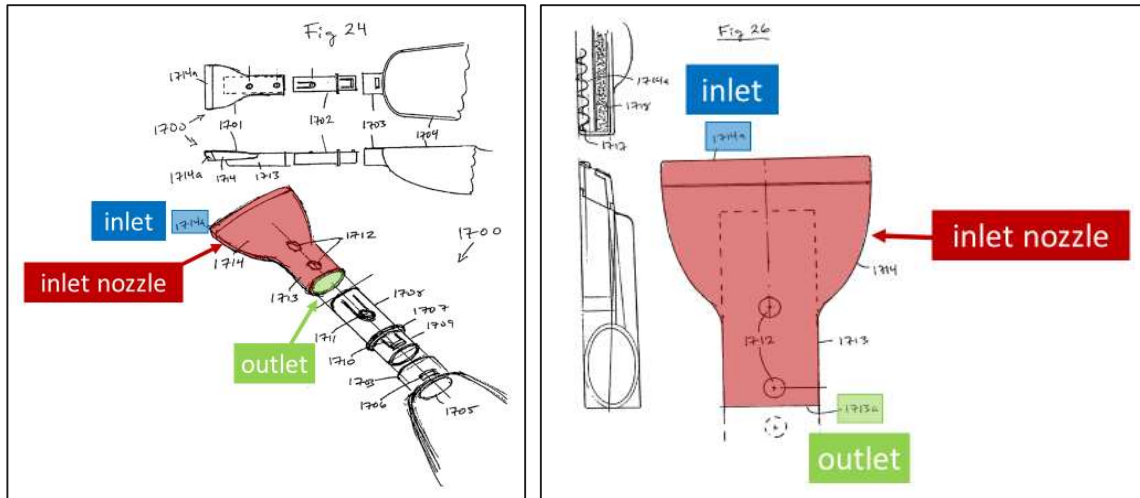
Butler teaches these limitations. Ex1002 ¶¶114-118.

Butler teaches a surface cleaning head (“**inlet nozzle 1701**”/“**cleaning head 1208**”) having a front end (at “**inlet 1714a**”/“**nozzle opening 1226**”) and a rear end (at “**outlet 1713a**”/“**nozzle opening 1224**”):



Ex1005, 31:24-27, 42:6-9, Figs. 12A, 24, 26; Ex1002 ¶¶116-117. Butler’s surface cleaning heads are interchangeable: “any type of cleaning device may be attached.” Ex1005, 22:6-9.

Butler teaches a surface cleaning head having a dirty air inlet (“**inlet 1714a**”/“**nozzle opening 1226**”) and a surface cleaning head air outlet (“**outlet 1713a**” for the **inlet nozzle 1701**”/“**end** to a cleaning head 1208” “attach[ed]” to “**grip 1202**”):



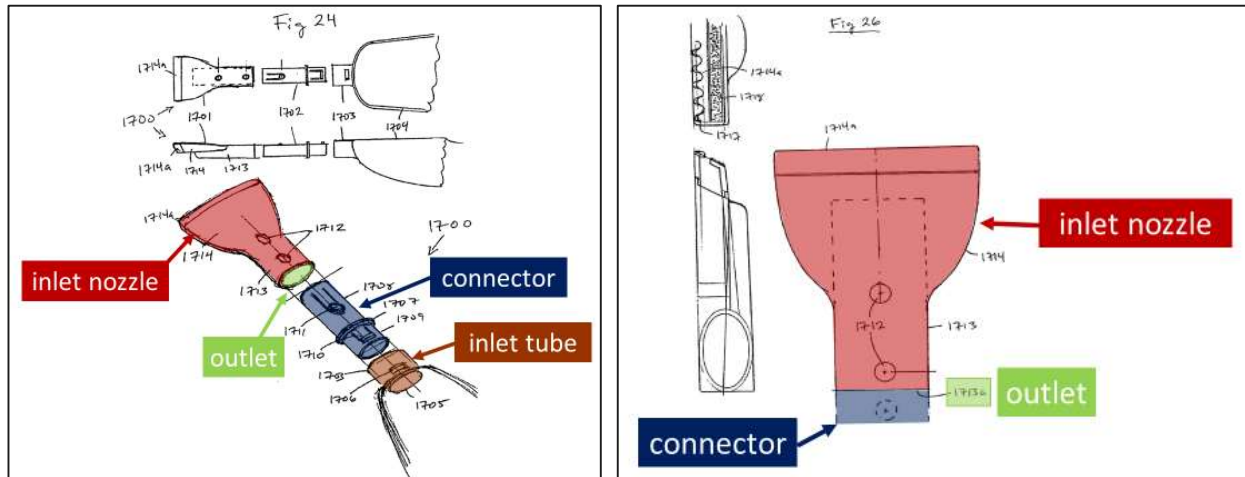
Ex1005, 31:6-27, 42:6-9, Figs. 12A, 24, 26; Ex1002 ¶¶117-118.

e. [1c.1]/[12c.1.i]

Butler teaches these limitations. Ex1002 ¶¶119-124.

Butler teaches a rigid air flow conduit (“**nozzle connector 1702**”) which is mountable between the cleaning head air outlet (“**outlet 1713a** for the **inlet nozzle 1701**”) and a hand vacuum cleaner air inlet (“**inlet tube 1703** located on the housing”), and, when mounted to the surface cleaning head and the hand vacuum

cleaner, extends between the surface cleaning head air outlet and the dirty air inlet of the hand vacuum cleaner:



Ex1005, 41:8-11, 42:7-8, Figs. 24, 26; Ex1002 ¶¶121-122.

Butler’s “**inlet tube**” is “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.” Ex1005, 41:15-18.

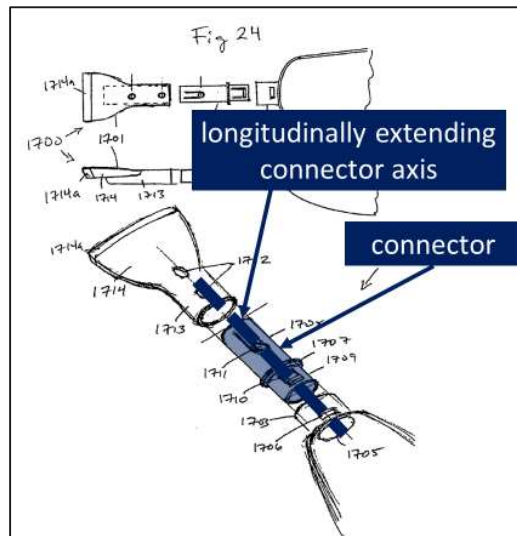
Butler’s “**connector 1702** is a hollow tube” “divided into two portions by a collar 1707”: an upstream “inlet portion 1708,” which is “telescopically received within the **nozzle 1701**,” and a downstream “outlet portion 1709,” which is “telescopically received within or around the **inlet tube 1703**.” *Id.*, 41:19-29. The mounting includes “a flexible nozzle-attaching tab 1711 that corresponds to one or more apertures 1712 in the nozzle 1701,” such that the user may “depress this tab 1711 to remove the nozzle 1701 from the connector 1702.” *Id.*, 41:26-42:1. Likewise, “cantilever tab 1710” fits into the “inlet tube aperture 1706” of the hand

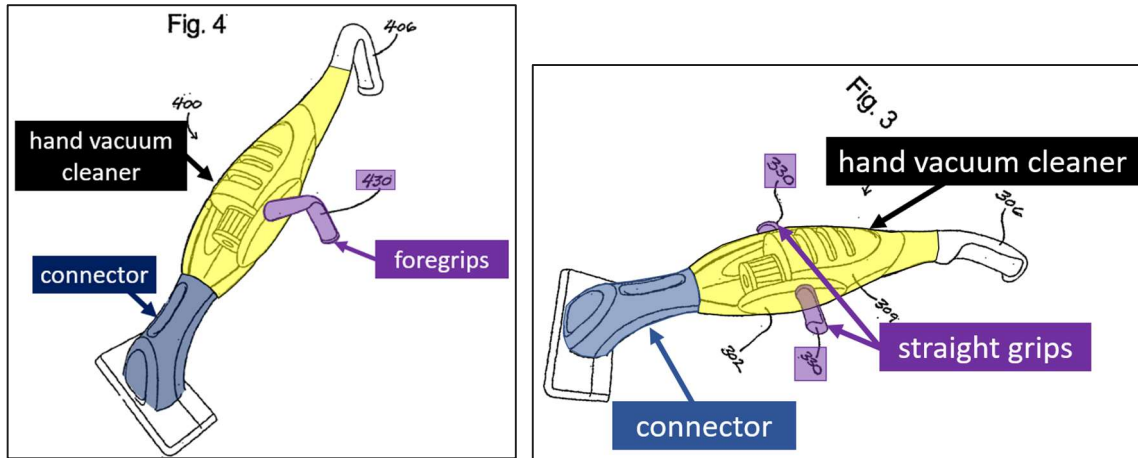
vacuum cleaner and a user can depress the “cantilever tab 1710,” clicking it out of the “inlet tube aperture 1706” to remove the “connector 1702” from the “vacuum cleaner.” *Id.*, 41:19-26; Ex1002 ¶¶123-124.

f. [12c.1.ii]

Butler teaches these limitations. Ex1002 ¶¶125-130.

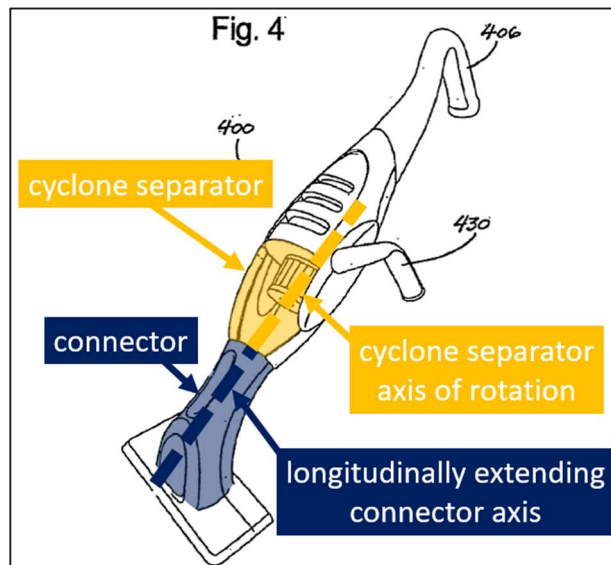
Butler’s **connector** has a **longitudinally extending connector axis**, which is a longitudinally extending conduit axis:

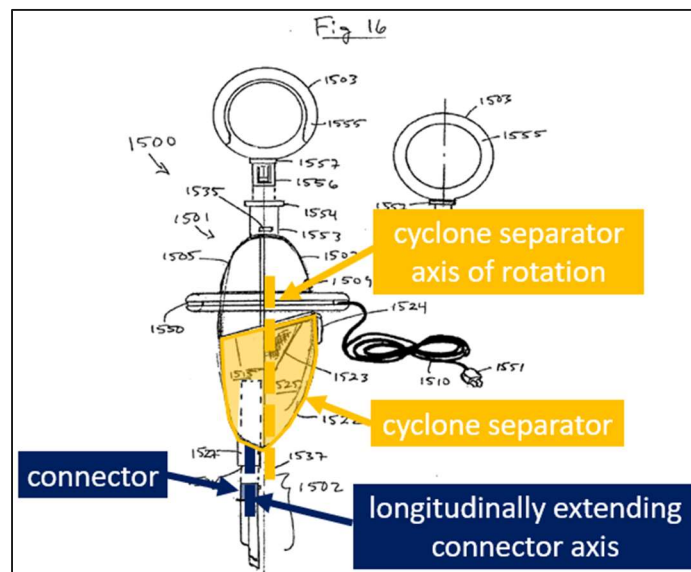
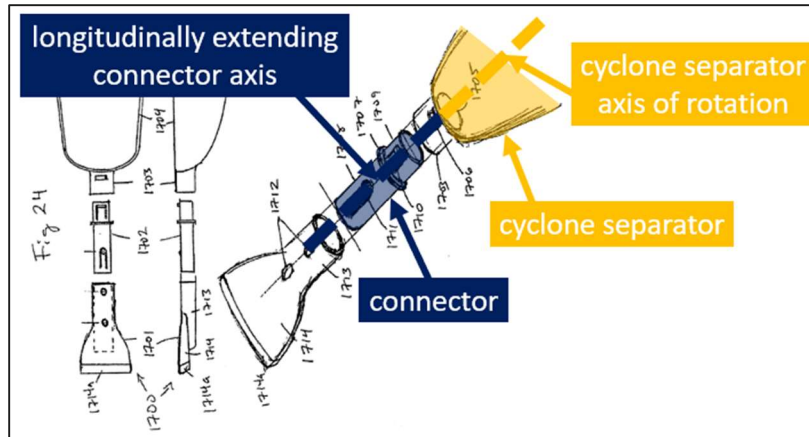




Ex1005, 19:9-12, 19:22-24, Figs. 3-4; Ex1002 ¶128.

When so mounted, the **longitudinally extending connector axis** is parallel to the **cyclone separator's axis of rotation**:





Ex1005, Figs. 4-5, 24, 16; Ex1002 ¶129.

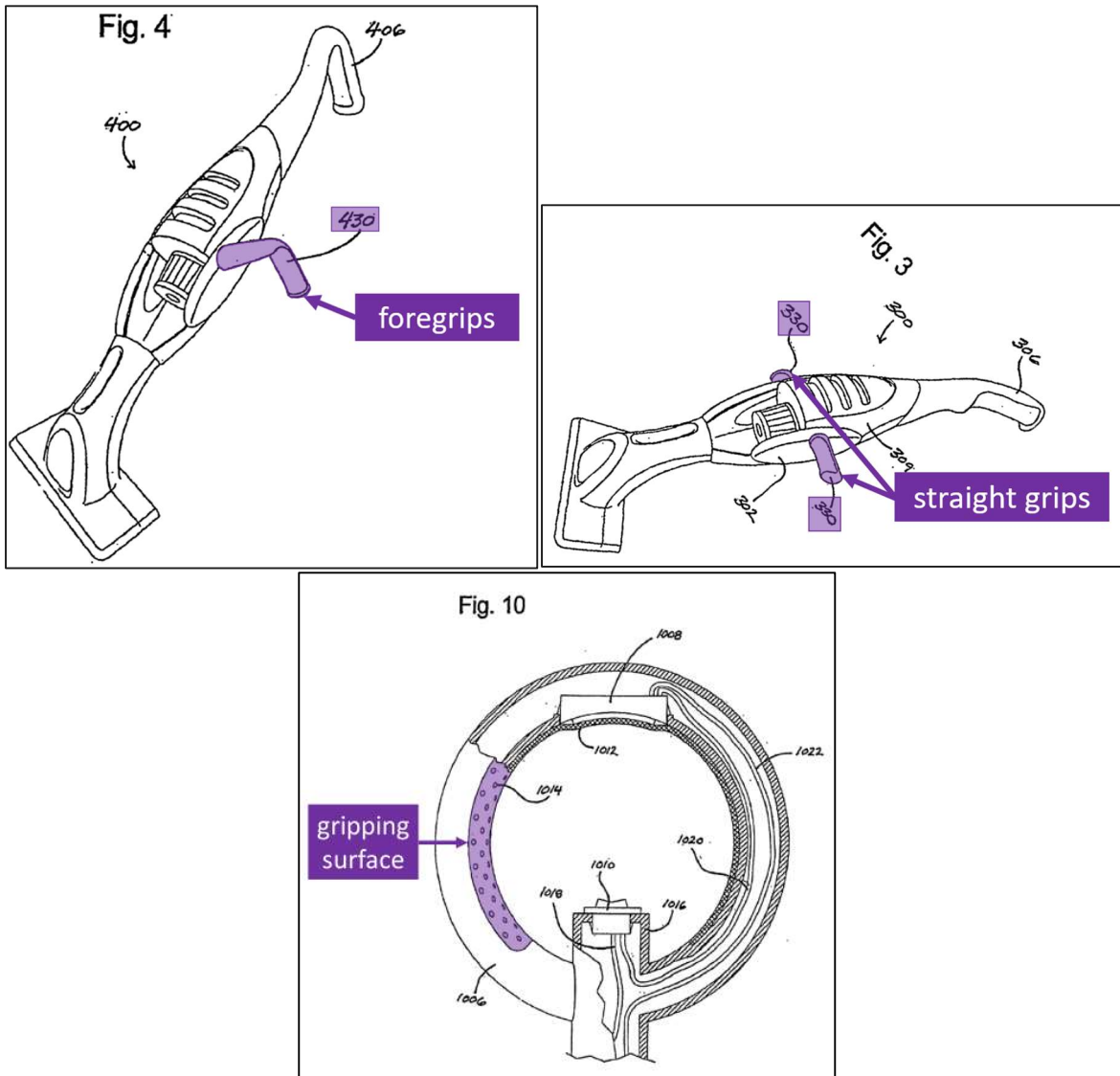
If PO argues these axes are co-axial, a POSA would have understood they are also parallel. Ground 1, [1a.2]/[12a.2]; Ex1002 ¶130.

g. [1c.2]/[12c.2]

Butler teaches and renders obvious these limitations. Ex1002 ¶¶131-146.

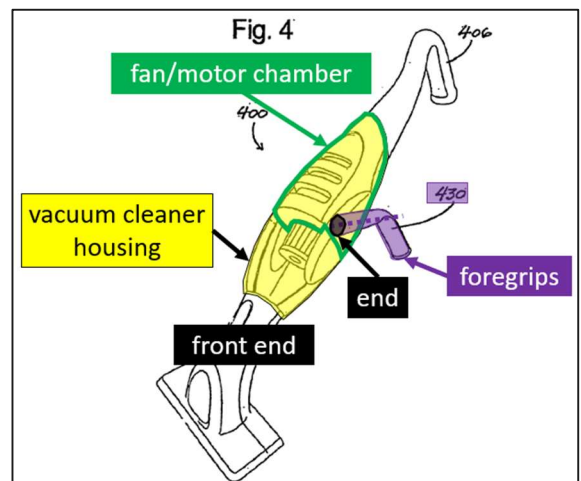
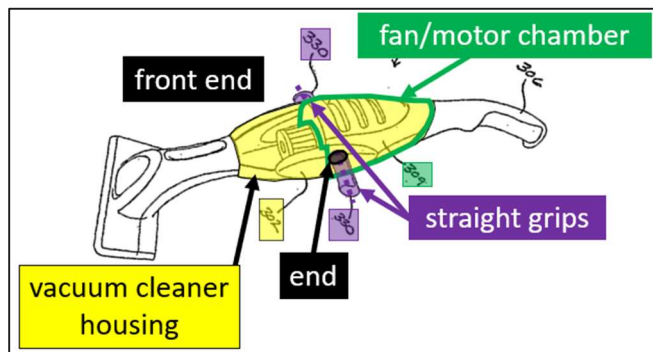
Regarding [1c.2], Butler’s pistol grip handle has a pistol grip portion. Ex1002 ¶¶133-134. A “gripping surface” may be placed on any or all portions of any of Butler’s disclosed handles: “pistol-grip style **foregrips 430**” and “**straight**

grips 330” “may be made from any suitable material, and may also include **gripping surfaces** or surface treatments to enhance the user’s grip and feel,” and these “**gripping surfaces**...compris[e] 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”:



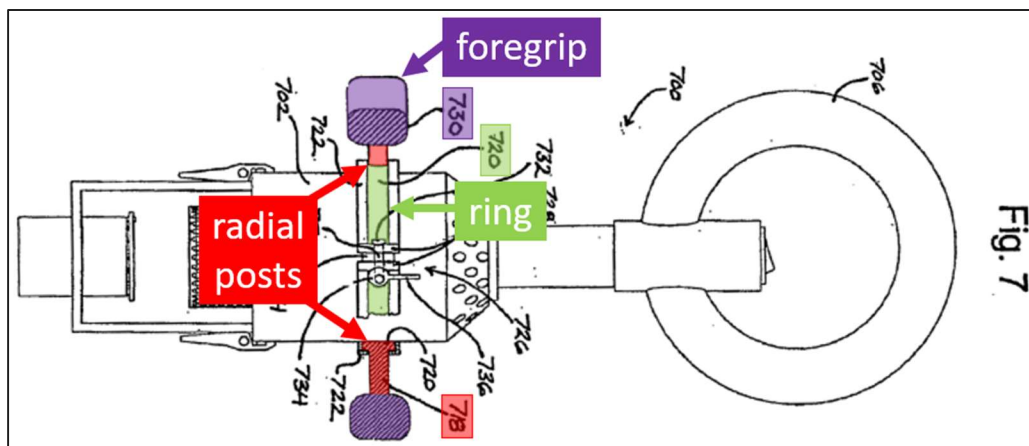
Ex1005, 11:3-11, 11:22-24, 19:22-20:2, Figs. 3-4, 10; Ex1002 ¶133. Butler's "pistol-grip style foregrips" and "straight grips" with pistol-grip-shaped "gripping surfaces" that a user grips with their hand are a pistol-grip handle having a pistol-grip portion. Ex1002 ¶134.

Butler's pistol-grip handle extends generally radially away from, and has an end mounted to, an outer wall of the hand vacuum cleaner ("vacuum cleaner housing 302") at a location rearward of the front end and forward of a rear end of the suction motor. Ex1002 ¶135. Butler's "foregrip[s]...extend generally radially from the vacuum cleaner housing 302 at a location adjacent...the fan/motor chamber 309":



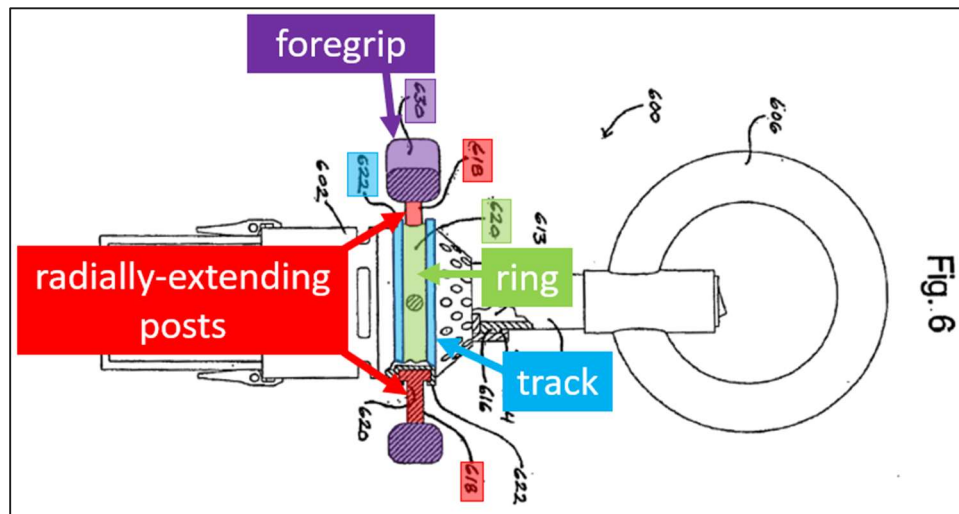
Ex1005, Figs. 3-4, 19:18-24; Ex1002 ¶135. As shown above, Butler's foregrips 330, 430, which "may be provided with joints or pivots to allow them to be articulated into more desirable positions," have an **end** mounted to "vacuum cleaner housing 302" at a location rearward of the **front end** and forward of a rear

Each of Butler's foregrips can be provided on any portion of the vacuum cleaner housing, including at a location rearward of the front end and forward of a rear end of the suction motor: "foregrips 330, 430...can be removed and inserted in various different locations on the housing," and they "may be pivotable or otherwise articulated to provide even greater ergonomic flexibility and control of the device." Ex1005, 19:24-26, 22:26-28; Ex1002 ¶139. Butler's "foregrip 730 is attached to a ring 720," "and the ring 720 is sized such that it can slide along the length of the housing," "allow[ing] the user to adjust the distance between the rear grip and the foregrip":



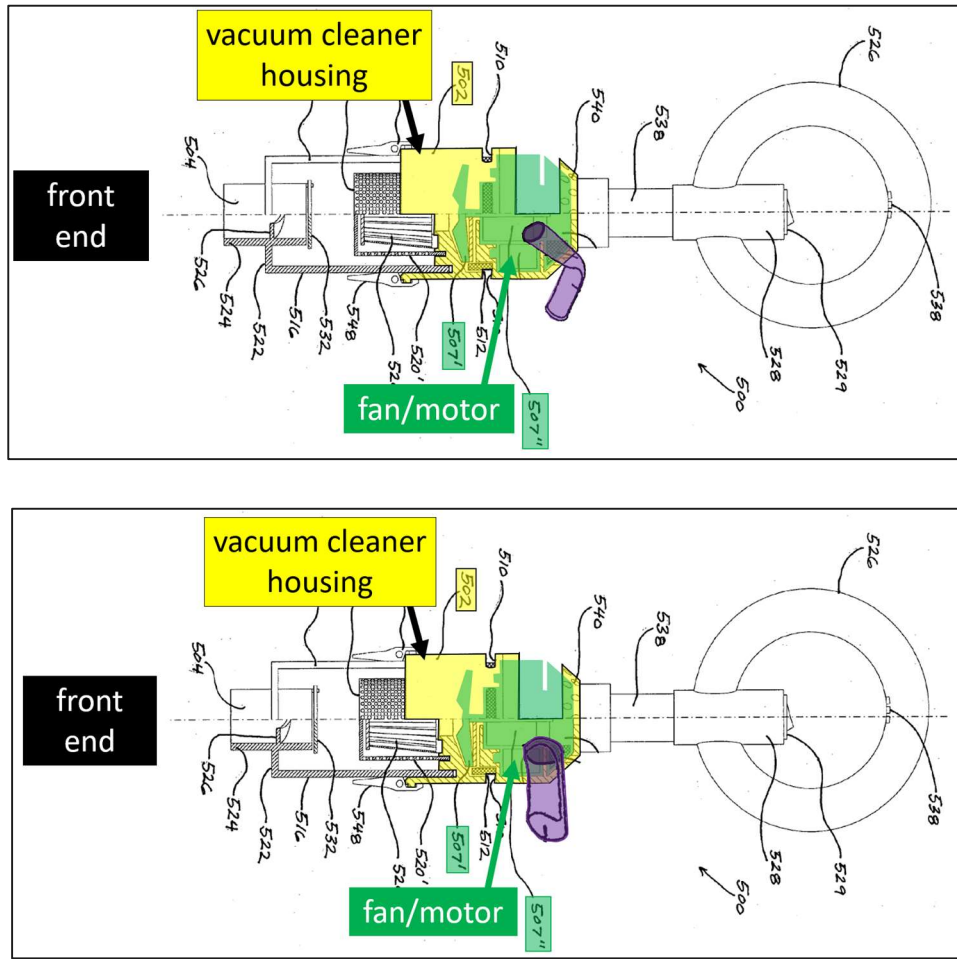
Ex1005, 24:3-11; Fig. 7; *id.*, Figs. 2A, 3-6, 8, 16, 23; Ex1002 ¶140. A POSA would have understood when "ring 720" "slide[s]" rearwardly "along the length of the housing," Butler's "foregrip" is also mounted to, and extends generally radially away from, an outer wall of the hand vacuum cleaner at a location rearward of the front end and forward of a rear end of the suction motor. Ex1002 ¶141.

“[T]he **foregrip**...is also rotatable about the vacuum cleaner housing.”
Ex1005, 23:12-13. “[T]he **foregrip** is attached to the housing 602 by a number of **radially-extending posts 618**, which terminate...at a **ring 620**,” “captured within a **track 622** in the housing 602, in which it is free to rotate,” and “a lock may be provided to prevent excessive rotation or selectively prevent any rotation”:



Ex1005, 23:14-17, Fig. 6; *id.*, Figs. 2A, 3-5, 7-8, 16, 23; Ex1002 ¶142. “[T]he loop-shaped grips may be replaced by any combination of rear grip and foregrip,” e.g., “foregrips 330, 430,” which “can be removed and inserted in various different locations on the housing.” Ex1005, 19:9-12, 19:24-26. Thus, a POSA would have understood each of Butler’s “foregrips” can be provided on any location of Butler’s “housing” (including the claimed location). Ex1002 ¶143. A POSA would have understood because Butler’s “**foregrips 330, 430**” are rotatable around the circumference of Butler’s body, and slideable forward and rearward on Butler’s

body, one of the available positions on Butler’s “**housing 502**” is a location rearward of the front end and forward of a rear end of the “**fan/motor**”:



Ex1005, Figs. 3(modified), 4(modified), 5(modified); Ex1002 ¶144.

A POSA would have understood this limitation is met regardless of whether “the front end” as claimed refers back to the claimed “a front end” of the hand vacuum cleaner, the claimed “a front end” of the surface cleaning head, or refers to a front end of the suction motor, because, as shown and explained above, Butler’s pistol-grip handle is rearward of the front end of the suction motor and the front

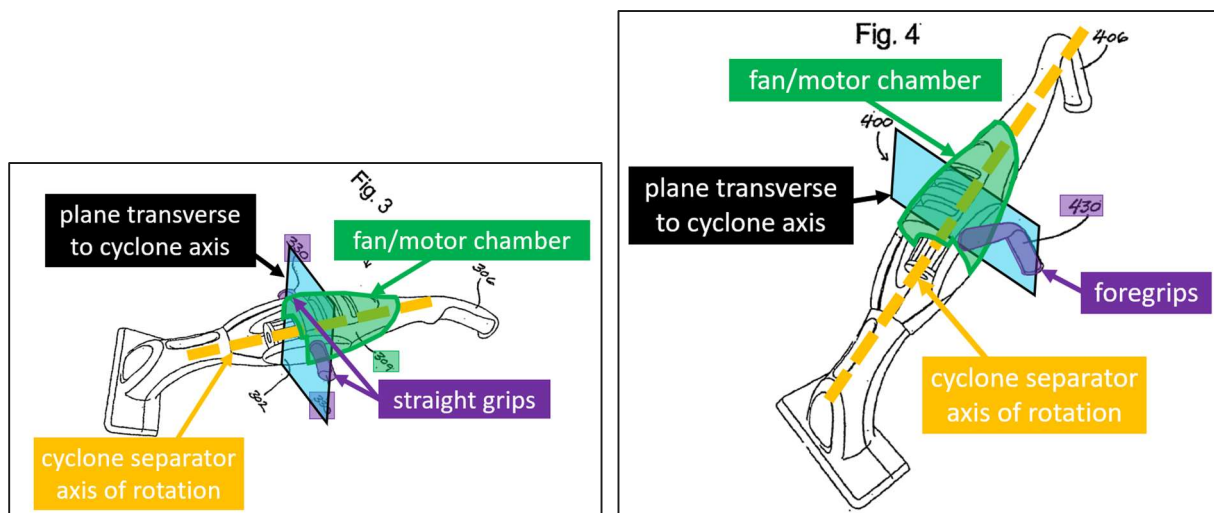
ends of the hand vacuum cleaner and surface cleaning head are forward of the front end of the suction motor. Ex1002 ¶145.

If the claimed mounting location is not expressly disclosed, a POSA would have found it obvious to improve the maneuverability of Butler's cleaner by mounting the handle at a location that reduces asymmetrical weight balance caused by heavy components like the motor, thereby increasing ergonomics and reducing strain on the user, which is a stated goal of Butler. Ex1002 ¶146. Butler teaches "it may be beneficial to locate" the handle "to assist with manipulating the vacuum," and "the foregrip 130 should generally surround the device's center of gravity CG" so, "as the user rotates the vacuum cleaner 100, the center of gravity CG will remain at generally the same location, causing the general balance of the device to feel the same regardless of its angular orientation." Ex1005, 10:23-26, 13:3-11. "The position of the center of gravity CG can be adjusted when designing the device by selectively positioning the various working parts along the length of the vacuum cleaner." *Id.*, 15:15-18. A POSA thus would have been motivated to improve weight balance by mounting Butler's pistol-grip handle at a location rearward of the front end and forward of a rear end of the suction motor and would have reasonably expected success because Butler teaches handle relocation to assist with manipulating the vacuum can and should be done. Ex1005, 10:23-26, 13:3-11, 19:22-28; Ex1002 ¶146.

h. [1c.3]

Butler teaches and renders obvious these limitations. Ex1002 ¶¶147-149.

Butler teaches and renders obvious mounting an end of the pistol-grip handle to an outer wall of the hand vacuum cleaner at a location rearward of the front end and forward of a rear end of the suction motor. Ground 1, [1c.2]/[12c.2]. When so mounted, a plane transverse to the cyclone axis of rotation extends through the pistol-grip portion and the hand vacuum cleaner at a location rearward of the front end and forward of a rear end of the suction motor:



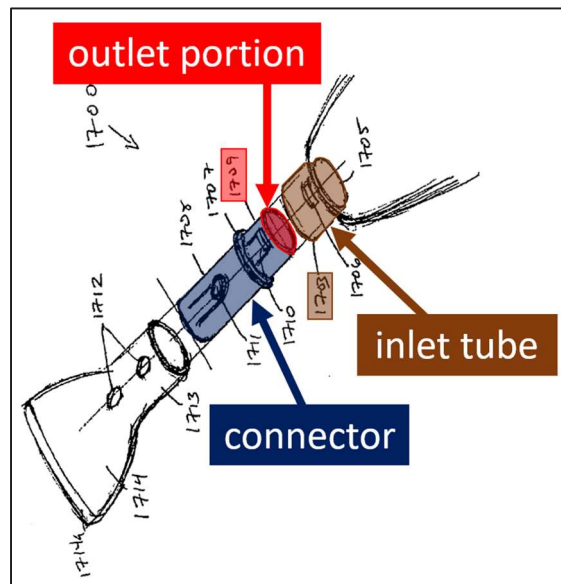
Ex1005, Figs. 3-4, 19:22-28; Ex1002 ¶148.

For the same reasons as explained for Ground 1, [1c.2]/[12c.2], a POSA would have been motivated to modify Butler to locate the pistol-grip handle as claimed to optimize weight balance and would have reasonably expected success. Ex1002 ¶149.

i. [1c.4]

Butler teaches these limitations. Ex1002 ¶¶150-152.

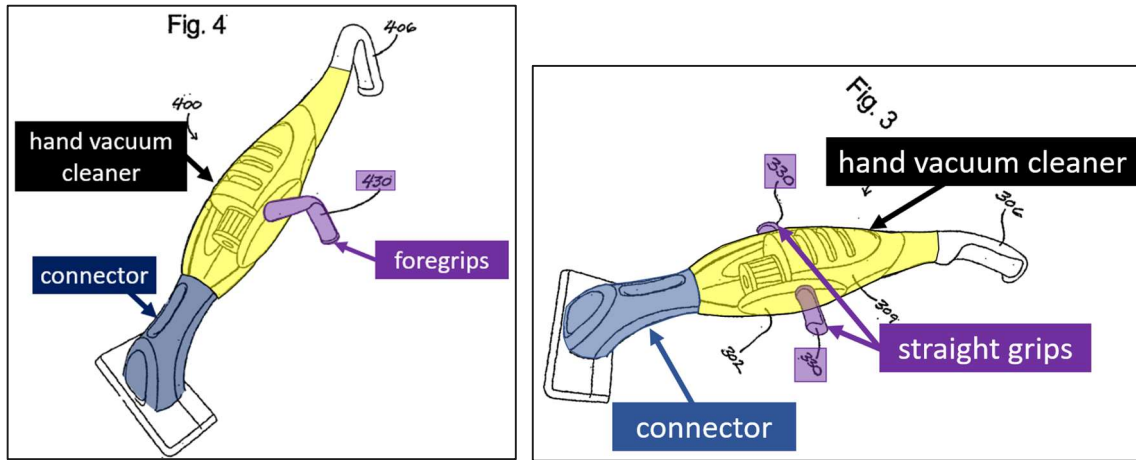
Butler teaches the dirty air inlet (“**inlet tube 1703**”) of the hand vacuum cleaner is removably drivingly mountable to a downstream end of the rigid air flow conduit (“**outlet portion 1709**” of “**connector 1702**”):



Ex1005, 41:9-42:5, Fig. 24; Ex1002 ¶151; Ground 1, [1c.1]/[12c.1.i], [12c.1.ii].

A POSA would have understood Butler's "inlet tube 1703" is removably drivingly mountable to "outlet portion 1709" of "connector 1702" and, when the hand vacuum cleaner is mounted to "outlet portion 1709" of "connector 1702," Butler's pistol-grip handles (**foregrips 330, 430**) are a driving handle for the surface cleaning apparatus because they are used to "ergonomically maneuver the device and rotate it into different positions for cleaning horizontal and inclined

surfaces,” and the rigid “**connector**” likewise drives surface-cleaning-head movement when mounted:

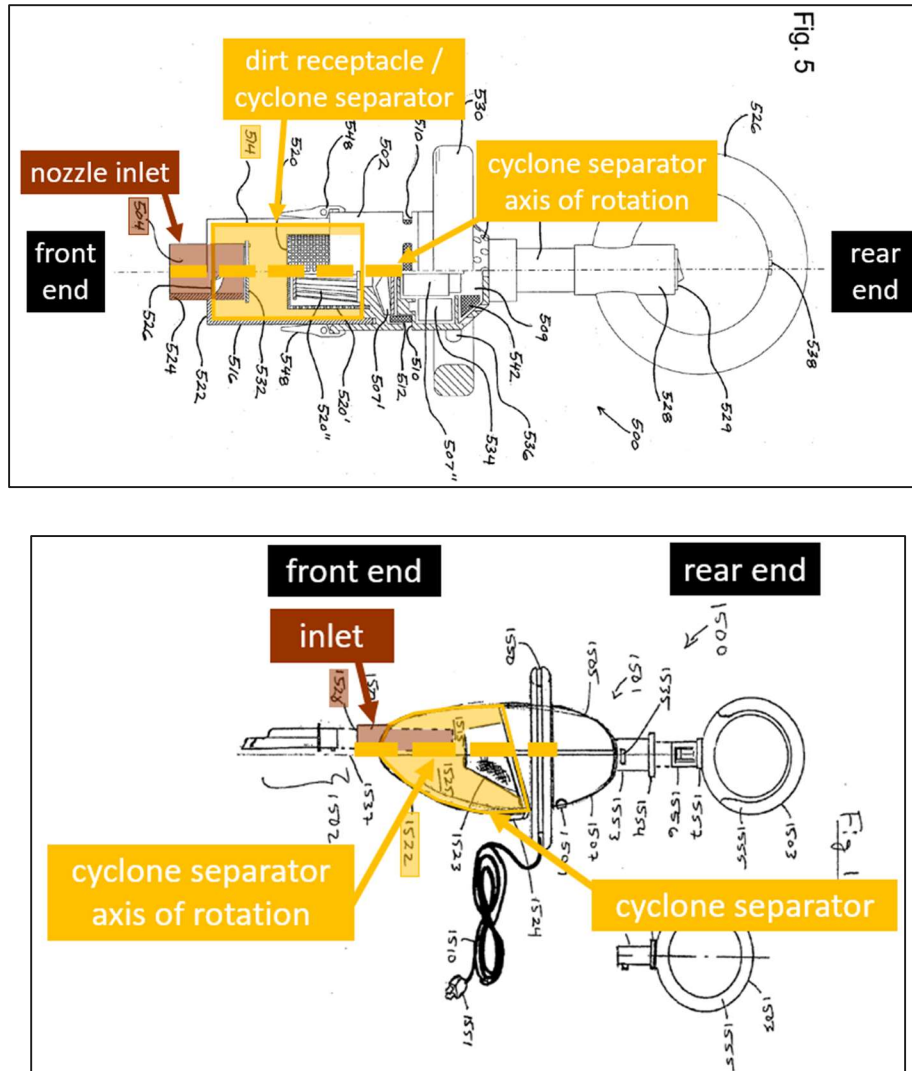


Ex1005, 19:9-12, 19:22-24, Figs. 3-4; Ex1002 ¶152.

j. [1c.5]

Butler teaches these limitations. Ex1002 ¶¶153-154.

When Butler’s hand vacuum cleaner is positioned with the **front end** of the hand vacuum cleaner in front of the **rear end** of the hand vacuum cleaner and the dirty air inlet (“**nozzle inlet 504**”/“**inlet 1528**”) faces forwardly, the **cyclone separator axis of rotation** is generally horizontal:

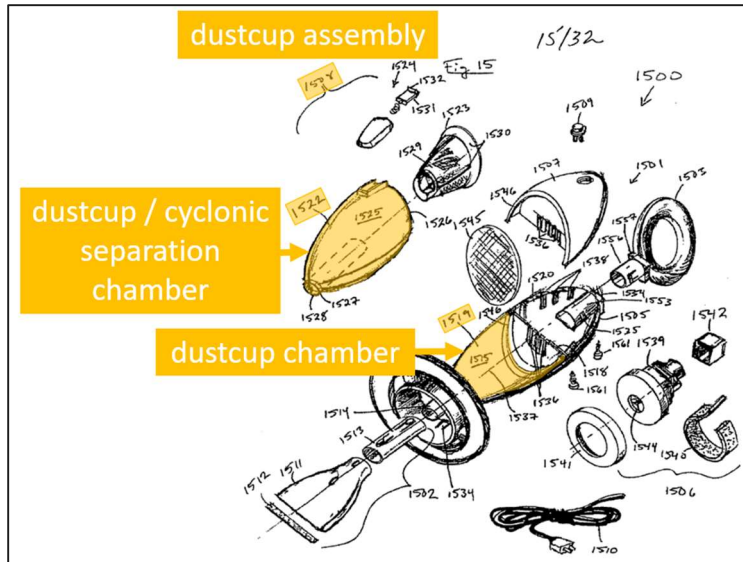


Ex1005, Fig. 5; Ex1002 ¶154; Ground 1, [1a.1]/[12a.1].

3. [2]/[14]

Butler teaches and renders obvious claims 1 and 12 and teaches the additional limitations of these claims. Ex1002 ¶¶155-159.

Butler’s “**dustcup 1522** is removably installed in the **dustcup chamber 1519**”:

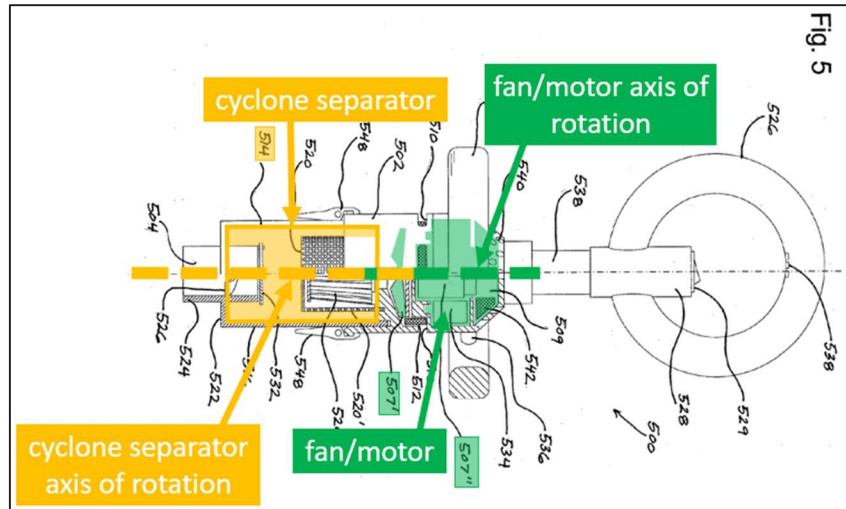


Ex1005, 35:14-16, Fig. 15; *id.*, 21:8-9 (“dirt receptacle 514 is removably attached”), 21:16-23 (same); Ex1002 ¶¶158-159; Ground1, [1a.2]/[12a.2].

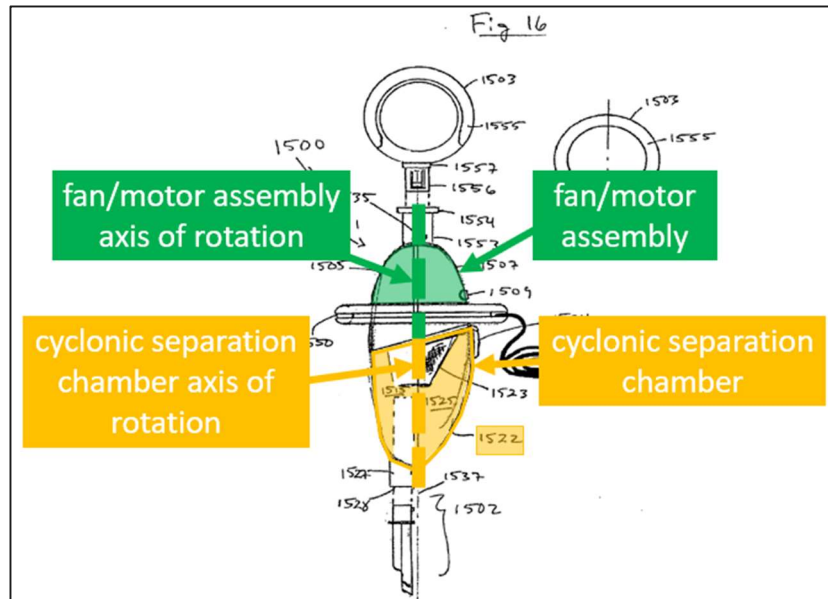
4. [4]

Butler teaches and renders obvious claim 1 and teaches the additional limitations of this claim. Ex1002 ¶¶160-164.

Butler’s cyclone axis of rotation (**cyclone separator axis of rotation**) is generally parallel to the suction motor axis of rotation (**fan/motor axis of rotation**):



Ex1005, Fig. 5; Ex1002 ¶162. Butler’s **cyclonic separation chamber axis of rotation** is generally parallel to the “**fan/motor assembly 1506[’s]’ axis of rotation**”:



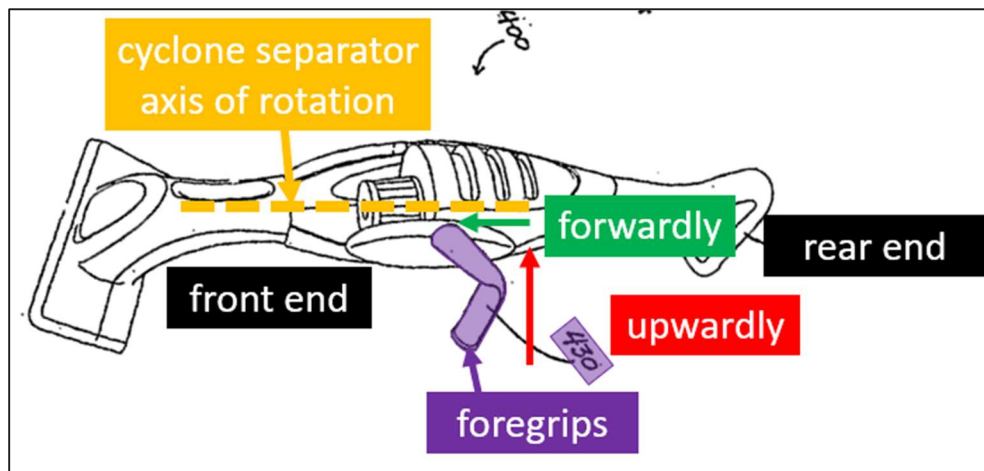
Ex1005, 35:4-6, Fig. 16; Ex1002 ¶163.

If PO argues these axes are co-axial, a POSA would have understood such axes are also parallel. Ground 1, [1a.2]/[12a.2]; Ex1002 ¶164.

5. [5]

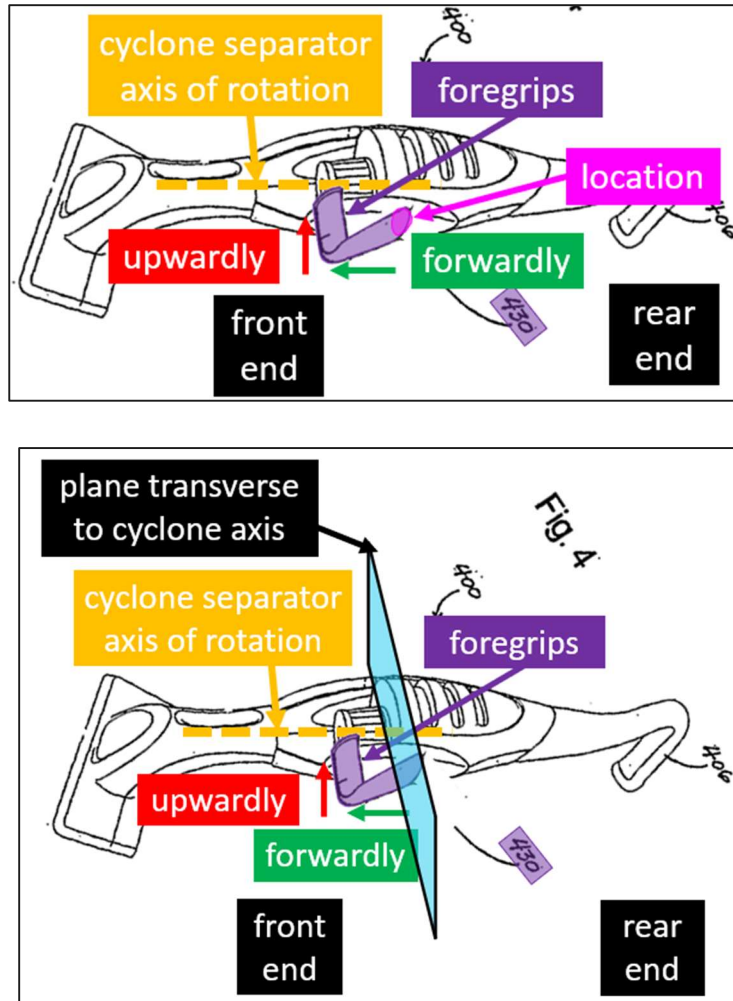
Butler teaches and renders obvious claim 1 and teaches and renders obvious the additional limitations of this claim. Ex1002 ¶¶165-169.

Butler's pistol-grip handle ("foregrips 430") extends **upwardly** and **forwardly** from the location when the hand vacuum cleaner is positioned with the **front end** forward of the **rear end** and the cyclone axis of rotation (**cyclone separator axis of rotation**) is positioned horizontally:



Ex1005, 19:23-24, Fig. 4; Ex1002 ¶167; Ground 1, [1a.2]/[12a.2].

Butler's "foregrips 330, 430" also may be provided with joints or pivots to allow them to be articulated into more desirable positions," which a POSA would have understood includes a position in which the pistol-grip style foregrips 430 extend upwardly and forwardly from **the location**, regardless of whether "the location" refers to "a location" where the handle end is mounted ([1c.2], top), or "a location" of the plane transverse to cyclone axis ([1c.3], bottom):



Ex1005, 19:26-28; Ex1002 ¶168; Ground 1, [1c.2]/[12c.2].

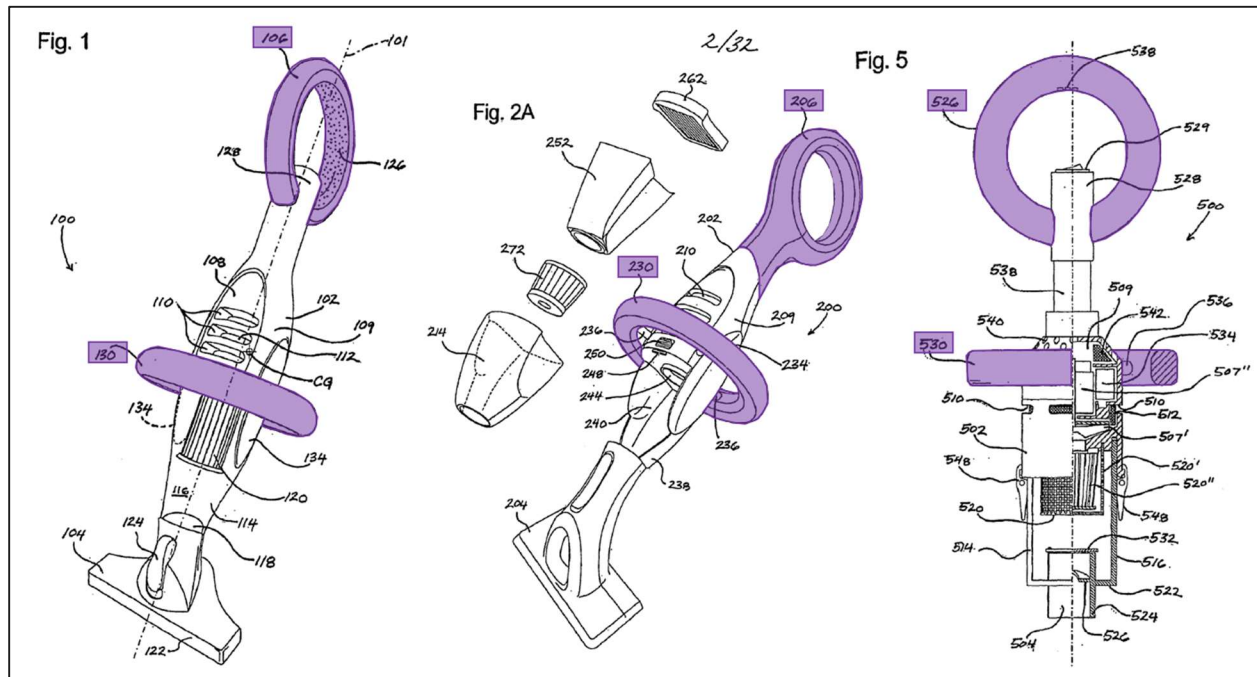
Alternatively, a POSA would have been motivated to modify Butler’s pistol-grip handles to be oriented as claimed to optimize user ergonomics for certain uses and would have reasonably expected success. Ex1002 ¶169. In Butler, “any combination of rear grip and foregrip that provide[s] the user with hand positions to ergonomically maneuver the device and rotate it into different positions” can be used and foregrips that “provide multiple hand positions” are beneficial. Ex1005, 19:6-17. A POSA therefore would have understood modifying Butler’s articable

foregrips to extend upwardly and forwardly from the location when the hand vacuum cleaner is orientated as claimed would have been straightforward and would have involved the simple substitution of one handle in one orientation for a different handle in a different orientation. Ex1002 ¶169.

6. [6]/[17]

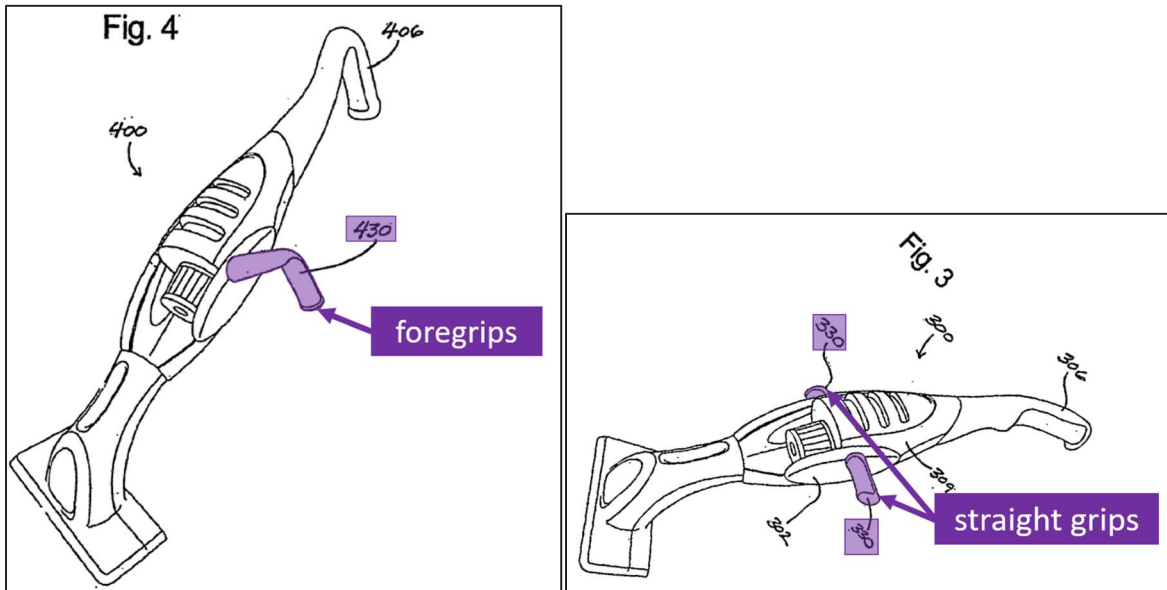
Butler teaches and renders obvious claim 1 and renders obvious the additional limitations of these claims. Ex1002 ¶¶170-181.

Butler teaches handles—**rear grips** and **foregrips**—having enclosed finger grip areas, including those provided on the forward side of the handle:



Ex1005, Figs. 1, 2A, 5; Ex1002 ¶172; Ground 1, [1c.2]/[12c.2] (“gripping surfaces” may be placed on any/all portions of any Butler handle).

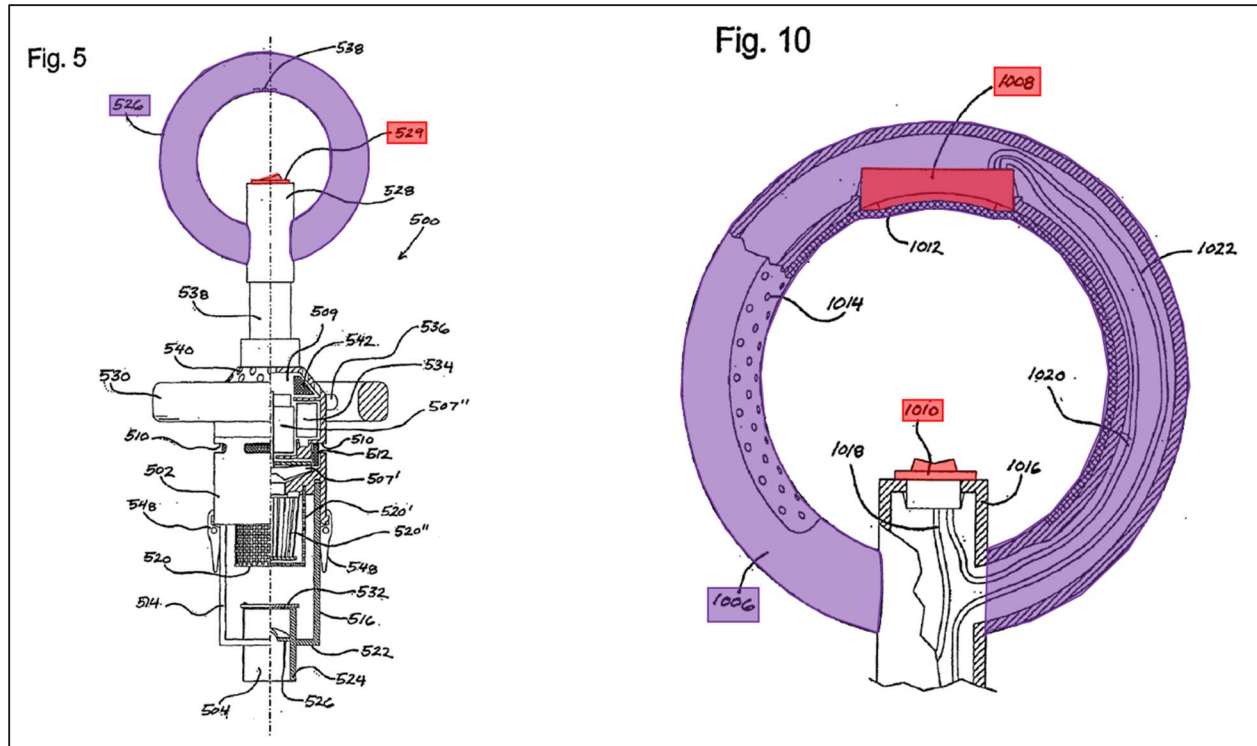
In Butler, a finger-actuated “power trigger” and/or “power switch” for operating the vacuum cleaner can be located on Butler’s various handles, including Butler’s pistol-grip handle (**foregrips 330, 430**):



Ex1005, 19:18-24, 20:7-11, 28:22-27, 29:1-2, 29:23-25, Figs. 3-4; Ex1002 ¶173.

While Butler does not explicitly depict the pistol-grip handles having an enclosed finger grip area provided on a forward side of the handle, a POSA would have found this obvious and would have been motivated to modify Butler accordingly to achieve certain well-known benefits of such a handle, including benefits Butler expressly teaches. Ex1002 ¶174. As Butler explains, handles having enclosed finger grip portions “give[] the user flexibility in selecting an ergonomic position in which to hold the [handle]”; they “provide a natural fit in the user’s hand” “to support and maneuver the back of the vacuum cleaner”; they “allow[] the user to hold the [handle] in virtually any annular location,” which

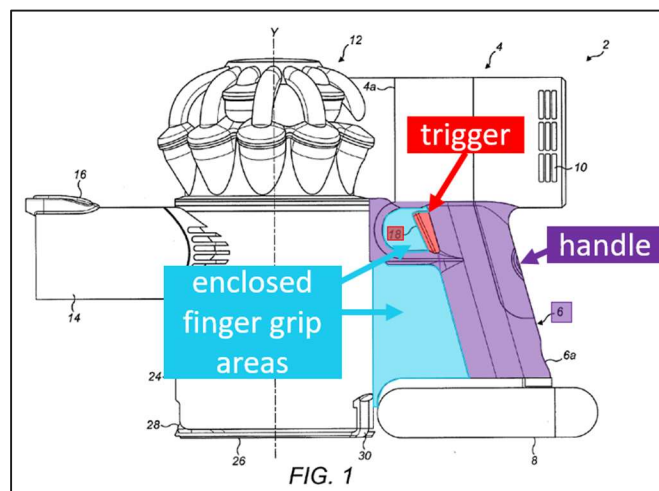
“provides improved flexibility in handling the device, and allows the user to rotate the housing to point the inlet nozzle 104 horizontally[,...]vertically[,...]or at any angle in between” because “[r]egardless of which angular position the housing 102 is in, the user can still maintain a firm and comfortable grip on the rear grip 106 and foregrip 130”; and they beneficially “shield[] the power switch [529/1010] ... from being accidentally activated,” thereby “reducing the likelihood of accidental activation”:



Ex1005, Figs. 5, 10, 10:16-27, 11:18-19, 12:4-12, 20:7-10, 29:1-22; *id.*, 29:25-29 (describing another accidental device activation prevention layout); Ex1002 ¶175. A POSA would have understood such handles also beneficially protect a user’s fingers from being pinched or injured by accidental contact with furniture, walls,

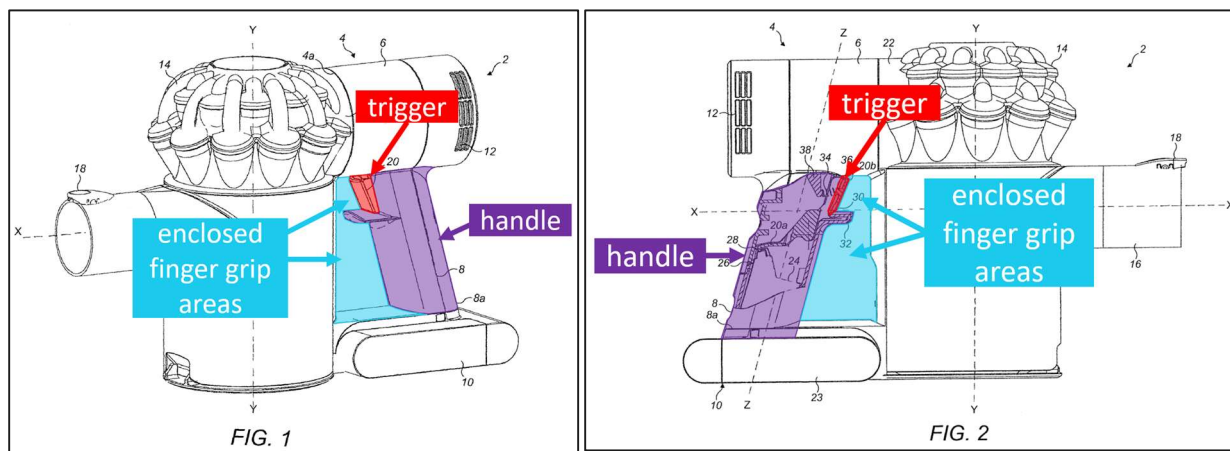
stairs, or other obstacles, and preventing injury is one of Butler's stated goals. Ex1005, 1:22-24 (addressing prior-art cleaners for which "unwieldy ergonomics" is "dangerous"), 28:18-20 (the prior art "tendency to keep the vacuum motor running at all times...increases the risk of injury"); Ex1002 ¶176.

Pistol-grip handles having enclosed finger grip areas provided on a forward side of the handle were well-known in the art to achieve these benefits. Ex1002 ¶¶176-177. US2013/0160232, published 18 months before the '983Patent's earliest-claimed priority date, teaches a hand-held vacuum cleaner with "**handle 6...oriented in a pistol-grip formation**" that has **enclosed finger grip areas** on a forward side of the **handle** that protect the user's fingers from injury and protect against accidental activation of a finger-actuated "**trigger 18** for turning the vacuum cleaner motor on and off":



Ex1018 ¶27, Fig. 1; Ex1002 ¶177. Similarly, PCT Publication 2013/117901, published 16 months before the '983Patent's earliest-claimed priority date, teaches

a hand-held vacuum cleaner with “**handle 8**...oriented in a pistol-grip formation” and **enclosed finger grip areas** on a forward side of the **handle** (where the user “grasp[s] the **handle**”) that protect the user’s fingers from injury and protect accidental activation of a finger-actuated “**trigger member 20**,” including because a “plate-like finger rest 32...allows a user to grasp the **handle** without actuating the **trigger**, during carrying for example”:



Ex1017, 5:17-18, 6:11-12, 7:31-8:4, 27:31-28:4, Figs. 1-2; Ex1002 ¶178.

A POSA therefore would have been motivated to modify Butler’s foregrips 330, 430 to incorporate one or more enclosed finger-grip areas (covering Butler’s foregrip-located “power trigger”/“power switch” and/or covering all of Butler’s foregrip grip portions) to achieve these benefits of preventing accidental cleaner operation and injury. Ex1002 ¶179. A POSA would have understood this modification involves a simple addition of a known element (an extension of foregrip 330, 430 enclosing “power trigger”/“power switch” and/or the entire

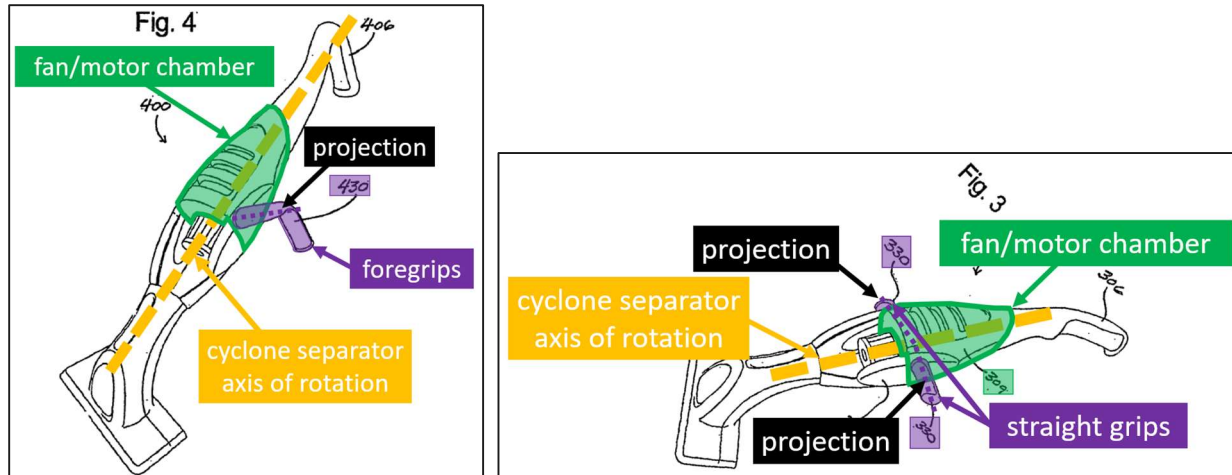
handle) to obtain the predictable results of encasing and protecting the hand-grip portion of the handle and “shield[ing] the power switch to some degree from being accidentally activated,” as Butler teaches. Ex1005, 11:18-19, Ex1002 ¶179. This modification would have at least been obvious to try as one of a finite number of handle possibilities, including handles with exposed finger-grip areas and handles with enclosed finger-grip areas. Ex1002 ¶¶179-180.

A POSA would have reasonably expected success modifying Butler’s foregrips as described for the reasons listed above. Ex1002 ¶181. Butler’s foregrips can “include[] various features to enhance the ergonomics and control of the vacuum cleaner,” and Butler’s handles “may be replaced by any combination of rear grip and foregrip that provide the user with hand positions to ergonomically maneuver the device,” which would have further given a POSA a reasonable expectation of success. Ex1005, 12:3-4, 19:6-12; Ex1002 ¶181.

7. [7]/[8]/[18]/[19]

Butler teaches and renders obvious claim 1 and teaches and renders obvious the additional limitations of these claims. Ex1002 ¶¶182-190.

In Butler, a projection of the pistol-grip handle (**foregrips 330, 430**) in a direction transverse to the cyclone axis of rotation (**cyclone separator axis of rotation**) intersects the suction motor and fan assembly and a housing of the suction motor and fan assembly (**fan/motor chamber 309**):



Ex1005, 19:18-24, Figs. 3-4; Ex1002 ¶185; Ground 1, [1a.2]/[12a.2].

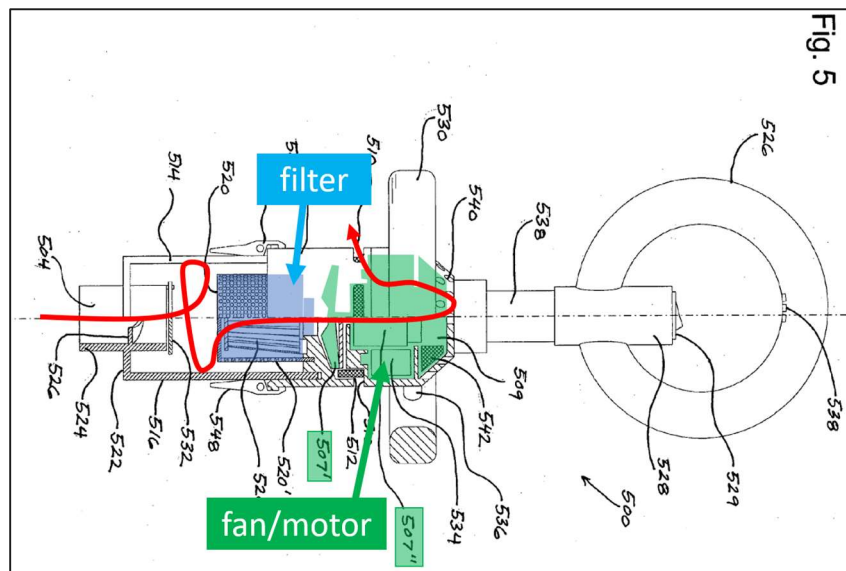
Butler’s “foregrips 330, 430...can be removed and inserted in various different locations on the housing,” including “at a location adjacent...the fan/motor chamber 309,” which contains the “fan/motor,” and other locations at which a POSA would have understood a projection of the pistol grip handle in a direction transverse to the cyclone axis of rotation intersects the suction motor and fan assembly and its housing. Ex1005, 19:18-26, 20:12-13; Ex1002 ¶186.

Alternatively, for the reasons explained for Ground 1, [1c.2]/[12c.2], a POSA would have been motivated to modify Butler to locate Butler’s pistol-grip handle at such a location, including to optimize weight balance and increase ergonomics, usability, and comfort, and a POSA would have reasonably expected success because Butler teaches such handle-placement modifications can be done. Ex1026, 8:15-17; Ex1002 ¶¶187-190.

8. [9]/[20]

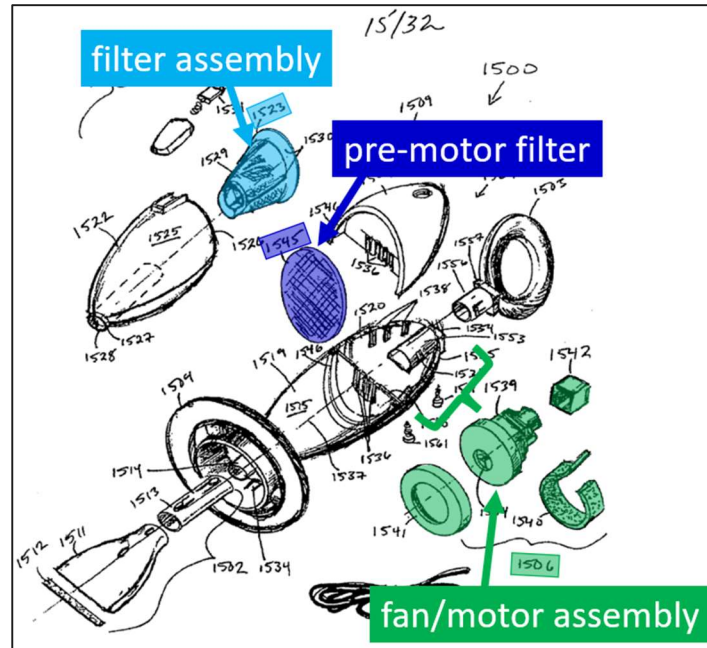
Butler teaches and renders obvious claims [2]/[14] and teaches the additional limitations of these claims. Ex1002 ¶¶191-198.

Butler teaches a pre-motor filter. Ex1002 ¶¶194-196. Butler’s “**filter 520** compris[ing]...**fine filter 520**” is positioned forward and upstream of “**fan/motor 507**,” and filters out “fine particle[s]” before the “working **airflow**” “cool[s] the **motor 507**”:



Ex1005, 20:14-26, 21:24-22:4, Fig. 5; Ex1002 ¶194.

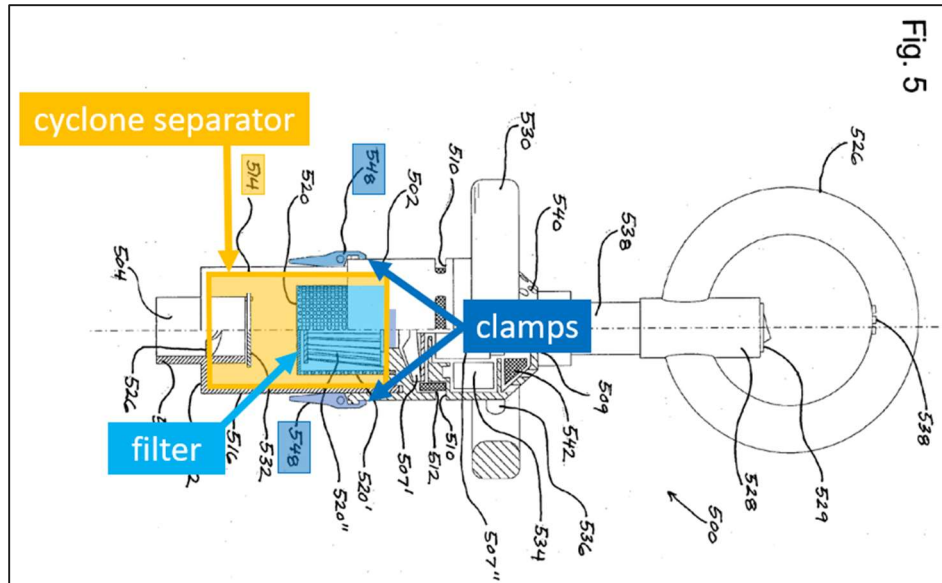
Butler teaches “**filter assembly 1523** compris[ing] a filter 1529” and “**pre-motor filter 1545**” positioned forward and upstream of “**fan/motor assembly 1506**”:



Ex1005, 35:20-24, 36:5-7, Fig. 15; Ex1002 ¶195.

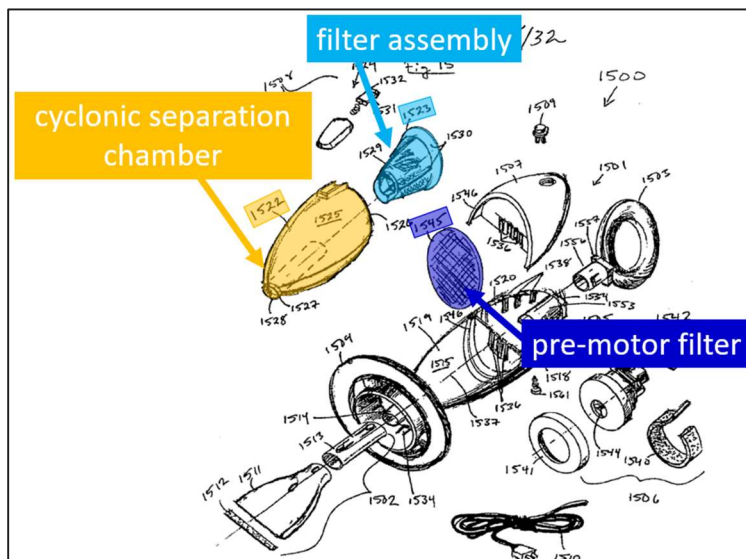
Each of these filters (filter 520, filter assembly 1523, and pre-motor filter 1545) is a pre-motor filter because each filters air before it reaches the suction motor. Ex1002 ¶196. In Butler, “any alternative filter shape, material, construction or filtration grade may be used, and multiple filter layers may also be used.” Ex1005, 18:12-14. A POSA therefore would have understood Butler teaches various physical filters that filter air upstream of Butler’s motor, which are interchangeable pre-motor filters. Ex1002 ¶196.

Butler teaches a pre-motor filter that is accessible when the cyclone unit is removed. Ex1002 ¶¶197-198. When Butler’s “cyclone separator” is “remov[ed]” by unclamping “[a] set of over-center clamps 548,” “filter 520 compris[ing]...fine filter 520” is accessible:



Ex1005, 21:8-15, 21:24-28, Fig. 5; Ex1002 ¶197.

When Butler's “**cyclonic separation chamber**” is “remov[ed]” from “[t]he body 1505,” “**filter assembly 1523**” and “**pre-motor filter 1545**” are each accessible:

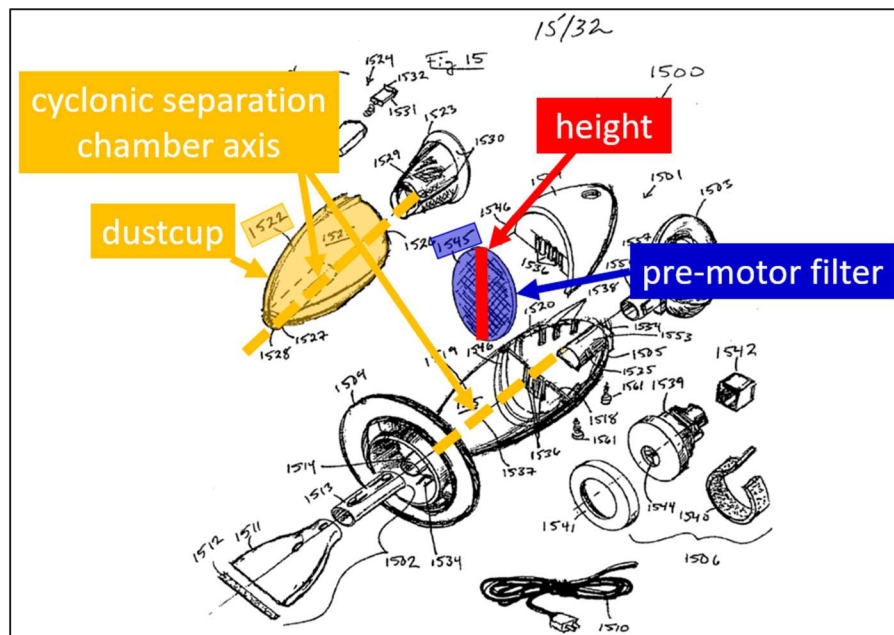


Ex1005, 35:12-16, 35:20-24, 36:2-7, Fig. 15; Ex1002 ¶198.

9. [10]/[21]

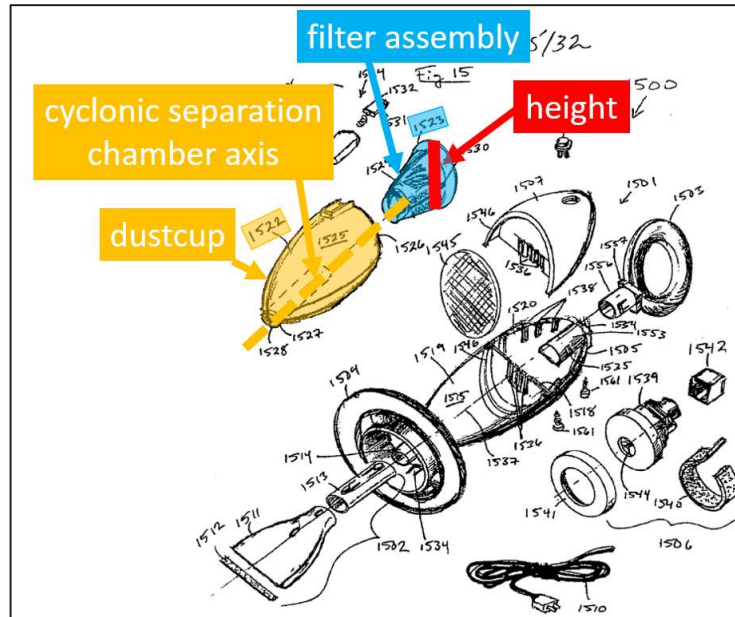
Butler teaches and renders obvious claims [9]/[20] and teaches and renders obvious the additional limitations of these claims. Ex1002 ¶¶199-215.

Butler teaches a pre-motor filter having a height in a direction transverse to the cyclone axis. Ex1002 ¶¶202-205. Butler’s “**pre-motor filter 1545**” has a **height** in a direction transverse to “**dustcup 1522[’s]**” **cyclonic separation chamber axis**:



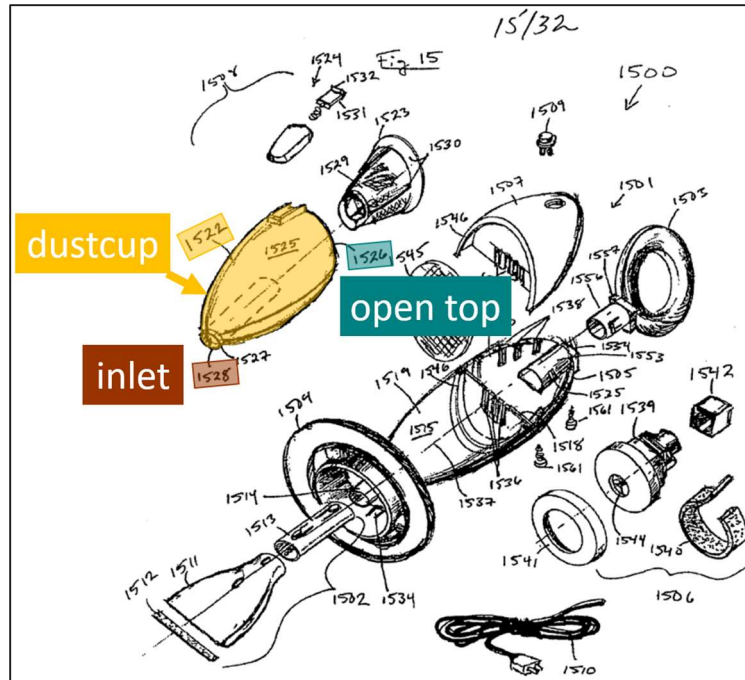
Ex1005, Fig. 15; Ex1002 ¶202. A POSA would have understood Butler’s “pre-motor filter 1545” has a height in a direction transverse to the cyclone axis when the “dustcup 1522” is mounted to the hand vacuum cleaner. Ex1002 ¶203.

Butler’s “**filter assembly 1523**” also has a height in a direction transverse to “**dustcup 1522[’s]**” **cyclonic separation chamber axis**:



Ex1005, Fig. 15; Ex1002 ¶204. A POSA would have understood Butler’s “filter assembly 1523” also has a height in a direction transverse to the cyclone axis when the “dustcup 1522” is mounted to the hand vacuum cleaner. Ex1002 ¶205.

Butler teaches the pre-motor filter height is larger than a diameter of the cyclone. Ex1002 ¶¶206-215. Butler’s “**dustcup 1522** comprises one or more sidewalls 1525 that form an **open top 1526** and taper to an **inlet 1528**”:



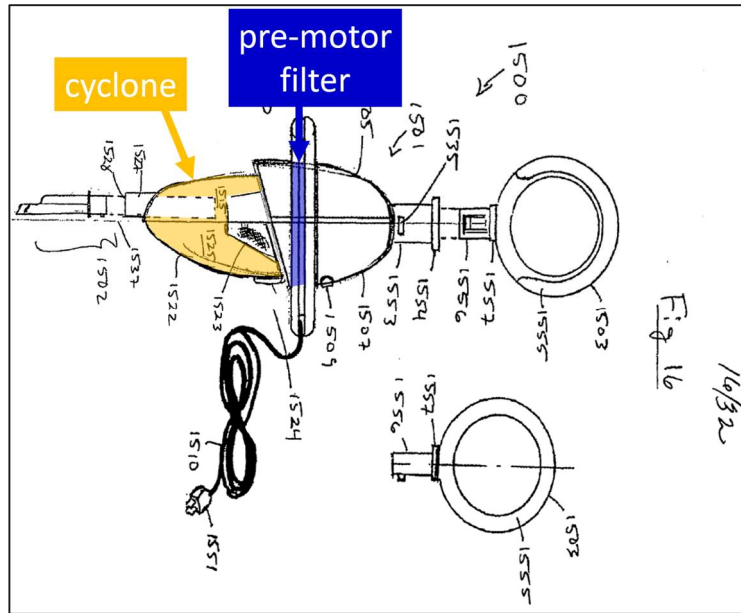
Ex1005, 35:28-30, Fig. 15; Ex1002 ¶206. A POSA would have understood the cyclone positioned in “dustcup 1522[’s]” “cyclonic separation chamber” necessarily has a diameter smaller than the height of “dustcup 1522[’s]” “sidewall” located at “open top 1526,” including because cyclonic airflow occurs within the “sidewall[s]” of “dustcup 1522.” Ex1002 ¶207.

“[T]he filter assembly 1523 comprises a filter 1529 and a frame 1530” that “sealingly engages with the open top 1526.” Ex1005, 36:5-7. Butler’s “pre-motor filter 1545” is positioned rearward of “filter assembly 1523” and covers “frame 1530.” *Id.*, 35:20-36:5, Fig. 15; Ex1002 ¶208. Thus, a POSA would have understood the heights of Butler’s “filter assembly 1523” and “pre-motor filter 1545” are the same or larger than the height of “dustcup 1522[’s]” “sidewall” located at “open top 1526,” and therefore each of Butler’s “filter assembly 1523”

and “pre-motor filter 1545” have a height larger than a diameter of the cyclone contained within the “sidewall.” Ex1002 ¶208.

Likewise, a POSA would have understood Butler’s “filter assembly 1523” and “pre-motor filter 1545” each have a height larger than the cyclone diameter located at “dustcup 1522[’s]” “taper[ed]” “inlet 1528,” which “is generally smaller than the open top 1526,” Ex1005, 35:28-36:2, and therefore Butler teaches a pre-motor filter having a height larger than a diameter of the cyclone. Ex1002 ¶¶209-210

A POSA would have been motivated to increase the amount of pre-motor filtration by increasing the size of Butler’s pre-motor filter 1545, which would also result in a pre-motor filter height larger than a diameter of the cyclone. Ex1002 ¶¶211-215. A POSA would have understood increasing filter size (surface area and volume) increases the amount of air filtration and allows the filter to filter more particles before becoming clogged. Ex1031, ¶33. A POSA would have been motivated to increase the amount of pre-motor filtration to increase the overall amount of filtration to further protect the motor from damage by dirty air, and to decrease the resistance of airflow through the filter. Ex1002 ¶¶211-213. A POSA would have understood “pre-motor filter 1545” could be increased by enlarging Butler’s “housing 502”/“fan motor housing 1520” to accommodate the larger “**pre-motor filter 1545**” and would have been motivated to do so:



Ex1005, Fig. 16(modified); Ex1002 ¶213. When so modified, “**pre-motor filter 1545**” has a height larger than a diameter of the **cyclone**. Ex1002 ¶¶213-214.

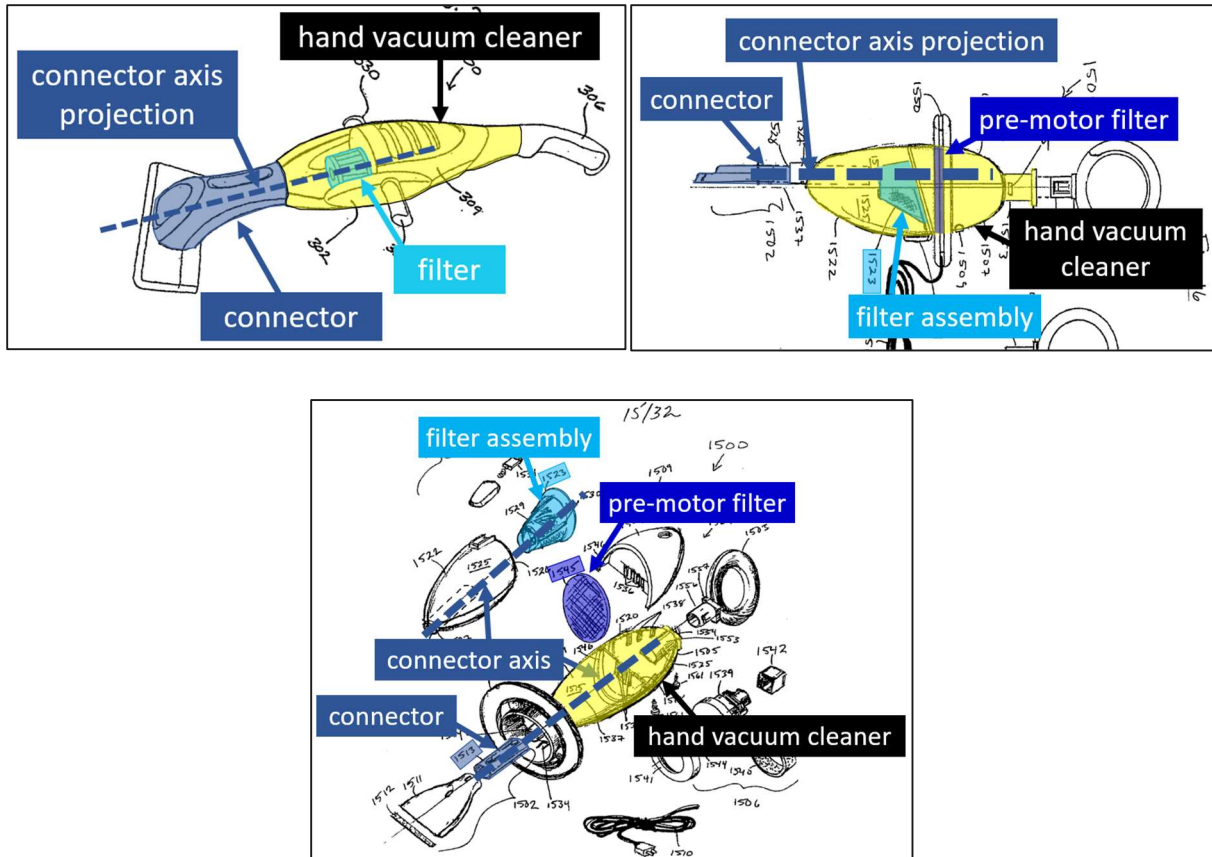
A POSA would have reasonably expected success making this modification because it would have involved modestly enlarging Butler’s pre-motor filter and rear housing components, which would have been straightforward. Ex1002 ¶215.

10. [13]

Butler teaches and renders obvious claim [12] and teaches the additional limitations of this claim. Ex1002 ¶¶216-220.

Butler teaches a pre-motor filter. Ground 1, [9]/[20].

When Butler’s hand vacuum cleaner is mounted to the downstream end of the rigid air flow conduit (Ground 1, [1c.1]/[12c.1.i], [12c.1.ii]), a projection of Butler’s longitudinally extending conduit axis intersects the pre-motor filter:



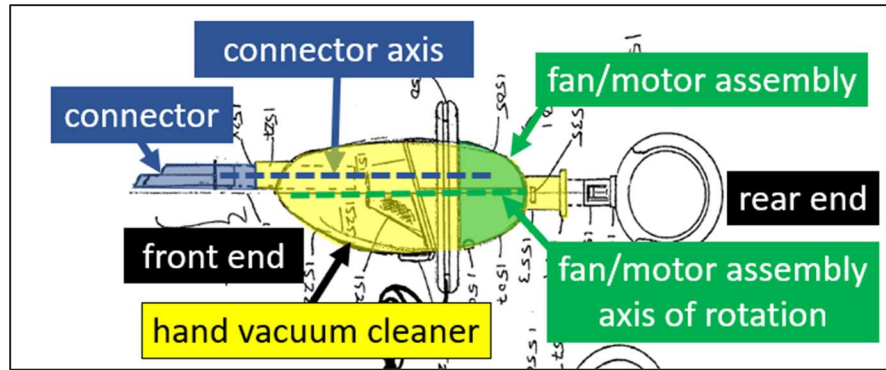
Ex1005, Figs. 3-4, 15; Ex1002 ¶219.

As depicted above, this is true for each Butler pre-motor filter identified for [9]/[20]; Ex1002 ¶220.

11. [15]

Butler teaches and renders obvious claim [12] and teaches and renders obvious the additional limitations of this claim. Ex1002 ¶¶221-223.

When Butler's hand vacuum cleaner is mounted to the downstream end of the rigid air flow conduit and is positioned with the hand vacuum cleaner front end in front of the hand vacuum cleaner rear end, Butler's suction motor axis of rotation is vertically spaced from the longitudinally extending conduit axis:



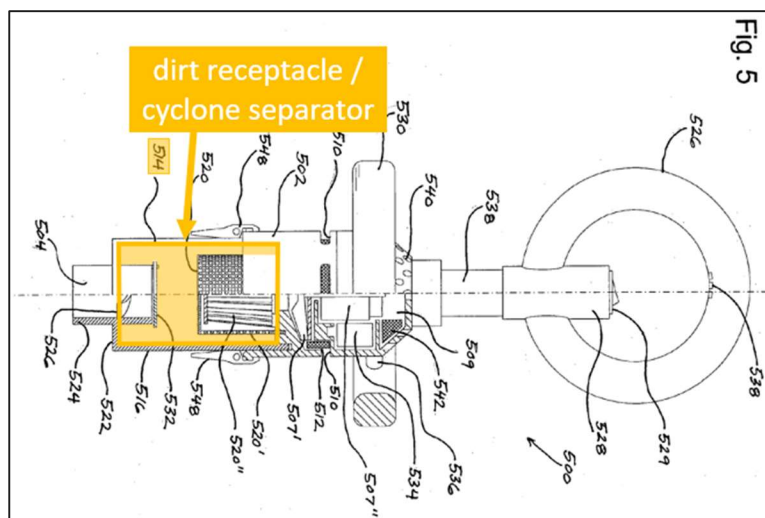
Ex1005, Fig. 16; Ex1002 ¶223; Ground 1, [1a.2]/[12a.2], [1c.1]/[12c.1.i], [12c.1.ii], [1c.5]; Ex1005, 16:25-28 (interchangeable components).

B. Ground 2: Butler In Combination With Jianan Renders Obvious Claims 3, 10-11, 16, and 21-22

1. Motivation To Combine Butler And Jianan

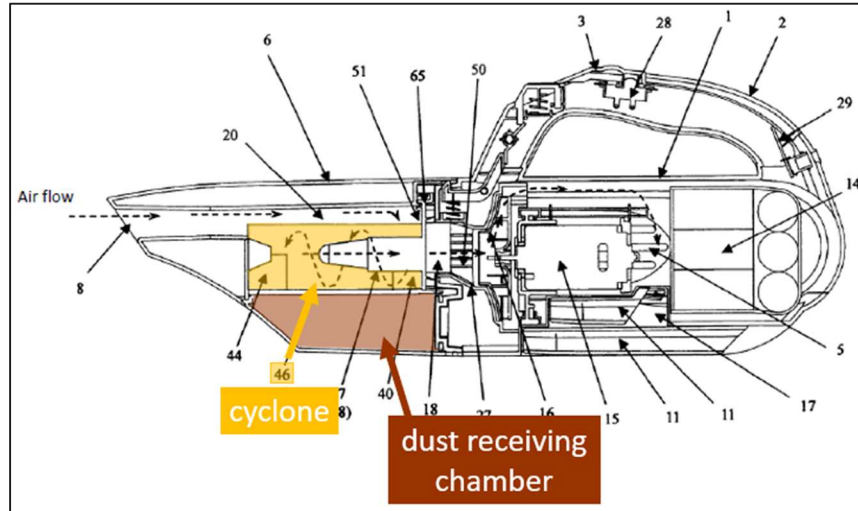
a. Scope and Content of Prior Art

Butler teaches “an improved vacuum cleaner for cleaning raised and vertical surfaces,” including stairs. Ex1005, 3:10-12. Butler’s vacuum uses a “**dirt receptacle** compris[ing] a **cyclone separator**” to separate dirt from air:

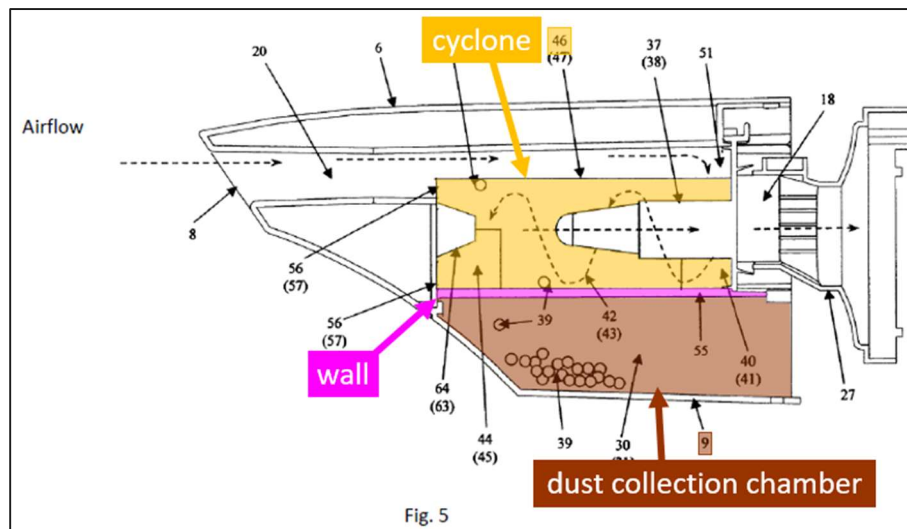


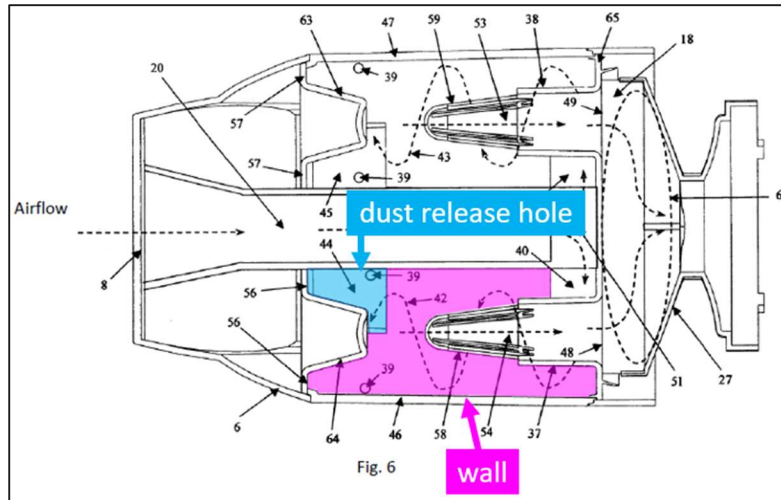
Ex1005, claim 11, Fig. 5; Ex1002 ¶224.

Jianan teaches a “handheld vacuum” with a “detachable dust cup” comprising “two parallel **cyclones** and separate **dust receiving chambers**”:



Ex1015, Abstract, 4, Fig. 3; Ex1002 ¶225. “[W]all 55” separates “**cyclone 46**” and the “independent **dust collection chamber 9**”:

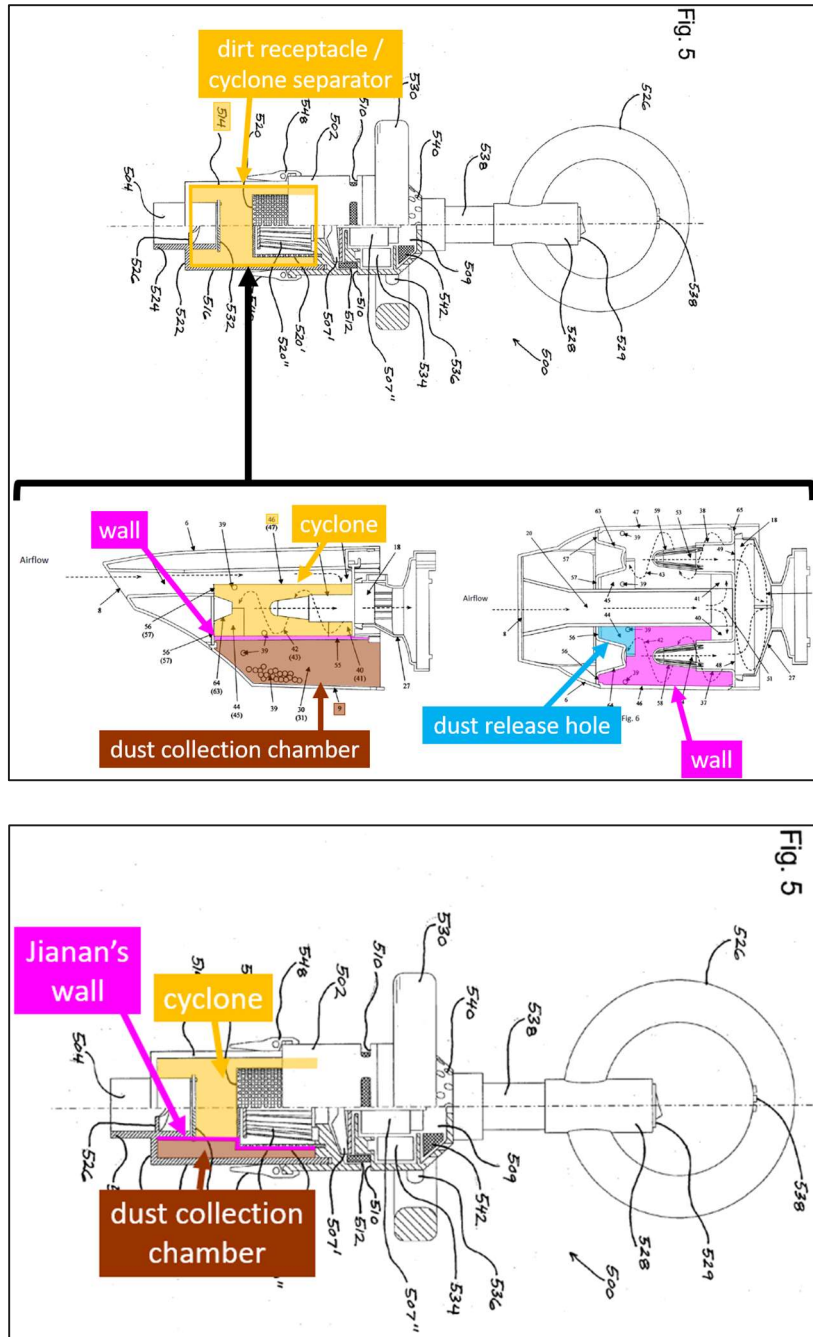




Ex1015, 9-10, Figs. 5-6; Ex1002 ¶226. “[D]ust collection chamber 9 is connected to the cyclone body via the dust release hole.” Ex1015, 9.

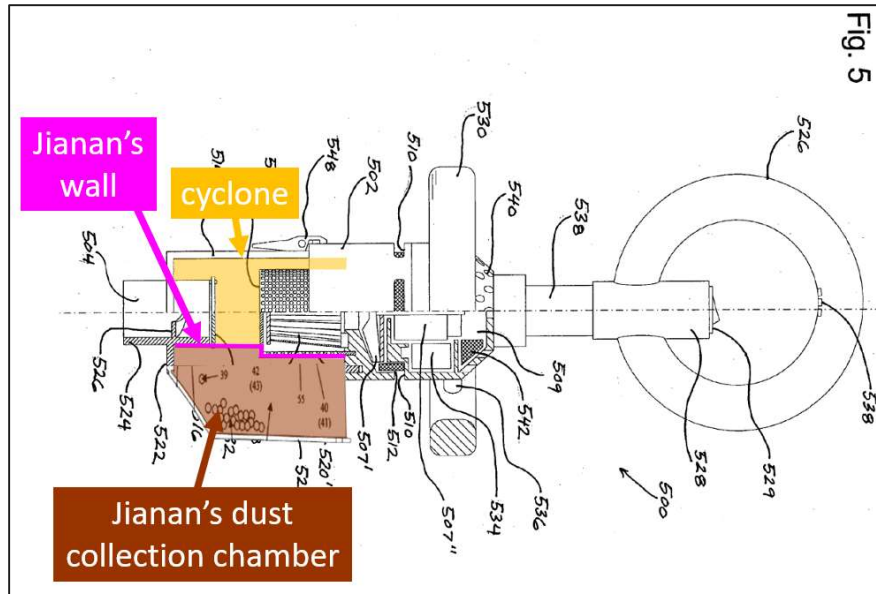
b. Motivation to Combine

A POSA would have been motivated to modify Butler to achieve the benefits of Jianan’s cyclonic-separation system having an independent dust-collection chamber in multiple ways. Ex1002 ¶227. For example, a POSA would have been motivated to modify Butler’s “dirt receptacle compris[ing] a cyclone separator” to have an “independent dust collection chamber,” oriented and functioning in the same way that Jianan teaches—by separating the “cyclone” chamber from the “independent dust collection chamber” using a horizontal “wall” with a “dust release hole”:



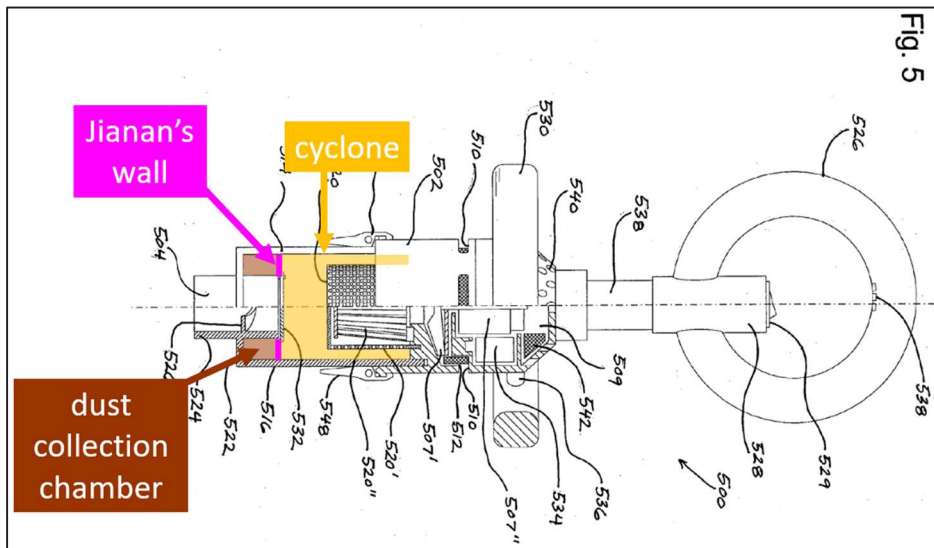
Ex1005, Figs. 5, 5(modified); Ex1015, Figs. 5-6, 5(modified); Ex1002 ¶227.

A POSA also would have been motivated to modify Butler’s “**dirt receptacle** compris[ing] a **cyclone separator**” to include an extended “independent **dust collection chamber**” and a horizontal “**wall**” as Jianan teaches:



Ex1005, Fig. 5(modified); Ex1015, Fig. 5(modified); Ex1002 ¶228.

A POSA would have also been motivated to modify Butler’s “**dirt receptacle** compris[ing] a **cyclone separator**” to have an “independent **dust collection chamber**” separated from the cyclone chamber by a vertically oriented “**wall**”:

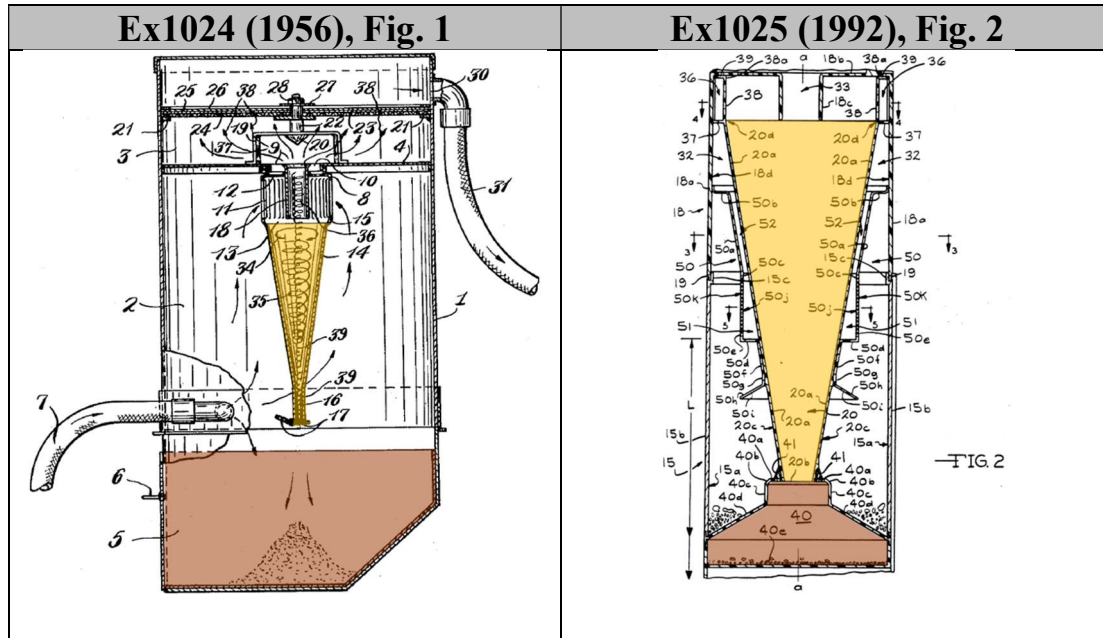


Ex1005, Fig. 5(modified); Ex1015 Fig. 5(modified); Ex1002 ¶229.

A POSA would have been motivated to combine Butler and Jianan as described. Ex1002 ¶¶230-237. **First**, Butler and Jianan are analogous art. Ex1002 ¶231. Like Butler, which teaches a hand vacuum cleaner with a removable cyclone unit (“dirt receptacle compris[ing] a cyclone separator” is “remov[ed]” by unclamping “[a] set of over-center clamps 548”) and an openable door (“dirt receptacle 214 may be covered by an access panel or door” to “facilitate the chamber’s emptying”), Ex1005, 18:26-30, 21:8-23, claim 11, Jianan teaches a “handheld vacuum cleaner” with a removable cyclone unit (“detachable dust cup part” “includes” “two parallel cyclones and separate dust receiving chambers”) and an openable door (“dust [collection] chamber has...an opening and closing device such as a door or the like”), Ex1015, Abstract, 4, claim 3; Ex1002 ¶231.

Second, Butler and Jianan each provide motivations for this combination. Ex1002 ¶¶232-233. While Butler discloses several cyclonic embodiments, Ex1005, 18:3-14, 22:14-25, 36:2-4, Butler explains that its vacuum “may alternatively comprise[] any known type of dirt separation and retention system,” and that such “variations will be apparent to those of ordinary skill in the art in view of the present disclosure and with routine experimentation with the invention.” *Id.*, 8:26-27, 19:1-3. A POSA would have therefore looked for “known type[s] of dirt separation and retention system[s]” to supplement Butler’s teachings, including a cyclone unit with a **cyclone chamber** and an **independent**

dirt-collection chamber, as Jianan teaches, and as existed for 50+ years before the '983Patent:

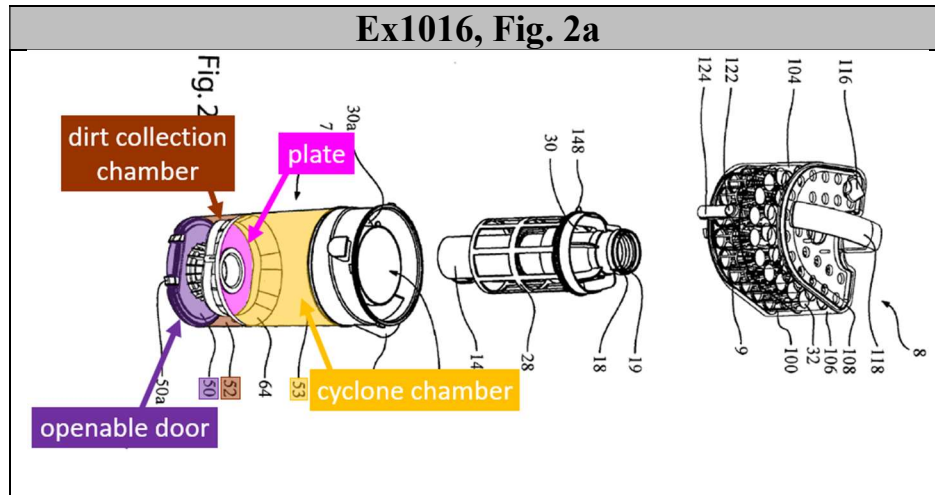


Ex1002 ¶232.

A POSA would have understood cyclone units with this exterior dirt-collection chamber had certain benefits, including: (1) improved separation, because large dust particles no longer interfere with the cyclonic airflow, (2) improved suction, because less dust accumulates in the filter, and (3) reduced recurring pre-filter cleaning and replacement, because less debris reaches the pre-motor filter. Ex1002 ¶233. Jianan itself teaches two benefits to this design: (1) because “the cyclone system is designed to collect dust 39 in an independent dust collection chamber 9,” “most of the dust...separated through the cyclone” will remain in the “dust collection chamber,” and “users will not have to clean the filter

as often,” and (2) because “only a small amount of dust (mainly very fine dust) will...enter the filter,” “users...will experience constant suction power” and “improvement[s]” in “the efficiency of the cyclone.” Ex1015, 5, 10.

Third, a POSA would have understood these benefits could be achieved by implementing Jianan’s independent dust-collection chamber teachings in various ways, as shown above. Ex1002 ¶¶234-235. Each configuration provides additional benefits for different uses that would have further motivated a POSA to modify Butler. Ex1002 ¶234. A POSA would have understood implementing a horizontal “wall” is beneficial for cleaning vertical surfaces, and a vertical “wall” is beneficial for cleaning horizontal surfaces (both Butler’s stated objectives, Ex1005, 7:2-5), because, when so oriented during those use-cases, gravity causes the dust to collect in the correspondingly oriented independent dust-collection chamber. Ex1002 ¶234. Implementing a vertical “wall” would also make it easier and more hygienic to empty the dust-collection chamber, because it would be provided adjacent to Butler’s openable front door. Ex1005, 18:26-30, 21:8-23; Ex1002 ¶234. And, vacuum cleaners with this configuration were well-known in the art, which would further motivate a POSA and provide a reasonable expectation of success, including as shown in US2007/0209335:



A POSA would have understood implementing a horizontal “wall” and an enlarged dust-collection chamber enables longer periods of operation because the vacuum can hold more dust. Ex1002 ¶235.

Fourth, this combination would have involved a simple substitution of known elements to obtain predictable results. Ex1002 ¶¶236-237. Butler teaches a cyclone unit with an integrated dirt-collection chamber/cyclone chamber. Ex1005, Fig. 5. Jianan teaches a cyclone unit with a cyclone chamber separated from a dirt-collection chamber by a wall. Ex1015, Figs. 5-6. A POSA would have understood the simple substitution of an integrated dirt-collection chamber for a separated one would achieve the predictable result of more efficient cyclonic air filtration and reduced pre-filter maintenance. Ex1002 ¶236. As depicted above, Butler and Jianan are directed to hand vacuums having a similar orientation of cyclone unit relative to the overall vacuum configuration, which would have further motivated a POSA to make the combination. Ex1002 ¶237.

c. Reasonable Expectation of Success

A POSA would have reasonably expected success for the reasons stated above. Ex1015, 10; Ex1005, claim 11; Ex1002 ¶238. As explained above, Butler and Jianan are very similar, including because they are both hand vacuums having similar orientations and removable cyclonic-separation units with openable doors for emptying, which would have further given a POSA a reasonable expectation of success. Ex1005, 18:26-30, 21:8-15, claim 11, Fig. 5; Ex1015, Abstract, 4, claim 3, Figs. 3, 5-6; Ex1002 ¶238.

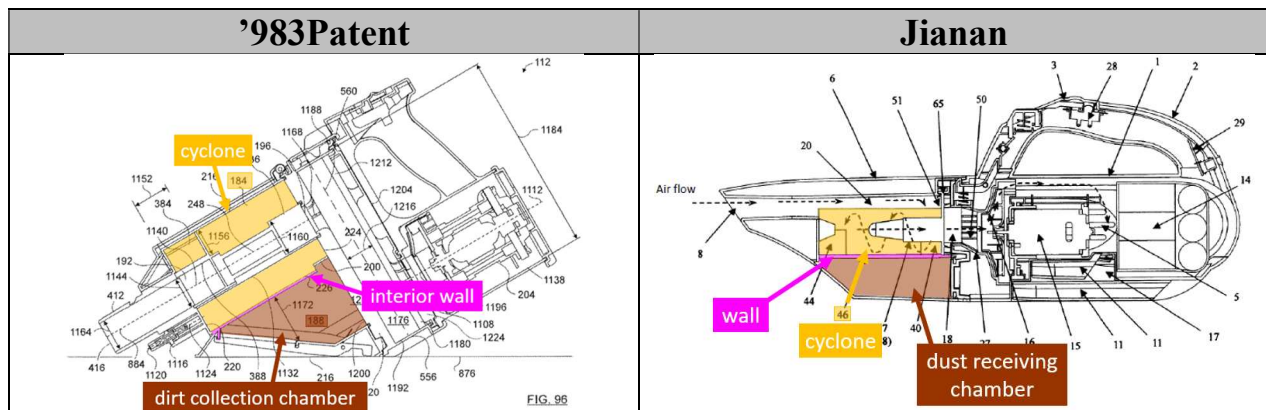
2. [3]/[16]

The Butler-Jianan combination teaches and renders obvious claims [1]/[12] for the same reasons Butler does. Ground 1, [1]/[12]; Ex1002 ¶¶238-241. The Butler-Jianan combination further teaches the remaining limitations of these claims. Ex1002 ¶¶238-247.

Butler teaches a hand vacuum cleaner comprising a cyclone chamber. Ground 1, [1a.2]/[12a.2]; Ex1002 ¶242.

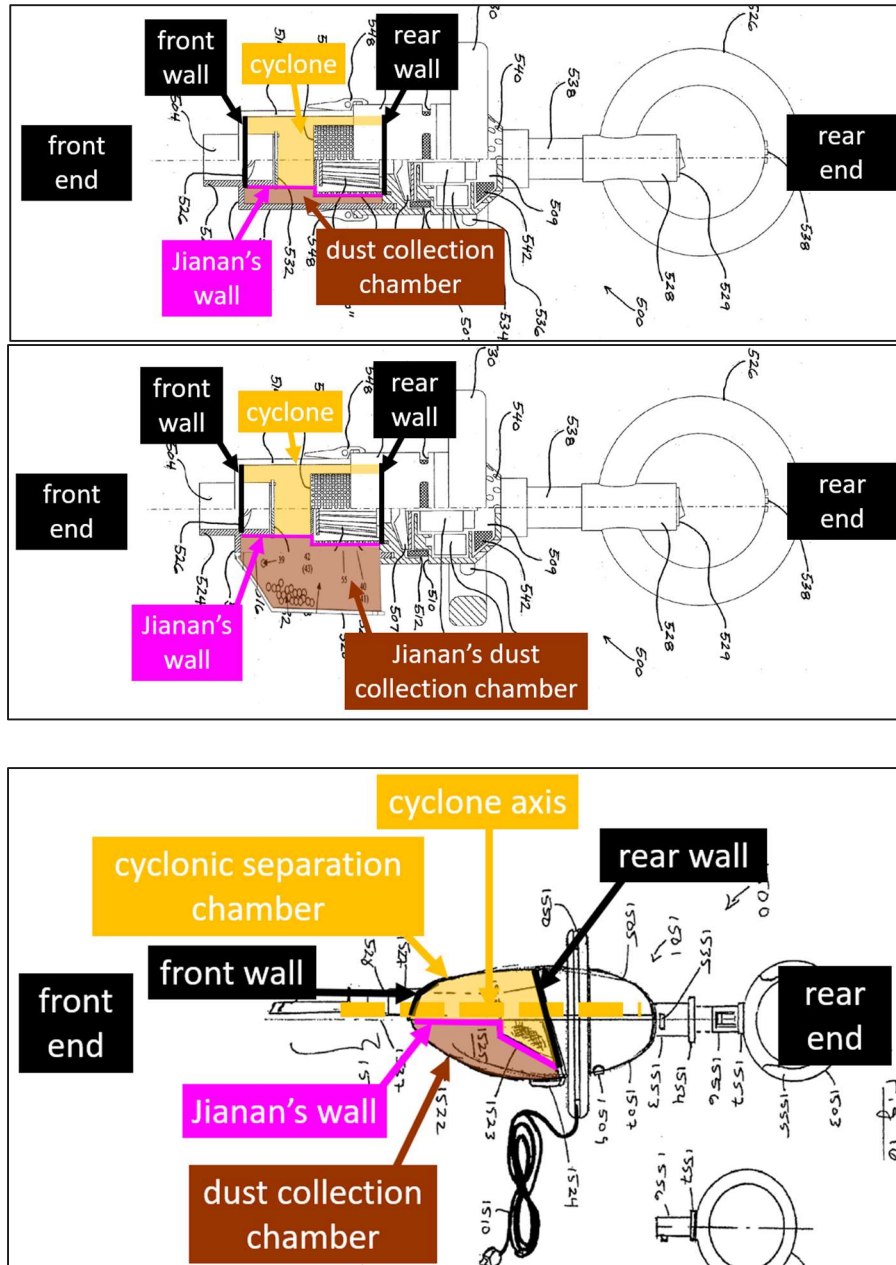
Jianan teaches a sidewall extending between front and rear walls of a cyclone chamber that extends generally horizontally when the hand vacuum cleaner is positioned with its front end in front of its rear end, the cyclone axis of rotation is positioned horizontally, and the dirty air inlet faces forwardly, and a dirt outlet is provided in a lower portion of the sidewall and is in communication with a

understood “wall 55” is a sidewall extending between front and rear walls of the cyclone chamber, “independent dust collection chamber 9” is a dirt-collection chamber that is exterior to “cyclone 46” positioned in a cyclone chamber, and “dust release hole” is a dirt outlet provided in a lower portion of the side wall that is in communication with the dirt-collection chamber. Ex1002 ¶244. A POSA would have understood “dust release hole” is provided at a lower portion of “wall 55” to facilitate “[d]ust particles escap[ing] into the hole cutout” with gravity. Ex1015, 4-5; Ex1002 ¶245. This is at least as much disclosure of these limitations as the ’983Patent:



Ex1001, Fig. 96; Ex1015, Fig. 3; Ex1001, 12:41-42 (“As shown, a common interior wall 226 may divide cyclone chamber 184 from dirt collection chamber 188.”); Ex1002 ¶245.

The Butler-Jianan combination teaches this limitation:

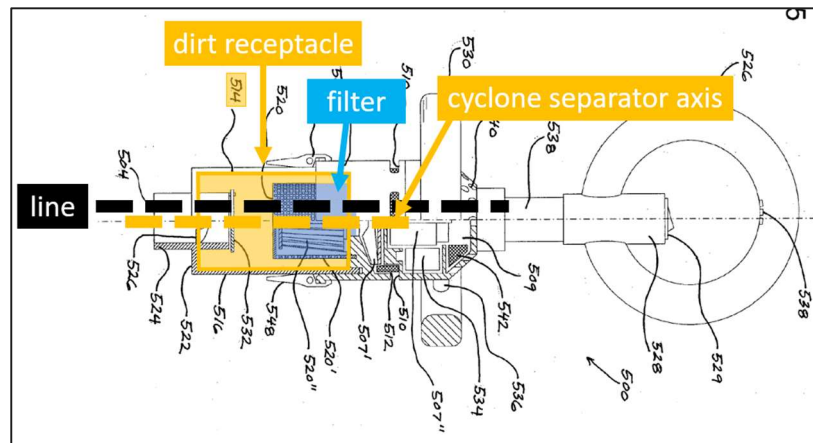


Ex1005, Figs. 5(modified), 16(modified); Ex1015, Fig. 5(modified); Ex1002 ¶246; Ground 2, §1.

If modifying Butler in view of Jianan moves the cyclone axis, it continues to extend in a forward/rearward direction, remains generally horizontal when oriented as shown above, and remains parallel to the suction motor axis and longitudinally

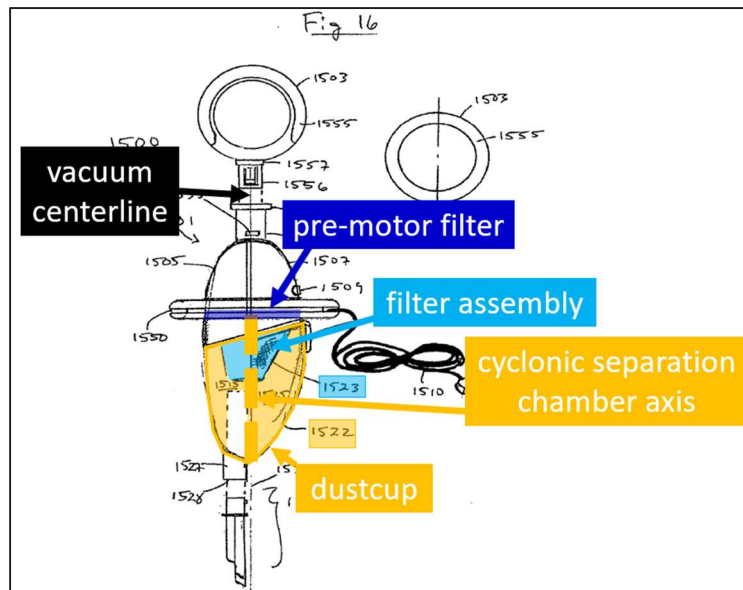
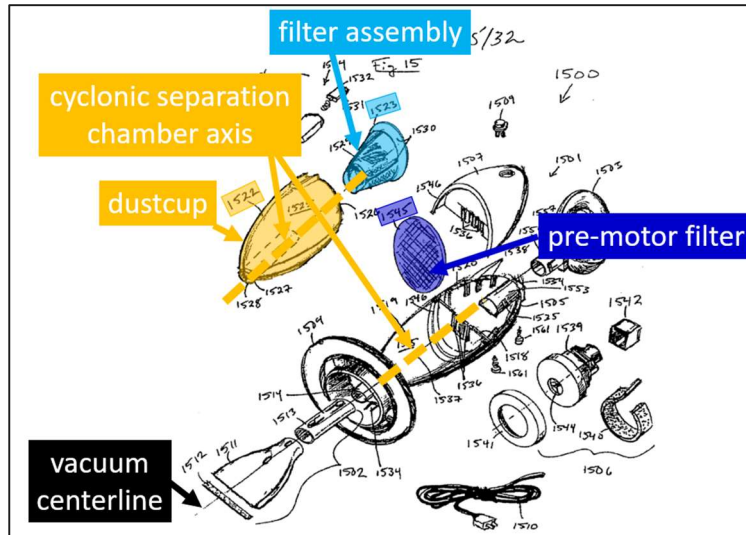
The Butler-Jianan combination teaches a dirt-collection chamber that is exterior to the cyclone chamber. Ground 2, [3]/[16].

Butler teaches a **line** that is parallel to the cyclone axis (**cyclone separator axis**) extends through the dirt-collection chamber (“**dirt receptacle 514**”) and the pre-motor filter (“**filter 520**”):



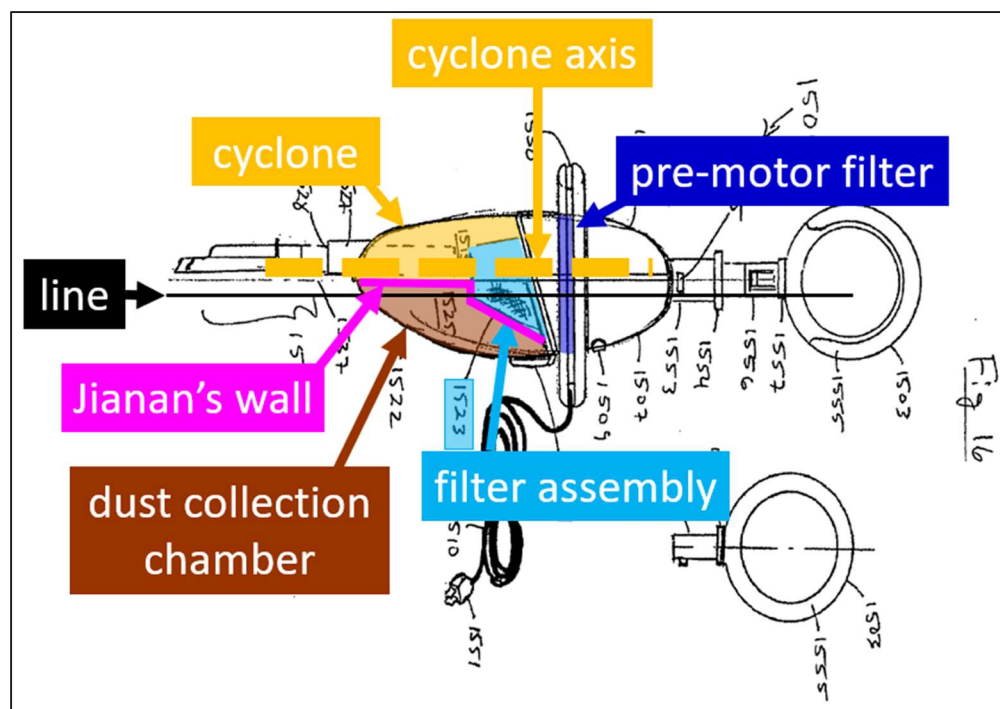
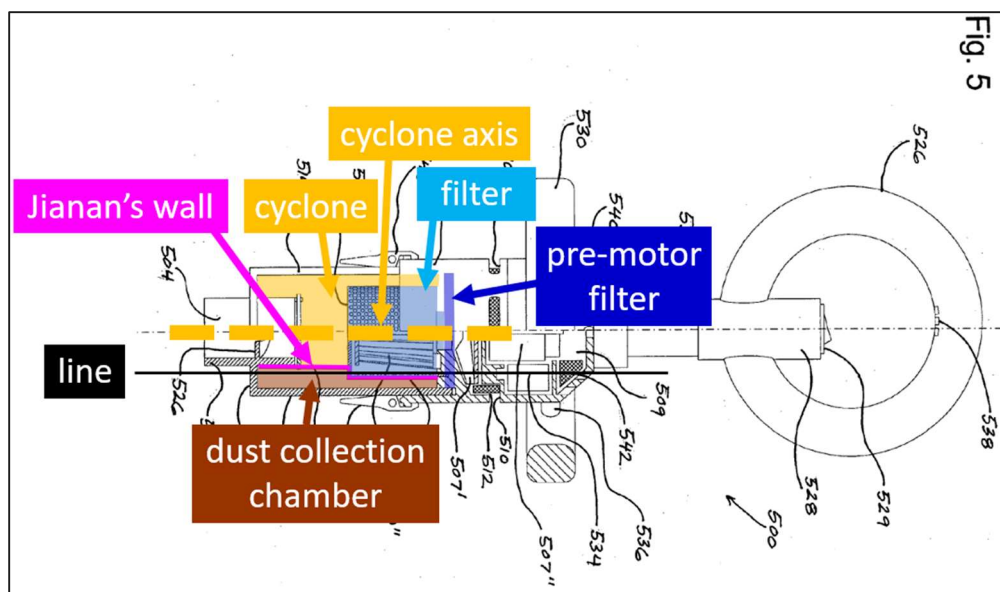
Ex1005, Fig. 5; Ex1002 ¶256.

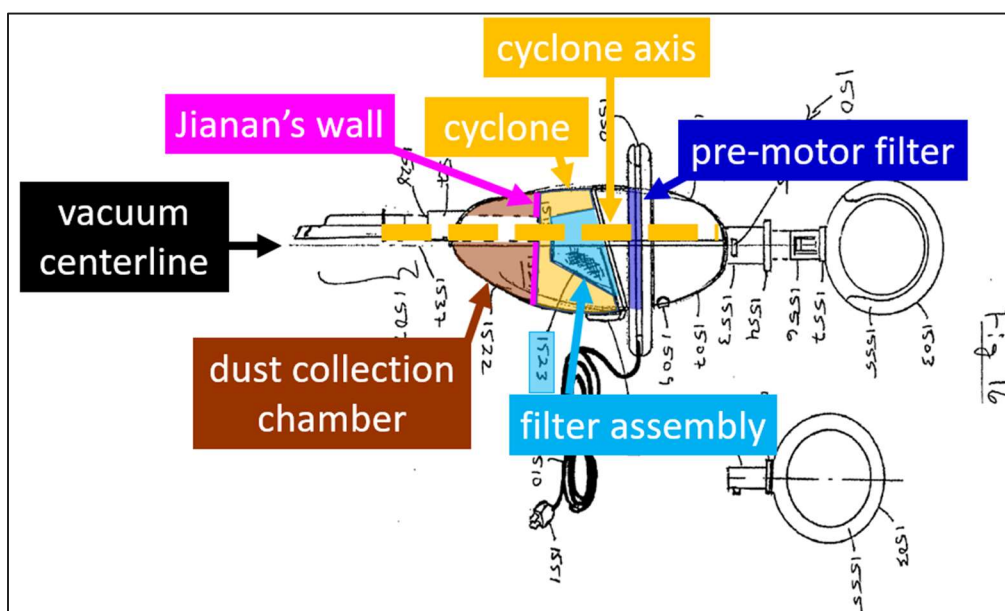
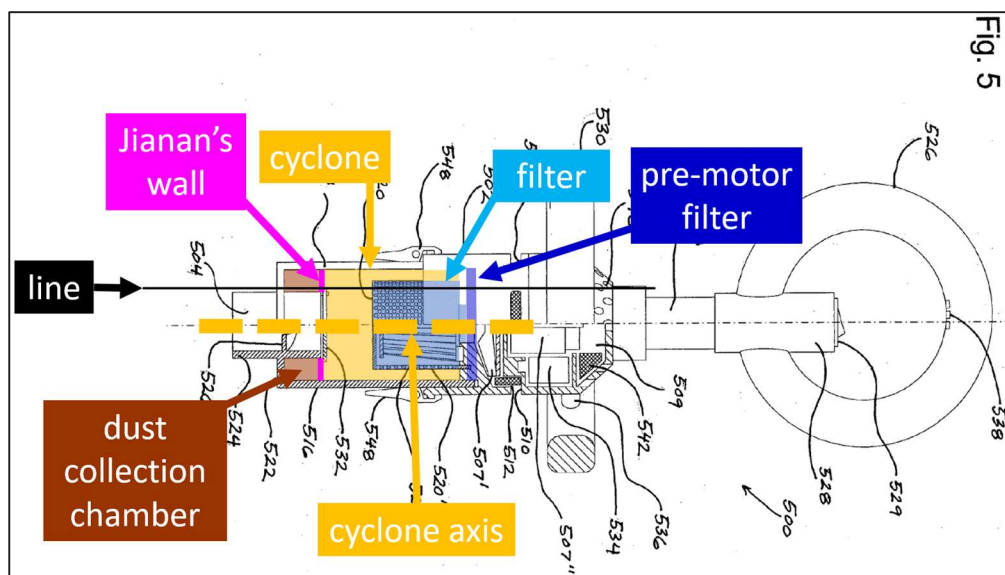
Likewise, a “**vacuum centerline 1537**” parallel to Butler’s **cyclonic separation chamber axis** extends through the “**dustcup 1522**” (dirt-collection chamber) and “**filter assembly 1523**” and “**pre-motor filter 1545**”:

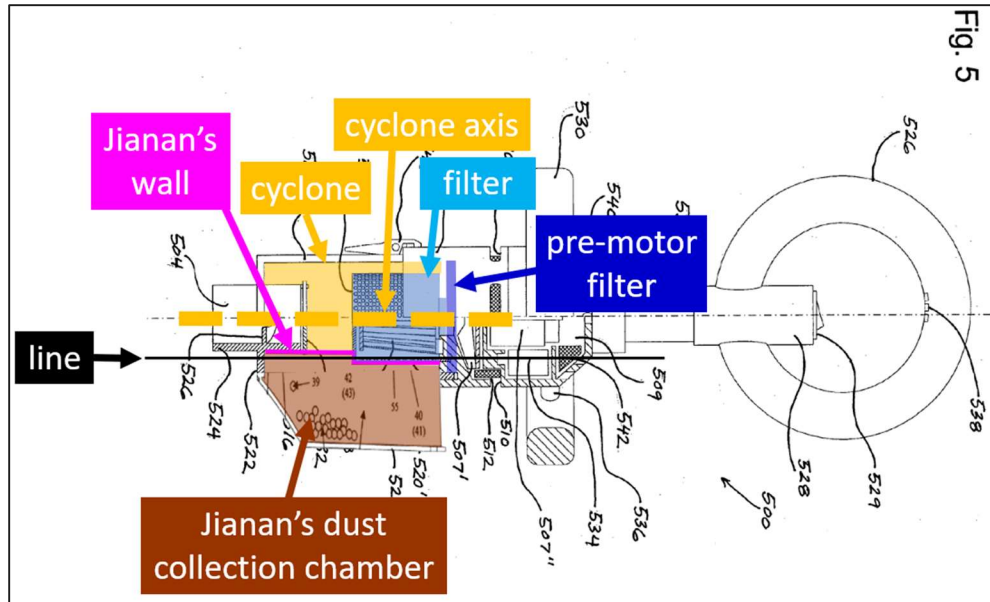


Ex1005, Figs. 15, 16; Ex1002 ¶257.

This limitation is also met when Butler’s “dirt receptacle compris[ing] a cyclone separator” is modified in view of Jianan’s “independent **dust collection chamber**” teachings:





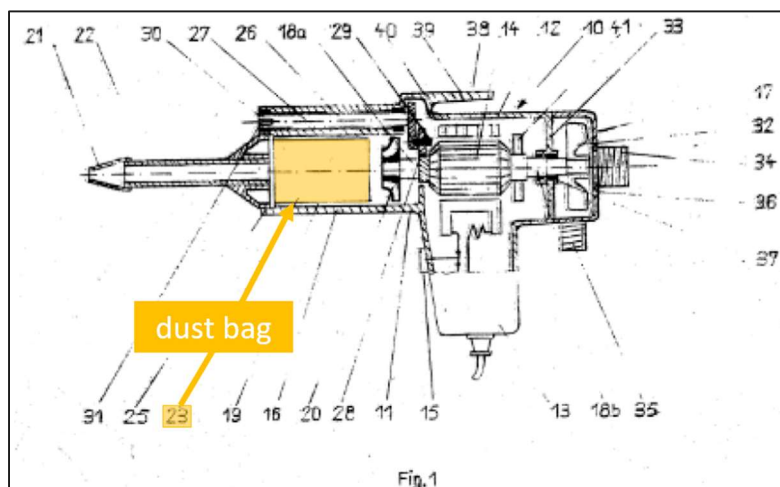


Ex1005, Figs. 5(modified), 16(modified); Ex1015, Fig. 5(modified); Ex1002 ¶¶258-259.

C. Ground 3: Rebel In Combination With Martelliere Renders Claims 1-2, 4-10, 12-15, and 17-21 Obvious

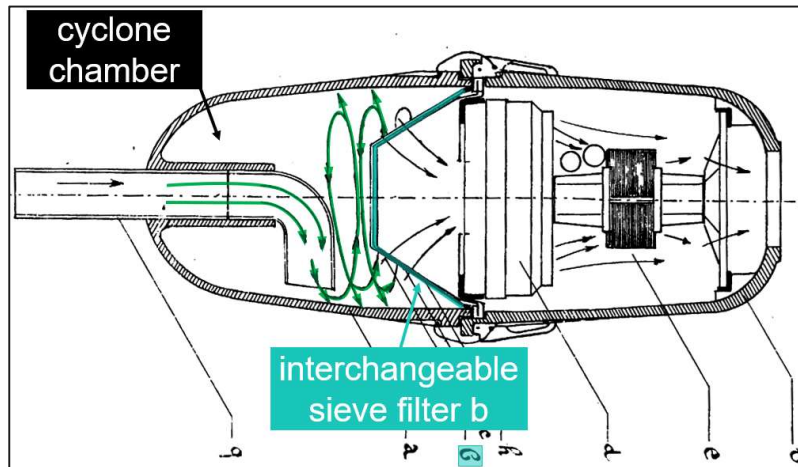
1. Motivation To Combine Rebel And Martelliere

Rebel teaches a compact “vacuum cleaner” with a “**dust bag 23**” to filter dust:



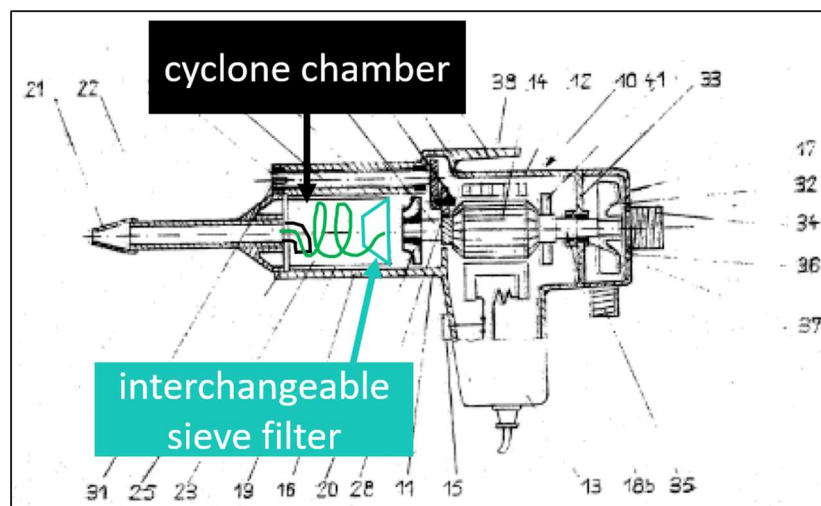
Ex1007, 4, Fig. 1; Ex1002 ¶260.

Martelliere teaches a compact vacuum cleaner with a “tangential[]” air inlet that creates a “Whirlwind” within a cyclone chamber to filter dust, which is then further filtered by a pre-motor filter, “**interchangeable sieve filter *b***”:



Ex1020, 1, Fig. 1; Ex1002 ¶261.

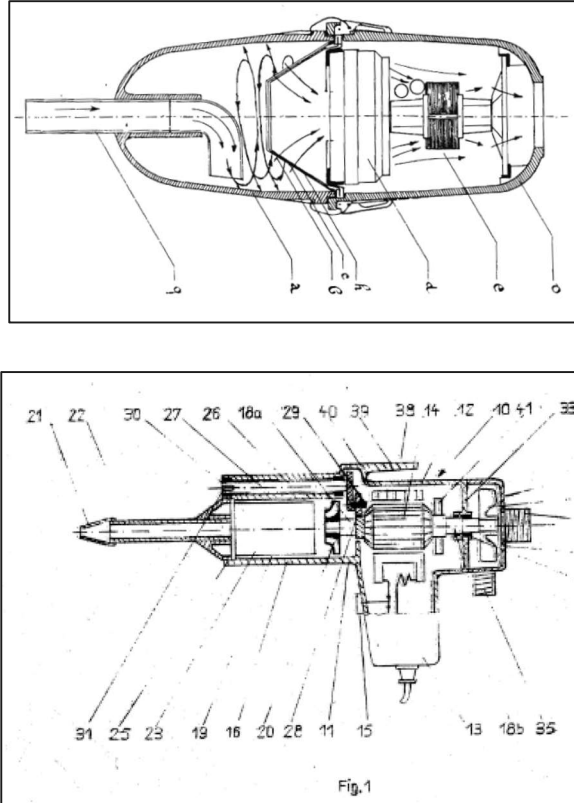
A POSA would have been motivated to combine Martelliere’s cyclonic-separation and pre-motor-filter teachings with Rebel:



Ex1007, Fig. 1(modified); Ex1020, Fig. 1; Ex1002 ¶262.

A POSA reading Rebel—including its teaching of a “dust bag” air-filtration unit that must “be removed from the housing” for emptying (Ex1007, 4)—would have been motivated to incorporate Martelliere’s teachings of a tangential air inlet to generate a “Whirlwind” (*i.e.*, cyclonic filtration) and its “**interchangeable sieve filter b**” (Ex1020, 1, Fig. 1) as the air filtration unit for its many known benefits, including benefits Martelliere expressly teaches, and would have reasonably expected success. Ex1002 ¶263. As Martelliere teaches, “[b]y application of the ‘Whirlwind’ principle,” “the materials are deposited in the bottom of the container, after having separated from the air, before it passes through the filter screen,” which “prevent[s] clogging” and creates “stable suction,” and by using a transparent cyclonic chamber, “the user is able, when stopped, to see where the filling of the container is” and “can therefore better judge when it must be emptied.” Ex1020, 1. Martelliere and Rebel are analogous art—each teach vacuum cleaners with similar layouts. Ex1002 ¶¶264-265.

A POSA would have been motivated to make this simple substitution of one known dust-separating element (dust bag chamber) for another (cyclone chamber with a filter) to obtain predictable results (dust separation). Ex1002 ¶266. Both Rebel and Martelliere teach a dust-separation unit at the front of the vacuum cleaner with a centrally located air inlet having a similar form factor and orientation:



Ex1020, Fig. 1; Ex1007, Fig. 1; Ex1002 ¶266. These similarities would have further motivated a POSA to combine them. Ex1002 ¶267.

A POSA would have found it obvious to at least try this combination. Ex1002 ¶268. There were a finite number of identified dust-separation solutions, including dust bags (as Rebel teaches) and cyclonic separators with a filter (as Martelliere teaches), and a POSA would have been motivated to use cyclonic separation with a filter as taught by Martelliere to achieve its known benefits. Ex1002 ¶268. This combination would at least have been obvious to try because Martelliere explicitly teaches that its cyclonic filtration teachings “remedy [the] disadvantages” of “dust bag” filters. Ex1020, 1, Ex1002 ¶269. As explained in

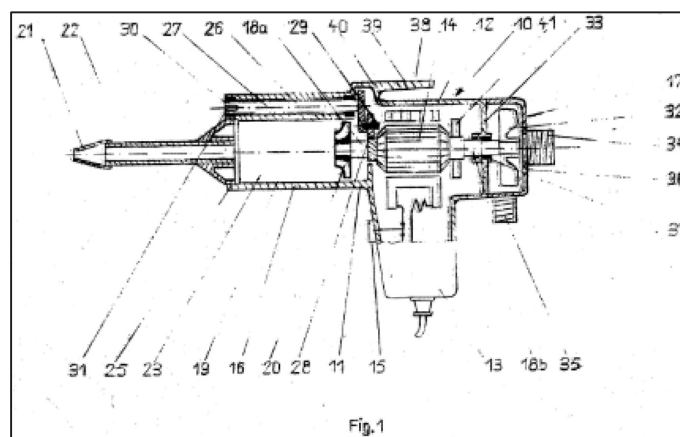
§IV.B, during prosecution of the '983 Patent, the Examiner found—and the Applicant did not dispute—it would have been obvious to substitute cyclonic-separation units for non-cyclonic separation units. Ex1004, 260-265, 276-281; Ex1002 ¶269.

A POSA would have reasonably expected success. Ex1002 ¶270. Rebel teaches a dust-separation unit in a similar layout to Martelliere, and a POSA would have understood substituting Martelliere's cyclonic chamber and filter unit for Rebel's "dust bag" would have been simple and would have reasonably expected success in making this simple substitution. Ex1002 ¶270.

2. [1]/[12]

a. [1pre]/[12pre]

If the preambles are limiting, Rebel, Martelliere, and the Rebel-Martelliere combination teaches them. Ex1002 ¶¶271-275. Rebel teaches "a vacuum cleaner" that is a surface cleaning apparatus:

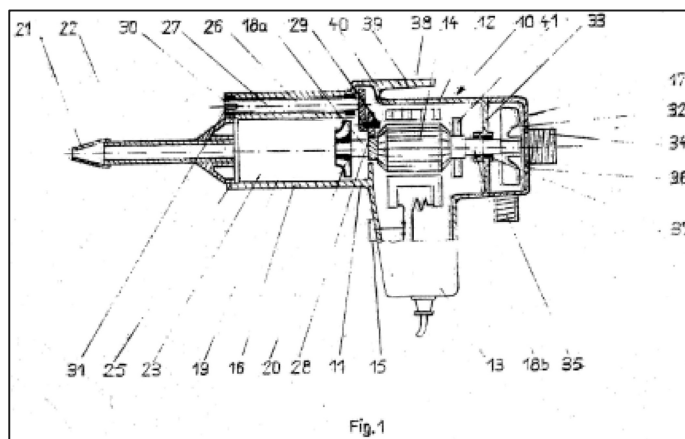


Ex1007, Cover, 1, Fig. 1; Ex1002 ¶273.

Martelliere likewise teaches a “vacuum cleaner” that is a surface cleaning apparatus. Ex1020, 1, Fig. 1. So, too, for their combination. Ex1002 ¶¶274-275.

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

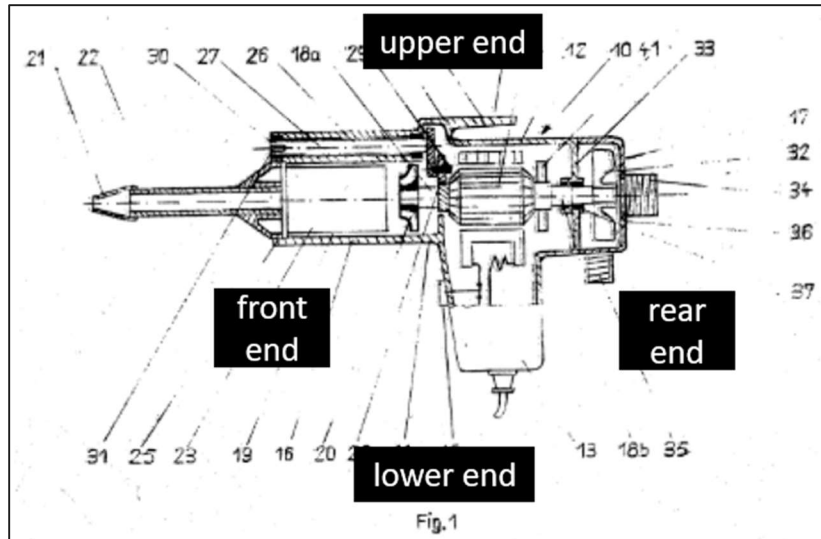
The Rebel-Martelliere combination teaches these limitations. Ex1002 ¶¶276-287. Rebel teaches a “handheld vehicle care device” including “a vacuum cleaner” that is a hand vacuum cleaner:



Ex1007, Cover, 1, Fig. 1; Ex1002 ¶277.

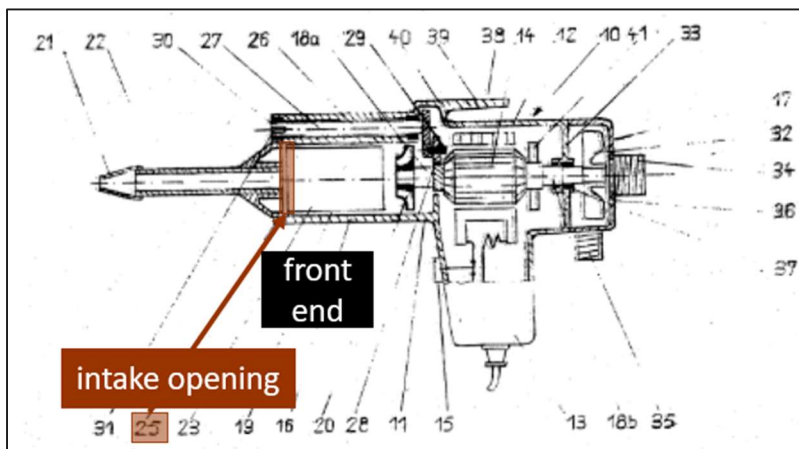
Martelliere likewise teaches a hand vacuum cleaner: a compact-sized “vacuum cleaner” that is “held.” Ex1020, 1, Fig. 1; Ex1002 ¶278. So, too, for their combination. Ex1002 ¶279.

Rebel’s hand vacuum cleaner includes **front, rear, upper, and lower ends**:



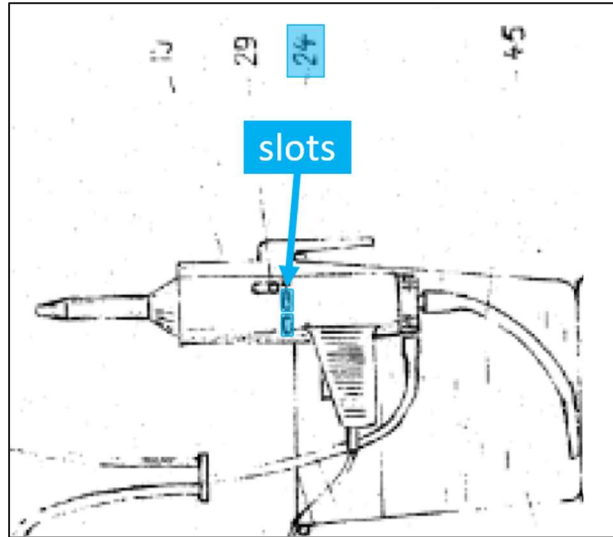
Ex1007, Fig. 1; *id.*, 4 (“The pistol-shaped housing 11 of the multipurpose device comprises...a front part 16, and a rear part 17”); Ex1002 ¶280.

The hand vacuum cleaner **front end** has a dirty air inlet (“**intake opening 25**”):



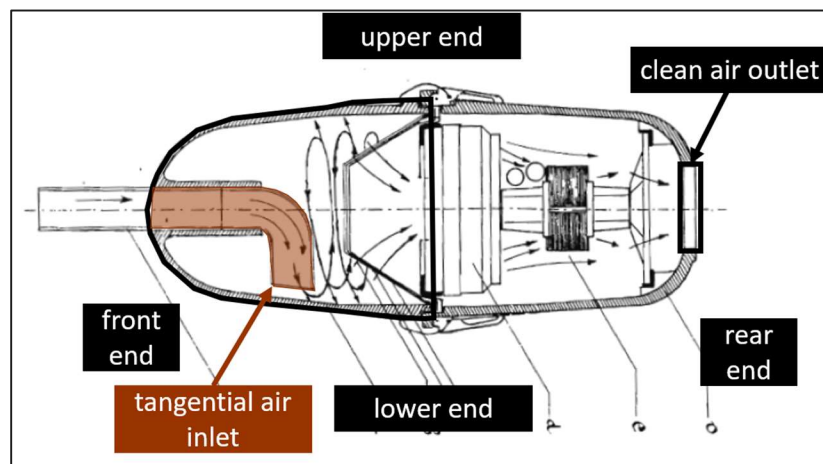
Ex1007, 6, Fig. 1; Ex1002 ¶281.

Rebel’s hand vacuum cleaner has a clean air outlet (“**slots 24**,” through which “the air escapes” after having been filtered by “dust bag 23”):



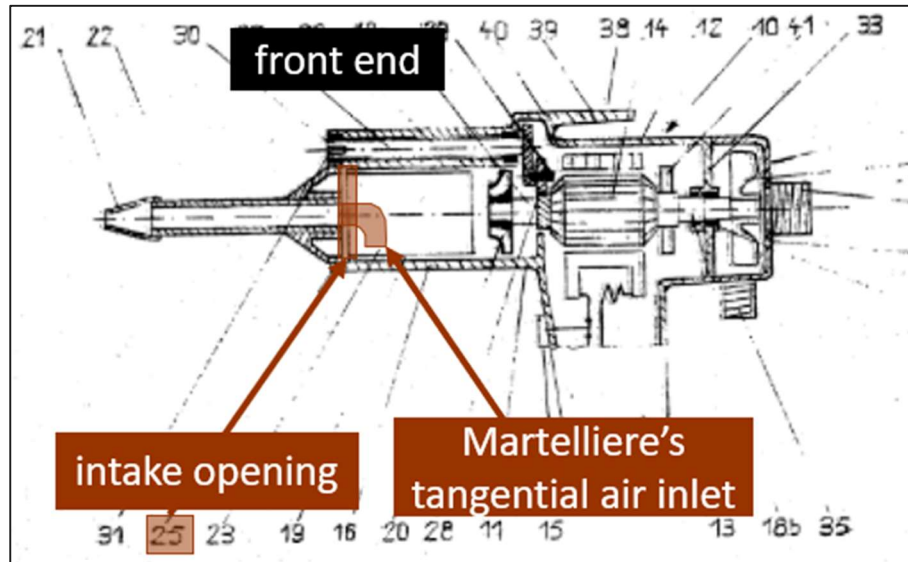
Ex1007, 4, 8, Fig. 2; Ex1002 ¶282.

Martelliere likewise teaches a hand vacuum cleaner having **front, rear, upper and lower ends**:



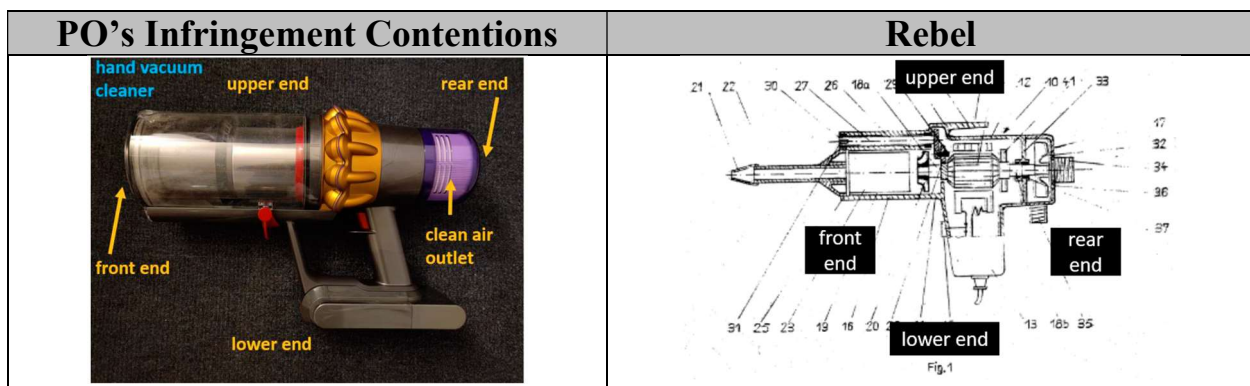
Ex1020, 1, Fig. 1; Ex1002 ¶283. In Martelliere, the location where the air is “sucked **tangentially** to the interior wall of the transparent container” is a dirty air inlet at the front end. Ex1020, 1, Fig. 1; Ex1002 ¶284. The location where the air exits is a clean air outlet. Ex1002 ¶285.

In the Rebel-Martelliere combination, Rebel’s “**intake opening 25**” and Martelliere’s “**tangential[]**” **air inlet** individually and collectively are a dirty air inlet at the **front end**:

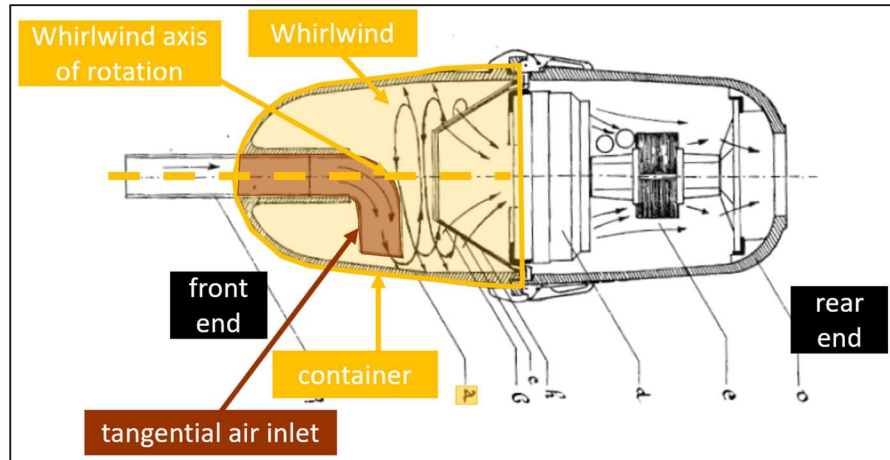


Ex1007, Fig. 1(modified); Ex1020, Fig. 1; Ex1002 ¶286.

This is at least as much disclosure of these limitations as PO contends infringes:

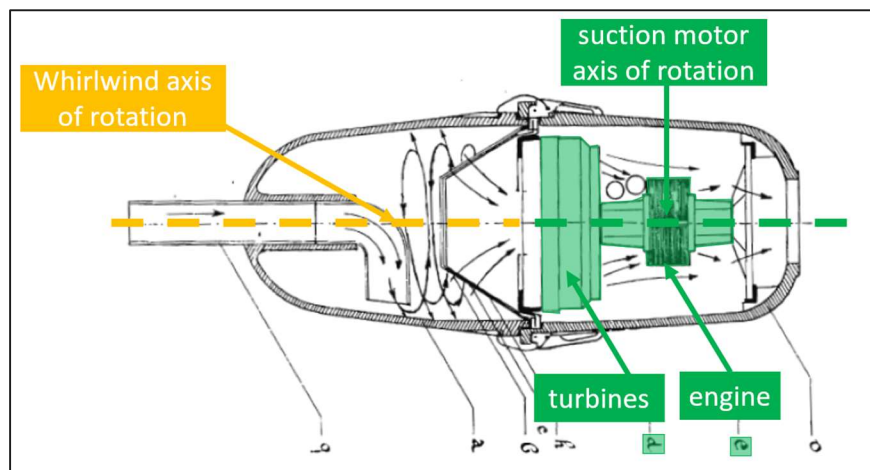


Ex1021 (Ex. 28 to Complaint), 3(PO's annotations); Ex1007, Fig. 1; Ex1002 ¶287.



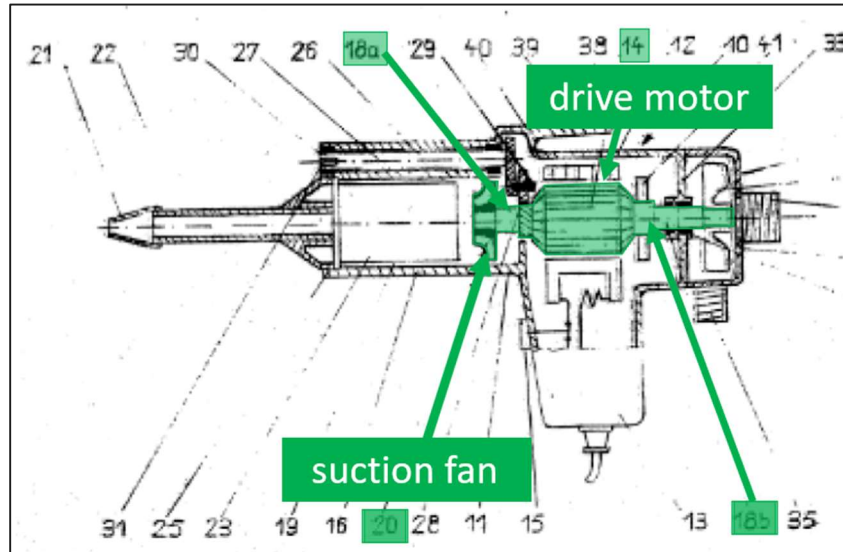
Ex1020, 1, Fig. 1; Ex1002 ¶292.

Martelliere teaches a suction motor and fan assembly having a suction motor axis of rotation: Martelliere’s vacuum cleaner is powered by “**turbines *d***” and “**engine *e***,” which a POSA would have understood is a suction motor and fan assembly having a **suction motor axis of rotation** that is generally parallel to the cyclone axis of rotation (**‘Whirlwind’ axis of rotation**):

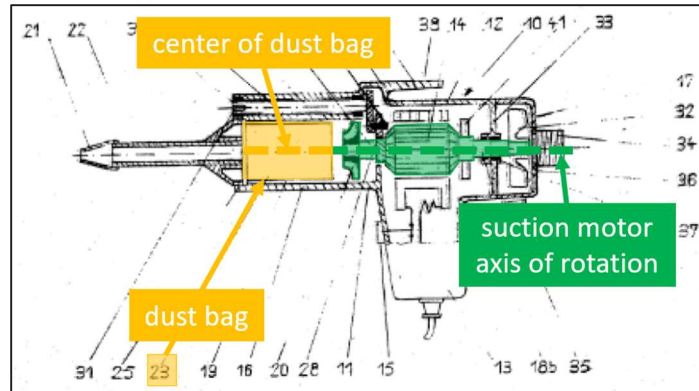


Ex1020, 1, Fig. 1; Ex1002 ¶293.

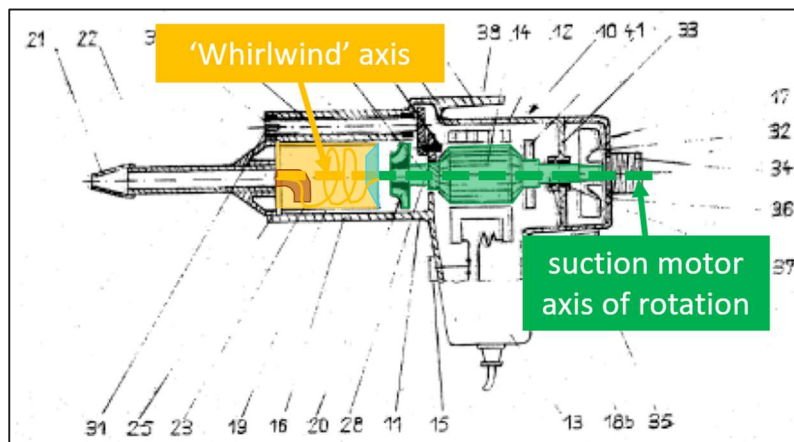
Rebel likewise teaches a suction motor and fan assembly having a suction motor axis of rotation. Ex1002 ¶¶294-296. Rebel teaches a “**motor-driven** vacuum cleaner” in which the “**drive motor 14**” comprises “**shaft 18**,” which drives “**suction fan 20**” to “suck[] in the air and the dust”:



Ex1007, 1-2, 4-5; Fig. 1; Ex1002 ¶294. Rebel teaches that “motor 14” includes “shaft 18,” which it describes as “shaft 18 of the electric motor 14.” Ex1007, 5. A POSA would have understood Rebel’s suction motor and fan assembly has a **suction motor axis of rotation** that is generally parallel to the center of “**dust bag 23**”:



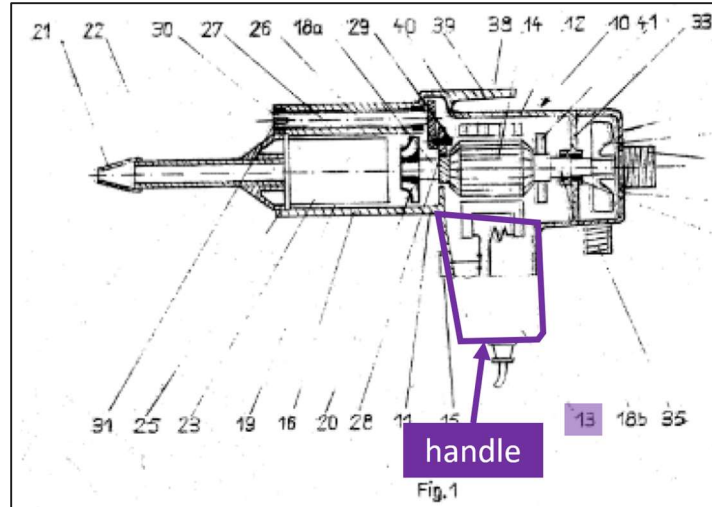
Ex1007, Fig. 1; Ex1002 ¶¶295-296. In the Rebel-Martelliere combination, the suction motor axis of rotation (Martelliere’s and/or Rebel’s) is generally parallel to the cyclone axis of rotation (Martelliere’s ‘Whirlwind’ axis of rotation):



Ex1007, Fig. 1(modified); Ex1020, Fig. 1(modified); Ex1002 ¶297.

If PO argues these axes are co-axial, a POSA would have understood co-axial axes are parallel for the reasons explained for Ground 1, [1a.2]/[12a.2]; Ex1002 ¶298.

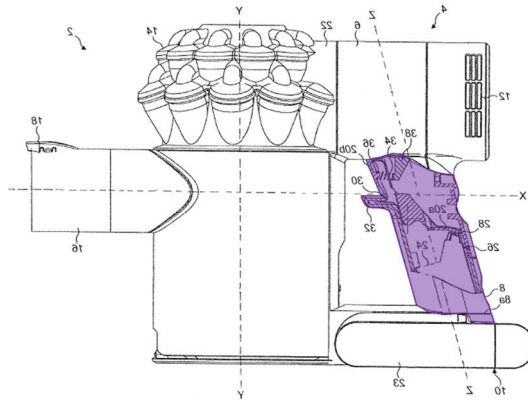
Rebel teaches a pistol-grip handle (“handle 13”):



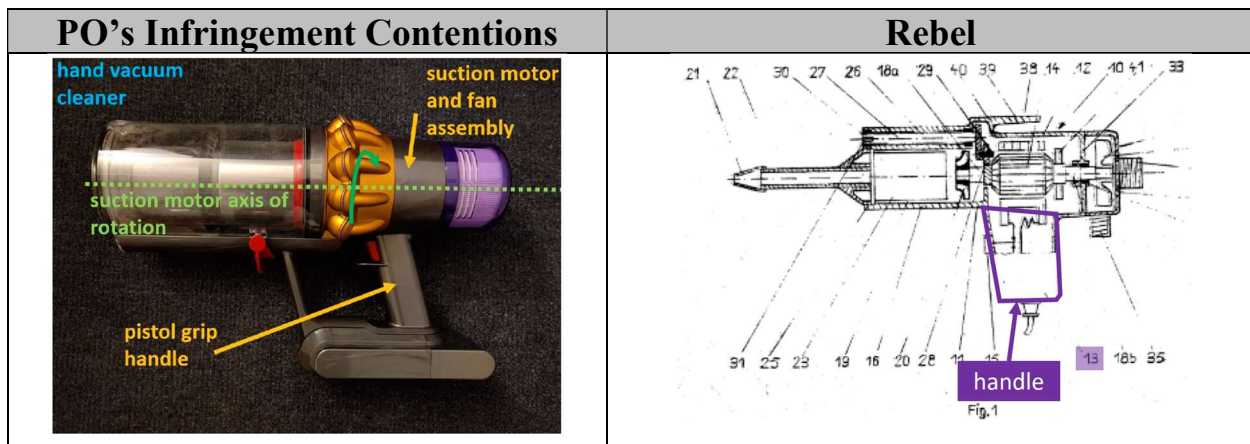
Ex1007, 4, Fig. 1; Ex1002 ¶¶299-302. A POSA would have understood Rebel’s “handle 13” is a pistol-grip handle. Ex1002 ¶300. Rebel describes the vacuum cleaner’s housing as “pistol-shaped housing 11.” Ex1007, 4. Similar handles have been called “pistol-grip” handles for nearly 70 years:

Ex1028, pages 1, 3 (“pistol grip (5)”) (1954)	
Ex1011, Fig. 1 (“pistol-grip holder 19”) (1955)	Ex1030, Fig. 2 (“pistol style compact vacuum cleaner”) (1998)

**Ex1017, Fig. 2 (“handle 8 is oriented in a pistol-grip formation”)
(2013)**



Moreover, Rebel teaches a pistol-grip handle at least to the same extent as PO contends infringes:

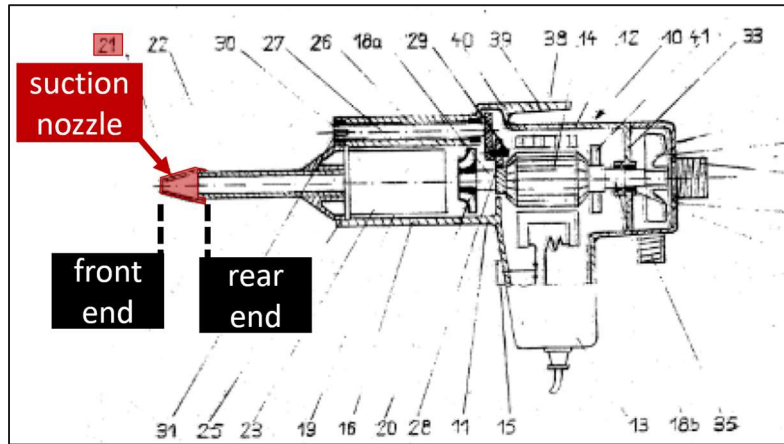


Ex1021 (Ex.28 to Complaint), 6(PO's annotations); Ex1007, Fig. 1; Ex1002 ¶¶300-302.

d. [1b]/[12b]

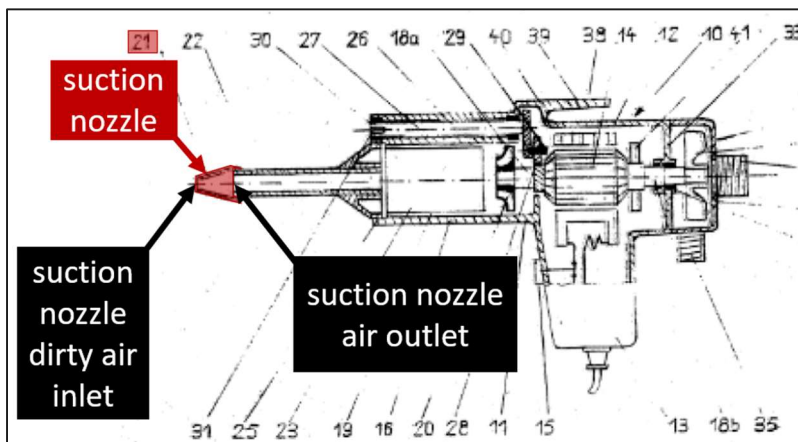
Rebel teaches these limitations. Ex1002 ¶¶303-306.

Rebel teaches “**suction nozzle 21**” which “sucks in the air and the dust” and is a surface cleaning head that has a **front end** and a **rear end** as shown because it is a three-dimensional nozzle designed to interact with the surface to be cleaned:



Ex1007, 4, Fig. 1; Ex1002 ¶305.

“**[S]uction nozzle 21**” has a **dirty air inlet** and a surface cleaning head air outlet (**suction nozzle air outlet**) as shown below because “the electric motor [] sucks in the air and the dust through the **suction nozzle 21**” and then into “the suction connection 22”:

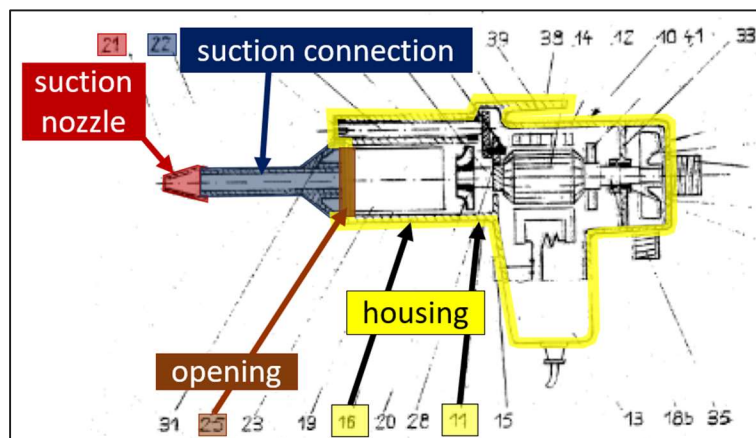


Ex1007, 4, Fig. 1; Ex1002 ¶306.

e. [1c.1]/[12c.1.i]

Rebel teaches these limitations. Ex1002 ¶¶307-311.

Rebel teaches a rigid air flow conduit (“**suction connection 22**”) which is mountable/mounted between the surface cleaning head air outlet (“[t]he **suction nozzle 21** is removably attached to the **suction connection 22**”) and the hand vacuum cleaner dirty air inlet (“**connection 22**...is connected to the **front housing part 16**” at “**opening 25** for the **suction connection 22**” and “can be removed from the **housing 11**”) and extends between them:



Ex1007, 4, Fig. 1; Ex1002 ¶309.

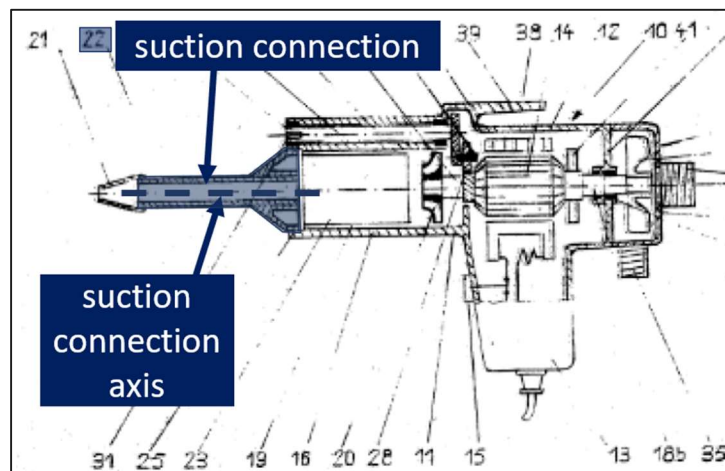
A POSA would have understood “suction connection 22” is rigid because it is depicted as a straight pipe rigidly supporting “suction nozzle 21.” If PO disagrees, it would have been obvious to make “suction connection 22” rigid. Ex1002 ¶310. Rebel depicts “suction connection 22” as straight and Rebel describes the purpose of its “pistol-shaped” device is to be a “handheld vehicle care device” for, e.g., cleaning tight spaces of a vehicle that would require “operat[ing] [the device] with one hand,” which would motivate a POSA to use a rigid tube as opposed to a flexible one that would require a second hand to guide.

Ex1007, 1, 3-4; Ex1002 ¶311. A rigid “suction connection 22” would better support “suction nozzle 21” as a rigid member, and it would have at least been obvious to try as there are a finite number of possibilities—namely, rigid or flexible. Ex1007, 5; Ex1002 ¶311.

f. [12c.1.ii]

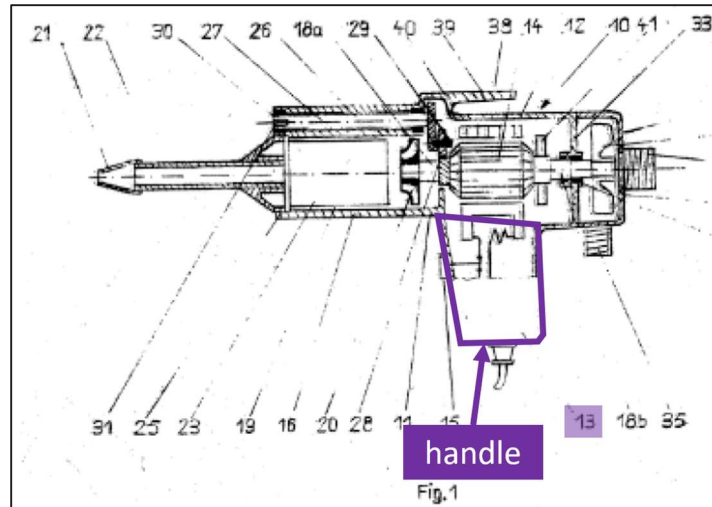
Rebel in combination with Martelliere renders this limitation obvious. Ex1002 ¶¶312-317.

Rebel teaches a rigid air flow conduit (“**suction connection 22**”) having a longitudinally extending conduit axis:



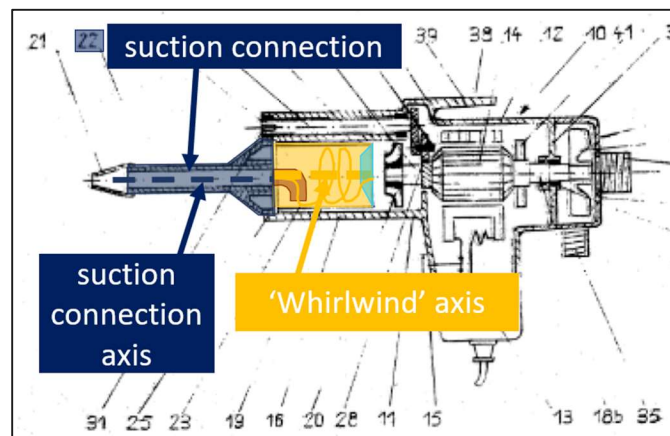
Ex1007, Fig. 1; Ex1002 ¶313; Ground 3, [1c.1]/[12c.1.i].

When Rebel’s cleaner is mounted to the downstream end of the rigid air flow conduit, the **handle** is a driving handle for the surface cleaning apparatus:



Ex1007, Fig. 1; Ex1002 ¶314. Rebel’s “handle” is a driving handle because it is a “means of holding the multipurpose device,” is used to maneuver and operate the device, and because driving the handle drives the entire device. Ex1007, 3-4; Ex1002 ¶315.

In the Rebel-Martelliere combination, when the hand vacuum cleaner is mounted to the downstream end of the rigid air flow conduit, the longitudinally extending conduit axis of the rigid air flow conduit is parallel to the cyclone axis of rotation (“**Whirlwind**” axis of rotation):



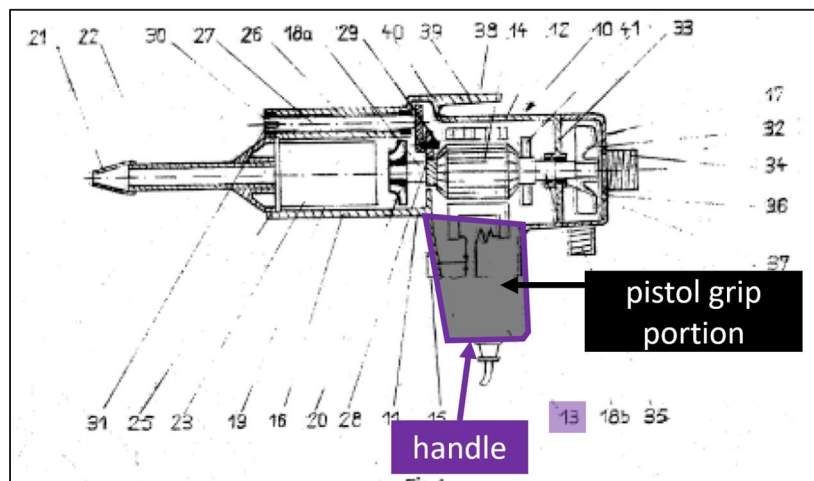
Ex1007, Fig. 1(modified); Ex1020, Fig. 1(modified); Ex1002 ¶316; Ground 3, [1a.2]/[12a.2].

If PO argues these axes are co-axial, a POSA would have understood they are also parallel for the reasons explained for Ground 1, [1a.2]/[12a.2]; Ex1002 ¶317.

g. [1c.2]/[12c.2]

Rebel teaches and renders obvious these limitations. Ex1002 ¶¶318-331.

Rebel’s pistol grip handle (“**handle 13**” of “pistol-shaped housing 11”) has a **pistol grip portion**:

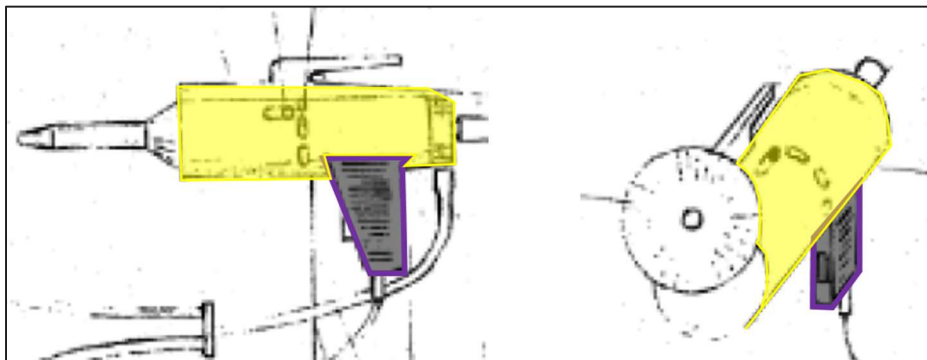
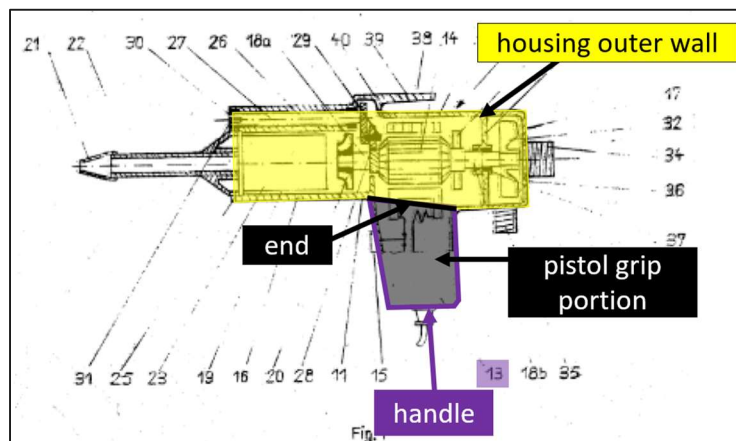


Ex1007, 4, Fig. 1; Ex1002 ¶320.

If PO argues a “pistol grip handle ha[ving] a pistol-grip portion” requires a feature that assists with gripping (e.g., a textured surface or contour), including as taught by Butler, it would have been obvious to a POSA to modify Rebel to add such a feature to “handle 13” to improve the user’s ability to grip and manipulate

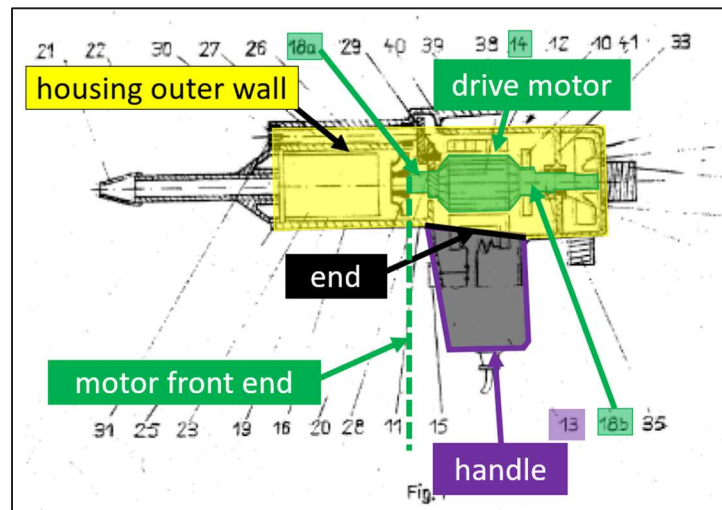
the device, thus furthering Rebel's stated purpose of the "handle" as a "means of holding the multipurpose device," including when "operated with one hand." Ex1007, 3; Ex1002 ¶321. A POSA would have reasonably expected success modifying Rebel because it would have involved simply adding a gripping surface (for example, a rubber coating or dimples) to the handle, which was well-known in the art and had the known benefit of improving grip. Ground 1, [1c.2]/[12c.2]; Ex1002 ¶322.

Rebel's pistol-grip handle ("handle 13") extends generally radially away from, and has an **end** mounted to, an outer wall of the hand vacuum cleaner ("housing 11['s]'s" outer wall):



Ex1007, Fig. 1; Ex1002 ¶323; Ground 3, [1a.2]/[12a.2].

Rebel's **"handle 13"** extends generally radially way from, and has an **end** mounted to, "housing 11[']s]" outer wall at a location rearward of the front end and forward of a rear end of the suction motor ("**drive motor 14**" containing "**front output shaft 18a**" and "**rear output shaft 18b,**");

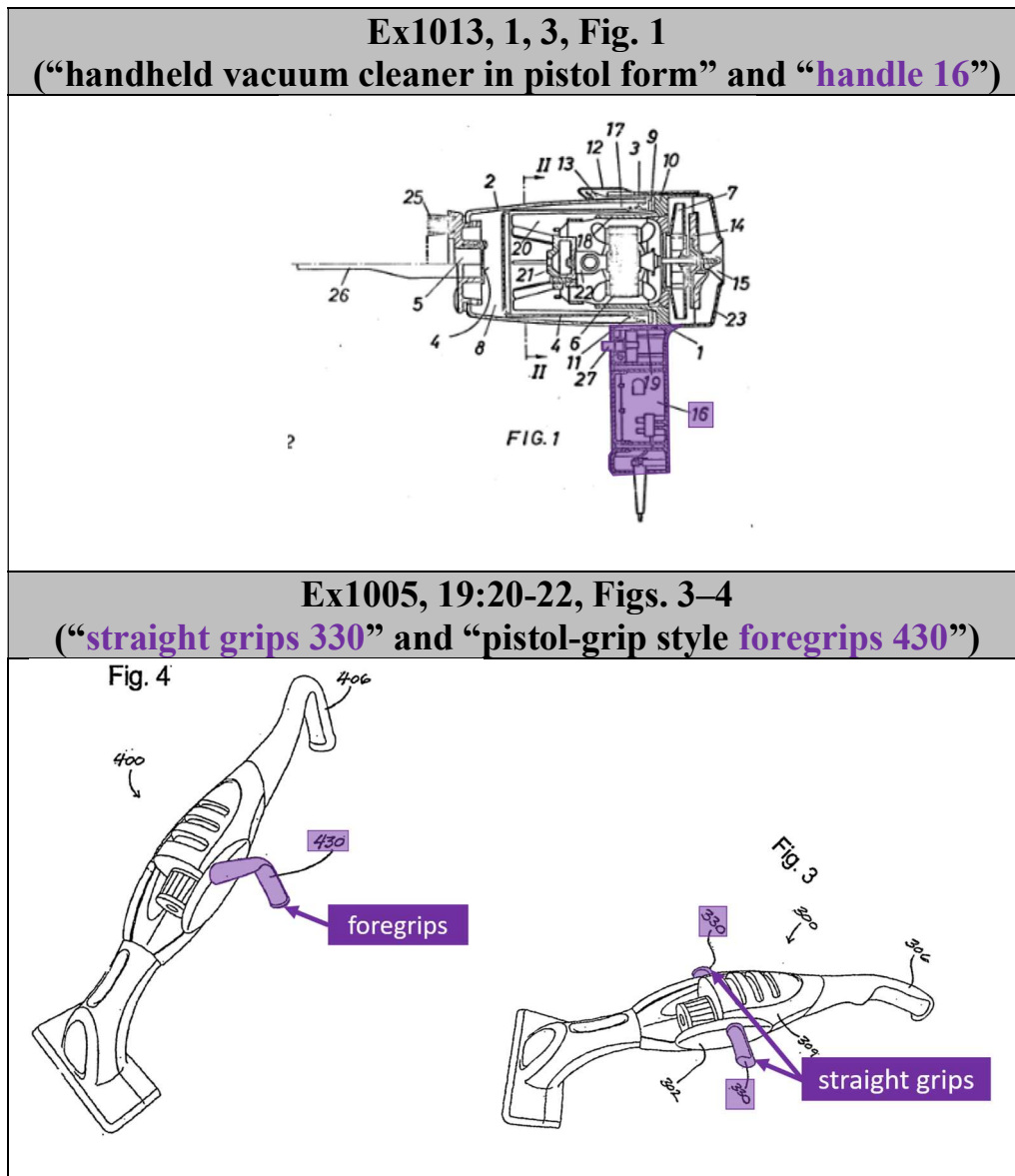


Ex1007, Fig. 1; Ex1002 ¶324. A POSA would have understood “shaft 18” is part of “drive motor 14,” including because Rebel describes it as part “of” the motor, “the shaft 18 of the electric motor 14,” because a POSA would have understood a motor shaft is needed to drive the “suction fan 20,” and because the ’983Patent describes the “suction motor 204” as having a “motor axis 252 of suction motor 204,” which a POSA would have understood is the axis of the rotating motor shaft.

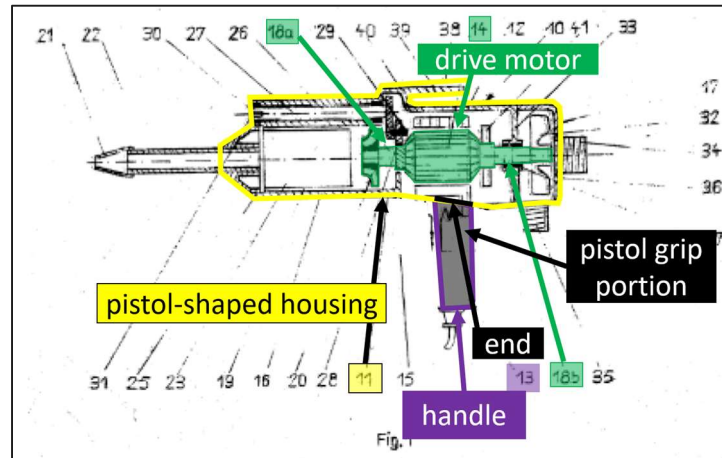
Ex1001, 13:38-46; Ex1002 ¶325.

If PO argues Rebel does not disclose this limitation, a POSA would have found it obvious, based on Rebel's teachings, to narrow Rebel's handle, which

would improve its ability to be a “means of holding the multipurpose device,” as Rebel teaches. Ex1007, 3; Ex1002 ¶326. A POSA would have reasonably expected success because it would have only involved slightly reducing the size of a well-known, simple component (the handle) and because thin pistol-grip handles were well known:



Ex1002 ¶327. When Rebel's handle is so modified, it likewise meets this limitation:



Ex1007, Fig. 1(modified); Ex1002 ¶328.

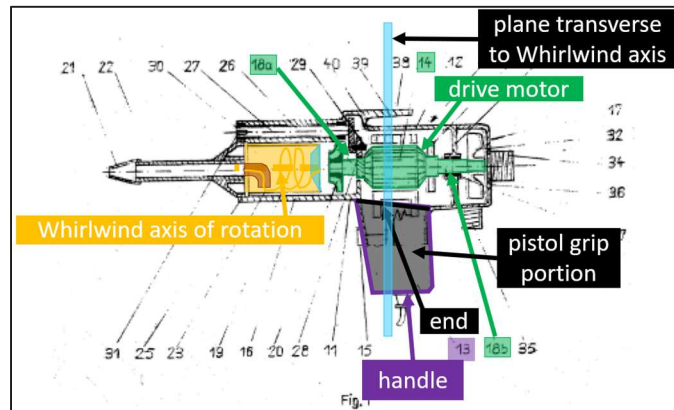
A POSA would have been motivated to modify Rebel to mount the handle below the motor, including a location rearward of the front end and forward of a rear end of the suction motor, because it would locate the center of gravity of a heavy motor directly above the handle, thereby increasing ergonomics, reducing strain on the user, and improving the handle's ability to be a "means of holding the multipurpose device," as Rebel teaches. Ex1007, 3; Ex1002 ¶329. A POSA would have reasonably expected success because this modification would have involved slightly relocating the handle position and because such considerations were well-known in the art, including as taught by Butler (Ground 1, [1c.2]/[12c.2]) and by GB2,484,146, which teaches that "[a]dvantageously, this motor may be positioned at or near the upper end of the pistol grip, so that the weight of the motor may be

supported more comfortably on top of the user's hand" (Ex1026, 4:19-21).
Ex1002 ¶¶330-331.

h. [1c.3]

Rebel in combination with Martelliere renders this limitation obvious.
Ex1002 ¶¶332-333.

Rebel in combination with Martelliere teaches a plane that is transverse to the cyclone axis of rotation extends through the pistol-grip portion and the hand vacuum cleaner at a location rearward of the front end and forward of a rear end of the suction motor:

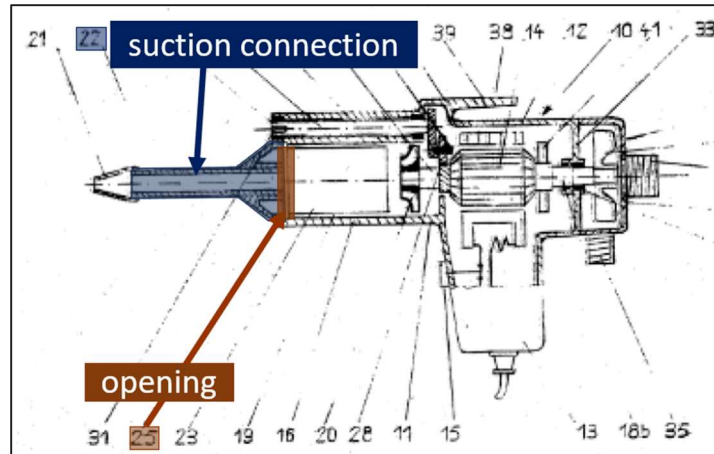


Ex1007, Fig. 1(modified); Ex1002 ¶333.

i. [1c.4]

Rebel teaches and renders obvious these limitations. Ex1002 ¶¶334-339.

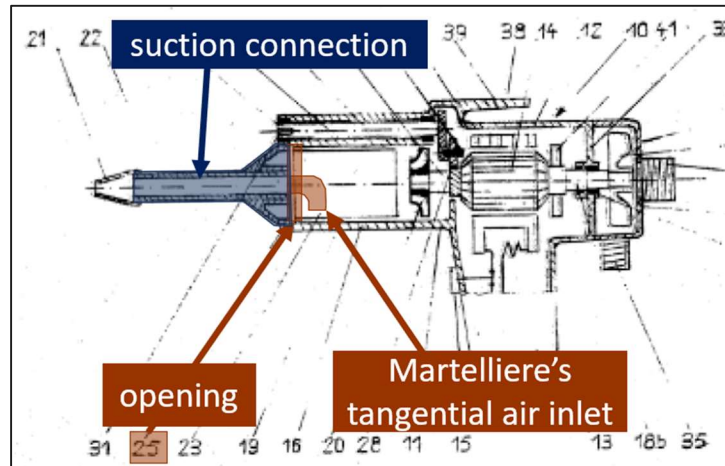
Rebel teaches that the dirty air inlet of the cleaner (“**opening 25**”) is removably drivingly mountable to a downstream end of the rigid air flow conduit (“**suction connection 22**”):



Ex1007, Fig. 1; Ex1002 ¶335; Ground 3, [1a.1]/[12a.1], [1c.1]/[12c.1.i]. The mounting between the “opening” and “suction connection” is removeable because the “suction connection” is “detachably attached” and can be “removed from” the housing: “dust bag 23 is detachably attached to the suction connection 22 and can be removed from the housing 11 together with said connection.” Ex1007, 4; Ex1002 ¶336.

Rebel’s dirty air inlet, “opening 25,” is drivingly mountable to a downstream end of “suction connection 22” and when the cleaner is mounted to the downstream end of “suction connection 22,” the pistol-grip handle (“handle 13”) is a driving handle for the surface cleaning apparatus because movement of “handle 13” drives the entire device, including rigid “suction connection 22,” which, in turn, drives “suction nozzle 21” when so mounted. Ex1002 ¶337; Ground 3, [1a.2]/[12a.2], [1c.1]/[12c.1.i], [12c.1.ii].

These features of “**opening 25**” would not change when Martelliere’s cyclonic-separator teachings, including its “**tangential[]**” **air inlet**, are incorporated with Rebel:

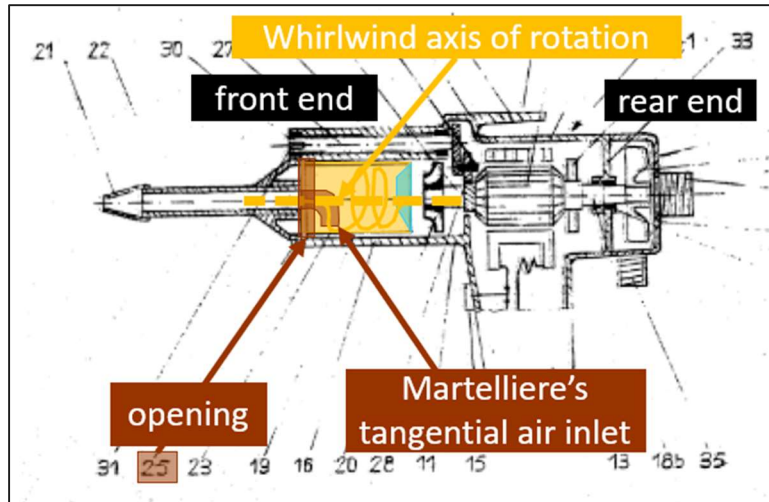


Ex1007, Fig. 1(modified); Ex1020, Fig. 1(modified); Ex1002 ¶338. Rebel’s “opening 25” and Martelliere’s “tangential[]” air inlet are individually and together a dirty air inlet of the hand vacuum cleaner. Ex1002 ¶339.

j. [1c.5]

Rebel in combination with Martelliere teaches these limitations. Ex1002 ¶¶340-341.

In the Rebel-Martelliere combination, when the hand vacuum cleaner is positioned with the **front end** of the hand vacuum cleaner in front of the **rear end** of the hand vacuum cleaner and the dirty air inlet (“**opening 25**”/“**tangential[]**” **air inlet**) faces forwardly, the cyclone axis of rotation (“**Whirlwind**” **axis**) is generally horizontal:

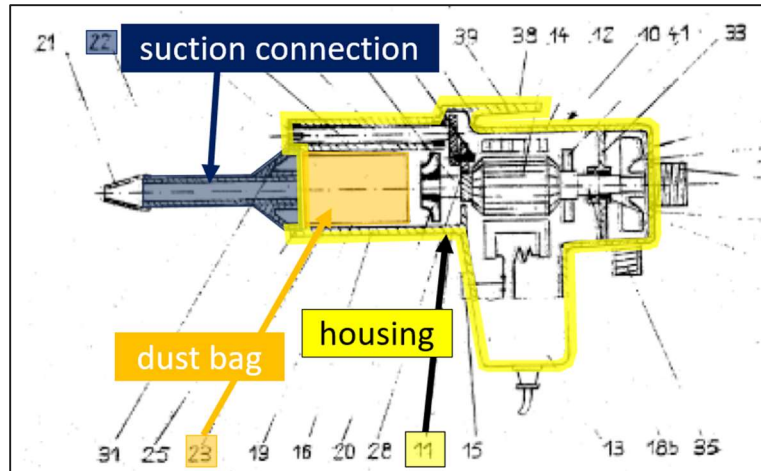


Ex1007, Fig. 1(modified); Ex1020, Fig. 1(modified); Ex1002 ¶341.

3. [2]/[14]

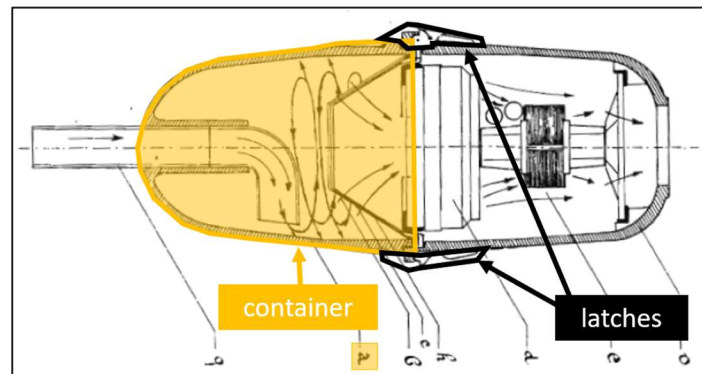
The Rebel-Martelliere combination renders claims [1]/[12] obvious and teach and render obvious the remaining limitation of these claims. Ex1002 ¶¶342-348.

Rebel teaches that the air-filtration unit is removably mountable as part of the hand vacuum cleaner: “**dust bag 23** is detachably attached to the **suction connection 22** and can be removed from the **housing 11** together with said **connection**”:



Ex1007, 4, Fig. 1; Ex1002 ¶345.

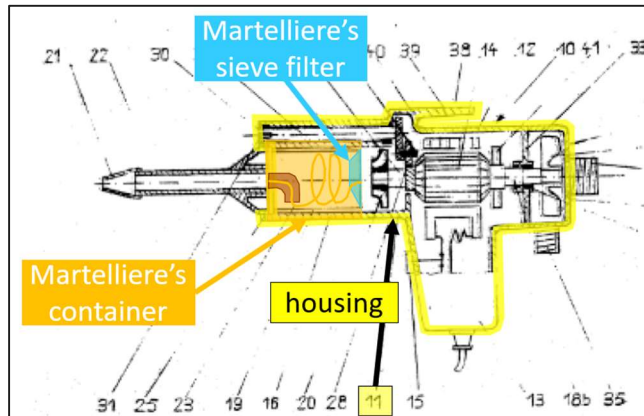
Martelliere teaches that the cyclone unit (“**container a**,” in which the “Whirlwind” cyclonic airflow occurs) is removably mountable as part of the hand vacuum cleaner: “the **container** is very easily detachable” using latches:



Ex1020, 1, Fig. 1; Ex1002 ¶346.

Because both Rebel and Martelliere teach the air-filtration unit is removably mountable as part of the hand vacuum cleaner, a POSA would have understood in the Rebel-Martelliere combination, the cyclone unit (Martelliere’s “very easily detachable” “**container**”) is removably mountable as part of the hand vacuum

cleaner to empty the collected dust, to allow a user to clean the container, and to create access to the pre-motor filter (Martelliere's "**sieve filter**") for cleaning, and maintenance:

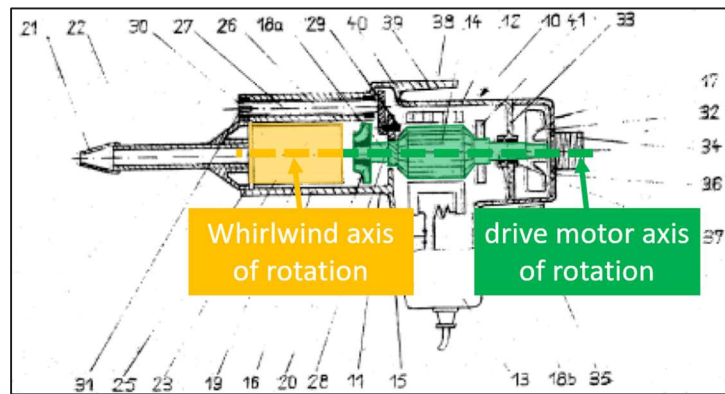


Ex1007, Fig. 1(modified); Ex1020, Fig. 1(modified); Ex1002 ¶347. A POSA would have found it obvious to make the cyclone unit removably mountable for these reasons. Ex1002 ¶348. It would have at least been obvious to try, as one of a finite number of ways to empty the collected dust and create access to the pre-motor filter, including removing the cyclone unit and opening a door to the cyclone unit. Ex1002 ¶348. A POSA would have reasonably expected success because it would have been straightforward to make the cyclone unit removably mountable, including using latches as Martelliere teaches, and/or using other well-known mechanisms to “detach[]” the air-filtration unit, as Rebel teaches. Ex1020, 1, Fig. 1; Ex1007, 4, Fig. 1; Ex1002 ¶348.

4. [4]

The Rebel-Martelliere combination renders claim 1 obvious and teaches the remaining limitation of this claim. Ex1002 ¶¶349-352.

In the Rebel-Martelliere combination, the cyclone axis of rotation (“**Whirlwind**” axis) is generally parallel to the **suction motor axis of rotation**:



Ex1007, Fig. 1(modified); Ex1020, Fig. 1(modified); Ex1002 ¶351.

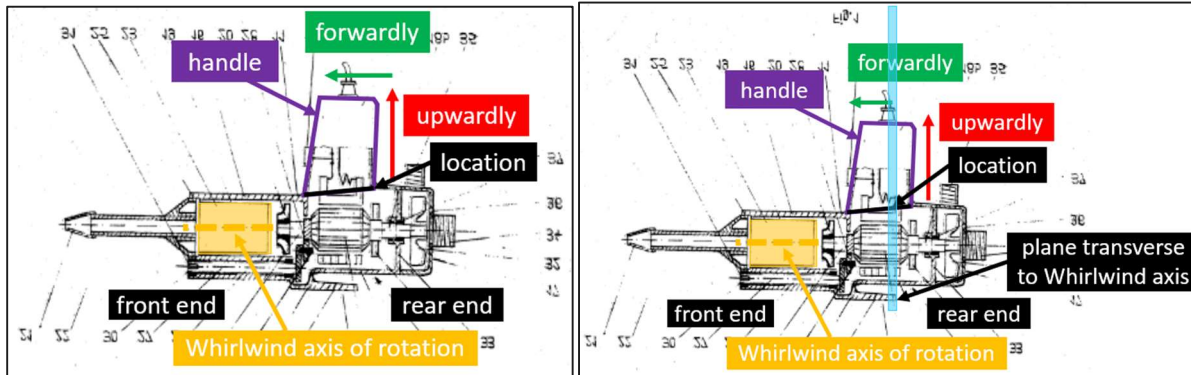
If PO argues these axes are co-axial, a POSA would have understood they are also parallel for the reasons explained for Ground 1, [1a.2]/[12a.2]; Ex1002 ¶352.

5. [5]

The Rebel-Martelliere combination renders claim 1 obvious and teaches the remaining limitation of this claim. Ex1002 ¶¶353-356.

When the Rebel-Martelliere combination hand vacuum cleaner is positioned with the **front end** of the hand vacuum cleaner in front of the **rear end** of the hand vacuum cleaner, the cyclone axis of rotation (“**Whirlwind**” axis) is positioned

horizontally and the pistol grip handle (“**handle 13**”) extends **upwardly** and **forwardly** from **the location**, regardless of whether “the location” refers to “a location” where the handle end is mounted ([1c.2], left), or “a location” of the plane transverse to cyclone axis ([1c.3], right):



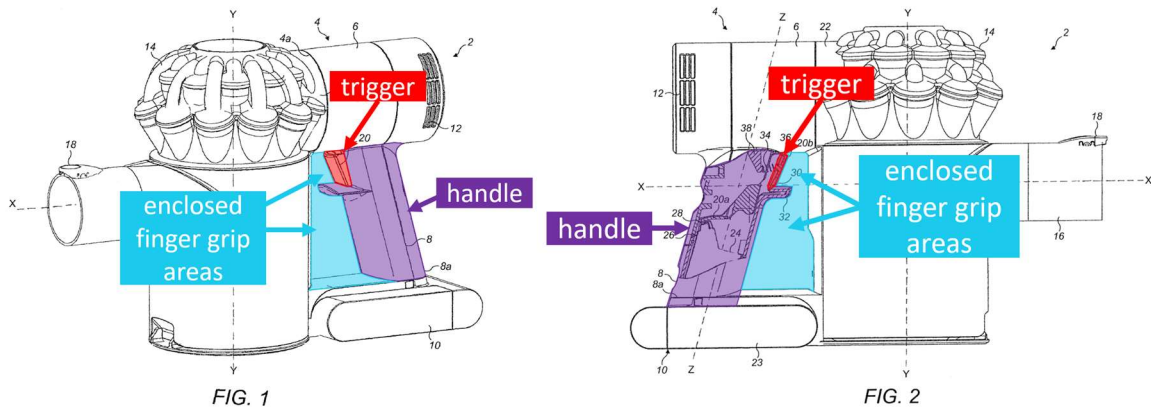
Ex1007, Fig. 1(modified); Ex1020, Fig. 1(modified); Ex1002 ¶355. A POSA would have understood one of the ways in which a user can “hold[] the multipurpose device” of Rebel-Martelliere vacuum is as depicted above, particularly when cleaning hard-to-reach areas, such as under a vehicle’s seat, as Rebel teaches. Ex1007, 1 (“Multipurpose device, in particular handheld vehicle care device”), 3; Ex1002 ¶356.

6. [6]/[17]

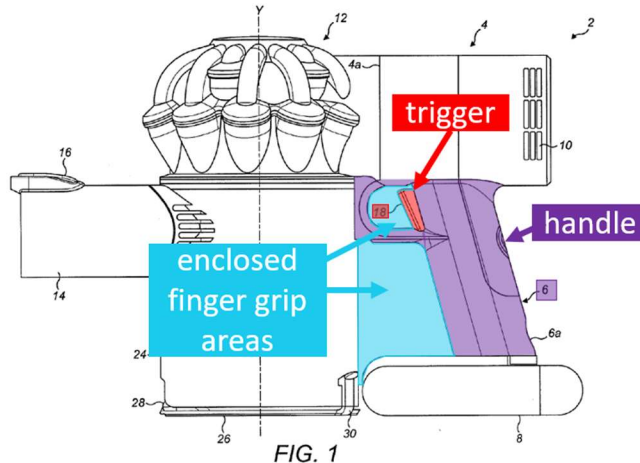
The Rebel-Martelliere combination renders obvious claim 1 and the remaining limitation of these claims. Ex1002 ¶¶357-362.

Rebel’s “**handle 13**...accommodates...**switch 15**,” which “operate[s]” the “electric motor”:

Ex1017, 7:31-8:4 Figs. 1-2 (enclosed finger grip areas “allow[] a user to grasp the handle without actuating the trigger”)



Ex1018, ¶27, Fig. 1 (enclosed finger grip areas prevent accidental operation of trigger 18)



See Ground 1, [6]/[17]; Ex1002 ¶360.

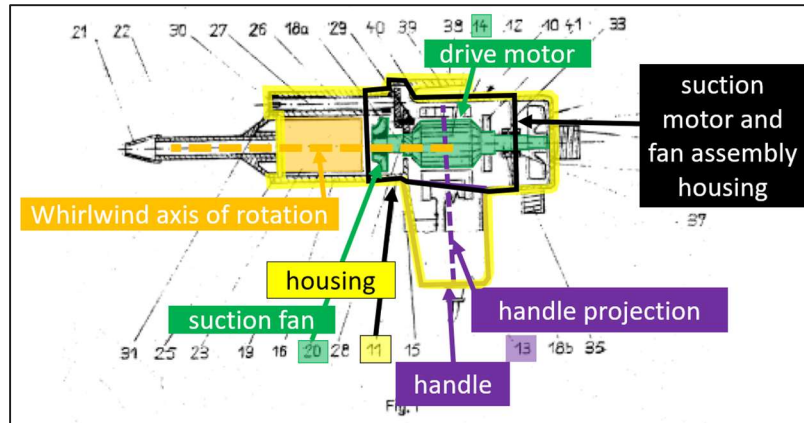
A POSA therefore would have been motivated to modify Rebel’s “handle 13” to include such an enclosed finger grip area to achieve these benefits. Ex1002 ¶361. A POSA would have understood this modification involves simply adding a known element (an extension of “handle 13” enclosing the “switch 15” and/or the

entire handle) to obtain the predictable results of encasing and protecting the hand-grip portion of the handle and protecting the “switch” from accidental operation. Ex1002 ¶361. This modification would have at least been obvious to try as one of a finite number of handle possibilities, including handles with exposed finger grip areas and handles with enclosed finger grip areas. Ex1002 ¶362. A POSA would have reasonably expected success modifying Rebel’s handle as described for the reasons listed above and because it would have been a straightforward modification of the handle to include such an enclosure. Ex1002 ¶362.

7. [7]/[8]/[18]/[19]

The Rebel-Martelliere combination renders claim 1 obvious and teaches the remaining limitation of these claims. Ex1002 ¶¶363-366.

In the Rebel-Martelliere combination, a projection of the pistol grip handle (“**handle 13**”) in a direction transverse to the cyclone axis of rotation (“**Whirlwind**” **axis**) intersects the suction motor and fan assembly (“**drive motor 14**,” which comprises “**shaft 18**,” and “**suction fan 20**”) and a housing of the suction motor and fan assembly (the **portion** of “**housing 11**” that houses “**motor 14**” and “**fan 20**”):

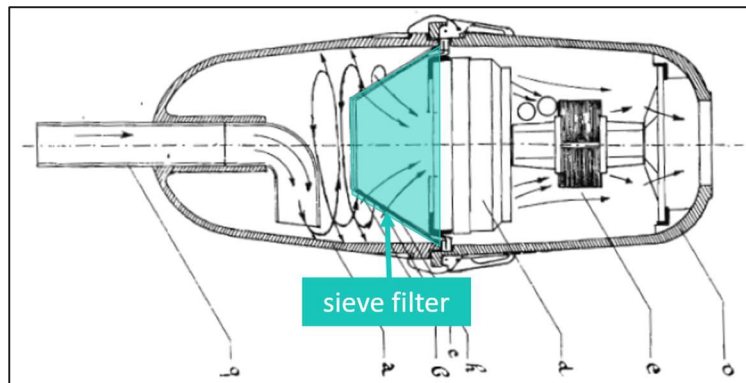


Ex1007, Fig. 1(modified); Ex1020, Fig. 1(modified); Ex1002 ¶366.

8. [9]/[20]

The Rebel-Martelliere combination renders claims [2]/[14] obvious and teaches the remaining limitation of these claims. Ex1002 ¶¶367-372.

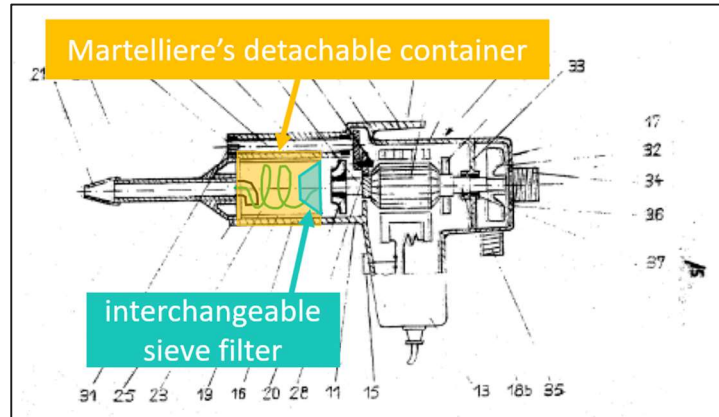
Martelliere teaches a pre-motor filter (“**interchangeable sieve filter *b***”), wherein the pre-motor filter is accessible when the cyclone unit is removed:



Ex1020, 1, Fig. 1; Ex1002 ¶370. A POSA would have understood “sieve filter” is a pre-motor filter because it “filter[s]...the vacuumed dust” upstream of the suction motor. Ex1020, 1, Fig. 1; Ex1002 ¶371. A POSA would have understood “sieve filter” is accessible when the cyclone unit (“chamber a”), which surrounds “sieve

filter,” is removed, because Martelliere teaches “sieve filter” is “interchangeable” and is “replaced at each emptying.” Ex1020, 1, Fig. 1; Ex1002 ¶371.

This limitation remains met when Martelliere’s air-filtration unit teachings, including pre-motor-filter “**sieve filter**,” are incorporated into Rebel:

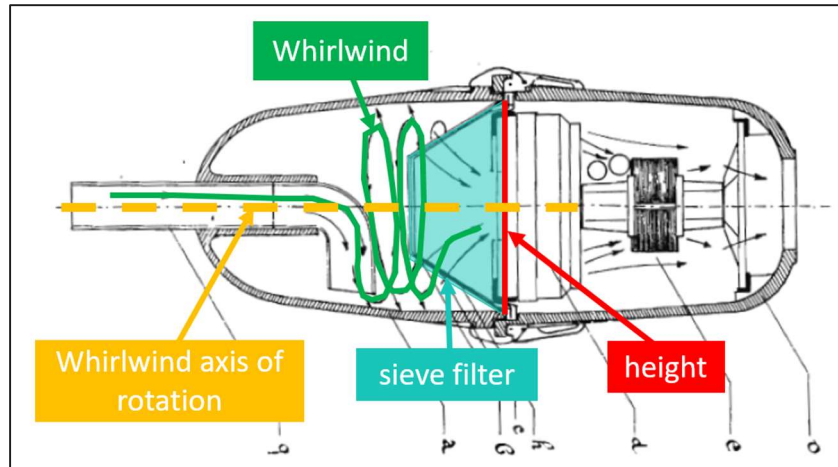


Ex1007, Fig. 1(modified); Ex1020, Fig. 1(modified); Ex1002 ¶372; Ground 3 [2]/[14].

9. [10]/[21]

The Rebel-Martelliere combination renders claims [9]/[20] obvious and further teaches and renders obvious the remaining limitation of these claims. Ex1002 ¶¶373-382.

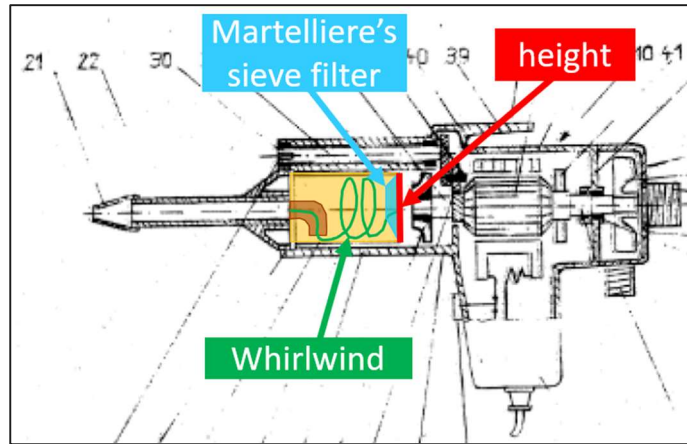
In Martelliere, the pre-motor filter (“**sieve filter**”) has a **height** in a direction transverse to the cyclone axis (“**Whirlwind**” **axis**) and the height is larger than a diameter of the cyclone (“**Whirlwind**”):



Ex1020, Fig. 1; Ex1002 ¶376.

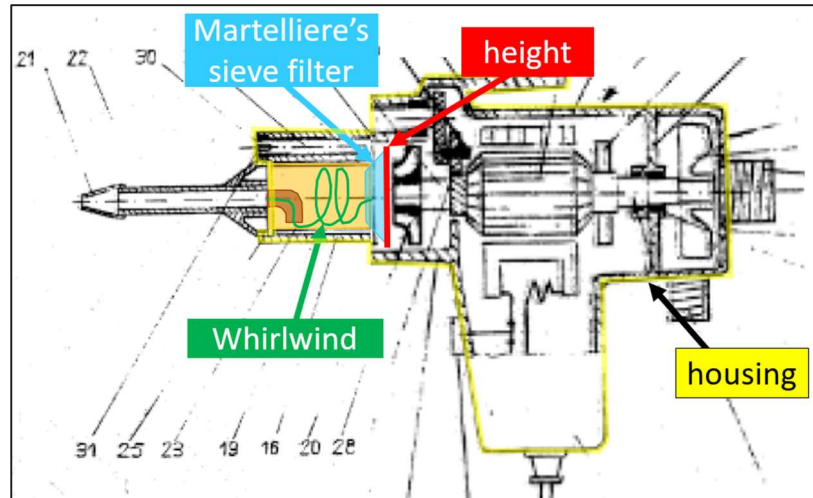
As shown above, a POSA would have understood Martelliere teaches the pre-motor filter height in a direction transverse to the cyclone axis is larger than a diameter than of the cyclone because the “sieve filter” extends to the edges of Martelliere’s “container,” and therefore the height is larger or as large as the largest-diameter of the cyclone, and because the “container” tapers towards the front, and thus the height is larger than a diameter of the cyclone at the tapered end. Ex1002 ¶377.

Likewise, in the Rebel-Martelliere combination, the “sieve filter” has a height larger or as large as the largest-diameter of the cyclone:



Ex1007, Fig. 1(modified); Ex1020, Fig. 1(modified); Ex1002 ¶378.

In the Rebel-Martelliere combination, a POSA would have been motivated to increase the amount of pre-motor filtration by increasing the size of Martelliere's "sieve filter," which would also result in the pre-motor filter height being larger than a diameter of the cyclone. Ex1002 ¶379. A POSA would have understood increasing filter size (surface area and volume) increases the amount of air filtration and allows the filter to filter more particles before becoming clogged. Ex1031, ¶33; Ex1002 ¶379. A POSA would have been motivated to increase the amount of pre-motor filtration to increase the overall amount of filtration during operation, to further protect the motor from being damaged by dirty air, and to decrease the resistance of airflow through the filter. Ex1002 ¶380. A POSA would have understood Martelliere's "**sieve filter**" and its **height** could be increased by simply enlarging certain portions of Rebel's "**housing 11**":



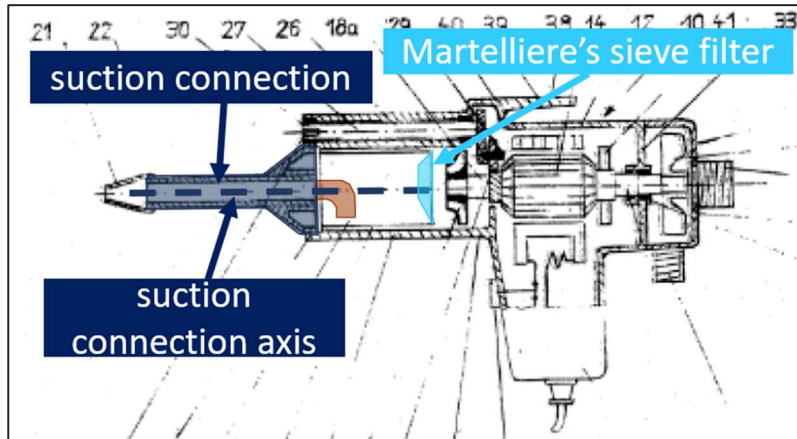
Ex1007, Fig. 1(modified); Ex1020, Fig. 1(modified); Ex1002 ¶380. When so modified, the pre-motor “sieve filter” has a height larger than a diameter of the cyclone. Ex1002 ¶381.

A POSA would have reasonably expected success because this modification would have involved modestly enlarging Martelliere’s pre-motor filter and the rear portion of Rebel’s housing, which would have been straightforward. Ex1002 ¶382.

10. [13]

The Rebel-Martelliere combination renders claim 12 obvious and teaches the remaining limitations of this claim. Ex1002 ¶¶383-385.

The Rebel-Martelliere combination teaches a pre-motor filter (“**sieve filter**”), wherein, when the hand vacuum cleaner is mounted to the downstream end of the rigid air flow conduit (“**suction connection 22**”), a projection of the longitudinally extending conduit axis (**suction connection axis**) intersects the pre-motor filter:

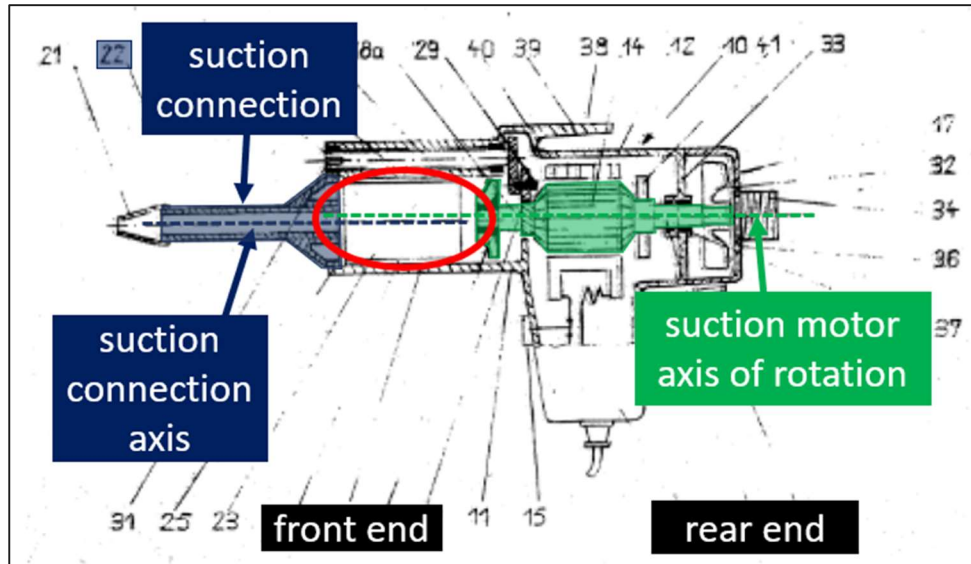


Ex1007, Fig. 1(modified); Ex1020, Fig. 1(modified); Ex1002 ¶385.

11. [15]

The Rebel-Martelliere combination renders claim 12 obvious and further teaches and renders obvious the remaining limitation of this claim obvious. Ex1002 ¶¶386-391.

Rebel teaches that, when the hand vacuum cleaner is mounted to the downstream end of the rigid air flow conduit (“**suction connection 22**”) and when the hand vacuum cleaner is positioned with the **front end** of the hand vacuum cleaner in front of the **rear end** of the hand vacuum cleaner, the **suction motor axis of rotation** is **vertically spaced** from the longitudinally extending conduit axis (**suction connection axis**):



Ex1007, Fig. 1; Ex1002 ¶388.

If PO argues the drive motor axis of rotation is not vertically spaced from the suction connection axis, it would have been obvious to modify Rebel to vertically space these axes, even by a modest amount. Ex1002 ¶389. Rebel teaches “a handheld vehicle care device” that “comprises a motor-driven vacuum cleaner.” Ex1007, 1. A POSA would have understood raising or lowering Rebel’s “suction connection 22” would improve the utility of the device for certain uses, including cleaning hard-to-reach areas, e.g., under a vehicle seat, and a POSA would have reasonably expected success, because it would have been a minor modification to the location of the suction connector. Ex1002 ¶390. A POSA would have also been motivated to raise or lower Rebel’s motor/fan assembly to optimize airflow, cooling, and component packaging. Ex1002 ¶391. It would have at least been obvious to try moving the suction connector up/down relative to

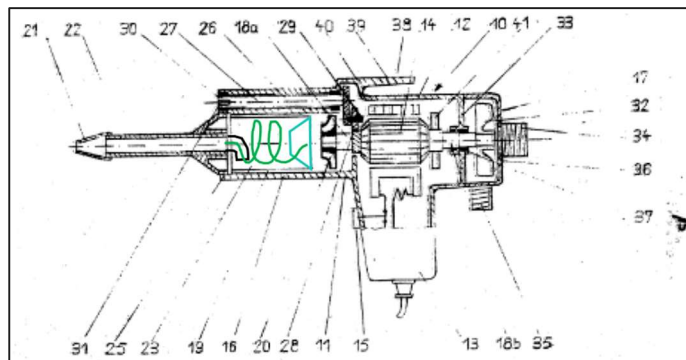
the drive motor, as there are a finite number of relative locations of these components and thus a finite number of relative positions of their axes, including co-axial and vertically offset. Ex1002 ¶391.

D. Ground 4: Rebel In Combination With Martelliere And Jianan Renders Claims 3, 10-11, 16 and 21-22 Obvious

1. Motivation To Combine Rebel, Martelliere, And Jianan

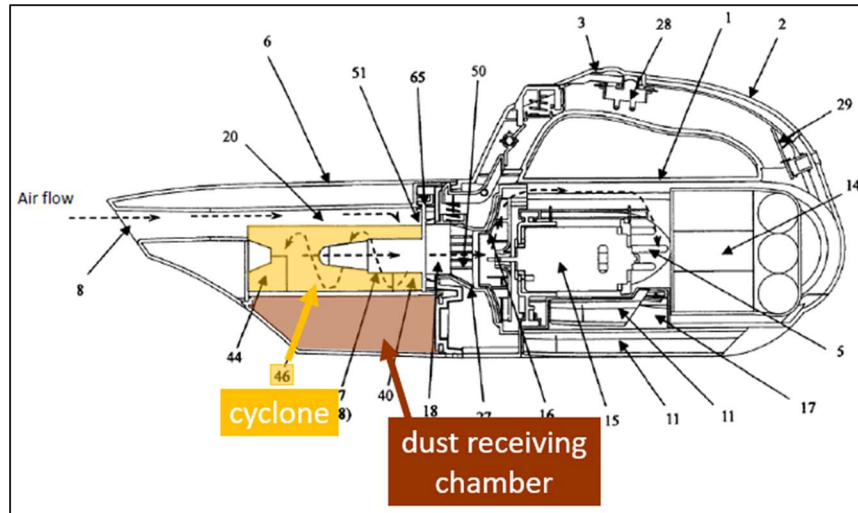
a. Scope and Content of Prior Art

The Rebel-Martelliere combination is a “[m]ultipurpose device” including a cyclonic “vacuum cleaner”:

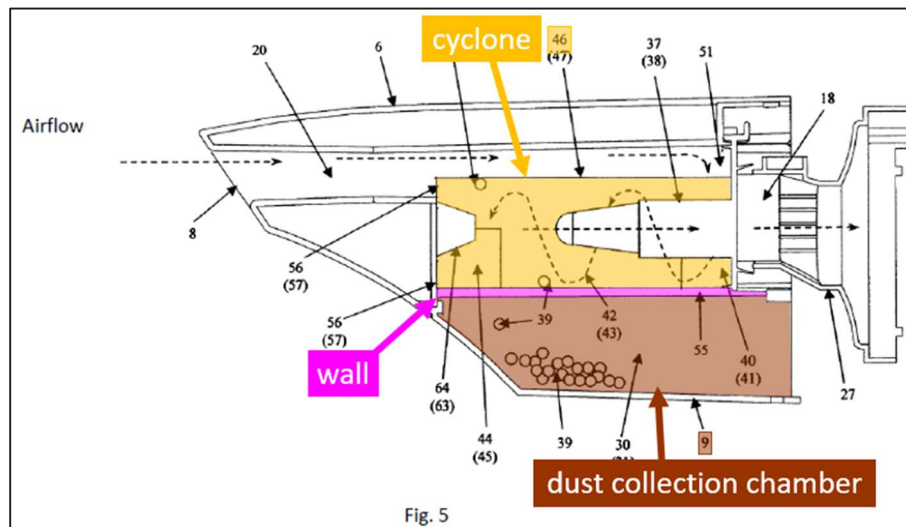


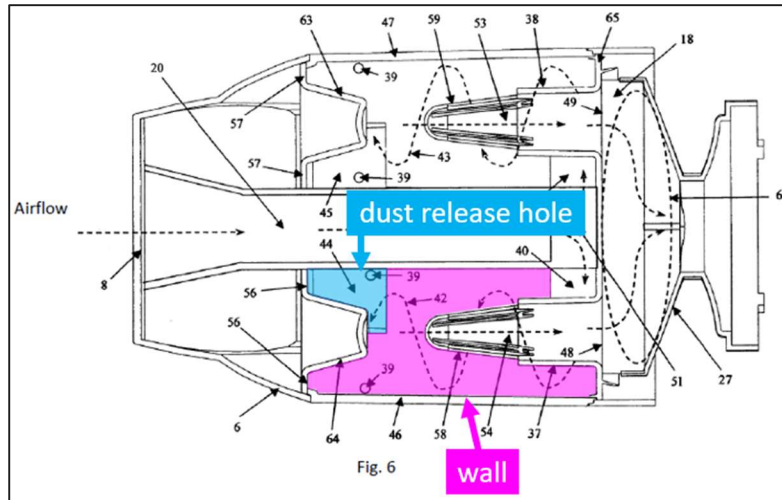
Ex1007, 1, Fig. 1(modified); Ex1020, 1, Fig. 1(modified); Ground 3, §1; Ex1002 ¶¶392-395.

Jianan teaches a “handheld vacuum” with a “detachable dust cup” comprising “two parallel **cyclones** and separate **dust receiving chambers**”:



Ex1015, Abstract, 4, Fig. 3; Ex1002 ¶393. “[W]all 55” separates “cyclone 46” and the “independent dust collection chamber 9”:

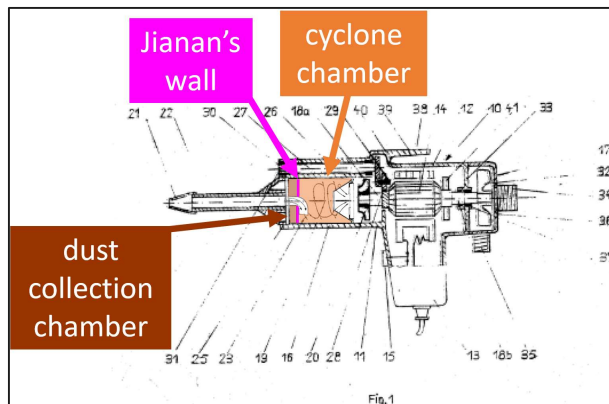
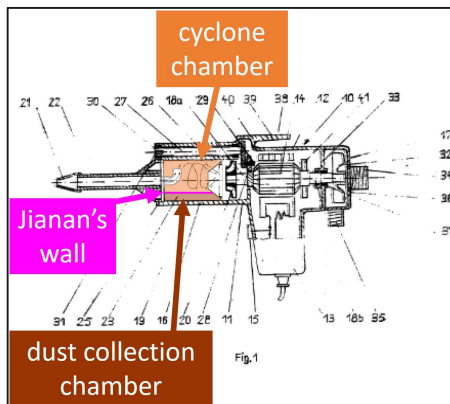
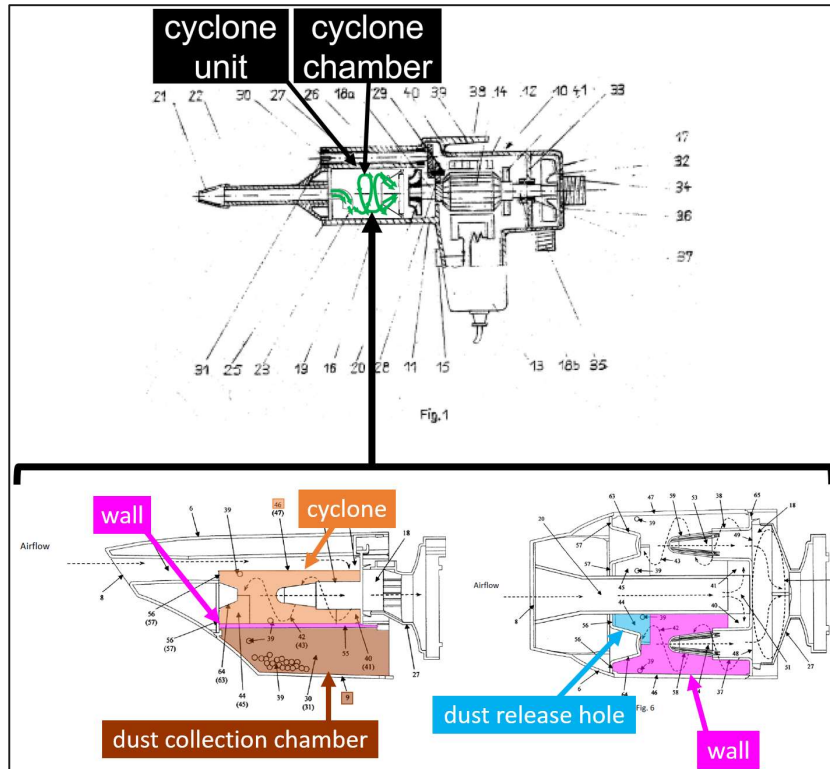


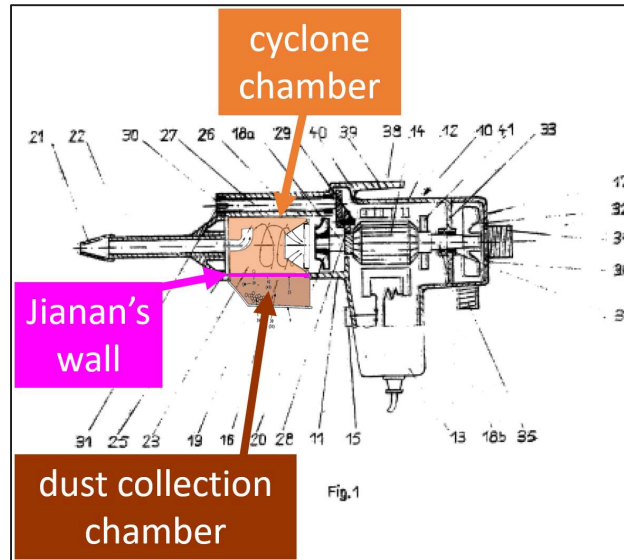


Ex1015, 9-10, Figs. 5-6; Ex1002 ¶394. “[D]ust collection chamber 9 is connected to the cyclone body via the dust release hole.” Ex1015, 9.

b. Motivation to Combine

A POSA would have been motivated to incorporate Jianan’s teachings into the Rebel-Martelliere combination to achieve the benefits of Jianan’s independent dust-collection chamber in multiple ways, including by adding a horizontal or vertical “wall” with a “dust release hole” to the cyclone chamber, and by adding Jianan’s external dust-collection chamber:





Ex1007, 4, Fig. 1(modified); Ex1020, Fig. 1(modified); Ex1015, Figs. 5-6(modified); Ex1002 ¶396. A POSA would have understood Martelliere's "tangential[]" air inlet would create cyclonic airflow whether pointed toward the upper or lower end of the cyclone chamber. Ex1002 ¶397. To accommodate the separate dirt-collection chamber when a horizontal wall is used, a POSA would have been motivated to point Martelliere's "tangential[]" air inlet upwards. Ex1002 ¶398.

For the same reasons as for Ground 2, §1.b, a POSA would have been motivated to incorporate Jianan's teachings into the Rebel-Martelliere combination as described. Ex1002 ¶399. Jianan is analogous art to the Rebel-Martelliere combination: both teach a hand vacuum cleaner with a removable cyclonic-separation unit. Ground 3, [2]/[14]; Ex1015, Abstract, 4, claim 3; Ex1002 ¶399. These references provide motivations for this combination. Ex1002 ¶¶399-400.

Martelliere teaches it is beneficial to “prevent[] clogging” of the “filter screen” and to create “stable suction” by having “the [dust] materials [be] deposited in the bottom of the container, after having separated from the air, before it passes through the filter screen,” which would have motivated a POSA to look for ways to further prevent clogging and improve suction stability, such as Jianan teaches. Ex1020, 1; Ex1002 ¶400. A POSA would have understood cyclone units with an exterior dirt-collection chamber as Jianan teaches had certain benefits, including benefits Jianan expressly teaches. Ground 2, §1; Ex1015, 5, 10; Ex1002 ¶400.

This combination would have involved a simple substitution of known elements to obtain predictable results. Ex1002 ¶401. The Rebel-Martelliere combination teaches a cyclone unit with an integrated dirt-collection chamber/cyclone chamber. Ex1020, Fig. 1. Ex1002 ¶401. Jianan teaches a cyclone unit with a cyclone chamber separated from a dirt-collection chamber by a wall. Ex1015, Figs. 5-6. Ex1002 ¶401. Simply substituting an integrated dirt-collection chamber for a separated one would achieve the predictable result of more efficient cyclonic air filtration and reduced pre-filter maintenance. Ex1002 ¶401. As depicted above, the Rebel-Martelliere combination and Jianan are both hand vacuums having a similar orientation of cyclone unit relative to the overall vacuum configuration, which would have further motivated a POSA to make the combination. Ex1002 ¶402.

c. Reasonable Expectation of Success

A POSA would have reasonably expected success for the reasons stated above, including because the Rebel-Martelliere combination and Jianan are very similar; they are hand vacuums having similar orientations and removable cyclonic separating units, which would have further given a POSA a reasonable expectation of success. Ex1002 ¶403.

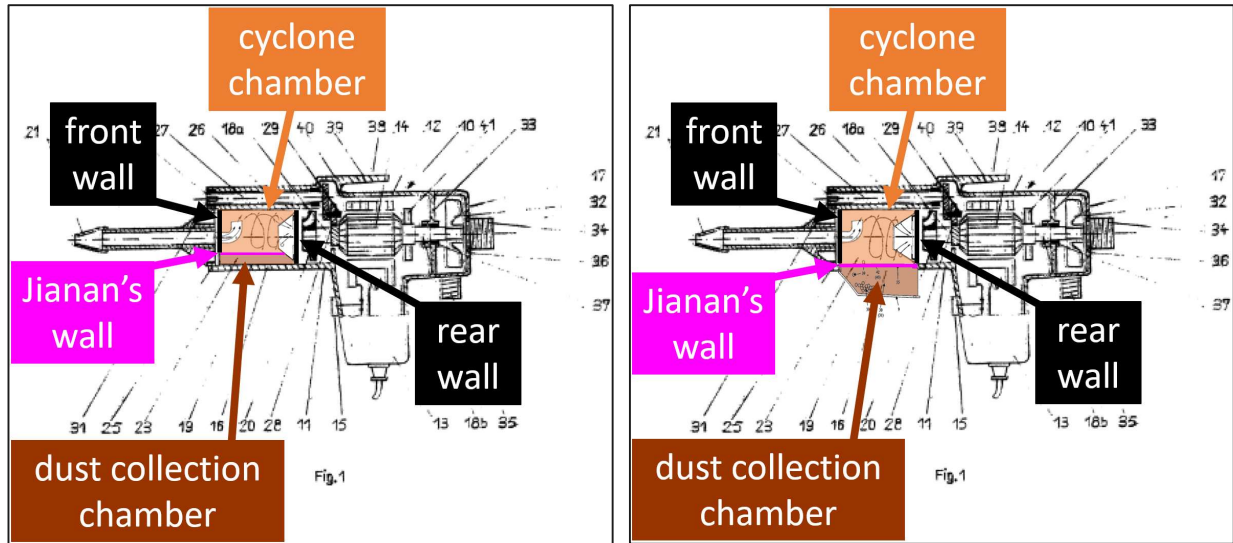
2. [3]/[16]

The Rebel-Martelliere-Jianan combination teaches and renders obvious claims [1]/[12] for the same reasons the Rebel-Martelliere combination does. Ground 3, [1]/[12]; Ex1002 ¶406. The Rebel-Martelliere-Jianan combination further teaches the remaining limitations of these claims. Ex1002 ¶¶404-410.

The Rebel-Martelliere combination teaches a hand vacuum cleaner comprising a cyclone chamber. Ground 3, [1a.2]/[12a.2]; Ex1002 ¶407.

Jianan teaches these claims' additional limitations. Ground 2, [3]/[16]; Ex1002 ¶408.

The Rebel-Martelliere-Jianan combination teaches this limitation:



Ex1007, 4, Fig. 1(modified); Ex1020, Fig. 1(modified); Ex1015, Fig. 5(modified); Ex1002 ¶409.

If modifying the Rebel-Martelliere combination in view of Jianan moves the cyclone axis, it continues to extend in a forward/rearward direction, remains generally horizontal when oriented as shown above, and remains parallel to the suction motor axis and longitudinally extending conduit axis such that claims 1 and 12 are met. Ground 3, [1]/[12]; Ex1002 ¶410.

3. [10]/[21]

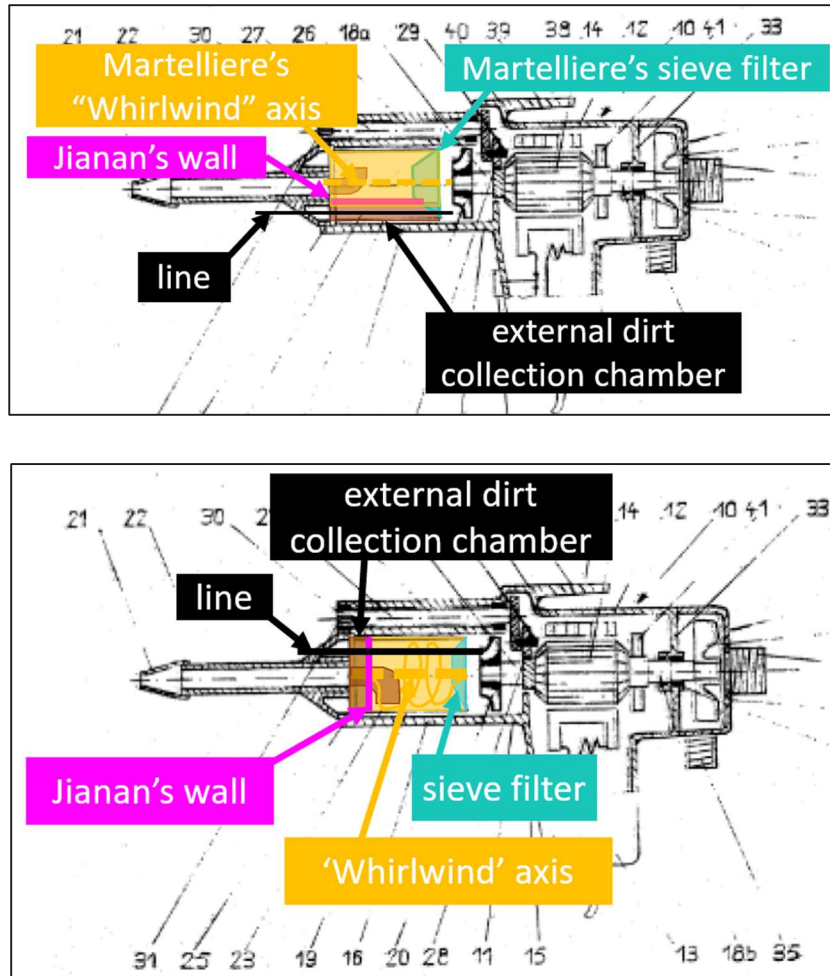
The Rebel-Martelliere-Jianan combination teaches and renders obvious claims [9]/[20] for the same reasons the Rebel-Martelliere combination does. Ground 3, [9]/[20]; Ex1002 ¶413. The Rebel-Martelliere-Jianan combination further teaches the remaining limitations of these claims. Ex1002 ¶¶411-416.

The Rebel-Martelliere combination teaches the pre-motor filter has a height in a direction transverse to the cyclone axis and the height is larger than a diameter of the cyclone. Ground 3, [10]/[21]. Incorporating Jianan's teachings into the Rebel-Martelliere combination maintains or reduces the cyclone chamber height and therefore maintains or reduces the diameter of the cyclone but does not reduce the pre-motor filter height. Ex1002 ¶¶413-415. Thus, the Rebel-Martelliere-Jianan combination teaches this limitation. Ex1002 ¶416.

4. [11]/[22]

The Rebel-Martelliere-Jianan combination teaches and renders obvious claims [10]/[21] for the same reasons the Rebel-Martelliere combination does. Ground 3, [10]/[21]; Ex1002 ¶419. The Rebel-Martelliere-Jianan combination further teaches the remaining limitations of these claims. Ex1002 ¶¶417-421.

The Rebel-Martelliere-Jianan combination teaches a dirt-collection chamber that is exterior to the cyclone chamber and a **line** that is parallel to the cyclone axis (“**Whirlwind**” **axis**) extends through the **dirt-collection chamber** and the pre-motor filter (“**sieve filter**”):



Ex1007, Fig. 1(modified); Ex1020, Fig. 1(modified); Ex1015, Fig. 5(modified);
Ex1002 ¶421.

IX. DISCRETIONARY FACTORS FAVOR INSTITUTION

A. §314(a)

Fintiv should not be followed because it exceeds the Director's authority, is arbitrary and capricious, was adopted without notice-and-comment rulemaking, violates the APA and AIA, and because it "does not apply to parallel U.S. International Trade Commission (ITC) proceedings...." USPTO Interim

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

B. §325(d)

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

“[A] reference that ‘was neither applied against the claims nor discussed by the Examiner’ does not weigh in favor of exercising [] discretion under §325(d).” *Fasteners for Retail, Inc. v. RTC Indus., Inc.*, IPR2019-00994, Paper 9 at 7-11 (PTAB Nov. 5, 2019). Butler, Rebel, and Martelliere were not cited on the face of the ’983Patent. While Jianan was cited in an IDS during the ’983Patent’s prosecution, among hundreds of other cited references, the Examiner neither discussed it nor applied it against the claims. Ex1004, 253-268. The combination of prior art presented in this Petition, and the relied-upon references were not previously meaningfully before the Office, nor are they cumulative, and Examiner did not address them. *Advanced Bionics*, IPR2019-01469, Paper 6 at 9-11.

Even if the Board finds *Advanced Bionics* part one is met, under part two, the Office committed material error. During prosecution, the Office overlooked

Jianan’s key disclosures relied upon in this Petition; namely, a hand vacuum cleaner with an external dirt-collection chamber that reduces the need to replace filters and improves cyclone efficiency. §§VIII.B.1, VIII.D.1.

Dr. Giachetti’s cited expert testimony shows how the references disclose or render obvious every limitation of the challenged claims and the reasons a POSA would have made the relied-upon combinations. Thus, this Petition advances additional evidence and arguments that the Office did not consider, which weighs against exercising discretion under §325(d). *Mylan Pharms. Inc. v. Merck Sharp & Dohme Corp.*, IPR2020-00040, Paper 21 at 20 (PTAB May 12, 2020).

Petitioners “cannot be expected to anticipate every argument that may be raised by a patent owner” regarding §325(d). *Google LLC v. Valtrus Innovations Ltd.*, IPR2022-01197, Paper 12 at 5 (PTAB Mar. 29, 2023). If PO raises such a challenge, Petitioners request the opportunity to respond.

X. SECONDARY CONSIDERATIONS

Petitioners are unaware of any secondary considerations of non-obviousness.

XI. MANDATORY NOTICES UNDER 37 C.F.R. §42.8

A. Real Parties-in-Interest

Petitioners identify themselves as the real parties-in-interest.

B. Related Matters

To the best of Petitioners’ knowledge, apart from the above-mentioned litigation, *Certain Surface Cleaning Devices and Components Thereof*, Dkt. No.

337-TA-1404 (the “ITC Litigation”), the ’983 Patent has not been involved in any litigation, *inter partes* or post-grant review prior to this proceeding.

C. Lead and Backup Counsel, Service, and Power of Attorney

Lead Counsel	Back-Up Counsel
Christian Huehns Reg. No. 77,717 christian.huehns@kirkland.com <u>Postal and Hand-Delivery Address:</u> KIRKLAND & ELLIS LLP 333 West Wolf Point Plaza Chicago, IL 60654 Telephone: (312) 862-2000 Facsimile: (312) 862-2200	Matthew Benjamin Hershkowitz Reg. No. 77,881 matt.hershkowitz@kirkland.com <u>Postal and Hand-Delivery Address</u> KIRKLAND & ELLIS LLP 601 Lexington Ave New York, NY 10022 Telephone: (212) 446-4800 Facsimile: (212) 446-4900 Jay Emerick (<i>pro hac vice</i> motion forthcoming) jay.emerick@kirkland.com <u>Postal and Hand-Delivery Address:</u> KIRKLAND & ELLIS LLP 333 West Wolf Point Plaza Chicago, IL 60654 Telephone: (312) 862-2000 Facsimile: (312) 862-2200 Bryan S. Hales, P.C. (<i>pro hac vice</i> motion forthcoming) bhales@kirkland.com <u>Postal and Hand-Delivery Address:</u> KIRKLAND & ELLIS LLP 333 West Wolf Point Plaza Chicago, IL 60654 Telephone: (312) 862-2000 Facsimile: (312) 862-2200

Petitioners concurrently submit a Power of Attorney, 37 C.F.R. § 42.10(b), and consent to electronic service at DysonIPR@kirkland.com.

XII. PAYMENT OF FEES UNDER 37 C.F.R. §42.103

Petitioners concurrently electronically submit the required fees for this Petition. The Board is authorized to charge Deposit Account No. 506092 for any fee deficiency.

Petition for *Inter Partes* Review of U.S. Patent No. 11,910,983

Date: August 16, 2024

Respectfully submitted,

/s/ Christian Huehns

Christian Huehns (Reg. No. 77,717)

Bryan S. Hales, P.C. (*pro hac*
forthcoming)

Jay Emerick (*pro hac* forthcoming)

KIRKLAND & ELLIS LLP

333 West Wolf Point Plaza

Chicago, IL 60654

Telephone: (312) 862-2000

Facsimile: (312) 862-2200

christian.huehns@kirkland.com

bhales@kirkland.com

jay.emerick@kirkland.com

DysonIPR@kirkland.com

Matthew B. Hershkowitz (Reg. No.
77,881)

KIRKLAND & ELLIS LLP

601 Lexington Ave.

New York, NY 10022

Telephone: (212) 446-4800

Facsimile: (212) 446-4900

matt.hershkowitz@kirkland.com

Attorneys for Petitioner

CERTIFICATE OF COMPLIANCE

This Petition complies with the type-volume limitations as mandated in 37 C.F.R. § 42.24, totaling 13,917 words. Counsel has relied upon the word count feature provided by Microsoft Word.

/s/ Christian Huehns

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§ 42.6(e)(4)(i) *et seq.* and 42.105(b), the undersigned certifies that a copy of the foregoing document with the accompanying Exhibits listed in Petitioner's Exhibit List was caused to be served by Federal Express, costs prepaid, to Patent Owner at the following address of record:

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

A copy was also served via electronic mail and FTP on the attorneys of record in the following related matter, *Certain Surface Cleaning Devices and Components Thereof*, Dkt. No. 337-TA-1404:

GIBSON, DUNN & CRUTCHER LLP
SharkNinja-DysonITC@gibsondunn.com

/s/ Sheryl A. Brongiel
Sheryl A. Brongiel