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Document Description: Auth or Resc of Auth to Access Appl by DAS/PDX Office

PTO/SB/39 (11-15)
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P.O. Box 1450, Alexandria, VA 22313-1450

Application Number (if known):	Filing Date: March 30, 2016
First Named Inventor: Wayne Ernest Conrad	Attorney Docket Number: 10452-P46958US04

Title (Required): SURFACE CLEANING APPARATUS

Check either box 1 or 2 below, but **not** both:

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Signature	/Philip C. Mendes da Costa/	Date	March 30, 2016
Name (Print/Typed)	Philip C. Mendes da Costa	Practitioner Registration Number (if applicable)	33,106
Name of Assignee (if applicable)	Omachron Intellectual Property Inc.	Title (if applicable)	Agent for the Applicant

☐ *Total of _____ forms are submitted.

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Document Description: Power of Attorney

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Application Number	n/a
Filing Date	March 30, 2016
First Named Inventor	Wayne Ernest Conrad
Title	SURFACE CLEANING APPARATUS
Art Unit	N/A
Examiner Name	N/A
Attorney Docket Number	10452-P46958US04

SIGNATURE of Applicant or Patent Practitioner

Signature	/Philip C. Mendes da Costa/	Date (Optional)	March 30, 2016
Name	Philip C. Mendes da Costa	Registration Number	33106
Title (if Applicant is a juristic entity)	Agent for Applicant		
Applicant Name (if Applicant is a juristic entity)	Omachron Intellectual Property Inc.		

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Application Number	Filing Date

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OR

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I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

Omachron Intellectual Property Inc.

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

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SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature		Date (Optional)	July 28, 2015
Name	Philip C Mendes da Costa		
Title	Vice President		

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Doc Code: ECOMM.AUTH/ECOMM.WTDW
Doc Description: Internet Communications Authorized/Internet Communications Authorization Withdrawn

PTO/SB/439 (11-15)

AUTHORIZATION FOR INTERNET COMMUNICATIONS IN A PATENT APPLICATION OR REQUEST TO WITHDRAW AUTHORIZATION FOR INTERNET COMMUNICATIONS		
	Application No.	N/A
	Filing Date	March 30, 2016
	First Named Inventor	Wayne Ernest Conrad
	Art Unit	N/A
	Examiner Name	N/A
	Practitioner Docket No.	10452-P46958US04

To: Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I. To authorize permission for Internet Communications.

☑ Recognizing that Internet communications are not secure, I hereby authorize the USPTO to communicate with the undersigned and practitioners in accordance with 37 CFR 1.33 and 37 CFR 1.34 concerning any subject matter of this application via video conferencing, instant messaging, or electronic mail. I understand that a copy of these communications will be made of record in the application file. (MPEP 502.03)

II. To withdraw authorization for Internet Communications.

☐ The authorization given on _____, to the USPTO to communicate with the undersigned and any practitioner in accordance with 37 CFR 1.33 and 37 CFR 1.34 concerning any subject matter of this application via Internet communications such as video conferencing, instant messaging, or electronic mail is hereby withdrawn. I understand that the withdrawal is effective when approved rather than when received.

I am the

☐ applicant.

☑ attorney or agent of record. Registration number 33,106.

☐ attorney or agent acting under 37 CFR 1.34. Registration number _____.

/Philip C. Mendes da Costa/ — Signature

March 30, 2016 — Date

Philip C. Mendes da Costa — Typed or printed name

416.957.1695 — Telephone Number

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Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	SURFACE CLEANING APPARATUS
First Named Inventor/Applicant Name:	Wayne Ernest Conrad
Filer:	Philip C. Mendes da Costa/Snezana Lisowsky
Attorney Docket Number:	10452-P46958US04

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility application filing	1011	1	280	280
Utility Search Fee	1111	1	600	600
Utility Examination Fee	1311	1	720	720
Pages:				
Utility Appl Size fee per 50 sheets >100	1081	2	400	800
Claims:				
Miscellaneous-Filing:				
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**2400**

Electronic Acknowledgement Receipt	
EFS ID:	25352371
Application Number:	15085830
International Application Number:	
Confirmation Number:	9332
Title of Invention:	SURFACE CLEANING APPARATUS
First Named Inventor/Applicant Name:	Wayne Ernest Conrad
Customer Number:	1059
Filer:	Philip C. Mendes da Costa/Snezana Lisowsky
Filer Authorized By:	Philip C. Mendes da Costa
Attorney Docket Number:	10452-P46958US04
Receipt Date:	30-MAR-2016
Filing Date:	
Time Stamp:	18:53:21
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$2400
RAM confirmation Number	5733
Deposit Account	022095
Authorized User	MENDES DA COSTA, PHILIP C.
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Specification	P46958US04_specification_20160330.pdf	229296 7e935d627c82cca25fa074c51a2fad87f2c56a00	no	76
Warnings:					
Information:					
2	Claims	P46958US04_claims_20160330.pdf	39238 cb610cdc41eaf9a250223f24c86e6630456b3015	no	3
Warnings:					
Information:					
3	Abstract	P46958US04_Abstract_20160330.pdf	57443 426cf3c356609e7cafa5729da1275115fe87683e	no	1
Warnings:					
Information:					
4	Drawings-only black and white line drawings	P46958US04_drawings.pdf	8296349 86255595ea4eab487d4b1ebcb5a7012d3f162644	no	130
Warnings:					
Information:					
5	Application Data Sheet	P46958US04_ADS.pdf	1823046 a9a8aac928011fb8f053270d0b6b99fa0f908196	no	8
Warnings:					
Information:					
6	Oath or Declaration filed	P46958US01_US04_Declaration.pdf	819512 0c4808b74d439c46786214706f0803e60c74f83c	no	1
Warnings:					
Information:					
7	Auth or Resc of Auth to Access Appl by DAS/PDX Office	P46958US04_DASPDX.pdf	102095 fe525ed3cb8cc751f72a2f2f6fa7e8591a1dd5a8	no	2
Warnings:					
Information:					

8	Auth or Resc of Auth to Access Search Results	P46958US04_EPO_search.pdf	103232 0a30092abce1b14376df991a95ad90560f58ca5a	no	2
Warnings:					
Information:					
9	Power of Attorney	P46958US04_POA.pdf	215135 726aa589262423cbe2d6f36dd000569ace851d68	no	2
Warnings:					
Information:					
10	Internet Communications Authorized	P46958US04_SB439.pdf	80322 597901176e254fda86cd608541904e923994f3e0	no	2
Warnings:					
Information:					
11	Fee Worksheet (SB06)	fee-info.pdf	36950 2686a592cf425d6584068dc1480de226f1a90071	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	11802618	

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New Applications Under 35 U.S.C. 111

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National Stage of an International Application under 35 U.S.C. 371

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New International Application Filed with the USPTO as a Receiving Office

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TITLE: SURFACE CLEANING APPARATUS

INVENTOR: WAYNE CONRAD

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of co-pending United States Patent Application No. 14/822,211, filed August 10, 2015, which claimed priority from United States Provisional Patent Application No. 62/093,189, filed December 17, 2014 entitled SURFACE CLEANING APPARATUS, the entirety of which is hereby incorporated by reference.

FIELD

[0002] This disclosure relates to the field of surface cleaning apparatus. In some aspects, this disclosure relates to a type of stick vacuum cleaner wherein a hand vacuum cleaner is removably mounted to a drive handle and provides motive power to draw dirty air into the surface cleaning head.

INTRODUCTION

[0003] Various types of surface cleaning apparatus are known. These include upright vacuum cleaner, stick vacuum cleaners, hand vacuum cleaners and canister vacuum cleaners. Stick vacuum cleaners and hand vacuum cleaners are popular as they tend to be smaller and may be used to clean a small area or when a spill has to be cleaned up. Hand vacuum cleaners or handvacs are advantageous as they are lightweight and permit above floor cleaning and cleaning in hard to reach locations. However, they have a limited dirt collection capacity. Upright vacuum cleaners enable a user to clean a floor and may be have a pod that is removably attached for above floor cleaning. In such cases, the pod comprises, e.g., a cyclone, a dirt collection chamber and the suction motor for the upright vacuum cleaner. However, such the pods tend to be bulky since they comprise the total dirt collection capacity for the upright vacuum cleaner.

SUMMARY

[0004] In accordance with one aspect of this disclosure, a stick vacuum cleaner is provided which has a removable hand vacuum cleaner and also a supplemental bin which

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

[0005] In accordance with this aspect, there is provided a multimode surface cleaning apparatus comprising:

(a) a surface cleaning head having a dirty air inlet;

(b) an upright section moveably mounted to the surface cleaning head, the upright section moveable between a plurality of reclined floor cleaning positions;

(c) a hand vacuum cleaner removably mounted to the upright section, the hand vacuum cleaner comprising a cyclone chamber, a dirt collection region, a suction motor and a clean air outlet; and,

(d) an auxiliary dirt collection assembly removably mounted to the upright section

wherein, in a first upright mode of operation, the auxiliary dirt collection assembly is removed from the upright section and the hand vacuum cleaner is in airflow communication with the dirty air inlet and, in a second upright mode of operation, the multimode surface cleaning apparatus is operable with the auxiliary dirt collection assembly mounted to the upright section.

[0006] In some embodiments, the auxiliary dirt collection assembly may comprise a dirt collection chamber and when the auxiliary dirt collection assembly is mounted to the upright section, dirt separated in the cyclone chamber is collectable in the dirt collection chamber of the auxiliary dirt collection assembly.

[0007] In some embodiments, when the auxiliary dirt collection assembly may be mounted to the upright section, the dirt collection chamber of the auxiliary dirt collection assembly is selectively connectable in communication with the dirt collection region of the hand vacuum cleaner.

[0008] In some embodiments, in the second upright mode of operation, the dirt collection region of the hand vacuum cleaner may be positioned above the dirt collection chamber of the auxiliary dirt collection assembly.

[0009] In some embodiments, the cyclone chamber may have a dirt outlet and the dirt collection region comprises a dirt collection chamber of the hand vacuum cleaner.

[0010] In some embodiments, the dirt collection chamber may have a manually openenable dumping door and the dirt collection chamber of the auxiliary dirt collection assembly may be in communication with the dirt collection chamber of the hand vacuum cleaner when the dumping door is opened.

[0011] In some embodiments, when the auxiliary dirt collection assembly is mounted to the upright section, the dirt collection chamber of the auxiliary dirt collection assembly may be automatically connected in communication with a dirt outlet of the cyclone chamber.

[0012] In some embodiments, in the second upright mode of operation, the dirt collection region of the hand vacuum cleaner may be positioned above the dirt collection chamber of the auxiliary dirt collection assembly.

[0013] In some embodiments, the dirt collection region of the hand vacuum cleaner may be in communication with the dirt outlet of the cyclone chamber and the dirt collection region may have a dumping door that is automatically opened when the auxiliary dirt collection assembly is mounted to the upright section and the dirt collection chamber of the auxiliary dirt collection assembly is in communication with the dirt collection region of the hand vacuum cleaner when the dumping door is opened.

[0014] In some embodiments, the auxiliary dirt collection assembly may comprise a cyclone chamber and a dirt collection region.

[0015] In some embodiments, in the second upright mode of operation, the cyclone chamber of the auxiliary dirt collection assembly may be connected in series with the cyclone chamber of the hand vacuum cleaner.

[0016] In some embodiments, in the second upright mode of operation, the cyclone chamber of the auxiliary dirt collection assembly may be connected in parallel with the cyclone chamber of the hand vacuum cleaner.

[0017] In some embodiments, in the second upright mode of operation, the cyclone chamber of the hand vacuum cleaner may be bypassed and air exiting the cyclone chamber of the auxiliary dirt collection assembly passes through a pre-motor filter of the hand vacuum cleaner, the suction motor and exits via the clean air outlet of the hand vacuum cleaner.

[0018] In some embodiments, the auxiliary dirt collection assembly may further comprise a pre-motor filter.

[0019] In some embodiments, in the second upright mode of operation, the cyclone chamber of the auxiliary dirt collection assembly may be connected in parallel with the cyclone chamber of the hand vacuum cleaner.

[0020] In some embodiments, in the second upright mode of operation, the cyclone chamber of the hand vacuum cleaner and a pre-motor filter of the hand vacuum cleaner may be bypassed and air exiting the cyclone chamber of the auxiliary dirt collection assembly may pass through the pre-motor filter of the auxiliary dirt collection assembly, the suction motor and exits via the clean air outlet of the hand vacuum cleaner.

[0021] In some embodiments, the auxiliary dirt collection assembly may further comprise an auxiliary dirt collection assembly suction motor.

[0022] In some embodiments, in the second upright mode of operation, at least a portion of air entering the dirty air inlet may bypass the hand vacuum cleaner and exit via an alternate clean air outlet.

[0023] In some embodiments, the alternate clean air outlet may be provided on the auxiliary dirt collection assembly.

[0024] In some embodiments, the hand vacuum cleaner may have a handle and, when the multimode surface cleaning apparatus is in the first and second upright modes of operation, the handle may be a drive handle of the multimode surface cleaning apparatus.

[0025] In some embodiments, the upright section may comprise an up flow duct and the auxiliary dirt collection assembly may be removably mounted to the up flow duct.

[0026] In some embodiments, the up flow duct may comprise a rigid extension cleaning wand and the rigid extension cleaning wand may be removable from one of the upright section and the surface cleaning head and, in a first above floor mode of operation, an above floor cleaning unit may comprise the hand vacuum cleaner and the rigid extension cleaning wand.

[0027] In some embodiments, the up flow duct may comprise a rigid tube, the hand vacuum cleaner may have a handle and, the hand vacuum cleaner may have an air inlet that is drivingly engageable with the rigid tube whereby, when the multimode surface cleaning apparatus is in the first and second upright modes of operation, the handle may be a drive handle of the multimode surface cleaning apparatus.

[0028] In some embodiments, the auxiliary dirt collection assembly may have a longitudinal axis that is generally parallel to the up flow duct.

[0029] In some embodiments, the auxiliary dirt collection assembly may comprise a cyclone chamber having a longitudinal axis that is generally parallel to the up flow duct.

[0030] In some embodiments, the hand vacuum cleaner may be provided on a rear portion of the upright section and the auxiliary dirt collection assembly may be provided on a front portion of the upright section.

[0031] In some embodiments, the upright section may comprise an up flow duct and the auxiliary dirt collection assembly may be removably mounted to a front side of the up flow duct and a portion of the hand vacuum cleaner may be positioned rearward of the up flow duct.

[0032] In some embodiments, the suction motor may be positioned rearward of the up flow duct.

[0033] In some embodiments, the upright section may comprise a lower portion and an upper portion and the upper section may be moveable forwardly relative to the lower section and the auxiliary dirt collection assembly may be removably mounted to the lower section.

[0034] In some embodiments, the upright section may comprise an up flow duct having a lower portion and an upper portion and the upper section may be moveable forwardly relative to the lower section and the auxiliary dirt collection assembly may be removably mounted to the lower section.

[0035] In some embodiments, the up flow duct may comprise a rigid tube, the hand vacuum cleaner may have a handle and, the hand vacuum cleaner may have an air inlet that is drivingly engageable with the rigid tube whereby, when the multimode surface cleaning apparatus is in the first and second upright modes of operation, the handle may be a drive handle of the multimode surface cleaning apparatus.

DRAWINGS

[0036] FIG. 1 is a front perspective view of a surface cleaning apparatus in accordance with at least one embodiment;

[0037] FIG. 2 is a rear perspective view of the apparatus of FIG. 1;

[0038] FIG. 3 is a side elevation view of the apparatus of FIG. 1;

[0039] FIG. 4 is a front perspective view of the apparatus of FIG. 1 with a supplemental dirt collection chamber partially removed;

[0040] FIG. 5 is a front perspective view of a surface cleaning apparatus in accordance with another embodiment;

[0041] FIG. 6 is a rear perspective view of the apparatus of FIG. 5;

[0042] FIG. 7 is a side elevation view of the apparatus of FIG. 5 with an electrical cord bag;

[0043] FIG. 8 is a front elevation view of the apparatus of FIG. 5;

[0044] FIG. 9 is a rear elevation view of the apparatus of FIG. 5;

[0045] FIG. 10 is a top plan view of the apparatus of FIG. 5;

[0046] FIG. 11 is a bottom plan view of the apparatus of FIG. 5;

[0047] FIG. 12 is an exploded front perspective view of the apparatus of FIG. 5;

[0048] FIG. 12a is an exploded front perspective view of an alternate apparatus of FIG. 5;

[0049] FIG. 13 is a front perspective view of a surface cleaning apparatus in accordance with another embodiment;

[0050] FIG. 14 is a rear perspective view of the apparatus of FIG. 13;

[0051] FIG. 15 is a side elevation view of the apparatus of FIG. 13;

[0052] FIG. 16 is a front elevation view of the apparatus of FIG. 13;

[0053] FIG. 17 is a rear elevation view of the apparatus of FIG. 13;

[0054] FIG. 18 is a top plan view of the apparatus of FIG. 13;

[0055] FIG. 19 is a bottom plan view of the apparatus of FIG. 13;

[0056] FIG. 20 is a front perspective view of the apparatus of FIG. 13 with a supplemental cyclone bin assembly partially removed;

[0057] FIG. 21 is a cross-sectional view taken along line 21-21 in FIG. 1;

[0058] FIG. 22 is a bottom perspective view of a handvac of the apparatus of FIG. 1;

[0059] FIG. 23 is a perspective cross-sectional view of a cyclone bin assembly of the handvac of FIG. 22 transverse to the cyclone axis;

[0060] FIG. 23a is a top plan view of the cross-section of FIG. 23;

[0061] FIG. 24 is a front perspective view of the supplemental dirt collection chamber of the apparatus of FIG. 1;

[0062] FIG. 25 is a cross-sectional view taken along line 25-25 in FIG. 5;

[0063] FIG. 26 is a cross-sectional view taken along line 26-26 in FIG. 13;

[0064] FIG. 27 is a front perspective view of the apparatus of FIG. 1 in a lightweight upright mode;

[0065] FIG. 28 is a rear perspective view of the apparatus of FIG. 1 in the lightweight upright mode of FIG. 27;

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[0066] FIG. 29 is a side elevation view of the apparatus of FIG. 1 in the lightweight upright mode of FIG. 27;

[0067] FIG. 30 is a cross-sectional view taken along line 30-30 in FIG. 27;

[0068] FIG. 31 is a front perspective view of the apparatus of FIG. 1 in an above-floor cleaning mode;

[0069] FIG. 32 is a rear perspective view of the apparatus of FIG. 1 in the above-floor cleaning mode of FIG. 31;

[0070] FIG. 33 is a side elevation view of the apparatus of FIG. 1 in the above-floor cleaning mode of FIG. 31;

[0071] FIG. 34 is a front perspective view of the apparatus of FIG. 1 in a stair-cleaning mode;

[0072] FIG. 35 is a rear perspective view of the apparatus of FIG. 1 in the stair-cleaning mode of FIG. 34;

[0073] FIG. 36 is a side elevation view of the apparatus of FIG. 1 in in the stair cleaning mode of FIG. 34;

[0074] FIG. 36a is a front perspective view of the apparatus of FIG. 5 in an above-floor cleaning mode;

[0075] FIG. 37 is a front perspective view of the apparatus of FIG. 13 in a lightweight upright mode;

[0076] FIG. 38 is a rear perspective view of the apparatus of FIG. 13 in the lightweight upright mode of FIG. 37;

[0077] FIG. 39 is a front elevation view of the apparatus of FIG. 13 in the lightweight upright mode of FIG. 37;

[0078] FIG. 40 is a rear elevation view of the apparatus of FIG. 13 in the lightweight upright mode of FIG. 37;

[0079] FIG. 41 is a side elevation view of the apparatus of FIG. 13 in the lightweight upright mode of FIG. 37;

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[0080] FIG. 42 is a top plan view of the apparatus of FIG. 13 in the lightweight upright mode of FIG. 37;

[0081] FIG. 43 is a bottom plan view of the apparatus of FIG. 13 in the lightweight upright mode of FIG. 37;

[0082] FIG. 44 is a cross-sectional view taken along line 44-44 in FIG. 37;

[0083] FIG. 44a is a perspective view of the apparatus of FIG. 13 in an above-floor cleaning mode;

[0084] FIG. 44b is another perspective view of the apparatus of FIG. 13 in the above-floor cleaning mode of FIG. 44a;

[0085] FIG. 45 is a rear perspective view of the supplemental dirt collection chamber of FIG. 24;

[0086] FIG. 46 is a side elevation view of the supplemental dirt collection chamber of FIG. 24;

[0087] FIG. 47 is a front perspective view of a surface cleaning apparatus in accordance with another embodiment;

[0088] FIG. 48 is a cross-sectional view taken along line 48-48 in FIG. 47;

[0089] FIG. 49 is a cross-section view taken along line 49-49 in FIG. 47;

[0090] FIG. 50 is a side elevation view of the apparatus of FIG. 47;

[0091] FIG. 51 is a front elevation view of the apparatus of FIG. 47;

[0092] FIG. 52 is a front perspective view of an upright section of the apparatus of FIG. 13 including a diversion valve in a closed position;

[0093] FIG. 53 is a front perspective view of the upright section of FIG. 52 with a cyclone bin assembly seated on a pedal of the diversion valve;

[0094] FIG. 54 is a front perspective view of the upright section of FIG. 52 with the cyclone bin assembly connected to a wand, and the diversion valve in the open position;

[0095] FIG. 55 is a cross-sectional view taken along line 55-55 in FIG. 52;

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[0096] FIG. 56 is a cross-sectional view taken along line 56-56 in FIG. 53;

[0097] FIG. 57 is a cross-sectional view taken along line 57-57 in FIG. 54;

[0098] FIG. 58 is a front perspective view of an upright section of the apparatus of FIG. 13 including another diversion valve in a closed position

[0099] FIG. 59 is a front perspective view of the upright section of FIG. 58 with the cyclone bin assembly being connected to a wand, and the diversion valve in the closed position;

[00100] FIG. 60 is a front perspective view of the upright section of FIG. 58 with the cyclone bin assembly connected to the wand, and the diversion valve in the open position

[00101] FIG. 61 is a cross-sectional view taken along line 61-61 in FIG. 58;

[00102] FIG. 62 is a cross-sectional view taken along line 62-62 in FIG. 59;

[00103] FIG. 63 is a cross-sectional view taken along line 63-63 in FIG. 60;

[00104] FIG. 64 is a front perspective view of an upright section of the apparatus of FIG. 13 including another diversion valve in a closed position;

[00105] FIG. 65 is a front perspective view of the upright section of FIG. 64 with the diversion valve in a partially opened position;

[00106] FIG. 66 is a front perspective view of the upright section of FIG. 64 mounted to the wand with the diversion valve in an open position;

[00107] FIG. 67 is a cross-sectional view of the upright section of FIG. 64;

[00108] FIG. 68 is another cross-sectional view of the upright section of FIG. 64;

[00109] FIG. 69 is an enlarged view of a portion of FIG. 68;

[00110] FIG. 70 is a cross-sectional view taken along line 70-70 in FIG. 65;

[00111] FIG. 71 is a cross-sectional view taken along line 71-71 in FIG. 66;

[00112] FIG. 72 is a front perspective view of an upright section of the apparatus of FIG. 13 with another diversion valve in a closed position;

[00113] FIG. 73 is a front perspective view of the upright section of FIG. 72 being connected to the wand and with the diversion valve in a closed position;

[00114] FIG. 74 is a front perspective view of the upright section of FIG. 72 connected to the wand and with the diversion valve in an open position;

[00115] FIG. 75 is a cross-section view taken along line 75-75 in FIG. 72;

[00116] FIG. 76 is a cross-section view taken along line 76-76 in FIG. 73;

[00117] FIG. 77 is a cross-section view taken along line 77-77 in FIG. 74;

[00118] FIG. 78 is a side elevation view of the handvac of the apparatus of FIG. 1;

[00119] FIG. 79 is a side elevation view of the handvac of the apparatus of FIG. 5;

[00120] FIG. 80 is a side elevation view of the apparatus of FIG. 5 in an upright storage position with a surface cleaning head having rearwardly deployed wheels;

[00121] FIG. 81 is a side elevation view of the apparatus of FIG. 80 in a reclined in-use position with the rear wheels of the surface cleaning head retracted;

[00122] FIG. 82 is a front perspective view of the apparatus of FIG. 13 with a cyclone bin assembly in accordance with at least one embodiment;

[00123] FIG. 83 is a rear perspective view of the cyclone bin assembly of FIG. 82 in a closed position;

[00124] FIG. 84 is a side elevation view of the cyclone bin assembly of FIG. 82 in a closed position;

[00125] FIG. 85 is a front elevation view of the cyclone bin assembly of FIG. 82 in a closed position;

[00126] FIG. 86 is a front elevation view of the cyclone bin assembly of FIG. 82 with a cyclone chamber portion in an open position;

[00127] FIG. 87 is a front elevation view of the cyclone bin assembly of FIG. 82 with the cyclone chamber portion and a dirt collection portion in open positions;

[00128] FIG. 88 is a top perspective view of the cyclone bin assembly of FIG. 82 with the cyclone chamber portion and the dirt collection portion in open positions;

[00129] FIG. 89 is a front perspective view of the cyclone bin assembly of the apparatus of FIG. 13;

[00130] FIG. 90 is a rear perspective view of the cyclone bin assembly of FIG. 89;

[00131] FIG. 91 is a front elevation view of the cyclone bin assembly of FIG. 89;

[00132] FIG. 92 is a rear elevation view of the cyclone bin assembly of FIG. 89;

[00133] FIG. 93 is a side elevation view of the cyclone bin assembly of FIG. 89;

[00134] FIG. 94 is a top plan view of the cyclone bin assembly of FIG. 89;

[00135] FIG. 95 is a bottom plan view of the cyclone bin assembly of FIG. 89;

[00136] FIG. 95b is a front perspective view of the cyclone bin assembly of FIG. 89 with a bottom portion in an open position;

[00137] FIG. 95c is a front perspective view of the cyclone bin assembly of FIG. 89 with top and bottom portions in open positions;

[00138] FIG. 96 is a cross-sectional view taken along line 96-96 in FIG. 22;

[00139] FIG. 97a is a bottom perspective view of the handvac of the apparatus of FIG. 1;

[00140] FIG. 97b is a partial cross-sectional view taken along line 97b-97b of FIG. 97a;

[00141] FIG. 98a is a bottom perspective view of the handvac of the apparatus of FIG. 1 with an open door;

[00142] FIG. 98b a partial cross-sectional view taken along line 98b-98b of FIG. 98a;

[00143] FIG. 99 is a partial cross-sectional view of a surface cleaning apparatus having a handvac disconnected from the upright section, and a bypass valve in a first closed position;

[00144] FIG. 100 is a cross-sectional view of the surface cleaning apparatus of FIG. 99 having a handvac connected to the upright section and the bypass valve in the first closed position;

[00145] FIG. 101 is a cross-sectional view of the surface cleaning apparatus of FIG. 99 having the handvac connected to the upright section and a supplementary cyclone bin assembly, and the bypass valve in a second open position;

[00146] FIG. 102 is a cross-sectional view of a surface cleaning apparatus having a having a bypass airflow path and a pre-motor filter in a supplemental cyclone bin assembly;

[00147] FIG. 103 is a cross-sectional view of a surface cleaning apparatus having a clean air suction motor in a surface cleaning head;

[00148] FIG. 104a is a cross-sectional view of a surface cleaning apparatus having a having a clean air suction motor in a supplemental cyclone bin assembly;

[00149] FIG. 104b is a cross-sectional view of another surface cleaning apparatus having a clean air suction motor in a supplemental cyclone bin assembly;

[00150] FIG. 105a is a perspective view of a surface cleaning apparatus having a supplemental cyclone bin assembly disconnected from an upright section;

[00151] FIG. 105b is a perspective view of a surface cleaning apparatus having a cyclone chamber and dirt collection chamber disconnected from an upright section;

[00152] FIG. 106 is a side elevation view a surface cleaning apparatus in accordance with another embodiment;

[00153] FIG. 107 is a partial side elevation view of the apparatus of FIG. 106 with a handvac disconnected from an upright section;

[00154] FIG. 108 is a side elevation view of the apparatus of FIG. 106 in a reclined in-use position with an arm assembly in a first position;

[00155] FIG. 109 is a side elevation view of the apparatus of FIG. 106 in a steeply reclined in-use position with the arm assembly in a second position;

[00156] FIG. 110a is a rear perspective view of the handvac of the apparatus of FIG. 1 in an open position;

[00157] FIG. 110b is a front perspective view of the handvac of FIG. 110a in the open position;

[00158] FIG. 111 is a front perspective view of the dirt collection chamber of the apparatus of FIG. 1 in an open position;

[00159] FIG. 112 is a rear perspective view of the dirt collection chamber of FIG. 111 in the open position;

[00160] FIG. 113 is a side elevation view of the dirt collection chamber of FIG. 111 in the open position;

[00161] FIG. 114 is a front perspective view of the upright section of the apparatus of FIG. 5 with a cyclone bin assembly in a closed position;

[00162] FIG. 115 is a front perspective view of the upright section of FIG. 114 with the cyclone bin assembly in an open position;

[00163] FIG. 116 is a cross-sectional view of the handvac of the apparatus of FIG. 1 having a pre-motor filter chamber in an open position;

[00164] FIG. 117 is a exploded view of the handvac of FIG. 116;

[00165] FIG. 118 is a cross-sectional view of a surface cleaning apparatus having a plurality of cyclone chambers in parallel;

[00166] FIG. 119a is a cross-sectional view of a surface cleaning apparatus having a dirty air suction motor in a surface cleaning head in series with a clean air suction motor in a handvac;

[00167] FIG. 119b is a cross-sectional view of the surface cleaning apparatus of FIG. 119a with a supplemental cyclone bin assembly removed;

[00168] FIG. 120 is a cross-sectional view of a surface cleaning apparatus having a clean air suction motor in a surface cleaning head in series with a clean air suction motor in a handvac;

[00169] FIG. 121a is a cross-sectional view of a surface cleaning apparatus having a clean air suction motor in a supplemental cyclone bin assembly in series with a clean air suction motor in a handvac;

[00170] FIG. 121b is a cross-sectional view of the surface cleaning apparatus of FIG. 121a with a hose connecting the handvac suction motor and the suction motor of the supplemental cyclone bin assembly;

[00171] FIG. 122 is a cross-sectional view of a surface cleaning apparatus having an airflow which bypasses the handvac;

[00172] FIG. 123 is a perspective view of a surface cleaning apparatus in accordance with another embodiment;

[00173] FIG. 124 is an exploded perspective view of the surface cleaning apparatus of FIG. 123;

[00174] FIG. 125 is a cross-sectional view taken along line 125-125 in FIG. 123;

[00175] FIG. 126 is enlarged partial view of FIG. 125; and

[00176] FIG. 127 is an enlarged partial view of FIG. 126.

DESCRIPTION OF VARIOUS EMBODIMENTS

[00177] Numerous embodiments are described in this application, and are presented for illustrative purposes only. The described embodiments are not intended to be limiting in any sense. The invention is widely applicable to numerous embodiments, as is readily apparent from the disclosure herein. Those skilled in the art will recognize that the present invention may be practiced with modification and alteration without departing from the teachings disclosed herein. Although particular features of the present invention may be described with reference to one or more particular embodiments or figures, it should be understood that such features are not limited to usage in the one or more particular embodiments or figures with reference to which they are described.

[00178] The terms "an embodiment," "embodiment," "embodiments," "the embodiment," "the embodiments," "one or more embodiments," "some embodiments," and

"one embodiment" mean "one or more (but not all) embodiments of the present invention(s)," unless expressly specified otherwise.

[00179] The terms "including," "comprising" and variations thereof mean "including but not limited to," unless expressly specified otherwise. A listing of items does not imply that any or all of the items are mutually exclusive, unless expressly specified otherwise. The terms "a," "an" and "the" mean "one or more," unless expressly specified otherwise.

[00180] As used herein and in the claims, two or more parts are said to be “coupled”, “connected”, “attached”, or “fastened” where the parts are joined or operate together either directly or indirectly (i.e., through one or more intermediate parts), so long as a link occurs. As used herein and in the claims, two or more parts are said to be “directly coupled”, “directly connected”, “directly attached”, or “directly fastened” where the parts are connected directly in physical contact with each other. As used herein, two or more parts are said to be “rigidly coupled”, “rigidly connected”, “rigidly attached”, or “rigidly fastened” where the parts are coupled so as to move as one while maintaining a constant orientation relative to each other. None of the terms “coupled”, “connected”, “attached”, and “fastened” distinguish the manner in which two or more parts are joined together.

General Overview

[00181] Referring to FIGS. 1-3, a surface cleaning apparatus 100 is shown in accordance with a first embodiment. In the embodiment shown, the surface cleaning apparatus 100 is a type of upright vacuum cleaner which is referred to as a stick vacuum cleaner. As illustrated, surface cleaning apparatus 100 includes a surface cleaning head 104, an upright section 108, and a hand-carriable vacuum cleaner 112 (also referred to as handvac or hand vacuum cleaner 112).

[00182] Upright section 108 may be movably and drivingly connected to surface cleaning head 104. For example, upright section 108 may be permanently or removably connected to surface cleaning head 104 and moveably mounted thereto for movement from a storage position to an in use position, such as by a pivotable joint 116. Joint 116 may permit upright section 108 to pivot (i.e. rotate) with respect to surface cleaning head 104 about a horizontal axis. Accordingly, upright section 108 may be rotatable rearwardly so as

to be positionable in a plurality of reclined floor cleaning positions (see for example Figures 81 and 108).

[00183] Upright section 108 may also be steeringly connected to surface cleaning head 104 for maneuvering surface cleaning head 104. For example, joint 116 may be a swivel joint.

[00184] Handvac 112 may be removably connected to upright section 108. When mounted to upright section 108, a user may grasp handvac 112 to manipulate upright section 108 to steer surface cleaning head 104 across a surface to be cleaned. Accordingly, when handvac 112 is mounted to upright section 108, handle 484 is the drive handle of surface cleaning apparatus 100

[00185] Surface cleaning apparatus 100 has at least one dirty air inlet, one clean air outlet, and an airflow path extending between the inlet and the outlet. In the illustrated example, lower end 120 of surface cleaning head 104 includes a dirty air inlet 124, and a rear end 128 of handvac 112 includes a clean air outlet 132. An airflow path extends from dirty air inlet 124 through surface cleaning head 104, upright section 108, and handvac 112 to clean air outlet 132.

[00186] As exemplified, at least one suction motor, and preferably the only suction motor, and one air treatment member, which may be the only air treatment member, is provided in the handvac 112 to permit handvac 112 to operate independently when disconnected from surface cleaning head 104 and optionally from upright section 108. It will be appreciated that while at least one suction motor and at least one air treatment member are positioned in the airflow path to separate dirt and other debris from the airflow, that when used with other aspects disclosed herein, each of the suction motor and the air treatment member may be provided in the surface cleaning head 104, the upright section 108, and/or the handvac 112.

[00187] The air treatment member may be any suitable air treatment member, including, for example, one or more cyclones, filters, and bags. Preferably, at least one air treatment member is provided upstream of the suction motor to clean the dirty air before the air passes through the suction motor. In the illustrated embodiment, handvac 112

includes a cyclone bin assembly 136 including a cyclone chamber and a dirt collection region. In some embodiments, the dirt collection region may be a portion (e.g., a lower portion) of the cyclone chamber. In other embodiments, the dirt collection region may be a dirt collection chamber that is separated from the cyclone chamber by a dirt outlet of the cyclone chamber. Plurality of Dirt Collection Chambers

[00188] In accordance with one aspect of this disclosure, which may be used by itself or in combination with any one or more other aspects of this disclosure, a stick surface cleaning apparatus may have more than one dirt collection chamber. For example, the handvac may include a first dirt collection chamber, and the upright section may include a second dirt collection chamber. The second dirt collection chamber provides the surface cleaning apparatus with an enlarged dirt collection capacity in comparison with the dirt collection capacity of the handvac alone. Accordingly, the surface cleaning apparatus may operate for longer intervals before one or more of the dirt collection chambers needs to be emptied.

[00189] In accordance with this aspect, and as exemplified in FIG. 4, upright section 108 may have an auxiliary dirt collection assembly 140, which may comprise or consist of an auxiliary dirt collection chamber 141. For example, the auxiliary dirt collection chamber 140 may be the only component provided in the auxiliary dirt collection assembly and therefore the auxiliary dirt collection chamber 140 may be the auxiliary dirt collection assembly. Alternately, as disclosed in alternate embodiments, the auxiliary dirt collection assembly may also include one or more of a pre-motor filter, one or more cyclone chambers that may have one or more associated dirt collection chambers and a suction motor.

[00190] As illustrated, up flow duct 144 (also referred to as a wand if removable for use, e.g., in an above floor cleaning mode as exemplified in Figures 33 and 44a) may define the airflow path between surface cleaning head 104 and handvac 112. Auxiliary dirt collection chamber 140 may be a supplemental dirt collection chamber that is selectively mounted to up flow duct 144 and augments the dirt collection capacity of surface cleaning apparatus 100 when mounted to upper section 108.

[00191] It will be appreciated that if up flow duct 144 is the member that supports handvac 112 when auxiliary dirt collection assembly 140 is removed, the up flow duct is designed to be load supporting and may be a rigid tube. Further if the up flow duct is removable to function as an above floor cleaning wand, then the up flow duct may also be a rigid tube. In other embodiments, e.g., the up flow duct is not a load supporting member, then all or a portion of up flow duct 144 may be flexible, such as a flexible hose.

[00192] As exemplified in FIGS. 1 and 21, the dirt collection assembly 140 of the upright section 108 may collect at least a portion of the dirt separated from the dirty airflow by the handvac 112. Accordingly, the dirt collection assembly 140 of the upright section 108 may be in communication with the dirt collection chamber of handvac 112 all or a portion of the time when the handvac 112 is mounted to the upright section 108. For example, the dirt collection chamber of handvac 112 may have a door that automatically opens when handvac 112 is mounted to the upright section 108. Accordingly, dirt separated by handvac 112 may travel to the supplemental dirt collection assembly 140. Alternately, the door may be manually operable by a user. Accordingly, dirt may only be transferred to the supplemental dirt collection assembly 140 when a user elects to open the door. Alternately, the supplemental dirt collection assembly 140 may receive dirt from an auxiliary air treatment member, in which case the auxiliary dirt collection assembly may comprise a housing having both the auxiliary air treatment member and the auxiliary dirt collection chamber.

[00193] The dirt collection chamber of auxiliary dirt collection assembly 140 and handvac dirt collection chamber 188 may be of any suitable volumetric sizes. Preferably, the volumetric storage capacity of the dirt collection chamber of auxiliary dirt collection assembly 140 is at least equal to the volumetric storage capacity of handvac dirt collection chamber 188, and more preferably larger than the volumetric storage capacity of handvac dirt collection chamber 188. For example, the volumetric storage capacity of the dirt collection chamber of auxiliary dirt collection assembly 140 may be 1-20 times the volumetric storage capacity of handvac dirt collection chamber 188, more preferably 1.5-10 times, and most preferably 3-5 times. In alternative embodiments, the volumetric storage

capacity of the dirt collection chamber of auxiliary dirt collection assembly 140 may be less than that of handvac dirt collection chamber 188.

[00194] As exemplified in FIG. 21, handvac 112 may include a cyclone bin assembly 136 including one or more cyclone chambers 184 and one or more dirt collection chambers 188. The cyclone chamber or chambers and the dirt collection chamber or chambers may be of any design. As exemplified, cyclone chamber 184 includes an air inlet 192 in fluid communication with wand 144, an air outlet 196 downstream of air inlet 192, and a dirt outlet 200 in fluid communication with dirt collection chamber 188. Suction motor 204 or another suction source may draw dirty air to enter air inlet 192 and travel cyclonically across cyclone chamber 184 to dirt outlet 200 where dirt is ejected into dirt collection chamber 188. Afterwards, the air is discharged from cyclone chamber 184 at air outlet 196.

[00195] As exemplified in FIGS. 21-23, cyclone bin assembly 136 may include laterally opposed side walls 208, a top wall 212, a bottom wall 216, a first end wall 220, and a second end wall 224. As shown, a common interior wall 226 may divide cyclone chamber 184 from dirt collection chamber 188. For example, cyclone chamber 184 may be defined by top wall 212 and interior wall 226 which extend between end walls 220 and 224. Top wall 212 and interior wall 226 may be curved to define a substantially cylindrical or frustroconical sidewall of cyclone chamber 184. In alternative embodiments, cyclone chamber 184 may have a sidewall of any other suitable shape that is conducive to cyclonic flow. In some alternative embodiments, interior wall 226 of cyclone chamber 184 may be discrete from dirt collection chamber 188 instead of forming a common wall dividing cyclone chamber 184 from dirt collection chamber 188.

[00196] Dirt collection chamber 188 may be defined by bottom wall 216, side walls 208, and interior wall 226. In some embodiments, bottom wall 216 may be openable for fluidly connecting handvac dirt collection chamber 188 to supplemental dirt collection assembly 140 of upright section 108. This may permit dirt separated by cyclone chamber 184 and discharged through dirt outlet 200 to move through opened bottom wall 216 and collect in supplemental dirt collection assembly 140.

[00197] Optionally, when the auxiliary dirt collection assembly is mounted to upright section 108, dirt separated in the cyclone chamber is collectable in the dirt collection

chamber of the auxiliary dirt collection assembly. The auxiliary dirt collection assembly may be selectively connectable in communication with the dirt collection region of the hand vacuum cleaner by, e.g., an openable door 228 (also referred to as a dumping door). The door may be manually openable, such as by a handle, or automatically operated, such as when the auxiliary dirt collection assembly is mounted to upright section 108. In this case, dirt will collect in the handvac 112 and will remain there until door 228 is openable so as to allow the collected dirt to transfer to supplemental dirt collection assembly 140. In the latter case, supplemental dirt collection assembly 140 is automatically connected in communication with a dirt outlet of the cyclone chamber when the auxiliary dirt collection assembly is mounted to upright section 108. In this case, dirt will collect in the supplemental dirt collection assembly 140 when handvac 112 is mounted to the upright section 108.

[00198] In the illustrated example, bottom wall 216 includes a door 228, which may be a pivotally openable door 228. As shown, door 228 may be pivotally connected to dirt collection chamber 188 by a hinge 232 for rotation about a hinge axis 236. Door 228 may extend forwardly from a rear end 240 to a front end 244. Preferably, hinge 232 and hinge axis 236 are positioned at rear end 240 of door 228. In alternative embodiments, hinge 232 and hinge axis 236 may be positioned at front end 244 or intermediate front and rear ends 240 and 244.

[00199] Door 228 is preferably outwardly pivotal of dirt collection chamber 188. For example, door 228 may be movable between a closed position (FIG. 22) in which door 228 closes bottom wall 216, and an open position (FIG. 21) in which door 228 is rotated away from dirt collection chamber 188 for opening bottom wall 216 to permit dirt to move from handvac dirt collection chamber 188 to supplemental dirt collection assembly 140. As shown, in the open position front end 244 of door 228 may be moved away from handvac dirt collection chamber 188.

[00200] Hinge axis 236 may have any suitable orientation. In the illustrated example, hinge axis 236 extends laterally side-to-side of surface cleaning apparatus 100. Hinge axis 236 may be transverse to one or more of cyclone axis 248 of cyclone chamber 184, motor axis 252 of suction motor 204, or downstream direction 256 through air inlet 192. In the

example shown, hinge axis 236 is perpendicular to cyclone axis 248, motor axis 252, and downstream direction 256. In alternative embodiments, hinge axis 236 may be substantially parallel to one or more of cyclone axis 248, motor axis 252, or downstream direction 256.

[00201] In some embodiments, door 228 may extend upwardly and forwardly between rear end 240 and front end 244. For example, front end 244 may be positioned closer to cyclone chamber 184 and cyclone axis 248 than rear end 240. When door 228 is opened (FIG. 21), this may provide a bottom opening 260 having a transverse width 264 between cyclone chamber 184 and bottom wall 216.

[00202] Optionally, the dirt collection region (the dirt collection chamber) of the hand vacuum cleaner is positioned above the supplemental dirt collection assembly 140. Accordingly, dirt that is received in the dirt collection chamber of the hand vacuum cleaner may be transferred by due to gravity to the supplemental dirt collection assembly 140. Accordingly, for example, dirt outlet 200 may be positioned on a bottom end 268 of cyclone chamber 184 for discharging dirt toward bottom wall 216 and opening 260 to be delivered by gravity into supplemental dirt collection assembly 140 of upright section 108.

[00203] Reference is now made to FIGS. 21, 22, and 24. Preferably, when handvac 112 is connected to upright section 108, opening 260 is fluidly coupled to an inlet to dirt collection assembly 140. In the illustrated example, door 228 and opening 260 of cyclone bin assembly 136 align with an inlet 272 of dirt collection assembly 140. As shown, inlet 272 may be formed as an opening in an upper portion 276 of dirt collection assembly 140. In some embodiments, inlet 272 may include a door (not shown) which opens automatically and concurrently with door 228. Optionally, the door of inlet 272 may be biased (e.g. by a spring) to close inlet 272 and seal dirt collection assembly 140 when door 228 is closed or handvac 112 is disconnected from upright section 108.

[00204] Preferably, opening 260 and inlet 272 of upper portion 276 of dirt collection assembly 140 are sized and positioned to receive at least a portion of door 228 when door 228 is in the open position. This may permit door 228 to open outwardly into the open position as shown in FIG. 21.

[00205] If door 228 is moveable from the closed position to the open position automatically upon connecting handvac 112 to upright section 108, then handvac 112 may include an actuator drivingly connected to door 228 to move door 228 (e.g., pivot door 228 about hinge axis 236) to the open position when handvac 112 is connected to upright section 108. In the illustrated embodiment, door 228 includes an arm 280 pivotally connected at hinge 232. As shown, arm 280 may include a lever portion 284 which extends rearwardly of hinge 232, and which may be depressed to pivot door 228 to the open position. Further, dirt collection assembly 140 is shown including an engaging member 288 positioned to align with lever portion 284 of arm 280. In use, engaging member 288 may depress lever portion 284 of arm 280 upon connecting handvac 112 to upright section 108 to automatically pivot door 228 into the open position, whereby opening 260 may be fluidly connected to inlet 272 of supplemental dirt collection assembly 140. In one aspect, this may permit a user, who has used handvac 112 when disconnected from upright section 108, to automatically empty handvac dirt collection chamber 188 by connecting handvac 112 to upright section 108. Afterwards, handvac 112 may be disconnected from upright section 108 with an empty dirt collection chamber 188.

[00206] If door 228 is manually moveable from the closed position to the open position then, as exemplified in FIGS. 97a-b and 98a-b, door 228 may be provided with an actuator, e.g., a manually operable lever portion 284. Lever portion 284 may extend downwardly from door 228 such that lever portion 284 is user-accessible and user-operable while handvac 112 is mounted to upright section 108. As exemplified, lever portion 284 may protrude from the bottom wall 216 of cyclone bin assembly 136 to provide user-accessibility to lever portion 284.

[00207] As exemplified in FIGS. 21, 22, 24, 97a-b, and 98a-b, whether door 228 is manually or automatically operable, door 228 may be biased to the closed position. For example, door 228 may be biased for rotation about hinge axis 236 toward the closed position by a biasing member (not shown), such as a torsion spring. This may permit door 228 to close automatically upon disconnecting handvac 112 from upright section 108, to prevent dirt from spilling from dirt collection chamber 188 and to permit immediate use of handvac 112 for cleaning. In alternative embodiments, door 228 may not be biased toward

the closed position. For example, door 228 may remain in the open position upon disconnecting handvac 112 from upright section 108. In such a case, door 228 may remain open until manually closed. For example, referring to FIGS. 98a-b, door 228 may remain in the open position shown until lever portion 284 of arm 280 is user-activated to move door 228 to the closed position.

Removable Supplemental Dirt Collection Assembly

[00208] In accordance with another aspect of this disclosure, which may be used by itself or in combination with any one or more other aspects of this disclosure, a surface cleaning apparatus has two or more dirt collection chambers wherein one of the dirt collection chambers is optionally removable, and the surface cleaning apparatus is operable when the removable dirt collection chamber has been removed. Accordingly, as discussed with respect to the previous embodiment, a supplemental dirt collection chamber may be provided on the up flow duct or wand of a stick vacuum cleaner and may be the main dirt collection chamber (e.g., it may collect most or all of the separated dirt when the stick vacuum cleaner is operated with the supplemental dirt collection chamber in position). This may be referred to as a large dirt capacity upright mode or a second upright mode of operation.

[00209] The supplemental dirt collection chamber may be removable for emptying and to reconfigure the vacuum to a light weight upright mode or a first upright mode of operation. Once removed, the vacuum cleaner may be operable to separate dirt and collect the separated dirt in another dirt collection chamber (e.g. the handvac dirt collection chamber). An advantage of the light weight upright mode is that the size and weight of the vacuum cleaner may be reduced by removal of the supplemental dirt collection chamber. This may be of assistance when the vacuum cleaner is used to clean around and under furniture, and when the vacuum cleaner is to be carried upstairs.

[00210] As exemplified in FIGS. 1 and 4, dirt collection assembly 140 of upright section 108 may be removably connected to wand 144 and handvac 112. This may permit dirt collection assembly 140 to be removed for emptying, or to operate apparatus 100 in a light weight upright mode. It will be appreciated that, in alternate embodiments, wand 144

and dirt collection assembly 140 of upright section 108 may be integrally formed or permanently connected as a one piece assembly.

[00211] Dirt collection assembly 140 may be removably mounted to wand 144 in any suitable fashion. In the illustrated embodiment, a lower end 292 of dirt collection assembly 140 may be toed onto a lower end 296 of wand 144, and then dirt collection assembly 140 may be pivoted about lower end 292 toward wand 144 and held in position by a suitable releasable fastening mechanism.

[00212] In the illustrated embodiment, handvac 112 may remain in fluid communication with wand 144 and surface cleaning head 104 while supplemental dirt collection assembly 140 is disconnected from wand 144 and removed altogether from apparatus 100. This may permit dirt collection assembly 140 to be removed (e.g., for emptying or to operate apparatus 100 in a light weight upright mode) without disrupting the operation of apparatus 100.

Upstream Air Treatment Member

[00213] In accordance with another aspect of this disclosure, which may be used by itself or in combination with any one or more other aspects of this disclosure, an upstream air treatment member may be provided. The upstream air treatment member may be removably connectable upstream of the handvac. For example, the supplemental dirt collection assembly may have one or more cyclone chambers associated therewith. Accordingly, when the supplemental dirt collection assembly is positioned on upright section 108 (e.g., up flow duct 144), a supplemental cyclone chamber assembly 160 may be connected in series or parallel with the cyclone chamber of the handvac. Accordingly, when operated as an upright vacuum, the surface cleaning apparatus may be a dual cyclonic stage surface cleaning apparatus. When used in an above floor cleaning mode, the handvac may be a single cyclonic stage surface cleaning apparatus. Typically, the surface cleaning apparatus may be used as an upright vacuum cleaner (i.e., with the supplemental cyclonic bin assembly attached) for cleaning floors. This may represent the majority of area that is to be cleaned. Therefore, for a majority of the use of the surface cleaning apparatus, it may be used as a dual stage cyclonic surface cleaning apparatus.

[00214] In accordance with this aspect, the upright section may include a first air treatment member for separating at least large dirt particles from the airflow, and the air treatment member of the handvac may be positioned downstream of the first air treatment member for separating small dirt particles ("fines") from the airflow. In this case, the greatest volume of separated dirt may be collected in the dirt collection chamber of the upright section, and a lesser volume of fines may be collected in the dirt collection chamber of the handvac. This may reduce the rate at which the handvac dirt collection chamber may be filled, and reduce the frequency at which the handvac dirt collection chamber must be emptied. It will be appreciated that each cyclonic stage may be of any design and may be designed to remove any type of dirt.

[00215] It will be appreciated that, in some embodiments, dirt separated by the handvac may be collected in the supplemental dirt collection assembly. In such a case, the dirt collection region of the handvac may be in communication (automatically or manually selectively) with a dirt collection region in the supplemental dirt collection assembly, which region may be isolated from the dirt collection chamber for the cyclonic stage of the supplemental cyclone chamber assembly.

[00216] It will be appreciated that, if air travels through up flow duct 144 to handvac 112, when cyclone bin assembly 160 is connected to wand 144, air travelling through wand 144 may be diverted into cyclone bin assembly 160 and returned to wand 144 from cyclone bin assembly 160 downstream of the diversion. Optionally, in accordance with another aspect with is discussed in more detail subsequently, and which is exemplified in the embodiment of FIGS. 20 and 26, in some embodiments the diversion may occur automatically upon mounting of the supplemental cyclone bin assembly 160 to upright section 108. For example, cyclone bin assembly 160 may include a diversion member 428 which may be positionable in the conduit of wand 144 between the upstream and downstream ends 364 and 360 of wand 144. As shown, diversion member 428 may divide wand 144 into an upstream wand portion 440 and a downstream wand portion 444. Diversion member 428 may form an air-tight seal inside wand 144 for redirecting substantially all air travelling through upstream wand portion 440 into air inlet 316 of

cyclone bin assembly 160. In turn, air outlet 320 of cyclone bin assembly 160 may discharge into downstream wand portion 444 for travel downstream to handvac 112.

[00217] As exemplified in the embodiment of FIGS. 5, 12, and 25 supplemental cyclone bin assembly 160, 160 may be any suitable cyclone bin assembly and may include a cyclone chamber 308 and a dirt collection chamber 141. Cyclone chamber 308 may include an air inlet 316 for receiving dirty air from the surface cleaning head, e.g., via wand 144, an air outlet 320 for discharging air, e.g., to handvac 112, a dirt outlet 324 for discharging separated dirt into dirt collection chamber 141, a vortex finder 400 and a cyclone axis 392. Wand 144 may include an upstream end 360 connected to surface cleaning head 104, and a downstream end 364 connected to air inlet 316 of cyclone chamber 308.

[00218] From cyclone bin assembly 160, the airflow may flow downstream to handvac 112. Accordingly, handvac cyclone bin assembly 136 is positioned downstream of and in series with supplemental cyclone bin assembly 160. The air may be received in handvac cyclone bin assembly 136 where additional particulate matter may be further separated from the airflow and deposited into dirt collection chamber 188. In many cases, the additional particulate matter separated by cyclone bin assembly 136 may constitute less than 30% of the total volume of dirt separated from apparatus 100, and may constitute all or a majority of the fines that are separated. Accordingly, dirt collection chamber 188 may be filled at a lower volumetric rate than supplemental dirt collection chamber 141. This may help to maintain dirt collection capacity in handvac 112.

[00219] In operation, air exiting air outlet 320 of cyclone bin assembly 160 may enter handvac 112 for a second stage of cleaning by cyclone bin assembly 136. As illustrated, handvac 112 may include a nozzle 412 having an upstream end 416 and a downstream end 420. When handvac 112 is connected to upright section 108, upstream end 416 may be fluidly connected with air outlet 320 of upright section 108, and downstream end 420 may be fluidly connected with inlet 192 of handvac cyclone chamber 184.

[00220] In operation, air may be drawn into dirty air inlet 124 and enter upstream wand portion 440. Diversion member 428 may redirect the air traveling through upstream wand portion 440 to enter air inlet 316 of cyclone chamber 308. Air may travel through air

inlet 316 tangentially to sidewall 376 and spiral downwardly toward lower end wall 368, whereby dirt may be separated from the airflow and pass through dirt outlet 324 to accumulate in dirt collection chamber 141. The airflow may then travel downstream into vortex finder 400 and exit cyclone chamber 308 at air outlet 320 at downstream end 404 of vortex finder 400, into an outlet passage 476. Outlet passage 476 may have a downstream end fluidly connected to downstream wand portion 444. The air may travel through downstream wand portion 444 to downstream wand end 364 into handvac 112. In handvac 112, additional dirt may be separated from the airflow by cyclone bin assembly 136 before the air is discharged through clean air outlet 132.

[00221] It will be appreciated that, in accordance with this aspect, cyclone bin assembly 160 may be any suitable cyclone bin assembly. In the example shown in FIGS. 5, 12, and 25, cyclone chamber 308 includes a lower end wall 368, an upper end wall 372, and a sidewall 376 extending between the lower end wall 368 and the upper end wall 372. Preferably, sidewall 376 is substantially cylindrical or frustroconical in accordance with conventional cyclone chamber design.

[00222] Dirt outlet 324 may be formed as an opening in sidewall 376 for directing separated dirt into dirt collection chamber 141. In some embodiments, at least a portion of sidewall 376 of cyclone chamber 308 may form a common dividing wall between cyclone chamber 308 and dirt collection chamber 141. In this case, dirt outlet 324 may be formed as an opening in the common portion of sidewall 376.

[00223] Dirt outlet 324 may be formed at any suitable position on sidewall 376. In the illustrated example, dirt outlet 324 is positioned at an upper end of cyclone chamber 308 proximate upper end wall 372. More particularly, the illustrated embodiment includes a dirt outlet 324 defined by a slot 380 in sidewall 376 bordered by upper end wall 372. This may increase the capacity of dirt collection chamber 141. More specifically, dirt may accumulate by gravity from the bottom of dirt collection chamber 141 upwardly. Thus, the capacity of the dirt collection chamber 141 may be defined at least in part by the position of dirt outlet 324. Dirt collection chamber 141 is full when the level of dirt in dirt collection chamber 141 rises to dirt outlet 324. Accordingly, the capacity of dirt collection chamber 141 is the volume of the dirt collection chamber 141 below dirt outlet 324. Thus, the capacity of dirt

collection chamber 141 may be increased by positioning dirt outlet 324 in an uppermost position, such as proximate the upper end wall 372 of cyclone chamber 308 as shown.

[00224] Alternately, in some embodiments as exemplified in FIG 26, lower end wall 368 may comprise or be an arrester plate 1280 which separates cyclone chamber 308 from dirt collection chamber 141. In this case, dirt outlet 324 may be formed by a gap between arrester plate 1280 and sidewall 376, where dirt particles may fall by gravity into dirt collection chamber 141.

[00225] In accordance with another aspect which is discussed in more detail subsequently, as exemplified, cyclone chamber 308 may include an inlet passage 384 for redirecting axially-directed inlet air to flow tangentially to promote cyclonic action in cyclone chamber 308. An upstream end 388 of inlet passage 384 may face axially (i.e. substantially parallel to cyclone axis 392), and a downstream end (not shown) of inlet passage 384 may face tangentially to cyclone chamber 308. Air entering upstream end 388 of inlet passage 384 from air inlet 316 may travel along inlet passage 384 and exit downstream end (not shown) in a tangential direction. After spiraling upwardly around vortex finder 400 of cyclone chamber 308, the airflow may enter vortex finder 400 and exit cyclone chamber 308 through air outlet 320 at a downstream end 404 of vortex finder 400.

[00226] Handvac cyclone chamber 184 may be any suitable cyclone chamber. In some embodiments, cyclone chamber 184 is substantially similar to cyclone chamber 308. For example, cyclone chamber 184 may include an air inlet 192, an inlet passage 420, a dirt outlet 200, a vortex finder 424, a dirt outlet 200, an air outlet 196, and a cyclone axis 248. Air from upright section 108 may axially enter air inlet 192, be redirected to a tangential direction by inlet passage 420, spiral upwardly around vortex finder 424, deposit dirt into dirt outlet 200, and then exit cyclone chamber 184 through air outlet 196 at a downstream end of vortex finder 424.

Modes of Operation

[00227] In accordance with another aspect of this disclosure, which may be used by itself or in combination with any one or more other aspects of this disclosure, the surface cleaning apparatus is reconfigurable to operate in a plurality of different modes of operation. For example, the surface cleaning apparatus may be operable in two or more of

a handvac mode, a stair-cleaning mode, an above-floor cleaning mode, a large dirt capacity upright mode, a lightweight upright mode, or a dual motor upright mode. In some cases, the surface cleaning apparatus may be reconfigurable between different modes of operation with a single act of connection or disconnection. This may permit the surface cleaning apparatus to be quickly reconfigured with minimal interruption.

[00228] Referring to FIGS. 1, 5, and 13, surface cleaning apparatus 100, 152, and 168 are shown in a large dirt capacity upright cleaning mode. In the large dirt capacity upright cleaning mode, surface cleaning apparatus 100, 152, and 168 may include surface cleaning head 104, upright section 108 including wand 144 and supplemental dirt collection assembly 140, and handvac 112. The airflow path may extend from dirty air inlet 124 of surface cleaning head 104 downstream through wand 144 and then cyclone bin assembly 136 of handvac 112 to separate dirt from the airflow and deposit that dirt into dirt collection chamber 141 of upright section 108 and/or handvac dirt collection chamber 188. In apparatus 152 and 168, cyclone bin assembly 160 is also positioned in the airflow path for separating and collecting dirt from the airflow and cyclone bin assembly 136 of handvac 112 may optionally be bypassed as discussed subsequently.

[00229] As exemplified in FIGS. 12 and 12a one or more of the surface cleaning head 104, upright section 108, and handvac 112 may be removably connected to each other so as to be able to be assembled in a number of different combinations to provide apparatus 152 with a number of different modes of operation. In some embodiments, the wand 144 and supplemental assembly 140, 160 of upright section 108 may also be removably connected to each other to provide additional modes of operation. For example, in the large dirt capacity upright cleaning mode, surface cleaning head 104 may be connected to upstream end 360 of wand 144, downstream end 364 of wand 144 may be connected to an air inlet 316 of cyclone bin assembly 160, and air outlet 320 of cyclone bin assembly 160 may connected to upstream end 416 of handvac nozzle 412.

[00230] The large dirt capacity upright cleaning mode as shown may be particularly effective for cleaning large surface areas (e.g. the floor of one or more rooms). The user may grasp handvac handle 484 to steer surface cleaning head 104 across the surface to be cleaned (i.e. handle 484 may be a drive handle of the surface cleaning apparatus). The

tall height 492 of apparatus 100, 152, and 168 provided in part by the interposition of wand 144 between surface cleaning head 104 and handvac 112 may permit apparatus 100 to be operated by a user standing upright. The large dirt capacity of dirt collection chamber 141 of upright section 108 may permit extended usage of apparatus 100 before the dirt collection chamber 141 becomes full and must be emptied.

[00231] As exemplified in FIGS. 4, 5, 12, 12a, 20 and 27-30, and 37-44 dirt collection assembly 140 or cyclone bin assembly 160 may be selectively disconnected from upright section 108 to reconfigure apparatus 100, 152, or 168 from the large dirt capacity upright mode to a light weight upright mode. Likewise, dirt collection assembly 140 or cyclone bin assembly 160 may be selectively reconnected to upright section 108 to reconfigure apparatus 100, 152, or 168 from a light weight mode to a large dirt capacity upright mode.

[00232] Preferably, reconfiguring the apparatus from the large dirt capacity upright mode to the light weight upright mode may require only a single user action (e.g., disconnecting the dirt collection assembly 140 or cyclone bin assembly 160 from the upright section 108 may automatically close a dumping door of the handvac if the dumping door is open and may also automatically close a diversion member if the vacuum cleaner includes a supplemental cyclone bin assembly 160).

[00233] As exemplified in apparatus 100, door 228 which may have been open in the large dirt capacity upright mode for connecting dirt collection chambers 188 and 141, may close automatically (i.e. without any further user interaction) upon disconnecting dirt collection chamber 141, to seal bottom wall 216 of dirt collection chamber 141. Exemplary mechanisms include a biasing member, such as a spring and a mechanical or electrical drive member drivingly connected to the door to close the door as supplemental assembly 140, 160 is removed.

[00234] As exemplified in apparatus 168, disconnecting cyclone bin assembly 160 from wand 144 may automatically reroute the airflow path to extend directly from upstream wand end 360 to downstream wand end 364 without the intermediary diversion to cyclone bin assembly 160. Therefore, the airflow path between surface cleaning head 104 and handvac 112 is automatically reconfigured by disconnection of cyclone bin assembly 160

to reconfigure apparatus 168 to the light weight upright mode. Accordingly apparatus 168 may be continually operated while being reconfigured.

[00235] In alternative embodiments, door 228 of apparatus 100 may be manually closed as another step before, during or after dirt collection assembly 140 is disconnected from upright section 108 to complete the reconfiguration to the light weight upright mode. For example, a user may manually close the door. In other embodiments, as described in more detail below, a diversion valve of apparatus 168 may require manual closure as another step after cyclone bin assembly 160 is disconnected from wand 144 to complete the reconfiguration to the light weight upright mode. Alternately, a single actuator may be manually operated to close the door and the diversion valve.

[00236] As exemplified in FIG. 4, apparatus 152 may be reconfigurable from the large dirt capacity upright mode to a light weight upright mode by disconnecting assembly 140, 160 from wand 144. In some cases, it may be desirable to momentarily reconfigure an apparatus to the lightweight upright mode to complete a task (e.g. clean under an article of furniture), and afterward reconfigure the apparatus to the large dirt capacity upright mode. In the illustrated example, the airflow path between surface cleaning head 104 and handvac 112 persists during and after reconfiguration of apparatus 100 from the large dirt capacity upright mode to the lightweight upright mode. This may permit apparatus 100,to be operated continuously (i.e. air to continue to travel between inlet 124 and outlet 132) before, during, and after reconfiguration to the lightweight upright mode. In turn, this may allow for a quick reconfiguration with little or no disruption. It will be appreciated that if a cyclone is provided in the supplemental assembly (e.g., assembly 160), there may be a short period during which the diversion valve is not closed during the transition.

[00237] In some cases, reconfiguring apparatus 100, 152, or 168 from the large dirt capacity upright mode to the lightweight upright mode may provide a reduction in weight (i.e. by the removal of dirt collection assembly 140 or cyclone bin assembly 160), and a more slender profile. Thus, the lightweight upright mode may make apparatus 100, 152, or 168 easier to lift (e.g. carry upstairs), and easier to maneuver under and around furniture and the like. However, in this mode, all of the dirt separated by cyclone bin assembly 136 in the lightweight upright mode is collected in dirt collection chamber 188. Thus, apparatus

100, 152, or 168 may have less dirt collection capacity in the lightweight upright mode as compared with the large dirt capacity upright mode.

[00238] Referring now to FIGS. 31-33, 44a, and 44b, apparatus 100 and 168 are shown in an above-floor cleaning mode. As illustrated, apparatus 100 and 168 in the above-floor cleaning mode include handvac 112 and wand 144. Apparatus 100, 152, and 168 may be reconfigured from the lightweight upright mode to the above-floor cleaning mode by disconnecting surface cleaning head 104 from wand 144. It will be appreciated that assembly 140,160 may be retained in an above floor cleaning mode if desired. However, this would add extra weight to the apparatus in the above floor cleaning mode.

[00239] Referring to FIG. 36a, apparatus 152 is shown in another above-floor cleaning mode. As shown, apparatus 152 in an above-floor cleaning mode may include handvac 112 and an accessory wand 145. Accessory wand 145 may be provided supplementary to wand 144 of upright section 108. For example, accessory wand 145 may be removably mountable to a sidewall of upright section 108, as shown in FIG. 5. Still referring to FIG. 36a, in the above-floor cleaning mode shown, upstream end 360 may provide the dirty air inlet, and downstream end 364 may be removably fluidly connected to handvac nozzle 412. Accessory wand 145 may have any suitable length 516. For example, wand 144 may have a length sufficient to permit apparatus 100 to be used as an upright vacuum cleaner in the configuration of Figure 5. Accordingly, wand 144 may be 2 – 4 feet long. In contrast, accessory wand 145 may be shorter than wand 144 (e.g., a user wants to be closer to the area to be cleaned in an above floor cleaning mode) and accordingly accessory wand 145 may be 6-18 inches.

[00240] In the above-floor cleaning mode, the upstream end 496 of wand 144 may provide the dirty air inlet of apparatus 100, 152, or 168. The above-floor cleaning mode may be well suited to cleaning surfaces above the floor, or more generally surfaces that are not substantially horizontal, and for cleaning in crevices which surface cleaning head 104 might be unable to access. The wand 144 may provide extended reach for distant cleaning surfaces (e.g. curtains, and ceilings). An auxiliary cleaning tool such as a crevice tool, brush or the like may be attached to the inlet end of the wand.

[00241] Preferably, apparatus 100, 152, or 168 may be reconfigured from the lightweight upright mode to the above-floor cleaning mode by a single user action – disconnection of surface cleaning head 104 from the upstream end 496 of wand 144. This may permit the apparatus to be quickly reconfigured with little or no disruption. For example, the apparatus may operate continuously before, during, and after reconfiguration from the lightweight upright mode to the above-floor cleaning mode. This may permit a user to conveniently reconfigure the apparatus to the above-floor cleaning mode to clean a surface inaccessible in the lightweight upright mode, and afterward reconfigure the apparatus to the lightweight upright mode to continue cleaning, e.g. the floor.

[00242] In some embodiments, the above-floor cleaning mode may further include dirt collection assembly 140. For example, a user may reconfigure apparatus 100, 152, or 168 from the large dirt capacity upright mode (FIGS. 1, 5, and 13) to the above-floor cleaning mode by disconnecting surface cleaning head 104 from wand 144, while maintaining dirt collection assembly 140 in place on wand 144. An above-floor cleaning mode of this configuration may provide apparatus 100 with the reach of the above-floor cleaning mode, and the storage capacity of the large dirt capacity upright mode. In some embodiments, dirt collection assembly 140 may be a one piece assembly with the wand 144 (i.e. irremovably connected to wand 144), in which case the wand 144 may be an up flow duct.

[00243] Referring to FIG. 22, apparatus 100, 152, and 168 may be reconfigured to a handvac mode from any other mode of operation by disconnecting handvac 112 (e.g. from wand 144). As illustrated, the handvac mode may include handvac 112 alone. In the handvac mode, upstream end 416 of nozzle 412 may provide the dirty air inlet. Optionally, one or more accessories (not shown), such as a brush, crevice tool, auxiliary wand 145 may be connected to nozzle 412. If a wand 144 is part of dirt collection assembly 140 then an accessory wand 145 may be provided which is connectable to nozzle 412.

[00244] The handvac mode of apparatus 100 may be lighter, smaller, and more agile than the other modes of operation. However, the handvac mode may have a smaller dirt collection capacity than the large dirt capacity upright mode (FIGS. 1, 5, and 13) for example.

[00245] In some cases, a user may wish to momentarily disconnect handvac 112 for use in the handvac mode (e.g. to clean a surface that is more accessible in the handvac mode), and then return the apparatus to the previous mode. For example, apparatus 100, 152, or 168 may be momentarily reconfigured from the large dirt capacity upright mode (FIGS. 1, 5, and 13) or from the lightweight upright mode (FIGS. 27 and 37) to the handvac mode be merely removing the handvac and afterward reconfigured again to the upright mode.

[00246] It may be beneficial for the dirt collection chamber 188 of handvac 112 to have capacity available for use in the handvac mode upon disconnecting handvac 112 from upright section 108. Further, it may be beneficial for dirt collection chamber 188 of handvac 112 to reclaim capacity after reconnecting handvac 112 to upright section 108. This may be achieved by having dirt collection chamber 188 empty into assembly 140, 160 continually while handvac 112 is attached to the assembly, manually before removal of the handvac or upon removal of the handvac. The dirt capacity may be reclaimed by having dirt collection chamber 188 empty into assembly 140, 160 upon replacing handvac 112 to the assembly (either manually or automatically upon replacement).

[00247] An example of such a reconfiguration is discussed with respect to the embodiment of FIG. 21, In the illustrated example, handvac dirt collection chamber 188 has a bottom wall 216 that remains open to dirt collection assembly 140 while the handvac is attached to permit dirt from handvac dirt collection chamber 188 to transfer (e.g., by gravity) to dirt collection chamber 141 thereby preventing dirt collection chamber 188 from being filled while the apparatus is used in one of the upright operating modes. .

[00248] Apparatus 100 may be reconfigured from the handvac mode to the large dirt capacity upright mode by reconnecting handvac 112 to upright section 108. Preferably, reconnecting handvac 112 to upright section 108 automatically opens handvac dirt collection chamber 188 to dirt collection chamber 141 for transferring at least a portion of the dirt, collected while in the handvac mode, to dirt collection chamber 141 thereby emptying dirt collection chamber 188 so that dirt collection chamber 188 is not full when the handvac is once again used in the handvac mode.

[00249] In some embodiments, handvac dirt collection chamber 188 does not empty into assembly 140, 160 when attached to the assembly, manually or automatically. For example, FIGS. 25 and 26 show exemplary embodiments of apparatus 152 and 168 where assemblies 160 and 188 receive and store dirt separately at all times. As shown, upright dirt collection chamber 141 may receive and collect dirt separated by auxiliary cyclone bin assembly 160, and handvac dirt collection chamber 188 may separately receive and collect dirt separated by handvac cyclone bin assembly 136.

[00250] Turning now to FIGS. 123-126, apparatus 152 is shown in accordance with another embodiment. As exemplified, handvac cyclone bin assembly 136 may include a plurality of cyclonic cleaning stages arranged in series. For example, and referring to FIGS. 125 and 126, cyclone bin assembly 136 may include a first cyclonic cleaning stage 640 arranged in series upstream from a second cyclonic cleaning stage 644. First cyclonic cleaning stage 640 may include one or more air outlet(s) 196a which discharge into air inlet(s) 192b of second cyclonic cleaning stage 644.

[00251] Referring now to FIG. 127, each cyclonic cleaning stage 640 and 644 may include one or more cyclone chambers 184 in parallel. For example, cyclonic cleaning stages 640 and 644 may each include one cyclone chamber 184, or may each include a plurality of cyclone chambers 184. Alternatively, one of cyclonic cleaning stages 640 and 644 may include one cyclone chamber 184 and the other stage may include a plurality of cyclone chambers 184. In the illustrated example, first cyclonic cleaning stage 640 includes one cyclone chamber 184a, and second cyclonic cleaning stage 644 includes a plurality of cyclone chambers 184b arranged in parallel. For example, second cyclonic cleaning stage 644 may include four or more cyclone chambers 184b arranged in parallel.

[00252] Second stage cyclone chamber(s) 184b may have any suitable orientation relative to first stage cyclone chamber(s) 184a. For example, each of second stage cyclone chamber(s) 184b may have an air inlet 192b and an air outlet 196b both positioned proximate a rear end 648 of the second cyclonic cleaning stage 644 (rearward with respect to the inlet of the handvac), or both positioned proximate a front end 652 of the second cyclonic cleaning stage 644. Alternatively, each of second stage cyclone chamber(s) 184b may have an air inlet 192 positioned proximate one of the front and rear ends 648 and 652,

and an air outlet 196b positioned proximate the other of the front and rear ends 648 and 652. In the illustrated example, second stage cyclone chambers 184b are shown including air inlets 192b at front end 648 and air outlets at rear end 652. This may reduce directional changes in the airflow which may reduce backpressure developed through second stage cyclone chambers 184b for enhanced airflow efficiency. As shown, axes 248b of second stage cyclone chamber 184b may be parallel to axis 248a of first stage cyclone chamber 184a.

[00253] Handvac cyclone bin assembly 136 may include one or more dirt collection regions 188. For example, cyclone chambers 184 of first and second cyclonic cleaning stages 640 and 644 may separate dirt into one common dirt collection region 188, or each cyclonic cleaning stage 640 and 644 may include a separate dirt collection region 188. In the latter case, all first stage cyclone chamber(s) 184a may discharge dirt into the first stage dirt collection region 188a, and all second stage cyclone chamber(s) 184b may discharge dirt into the second stage dirt collection region 188b. In the illustrated embodiment, handvac cyclone bin assembly 136 includes one first stage dirt collection region 188a, and a plurality of second stage dirt collection regions 188b, where each second sage dirt collection region 188b receives dirt discharged by a respective second stage cyclone chamber 184b.

[00254] Reference is now made to FIGS. 34-36, which show apparatus 100, 152, or 168 in a stair-cleaning mode of operation. As shown, apparatus 100, 152, or 168 in stair-cleaning mode may include handvac 112 directly connected to surface cleaning head 104. For example, nozzle 412 may be connected to pivot joint 116 of surface cleaning head 104.

[00255] The stair-cleaning mode of operation may be especially suitable for cleaning stairs and the like, where frequent lifting is required to clean the desired surface areas.

Handvac Center of Gravity in the Upright Modes

[00256] In accordance with another aspect of this disclosure, which may be used by itself or in combination with any one or more other aspects of this disclosure, when the apparatus is in an upright mode and, in particular in a large dirt capacity upright mode, the

center of gravity of the handvac may be located directly above the cyclone bin assembly (or dirt collection chamber) of the upright section.

[00257] As exemplified in FIGS. 21 and 25, apparatus 100 is shown in a large dirt capacity upright mode in a storage position. In the illustrated example, handvac 112 is shown including a handvac center of gravity 524. As shown, center of gravity 524 may be positioned vertically above dirt collection assembly 140/cyclone bin assembly 160 between the front and rear ends 532, 544 and 536, 548 of dirt collection assembly 140/cyclone bin assembly 160. Preferably, center of gravity 524 is positioned substantially centrally between front and rear ends 532, 544 and 536, 548 of dirt collection assembly 140/cyclone bin assembly and may be aligned with the wand.

[00258] Alternately, or in addition, as exemplified, center of gravity 524 is positioned between cyclone bin assembly 136 and suction motor 204, inside premotor filter chamber 556 of handvac 112.

Configuration of the Auxiliary Assembly

[00259] In accordance with another aspect of this disclosure, which may be used by itself or in combination with any one or more other aspects of this disclosure, a surface cleaning apparatus may have an upright section with an auxiliary dirt collection assembly 140 or auxiliary cyclone bin assembly 160 sized, shaped, and positioned according any one of a plurality of different configurations relative to the wand of the upright section and the handvac.

[00260] In some embodiments, a surface cleaning apparatus is provided having an upright mode wherein the auxiliary assembly 140, 160 and the handvac are positioned on the same side of the wand. As exemplified in FIGS. 1, 21, 24, 45, and 46, auxiliary assembly 140, 160 and handvac dirt collection chamber 188 may both extend rearwardly of wand 144. Referring to FIG 21, rear end 536 of dirt collection assembly 140 is shown positioned a rearward distance 564 from wand axis 568. Bottom wall 216 of dirt collection chamber 188 is shown positioned a rearward distance 576 from wand axis 568. Preferably, distances 564 and 576 are substantially equal. In alternative embodiments, distances 564 and 576 may be different. For example, distance 560 may be greater than distance 576, or distance 576 may be greater than distance 564. If rear end 536 is at an angle to the

vertical as exemplified, then the handvac is preferable designed such that the rear end does not extend rearwardly past a projection of the line of rear end 536. Accordingly, the lowest extend to which upright section 108 may be pivoted rearwardly is determined by the auxiliary assembly and not the handvac.

[00261] In some embodiments, a surface cleaning apparatus is provided having a upright mode wherein the auxiliary assembly 140, 160 and the handvac are positioned on opposite sides of the wand. As exemplified in FIG. 26, dirt collection assembly 140 of upright section 108 is positioned forwardly of wand 144, and handvac dirt collection chamber 188 is positioned rearwardly of wand 144. An advantage of this design is that the weight of the auxiliary assembly 140, 160 is on the opposite side of wand 144 from the handvac and may assist in offsetting the hand weight of the handvac felt by a user holding the handle of the handvac.

[00262] In some embodiments, a surface cleaning apparatus is provided having a upright mode where the auxiliary assembly 140, 160 and handvac are positioned on opposite left and right sides of the wand. For example, in apparatus 168, cyclone bin assembly 160 may be mounted to one of the left or right sides of upright section 108, and handvac 112 may be oriented relative to the upright section 108 such that dirt collection chamber 188 extends to the other of the left or right sides of upright section 108.

[00263] In some embodiments, the auxiliary assembly 140, 160 of the upright section surrounds at least a portion of the wand. Referring to FIGS. 1, 21, 24, 45 and 46, apparatus 100 is shown including an upright section 108 having dirt collection assembly 140 which partially surrounds wand 144. In the illustrated example, dirt collection assembly 140 includes a channel 584 for receiving at least a portion of wand 144. As shown, channel 584 may extend the height 588 of dirt collection assembly 140 between lower and upper ends 292 and 596. Channel 584 may also extend in depth from front end 532 rearwardly toward rear end 536.

[00264] As exemplified, dirt collection assembly 140 includes left and right portions 600 and 604 on opposite left and right sides of channel 584. In the upright mode of apparatus 100, wand 144 may be at least partially received in channel 584, whereby left and right portions 600 and 604 are positioned to the left and right sides of wand 144. As

shown, a front end 532 of dirt collection assembly 140 may extend forwardly of wand 144, such that at least a portion of wand 144 is positioned between the front and rear ends 532 and 536 of dirt collection assembly 140.

[00265] In the illustrated embodiment, dirt collection assembly 140 may also surround at least a portion of handvac 112 in the upright mode of apparatus 100. In the illustrated embodiment, an outlet end 608 of wand 144 may be received in channel 584 of dirt collection assembly 140. Accordingly, a front portion of handvac 112 may extend into channel 584 for connection with outlet end 608 of wand 144. In the illustrated embodiment, nozzle 412 and inlet passage 420 of handvac 112 may be positioned inside channel 584 of dirt collection assembly 140 in the upright mode of apparatus 100.

Upright section with a Plurality of Cyclones

[00266] In accordance with another aspect of this disclosure, which may be used by itself or in combination with any one or more other aspects of this disclosure, the supplemental cyclone bin assembly 160 may have a plurality of cyclones positioned in series and/or in parallel in the airflow path. The cyclones may be positioned to the same side of the upright section (e.g., front or back, left or right), or on different sides of the upright section (e.g., one front and one back or one on the right side and one on the left side).In one embodiment, the upright section may use two cyclones and the wand may be positioned between the two cyclones.

[00267] As exemplified in FIGS. 47-51,auxiliary cyclone assembly 160 comprises first and second supplemental cyclone bin assemblies 161, which may be individual units or may be formed as a single unit or housing. Each cyclone bin assembly 161 is shown including a cyclone chamber 308 and a dirt collection chamber141. Dirt collection chambers 141 may be combined to form a common repository for dirt separated by both cyclone bin assemblies 161 or each cyclone bin assembly 161 may have a separate dirt collection chamber 141.

[00268] Each cyclone chamber 308 may be any suitable cyclone chamber and maybe the same or different. As shown, each cyclone chamber 308 may include a tangential air inlet 344 proximate upper end 374, and an axial air outlet 320 at a downstream end of vortex finder400.

[00269] Cyclone bin assemblies 161 may be positioned in parallel in the airflow path between surface cleaning head 104 and handvac 112. As exemplified, the airflow path may extend from surface cleaning head 104 through an upstream wand portion 440, diverge into the inlets 316 of cyclone chambers 308 through cyclone chambers 308 to their respective air outlets 320. Each cyclone bin assembly 161 may include an outlet passage 476 connecting air outlets 320 to downstream portion 444 of wand 144 where the airflow path converges. From downstream portion 444 of wand 144, the airflow path may extend through handvac 112 and exit out clean air outlet 132.

[00270] As exemplified, upstream and downstream portions 440 and 444 of wand 144 may be divided by a diversion member 712, which is described subsequently with respect to a further alternate aspect. Air traveling downstream through upstream portion 440 may contact diversion member 712 and be redirected laterally into air inlets 316 of cyclone chambers 308. Outlet passages 476 of cyclone bin assemblies 161 may converge to form a single airflow path in downstream portion 444 of wand 144 above diversion member 712.

Diversion Valve

[00271] In accordance with another aspect of this disclosure, which may be used by itself or in combination with any one or more other aspects of this disclosure, a diversion valve is provided which diverts air travelling through upright section 108 (e.g., the wand 144) into the auxiliary assembly 160 (e.g., supplemental cyclone or cyclones 308). Preferably, the diversion valve operates automatically upon the auxiliary assembly 160 being disconnected from and/or connected to the surface cleaning apparatus.

[00272] As exemplified in FIG. 20, cyclone bin assembly 160 may be selectively connected to upright section 108 whereby the airflow path may be reconfigured to extend through cyclone bin assembly 160. Similarly, cyclone bin assembly 160 may be selectively disconnected from upright section 108 whereby the airflow path may be reconfigured to extend through wand 144 from end to end without diversion. Preferably, the airflow path reconfiguration is automatic upon connection and/or disconnection of cyclone bin assembly 160 to upright section 108.

[00273] In some embodiments, wand 144 may include a diversion outlet 704 and a diversion inlet 708 positioned between the upstream and downstream ends 360 and 364 of

wand 144. The diversion outlet 704 and diversion inlet 708 may be selectively opened when connecting cyclone bin assembly 160 to upright section 108 to reconfigure the airflow path to divert into the cyclone bin assembly 160 at diversion outlet 704, and to return to the wand 144 from cyclone bin assembly 160 at diversion inlet 708. Upright section 108 may include a diversion valve for opening and closing diversion outlet 704 and inlet 708.

[00274] A diversion valve 712 according to a first embodiment is exemplified in FIGS. 52-57. As exemplified, diversion valve 712 may include a sleeve 716 positioned inside of wand 144, and a pedal 720 for moving sleeve 716 between an open position and a closed position.

[00275] Sleeve 716 may be a conduit for fluidly coupling upstream and downstream wand portions 440 and 444 in the closed position of diversion valve 712 (see FIGS. 52 and 55) to bypass diversion outlet and inlet 704 and 708. Preferably, sleeve 716 may be a rigid conduit. Alternatively, sleeve 716 may include flexible and/or collapsible elements. Effectively, sleeve 716 may close diversion outlet and inlet 704 and 708 in the closed position of diversion valve 712. Optionally, diversion valve 712 may include one or more sealing members (e.g. O-rings) which may form an air-tight seal between sleeve 716 and upstream wand portion 440, and between sleeve 716 and downstream wand portion 444 to help prevent the escape of air through diversion outlet and inlet 704 and 708 in the closed position of diversion valve 712.

[00276] Sleeve 716 may be movable axially along wand 114 between the closed position (FIGS. 52 and 55) and the open position (FIGS. 54 and 57). Preferably, sleeve 716 is moved to the open position automatically by mounting cyclone bin assembly 160 to upright section 108 (e.g. connecting to wand 144), and/or moved to the closed position automatically by dismounting cyclone bin assembly 160 from upright section 108 (e.g. disconnecting from wand 144). In the illustrated embodiment, sleeve 716 is drivingly coupled to a pedal 720. Pedal 720 may be depressed to move sleeve 716 from the closed position of FIGS. 52 and 55 to the open position of FIGS. 54 and 57. As shown, pedal 720 may be positioned axially below sleeve 716 and extend outwardly of wand 144 to be depressed by cyclone bin assembly 160 when mounting cyclone bin assembly 160 to

upright section 108. Pedal 720 and sleeve 716 may be integrally molded, or separately formed and connected, to move axially up and down as a unit.

[00277] As exemplified, pedal 720 and sleeve 716 may be movably mounted to wand 144 for axial movement between the open and closed position. As shown, pedal 720 and sleeve 716 may move downwardly from the closed position (FIGS. 52 and 55) to the open position (FIGS. 54 and 57). In the closed position, sleeve 716 may extend the airflow path directly across the threshold between the upstream and downstream wand portions 440 and 444. In the open position, sleeve 716 may be retracted into the upstream wand portion 440 to open diversion outlet 704 and inlet 708, and thereby permit the airflow path to be diverted through diversion outlet 704, cyclone bin assembly 160 and diversion inlet 708. As shown, diversion outlet 704 may be positioned at a downstream end 724 of upstream wand portion 440, and diversion inlet 708 may be positioned at an upstream end 728 of downstream wand portion 444.

[00278] In an alternative embodiment, sleeve 716 may have one or more openings which align with diversion outlet and inlet 704 and 708 in the open position of valve 712. In the closed position, the openings in sleeve 716 may be closed by alignment with solid wall portions of wand 144, and diversion outlet and inlet 704 and 708 may be closed by alignment with solid wall portions of sleeve 716. In this case, sleeve 716 may be positioned inside the upstream and downstream wand portions 440 and 444 in both the open and closed positions of valve 712.

[00279] Preferably, sleeve 716 is biased to the closed position. For example, valve 712 may include a biasing member which acts on sleeve 716 to bias sleeve 716 to the closed position. In the illustrated example, valve 712 includes a spring 732 which acts on pedal 720 to urge pedal 720 and sleeve 716 upwardly to the closed position. In alternative embodiments, sleeve 716 may not be biased to the closed position. For example, sleeve 716 may include an actuator, such as a switch or lever, which must be manually activated to move sleeve 716 to the closed position or is moved by assembly 160 when assembly 160 is removed..

[00280] Still referring to FIGS. 52-57, cyclone bin assembly 160 may include an engagement member for mating with pedal 720 to mount cyclone bin assembly 160 on

pedal 720. In the illustrated example, a cavity 736 is formed in sidewall 376 of cyclone bin assembly 160 for receiving pedal 720. In use, cyclone bin assembly 160 may be set onto pedal 720 such that pedal 720 is received in cavity 736. Preferably, the weight of cyclone bin assembly 160 on pedal 720 is sufficient to overcome the bias of valve biasing member 732, and move pedal 720 and sleeve 716 downwardly to the open position. In alternative embodiments, additional downward force must be applied by the user to move pedal 720 and sleeve 716 downwardly against the bias of the biasing member 732 and/or an actuator, such as a foot pedal, may be utilized.

[00281] Cyclone bin assembly 160 may be toed onto pedal 720 (see e.g., FIGs 53, 56), and then pivoted on pedal 720 into position (see e.g., FIGs 54, 57) after pedal 720 and sleeve 716 have moved downwardly to the open position. In the illustrated example, cyclone bin assembly 160 may be set onto pedal 720 with cyclone axis 392 extending at a (non-zero) angle to wand axis 740, and then lowered with pedal 720 to move valve 712 to the open position, and finally pivoted about pedal 720 toward wand 144 to complete the connection of cyclone bin assembly 160 to wand 144. An locking member, such as a latch 744, which may be located at the end of the upper end or wand 144, may be provided to secure assembly 160 in position. In some embodiments, cyclone axis 392 may be substantially parallel to wand axis 740 when cyclone bin assembly 160 is connected to wand 144.

[00282] Cyclone bin assembly 160 may include a diversion member 428 for dividing wand 144 into upstream and downstream wand portions 440 and 444, and for diverting flow from the upstream wand portion 440 into cyclone bin assembly inlet 316. Diversion member 428 may take any suitable form. In the illustrated embodiment, diversion member 428 is a substantially flat plate which extends outboard of sidewall 376 for protruding into wand 144 through one of diversion outlet 704, diversion inlet 708, or another opening into wand 144. Alternatively, diversion member 428 may be curved to provide a less abrupt change in airflow direction, which may reduce the pressure drop across the diversion member 428. Optionally, diversion member 428 may include or interface with a sealing member (e.g. a deformable elastomeric seal) to form an airtight barrier between upstream and downstream wand portions 440 and 444. Alternately, the diversion member may be a

separate member that is installed as a separate step when (i.e. before, during, and/or after) connecting cyclone bin assembly 160 to the wand 144.

[00283] As exemplified, when cyclone bin assembly 160 is mounted to wand 144, as shown in FIGS. 54 and 57, air inlet 316 of cyclone chamber 308 is connected to diversion outlet 704 for receiving air from upstream wand portion 440 into cyclone chamber 308, and outlet passage 476 is connected to diversion inlet 708 for discharging air from cyclone bin assembly 160 into downstream wand portion 444.

[00284] Cyclone bin assembly 160 may be removably mounted to wand 144 by any suitable mechanism. In the illustrated embodiment, cyclone bin assembly 160 includes a latch 744 on handle 616 for engaging a tab 746 which extends outwardly of wand 144. Latch 744 may be user-operable by a user grasping handle 616 to release latch 744 from tab 746 for disconnecting cyclone bin assembly 160 from wand 144. Preferably, biasing member 732 of valve 712 automatically and immediately moves sleeve 716 to the closed position upon disconnection of cyclone bin assembly 160 to reconfigure the airflow pathway by closing diversion inlet and outlet 704 and 708.

[00285] A diversion valve 712 according to a second embodiment is exemplified in FIGS. 58-63. Diversion valve 712 is similar to diversion valve 712 of FIGS. 52-57 in many respects except, for example that sleeve 716 is embodied by a collapsible hose 716 instead of a more rigid conduit.

[00286] As exemplified, diversion valve 712 includes a collapsible sleeve 716 positioned inside of wand 144, and a pedal 720 for moving hose 716 been an open position and a closed position.

[00287] Sleeve 716 may be a collapsible conduit for fluidly coupling upstream and downstream wand portions 440 and 444 in the closed position of diversion valve 712 (see FIGS. 60 and 63) to bypass diversion inlet and outlet 708 and 712. Optionally, diversion valve 712 may include one or more seals (e.g. O-rings) which form an air-tight seal between sleeve 716 and upstream wand portion 440, and between sleeve 716 and downstream wand portion 444 to help prevent the escape of air through diversion inlet and outlet 704 and 708 in the closed position of diversion valve 716.

[00288] In the illustrated embodiment, sleeve 716 has a fixed-position upstream end 756 sealed to upstream wand portion 440, and a downstream end 760 axially movable inside wand 144. Downstream end 760 may be movable toward upstream end 756 to the open position (FIG. 60 and 63) whereby sleeve 716 is partially collapsed with downstream end 760 positioned in the upstream wand portion 440 upstream of diversion outlet 704. Downstream end 760 may also be movable away from upstream end 756 to the closed position (FIGS. 58 and 61) whereby sleeve 716 is extended with downstream end 760 position in the downstream wand portion 444 downstream of diversion inlet 708.

[00289] As exemplified, pedal 720 may be drivingly coupled to downstream end 760 of sleeve 716. Pedal 720 may be depressed (e.g. by the weight of cyclone bin assembly 160) to move downstream end 760 into the upstream wand portion 440, collapsing sleeve 716 into the open position of FIGS. 60 and 63. Pedal 720 may also be raised (e.g. automatically by action of biasing member 732 upon release of pedal 720 or pulled upwardly by assembly 160) to move downstream end 760 into the downstream wand portion 444, extending sleeve 716 into the closed position of FIGS. 58 and 61. Alternately, a manual actuator may be used.

[00290] A diversion valve 712 according to a third embodiment is exemplified in FIGS. 64-71. As exemplified, diversion valve 712 may include a diversion outlet door 772 and a diversion inlet door 776. Doors 772 and 776 may be opened when cyclone bin assembly 160 is connected to wand 144 for reconfiguring the airflow path to extend through cyclone bin assembly 160. Doors 772 and 776 may also be closed when cyclone bin assembly 160 is disconnected from wand 144 for reconfiguring the airflow path to extend directly across the threshold between upstream and downstream wand portions 440 and 444.

[00291] In the illustrated embodiment, doors 772 and 776 are pivotally mounted to wand 144 for movement between a closed position (see FIGS. 64 and 67-69) in which doors 772 and 776 seal diversion outlet 704 and inlet 708 respectively, and an open position (see FIGS. 66 and 71) in which doors 772 and 776 are open to allow air to flow through doors 772 and 776 between wand 144 and cyclone bin assembly 160. Doors 772 and 776 may be pivotally mounted to wand 144 in any suitable manner. In the example shown, doors 772 and 776 are pivotally mounted to wand 144 by a common hinge 780. As

shown, door 772 may pivot inwardly about hinge 780 toward a downstream direction, and door 776 may pivot inwardly about hinge 780 toward an upstream direction. In alternative embodiments, each of doors 772 and 776 may be pivotally mounted to wand 144 by a different hinge.

[00292] Preferably, doors 772 and 776 open automatically by connecting cyclone bin assembly 160 to wand 144. In the illustrated example, cyclone bin assembly 160 includes an inlet nose 784 for pushing open diversion outlet door 772, and an outlet nose 788 for pushing open diversion inlet door 776. As shown, noses 784 and 788 may extend outwardly of sidewall 376 for projecting through diversion outlet and inlet 704 and 708 respectively upon connecting cyclone bin assembly 160 to wand 144.

[00293] Preferably, when cyclone bin assembly 160 is connected to wand 144, an airflow path is formed between diversion outlet 704 and air inlet 316, and between diversion inlet 708 and air outlet 320, such that the airflow path from upstream wand portion 440 to downstream wand portion 444 is reconfigured to extend through cyclone bin assembly 160. In the illustrated example, connecting cyclone bin assembly 160 to wand 144 may include pushing noses 784 and 788 into diversion outlet and inlet 704 and 708 respectively to open doors 772 and 776.

[00294] Noses 784 and 788 may take any suitable form. As exemplified, nose 784 may be formed as a diversion member including an inlet passage having an upstream end 792 and a downstream end 796. Upstream end 792 may extend into wand 144 and form a seal with upstream wand portion 440 to redirect the airflow in upstream wand portion 440 to enter nose 784 toward downstream end 796. In the illustrated embodiment, upstream wand portion 440 includes a sealing ring 800 adjacent an upstream side 804 of diversion outlet door 772 onto which downstream end 796 may be seated for forming an airtight seal between upstream wand portion 440 and downstream end 796. Alternatively, or in addition, upstream side 804 may include a sealing member. Downstream end 796 of nose 784 may be integrally formed or otherwise connected with air inlet 316.

[00295] In the illustrated example, nose 788 is formed as a triangular plate which projects outwardly from air outlet 320. In other embodiments, nose 788 may have another suitable form for pushing diversion inlet door 776, such as a circular or rectangular plate or

a rod for example. As shown, when cyclone bin assembly 160 is connected to wand 144, nose 788 projects into diversion inlet 708 pushing open diversion inlet door 776. This may permit air outlet 320 to sealingly abut diversion inlet 708 for forming an airflow path between air outlet 320 and downstream wand portion 444. Optionally, a seal 808 may be provided at the interface between air outlet 320 and diversion inlet 708 for enhancing the airtightness of the connection.

[00296] It will be appreciated that in alternative embodiments, nose 788 may be formed as an outlet passage, which may be curved similar to nose 784. This may make the change in airflow direction across nose 788 less abrupt, which may reduce pressure losses.

[00297] Preferably, when cyclone bin assembly 160 is disconnected from wand 144, doors 772 and 776 automatically close to reconfigure the airflow passage to extend directly from upstream wand portion 440 to downstream wand portion 444 without diversion through diversion outlet 704 or inlet 708. For example, doors 772 and 776 may be biased to the closed position by a biasing member, such as a spring. In the illustrated embodiment, diversion valve 712 includes a torsional spring 812. Spring 812 may be positioned to bias both of doors 772 and 776 to the closed position. In the illustrated embodiment, spring 812 is held in a spring housing 816 mounted to an inside face 820 of diversion outlet door 772. As shown, spring 812 may have an arm 824 connected to diversion inlet door 776, effectively biasing doors 772 and 776 away from each other to their respective closed positions. In alternative embodiments, each of doors 772 and 776 may have a separate biasing member.

[00298] A diversion valve 712 according to a fourth embodiment is exemplified in FIGS. 72-77. Diversion valve 712 is similar to diversion valve 712 of FIGS. 64-71 in many respects except, for example, the door which selectively closes diversion outlet 704 and inlet 708.

[00299] In the illustrated embodiment, diversion valve 712 includes a door 772. Door 772 may be movable between a closed position (FIGS. 72 and 75) in which door 772 seals diversion outlet 704 and inlet 708, and an open position (FIGS. 74 and 77) in which door 772 is unsealed from outlet 704 and inlet 708 to allow the airflow to pass through diversion

outlet 704 and inlet 708. As exemplified, diversion valve 712 may include one door 772 for closing both of diversion outlet 704 and inlet 708, or separate doors 772 for diversion outlet 704 and inlet 708.

[00300] As shown, door 772 may be pivotally mounted to wand 144 in any suitable manner for movement between the open and closed positions. For example, door 772 may be pivotally mounted outside of wand 144 by a hinge 780. In the illustrated example, door 772 may pivot outwardly about hinge 780 away from wand 144 to the open position, and may pivot inwardly about hinge 780 toward wand 144 to the closed position. Preferably, door 772 is manually openable, whereby a user may grasp door 772 and manually move door 772 from the closed position to the open position. For example, door 772 may have a lever 840, a handle, or another gripping member for a user to grasp for manipulating the position of door 772.

[00301] Once door 772 is opened, as shown in FIGS. 73 and 76, cyclone bin assembly 160 may be connected to wand 144. In the illustrated embodiment, cyclone bin assembly 160 includes a diversion member 428 of the type describe above with reference to FIGS. 52-57. Diversion member 428 may be moved into wand 144 through diversion outlet 704, diversion inlet 708, or another opening in wand 144, for dividing wand 144 into an upstream portion 440 and a downstream portion 444, substantially as described above.

[00302] When cyclone bin assembly 160 is disconnected from wand 144, door 772 may be moved back into the closed position for reconfiguring the airflow path in wand 144 to extend directly from upstream portion 440 to downstream portion 444 without diversion. For example, door 772 may be manually moved from the open position to the closed position by hand, or door 772 may move automatically to the closed position by the bias of a biasing member (e.g. a spring).

[00303] In some embodiments, door 772 may be held in the closed position by the bias of a biasing member, or by a releasable locking mechanism (e.g. a latch). This may permit door 772 to form a tight seal against diversion outlet 704 and inlet 708.

[00304] In some embodiments, pedal 720 may be foot operable and may be located close to or on the surface cleaning head..

Angular Surface of Upright section

[00305] In accordance with another aspect of this disclosure, which may be used by itself or in combination with any one or more other aspects of this disclosure, a surface cleaning apparatus is provided having an upright section with a dirt collection chamber or cyclone bin assembly having a side profile that tapers or narrows from top to bottom. For example, the rear wall of the supplemental dirt collection chamber or supplemental cyclone bin assembly may extend upwardly at an acute angle relative to the wand axis such that the rear wall is farther from the wand axis at the top end than at the bottom end of the dirt collection chamber or cyclone bin assembly. An advantage of this design is that the surface cleaning apparatus may extend under furniture while providing a large dirt collection capacity.

[00306] As exemplified in FIGS. 3 and 7, surface cleaning apparatus 100 and 152 include an upright section 108 having a dirt collection chamber 140 or cyclone bin assembly 160 that extends from a lower end 292, 856 proximate surface cleaning head 104 to an upper end 596, 860. A rear end 536, 548 of auxiliary assembly 140/160 may extend upwardly from lower end 292 or 856 at a (non-zero) acute angle 848 to wand axis 568. Angle 848 is preferably between 10 and 70 degrees, and more preferably between 20 and 40 degrees. For example, a distance 538 between wand axis 568 and rear end 536, 548, measured normal to wand axis 568, may increase continually or generally continuously from lower end 292, 856 upwardly. As shown, distance 538 is greater at upper end 596. 860 than at lower end 292, r 856.

Handvac with Angled Bottom Wall

[00307] In accordance with another aspect of this disclosure, which may be used by itself or in combination with any one or more other aspects of this disclosure, a handvac may be provided having a bottom, such as a flat bottom wall, for supporting the handvac on a horizontal surface, and which extends at an acute angle (e.g., between 20 and 40 degrees) away from the inlet nozzle axis, and optionally at about the in-use orientation of the hand vac. This may provide the handvac with a resting orientation that is closer to or essentially at the in-use orientation of the handvac. For example, the in-use orientation of the handvac may normally have the inlet nozzle axis extending at a downward angle

relative to a horizontal surface to be cleaned. Thus, a user may not have to substantially reorient the handvac upon grasping the handvac in the resting orientation to reposition the handvac into the in-use orientation.

[00308] Reference is now made FIG. 78, where handvac 112 is shown resting on a horizontal surface 876. As shown, nozzle axis 884 extends at an angle 880 to horizontal surface 876. Angle 880 may be an acute angle which may be between 10 and 80 degrees, and preferably between 25 and 65 degrees, more preferably between 35 and 55 degrees or between 20 and 40 degrees. It will be appreciated that handvac 112 may be stably supported in any suitable manner, with nozzle axis 884 extending at angle 880 to horizontal surface 876. For example, handvac 112 may include one or more support elements (e.g. a wall or feet) which collectively provide a support for handvac 112 on a horizontal planar surface at a desired acute angle, and a center of gravity 524 vertically aligned with or between the support elements for stability when handvac 112 is so supported by the support element(s) on the horizontal surface.

[00309] As exemplified, bottom wall 216 of handvac 112 may extend at an angle 880 to inlet nozzle axis 884 of nozzle 412. Bottom wall 216 may be planar, and the plane of bottom wall 216 may intersect with nozzle axis 884 at angle 880. Bottom wall 216 may provide a flat planar surface for making broad contiguous contact with horizontal surface 876, or bottom wall 216 may include a plurality of discrete contact points or surfaces which collectively contact the horizontal surface 876 to support the handvac 112 (e.g. as in the feet of a tripod, or the wheels of a car). Preferably, handvac center of gravity 524 is preferably aligned vertically above bottom wall 216 when handvac 112 is supported on horizontal surface 876 by bottom wall 216. This may permit handvac 112 to rest stably (i.e. statically without tipping over) on horizontal surface 876 while supported solely by bottom wall 216.

[00310] Handvac 112 may have an in-use orientation relative to horizontal surface 876 at which a user may comfortably operate handvac 112 during cleaning. Typically, handvac 112 is most comfortably operated in an orientation that does not require an application of torque by the user's hands when the handvac 112 is held by handle 484. This may be the case where the center of gravity 524 of the handvac 112 is aligned

vertically below the user's hand. Accordingly, the center of gravity 524 may be vertically aligned below handle 484 in comfortable in-use orientations of handvac 112.

[00311] Preferably, center of gravity 524 is aligned vertically below handle 484 when handvac 112 is supported on horizontal surface 876. In the illustrated embodiment, center of gravity 524 is aligned vertically below handle 484 when bottom wall 216 is horizontal and supporting handvac 112 on a horizontal surface 876. Thus, the resting orientation of handvac 112 supported by bottom wall 216 on a horizontal surface 876 may be substantially the same as the in-use orientation of handvac 112. Accordingly, when a user grasps handvac 112 by handle 484 and lifts handvac 112, handvac 112 may already be in a balanced in-use position with the center of gravity 524 aligned below the user's hands.

[00312] In many cases, handvac 112 may be stored on a surface below a user's elbows. A user may angle their forearm downwardly to grasp handle 484 of handvac 112. In this case, the user's fingers and palm may be naturally aligned for grasping a handle which is angled forwardly of vertical. For example, to grasp a vertically oriented handle that is positioned below a user's elbow, a user may need to contort their wrist to conform to the orientation of the handle.

[00313] In the illustrated embodiment, handle axis 888 of handle 484 extends at a (non-zero) forward angle 892 to the vertical (e.g., e.g. when bottom wall 216 is horizontal). This may provide a comfortable handle alignment for grasping by a user when picking up handvac 112, and when using handvac 112 for cleaning surfaces below the user's elbows. Preferably, angle 892 is an acute angle of between 10 and 80 degrees, more preferably between 20 and 70 degrees and most preferably between 30 and 60 degrees.

[00314] Bottom wall 216 may be a wall of any component of handvac 112. In the illustrated embodiment, bottom wall 216 is a wall of cyclone bin assembly 136. Preferably, bottom wall 216 is a wall of dirt collection chamber 188. In the example shown, bottom wall 216 is an openable wall of dirt collection chamber 188. FIG. 79 shows another embodiment of handvac 112 where bottom wall 216 is not openable.

[00315] Referring to FIG. 78, bottom wall 216 of handvac 112 may include front wheels, rear wheels, or both. Wheels may provide rolling support for handvac 112 when

cleaning under furniture, for example. In alternative embodiments, handvac 112 may not include wheels on bottom wall 216 as shown.

Handle Position

[00316] In accordance with another aspect of this disclosure, which may be used by itself or in combination with any one or more other aspects of this disclosure, a floor cleaning apparatus is provided having a handvac with a handle, and an upright section with a cyclone bin assembly or dirt collection chamber with a handle. Preferably, the handles are centrally aligned with a plane of symmetry of the apparatus. This may permit the handles to be grasped for a balanced control of the apparatus. For example, the handles may be parallel to the same plane of symmetry.

[00317] Alternately, as exemplified in FIG. 2, one handle may be parallel to a plane of symmetry and the other transverse thereto but positioned such that the plane of symmetry extends through the transversely oriented handle. In the illustrated example, handvac 112 includes a handle 484 which extends along a handle axis 888. As exemplified, handle axis 888 may lie in a vertical plane 1044, which is aligned centrally between left and right sides of apparatus 100 (i.e., a plane of symmetry). Turning to FIG. 78, handle 484 is shown extending in length between a first handle end 1048 at the upper end 1052 of handvac 112, and a second handle end 1056 intermediate the upper and lower ends 1052 and 1060 of handvac 112.

[00318] Returning to FIG. 2, assembly 140 is shown including a handle 1064. As illustrated, handle 1064 may have a handle axis 1068 which extends perpendicularly or transverse to plane 1044 and handle axis 888. Handle 1064 may be formed in a rear end 536 of assembly 140. For example, handle 1064 may be flush with rear end 536 and include a concave finger cavity 1072 to facilitate grasping handle 1064. Preferably, handle 1064 is positioned laterally centrally such that plane 1044 intersects handle 1064, and optionally bisects handle 1064 at a midpoint between handle ends 1076 and 1080.

[00319] Handles 484 and 1064 may be positioned on opposite sides of surface cleaning apparatus 100. For example, handle 484 is shown extending from an upper end 1052 proximate the front surface of apparatus 100, and handle 1064 is shown extending flush with a rear surface of apparatus 100.

[00320] Apparatus 100 may include one or more actuator controls (e.g. buttons, levers, or switches) for controlling various functionality such as opening or disconnected elements, or connecting power to elements. Preferably, at least some of the actuator controls are positioned on or within finger reach of a handle to permit the control to be activated while grasping the handle. This may permit single handed operation of the function provided by the control.

[00321] Referring to FIG. 1, apparatus 100 is shown including a power switch 1084 located on upper end 1052 of handvac 112 proximate first handle end 1048 within finger-reach when grasping handvac handle 484. As illustrated, power switch 1084 may be laterally centrally positioned such that plane 1044 intersects and more preferably bisects power switch 1084.

[00322] Referring now to FIGS. 15 and 16, apparatus 168 is shown including an upright section 108 having a cyclone bin assembly 160 with a handle 616, and handvac 112 with handle 484. As shown, handle axis 1092 of handle 616, and handle axis 888 of handvac handle 484 may extend in a same plane 1096. Preferably, plane 1096 is a vertical plane positioned laterally centrally between left and right sides of apparatus 168 as shown. In the illustrated embodiment, plane 1096 bisects handles 616 and 484.

[00323] In the illustrated embodiment, handvac 112 includes a power switch 1084 located on upper end 1052 of handvac 112 which is bisected by plane 1044. Handle 616 of cyclone bin assembly 160 is also shown including a button 1100 for releasing latch 744 to disconnect cyclone bin assembly 160 from wand 144. As illustrated, button 1100 may be positioned laterally centrally between left and right sides of apparatus 168 such that button 1100 is bisected by plane 1096.

Handvac Axial Alignment

[00324] In accordance with another aspect of this disclosure, which may be used by itself or in combination with any one or more other aspects of this disclosure, a plurality of airflow path segments in the handvac may extend in parallel. In some cases, this may reduce the number of bends in the airflow path through the handvac, which may reduce the pressure drop across the airflow path.

[00325] As exemplified in FIG. 96, handvac inlet nozzle 412 may extend in length from an upstream nozzle end 416 rearwardly along a nozzle axis 884, handvac cyclone chamber 184 may extend from an air inlet 192 along a cyclone axis 248 to an air outlet 196, and handvac suction motor 204 may extend from a motor inlet 1108 along a motor axis 252 to a motor outlet 1112.

[00326] In some embodiments, two or more of nozzle axis 884, cyclone axis 248, and motor axis 252 may be parallel. For example, in the illustrated embodiment, nozzle axis 884, cyclone axis 248, and motor axis 252 are parallel. In some embodiments, two or more of nozzle axis 884, cyclone axis 248, and motor axis 252 may be co-axial. For example, in the illustrated embodiment, nozzle axis 884 and cyclone axis 248 are co-axial. In other embodiments, nozzle axis 884, cyclone axis 248, and motor axis 252 may all be co-axial.

[00327] In the illustrated embodiment, handvac 112 may include an electrical connector 1116 for providing power to an upstream attachment (e.g. a surface cleaning head). As shown, connector 1116 may extend from a front connector end 1120 along a connector axis 1124 to a rear connector end 1128. In some embodiments, connector axis 1124 may be parallel to one or more of nozzle axis 884, cyclone axis 248, and motor axis 252. In the illustrated embodiment, connector axis 1124 is parallel to nozzle axis 884, cyclone axis 248, and motor axis 252.

[00328] In some embodiments, handvac 112 may include one or more electrical cables 1132 which extend from electrical connector 1116 rearwardly to electrically couple electrical connector 1116 with a source of power (not shown). In the illustrated embodiment, electrical cables 1132 extend from electrical connector 1116 rearwardly along vortex finder 1136 of cyclone chamber 184 toward motor housing 1138. As shown, at least the portion of electrical cables 1132 which along vortex finder 1136 across cyclone chamber 184 is parallel to cyclone axis 248.

Axial Cyclone Inlet

[00329] In accordance with another aspect of this disclosure, which may be used by itself or in combination with any one or more other aspects of this disclosure, a handvac may be provided having a cyclone chamber with an axial inlet. That is, the inlet axis may be parallel to the cyclone axis, and more preferably co-axial with the cyclone axis. In some

cases, this may reduce the bends in the airflow path through the cyclone, which may reduce the pressure drop across the cyclone for better pneumatic efficiency. Preferably, the cyclone is a uniflow cyclone wherein the air outlet is at the opposite end from the air inlet. Alternately, or in addition, the axial inlet includes a portion that converts the axial flow to a tangential flow wherein the portion is provided within the diameter of the cyclone chamber. Optionally, the axial inlet is parallel to and may be co-axial with the handvac air inlet.

[00330] As exemplified in FIG. 96, handvac cyclone chamber 184 includes an air inlet 192 and an air outlet 196. As shown, air inlet 192 may include an inlet axis 1140 which is parallel to cyclone axis 248. Air inlet 192 may have a circular section transverse to axis 1140 with an inlet diameter 1144, or rectangular with a side dimension 1144. Preferably, the cross-sectional area of air inlet 192 is approximately equal to the cross-sectional area of inlet nozzle 412. Preferably, the cross-sectional area of air inlet 192 is between 80%-125% of the cross-sectional area of the inlet nozzle 412, more preferably 90%-120%, and most preferably 100%-115%.

[00331] Preferably, inlet 192 is in fluid communication with an upstream end 388 of an inlet passage 384. Inlet passage 384 may redirect the axial flow through inlet 192 to a tangential flow for developing a cyclonic motion inside cyclone chamber 184. Referring to FIGS. 23 and 23a, inlet passage 384 may extend from upstream passage end 388 to downstream passage end396 across an arcuate angular extent 1148. Preferably angular extent 1148 is between 45 and 300°, more preferably between 60 and 250°, and most preferably between 90 and 200°.

[00332] Returning to FIG. 96, inlet passage 384 is shown having a width 1152, and a height 1108. In some embodiments, the cross-sectional area of inlet passage 384 may be approximately equal to the cross-sectional area of air inlet 192. Preferably, the cross-sectional area of inlet passage 384 is between 80%-125% of the cross-sectional area of the inlet passage 384, more preferably 90%-120%, and most preferably 100%-115%.

[00333] Vortex finder 1136 may define an outlet passage to air outlet 196 of cyclone chamber 184. As shown, vortex finder 1136 may be substantially cylindrical having a

diameter 1160. In the illustrated embodiment, the cross-sectional area of vortex finder 1136 may be approximately equal to the cross-sectional area of inlet nozzle 412. For example, diameter 1160 may be approximately equal to diameter 1164 of inlet nozzle 412. Preferably, the cross-sectional area of vortex finder 1136 is between 80%-125% of the cross-sectional area of the inlet nozzle 412, more preferably 90%-120%, and most preferably 100%-115%.

Uniflow Cyclone

[00334] In accordance with another aspect of this disclosure, which may be used by itself or in combination with any one or more other aspects of this disclosure, a handvac may be provided having a cyclone chamber wherein the air outlet is at the opposite end from the air inlet. In some cases, this may reduce the bends in the airflow path through the cyclone, which may reduce the pressure drop across the cyclone for better pneumatic efficiency. Optionally, the cyclone inlet is at the front or inlet end of the handvac and may be parallel to or co-axial with the handvac air inlet.

[00335] As exemplified in FIG. 96, handvac inlet 192 is shown positioned at a front end 220 of cyclone chamber 184, and outlet 196 is shown positioned at a rear end 224 of cyclone chamber 184. Inlet 192 may have an inlet axis 1140 that is parallel to the outlet axis 1168 of air outlet 196. In the illustrated embodiment, inlet axis 1140 is co-axial with outlet axis 1168.

[00336] Optionally, the suction motor axis may be parallel to or co-axial with axis 1140, 1168. Accordingly, air may travel in a generally uniform direction through the components of the handvac.

Handvac Cyclone Dirt Collection Chamber

[00337] In accordance with another aspect of this disclosure, which may be used by itself or in combination with any one or more other aspects of this disclosure, the dirt collection chamber of the handvac may have a dirt inlet which is located at the upper end of the dirt collection chamber when the hand vac is oriented for cleaning a floor (see e.g., FIGS 81 and 103). In addition, the dirt collection chamber may be shaped to encourage dirt to collect at another end of the handvac away from the dirt outlet of the cyclone chamber

(e.g., it may extend downwardly away from the dirt inlet). This may clear the dirt inlet to permit additional dirt to enter.

[00338] As exemplified in FIG. 96, dirt may enter dirt collection chamber 188 from cyclone chamber 184 through dirt outlet 200 of cyclone chamber 184. In the illustrated embodiment, dirt outlet 200 is at a rear end 224 of cyclone chamber 184. In use, handvac 112 may be normally oriented with the nozzle 412 at the front end oriented downwardly for cleaning a surface below. Accordingly, dirt entering dirt collection chamber 188 from dirt outlet 200 may fall by gravity toward front end 220 of dirt collection chamber 188 away from dirt outlet 200. This may help to keep dirt outlet 200 clear for subsequent dirt to move through dirt outlet 200 during use.

[00339] In the illustrated embodiment, handvac 112 may be supportable on a horizontal surface 876 by contact between dirt collection chamber 188 and the horizontal surface 876. For example, dirt collection chamber 188 may include a bottom wall 216 for supporting handvac 112 on horizontal surface 876. Preferably, as discussed previously, handvac 112 is inclined with nozzle 412 facing downwardly when handvac 112 is supported on horizontal surface 876 by bottom wall 216. In the illustrated embodiment, bottom wall 216 is angled downwardly between front end 220 and rear end 224 for orienting nozzle axis 884 downwardly to horizontal when handvac 112 is supported on horizontal surface 876. As shown, this may provide dirt collection chamber 188 with a wedge-like shape having a height 1172 measured between upper and lower dirt collection chamber walls 226 and 216 which increases from the front end 220 to the rear end 224.

Pre-motor Filter Housing

[00340] In accordance with another aspect of this disclosure, which may be used by itself or in combination with any one or more other aspects of this disclosure, a pre-motor filter housing may be provided in the airflow path between the cyclone bin assembly and the suction motor for directing the airflow through one or more pre-motor filters contained therein.

[00341] As exemplified in FIGS. 96 and 117, handvac 112 has a pre-motor filter chamber 556 containing pre-motor filters 1176 and 1180, and a suction motor housing 1138 containing suction motor 204. The airflow path from inlet nozzle 412 to clean air

outlet 132 may extend downstream from cyclone bin assembly 136 to pre-motor filter chamber 556 to suction motor housing 1138. That is, cyclone bin assembly 136, pre-motor filter chamber 556, and suction motor housing 1138 may be positioned in the airflow path with pre-motor filter chamber 556 downstream of cyclone bin assembly 136 and suction motor housing 1138 downstream of pre-motor filter chamber 556.

[00342] In the illustrated example, pre-motor filter chamber 556 extends in height 1184 between an upper end 1188 to a lower end 1192 in the direction of pre-motor filter axis 560, and extends in depth 1216 between front wall 1220 and rear wall 1224. In some embodiments, cyclone axis 248 and motor axis 252 may be parallel and vertically offset as shown. For example, each of cyclone axis 248 and motor axis 252 may intersect pre-motor filter chamber 556 as shown. In some embodiments, outlet axis 1168 of cyclone chamber outlet 196 and, motor inlet axis 1196 of motor inlet 1108 may be parallel and vertically offset. For example, each of outlet axis 1168 and motor inlet axis 1196 may intersect pre-motor filter chamber 556 as shown.

[00343] In some embodiments, cyclone chamber outlet 196 discharges air from cyclone chamber 184 into pre-motor filter chamber 556, and pre-motor filter chamber 556 discharges air into motor inlet 1108. For example, cyclone chamber outlet 196 may be positioned at the threshold between cyclone chamber 184 and pre-motor filter chamber 556, and motor inlet 1108 may be positioned at the threshold between pre-motor filter chamber 556 and suction motor housing 1138. In alternative embodiments, one or more conduits (not shown) may separate pre-motor filter chamber 556 from cyclone chamber outlet 196 and/or motor inlet 1108.

[00344] In the illustrated embodiment, pre-motor filter chamber 556 extends in length between a front end 1200 and a rear end 1204. As shown, pre-motor filter chamber 556 may hold pre-motor filters 1176 and 1180 in the airflow path between cyclone chamber outlet 196 and motor inlet 1108 for filtering residual dirt particles remaining in the airflow. In some embodiments, pre-motor filter chamber 556 may hold pre-motor filters 1176 and 1180 in spaced apart relation to front and rear ends 1200 and 1204. An upstream plenum 1208 may be provided in the space between upstream pre-motor filter 1176 and front end 1200. A downstream plenum 1212 may be provided in the space between downstream pre-motor

filter 1176 and rear end 1204. Air entering upstream plenum 1208 from cyclone bin assembly 136 may distribute across the surface area of pre-motor filter 1176 for traversing filters 1176 and 1180 to downstream plenum 1212.

[00345] In the illustrated embodiment, cyclone chamber outlet 196 may direct air into an upper portion of upstream plenum 1208. For example, cyclone chamber outlet 196 may be connected to pre-motor filter chamber 556 proximate upper end 1188. In the illustrated embodiment, motor inlet 1108 may receive air from a lower portion of downstream plenum 1212. For example, motor inlet 1108 may be connected to pre-motor filter chamber 556 proximate lower end 1192. Accordingly, pre-motor filter chamber 556 may be used to redirect the air from transversely to the cyclone and motor axis without requiring conduits having bends therein.

Battery Power

[00346] In accordance with another aspect of this disclosure, which may be used by itself or in combination with any one or more other aspects of this disclosure, the surface cleaning head or upright section of the surface cleaning apparatus may include one or more batteries for powering the handvac when the handvac is connected to the surface cleaning head or upright section. The handvac may also include handvac batteries which may power the handvac when connected to or disconnected from the upright section and surface cleaning head (e.g. in an above-floor cleaning mode or handvac mode). When the handvac is electrically connected to the surface cleaning head, the batteries in the surface cleaning head may supplement the batteries in the handvac or be the sole power source.

[00347] As exemplified in FIG. 3, surface cleaning apparatus 100 (or any other surface cleaning apparatus embodiment disclosed herein) may include one or more handvac batteries 1268 mounted to the handvac 112, and one more supplemental batteries 1272. Supplemental batteries 1272 may be mounted to any other suitable component of apparatus 100 other than handvac 112. For example, supplemental batteries 1272 are shown mounted to surface cleaning head 104. Alternatively or additionally, supplemental batteries 1272 may be mounted to upright section 108.

[00348] As used herein, the plural term “batteries” means one or more batteries. For example, supplemental batteries 1272 may be one battery or a plurality of batteries.

Similarly, handvac batteries 1268 may be one battery or a plurality of batteries. Batteries 1272 and 1268 may be any suitable form of battery such as NiCad, NiMH, or lithium batteries, for example. Preferably, batteries 1272 and 1268 are rechargeable, however, in alternative embodiments, one or both of batteries 1272 and 1268 may be non-rechargeable single-use batteries.

[00349] In the illustrated embodiment, when handvac 112 is connected to upright section 108, an electrical connection may be formed between supplemental batteries 1272 and handvac 112, e.g. for powering suction motor 204.

[00350] In some embodiments, supplemental batteries 1272 may provide handvac 112 with enhanced power for generating greater suction with suction motor 204. For example, suction motor 204 may operate in a high power consumption mode, drawing power from supplemental batteries 1272, or supplemental batteries 1272 and handvac batteries 1268 simultaneously.

[00351] In some embodiments, supplemental batteries 1272 may provide the handvac 112 with extra energy for prolonged cleaning time between charges. For example, supplemental batteries 1272 may have a greater energy capacity (e.g. measured in Watt-hours) than handvac batteries 1268, such that handvac 112 may be sustained by supplemental batteries 1272 for a longer operating time. In some embodiments, handvac 112 may draw power from both of supplemental batteries 1272 and handvac batteries 1268, which have a greater combined energy storage capacity than handvac batteries 1268 alone.

[00352] In some embodiments, supplemental batteries 1272 may supply power to the handvac in preference to the handvac batteries 1268 to delay or avoid draining the handvac batteries 1268. For example, handvac 112 may draw power from supplemental batteries 1272 until substantially depleted before drawing power from handvac batteries 1268. This may conserve power in handvac batteries 1268 for use when handvac 112 is disconnected from supplemental batteries 1272 (e.g. in an above-floor cleaning mode, or handvac mode of apparatus 100). In some embodiments, handvac 112 may never draw power from handvac batteries 1268 when handvac 112 is electrically connected to supplemental batteries 1272.

[00353] In some embodiments, handvac 112 may draw power from supplemental batteries 1272 to recharge handvac batteries 1268. This may help to ensure that handvac batteries 1268 are not depleted when handvac 112 is disconnected from supplemental batteries 1272 (e.g. for use in an above-floor cleaning mode, or handvac mode of apparatus 100). In some cases, supplemental batteries 1272 may recharge handvac batteries 1268 only when apparatus 100 is not turned on.

[00354] In some embodiments, supplemental batteries 1272 may be recharged whenever the surface cleaning apparatus is connected to an external power outlet. In some cases, handvac batteries 1268 may be recharged when handvac 112 is electrically connected to an external power outlet (e.g. when surface cleaning head 104 or upright section 108 is connected to a power outlet by an electrical cord (not shown), and handvac 112 is connected to the surface cleaning head 104 or upright section 108).

[00355] In some embodiments, one or more of supplemental batteries 1272 and handvac batteries 1268 may be positioned in the airflow path. This may provide cooling for the batteries so positioned, which may help to prevent the batteries from overheating and may improve the performance of the batteries. In the illustrated example, handvac batteries 1268 are positioned in the airflow path inside motor housing 1138. For example, handvac batteries 1268 may be positioned inside motor housing 1138 between suction motor 204 and clean air outlet 132. The air passing over the handvac batteries 1268 may help to keep the batteries 1268 cool.

[00356] Supplemental batteries 1272 may be positioned in the airflow path to promote cooling of the batteries 1272. In the illustrated example, supplemental batteries 1272 are shown positioned inside surface cleaning head 104 in the airflow path between dirty air inlet 124 and downstream end 1240. The air passing over batteries 1272 may help to keep batteries 1272 cool.

[00357] In alternative embodiments, one or both of supplemental batteries 1272 and handvac batteries 1268 may be positioned outside of the airflow path (e.g. to be cooled passively).

Handvac Wheels

[00358] In accordance with another aspect of this disclosure, which may be used by itself or in combination with any one or more other aspects of this disclosure, the handvac may be provided with one or more sets of wheels, and a handle which may articulate to facilitate different cleaning postures.

[00359] As exemplified in FIGS. 106-109, surface cleaning apparatus 1292 may include a surface cleaning head 104, an upright section 108 (which may receive any assembly 140, 160 discussed previously), and a handvac 112. An airflow path through apparatus 1292 may extend from dirty air inlet 124 in surface cleaning head 104, downstream through upright section 108 and then handvac 112 to clean air outlet 1304. Upright section 108 may include a wand 144 having an upstream end 360 drivingly connected to a pivot joint 116 of surface cleaning head 104, and a downstream end 364 connected to an inlet nozzle 412 of handvac 112.

[00360] Handvac 112 may include an air treatment member positioned in the airflow path between inlet nozzle 412 for separating dirt from the airflow. In the illustrated example, handvac 112 includes a cyclone bin assembly 136 including a cyclone chamber 184, and a dirt collection chamber 188. Optionally, a bottom wall 216 of dirt collection chamber 188 may be pivotally openable for emptying dirt collection chamber 188.

[00361] As exemplified, apparatus 1292 may be movable between an upright storage position (FIG. 106) in which handvac 112 is substantially vertically aligned above surface cleaning head 104 and wand 144 is substantially vertically oriented, and an in-use floor cleaning position (FIG. 108) in which surface cleaning head 104 is positioned behind surface cleaning head 104 and wand 144 extends at an angle to vertical.

[00362] In the illustrated example, apparatus 1292 may include a handle 1340. Handle 1340 may be connected to wand 144 by an arm assembly 1344. As shown, arm assembly 1344 may include a first arm 1348 joined to a second arm 1352 by an articulating joint 1356. First arm 1348 may be connected to wand 144 and joint 1356, and second arm 1352 may be connected to handle 1340. Alternately, joint 1356 may be used to connect second arm 1352 to wand 144.

[00363] As shown, first arm 1348 may be rigidly connected to wand 144, and extend transversely to wand 144. For example, first arm 1348 may extend perpendicularly to wand 144. Second arm 1352 may be rotatable about joint 1356 between at least two positions. In the first position (FIG. 108), second arm 1352 may extend at an angle to first arm 1348 substantially in parallel with wand 144. In the second position (FIG. 109), second arm 1352 may extend substantially parallel to first arm 1348. An actuator (e.g., a button) 1358 may be provided on handle 1340 for toggle joint 1356 between an unlocked position in which second arm 1352 can move with respect to first arm 1348, and a locked position in which the position of second arm 1352 is fixed with respect to first arm 1348. Optionally, joint 1356 may be locked in a number of alternate positions. Alternately, joint 1356 may not be locked in the second bent position shown in FIG 109.

[00364] The first position (FIG. 108) may be suitable for cleaning open areas where vertical clearance is not an issue. The second position (FIG. 109) may be suitable for cleaning under furniture and the like, where wand 144 must be lowered to clear the furniture height. In the second position, the orientation of second arm 1352 may permit a user to grasp handle 1340 and lower wand 144 while conveniently standing upright.

[00365] In some embodiments, handvac 112 may include one or more front wheels 1364. Front wheel 1364 may be positioned to make rolling contact with a horizontal surface when wand 144 is lowered sufficiently. Thus, front wheel 1364 may assist with supporting the weight of handvac 112 and permit handvac 112 to roll across the horizontal surface. In the illustrated example, a front end 1360 of bottom wall 216 is provided with one or more front wheels 1364.

[00366] It will be appreciated that if rear end of assembly 140,160 is tapered as discussed previously, then assembly 140, 160 is configured to permit the vacuum cleaner to extend further under furniture than if the assembly 140,160 had the depth (front to back when in an upright storage position) as the upper end of the assembly 140, 160.

Openable Handvac Cyclone Bin Assembly

[00367] In accordance with another aspect of this disclosure, which may be used by itself or in combination with any one or more other aspects of this disclosure, the cyclone bin assembly of the handvac may be opened to empty the cyclone chamber and/or the dirt

collection chamber, to access the pre-motor filter or access a door to open the cyclone chamber and/or the dirt collection chamber by moving part or all of the cyclone bin assembly relative to a main body of the handvac which include the suction motor while the parts remain connected together. For example, the parts may be pivotally mounted to each other.

[00368] Referring to FIGS. 110a and 110b, front portion 1372 of handvac 112 may be pivotally connected to rear portion 1376 of handvac 112 for pivoting between the open position shown and a closed position. In the open position, cyclone bin assembly 136 may be accessible, e.g. for emptying or cleaning.

[00369] Front portion 1372 may be pivotally connected to rear portion 1376 in any suitable fashion. In the illustrated embodiment, front portion 1372 is pivotally connected to rear portion 1376 by a hinge 1380 for rotation about a hinge axis 1384 between the open and closed positions.

[00370] In the illustrated embodiment, front portion 1372 and rear portion 1376 separate at the interface between cyclone bin assembly 136 and pre-motor filter chamber 556. For example, front portion 1372 may include cyclone bin assembly 136 except for second end wall 224, and rear portion may include pre-motor filter chamber 556 and second end wall 224 of cyclone bin assembly 136. Accordingly, in the open position, access may be provided to empty and clean dirt collection chamber 188 and cyclone chamber 184 of cyclone bin assembly 136.

[00371] Referring to FIG. 116, in some embodiments handvac 112 may include a handle assembly 300 including handle 484 and suction motor 204. As exemplified, handle assembly 300 and rear wall 1224 of pre-motor filter chamber 556 may be removable from (entirely, or pivotally connected to) pre-motor filter chamber 556 as a unit toaccess the pre-motor filters 1176 and 1180 inside pre-motor filter chamber 556, e.g. for cleaning or replacement. As shown in FIG. 117, in some embodiments, handle assembly 300 may also be removably connected to rear wall 1224. In alternative embodiments, handle assembly 300 may be permanently connected to rear wall 1224.

Openable Dirt Collection Chamber

[00372] In accordance with another aspect of this disclosure, which may be used by itself or in combination with any one or more other aspects of this disclosure, the supplemental assembly may have a top and/or bottom openable portion.

[00373] As exemplified in FIGS. 111-113, dirt collection assembly 140 is shown including an upper portion 276 in an open position. Upper portion 276 may be moveably connected to (e.g., pivotally) or removable from dirt collection assembly 140 in any suitable manner. As exemplified, upper portion 276 may be connected to dirt collection chamber 140 by a hinge 1392 for rotation about a hinge axis 1(not shown) between the open and closed positions.

[00374] Upper portion 276 may be retained in the closed position in any suitable fashion. In the illustrated example, dirt collection chamber 140 includes a latch 1400 for securing upper portion 276 in the closed position. Latch 1400 may be user operable for selectively releasing upper portion 276 for movement to the open position.

[00375] As exemplified in FIGS. 114 and 115, upright section 108 of surface cleaning apparatus 152 is shown including a cyclone bin assembly 160. Cyclone bin assembly 160 is preferably openable for accessing cyclone chamber 308 and dirt collection chamber 141, e.g. for cleaning or emptying. Preferably, an upper and/or lower portion of cyclone bin assembly 160 may be openable. In the illustrated embodiment, upright section 108 includes an upper portion 1408 and a lower portion 1412. As shown, upper portion 1408 may be moveably connected to (e.g.,pivotally connected to) or removable from lower portion 1412 for movement been a closed position (FIG. 114) and an open position (FIG. 115).

[00376] Upper portion 1408 may be pivotally connected to lower portion 1412 in any suitable manner. In the illustrated embodiment, lower portion 1412 is pivotally connected to lower portion 1412 by a hinge 1416 for rotation about a hinge axis 1420 between the closed and open positions.

[00377] Upper portion 1408 may be retained in the closed position in any suitable manner. For example, upper portion 108 may include a releasable catch for selectively securing upper portion 1408 to lower portion 1412 in the closed position.

Handvac Cyclone Bin Assembly Bypass

[00378] In accordance with another aspect of this disclosure, which may be used by itself or in combination with any one or more other aspects of this disclosure, the cyclonic air treatment member of the handvac may be bypassed when a supplemental cyclonic bin assembly is provided. This may prevent accumulation of dirt in the handvac so that the handvac may have more or all of its dirt collection capacity available when disconnected from the upright section. Alternately or in addition, a pre-motor filter of handvac 112 may be bypassed when a supplemental cyclonic bin assembly is provided. For example, the supplemental cyclonic bin assembly may be provided with a pre-motor filter. The pre-motor filter may have a larger surface area than the pre-motor filter of handvac 112. Accordingly, by bypassing the pre-motor filter of handvac 112, the pre-motor filter of handvac 112 may only be used in an above floor cleaning mode thereby extending the useable time of the pre-motor filter of handvac 112 before cleaning or replacement may be needed.

[00379] Referring to FIGS. 99-101, handvac 112 may include a primary airflow path 1228 and a bypass airflow path 1232. As shown, primary airflow path 1228 may extend from air inlet 192 through cyclone bin assembly 136 to suction motor 204, and bypass airflow path 1232 may extend from air inlet 192 to suction motor 204 bypassing cyclone bin assembly 136. In some embodiments, bypass airflow path 1232 may extend through the pre-motor filters of pre-motor filter chamber 556, and in other embodiments, bypass airflow path 1232 may bypass pre-motor filters of pre-motor filter chamber 556. It will be appreciated that the cyclone and/or the pre-motor filter of the handvac may be bypassed. If both are bypassed, then the handvac may be used to provide some or all of the motive force to draw air through apparatus 168 but not any air treatment upstream of the suction motor.

[00380] In the illustrated embodiment, bypass airflow path 1232 is formed in part by a bypass passage 1236. Bypass passage 1236 may have an upstream end 1238 in airflow communication with handvac inlet 416, and a downstream end 1240 in airflow

communication with motor inlet 1108. As exemplified by the embodiment illustrated in FIG. 101, upstream end 1238 may be formed in a sidewall of handvac nozzle 412, and downstream end 1239 may be formed in a wall of premotor filter chamber 556. In some embodiments, downstream end 1239 may direct air from bypass passage 1236 into upstream plenum 1208 for routing bypass airflow path 1228 through pre-motor filters 1176 and 1180 as shown. In alternative embodiments, downstream end 1239 may direct air from bypass passage 1236 into downstream plenum 1212 for bypassing pre-motor filters 1176 and 1180.

[00381] As exemplified, apparatus 168 may include a bypass valve 1240 for selectively opening and closing primary and bypass airflow paths 1228 and 1232. Bypass valve 1240 may be positioned in any one or more of handvac 112, wand 144, and supplemental cyclone bin assembly 160, and may take any suitable form. For example, in some embodiments bypass valve 1240 may include components parts positioned in two or more of handvac 112, wand 144, and supplemental cyclone bin assembly 108 which cooperate and interact to open and close primary and bypass airflow paths 1228 and 1232.

[00382] In the illustrated embodiment bypass valve 1240 is positioned in inlet nozzle 412 of handvac 112. Bypass valve 1240 may be movable between a first position (FIGS. 99 and 100) in which bypass airflow path 1232 is closed and primary airflow path 1228 is open, and a second position (FIG. 101) in which bypass airflow path 1232 is open and primary airflow path 1228 is closed.

[00383] As exemplified in FIGS. 99-101, bypass valve 1240 may include a wheel 1242, a door 1244, and an actuator 1246. Wheel 1242 may be rotatably connected to nozzle 412 for rotation about its center. Door 1244 may be rigidly connected to wheel 1242 for rotation as one with wheel 1242. For example, door 1244 and wheel 1242 may rotate together as a unit. As shown, door 1244 and wheel 1242 may be rotatable between a first position (FIGS. 99 and 100) in which door 1244 seals an upstream end 1238 of bypass passage 1236, and a second position (FIG. 101) in which door 1244 seals an air inlet 192 of cyclone chamber 184.

[00384] As exemplified, actuator 1246 may include an upper end 1248 connected to wheel 1242 radially outboard of the center of wheel 1242. Actuator 1246 may be movable

vertically between a lowered position (FIGS. 99 and 100), and a raised position (FIG. 101). As shown, moving actuator 1246 from the lowered position to the raised position may rotate wheel 1242 and door 1244 clockwise which may move door 1244 to the second position (FIG. 101) in which door 1244 seals air inlet 192 of cyclone chamber 184. Further, moving actuator 1246 from the raised position to the lowered may rotate wheel 1242 and door 1244 counter clockwise which may move door 1244 to the first position (FIGS. 99 and 100) in which door 1244 seals upstream end 1238 of bypass passage 1236.

[00385] In some embodiments, actuator 1246 may be biased to the lowered position (FIGS. 99 and 100). Consequently, door 1244 and wheel 1242 may be biased to the first position (FIGS. 99 and 100) in which door 1244 seals an upstream end 1238 of bypass passage 1236. Actuator 1246 may be biased in any suitable fashion, such as by a linear coil spring 1250. In alternative embodiments, wheel 1242 may be biased clockwise in a suitable manner, such as by a torsional spring.

[00386] Actuator 1246 may have a lower end 1252 which extends outside of the airflow path. Lower end 1252 may be acted upon to move actuator 1246 vertically from the lowered position to the raised position for opening bypass airflow path 1232 and closing primary airflow path 1228. As shown, when handvac 112 is disconnected from wand 144 (FIG. 99), bypass valve 1240 may close the bypass airflow path 1232 (e.g. under the bias of spring 1250). Further, when handvac 112 is connected to wand 144 without supplemental cyclone bin assembly 160 (FIG. 100), bypass valve 120 may also close the bypass airflow path 1232. In each of these cases, the air entering handvac 112 is directed through handvac cyclone bin assembly 136 to separate dirt from the airflow. This may permit handvac 112 to operate when disconnected from supplemental cyclone bin assembly 160.

[00387] As shown in FIG. 101, when handvac 112 and cyclone bin assembly 160 are both connected to wand 144, an upper end 1254 of cyclone bin assembly 160 (handle 1254 in the illustrated example) may push against actuator lower end 1252 thereby moving actuator 1246 upwardly. This may rotate wheel 1242 and door 1244 counter clockwise, opening bypass airflow path 1232 and closing primary airflow path 1228. As shown, air exiting cyclone bin assembly 160 may travel through bypass airflow path 1232 toward

suction motor 204 bypassing cyclone chamber 184. This may permit supplemental cyclone bin assembly 160 to separate and collect dirt from the airflow path instead of handvac cyclone bin assembly 136. In turn, this may inhibit dirt accumulation in handvac dirt collection chamber 188, which may help to maximize the available dirt collection capacity of handvac dirt collection chamber 188 when the user chooses to disconnect cyclone bin assembly 160.

[00388] In the illustrated example, lower end 1252 is sloped. This may permit supplemental bin assembly 160 to be toed into wand 144 and then rotated horizontally towards wand 144 to complete the connection with wand 144, whereby the upper end 1254 of supplemental bin assembly 160 may ride the slope of lower end 1252 to push actuator 1246 upwardly.

[00389] Accordingly, bypass valve 1240 may be actuated to reconfigure the airflow path through handvac 112 automatically upon connecting and disconnecting supplemental bin assembly 160 from airflow communication with handvac 112. For example, bypass valve 1240 may be biased to close bypass airflow path 1232 whenever handvac 112 is not in airflow communication with supplemental bin assembly 160 so that the air treatment member of handvac 112 may separate dirt from the airflow. Similarly, bypass valve 1240 may be configured to open bypass airflow path 1232 and close primary airflow path 1228 whenever handvac 112 is in airflow communication with supplemental bin assembly 160 so that the air treatment member of handvac 112 does not separate and store dirt from the airflow.

[00390] The following is a description of numerous embodiments of surface cleaning apparatus 168. In the figures associated with some embodiments, a bypass valve 1232 and/or a diversion valve 712 may be represented schematically. It will be appreciated that the embodiments may be practiced using the bypass valves 1232 and/or diversion valves 712 described above, or other suitable valves.

[00391] Referring to FIG. 102, in some embodiments supplemental cyclone bin assembly 160 may include one or more pre-motor filters 1256 (herein after referred to as pre-motor filter 1256 in the singular) positioned in the airflow path. Preferably, pre-motor

filter 1256 is positioned downstream of cyclone chamber 308. As shown, pre-motor filter 1256 may be positioned between cyclone chamber air outlet 320 and outlet passage 476.

[00392] In some embodiments, pre-motor filter 1256 may separate fine dirt particles from the airflow in substitution for the pre-motor filters 1176 and 1180 of handvac 112. As shown, bypass valve 1232 may divert air from supplemental cyclone bin assembly 160 into a bypass airflow path which bypasses handvac cyclone bin assembly 136 and pre-motor filters 1176 and 1180. For example, downstream end of 1239 of bypass passage 1236 may direct the bypass airflow path 1232 to downstream plenum 1212 for bypassing pre-motor filters 1176 and 1180.

[00393] It will be appreciated that a pre-motor filter will have a certain filtering capacity of fine particles at which point the filter should be cleaned or replaced. By incorporating a pre-motor filter into the supplemental cyclone bin assembly 160, and using this filter whenever the supplemental cyclone bin assembly 160 is connected to the handvac, the filtering capacity of the handvac pre-motor filters may be preserved. This may permit extended use of the handvac pre-motor filters before they require cleaning or replacement.

[00394] It will also be appreciated that there will be a measurable pressure drop across a pre-motor filter placed in an airflow path. If positioned in series, too many filters may produce a pressure drop that materially reduces air flow at the dirty air inlet. By filtering the airflow alternately by the supplemental pre-motor filter 1256 and by the handvac pre-motor filter when the handvac is used without assembly 140, 160 attached the operational life of the handvac pre-motor filter may be extended.

[00395] As exemplified in the alternate embodiment of FIG. 103, surface cleaning head 104 may include a second suction motor 1258. Second suction motor 1258 may operate in parallel with or alternately instead of handvac suction motor 204 when handvac 112 is attached in flow communication with surface cleaning head 104. For example, a portion of air exiting supplemental cyclone bin assembly 160 may proceed to handvac suction motor 204 and a different portion may proceed to second suction motor 1258. In the illustrated embodiment, a second airflow path 1260 from diversion valve 712 to second suction motor 1258 is formed by an airflow conduit 1262 which connects diversion valve 712 to surface cleaning head 104.

[00396] As shown, when supplemental cyclone bin assembly 160 is in airflow communication with handvac 112, the airflow path extends through the air treatment member(s) of supplemental cyclone bin assembly 160 (e.g. cyclone chamber 308 and pre-motor filter 1256) and then divides into two parallel air flow paths 1232 and 1260. Bypass airflow path 1232 directs one portion of the airflow to the handvac suction motor 204 bypassing handvac cyclone chamber 184 (and optionally bypassing handvac pre-motor filters 1176 and 1180), and second airflow path 1260 directs a second portion of the airflow path to the second suction motor 1258 in head 104.

[00397] It will be appreciated that suction motors 1258 and 204 operating in parallel may generate greater suction at surface cleaning head 104 than any one of suction motors 1258 and 204 may generate operating alone. This may also permit supplemental cyclone bin 160 to include a pre-motor filter 1256 having greater surface area than the pre-motor filter of the handvac, where the additional pressure drop due to the use of two pre-motor filters may be compensated for by the enhanced suction generation of the parallel motors 1258 and 204.

[00398] As exemplified in the alternate embodiment of FIG. 104a, supplemental suction motor 160 may include a second suction motor 1258 which may operate in the same way as the embodiment of FIG 103. Second suction motor 1258 may operate in parallel with handvac suction motor 204. For example, a portion of air exiting supplemental cyclone chamber 160 may proceed to handvac suction motor 204 and a different portion may proceed to second suction motor 1258. In the illustrated embodiment, a second airflow path 1260 from outlet passage 478 to second suction motor 1258 is formed by an airflow conduit 1262.

[00399] As shown, when supplemental cyclone bin assembly 160 is in airflow communication with handvac 112, the airflow path extends through the air treatment member(s) of supplemental cyclone bin assembly 160 (e.g. cyclone chamber 308 and pre-motor filter 1256) and then divides into two parallel air flow paths 1232 and 1260. Bypass airflow path 1232 directs one portion of the airflow to the handvac suction motor 204 bypassing handvac cyclone chamber 184 (and optionally bypassing handvac pre-motor

filters 1176 and 1180), and second airflow path 1260 directs a second portion of the airflow path to the second suction motor 1258.

[00400] As shown, second suction motor 1258 may be positioned below dirt collection chamber 140 and cyclone chamber 308 of supplemental cyclone bin assembly 160, and second suction motor 1258 may be vertically aligned above surface cleaning head 104. This may help to lower the center of gravity of the apparatus 168 for enhanced stability against tipping.

[00401] In some embodiments, a pre-motor filter may be positioned in each of bypass airflow path 1232 and second airflow path 1260, as shown. For example, a pre-motor filter 1256 may be positioned in the second airflow path 1260 between outlet passage 478 and second suction motor 1258, and bypass airflow path 1232 may direct the airflow through handvac pre-motor filters 1176 and 1180. In the illustrated embodiment, pre-motor filter 1256 is shown positioned below dirt collection chamber 140 of supplemental cyclone bin assembly 160.

[00402] In alternative embodiments, air exiting cyclone chamber 308 may pass through a common pre-motor filter before dividing between the second airflow path 1260 and bypass airflow path 1232. For example, in FIG. 104b pre-motor filter 1256 is shown positioned downstream of cyclone chamber 308 and upstream of outlet passage 478. As shown, bypass airflow path 1232 may bypass handvac pre-motor filters 1176 and 1180. This may permit the filtration capacity of handvac pre-motor filters 1176 and 1180 to be preserved for use when supplemental cyclone bin assembly 160 is disconnected from airflow communication with handvac 112. In alternative embodiments, pre-motor filters 1176 and 1180 may be positioned in the bypass airflow path 1232.

[00403] As exemplified in FIG. 105a dirt collection chamber 140 and cyclone chamber 308 may be removable as a sealed unit from wand 144 and second suction motor 1258. For example, second suction motor 1258 may be mounted or removably mounted to wand 144 so that dirt collection chamber 140 and cyclone chamber 308 may be removed while second suction motor 1258 remains mounted to wand 144. This may permit cleaning and/or emptying of dirt collection chamber 140 and cyclone chamber 308 (e.g. carrying the same to a garbage bin to dump their contents) without having to carry second suction

motor 1258 (which may have a non-trivial weight). Also, assembly 160 may be removable as a unit to convert the apparatus to a lightweight or above floor operating mode.

[00404] As exemplified in FIG. 118, the air treatment members of handvac 112 and supplementary cyclone bin assembly 160 may operate in parallel. For example, handvac 112 and supplementary cyclone bin assembly 160 may separate dirt from mutually exclusive portions of the airflow entering dirty air inlet 124.

[00405] In the illustrated example, wand 144 may define two airflow paths. A first airflow path 1428 may be formed by a first division of wand 144 and may direct airflow moving therein to supplemental cyclone bin assembly 160 for cleaning, and then from supplemental cyclone bin assembly 160 to bypass airflow path 1232 of handvac 112. A second airflow path 1432 may be formed by a second division of wand 144 and may direct airflow moving therein to primary airflow path 1228 of handvac 112 for cleaning by cyclone bin assembly 136.

[00406] As exemplified, dirty air entering dirty air inlet 124 may divide into two airflows at wand upstream end 360 and then travel through the first and second airflow paths 1428 and 1432. Dirt may be separated from each airflow stream by a different one of supplementary cyclone bin assembly 160 and handvac 112. In the illustrated embodiment, the two airflows may recombine in pre-motor filter chamber 556. For example, the two airflows may recombine at the upstream plenum 1208 so that both airflows pass through pre-motor filters 1176 and 1180 before exiting through suction motor 204. In alternative embodiments, the two airflows may recombine at the downstream plenum 1212. For example, supplemental cyclone bin assembly 160 may have its own pre-motor filter for filtering the air of the first airflow path 1428.

[00407] In some embodiments, surface cleaning apparatus 168 may include two or more suction motors operating in series. In one aspect, this may enhance the suction at dirty air inlet 124 and/or compensate for suction loss from additional or higher efficiency air treatment members.

[00408] Referring to FIGS. 119a and 119b, a second suction motor 1258 may be positioned in the airflow path between dirty air inlet 124 and handvac 112. For example,

second suction motor 1258 may be a dirty air suction motor positioned in surface cleaning head 104. As shown, dirty air entering dirty air inlet 124 may be drawn through second suction motor 1258 before the airflow is cleaned by supplemental dirt collection chamber 160 and/or handvac 112 and discharged through handvac suction motor 204.

[00409] Referring to FIG. 120, second suction motor 1258 may be a clean air motor positioned downstream of handvac suction motor 204. As exemplified, motor outlet 1112 of handvac suction motor 204 may be fluidly connected to second suction motor 1258 in surface cleaning head 104 by an airflow path 1436. As shown, airflow path 1436 may be formed by a conduit 1440.

[00410] Referring to FIG. 121a, in some embodiments second suction motor 1258 may be positioned in supplementary cyclone bin assembly 160. For example, second suction motor 1258 may be positioned below dirt collection chamber 140. As shown, airflow path 1436 from motor outlet 1112 may direct air from suction motor 204 to second suction motor 1258 in supplementary cyclone bin assembly 160. For example, conduit 1440 may extend from motor outlet 1112 to second suction motor 1258. Conduit 1440 may take any suitable form. For example, conduit 1440 may be a rigid conduit as shown. Alternatively, FIG. 121b shows an embodiment where conduit 1440 is a flexible hose.

[00411] In some embodiments, when handvac is connected with supplement cyclone bin assembly 160, handvac 112 may not be positioned in the airflow path through the surface cleaning apparatus. For example, air entering the dirty air inlet 124 of the surface cleaning head may be cleaned by the supplementary cyclone bin assembly 160 and discharged without ever passing through handvac 112. In this way, handvac 112 may act as a handgrip for manipulating and steering surface cleaning apparatus 168 in the upright mode but not as an air cleaning implement.

[00412] In some embodiment, as exemplified in FIG. 122, , the handvac may be bypassed when assembly 160 is attached to upright section 108. As exemplified, air entering dirt air inlet 124 may move through wand 144 to supplemental cyclone bin assembly 160 and be discharged without moving through handvac 112. For example, the airflow path through surface cleaning apparatus 168 may direct all air from dirty air inlet 124 through wand 144 to cyclone chamber 308 to outlet passage 476 to second airflow path

1260 to suction motor 1258 of supplemental cyclone bin assembly 160, which may discharge the air to the outside environment.

[00413] Still referring to FIG. 122, in some embodiments there may be a plurality of suction motors in series. In the illustrated embodiment, surface cleaning head 104 includes a suction motor 1258 positioned in the airflow path between dirty air inlet 124 and wand 144. In alternative embodiments, suction motor 1258 may be the only suction motor in the airflow path.

[00414] While the above description provides examples of the embodiments, it will be appreciated that some features and/or functions of the described embodiments are susceptible to modification without departing from the spirit and principles of operation of the described embodiments. Accordingly, what has been described above has been intended to be illustrative of the invention and non-limiting and it will be understood by persons skilled in the art that other variants and modifications may be made without departing from the scope of the invention as defined in the claims appended hereto. The scope of the claims should not be limited by the preferred embodiments and examples, but should be given the broadest interpretation consistent with the description as a whole.

I claim:

1. A hand vacuum cleaner having a front end having a dirty air inlet, a clean air outlet, an upper end and a bottom, the hand vacuum cleaner comprising:

   (a) a main body comprising an upper end, a lower end, a front end, a rear end and a handle having an upper end and a lower end, the main body housing a suction motor and fan assembly, the suction motor and fan assembly having a suction motor axis of rotation; and,

   (b) a cyclone unit comprising a cyclone having a cyclone axis of rotation, a cyclone air inlet, a cyclone air outlet,

   wherein when the hand vacuum cleaner is positioned with the bottom on a horizontal surface, the cyclone axis of rotation is generally horizontal.

2. The hand vacuum cleaner of claim 1 wherein the handle is provided at a rear end of the main body.

3. The hand vacuum cleaner of claim 2 wherein the handle has a handle axis that intersects the suction motor axis of rotation.

4. The hand vacuum cleaner of claim 2 wherein the handle has a handle axis that intersects the suction motor.

5. The hand vacuum cleaner of claim 2 wherein the handle has a handle axis that extends upwardly and forwardly with respect to the cyclone axis of rotation.

6. The hand vacuum cleaner of claim 1 wherein the main body comprises a suction motor and fan assembly housing and the handle extends upwardly from the suction motor and fan assembly housing.

7. The hand vacuum cleaner of claim 1 wherein the handle has a hand grip portion that extends upwardly and forwardly when the hand vacuum cleaner is positioned with the bottom on a horizontal surface.

8. The hand vacuum cleaner of claim 1 wherein when the hand vacuum cleaner is positioned with the bottom on a horizontal surface, the suction motor axis of rotation is generally horizontal.

9. The hand vacuum cleaner of claim 1 wherein when the hand vacuum cleaner is positioned with the bottom on a horizontal surface, the suction motor axis of rotation is positioned below the cyclone axis of rotation.

10. The hand vacuum cleaner of claim 1 wherein the cyclone has a front end wall having the cyclone air inlet and a rear end wall having the cyclone air outlet.

11. The hand vacuum cleaner of claim 1 wherein the cyclone axis of rotation is generally parallel to the suction motor axis of rotation.

12. The hand vacuum cleaner of claim 1 wherein the cyclone unit is provided on the front end of the main body.

13. The hand vacuum cleaner of claim 1 wherein the dirty air inlet is provided on a front end of the cyclone unit.

14. The hand vacuum cleaner of claim 1 wherein the dirty air inlet comprises an inlet passage that extends longitudinally between an inlet end and an outlet end and has a longitudinal passage axis, the outlet end communicates with the cyclone air inlet and the longitudinal passage axis intersects the handle.

15. The hand vacuum cleaner of claim 14 wherein the handle has a hand grip portion that extends upwardly and forwardly when the hand vacuum cleaner is positioned with the bottom on a horizontal surface.

16. The hand vacuum cleaner of claim 14 wherein the suction motor axis of rotation is positioned below the cyclone axis of rotation when the hand vacuum cleaner is positioned with the bottom on a horizontal surface.

17. The hand vacuum cleaner of claim 15 wherein the longitudinal passage axis is generally coaxial with the cyclone axis of rotation.

18. The hand vacuum cleaner of claim 14 wherein the suction motor axis of rotation is positioned below longitudinal passage axis when the hand vacuum cleaner is positioned with the bottom on a horizontal surface.

Abstract

A hand vacuum cleaner has a horizontally disposed cyclone handle and the main body has a handle axis that extends upwardly and forwardly with respect to the cyclone axis of rotation.

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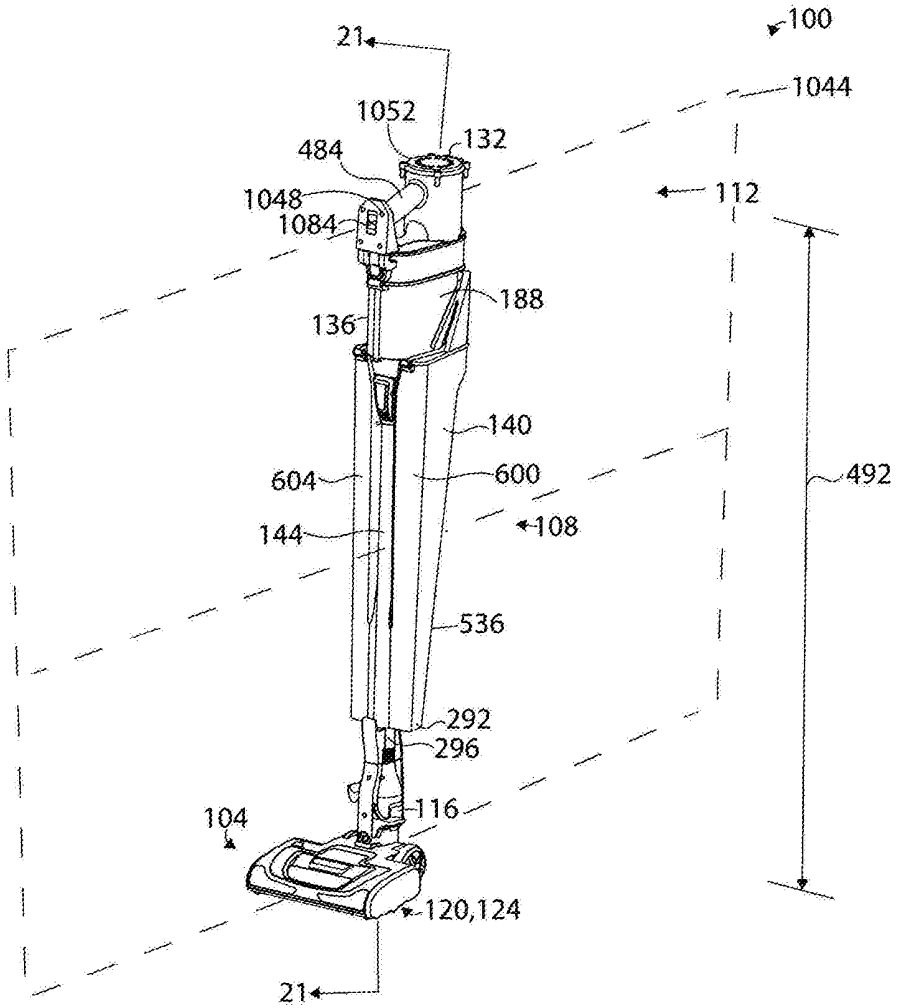


FIG. 1

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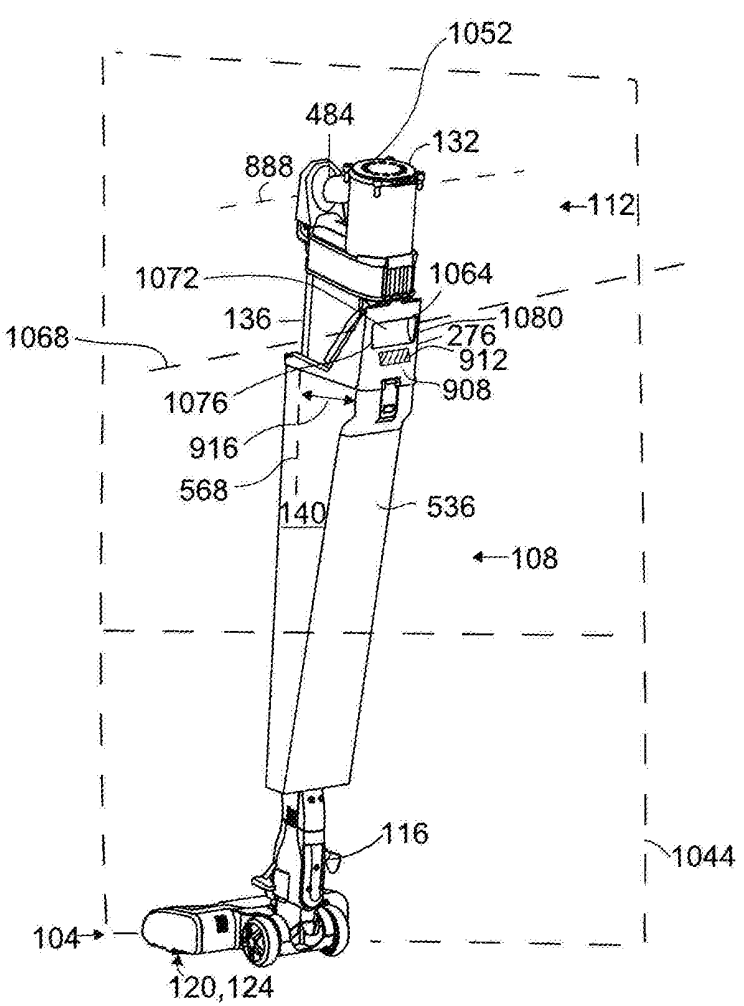


FIG. 2

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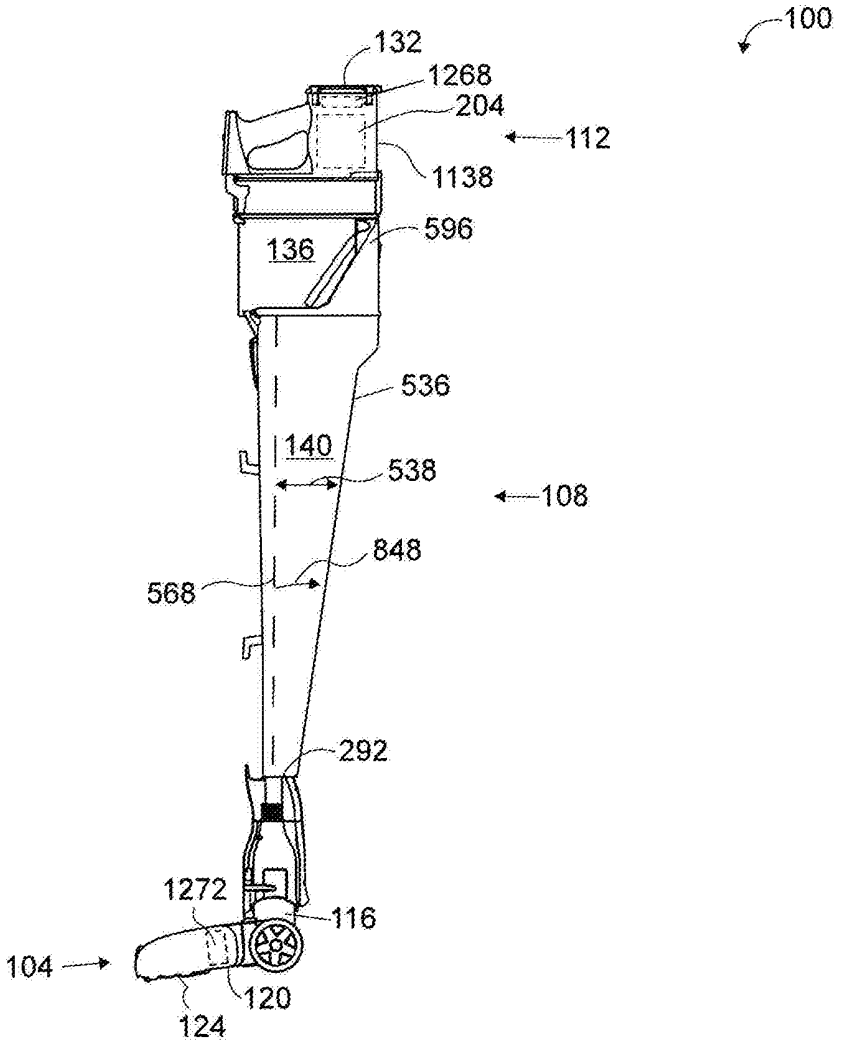


FIG. 3

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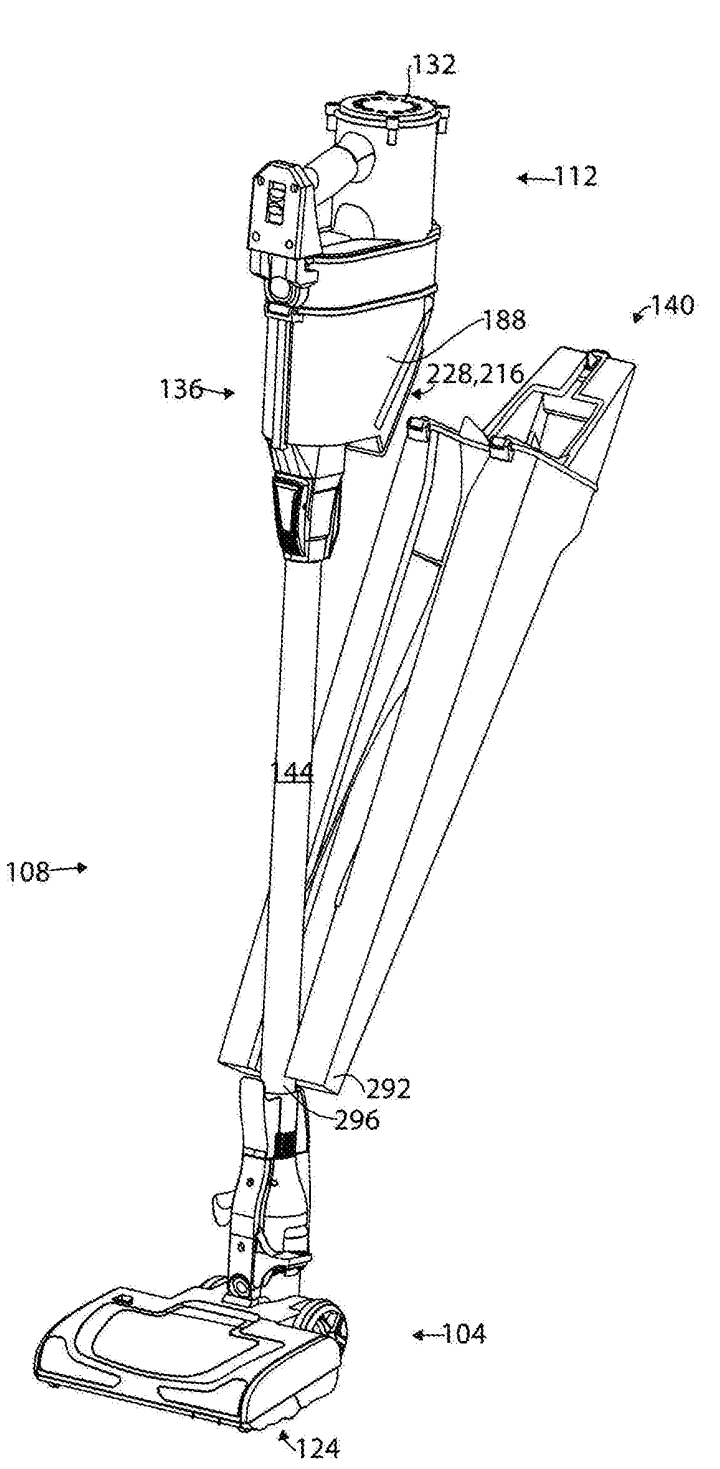


FIG. 4

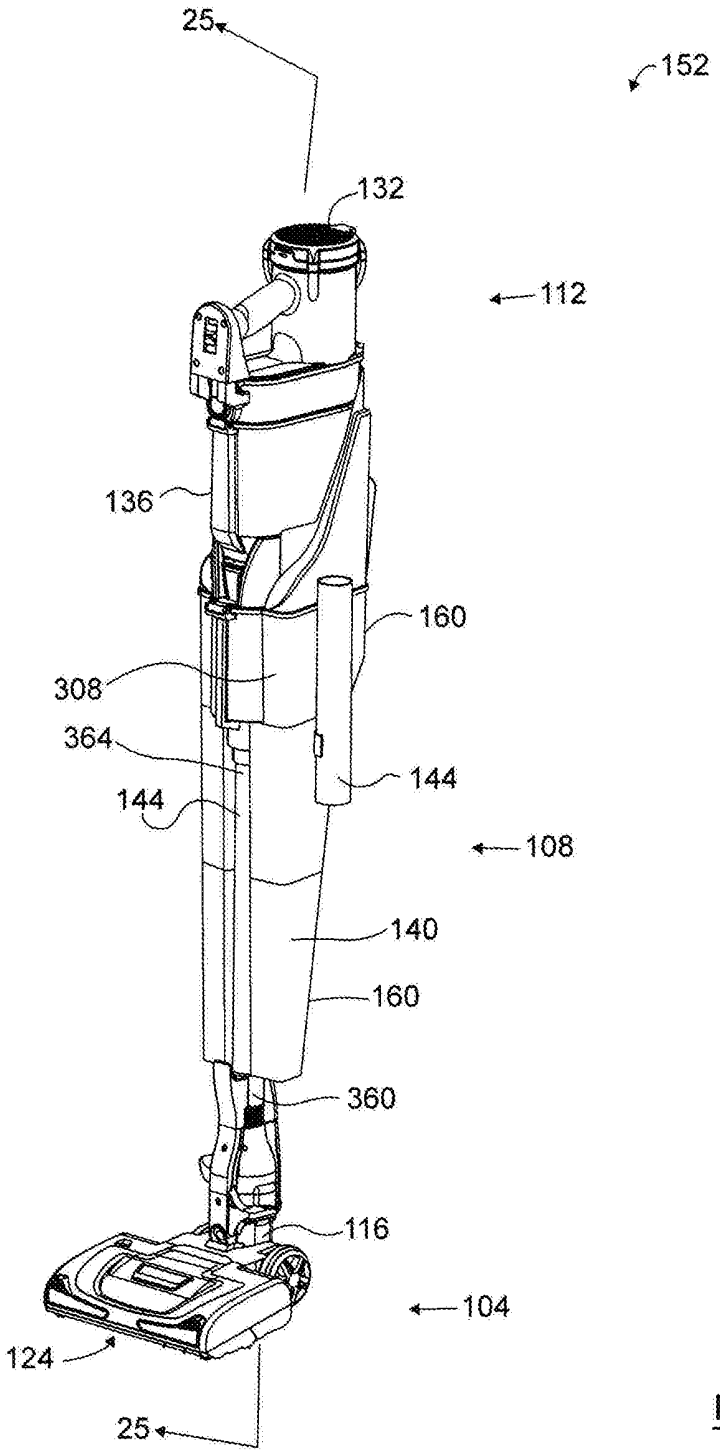

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FIG. 5

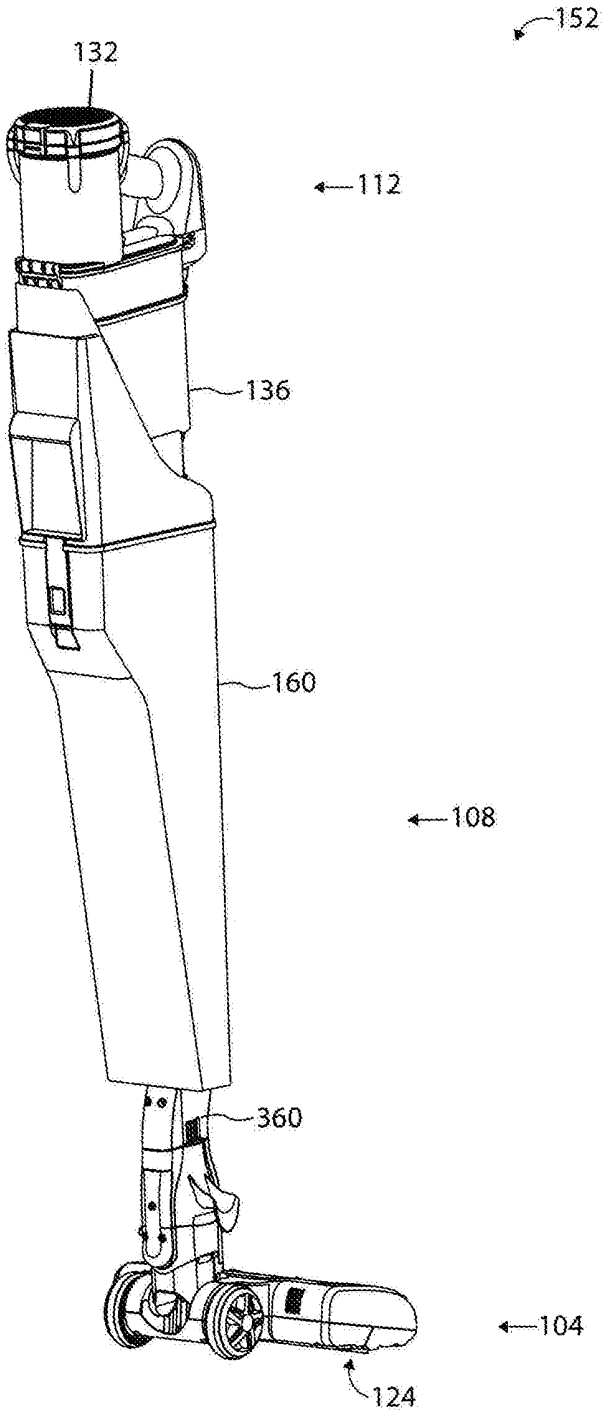


FIG. 6

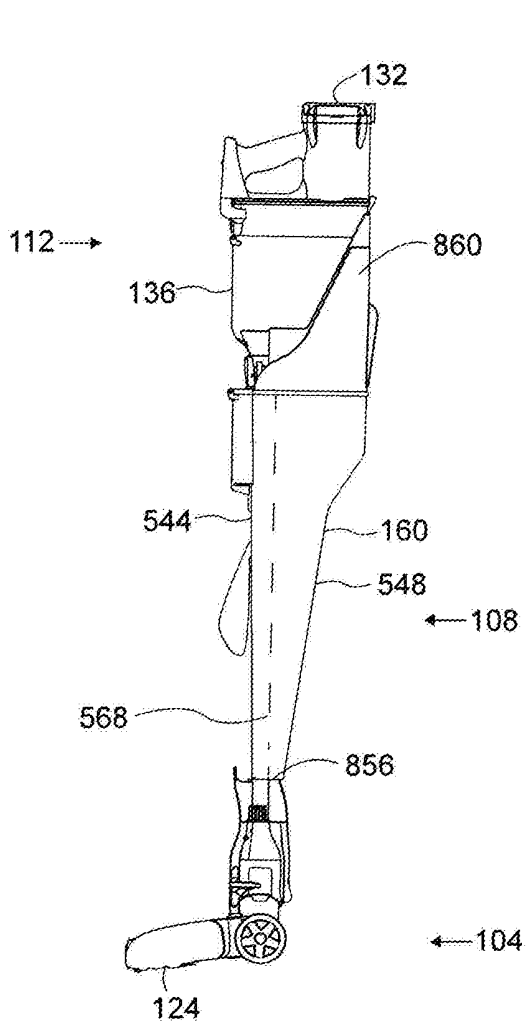


FIG. 7

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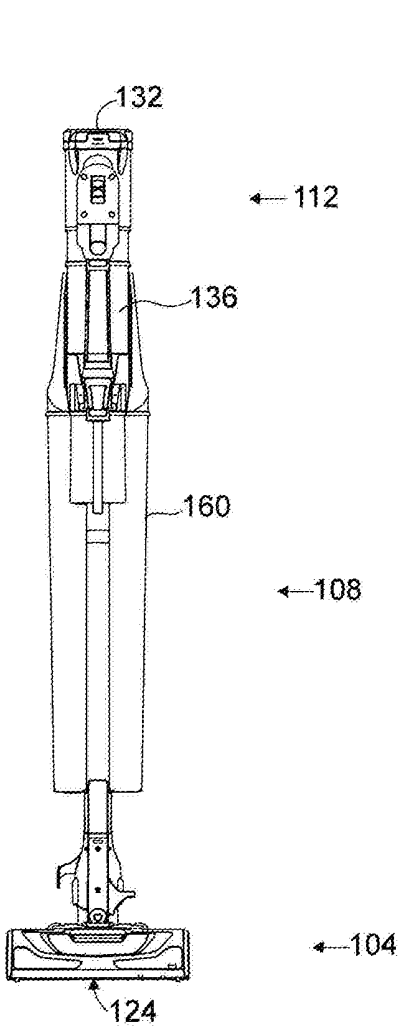


FIG. 8

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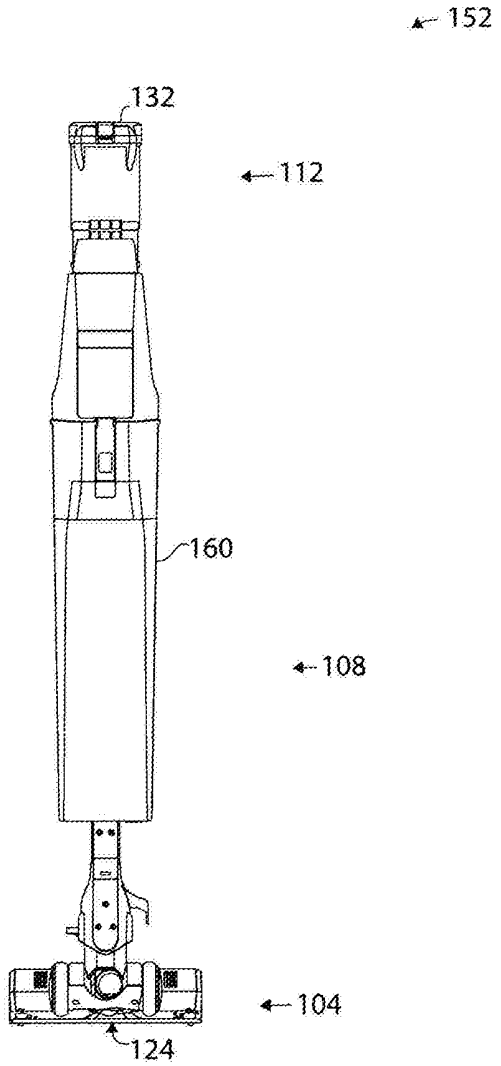


FIG. 9

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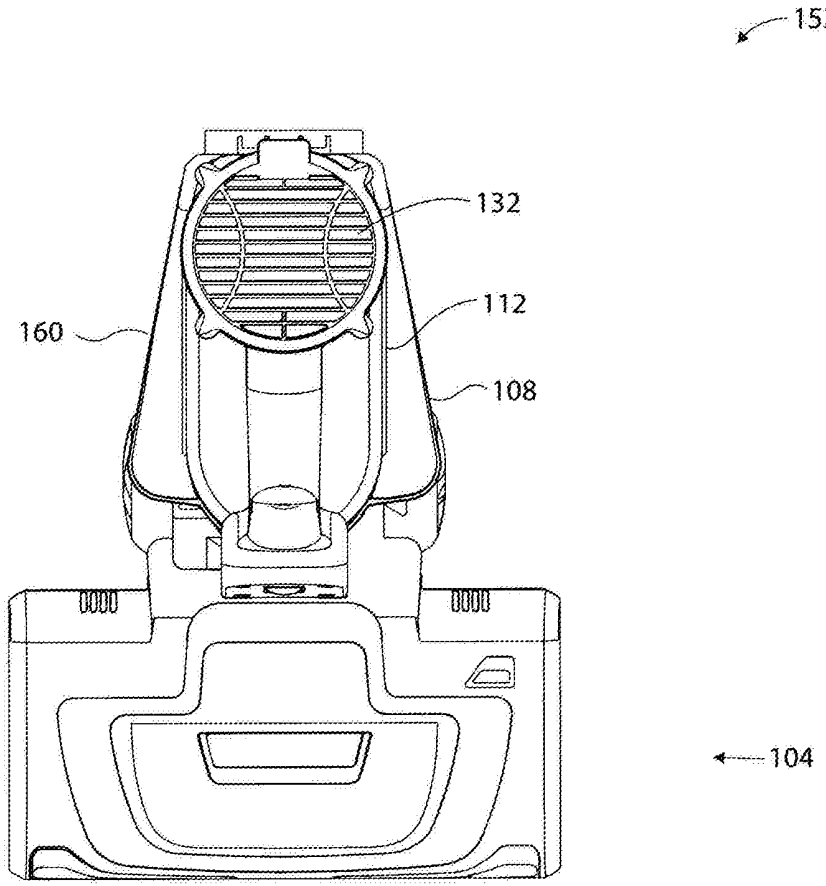


FIG. 10

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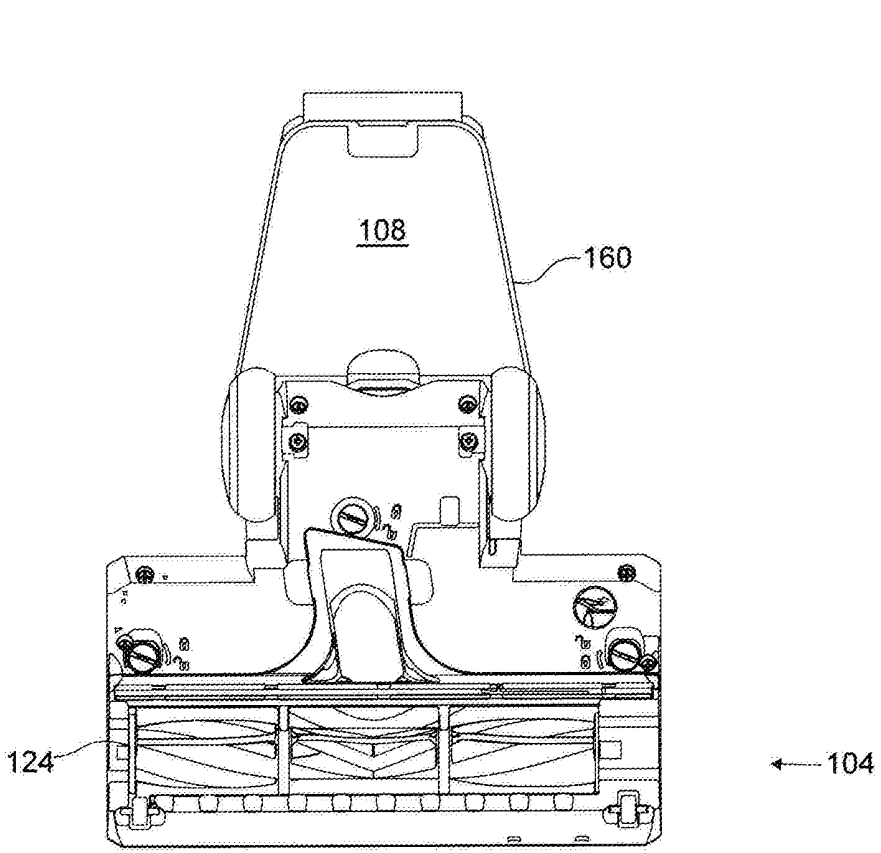


FIG. 11

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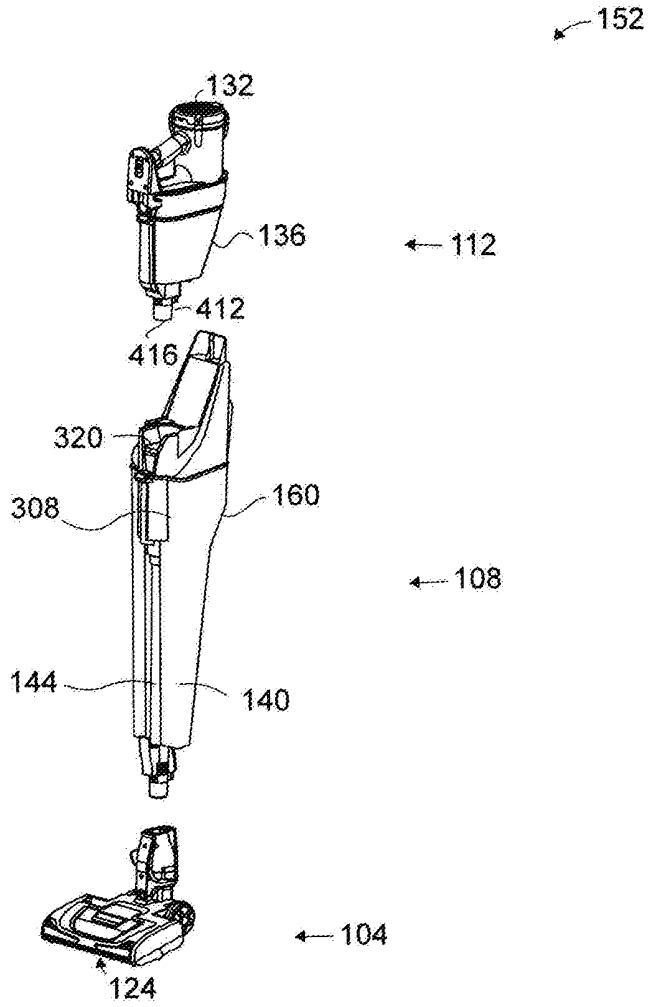


FIG. 12

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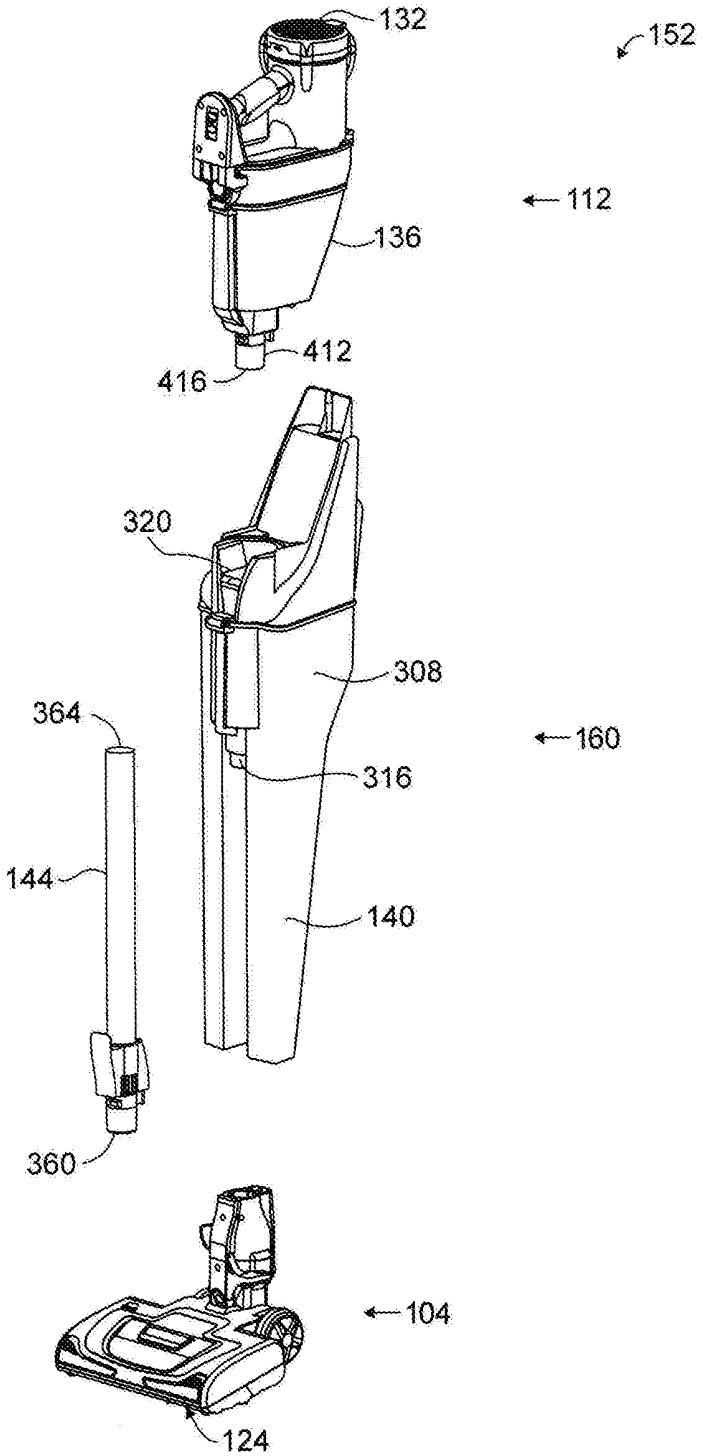


FIG. 12a

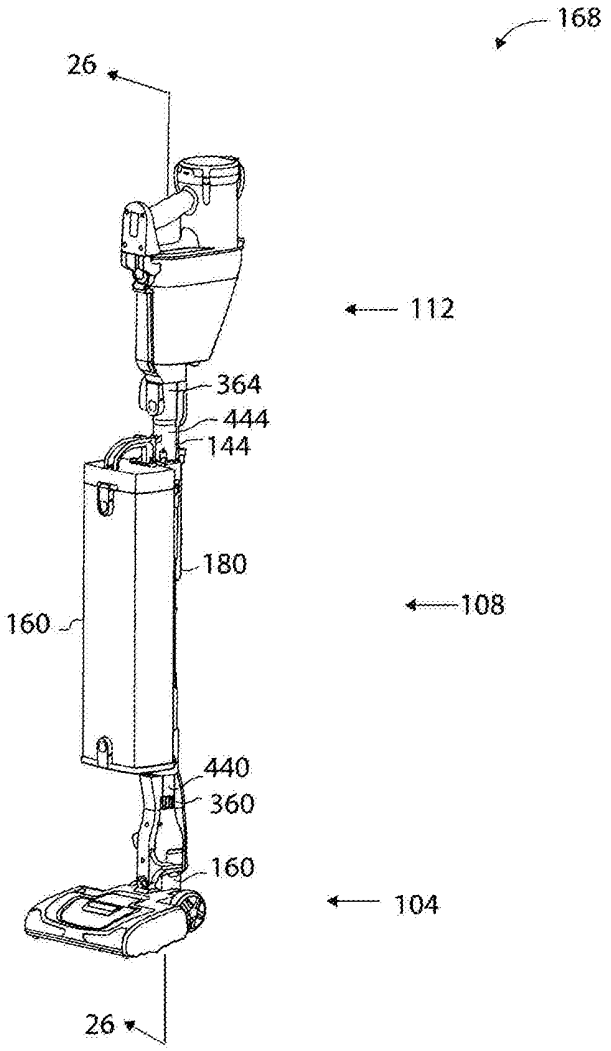


FIG. 13

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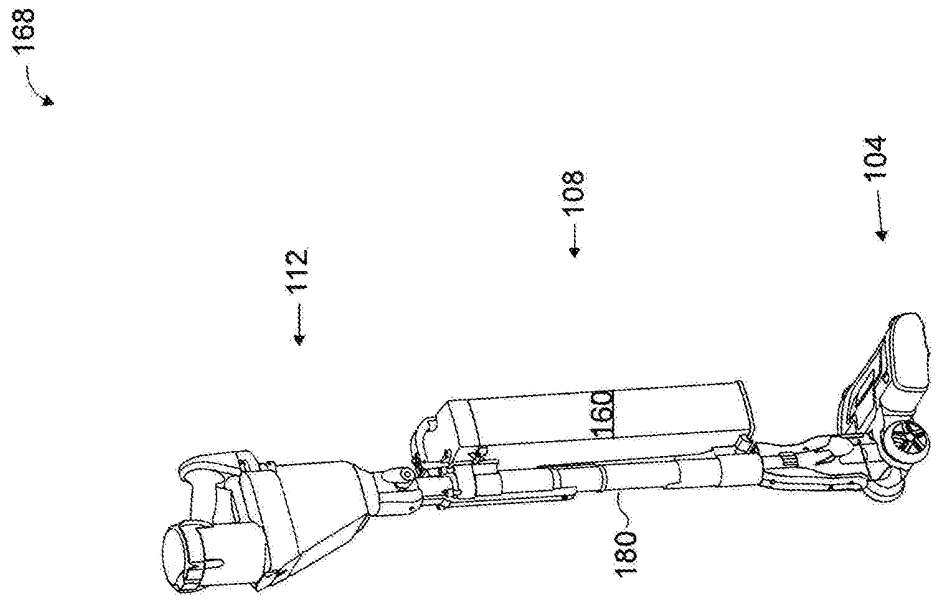


FIG. 14

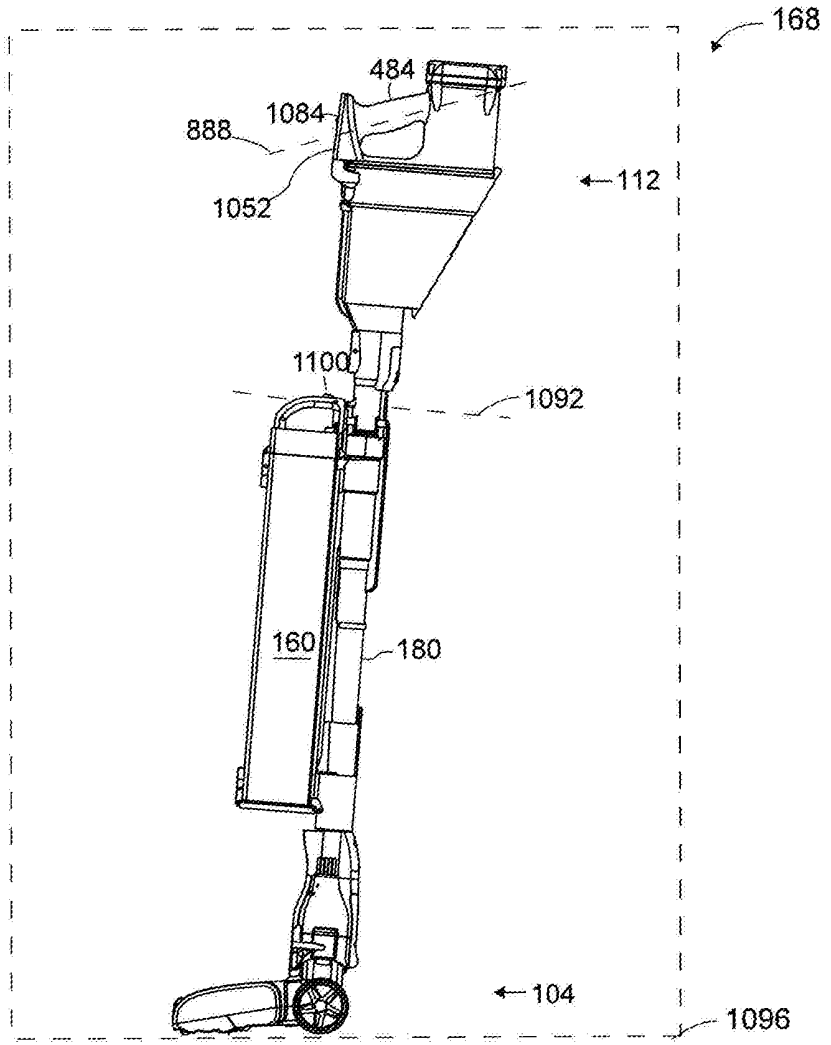


FIG. 15

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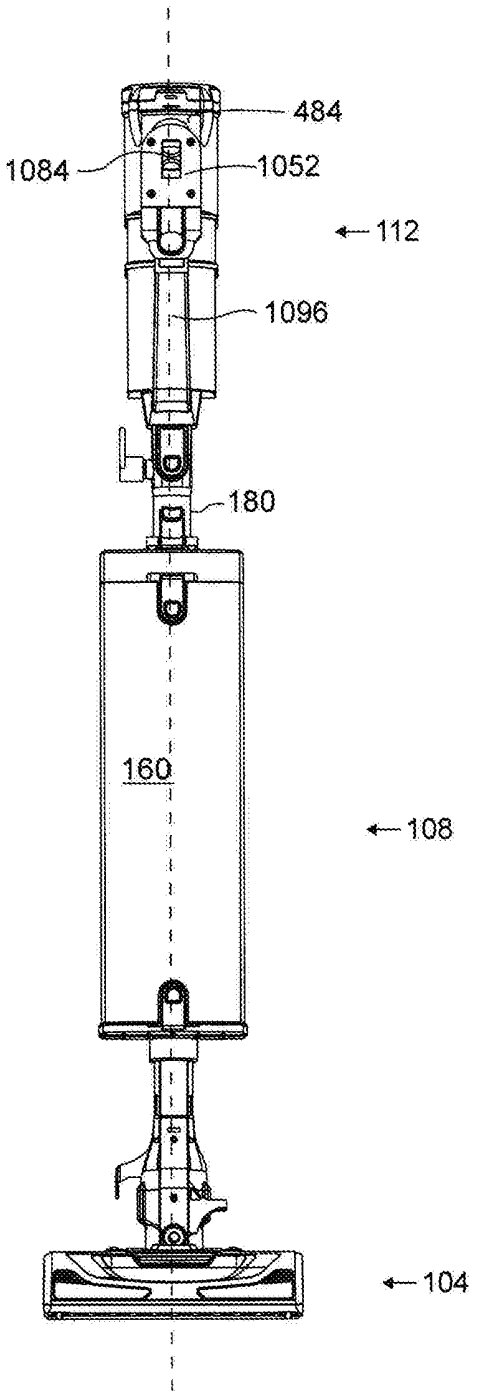


FIG. 16

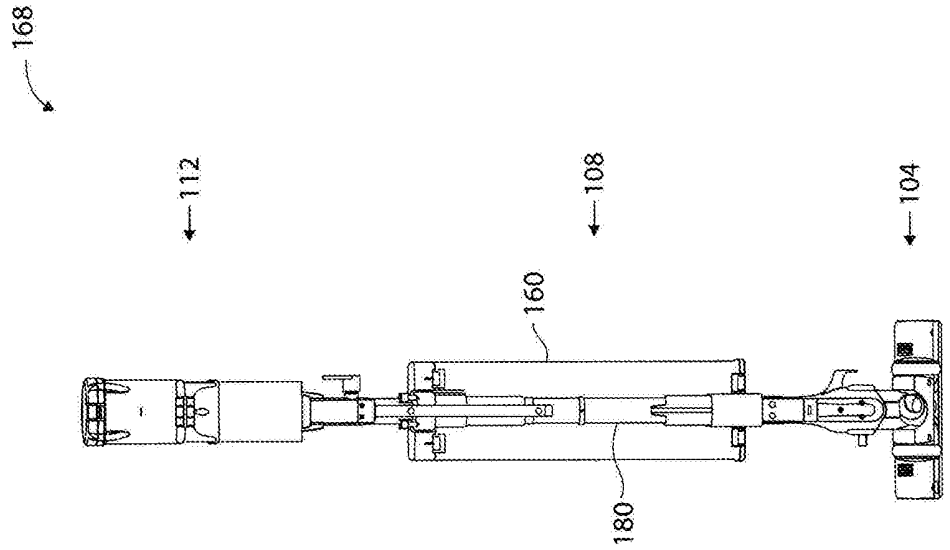


FIG. 17

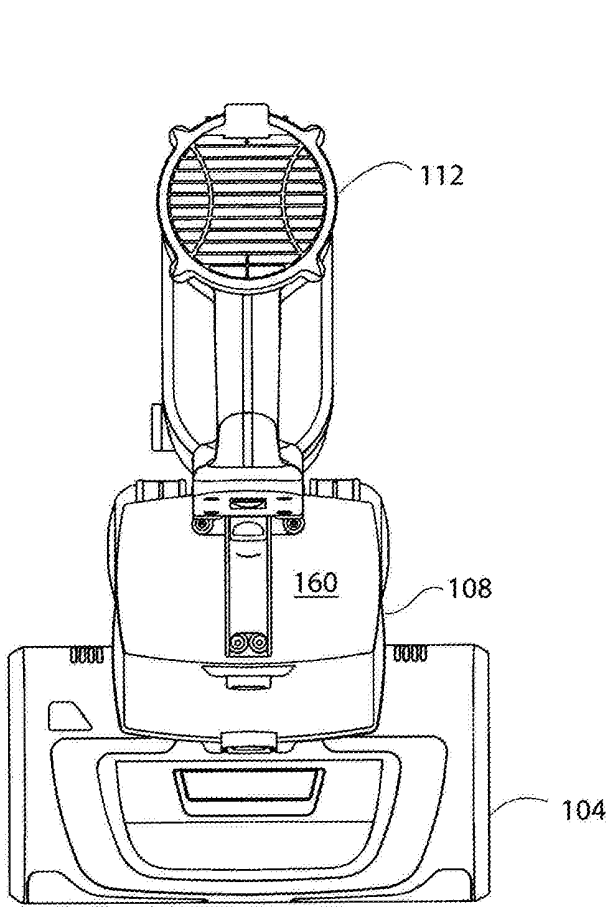


FIG. 18

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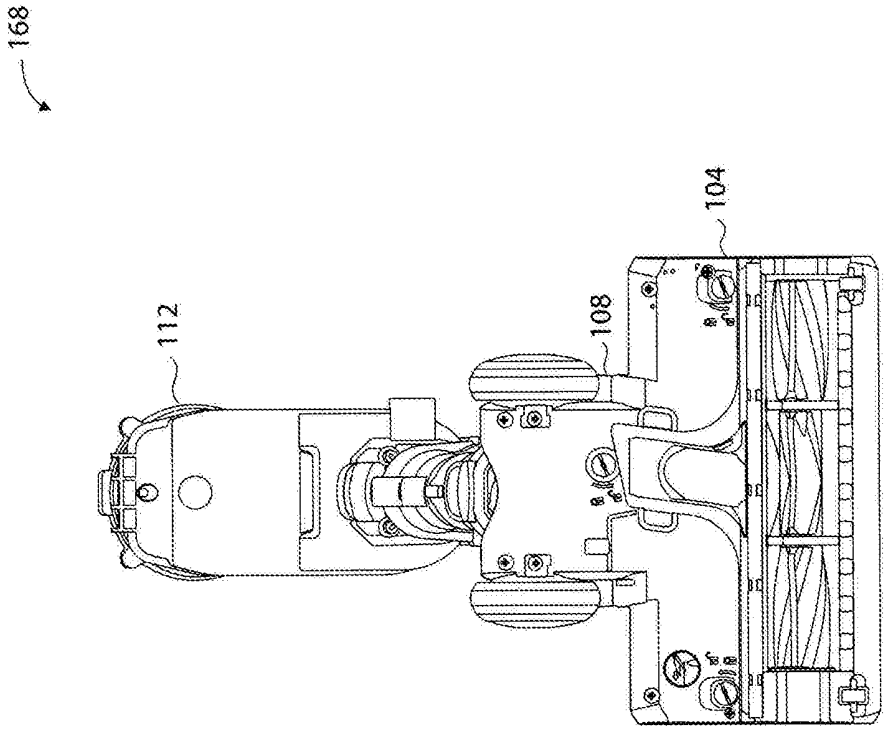


FIG. 19

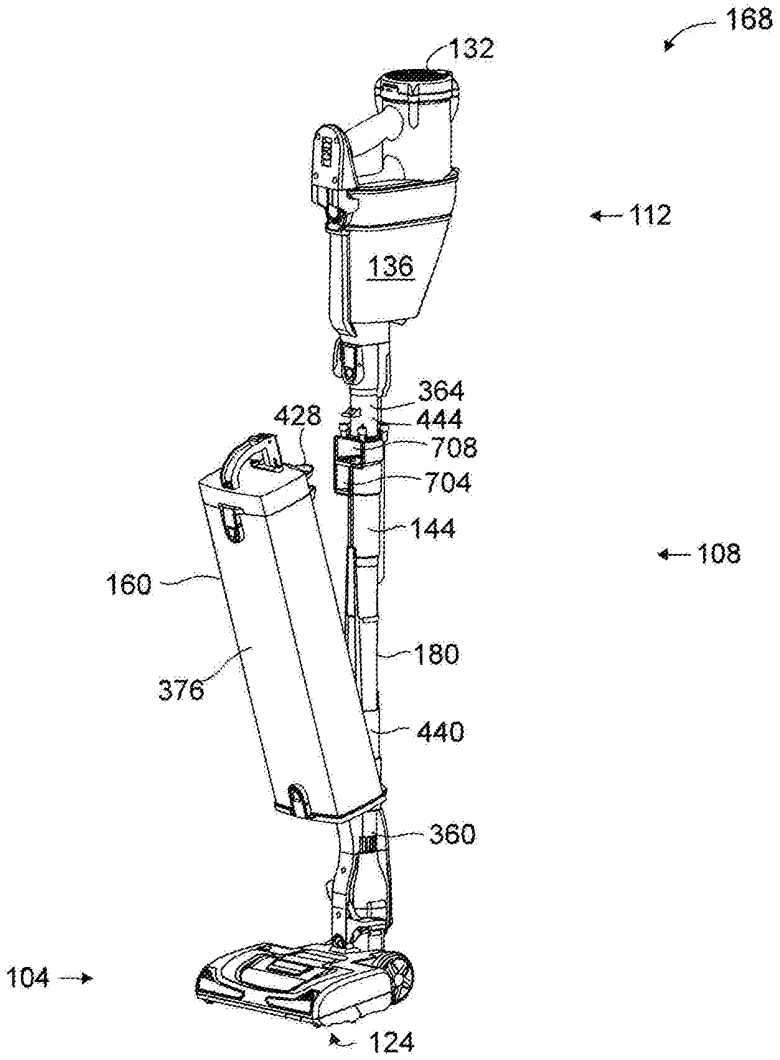


FIG. 20

Dyson Ex1004
Page 112

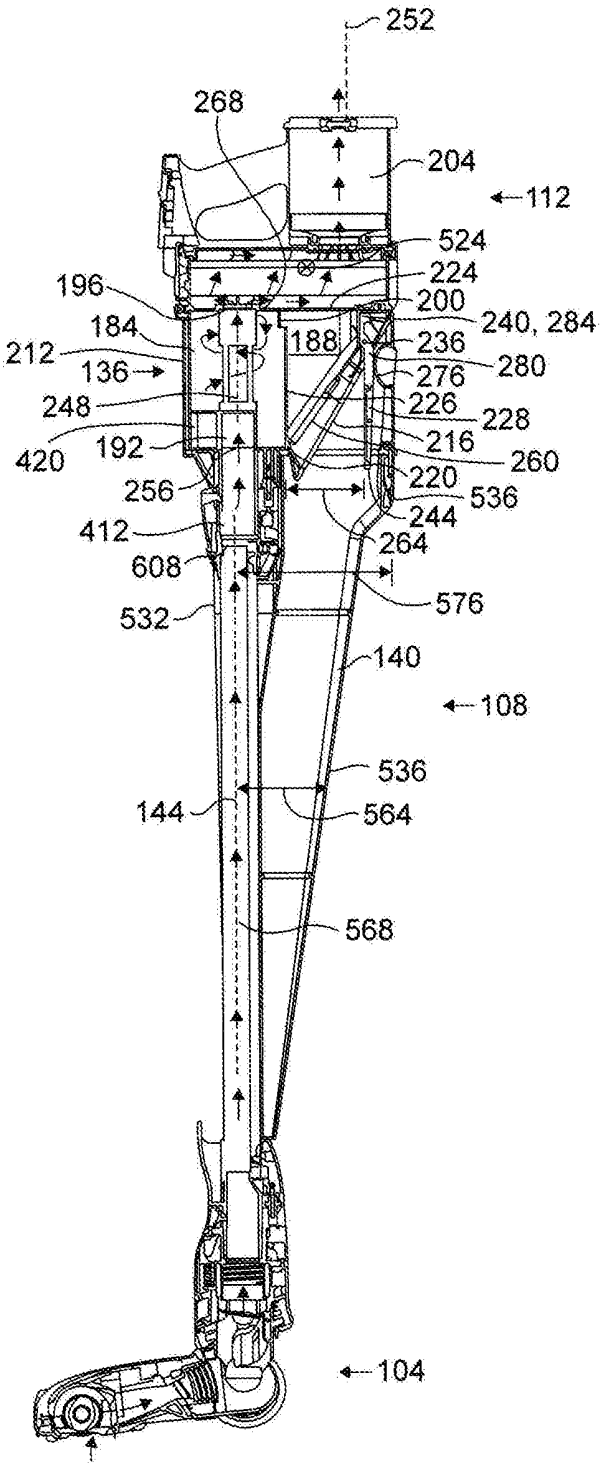

252
100
268
204
112
524
224
196
200
240, 284
184
188
236
212
280
136
276
248
226
228
420
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108
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564
568
104

FIG. 21

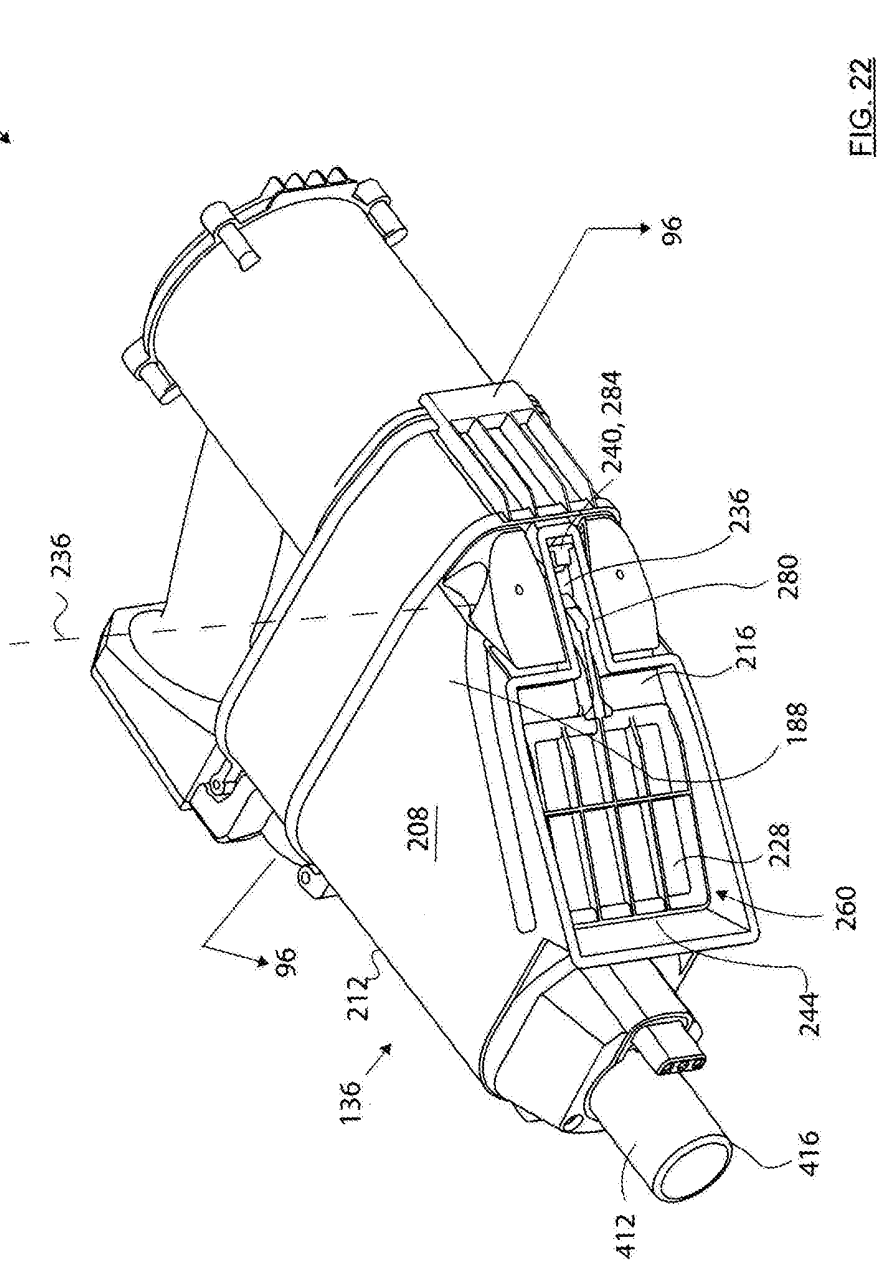

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96
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416
412

FIG. 22

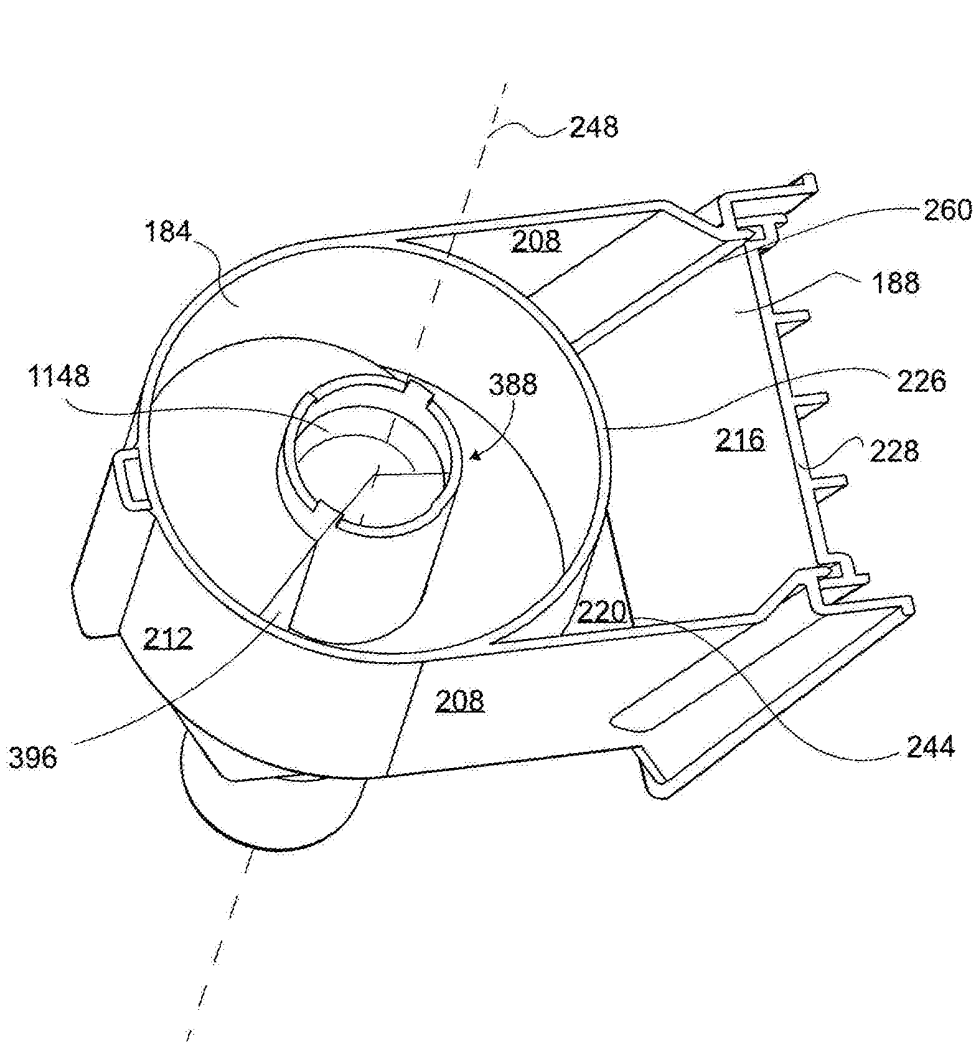


FIG. 23

Dyson Ex1004
Page 115

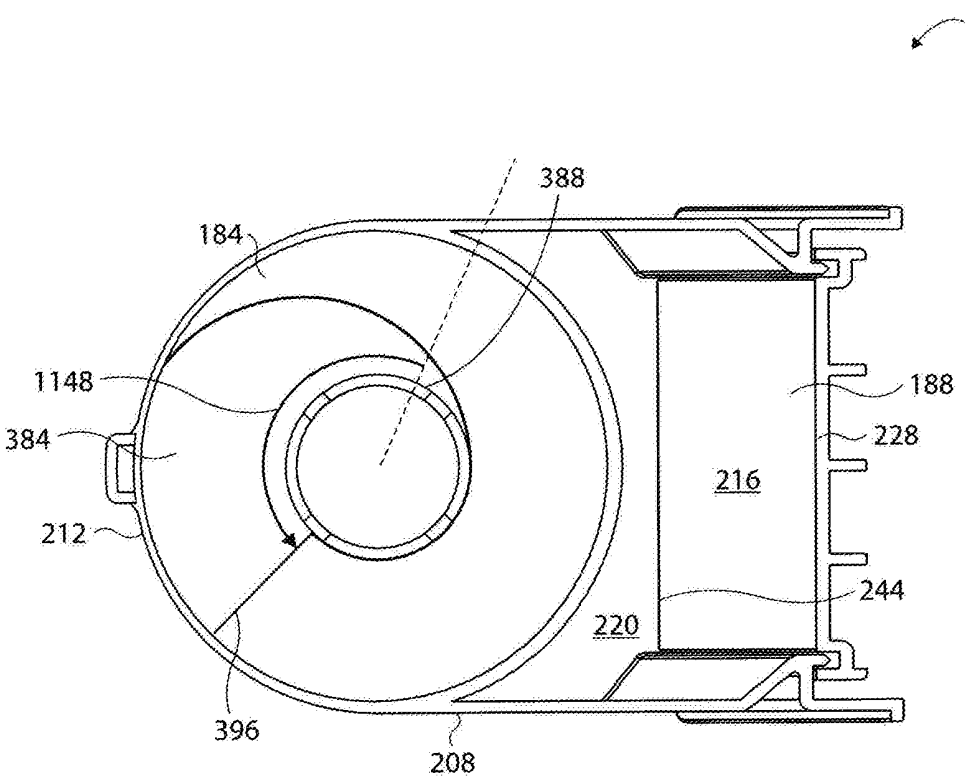


FIG. 23a

Dyson Ex1004
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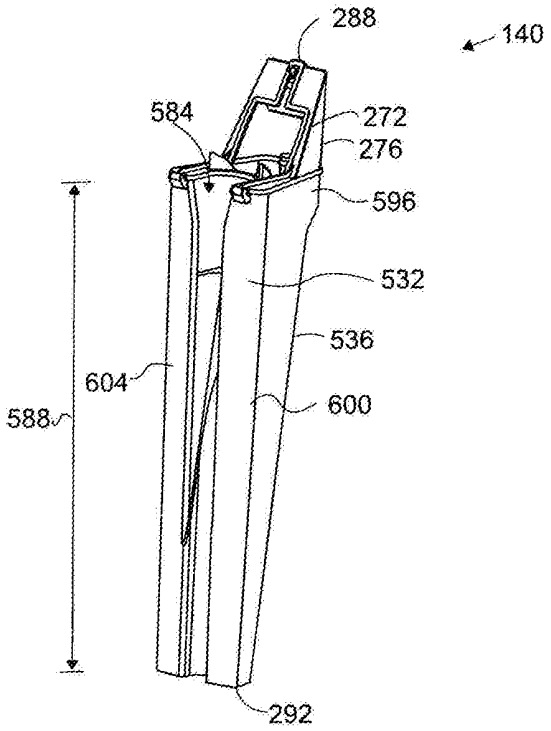


FIG. 24

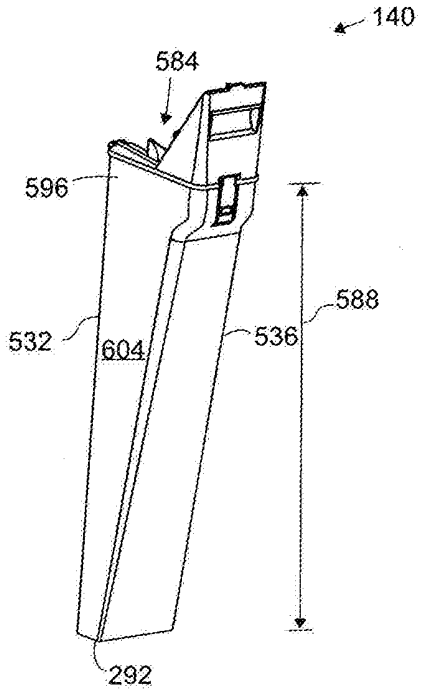


FIG. 45

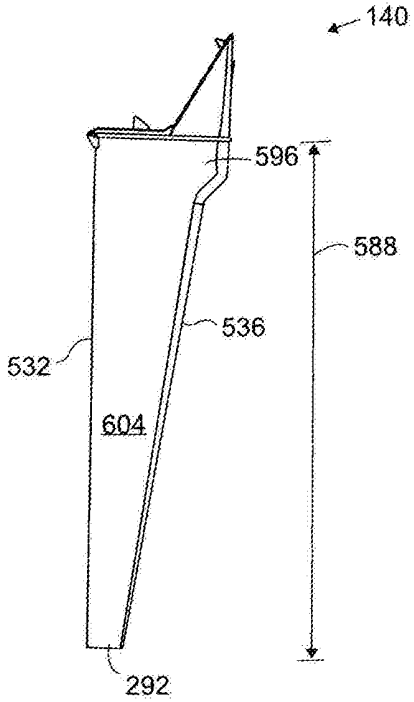


FIG. 46

Dyson Ex1004
Page 117

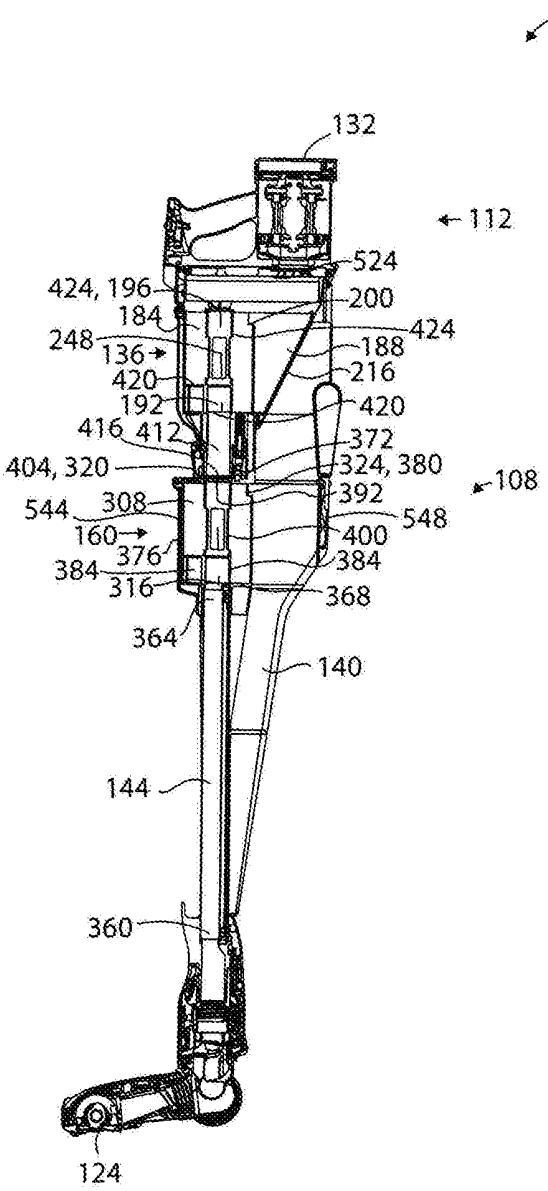

152
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424, 196
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372
404, 320
324, 380
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FIG. 25

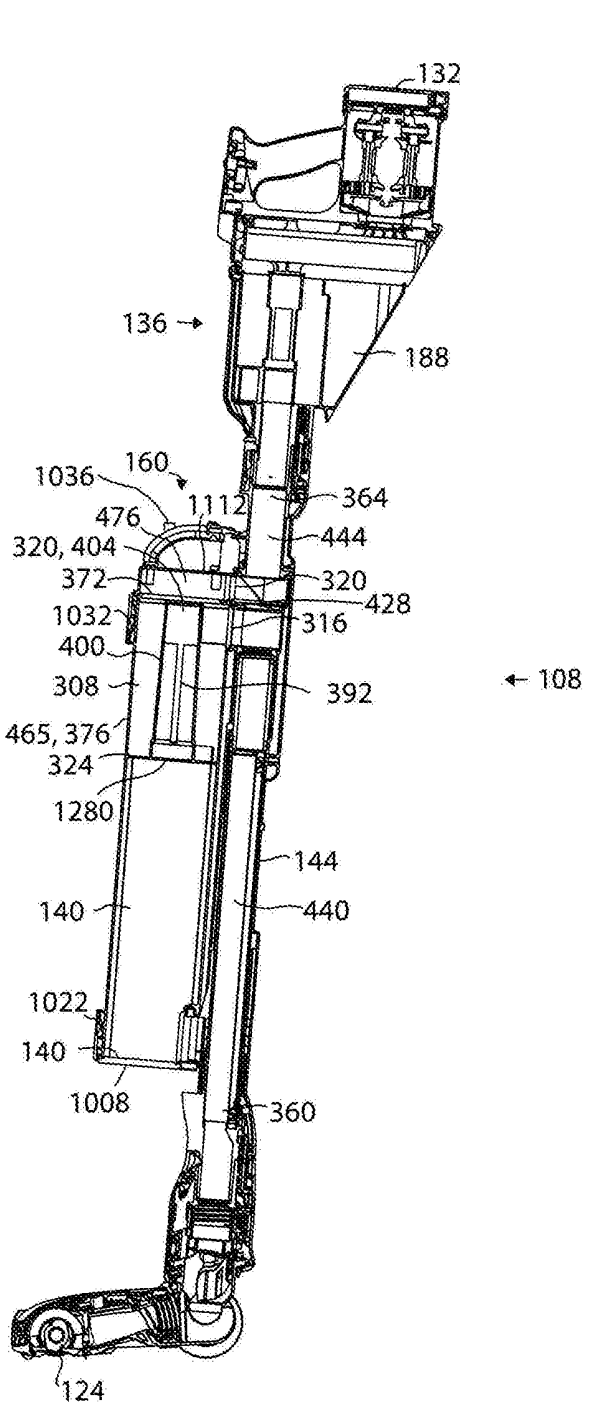

168
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476
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320, 404
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320
428
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440
1022
140
1008
360
124

FIG. 26

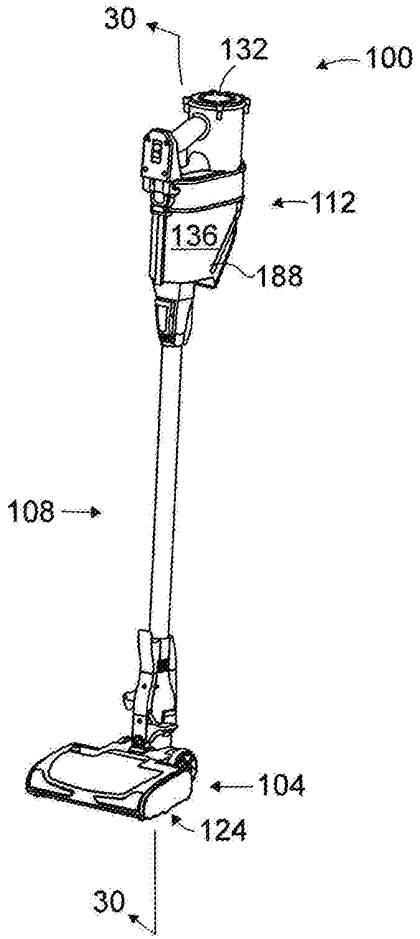


FIG. 27

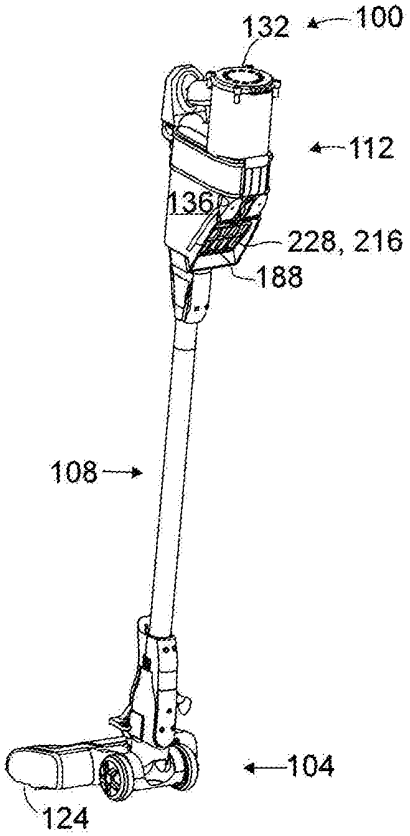


FIG. 28

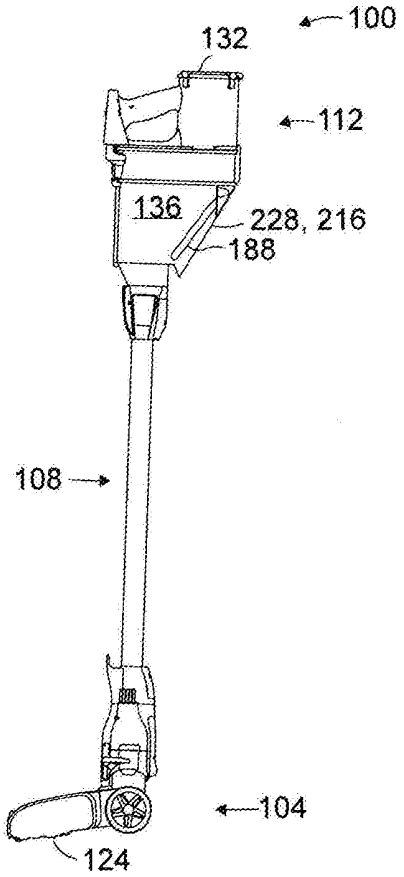


FIG. 29

Dyson Ex1004
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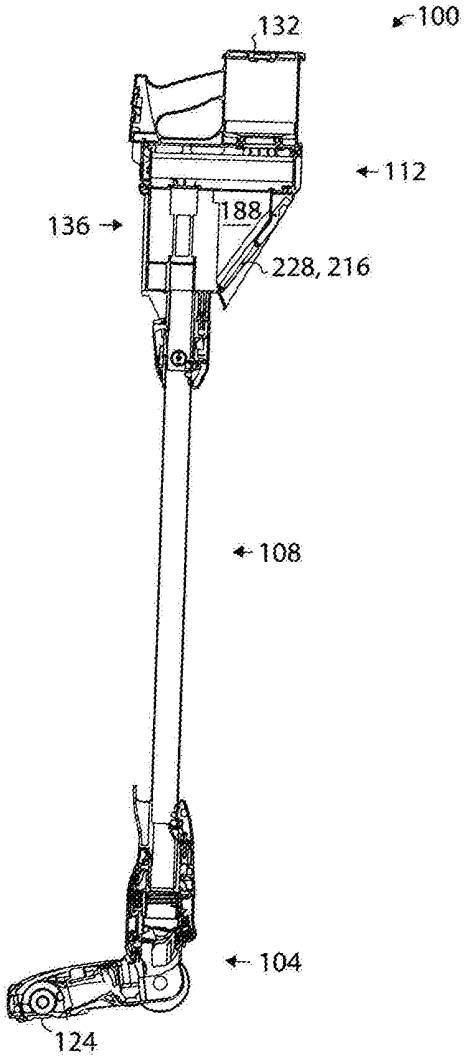


FIG. 30

Dyson Ex1004
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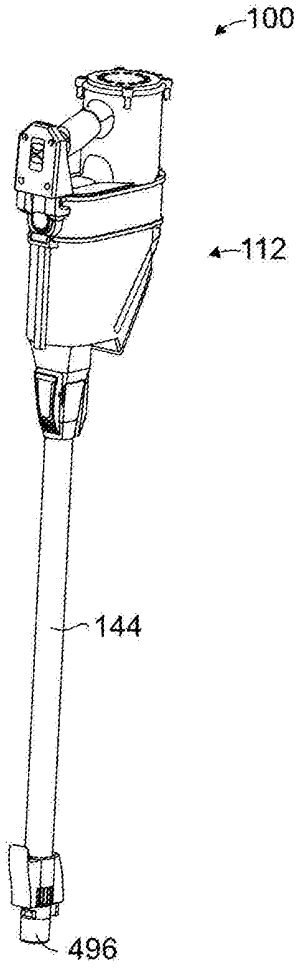


FIG. 31

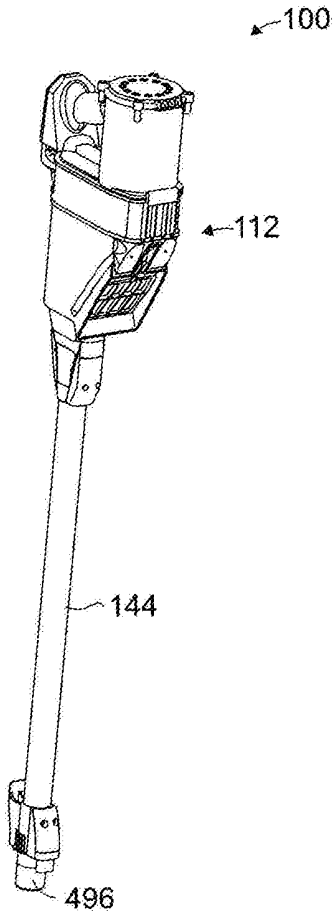


FIG. 32

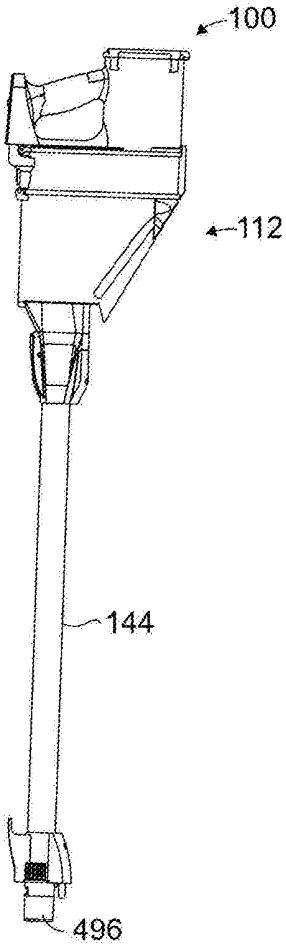


FIG. 33

Dyson Ex1004
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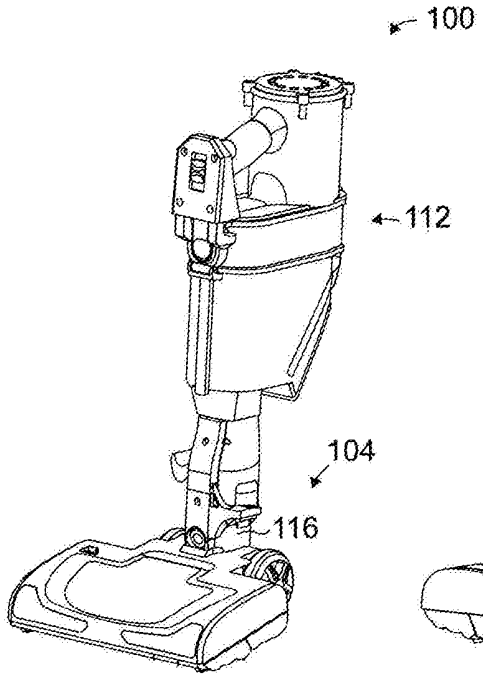


FIG. 34

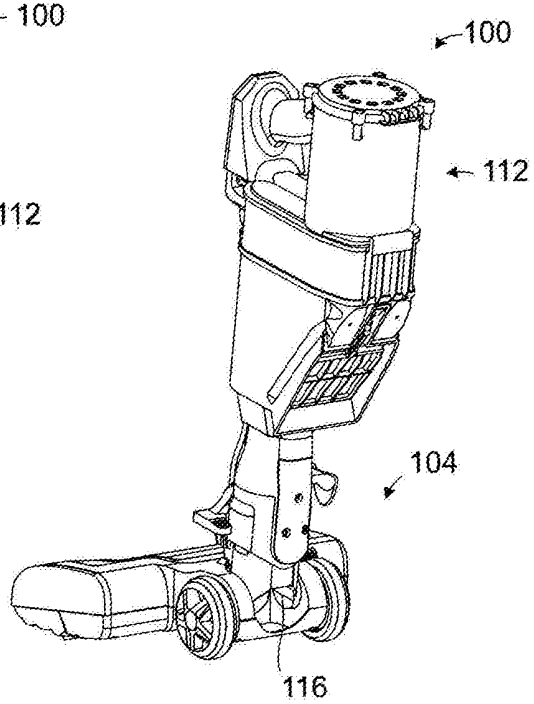


FIG. 35

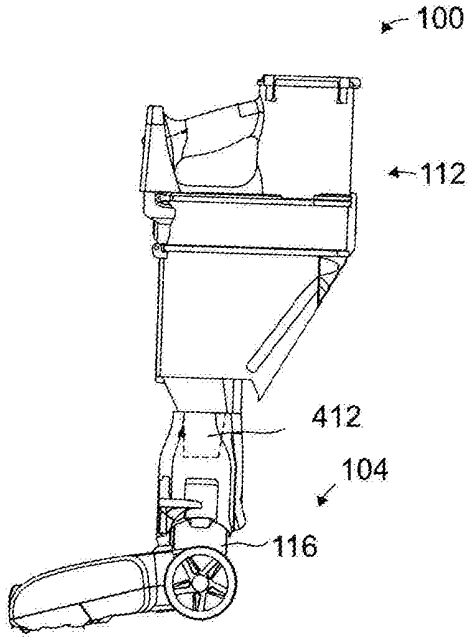


FIG. 36

Dyson Ex1004
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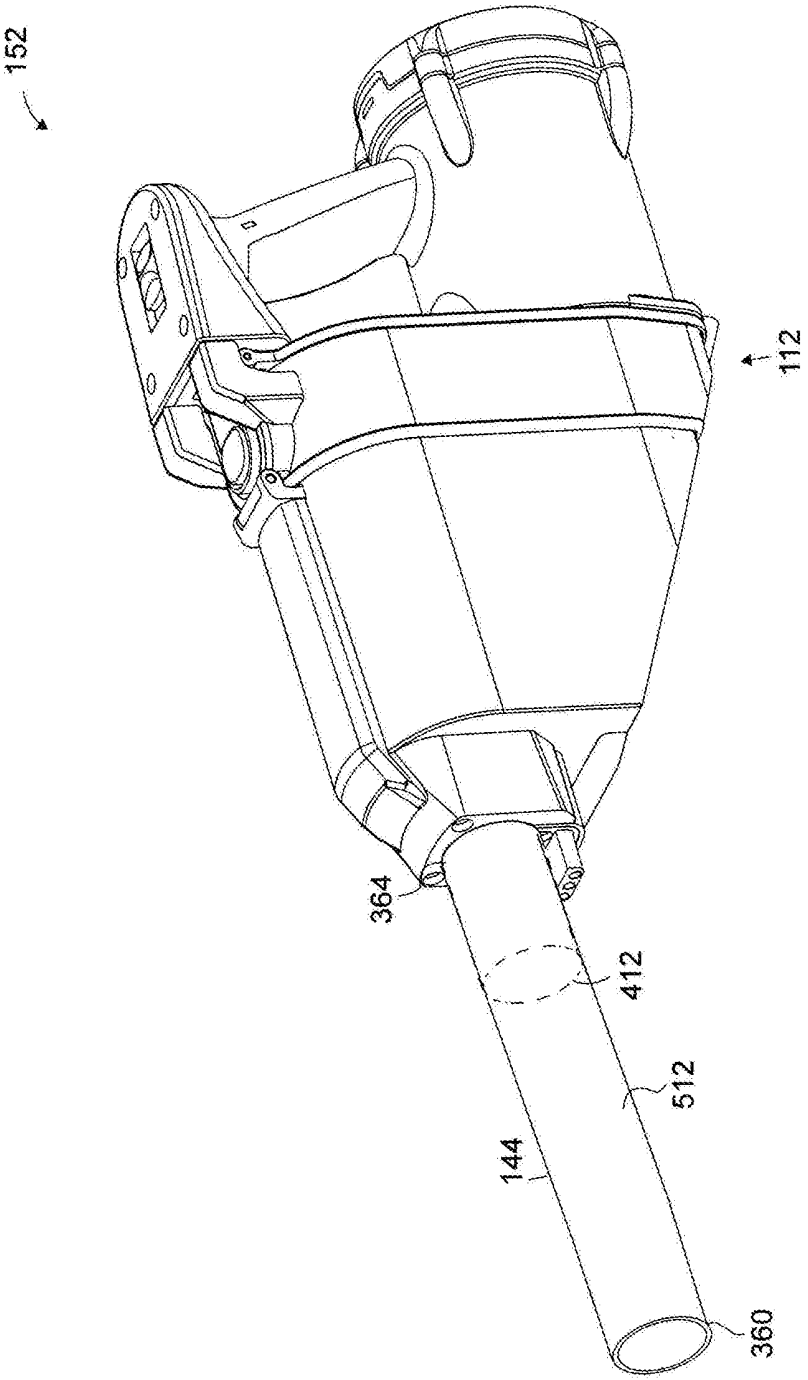


FIG. 36a

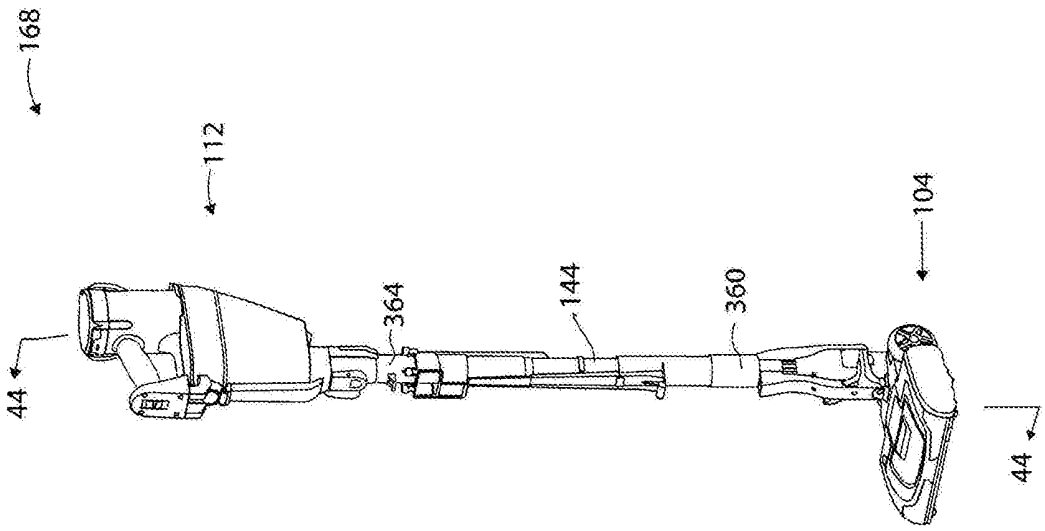


FIG. 37

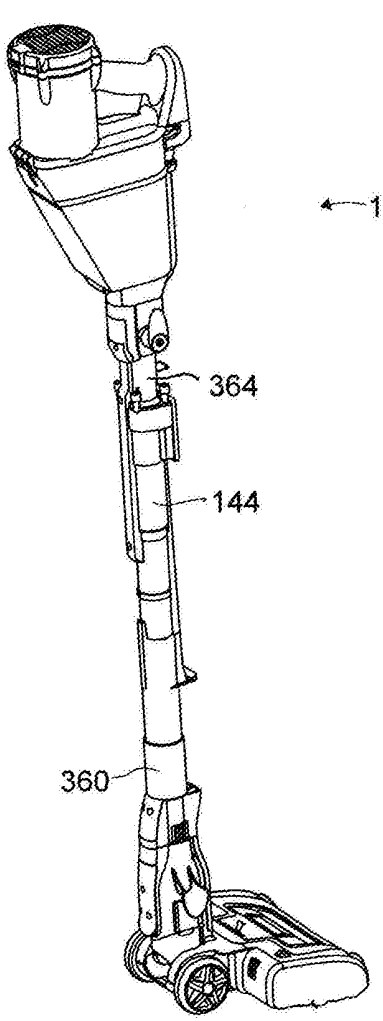


FIG. 38

Dyson Ex1004
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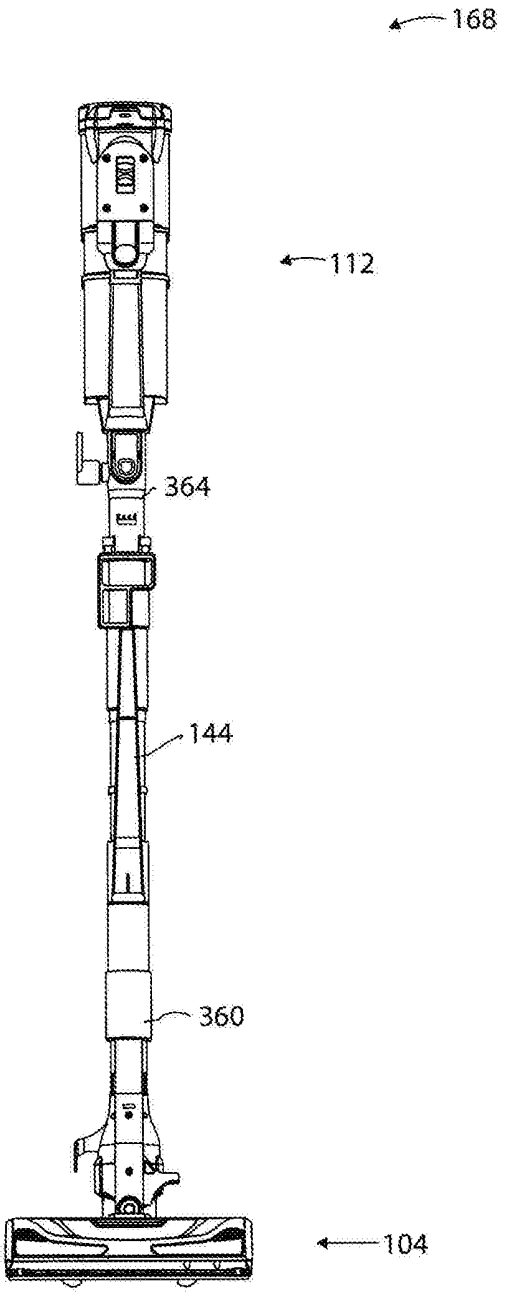


FIG. 39

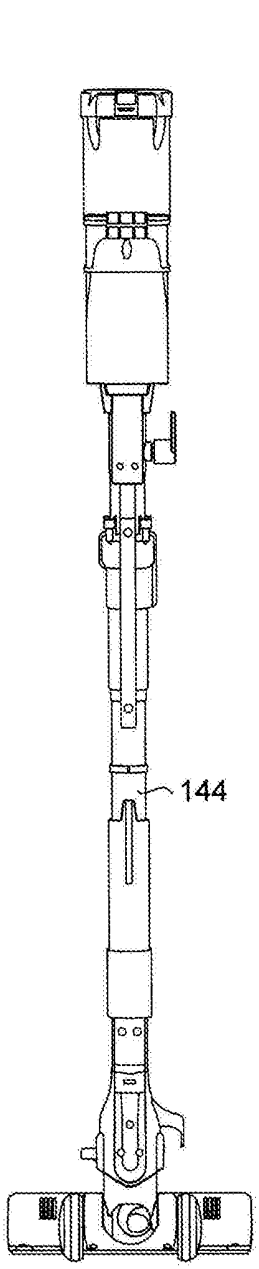


FIG. 40

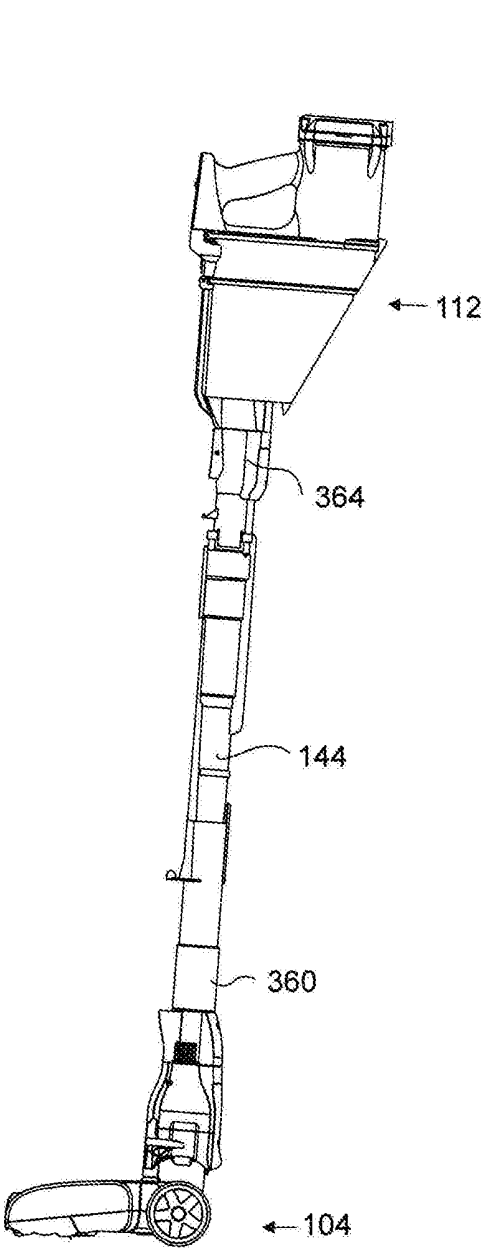


FIG. 41

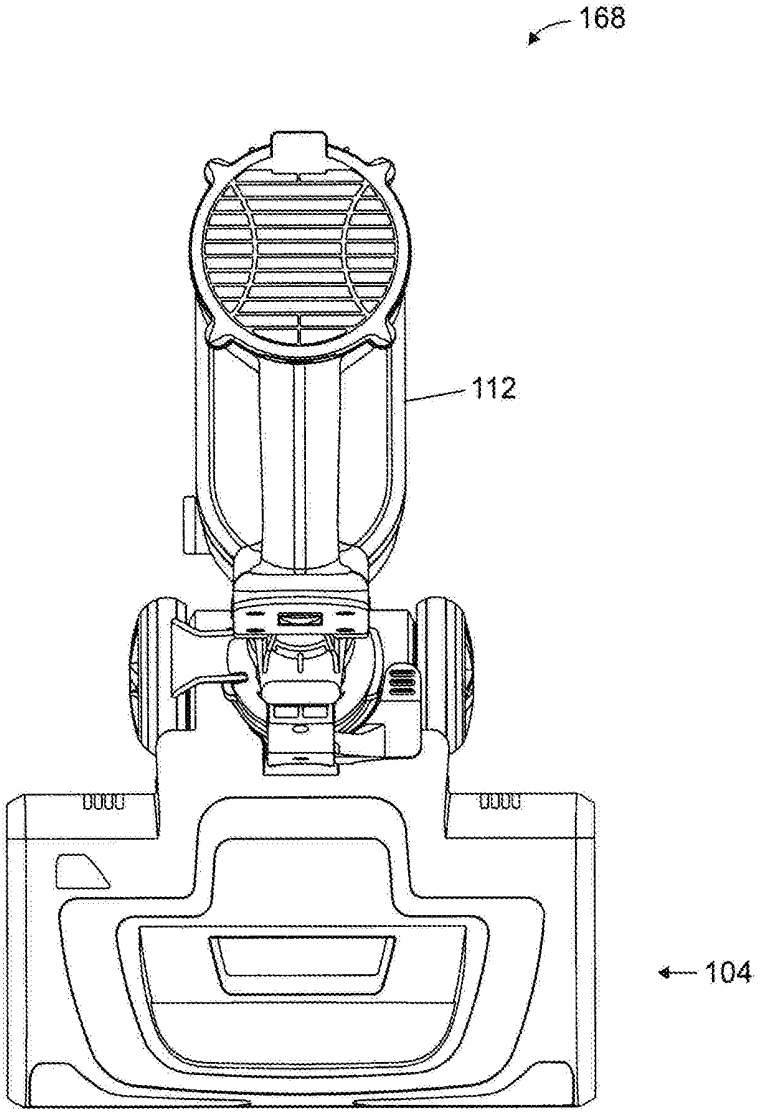


FIG. 42

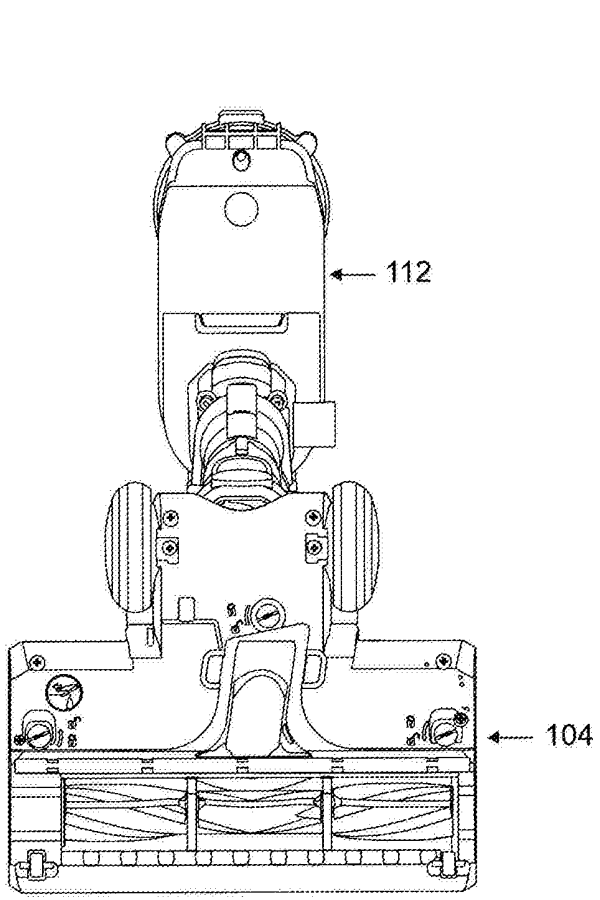


FIG. 43

Dyson Ex1004
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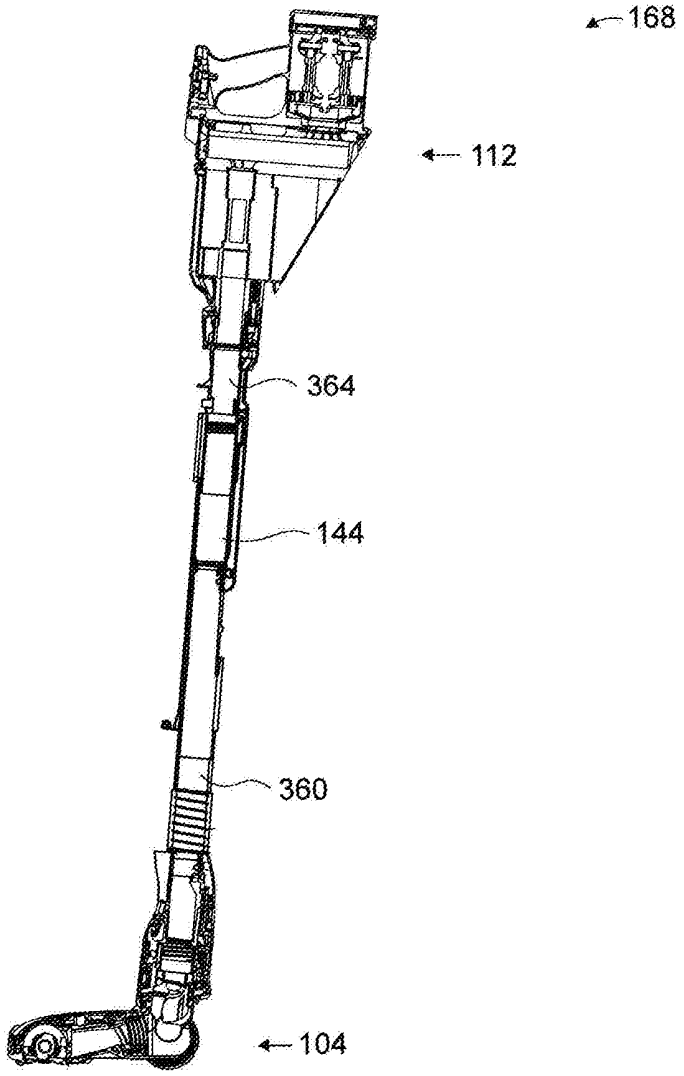


FIG. 44

Dyson Ex1004
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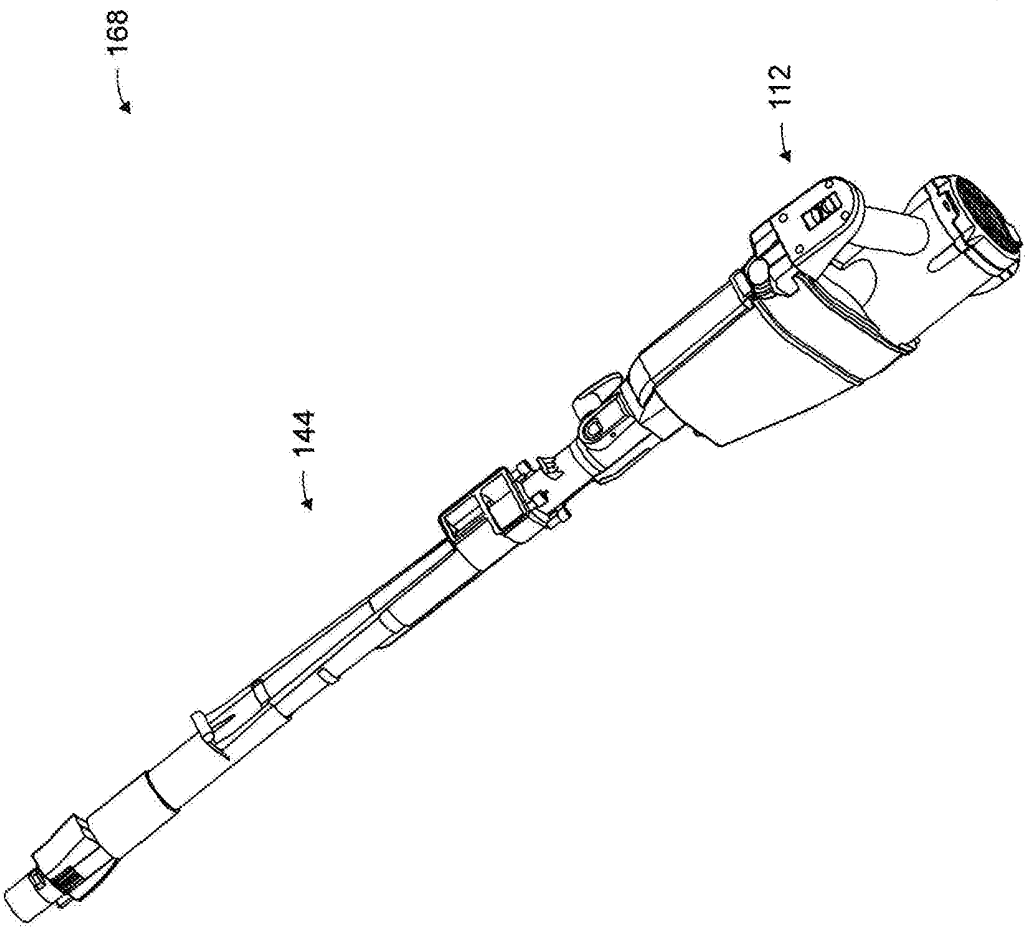


FIG. 44a

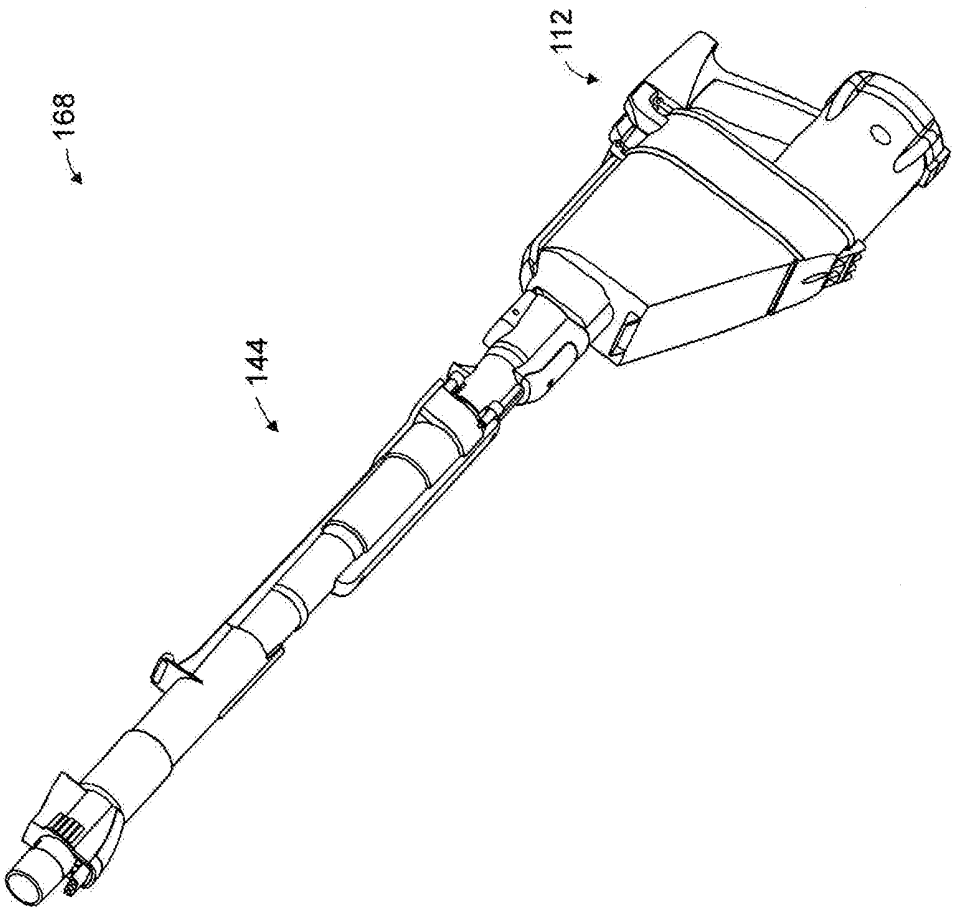


FIG. 44b

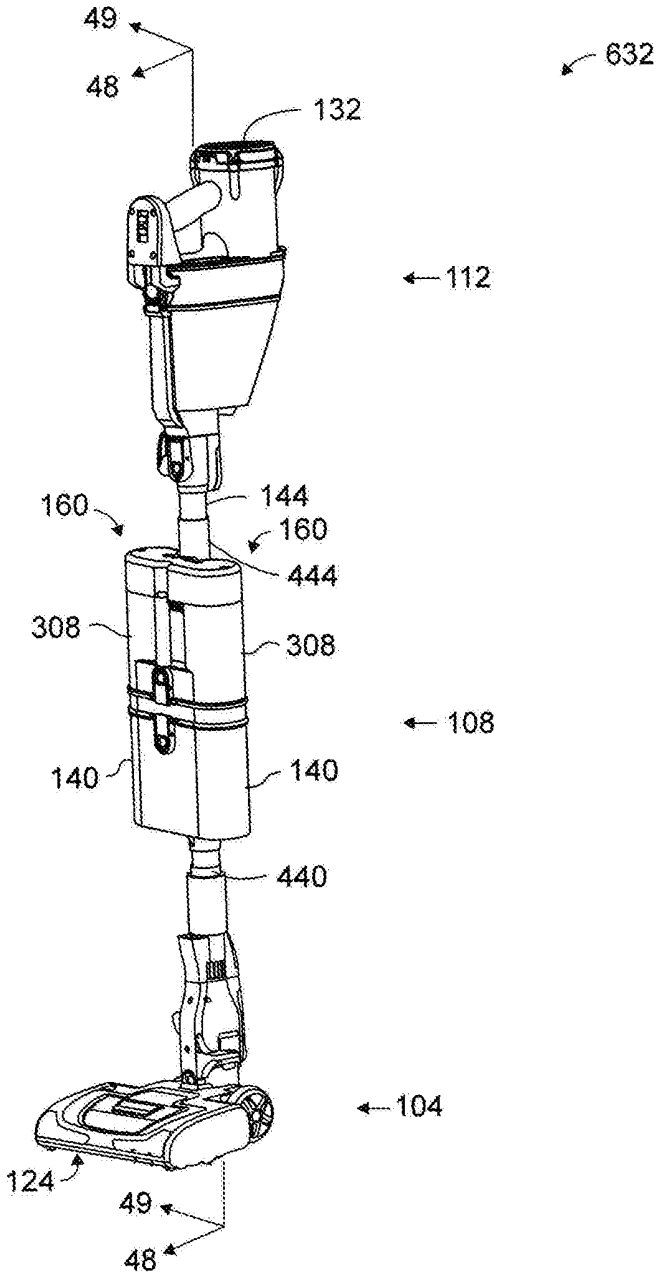

49
48
632
132
112
160
144
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444
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108
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FIG. 47

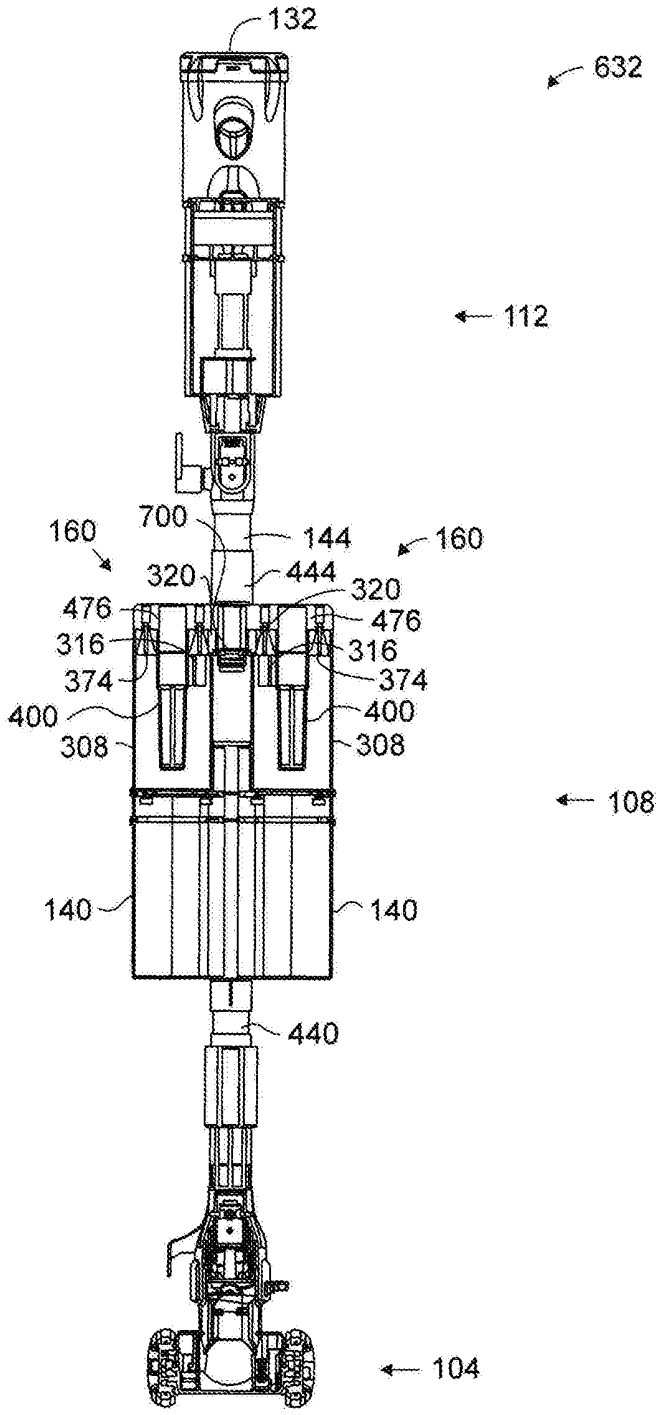

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FIG. 48

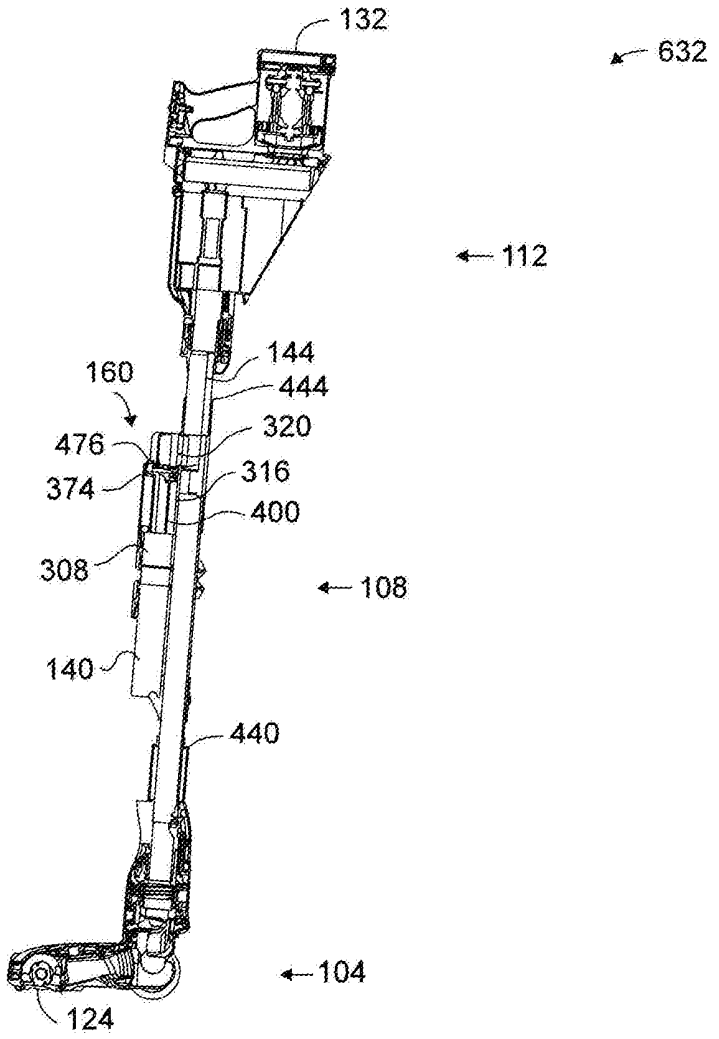


FIG. 49

Dyson Ex1004
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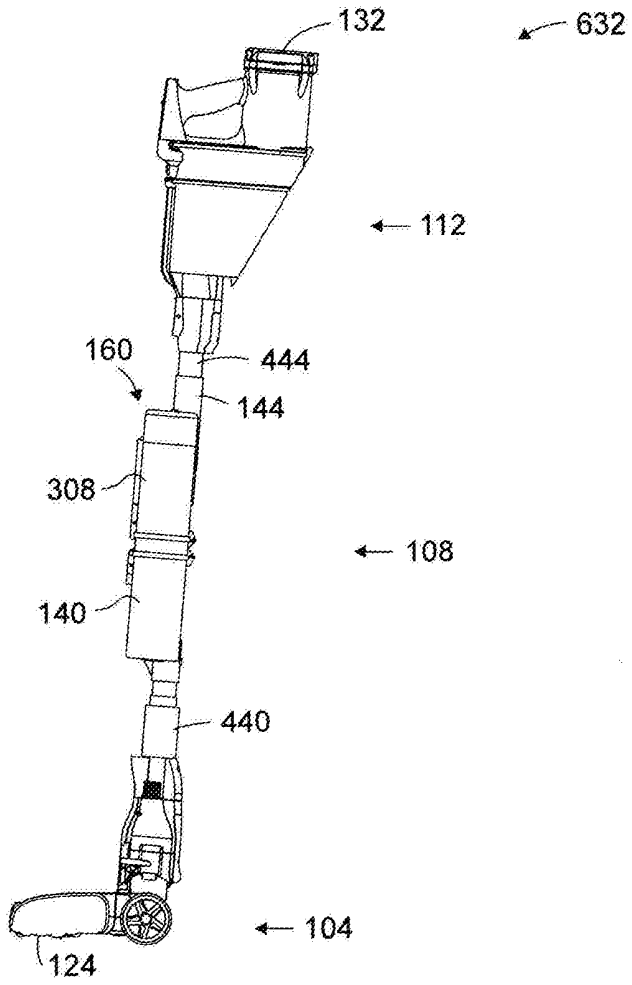


FIG. 50

Dyson Ex1004
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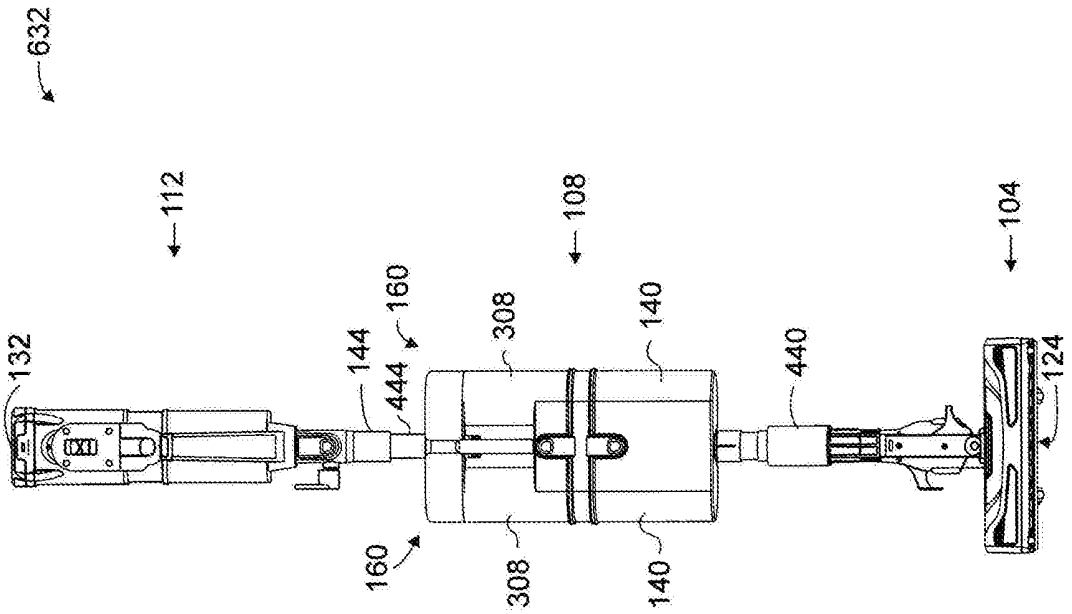


FIG. 51

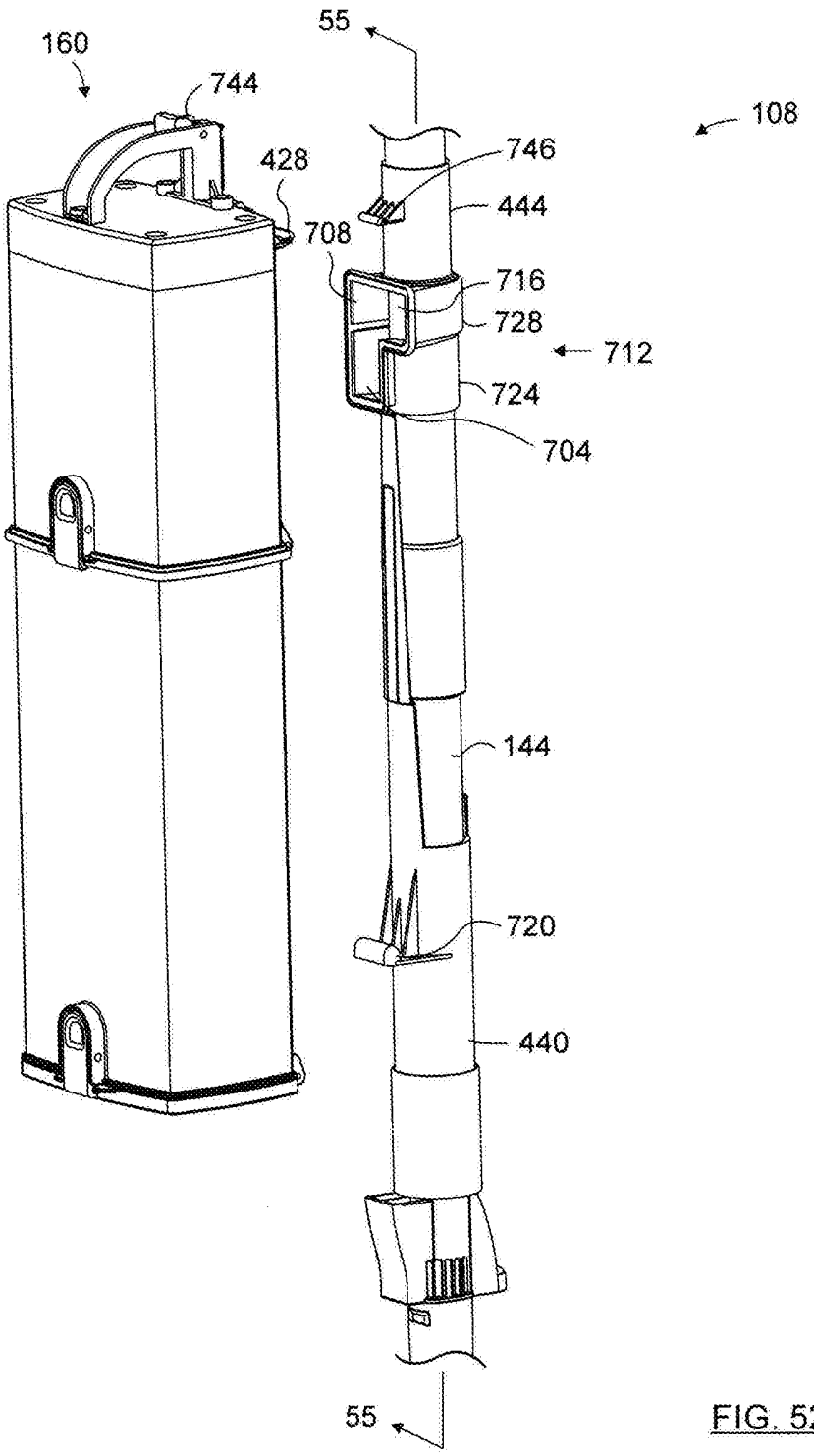


FIG. 52

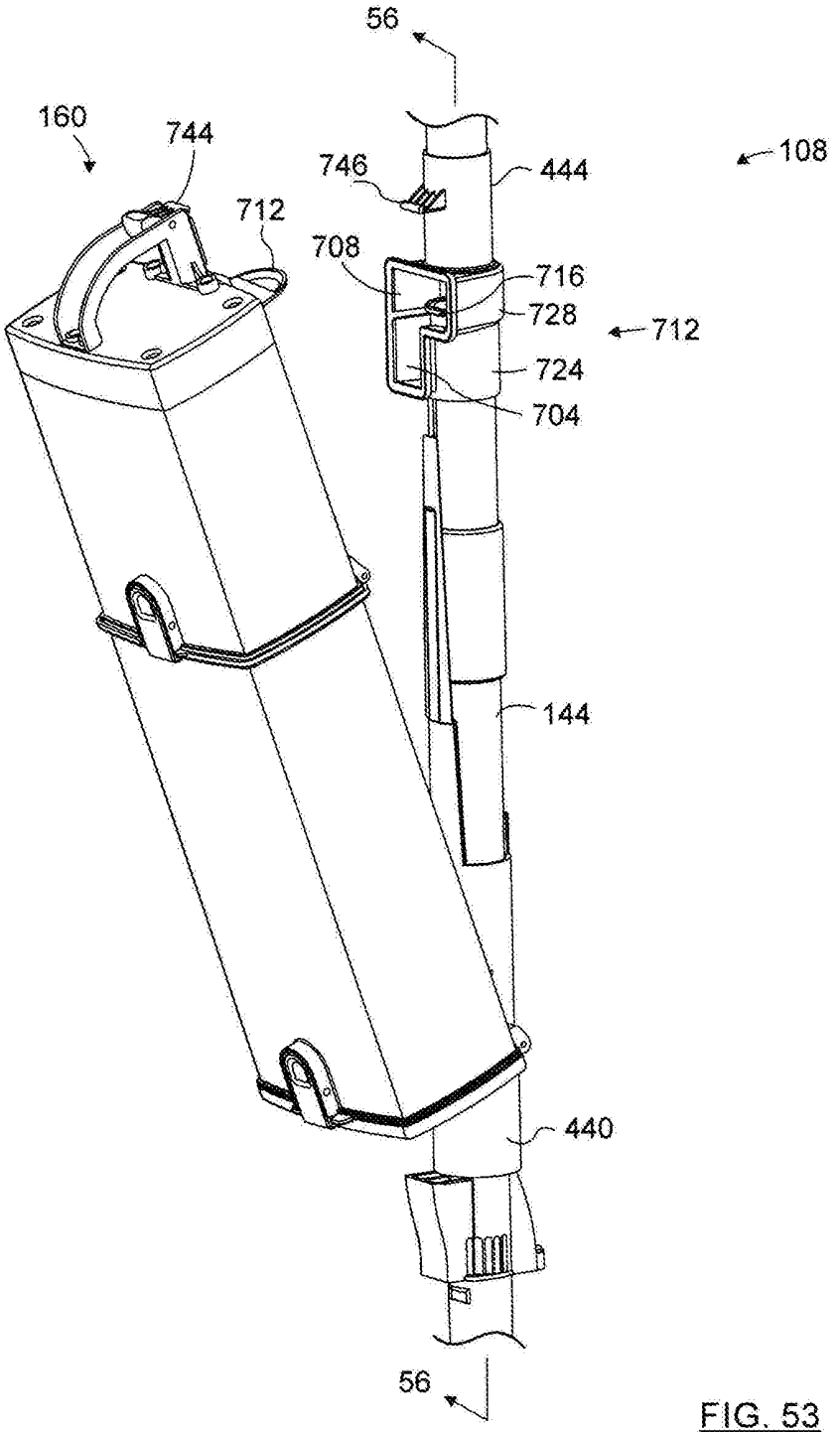


FIG. 53

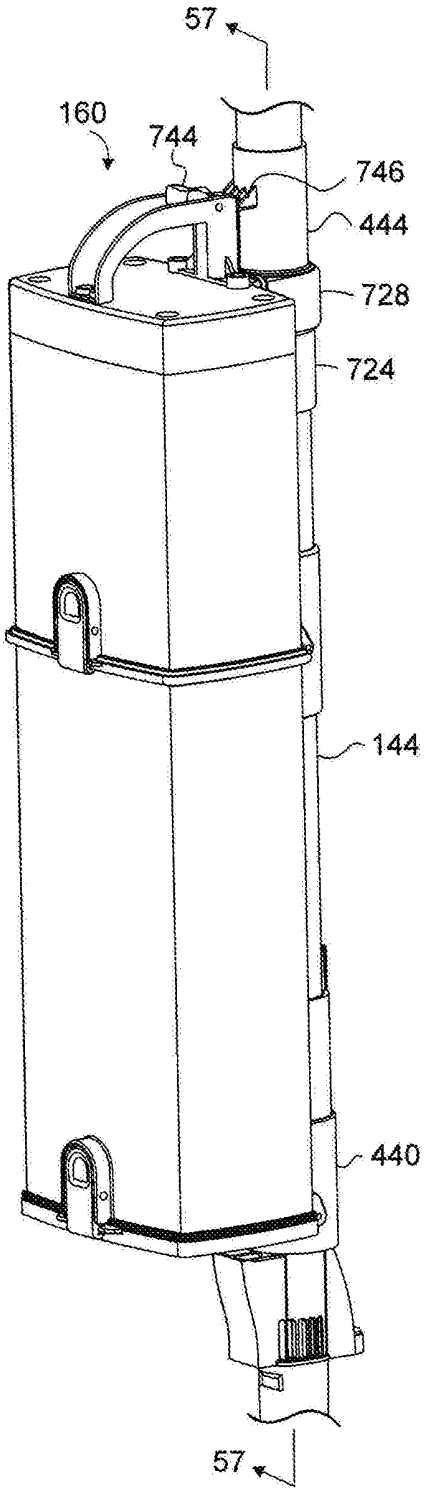


FIG. 54

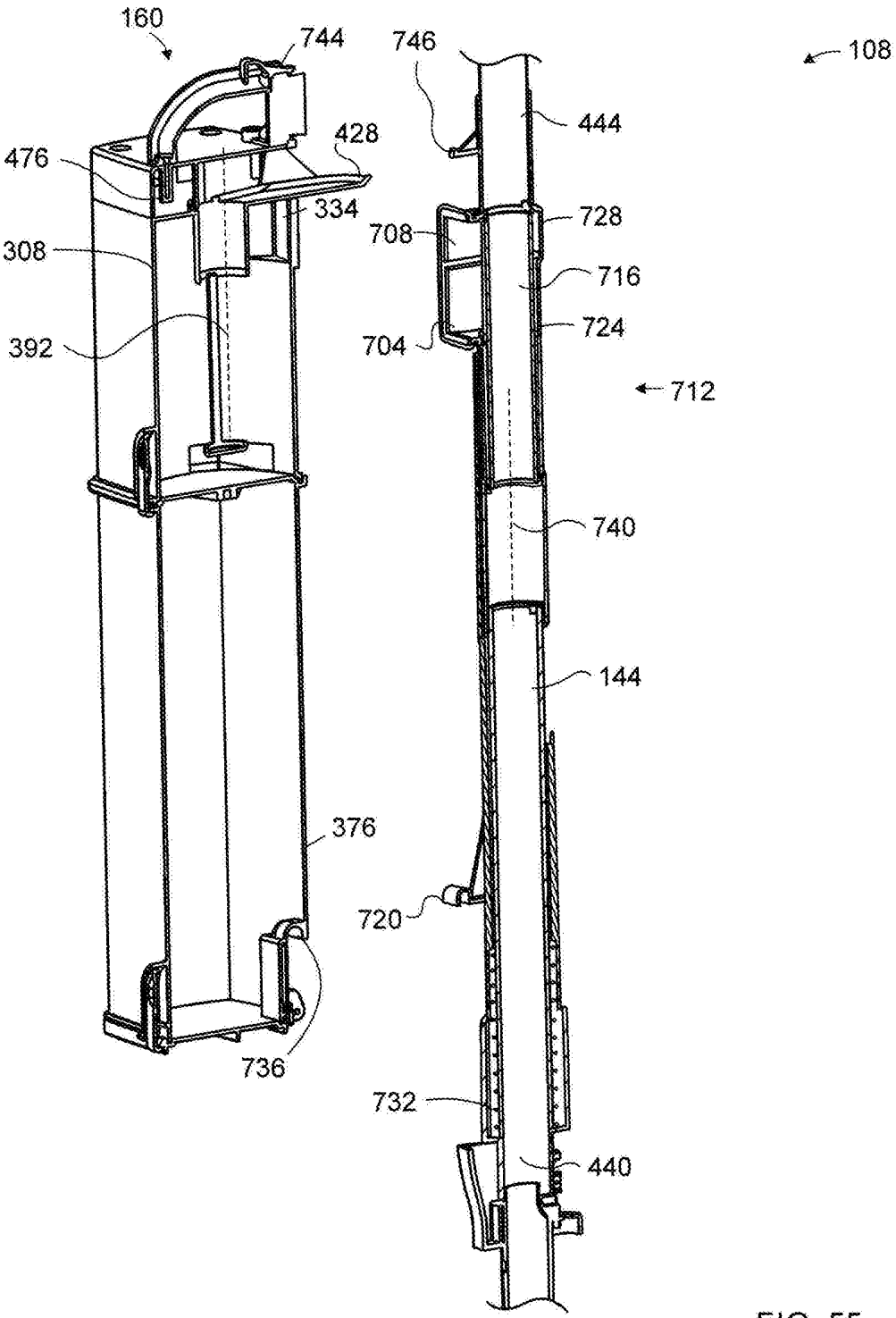

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FIG. 55

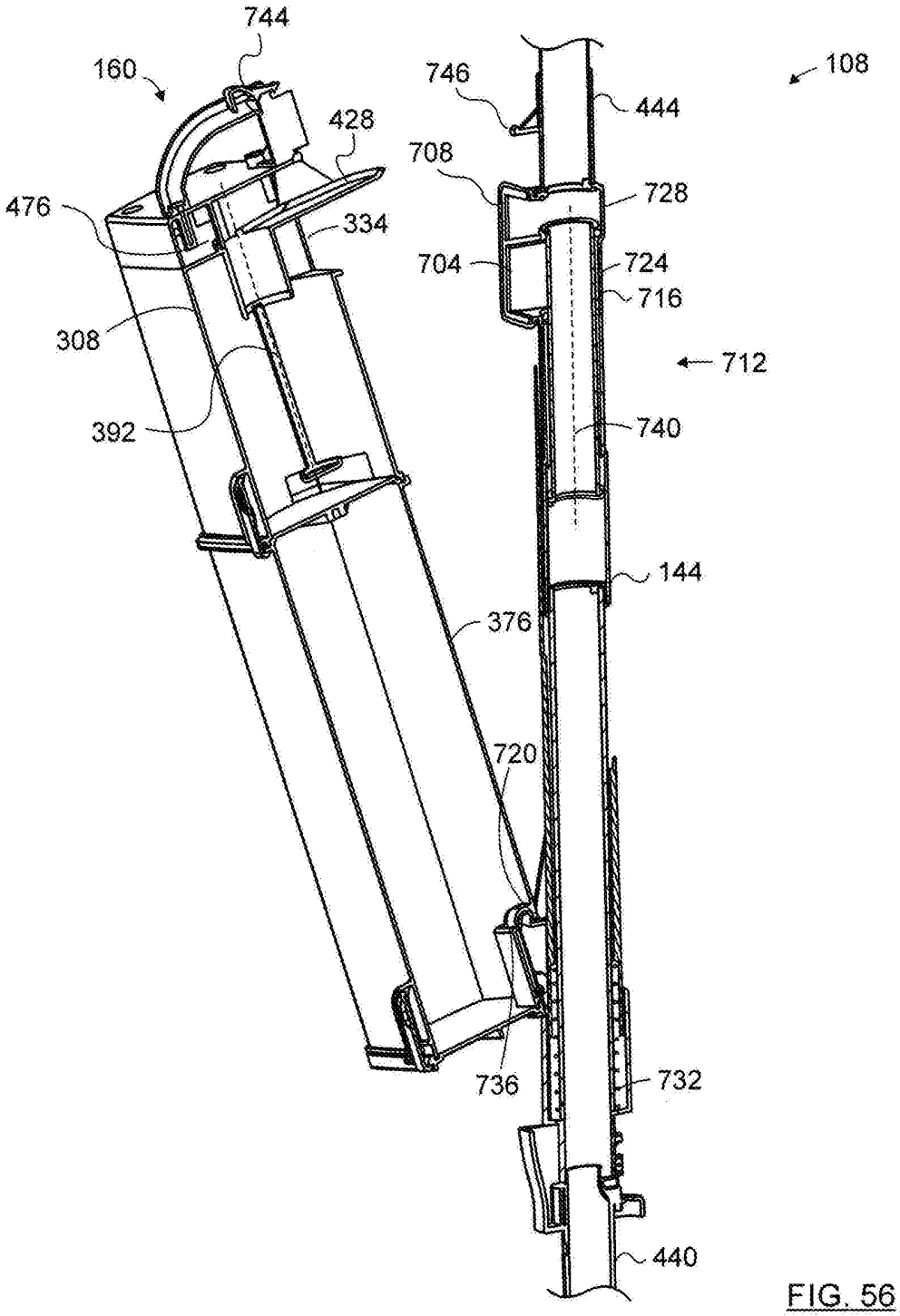

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FIG. 56

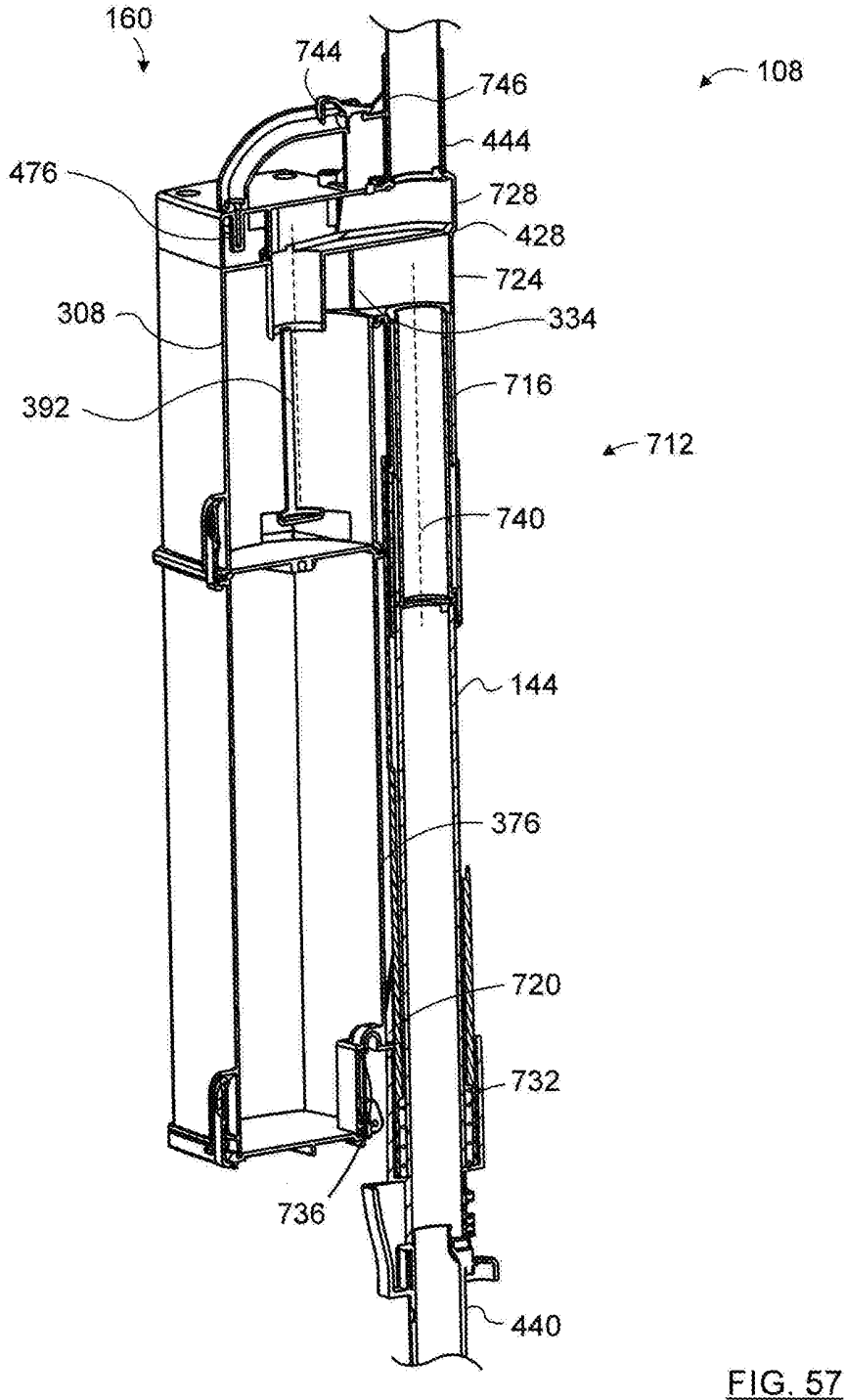

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FIG. 57

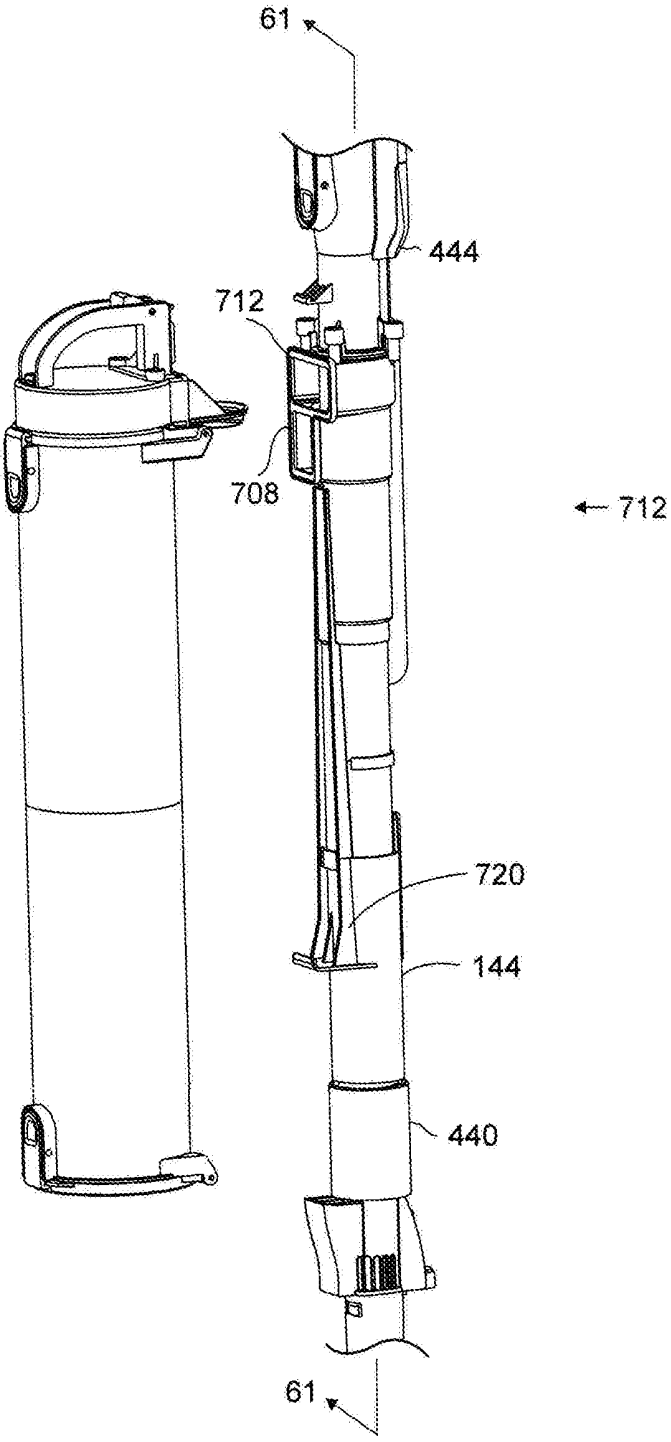


FIG. 58

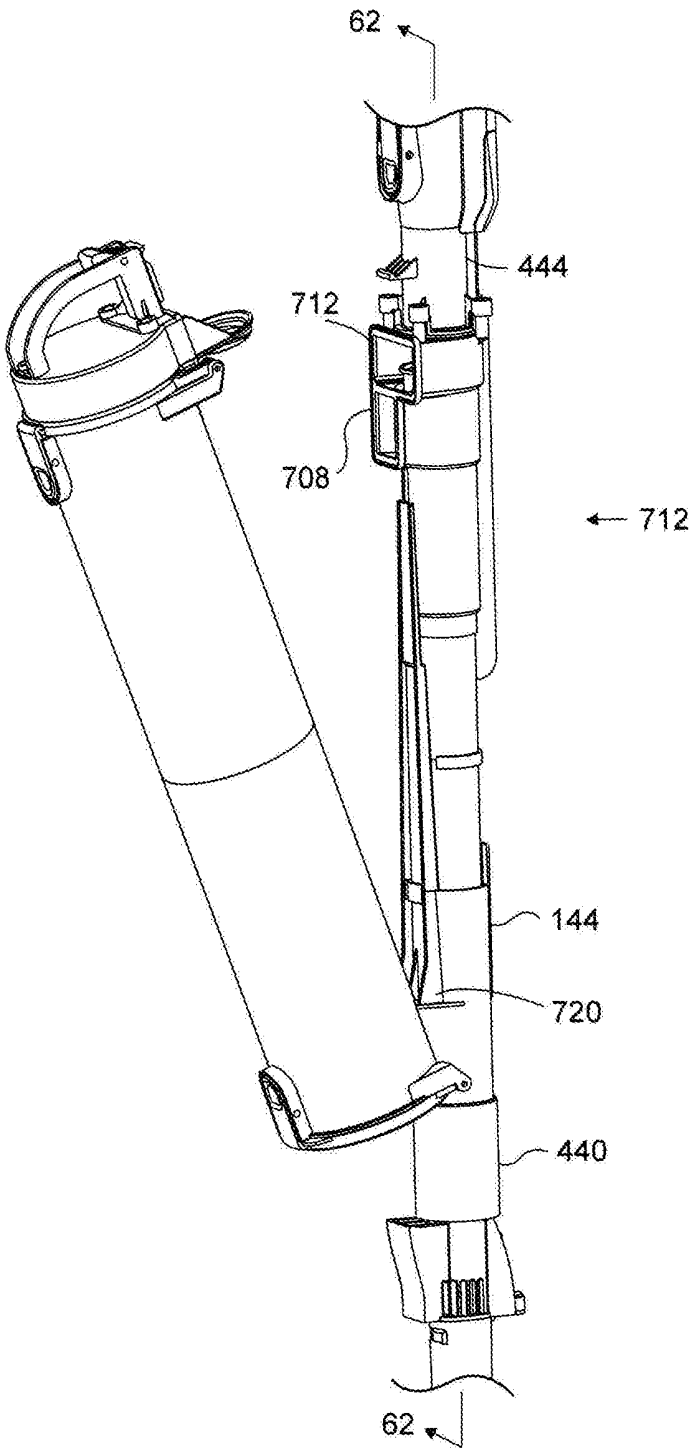


FIG. 59

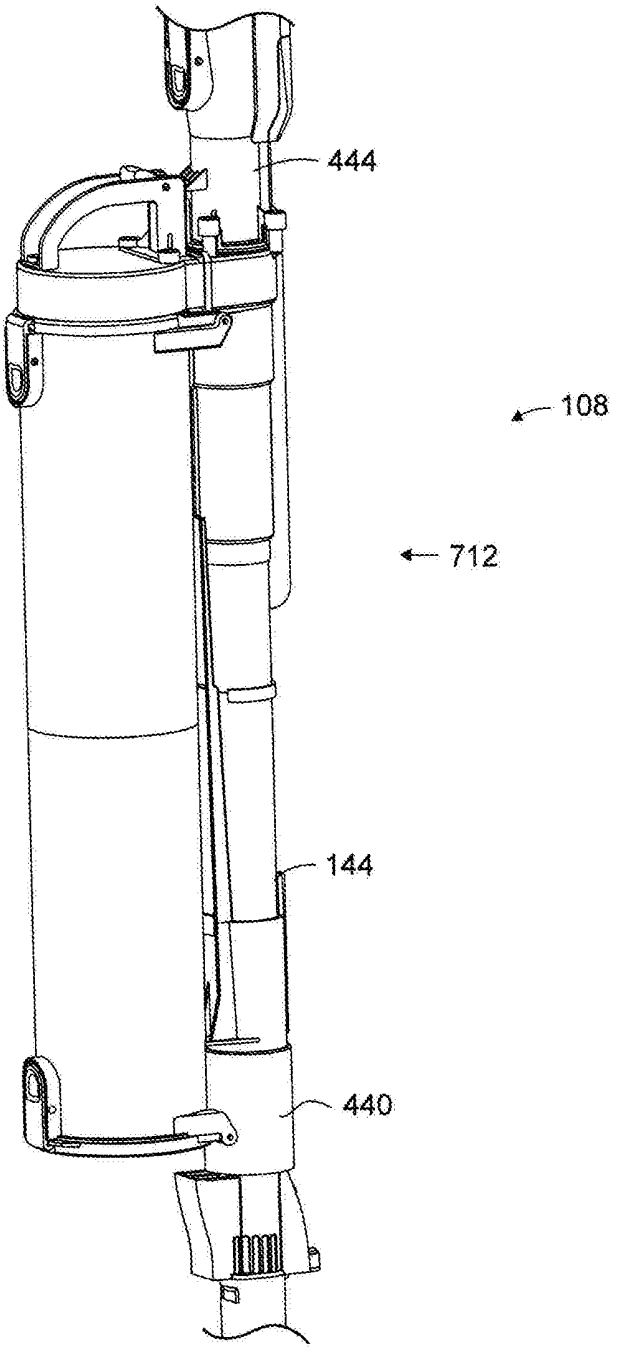


FIG. 60

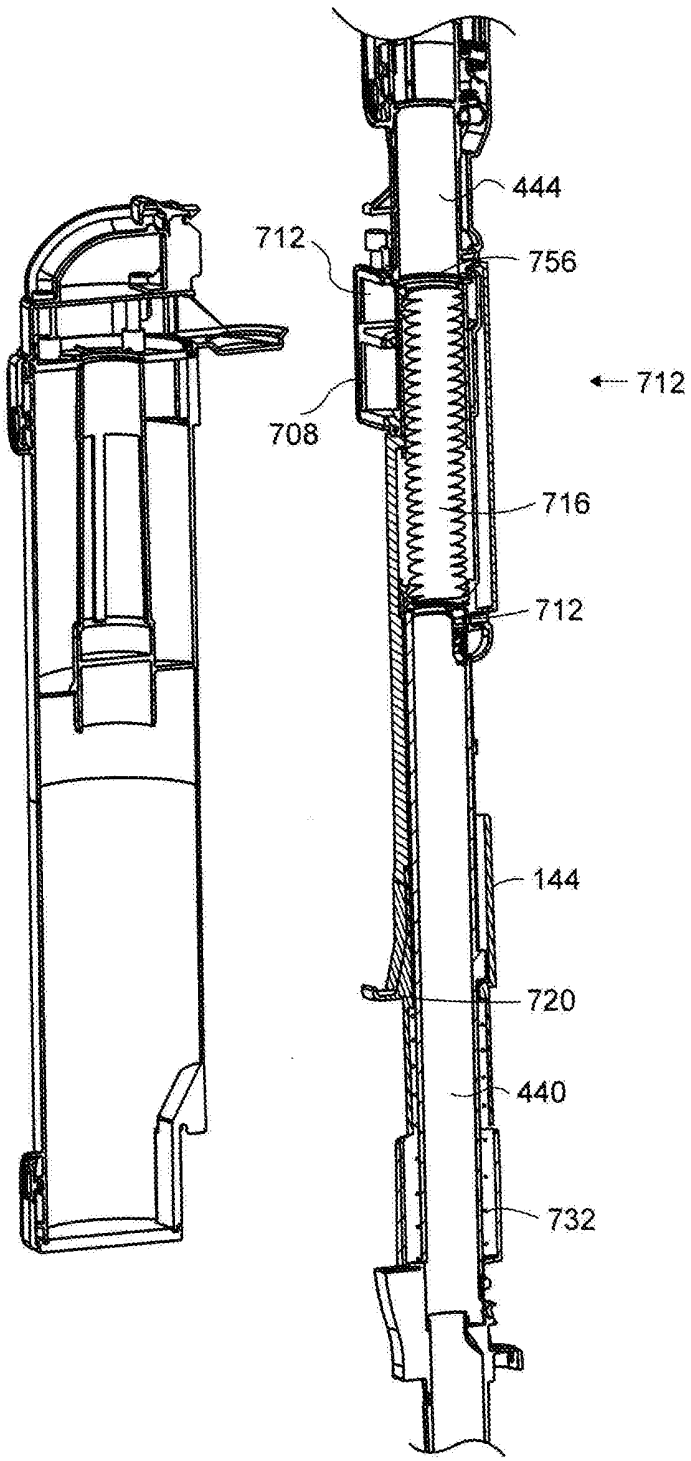


FIG. 61

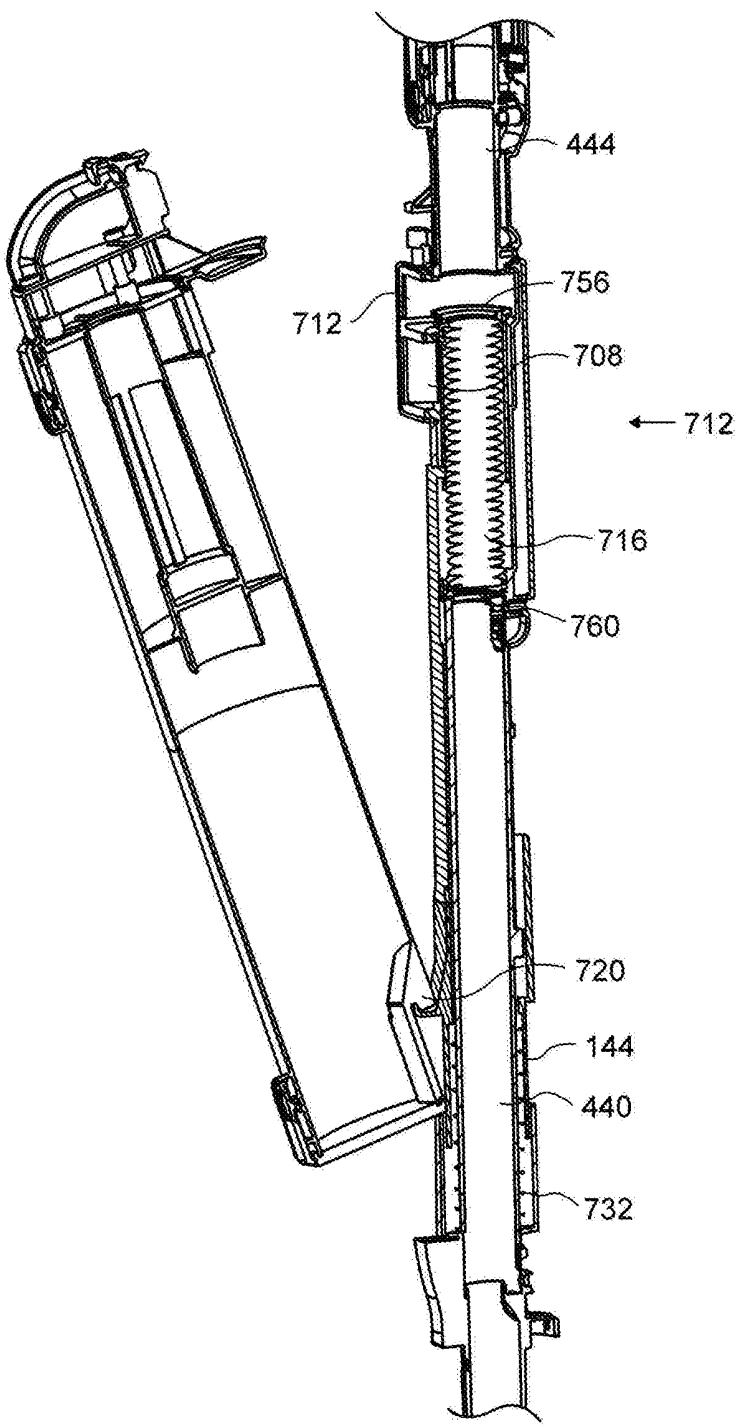


FIG. 62

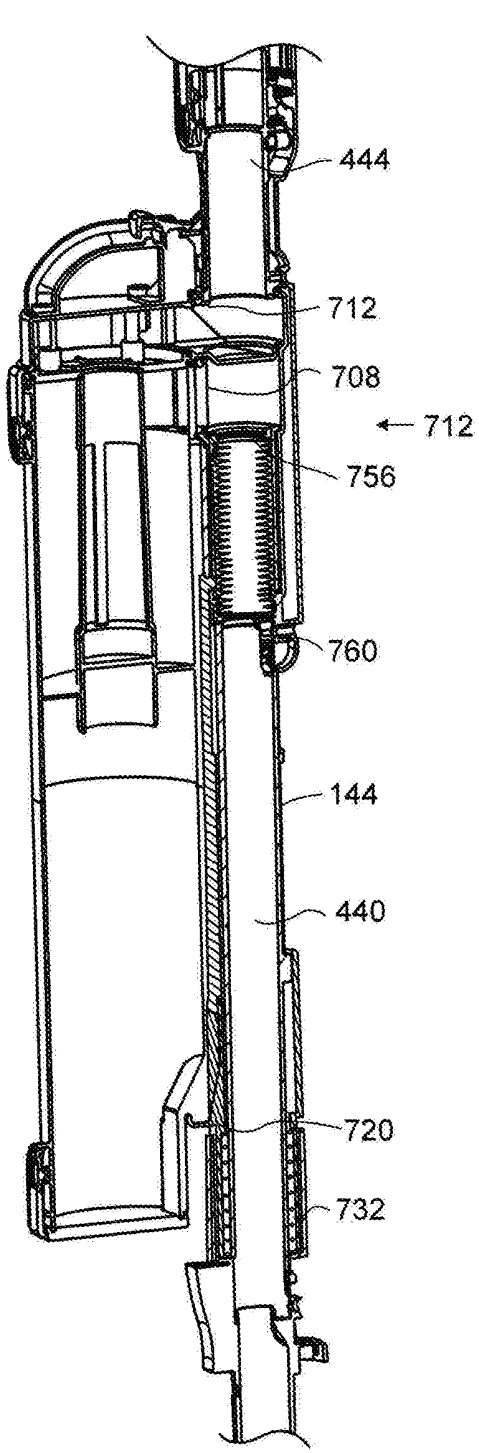


FIG. 63

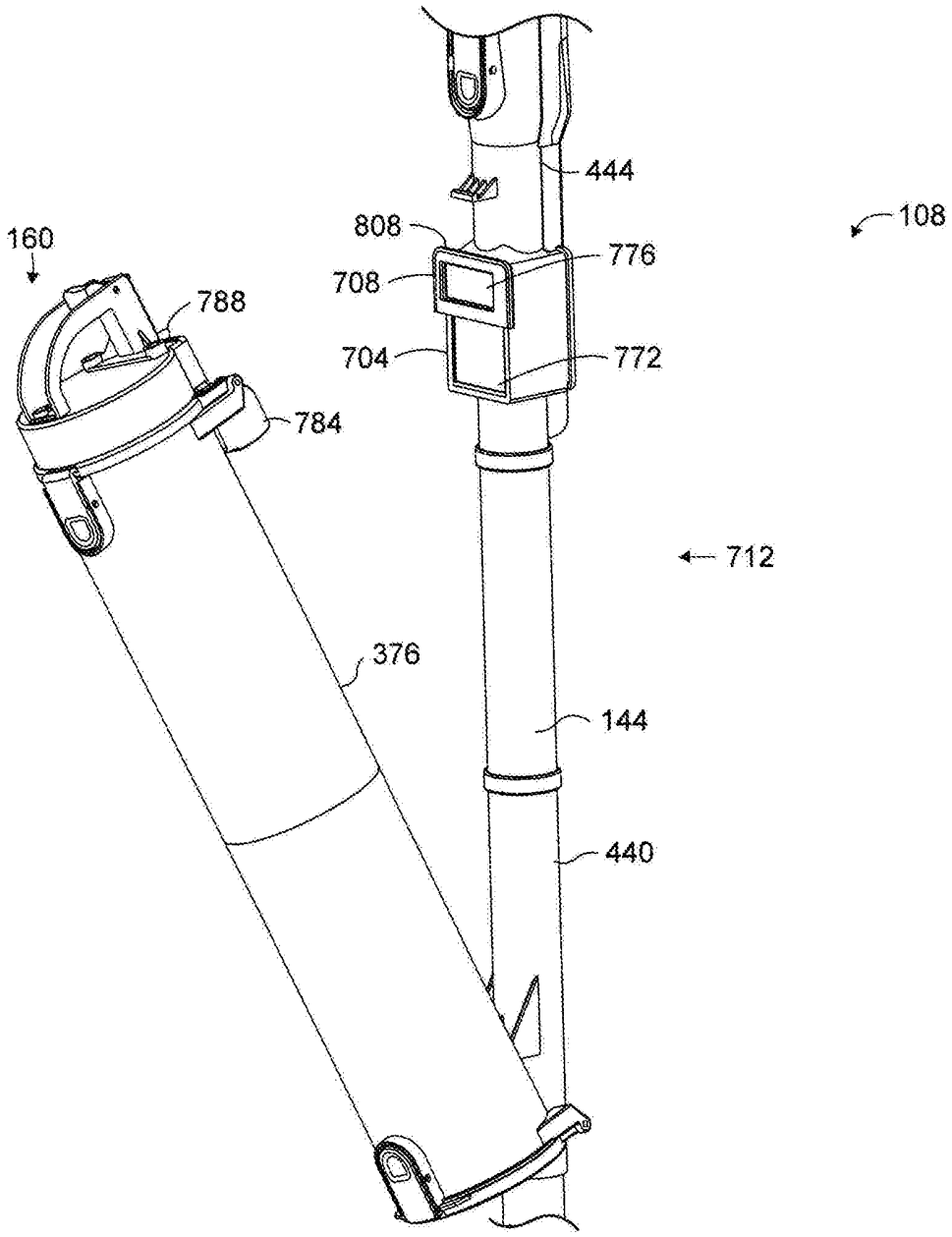


FIG. 64

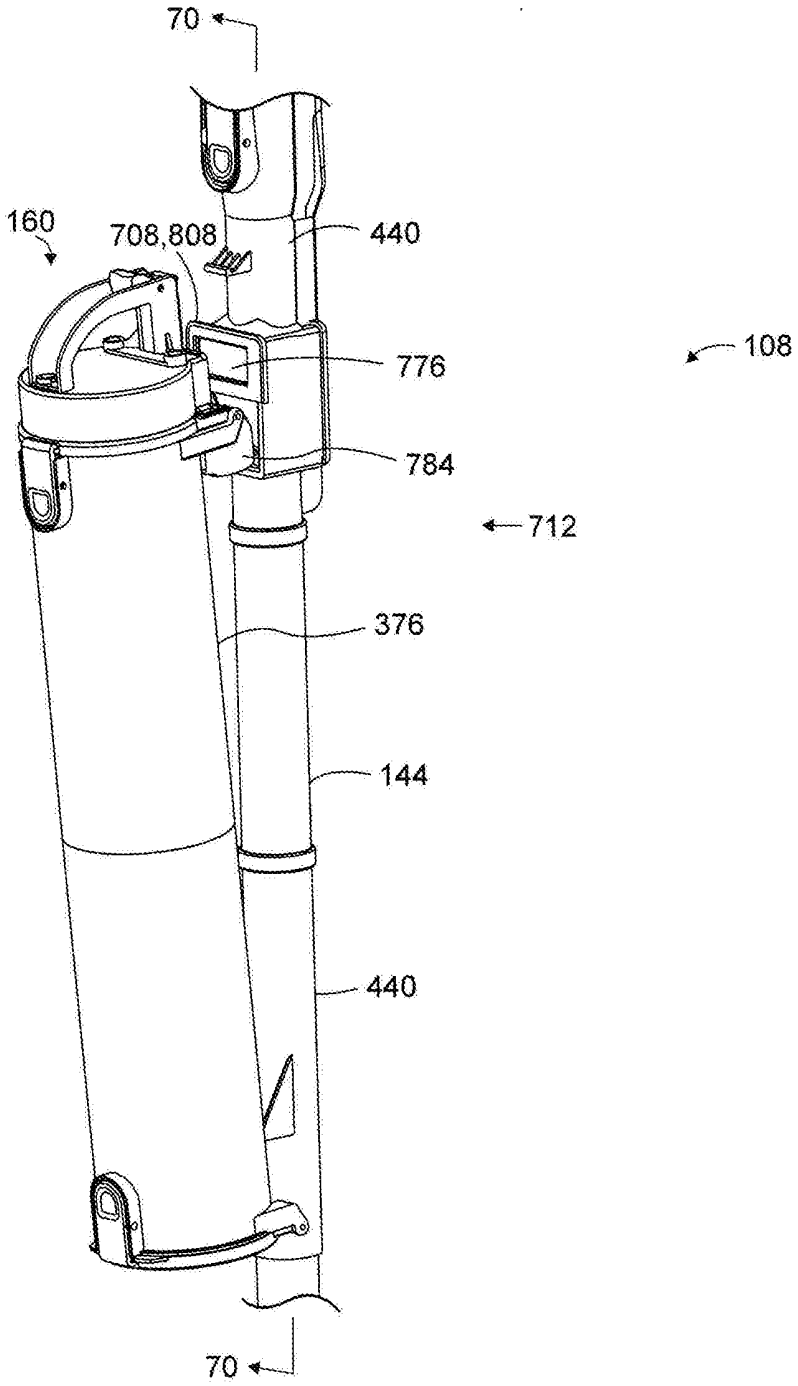


FIG. 65

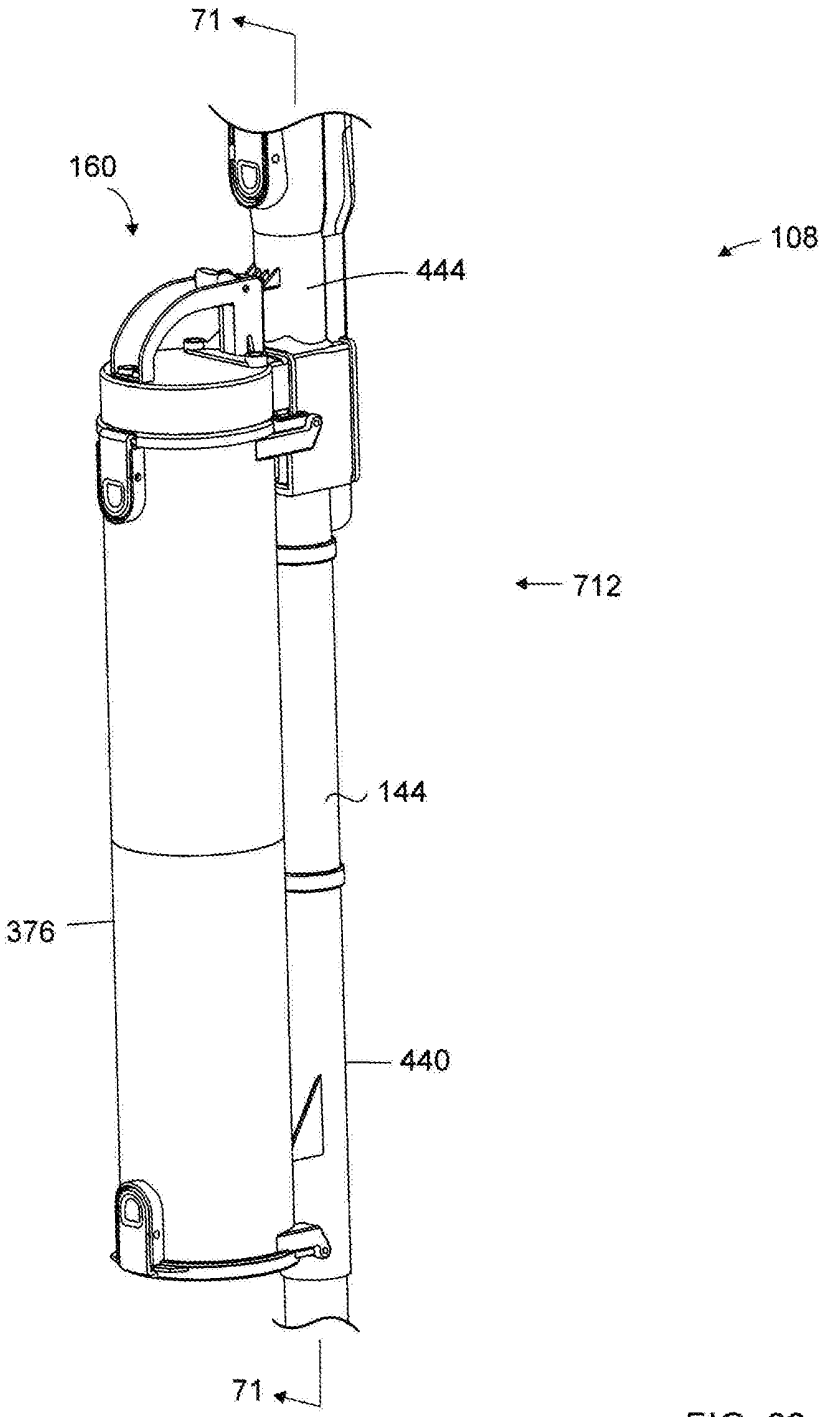


FIG. 66

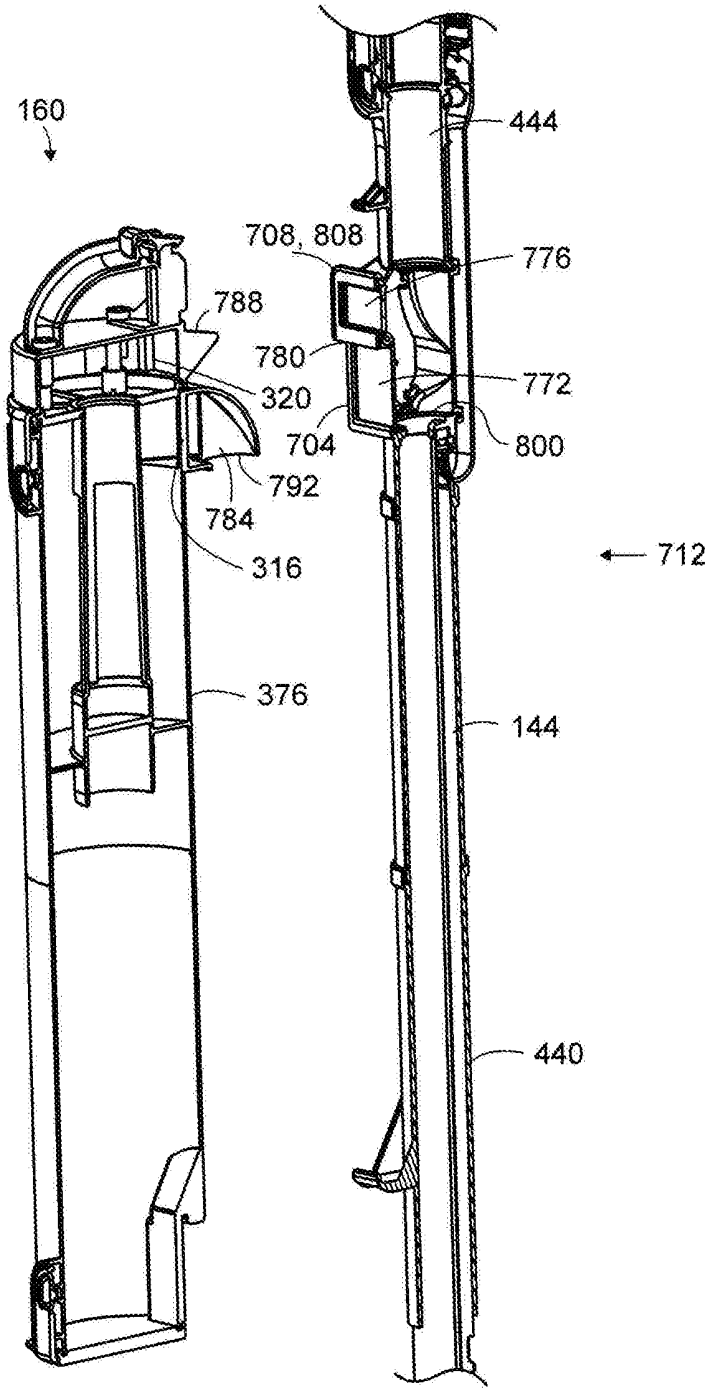

160
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FIG. 67

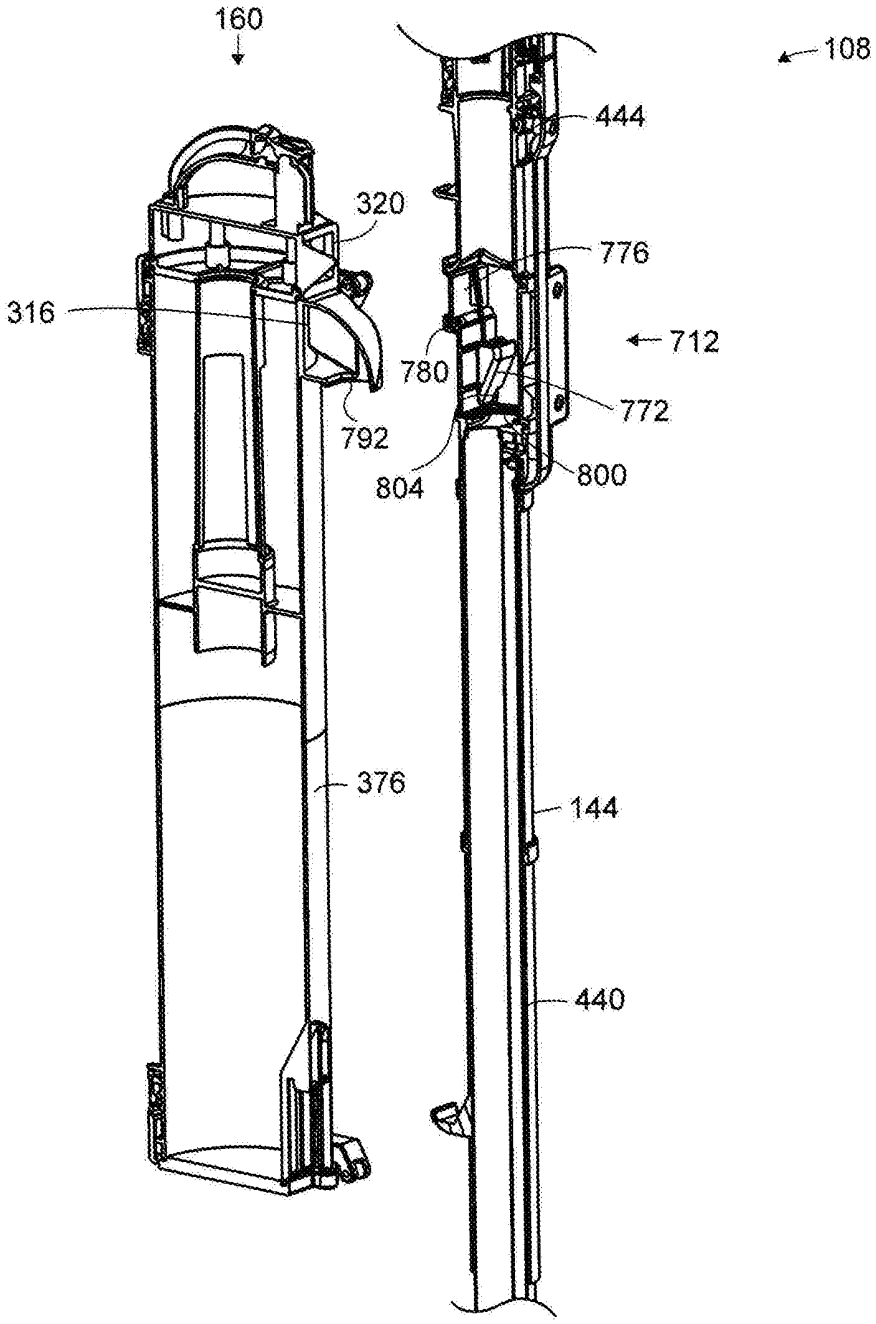


FIG. 68

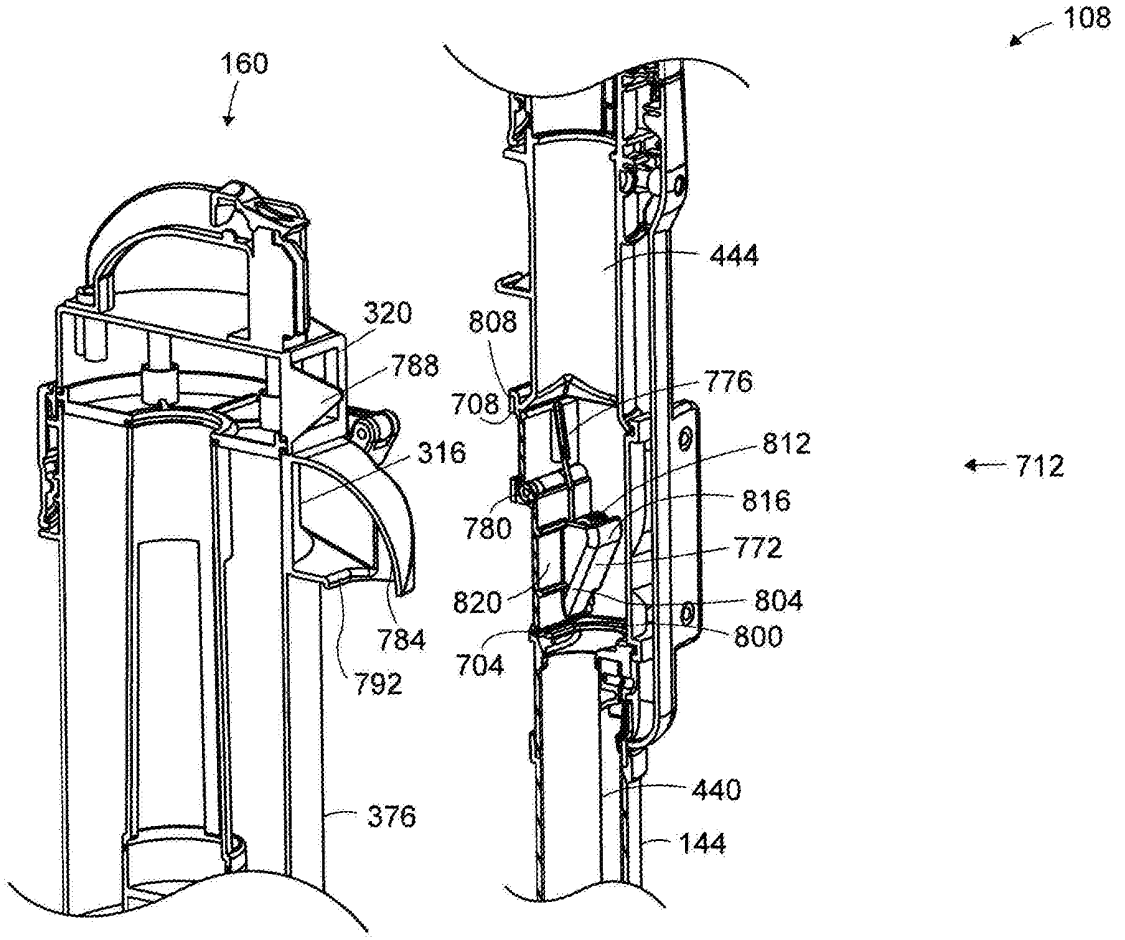


FIG. 69

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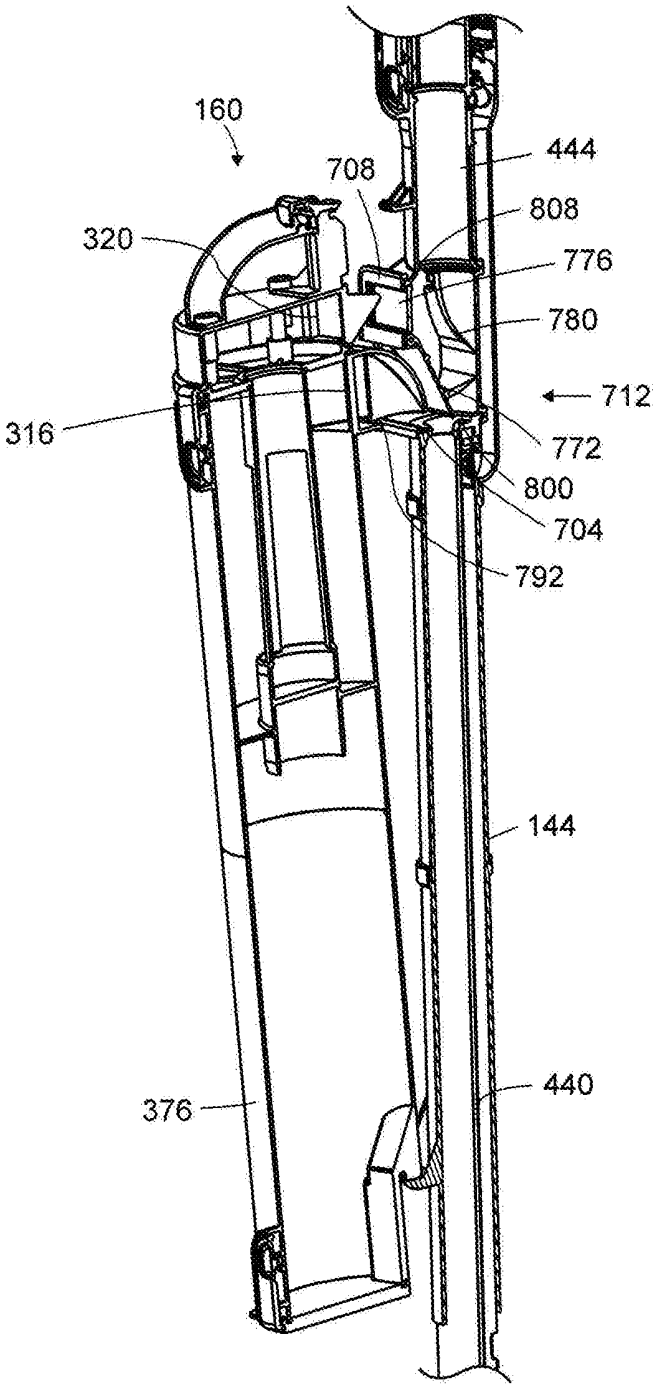

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FIG. 70

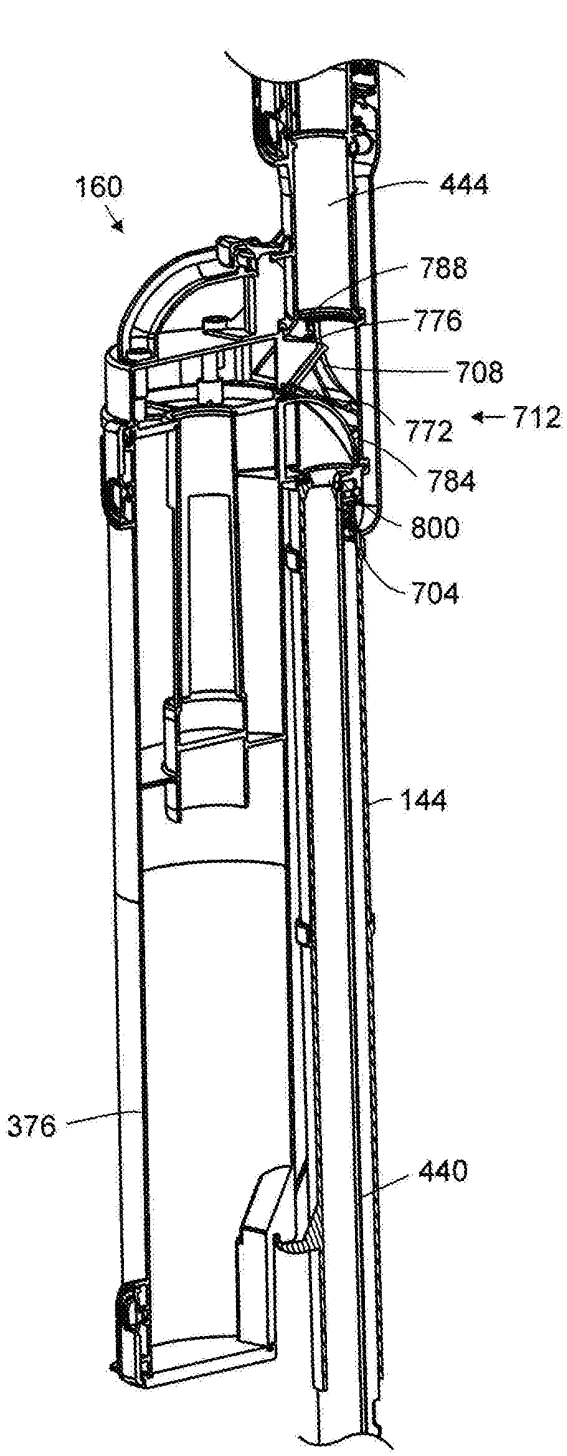


FIG. 71

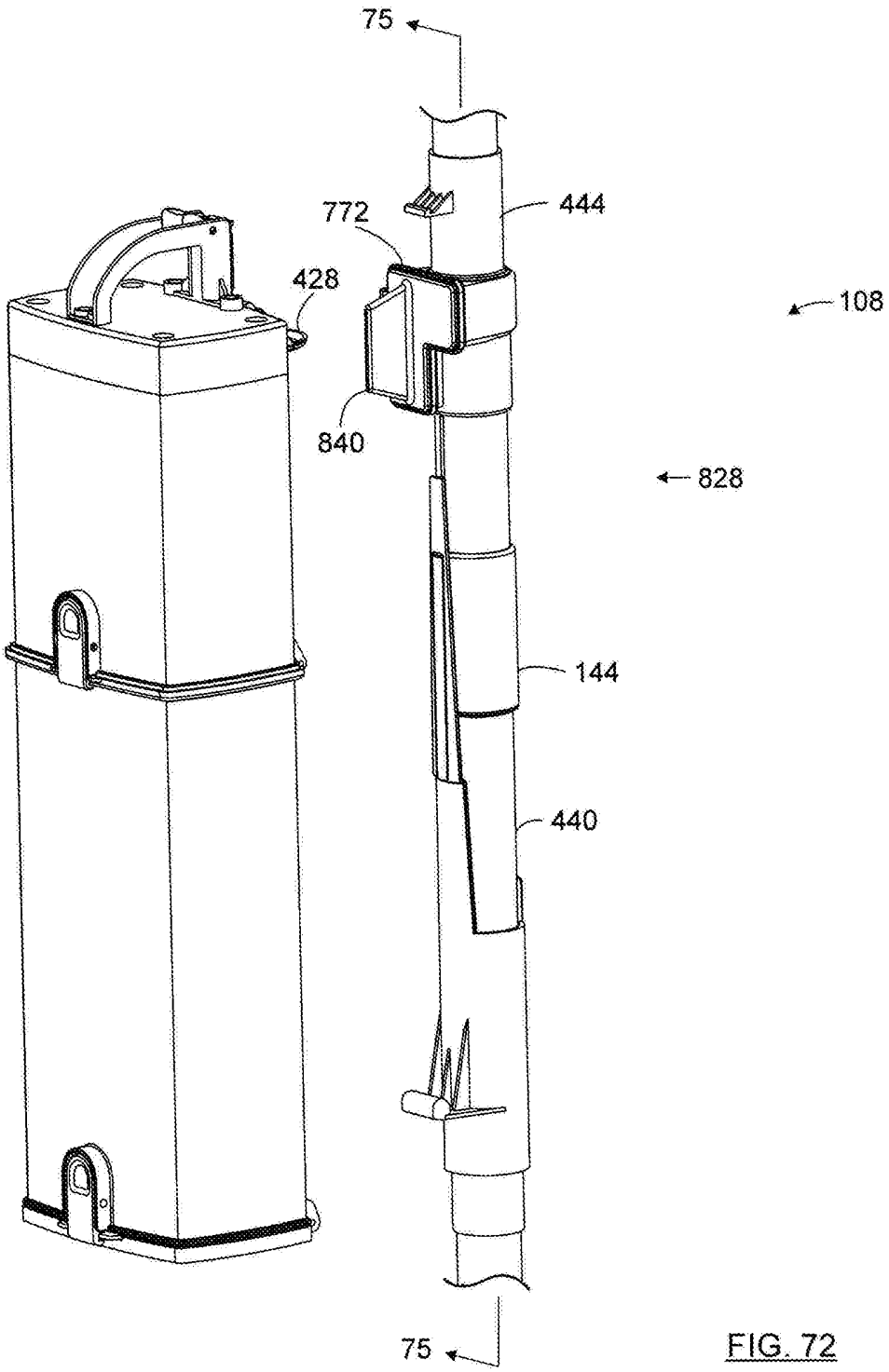


FIG. 72

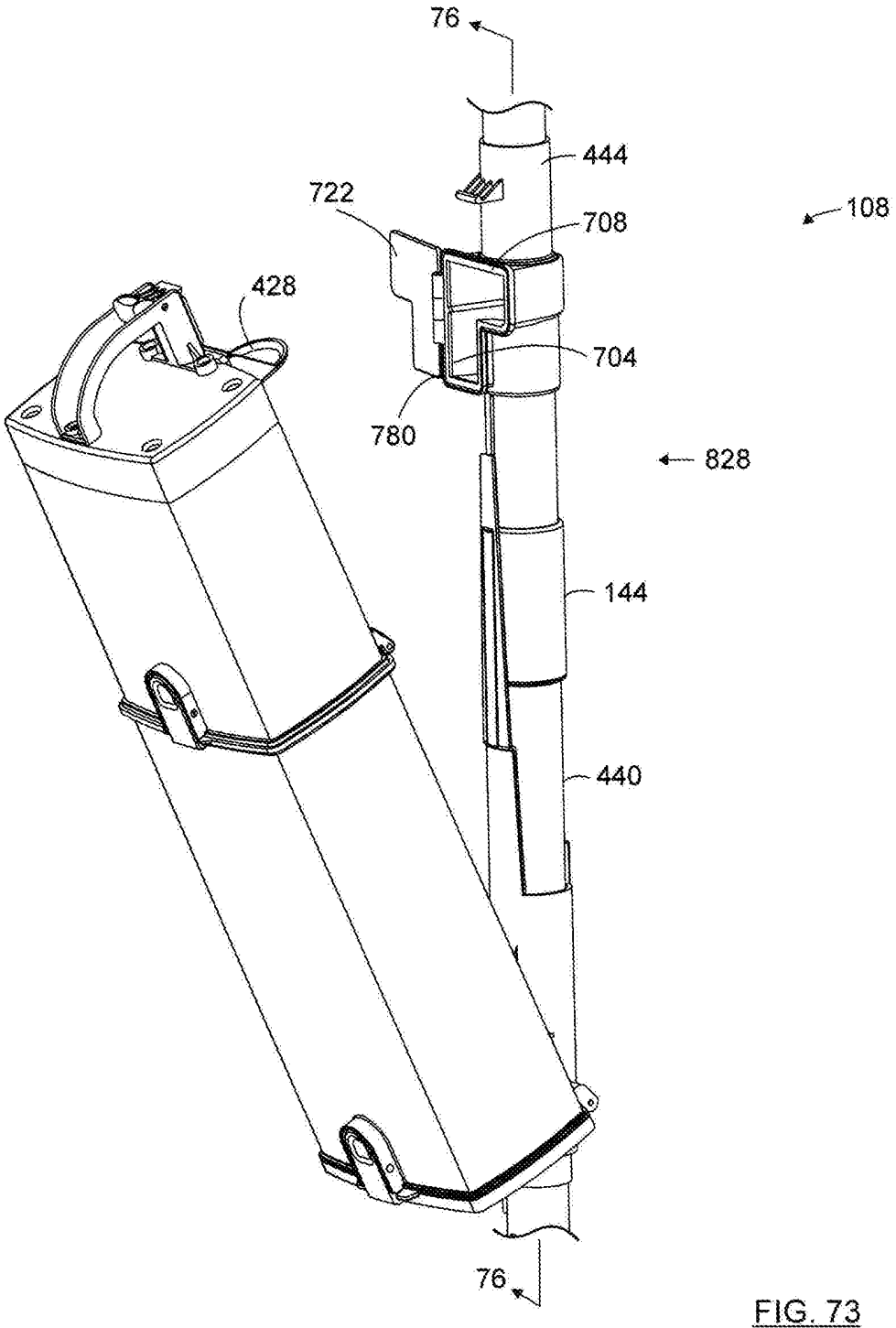


FIG. 73

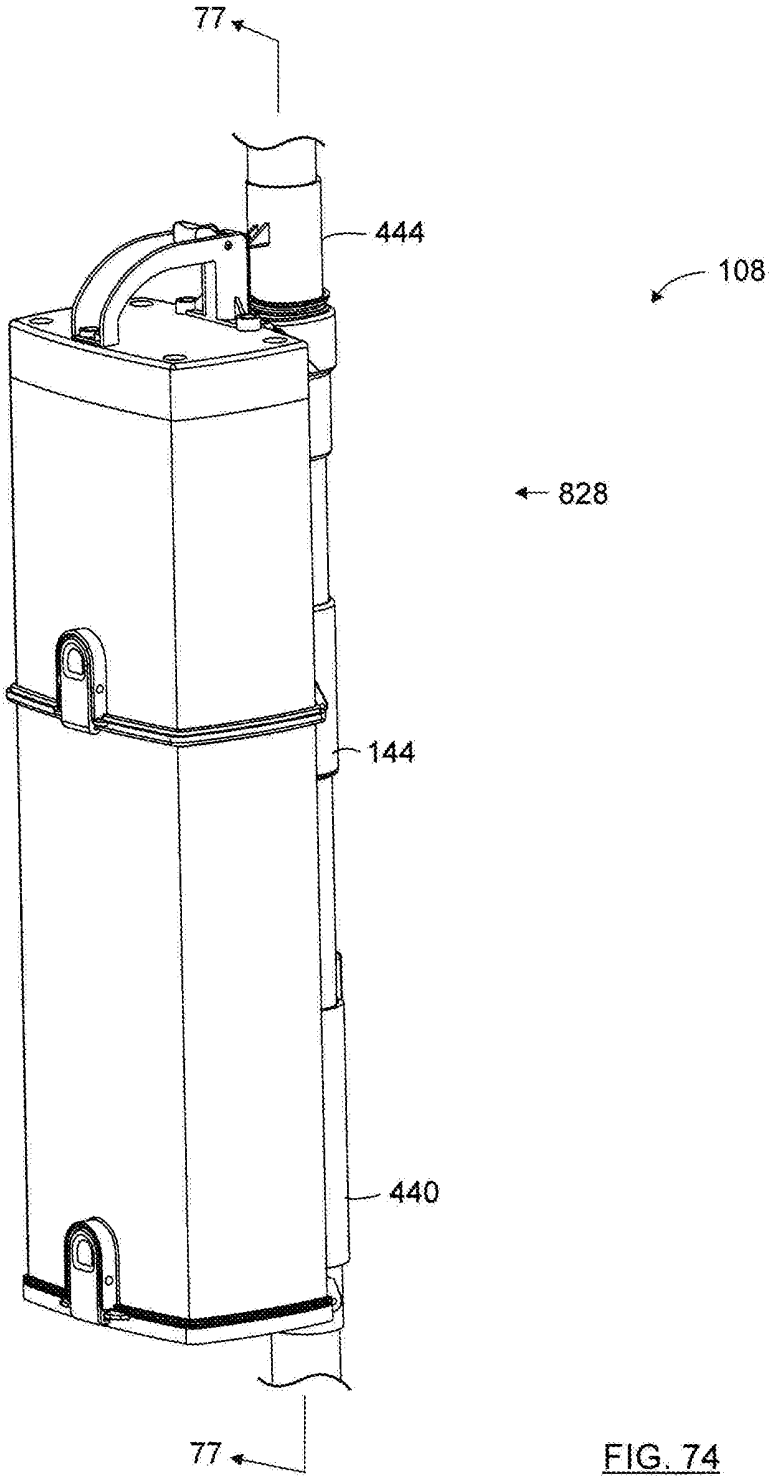


FIG. 74

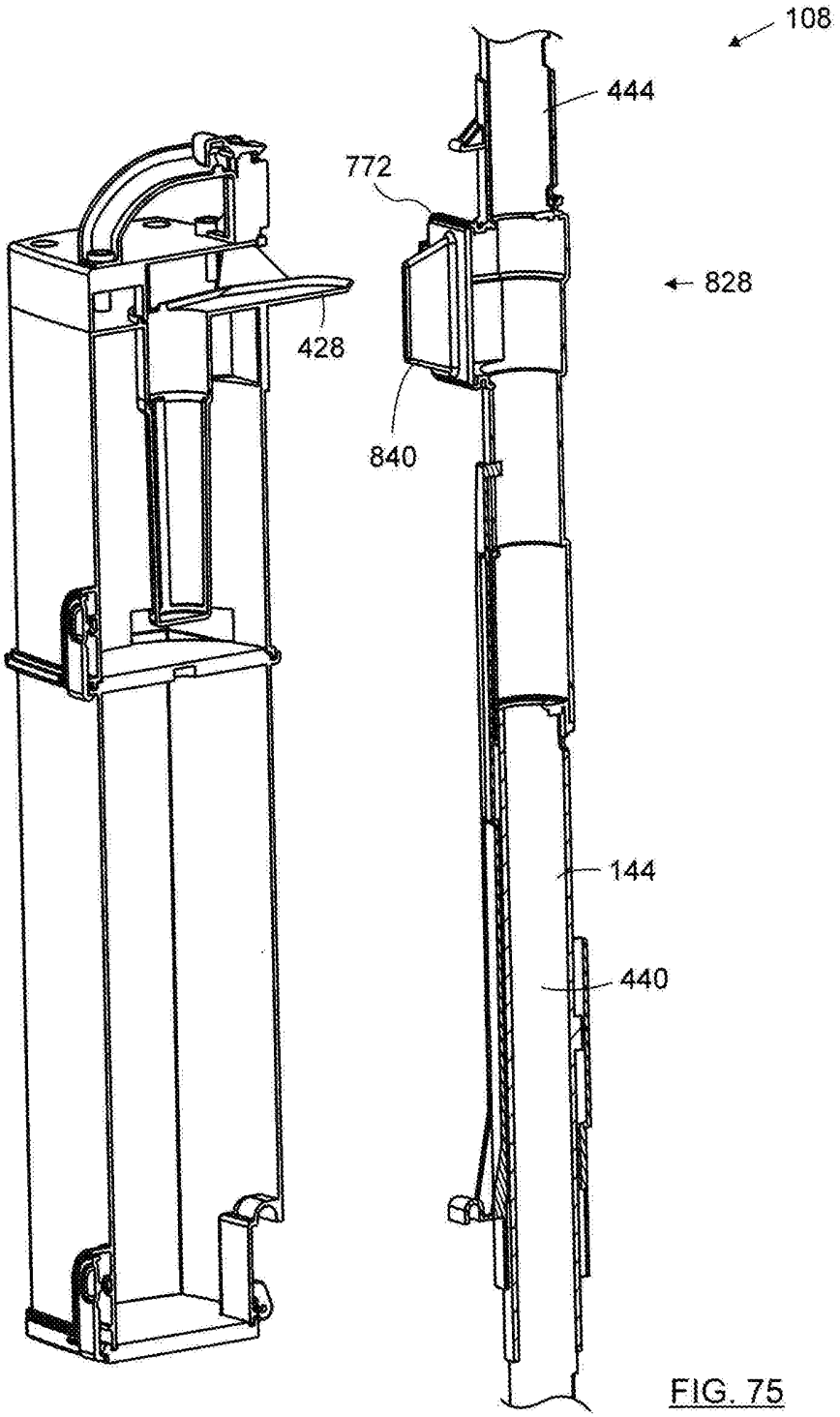


FIG. 75

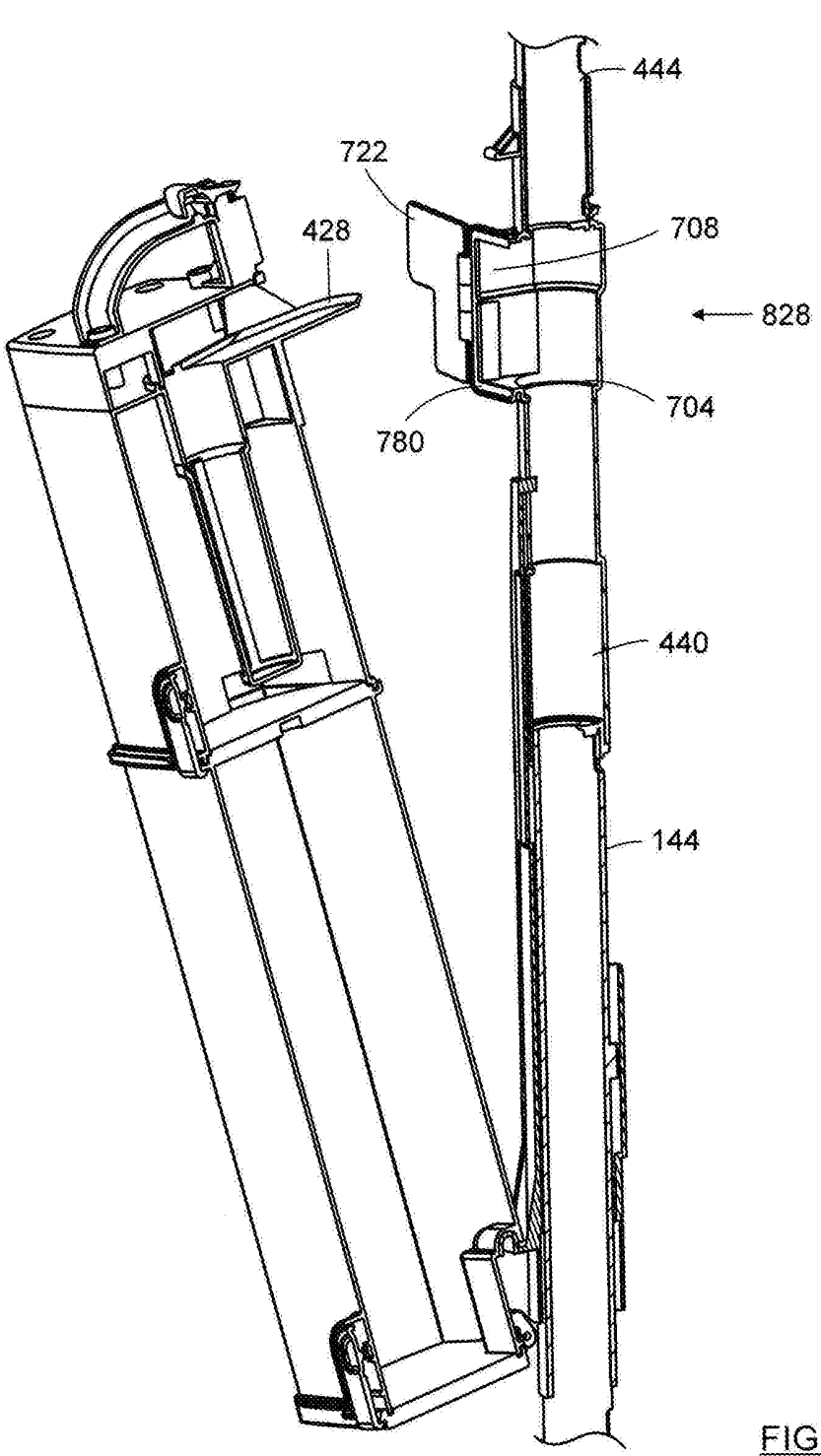


FIG. 76

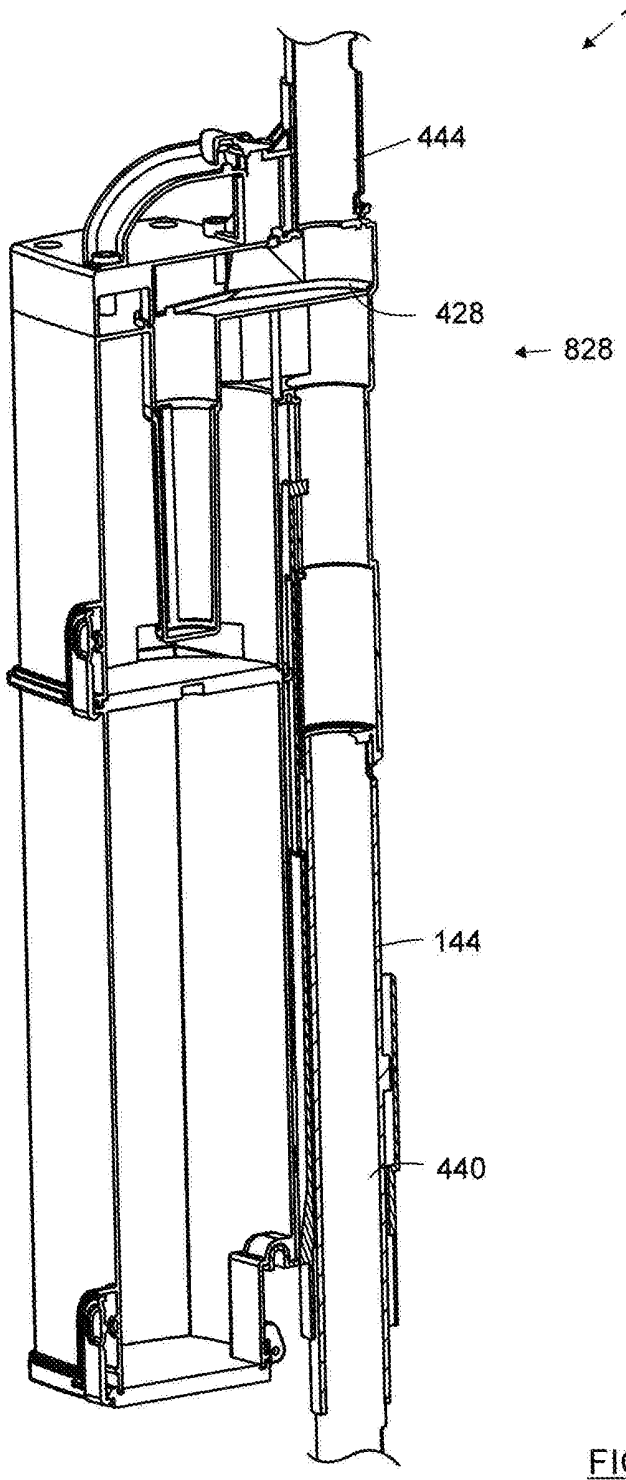


FIG. 77

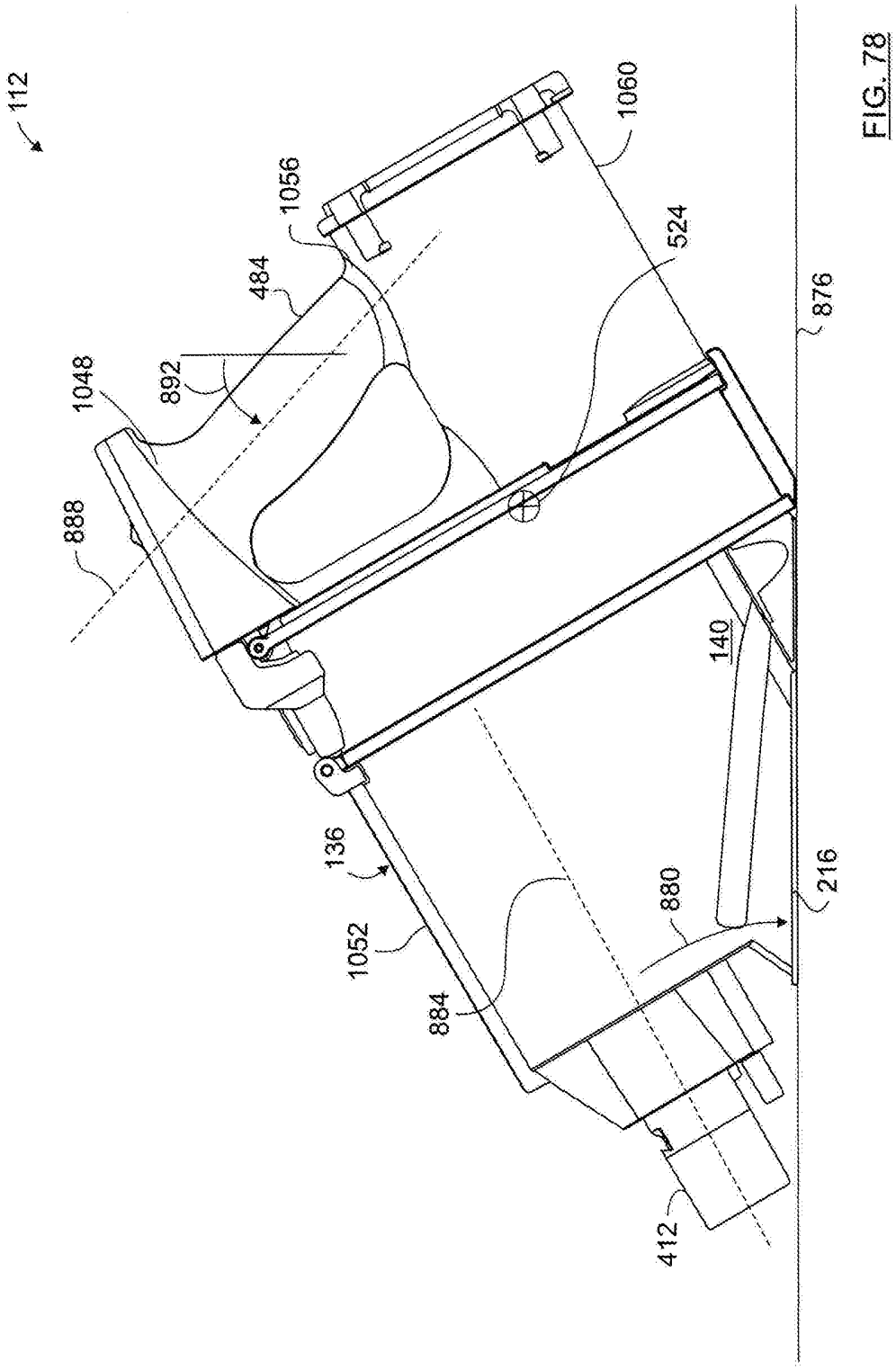

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FIG. 78

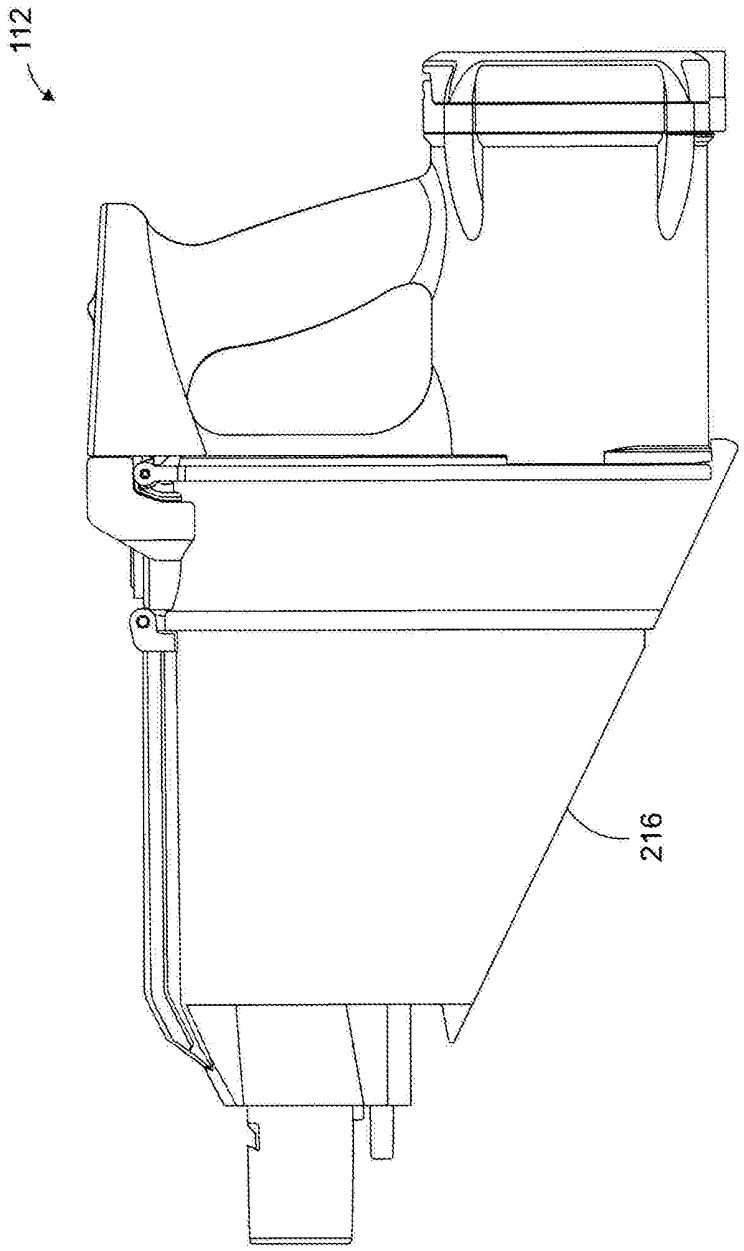


FIG. 79

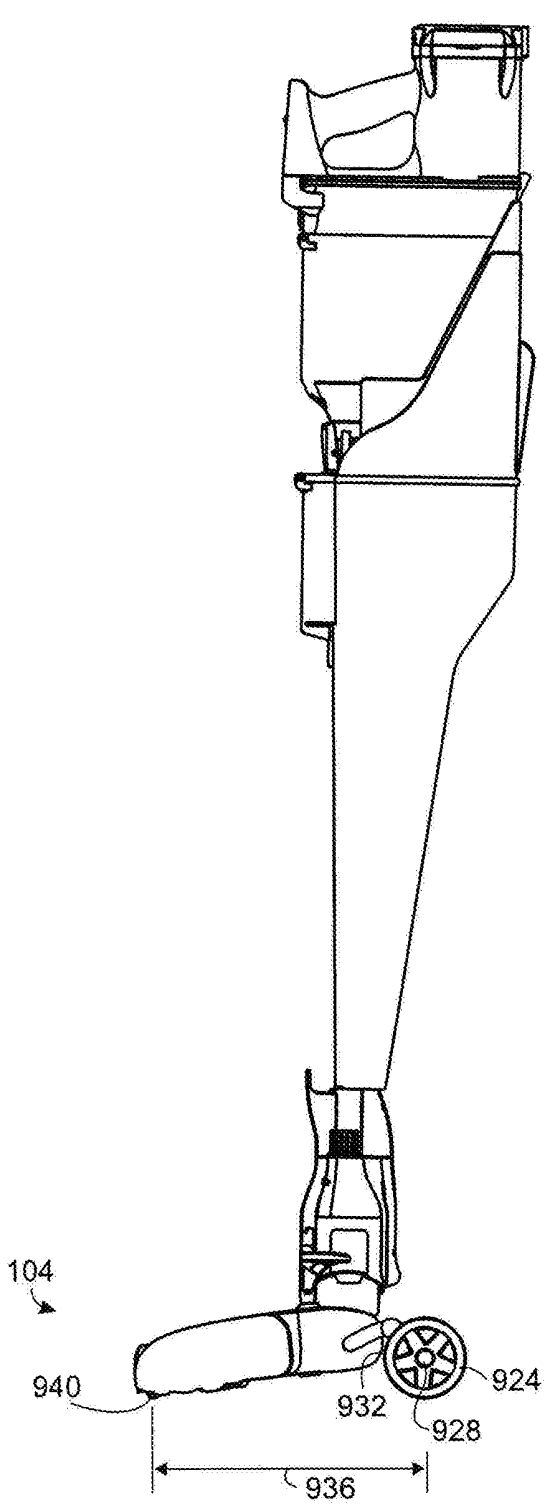


FIG. 80

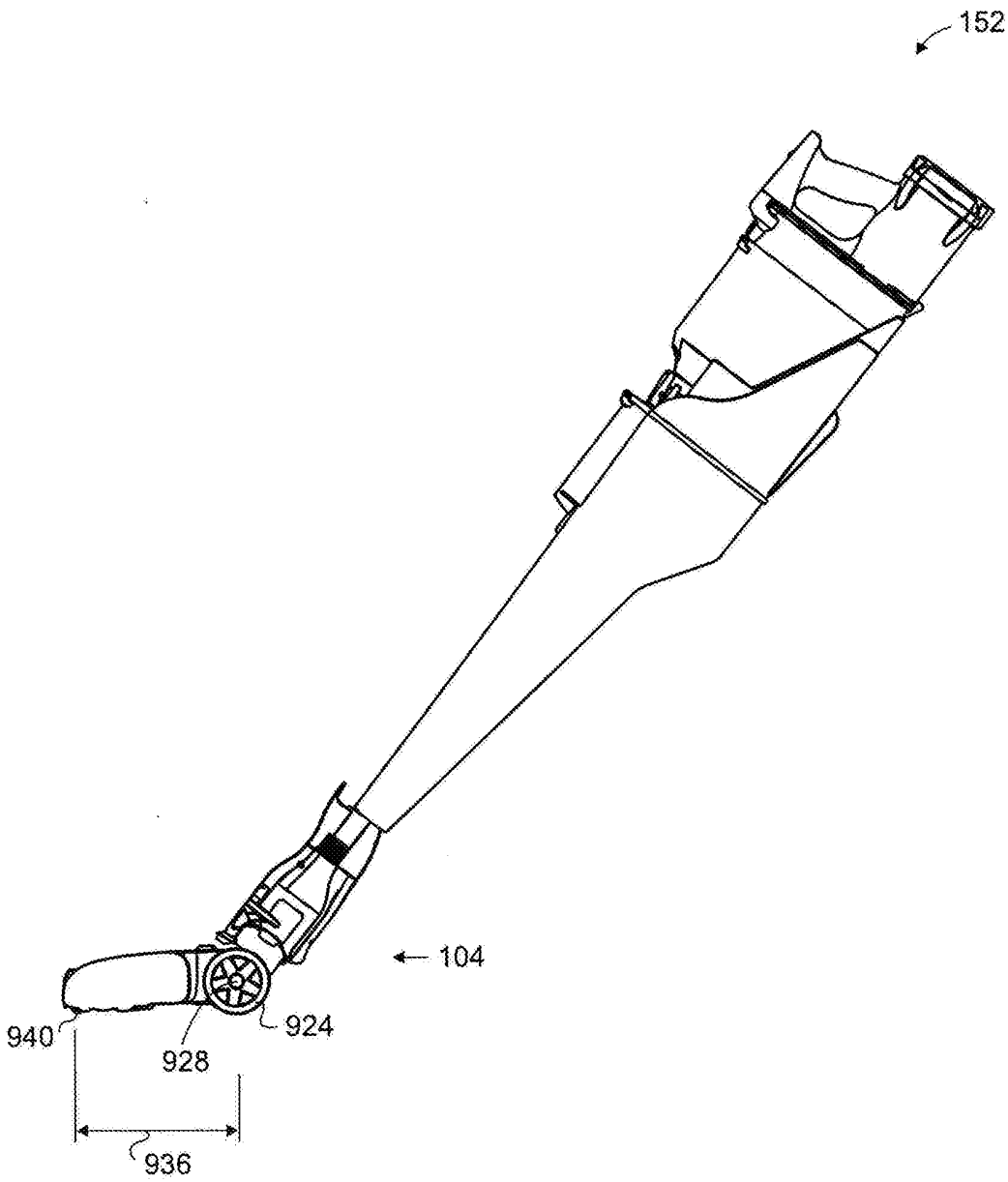


FIG. 81

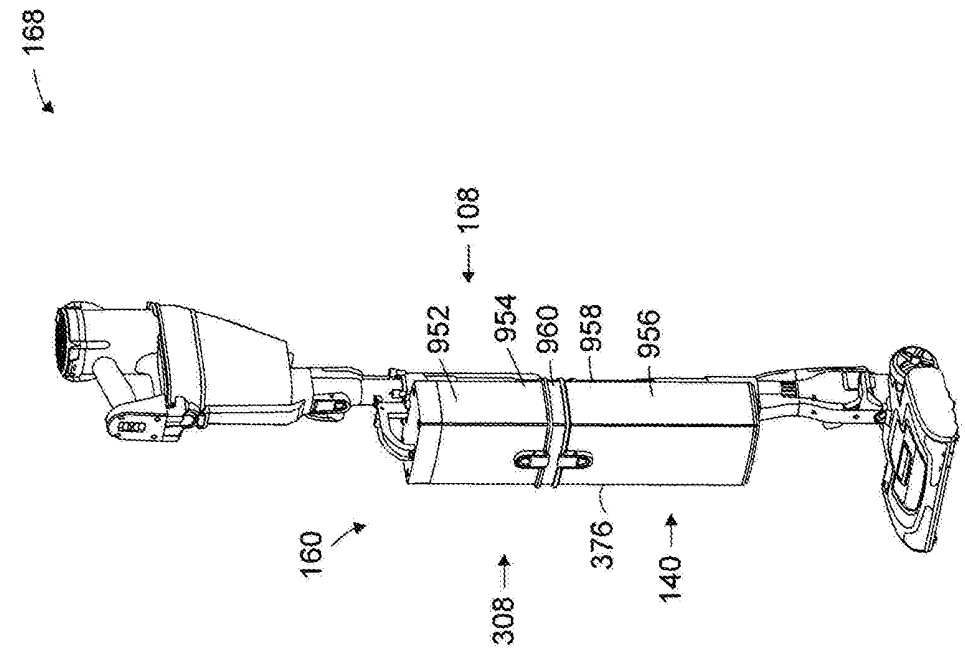


FIG. 82

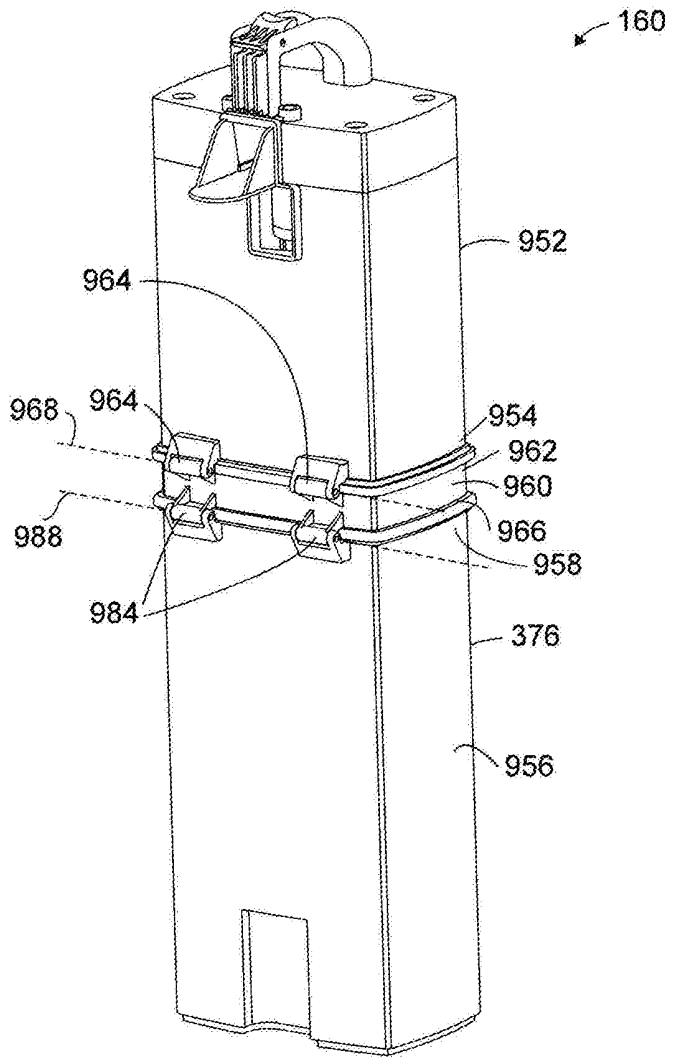


FIG. 83

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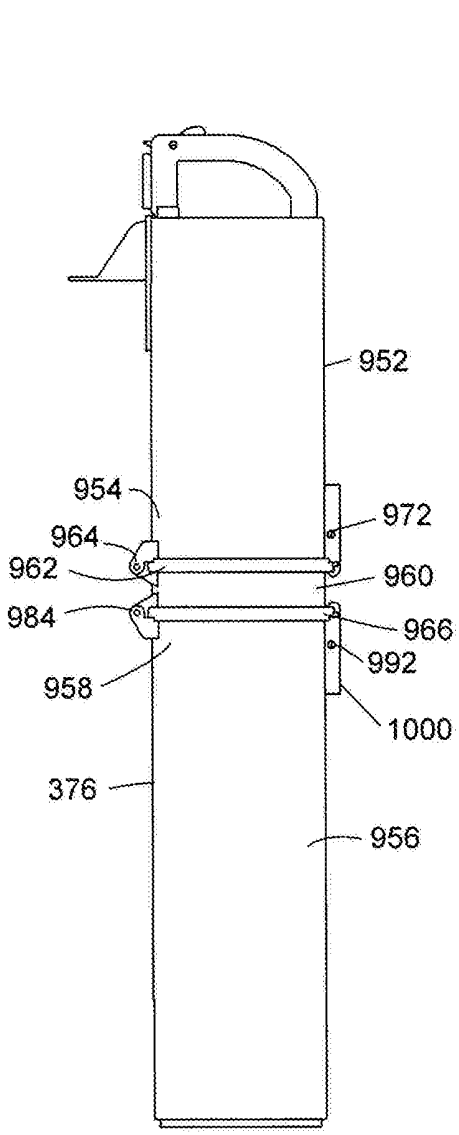


FIG. 84

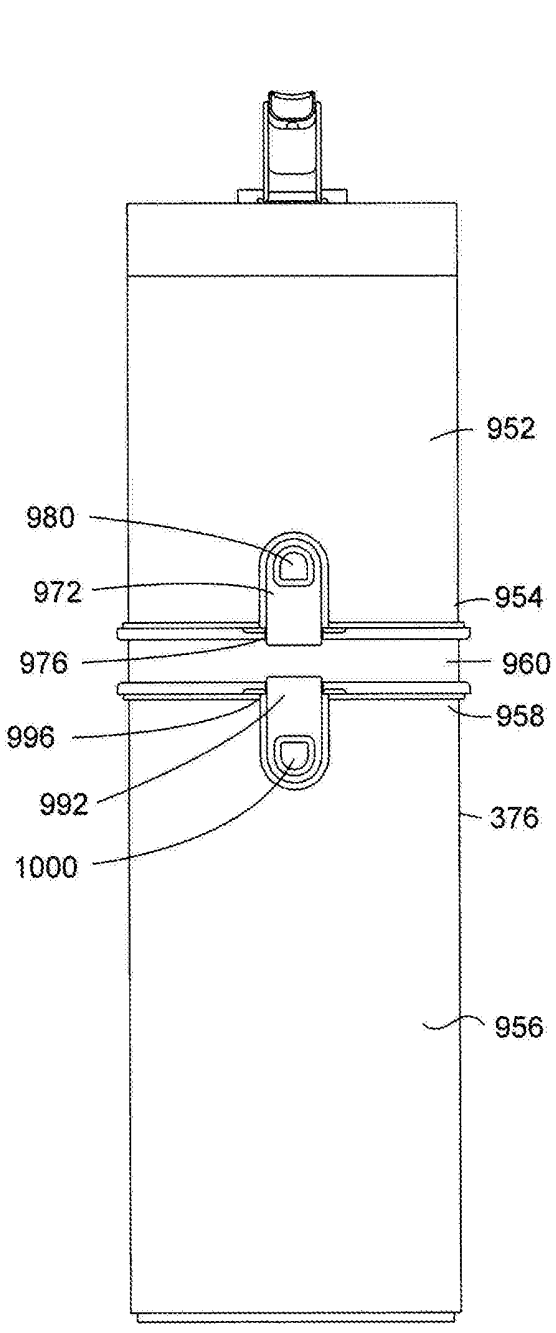


FIG. 85

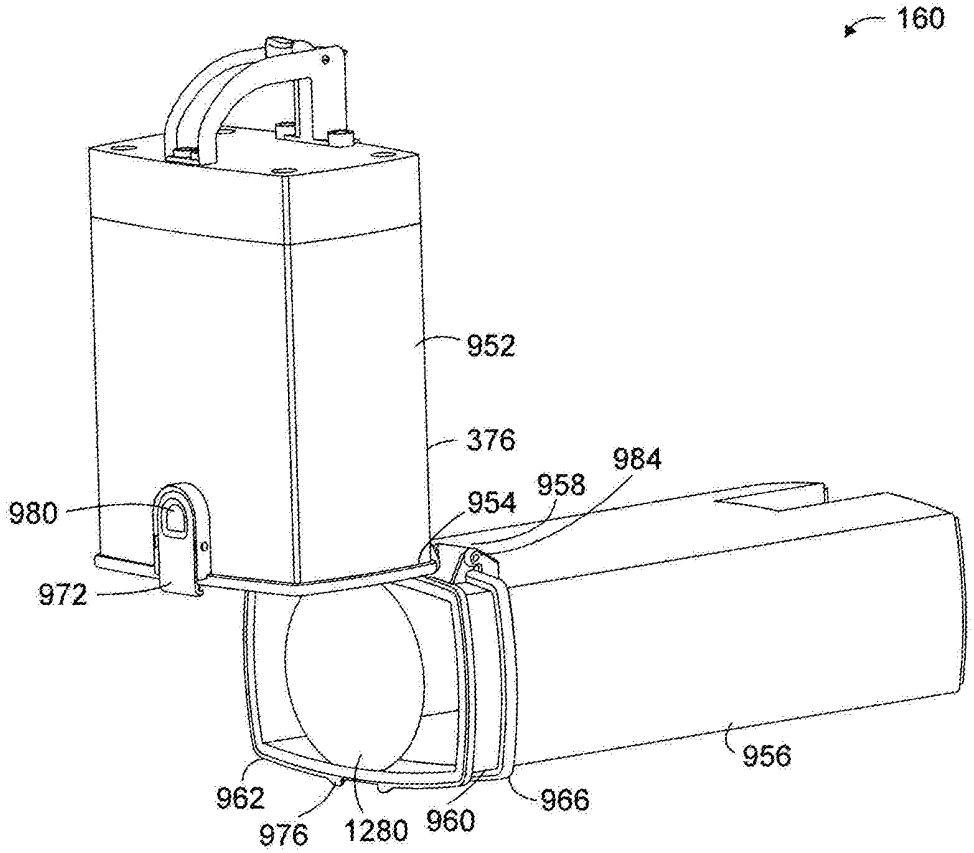


FIG. 86

Dyson Ex1004
Page 174

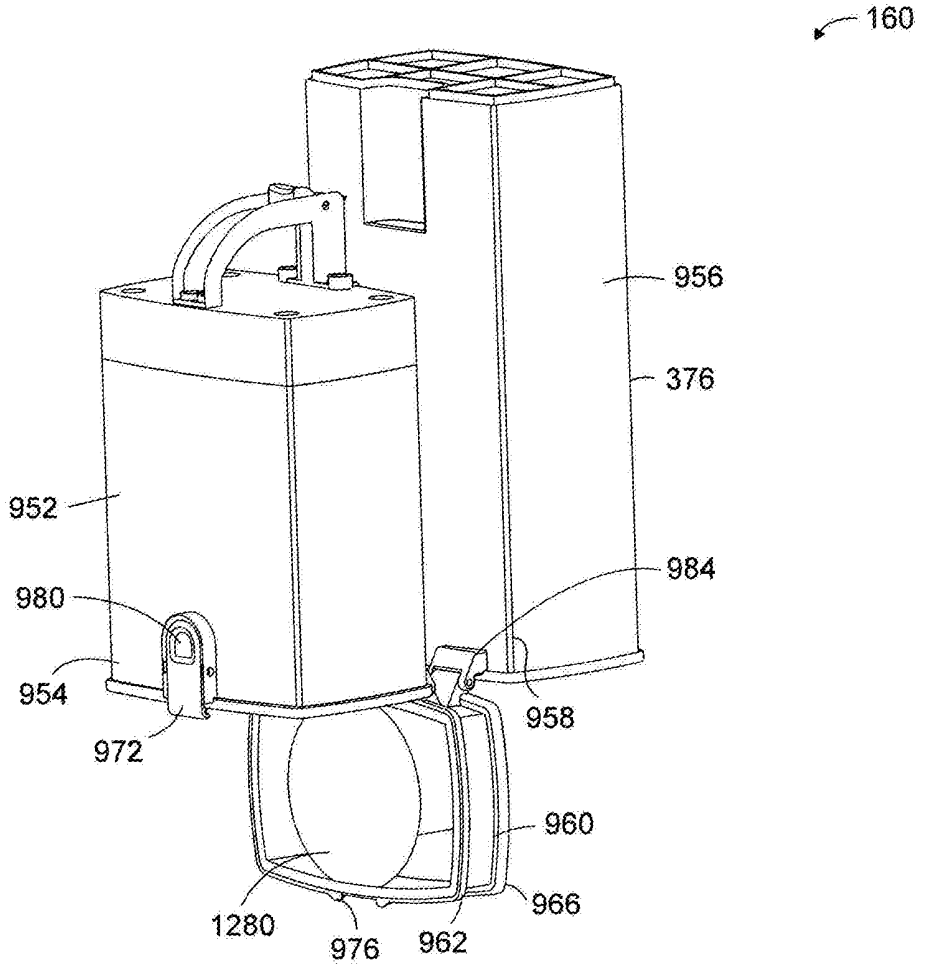


FIG. 87

Dyson Ex1004
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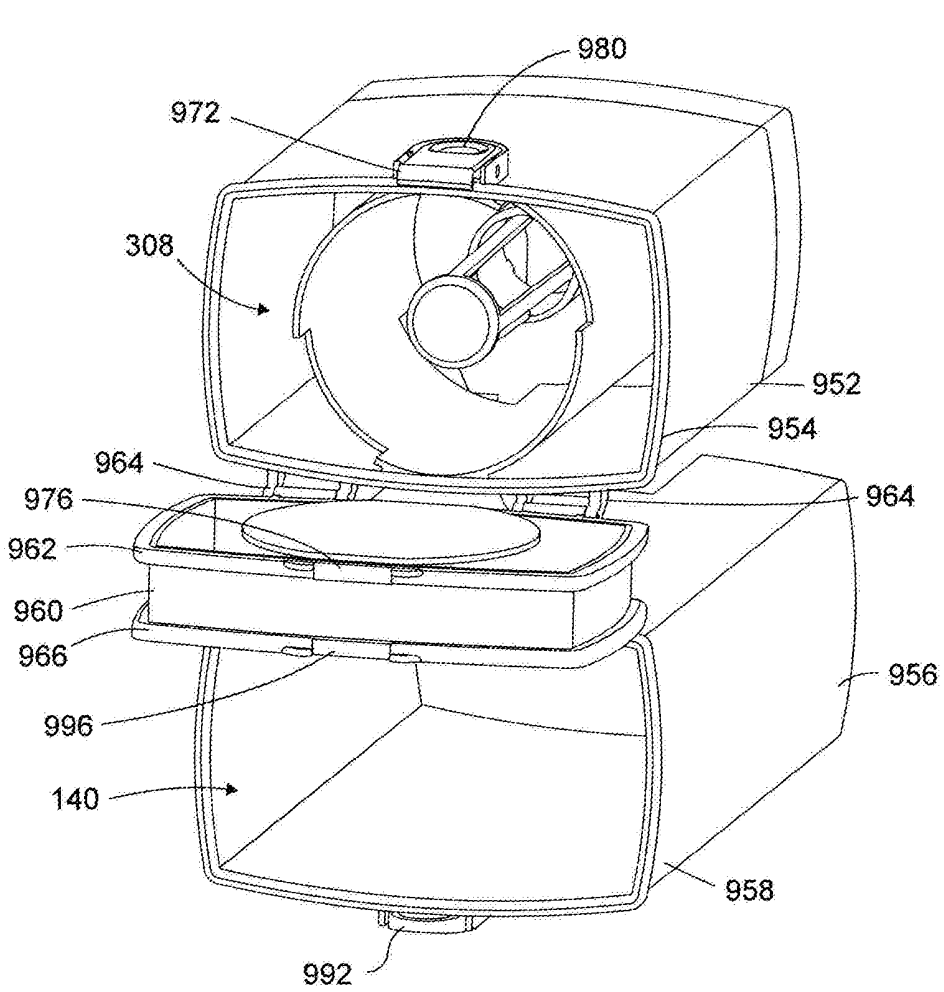


FIG. 88

Dyson Ex1004
Page 176

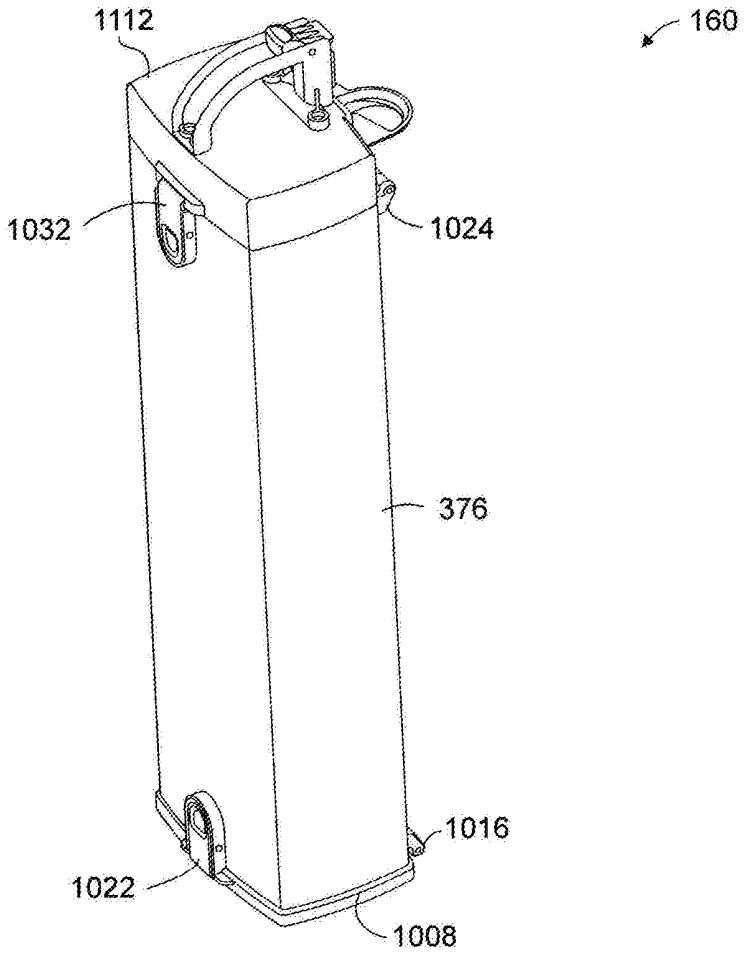


FIG. 89

Dyson Ex1004
Page 177

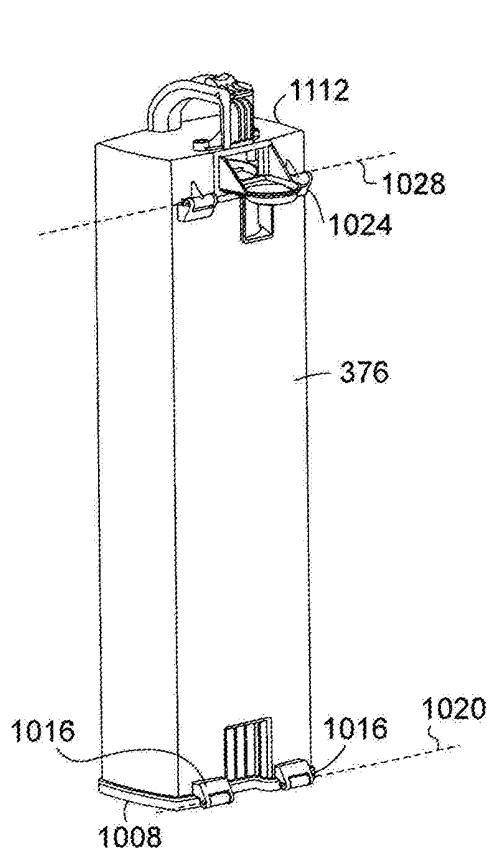


FIG. 90

Dyson Ex1004
Page 178

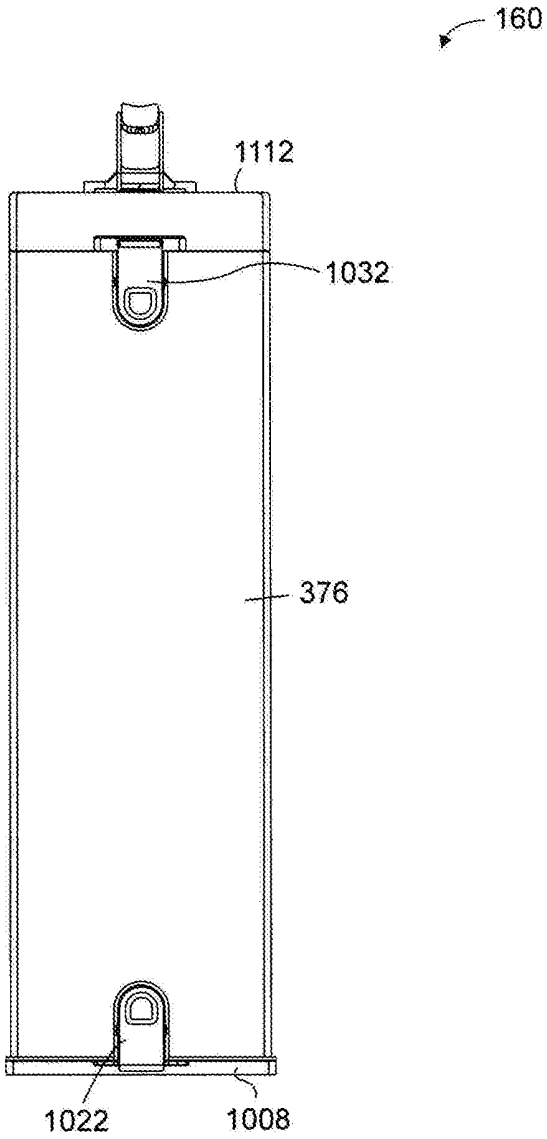


FIG. 91

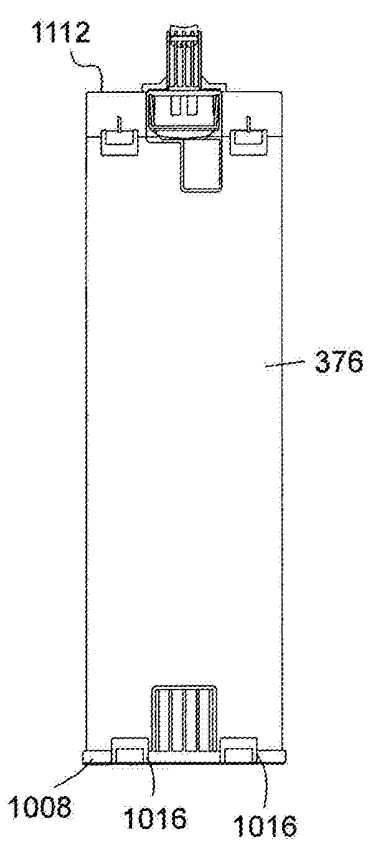


FIG. 92

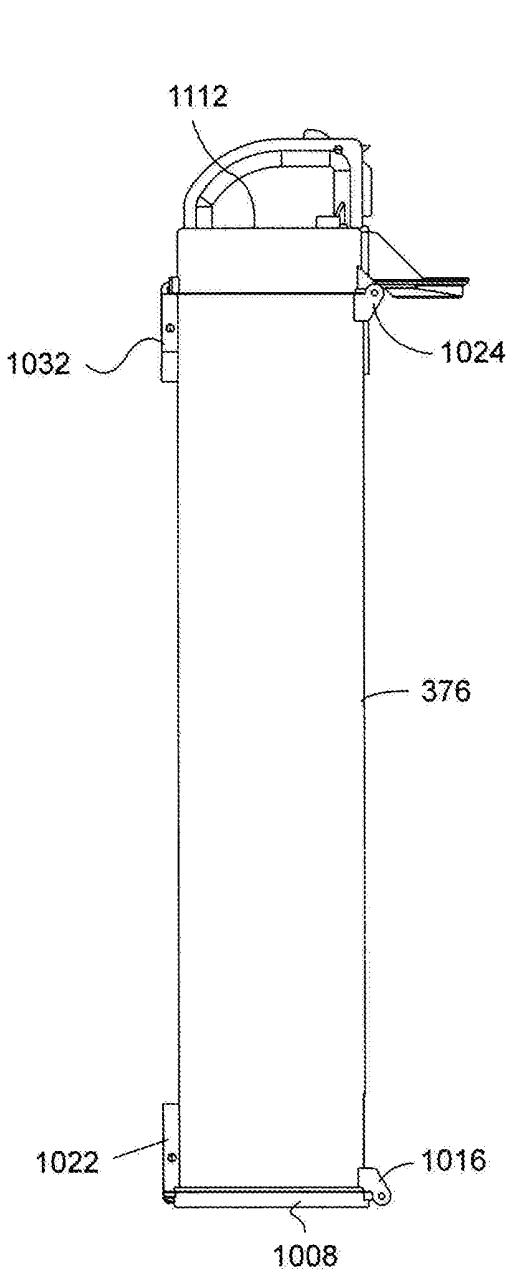


FIG. 93

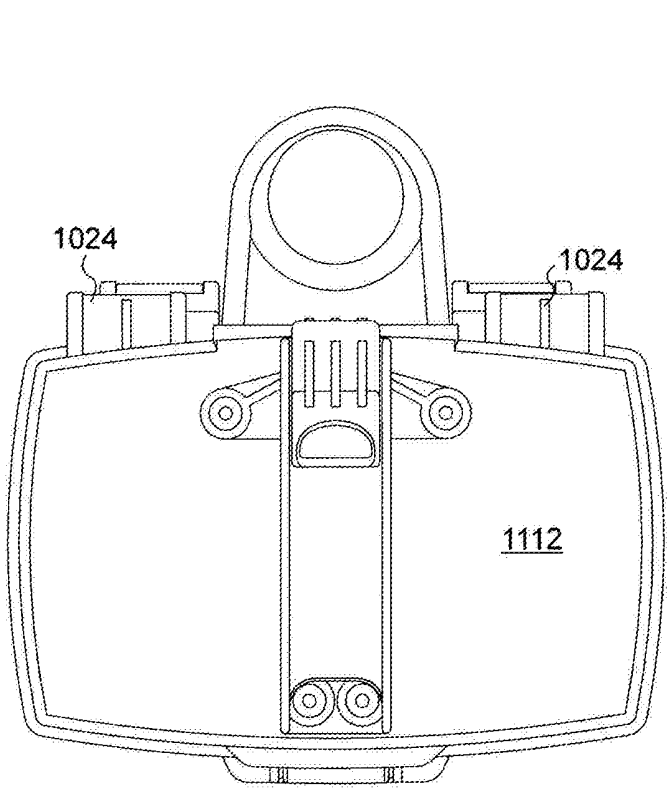


FIG. 94

Dyson Ex1004
Page 182

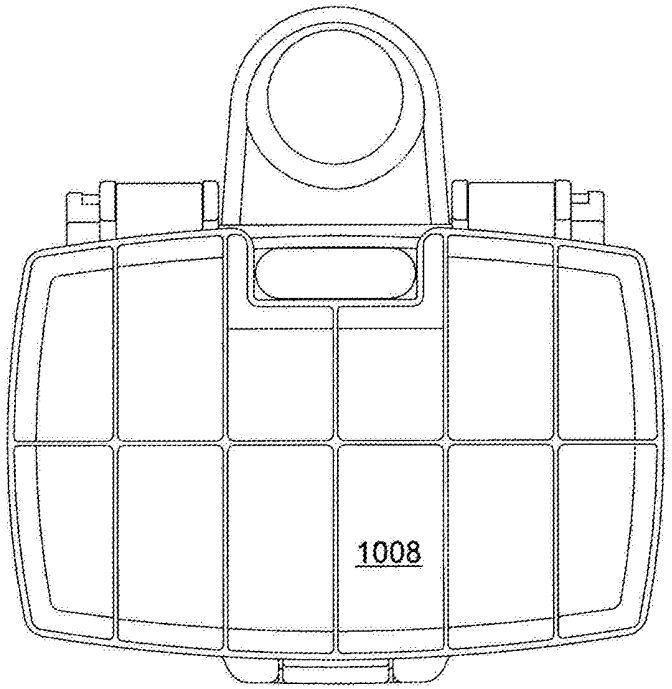


FIG. 95

Dyson Ex1004
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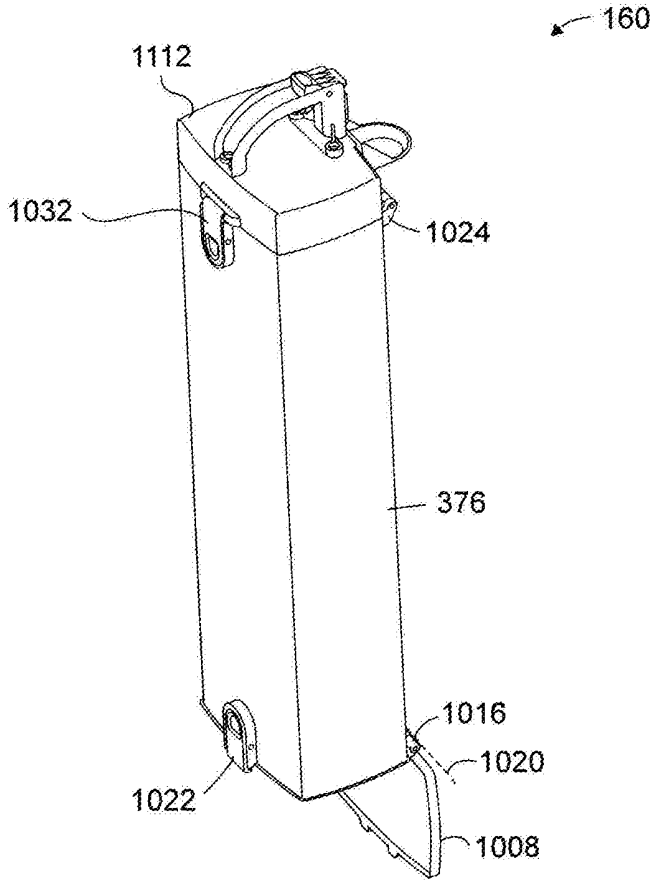


FIG. 95b

Dyson Ex1004
Page 184

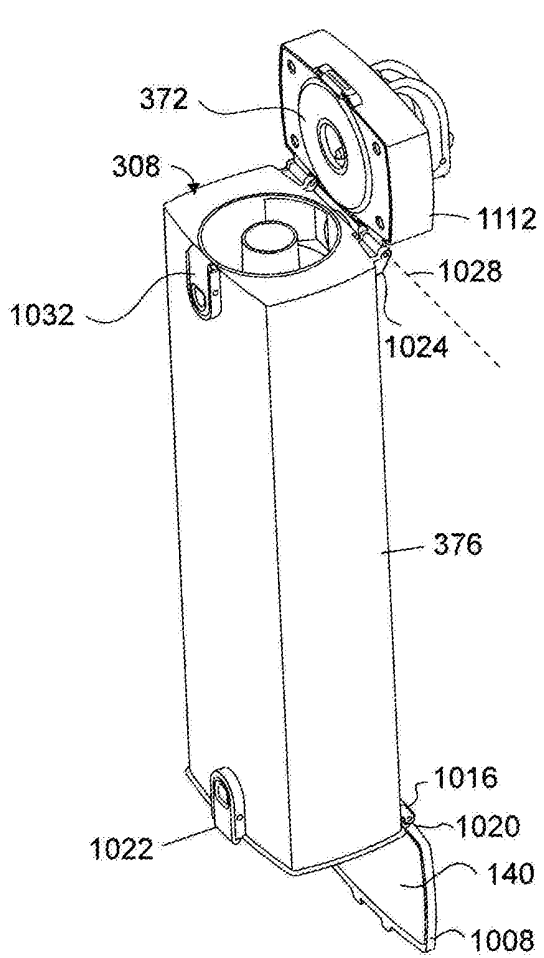


FIG. 95c

Dyson Ex1004
Page 185

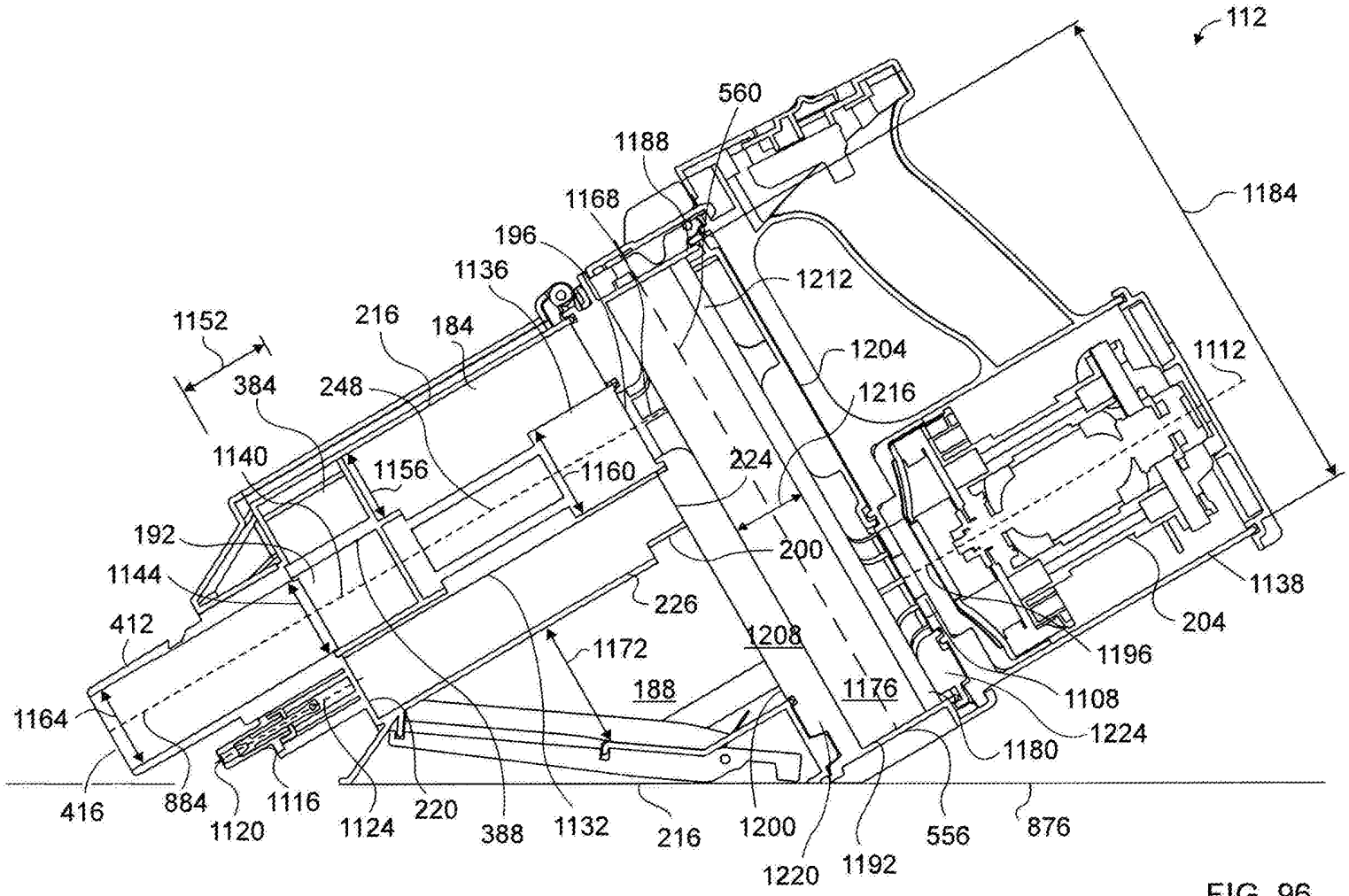


FIG. 96

Dyson Ex1004
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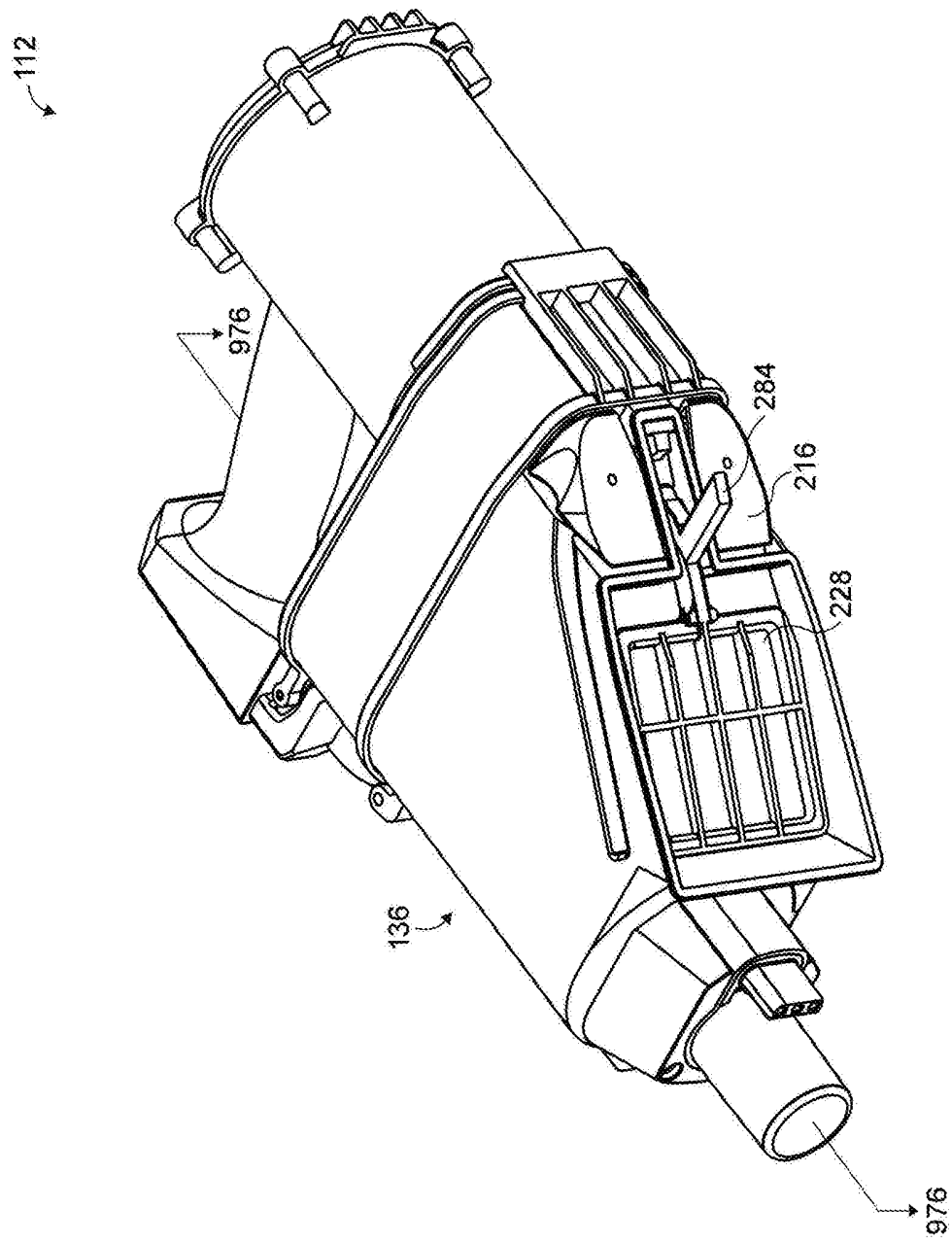


FIG. 97a

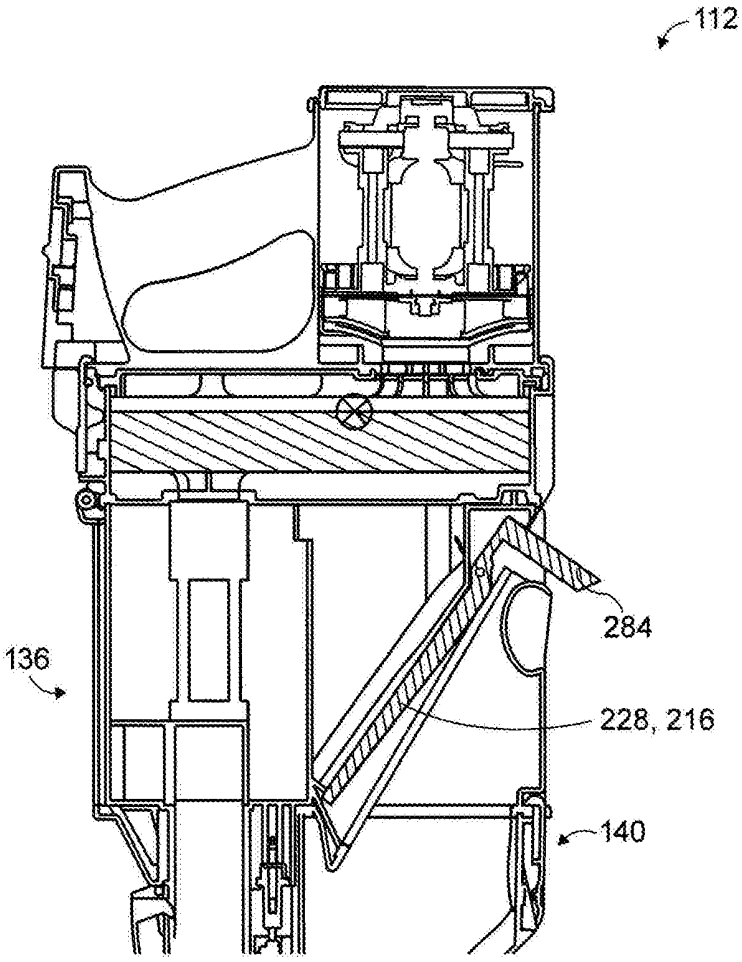


FIG. 97b

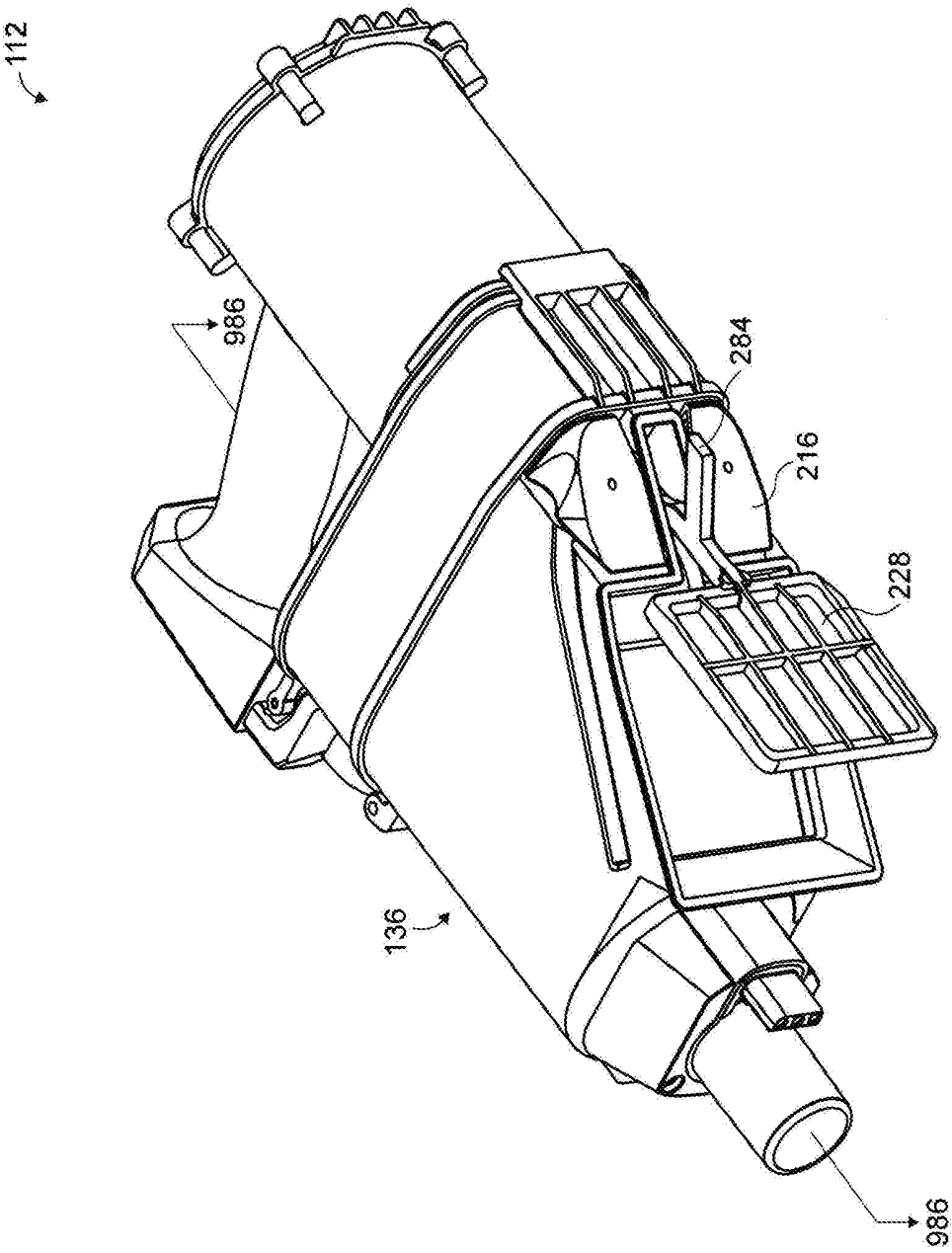


FIG. 98a

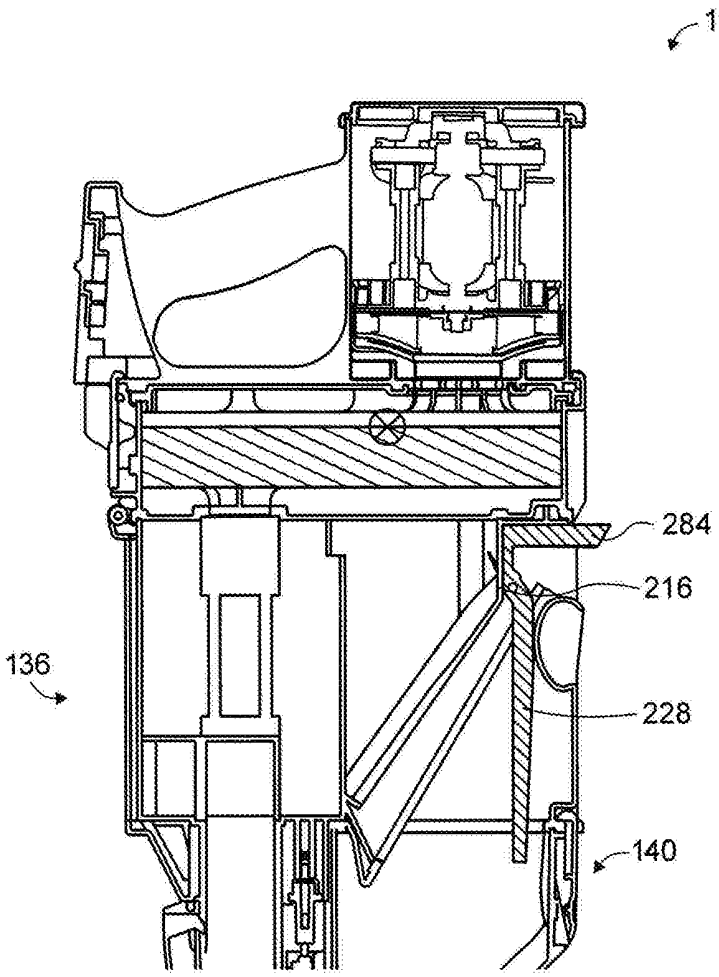


FIG. 98b

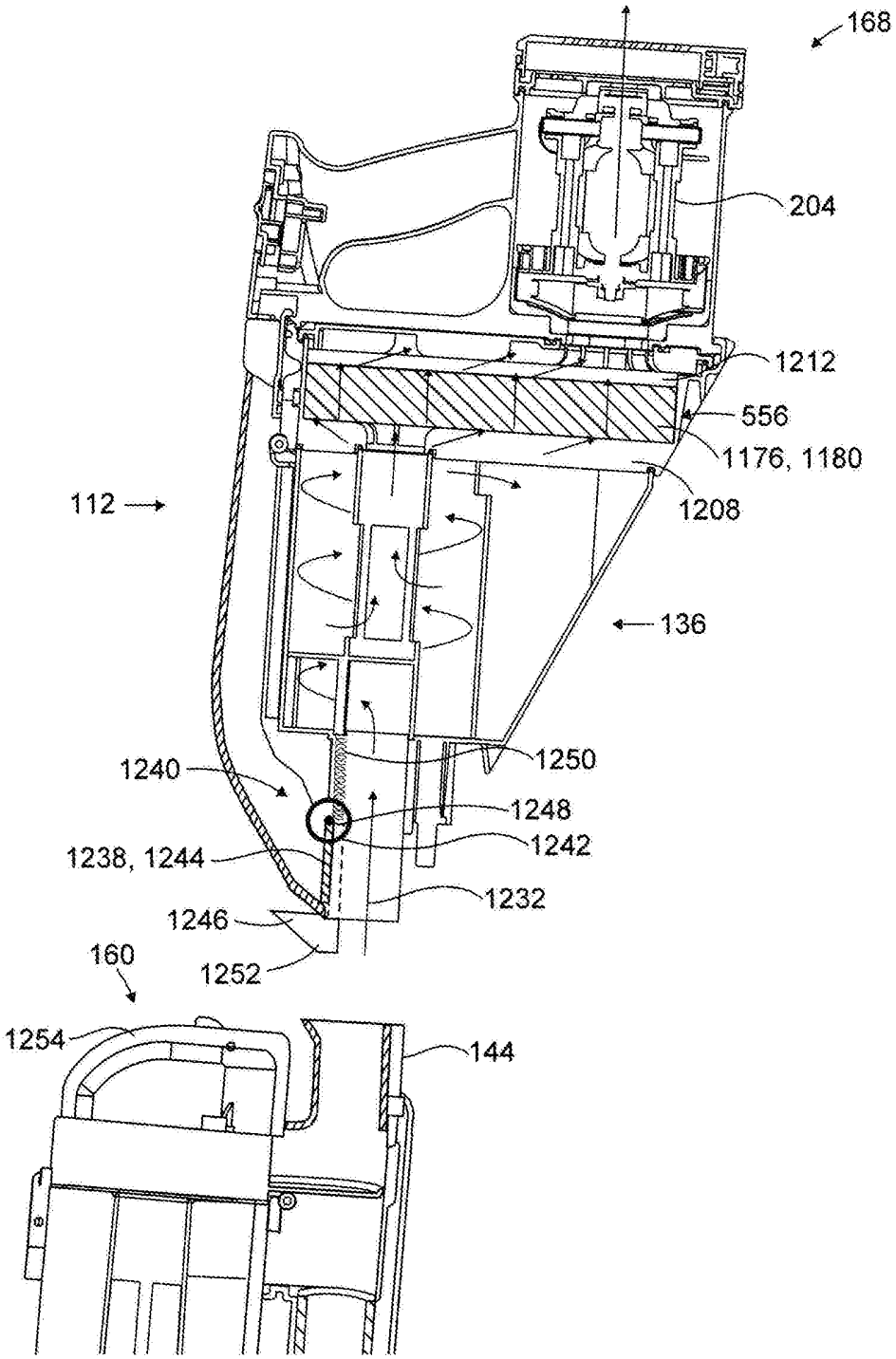

168
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FIG. 99

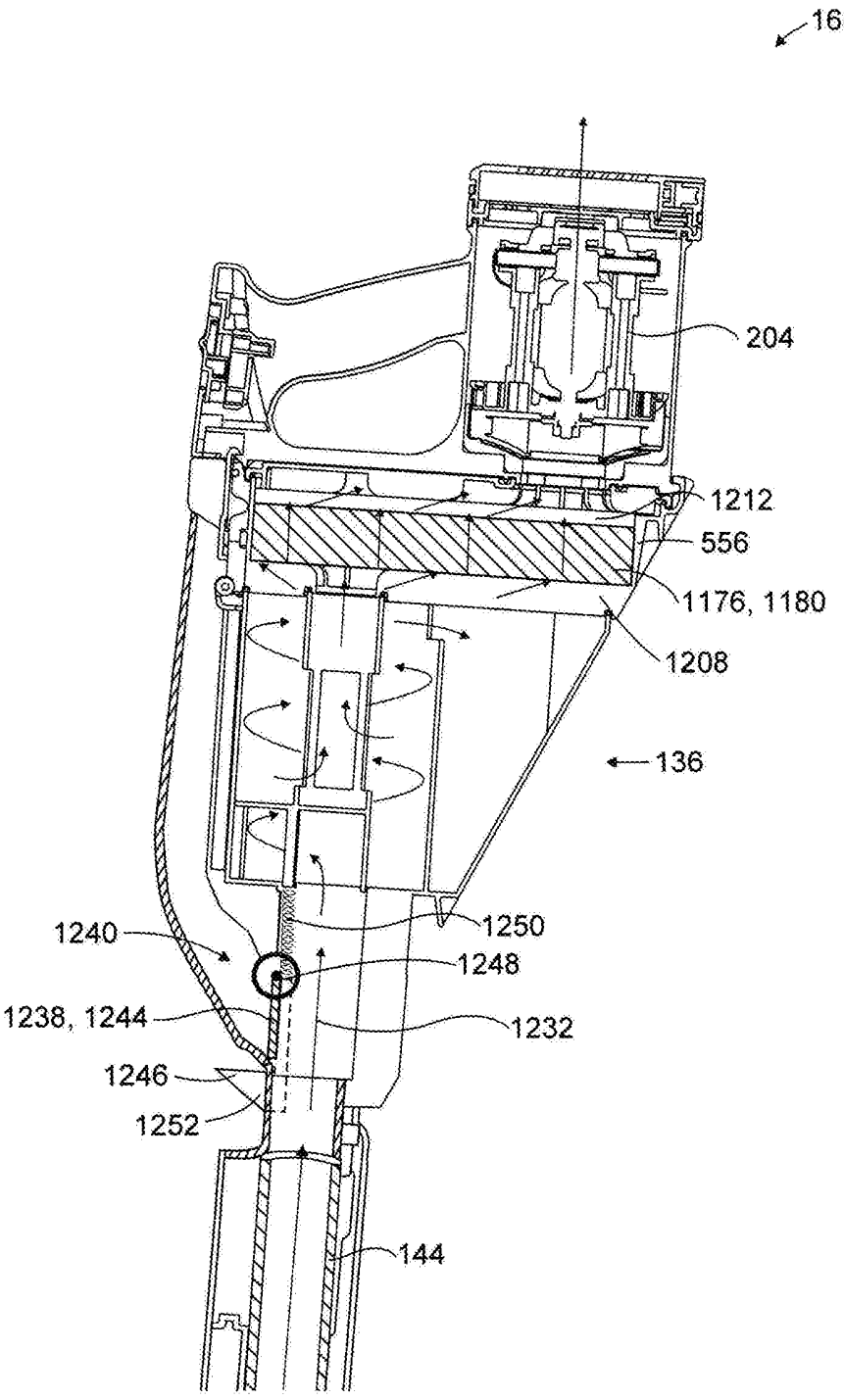

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FIG. 100

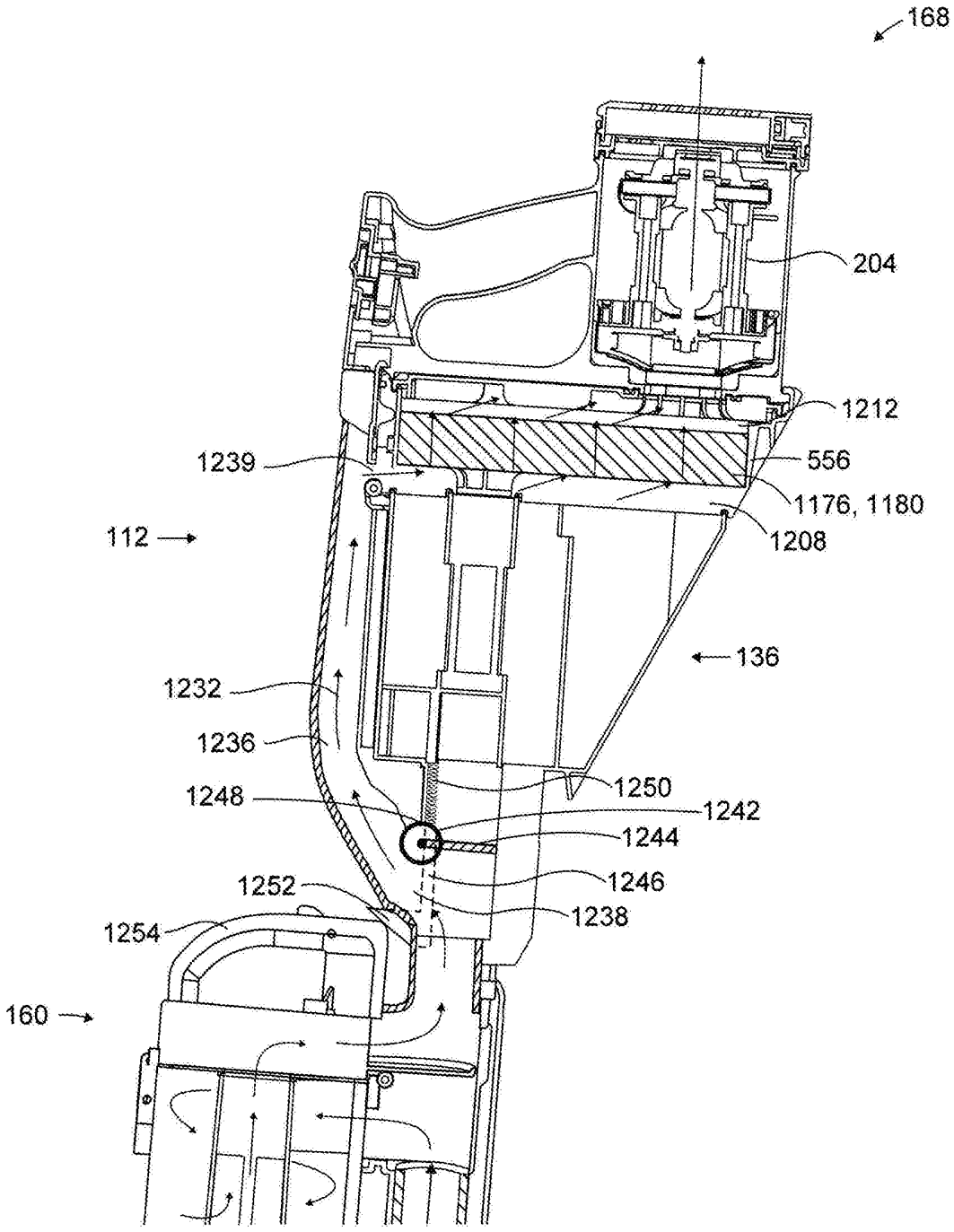

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FIG. 101

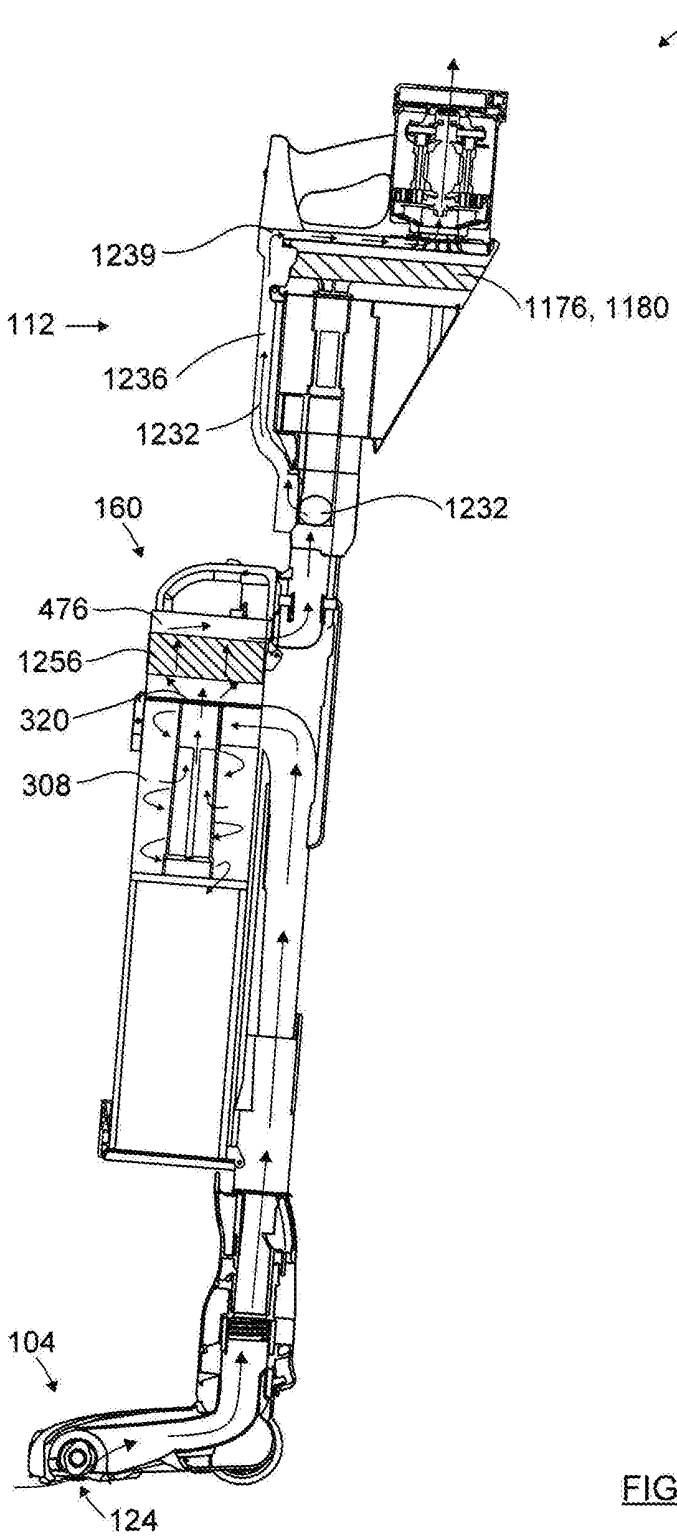

168
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1176, 1180
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104
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FIG. 102

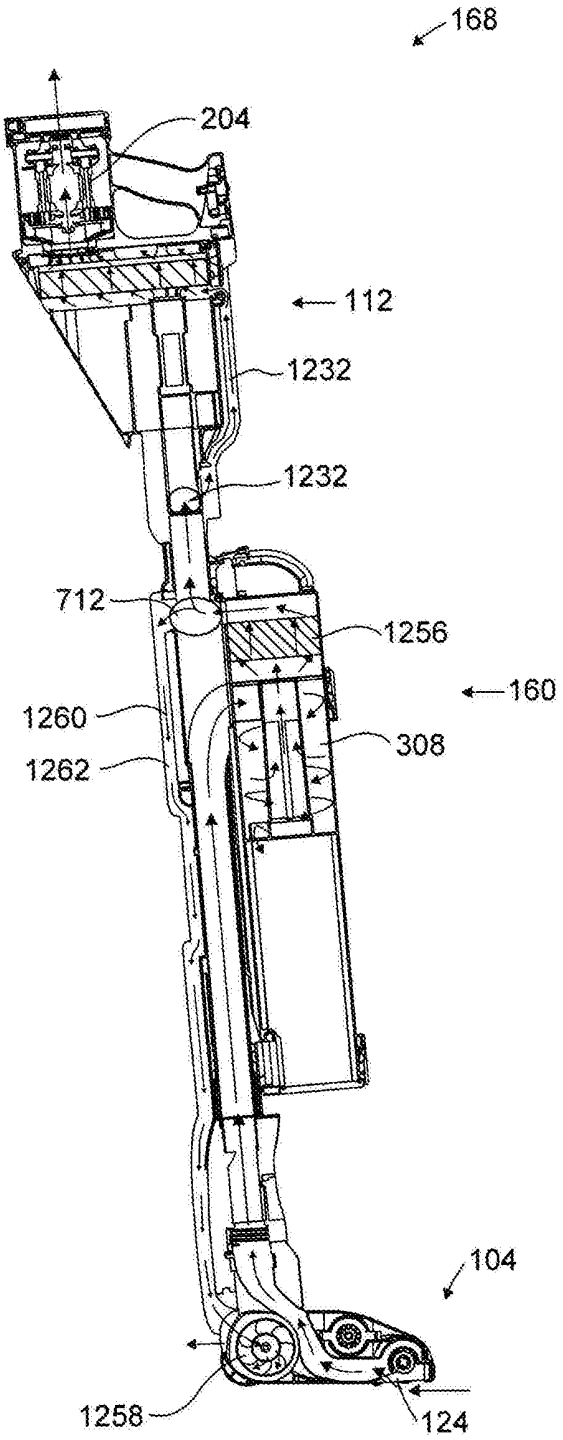


FIG. 103

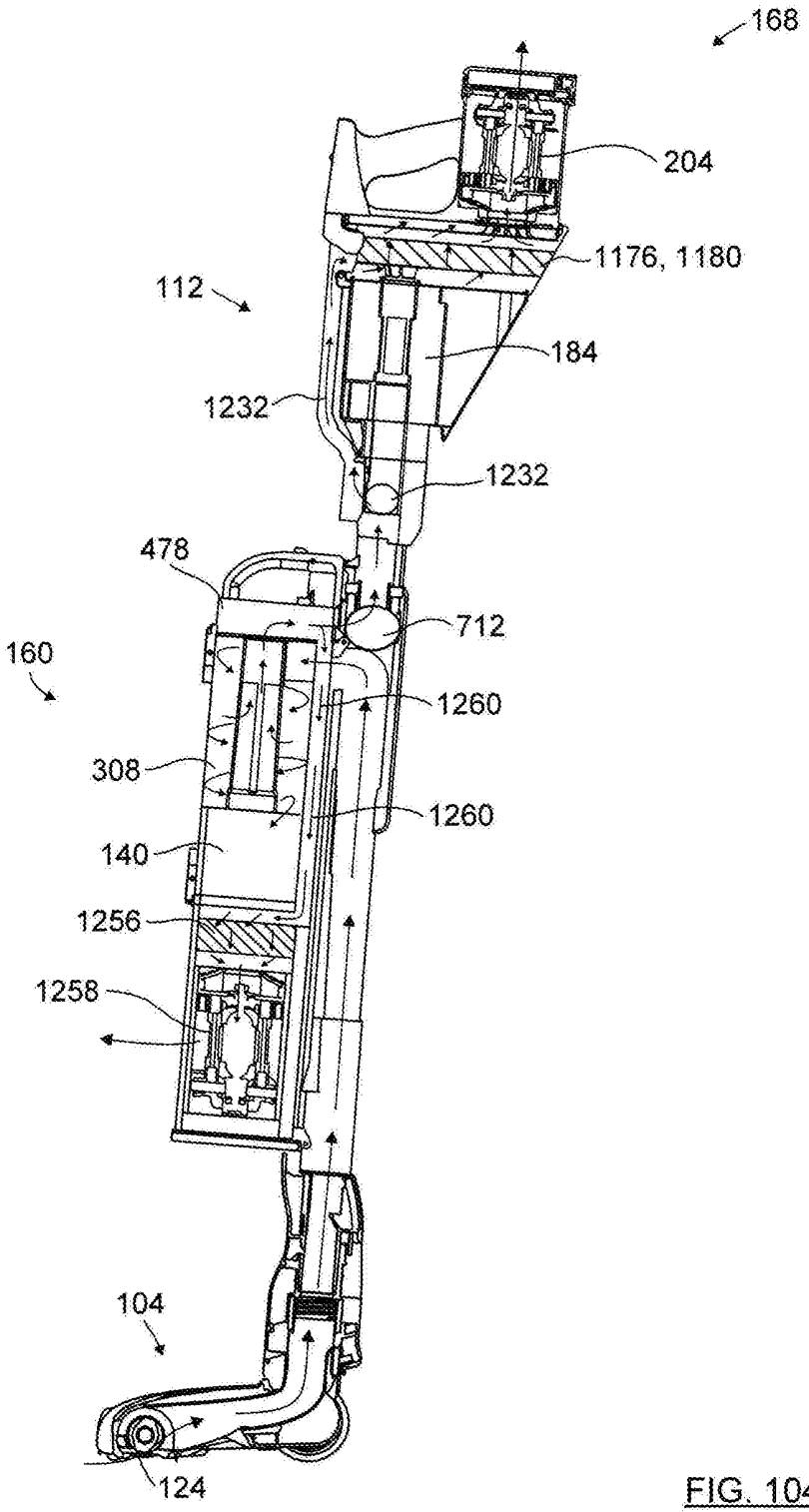

168
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FIG. 104a

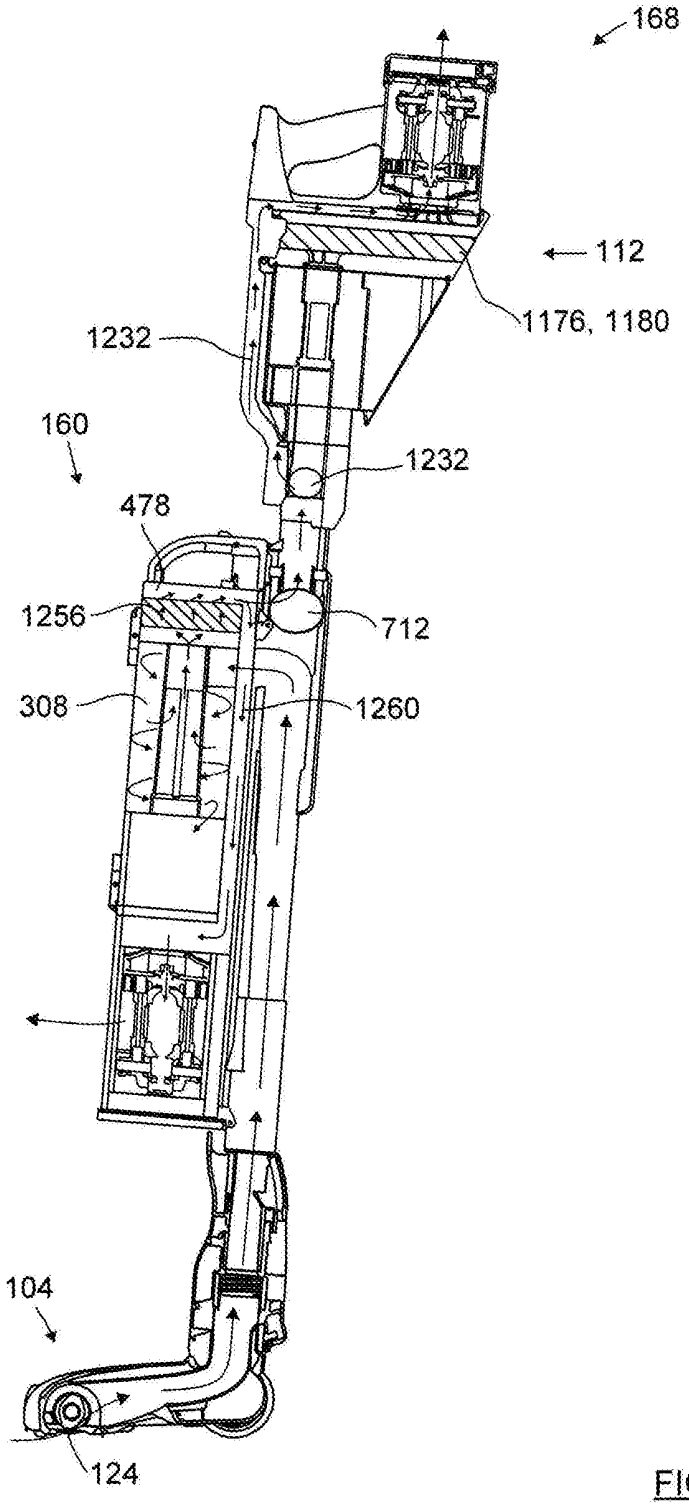


FIG. 104b

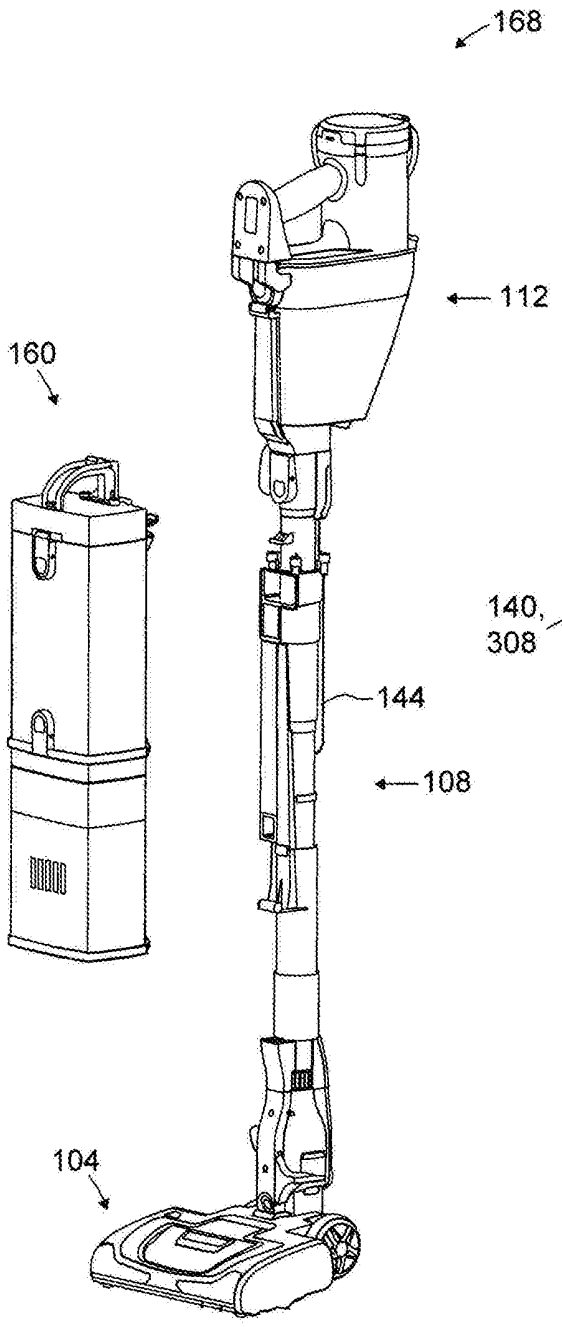


FIG. 105a

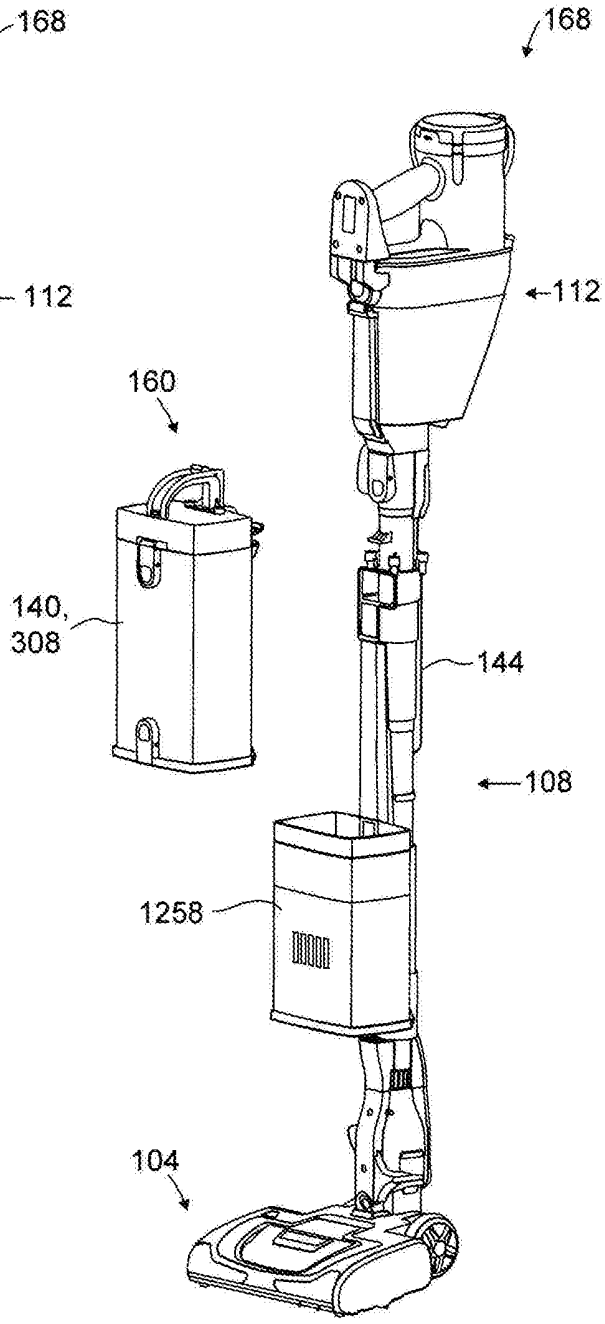


FIG. 105b

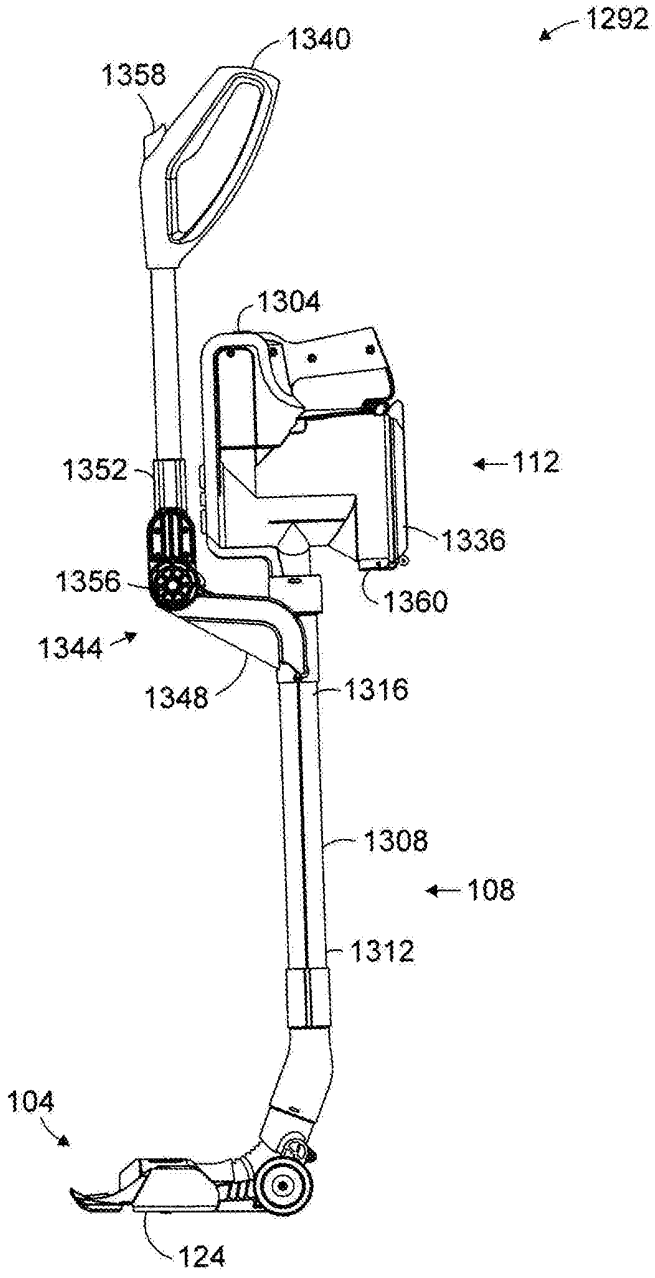

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FIG. 106

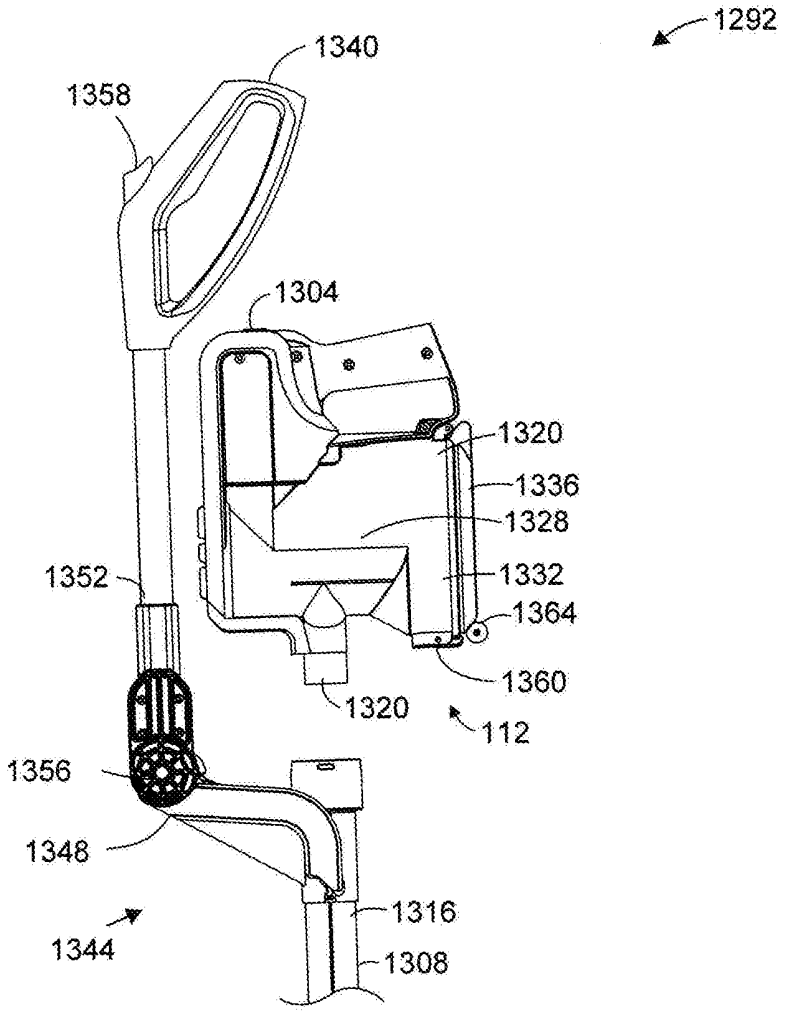

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FIG. 107

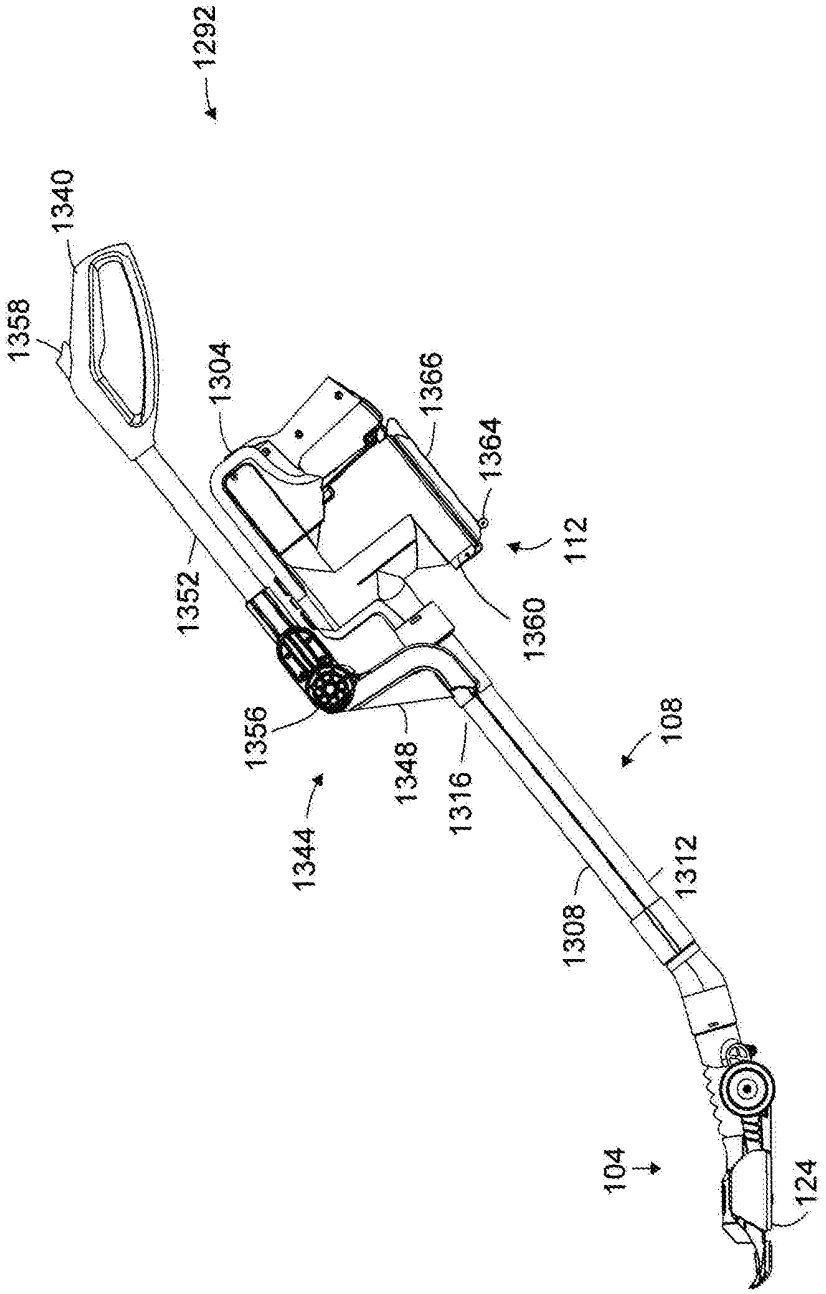

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FIG. 108

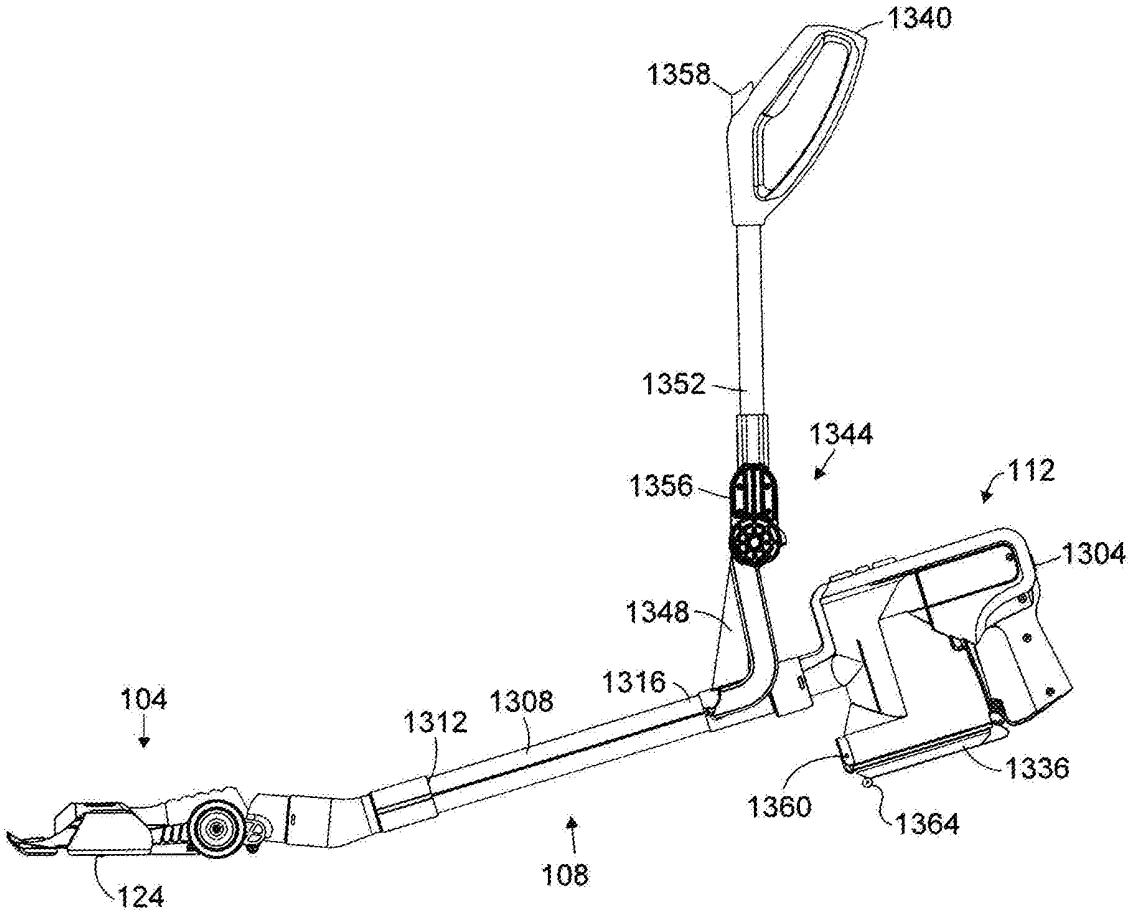


FIG. 109

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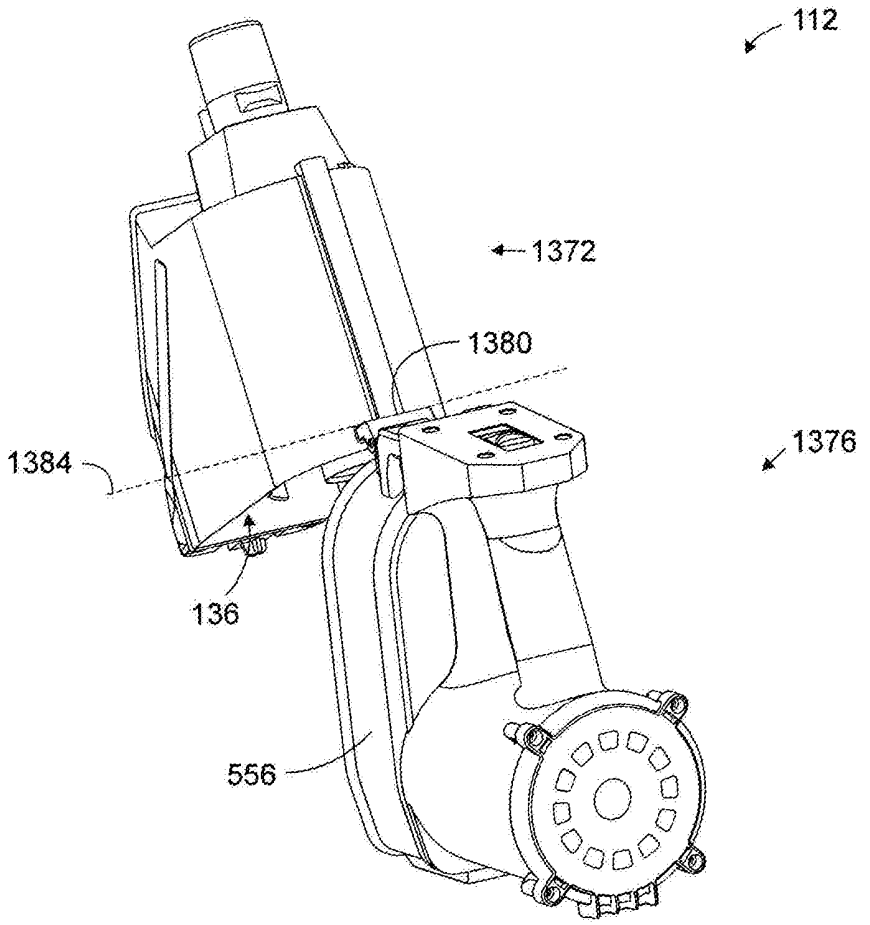


FIG. 110a

Dyson Ex1004
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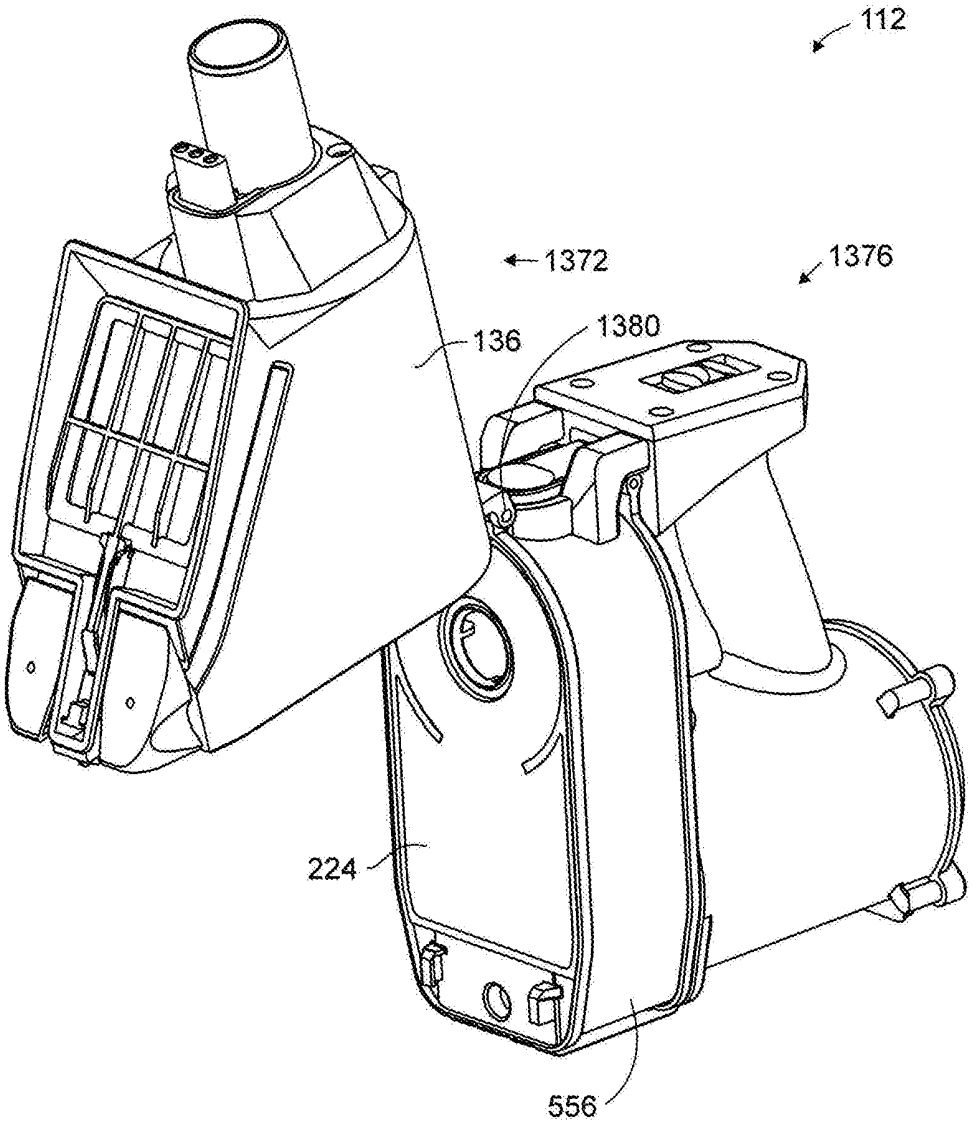


FIG. 110b

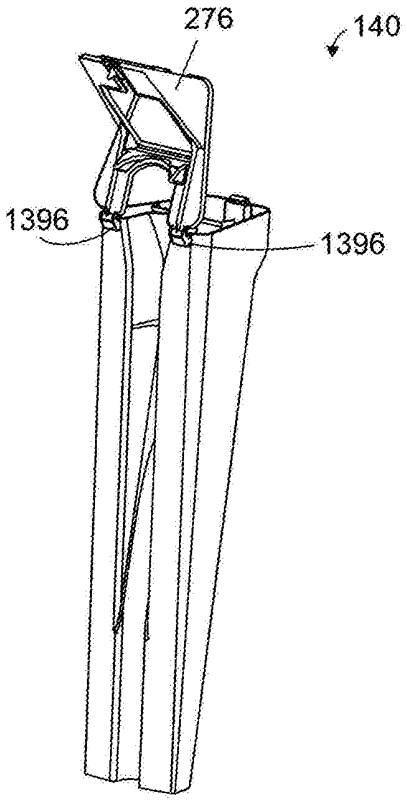


FIG. 111

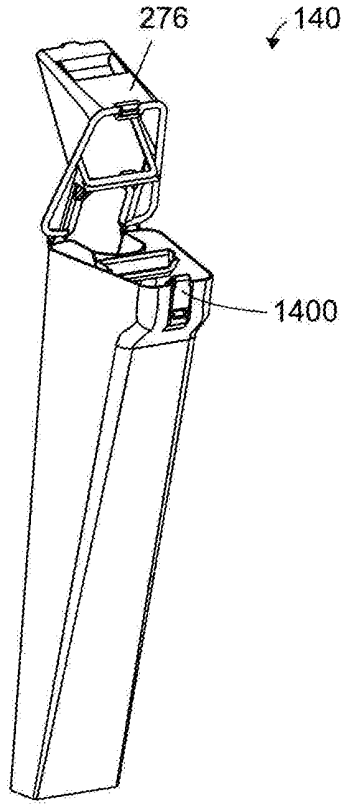


FIG. 112

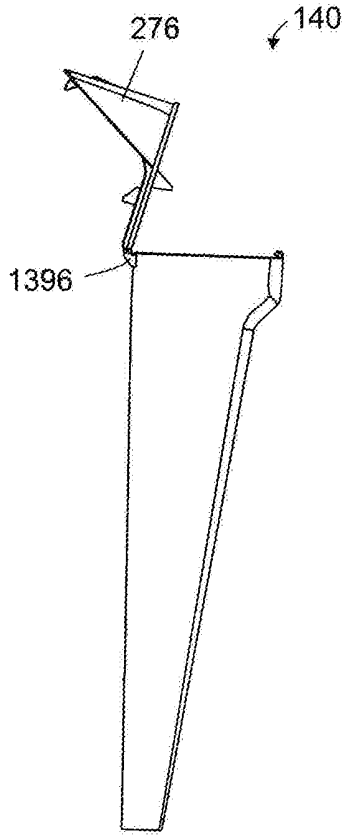


FIG. 113

Dyson Ex1004
Page 205

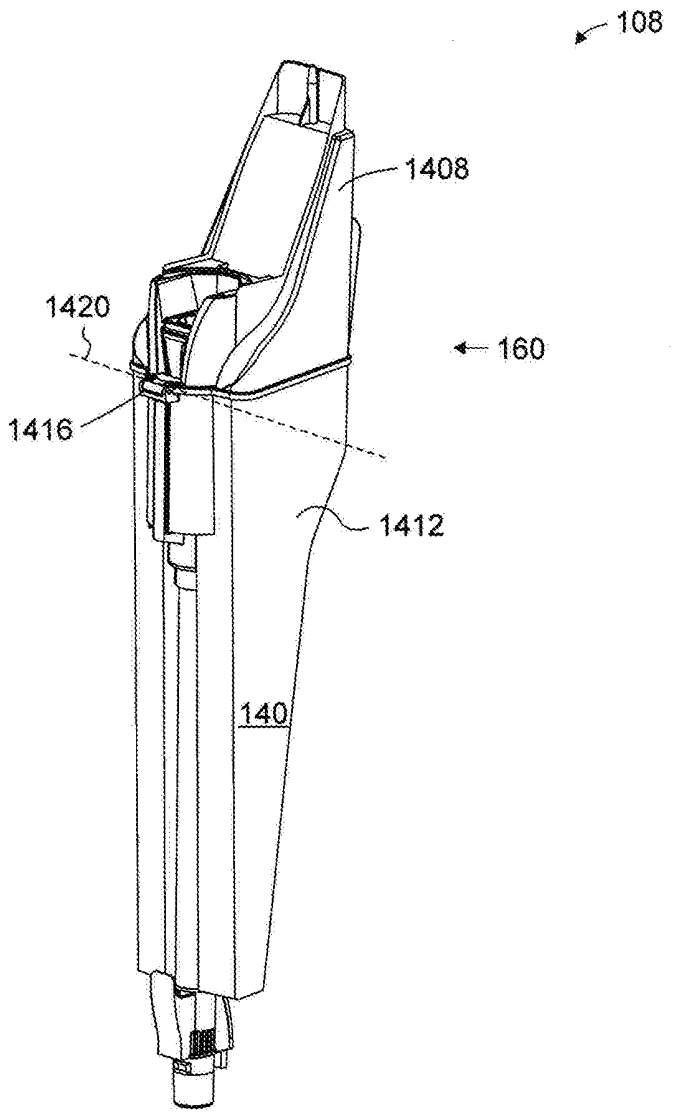


FIG. 114

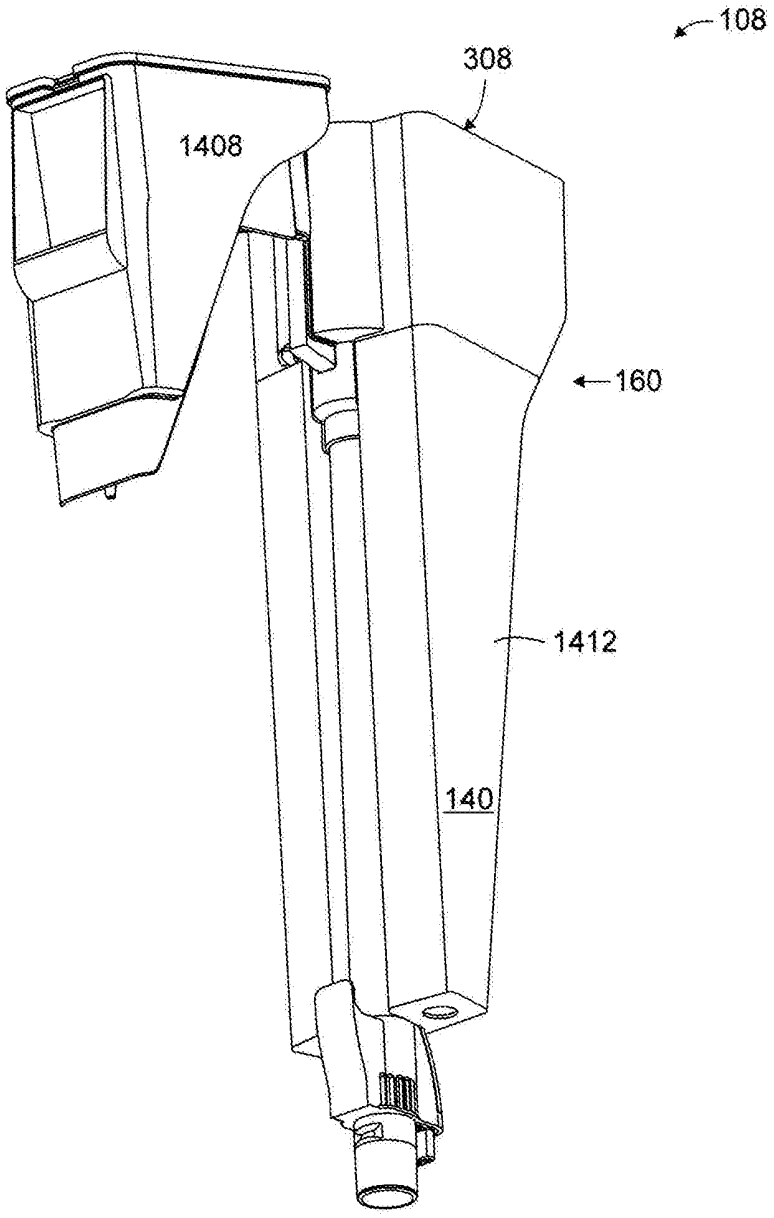


FIG. 115

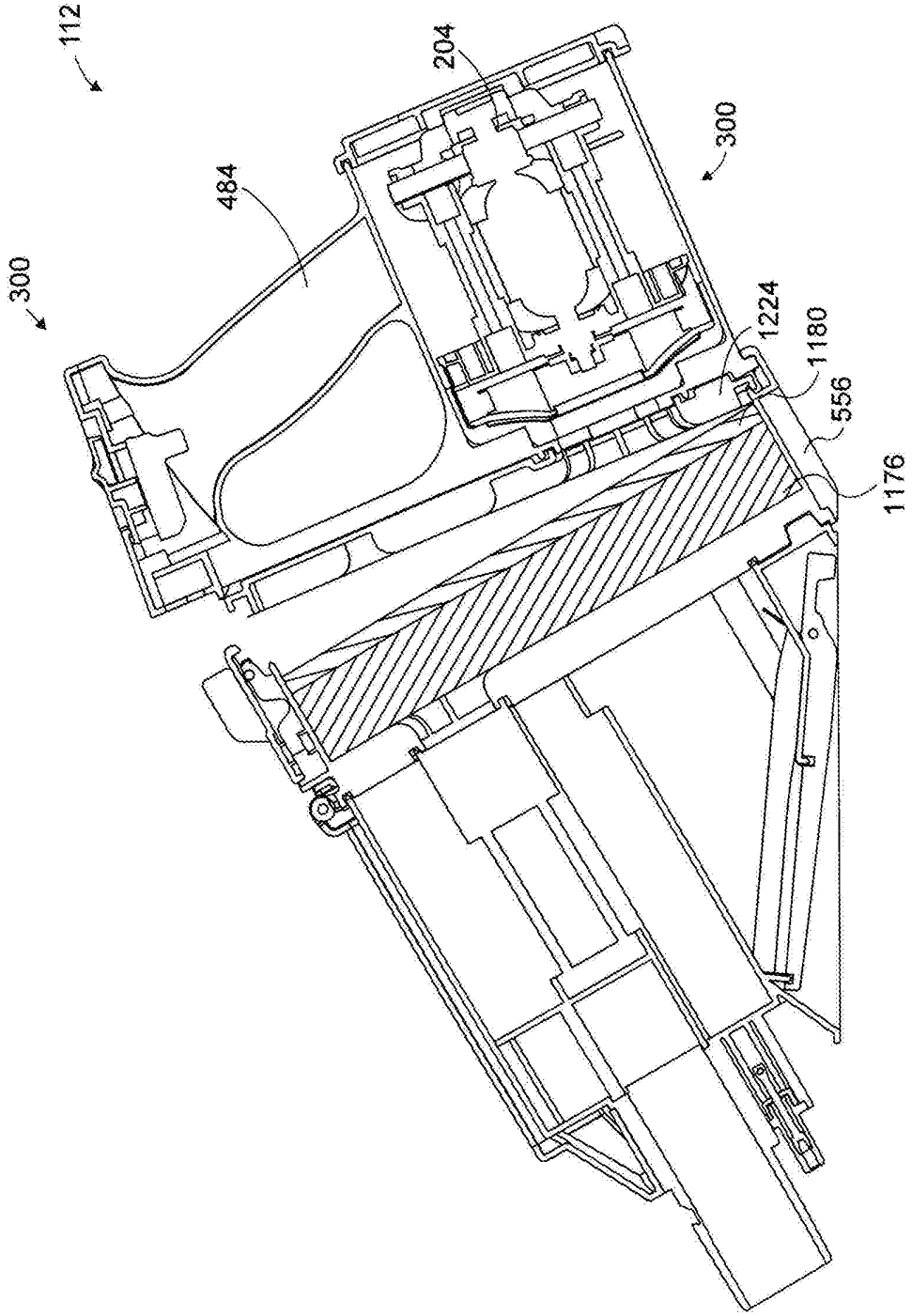


FIG. 116

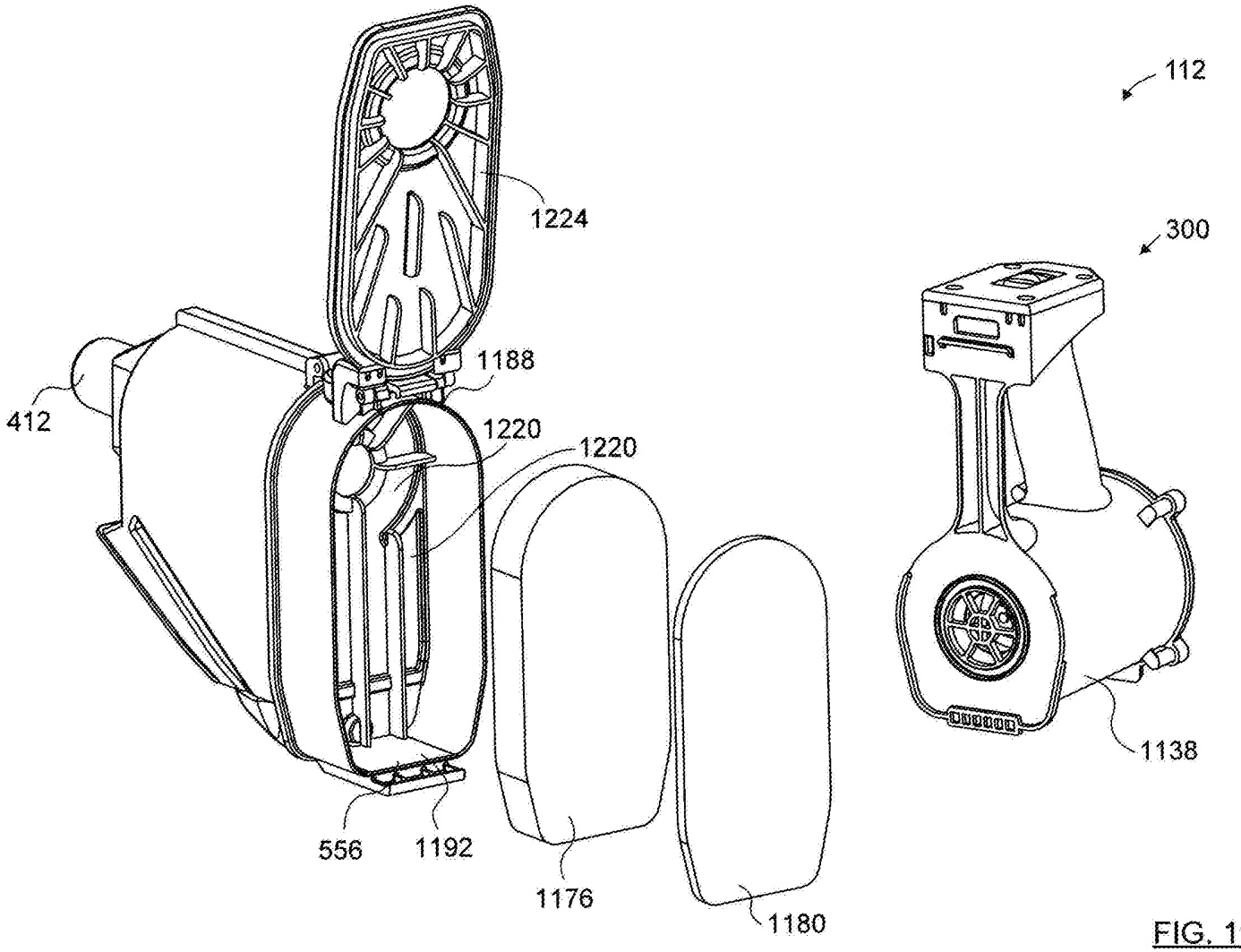


FIG. 117

Dyson Ex1004
Page 209

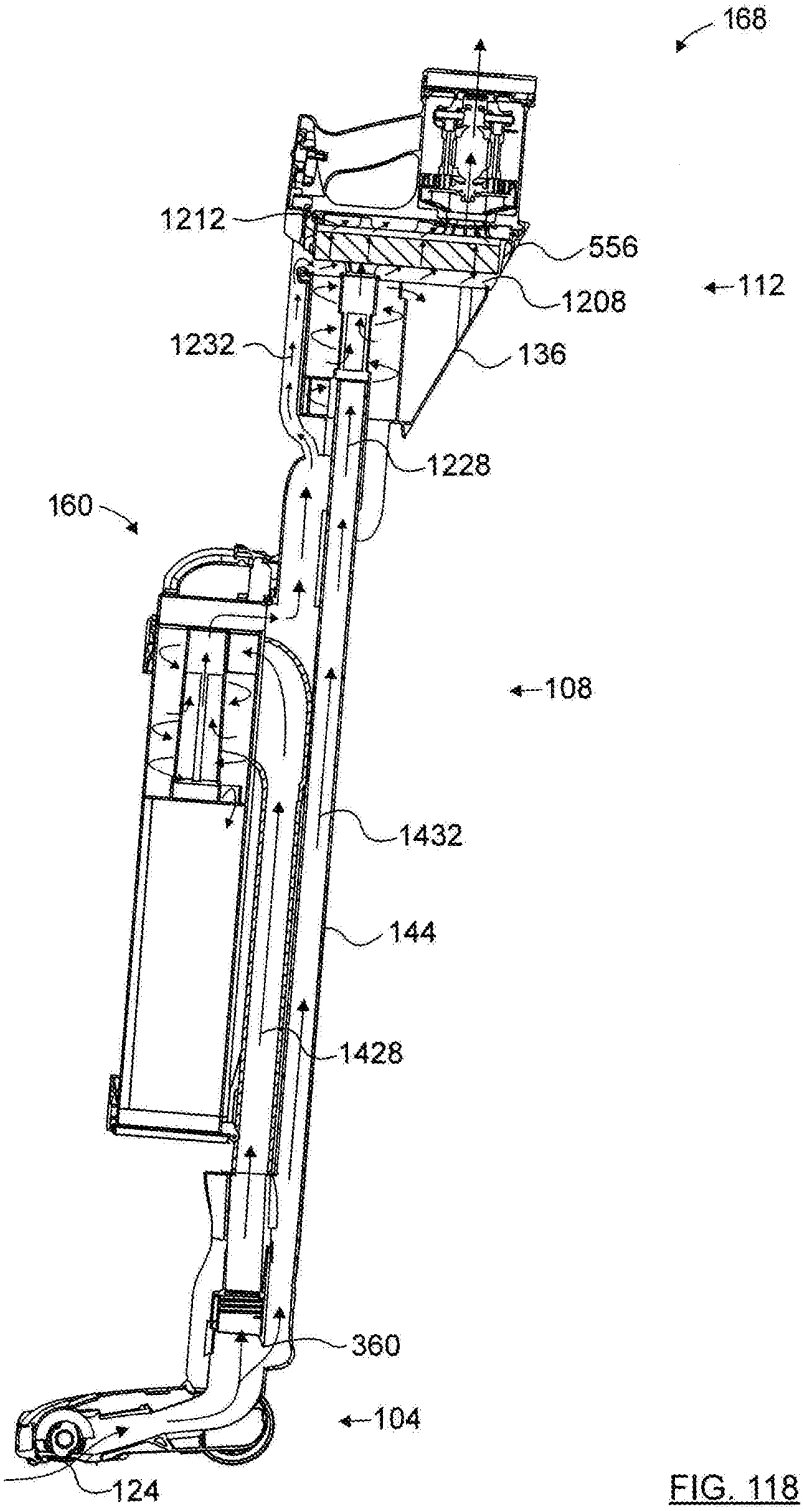

168
1212
556
112
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1228
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1428
360
104
124

FIG. 118

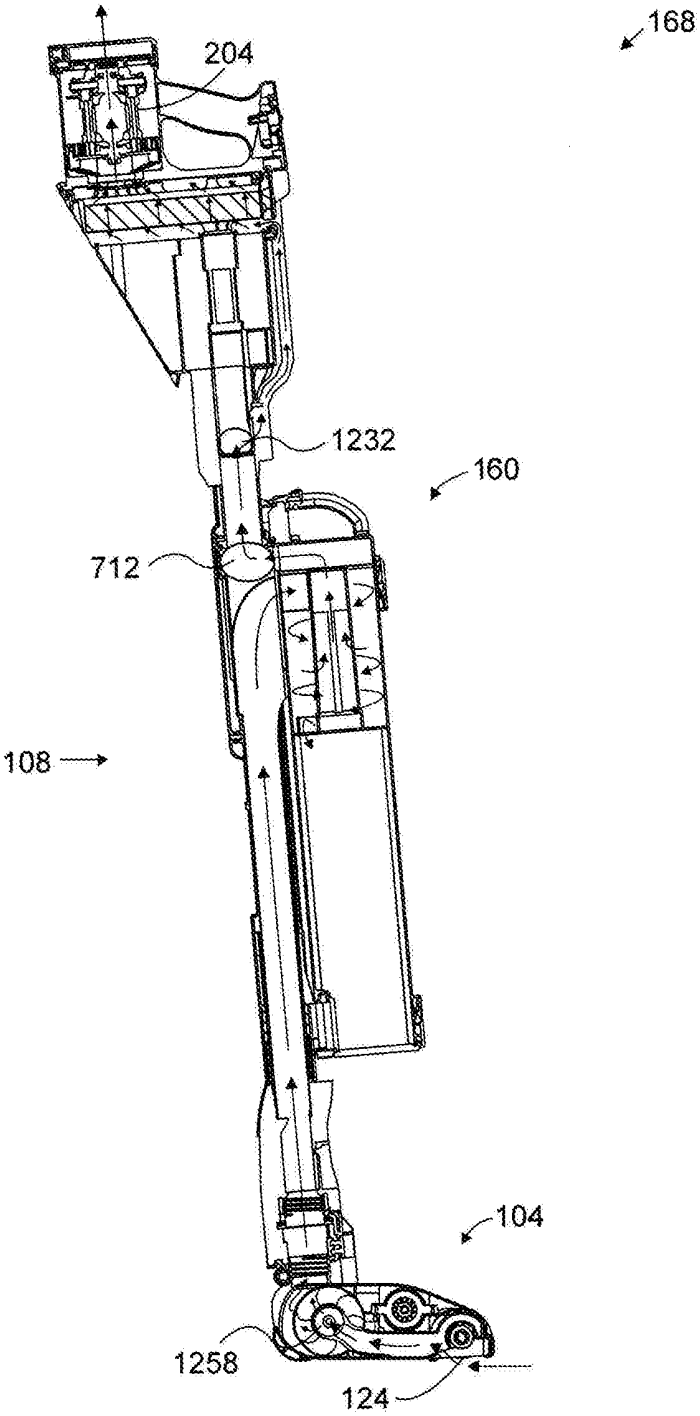


FIG. 119a

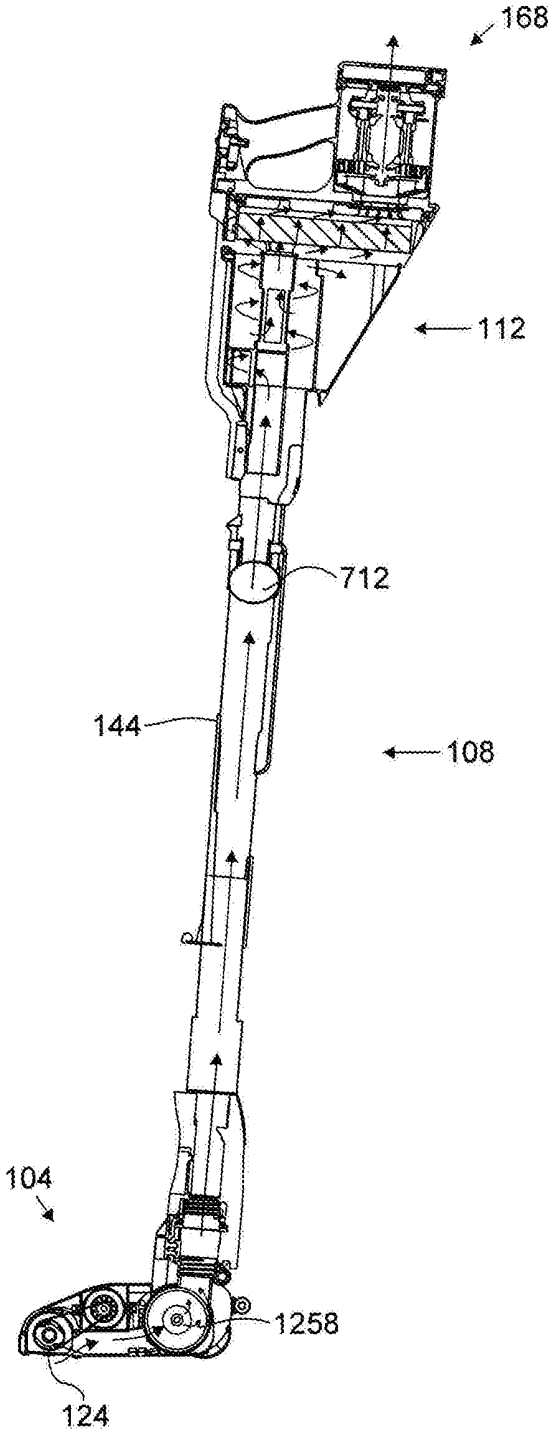


FIG. 119b

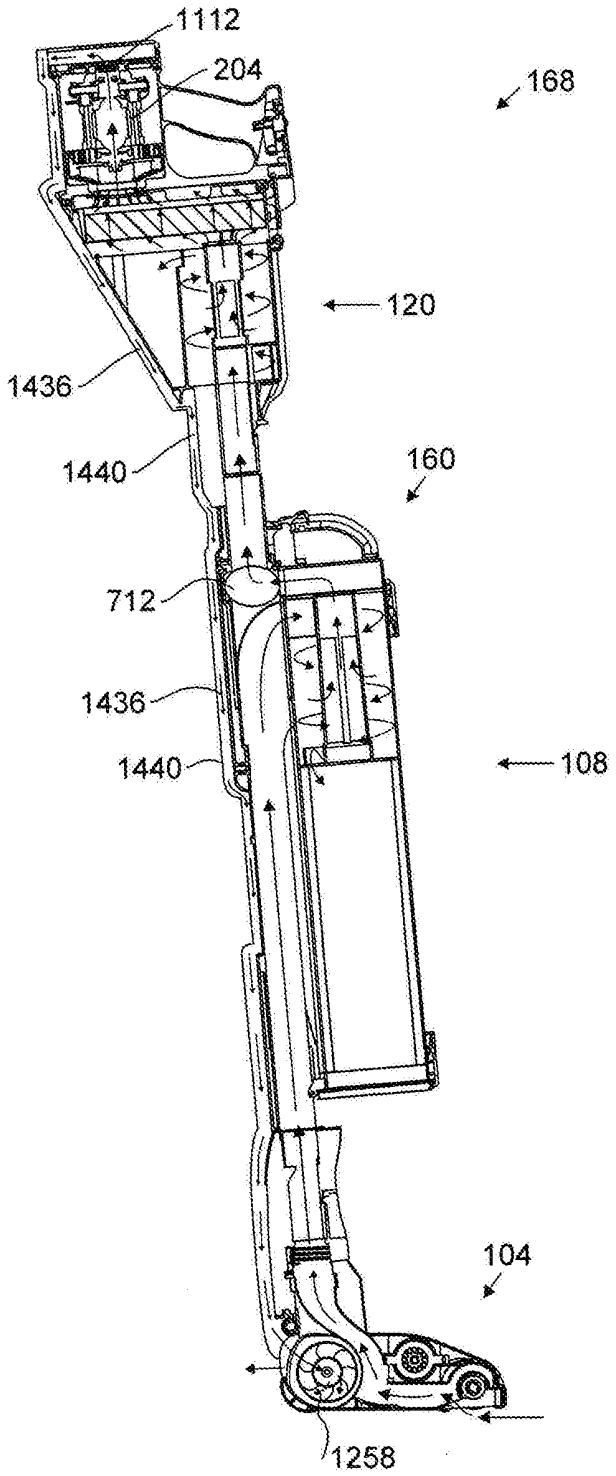


FIG. 120

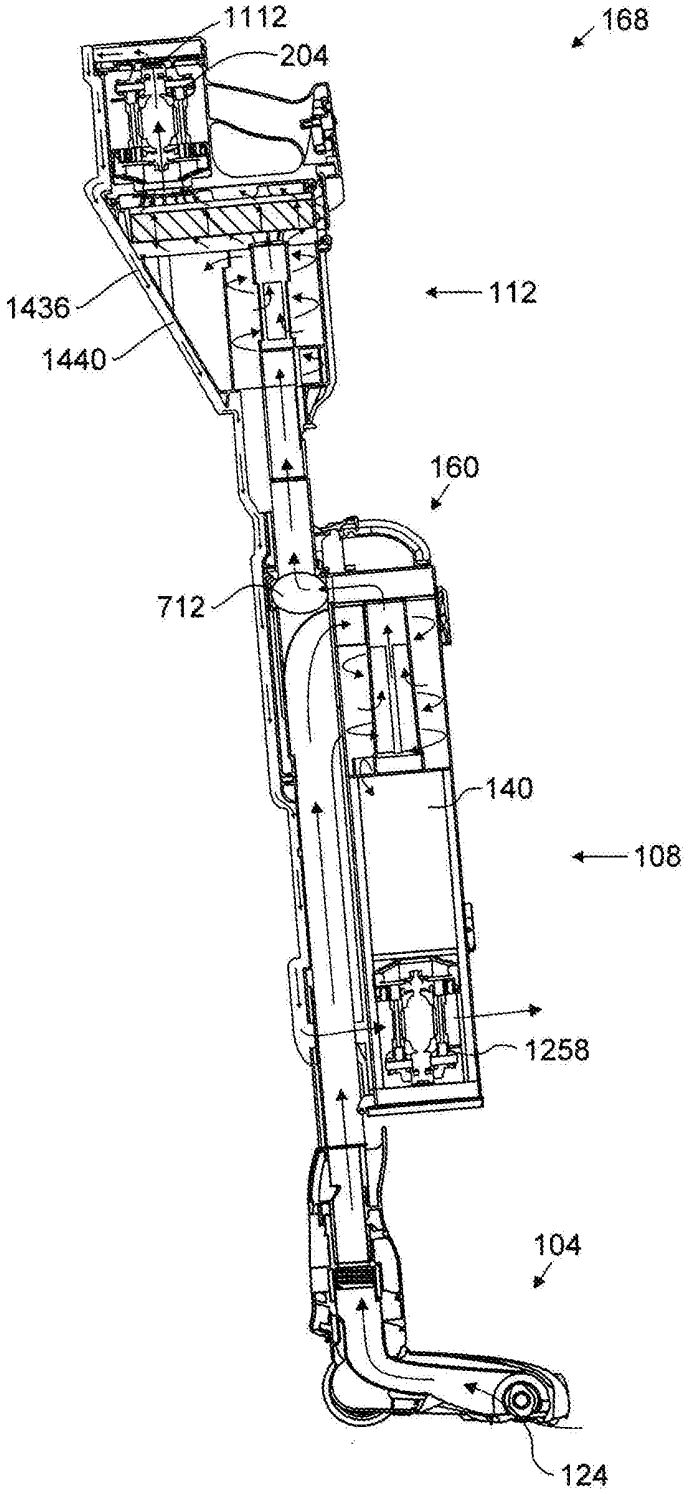


FIG. 121a

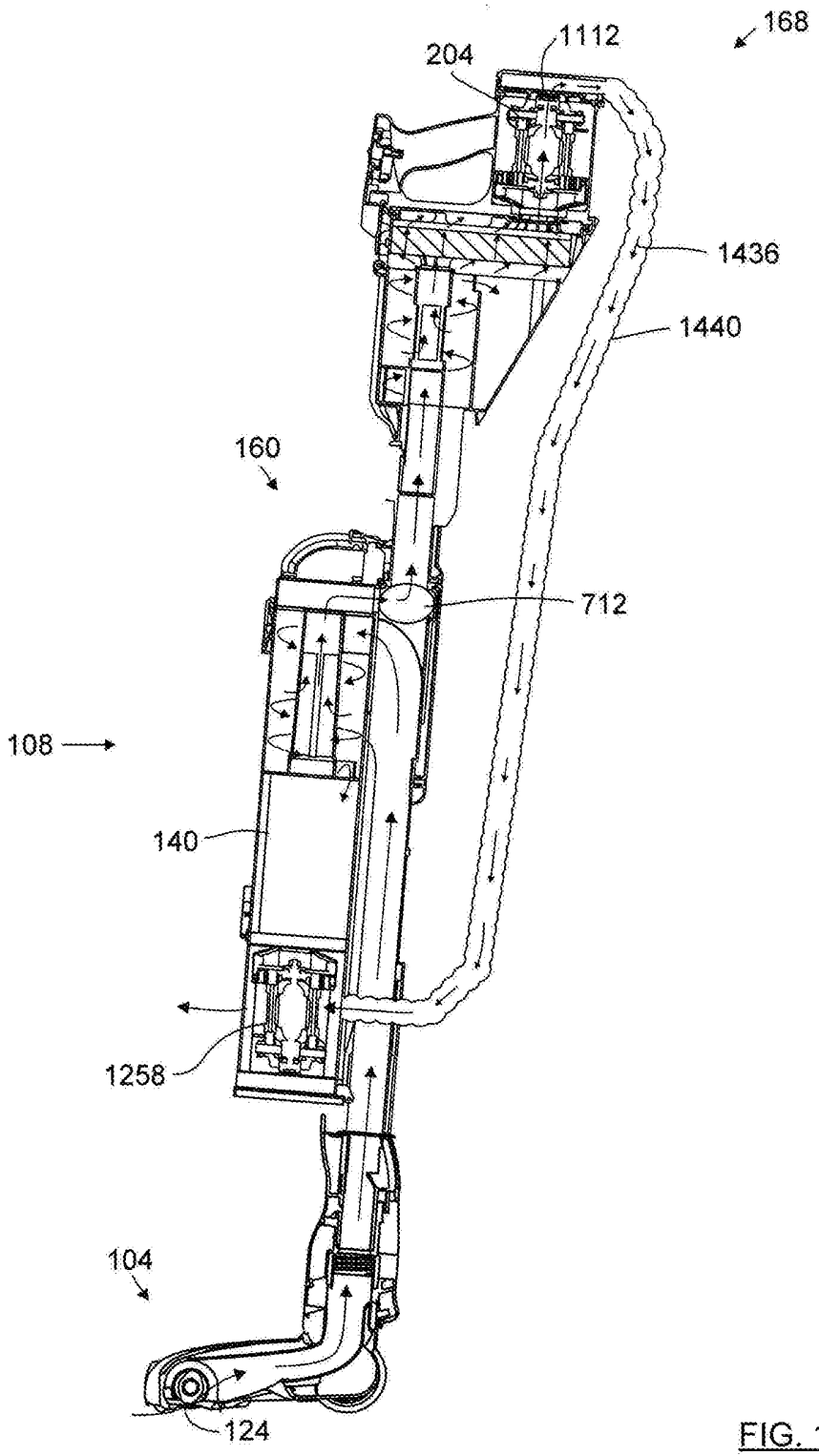


FIG. 121b

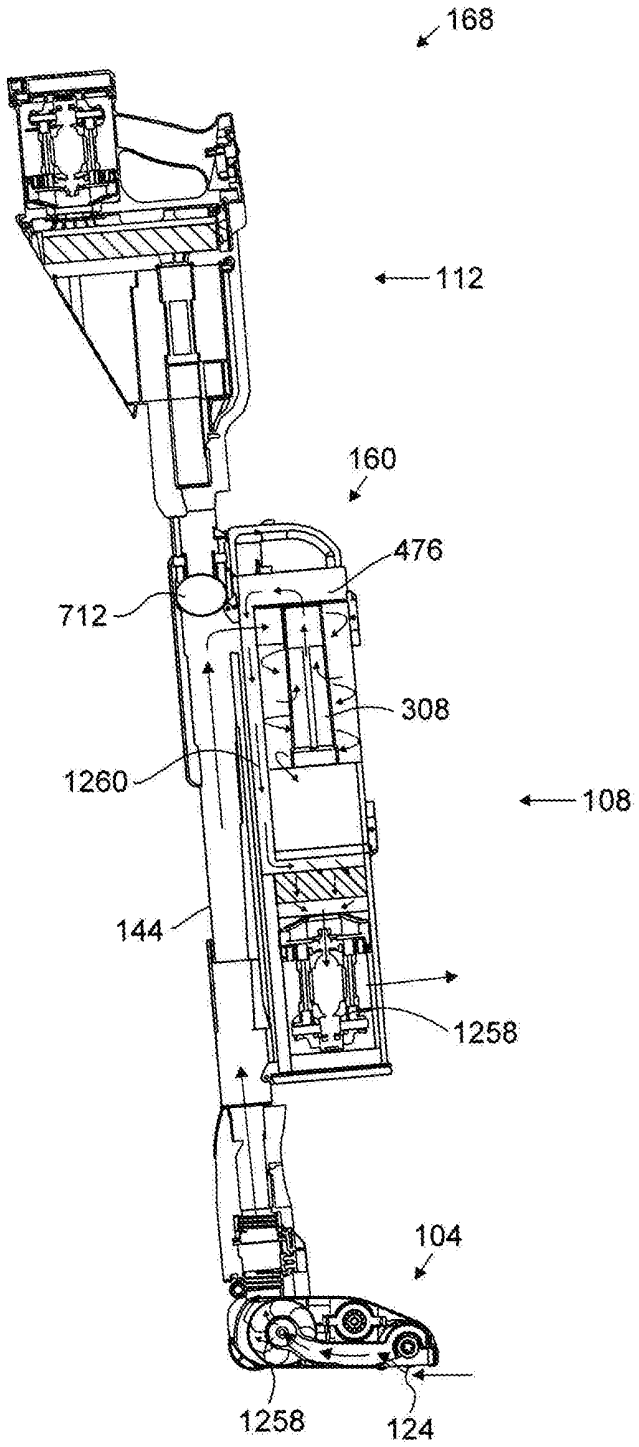


FIG. 122

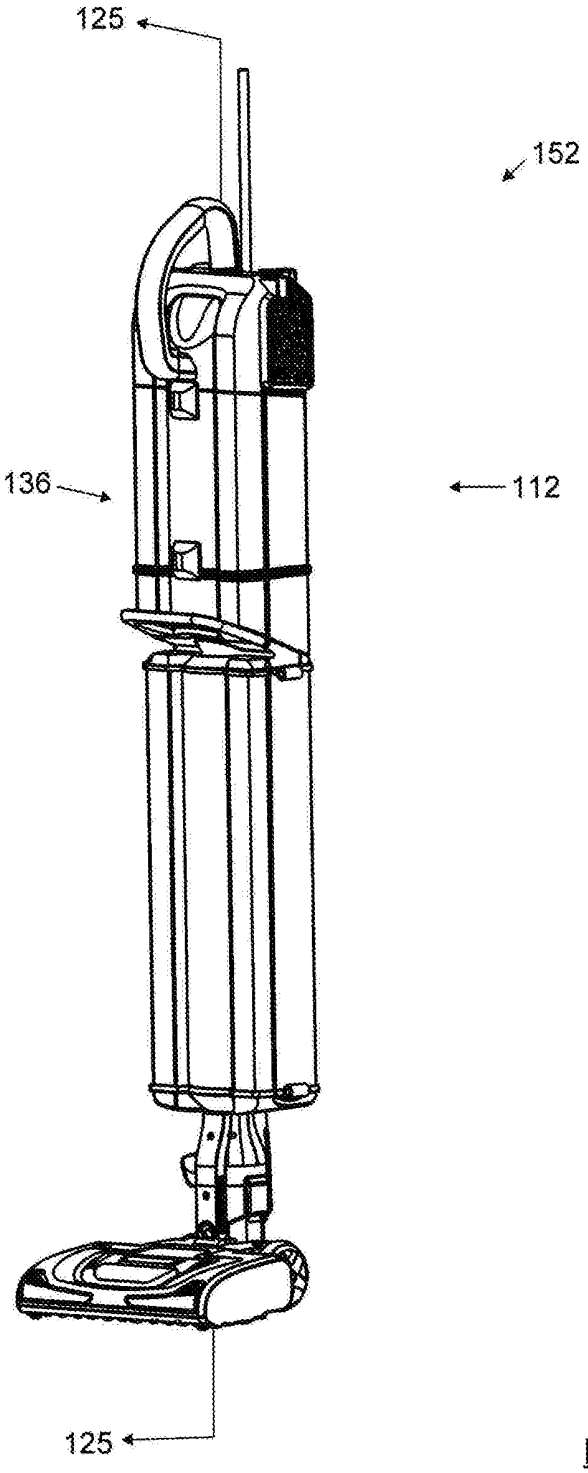


FIG. 123

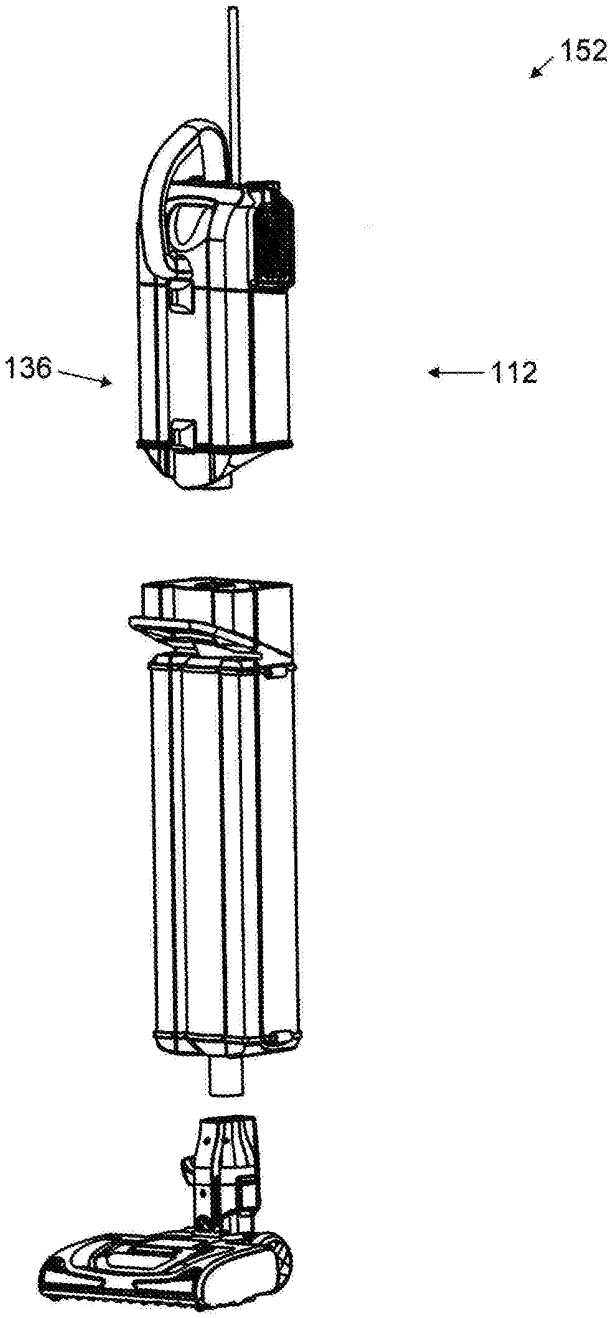


FIG. 124

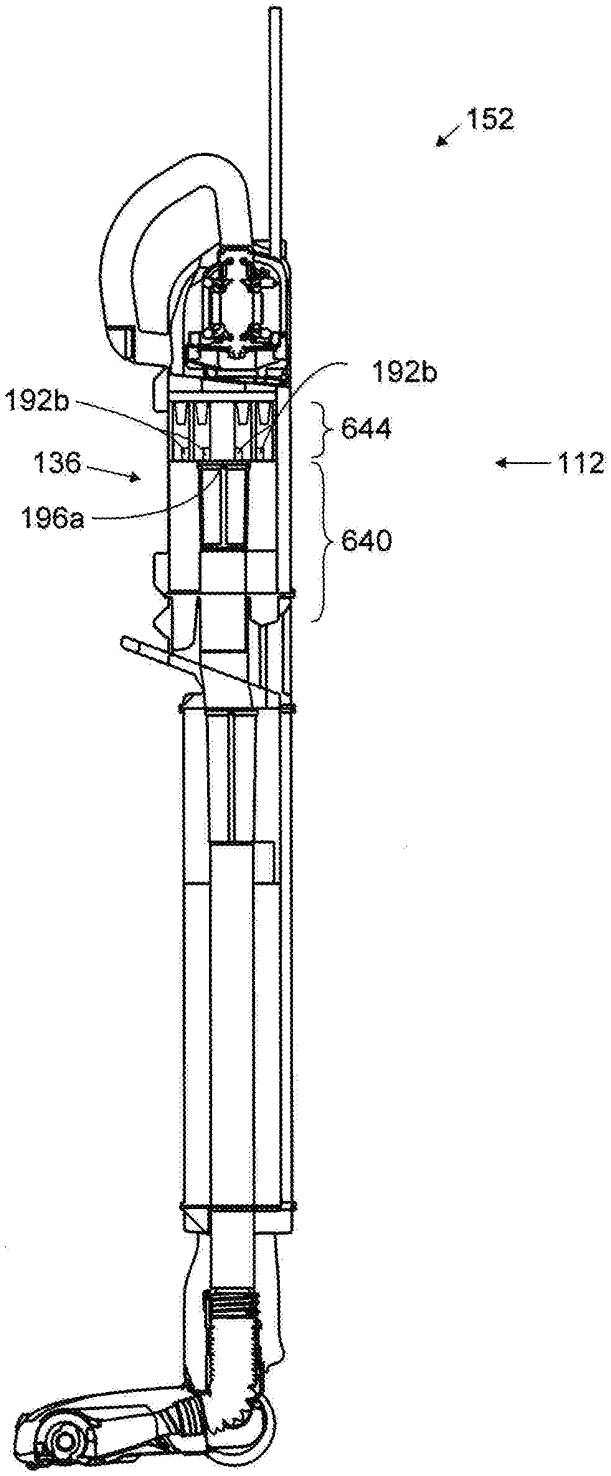


FIG. 125

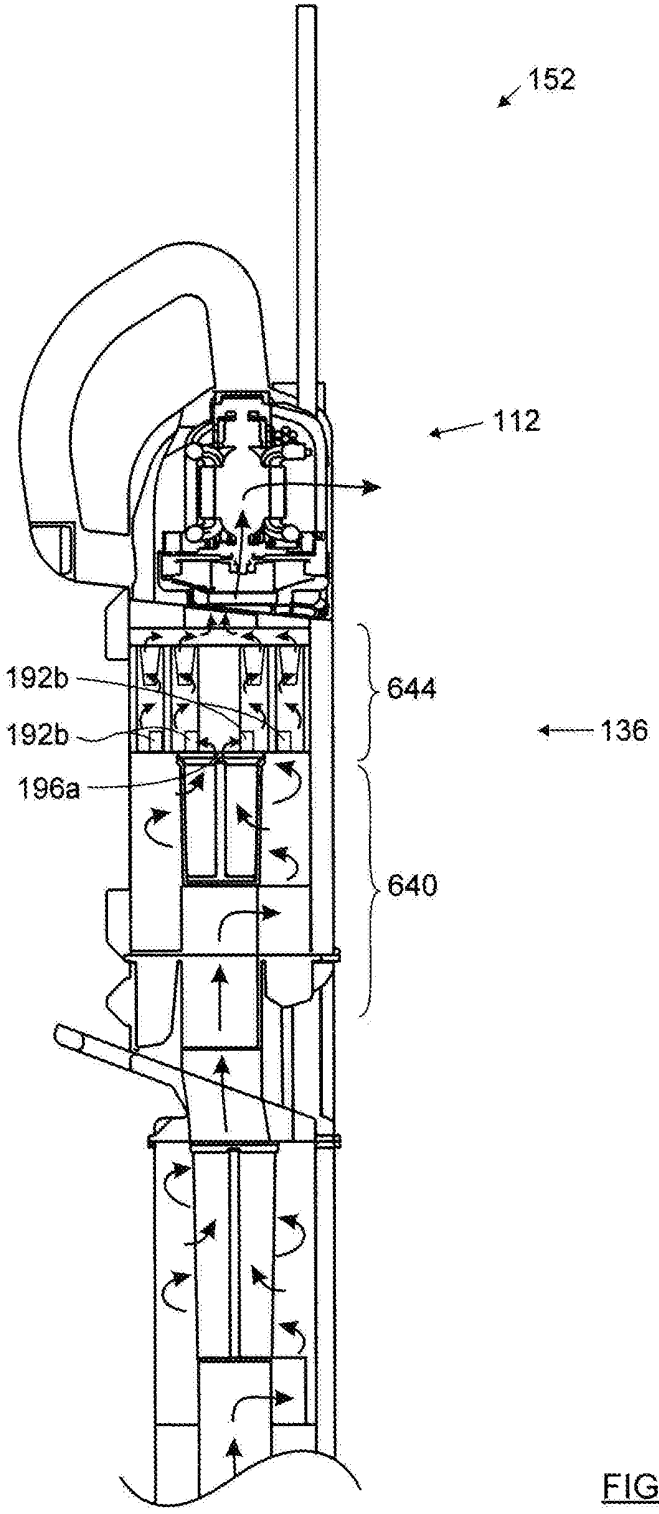


FIG. 126

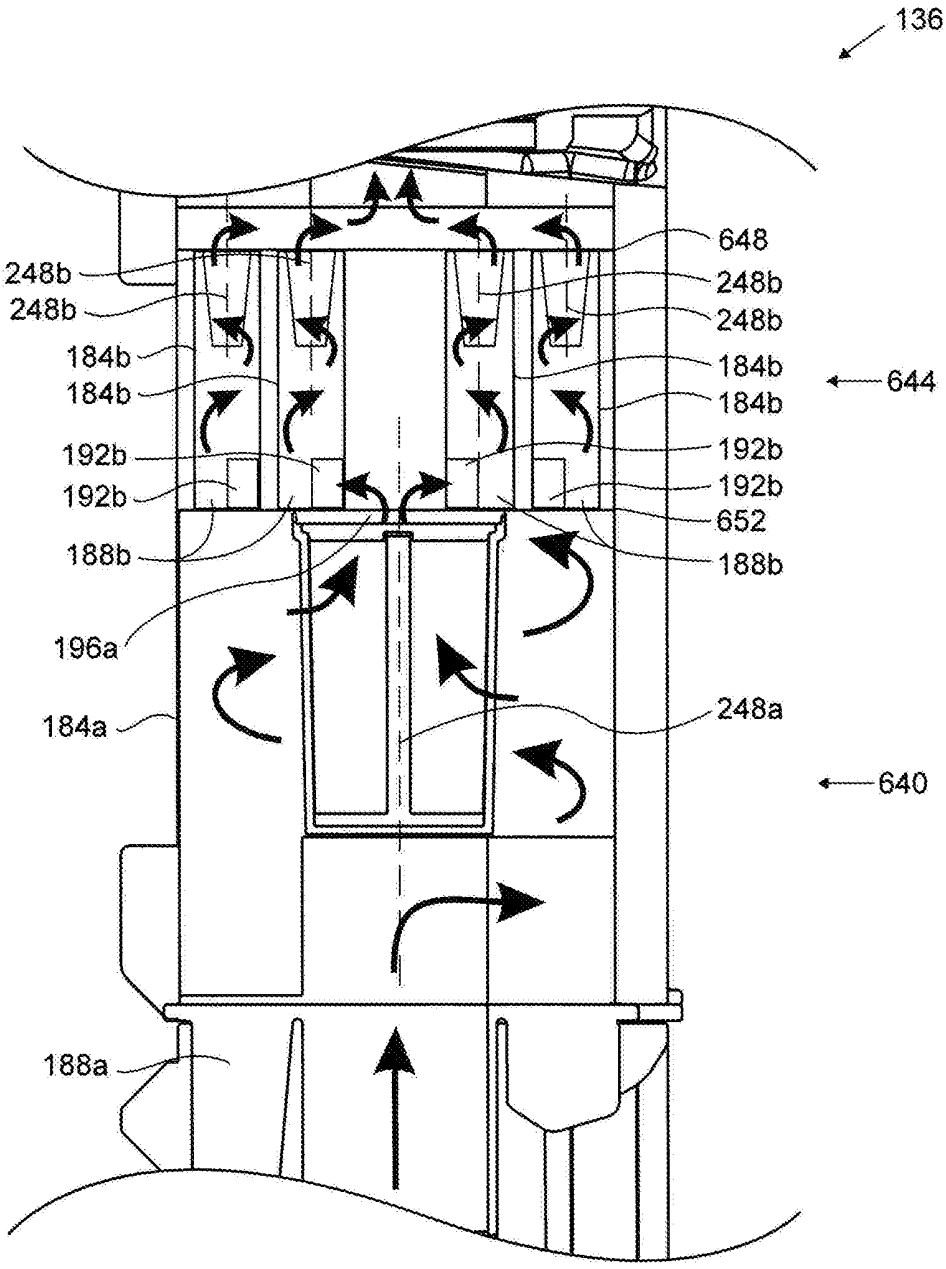

136
648
248b
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188b
196a
184a
248a
640
188a

FIG. 127

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	10452-P46958US04
	Application Number	
Title of Invention	SURFACE CLEANING APPARATUS	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 — Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Wayne	Ernest	Conrad	

Residence Information (Select One) US Residency ● Non US Residency Active US Military Service

City	Hampton	Country of Residence i	CA

Mailing Address of Inventor:

Address 1	9 King Lane		
Address 2			
City	Hampton	**State/Province**	ON
Postal Code	L0B 1J0	**Country** i	CA

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	01059		
Email Address	pmdcosta@bereskinparr.com	Add Email	Remove Email

Application Information:

Title of the Invention	SURFACE CLEANING APPARATUS		
Attorney Docket Number	10452-P46958US04	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	130	**Suggested Figure for Publication (if any)**	96

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	10452-P46958US04
	Application Number	
Title of Invention	SURFACE CLEANING APPARATUS	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	01059		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	14/822211	2015-08-10

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	10452-P46958US04
	Application Number	
Title of Invention	SURFACE CLEANING APPARATUS	

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
14/822211	Claims benefit of provisional	62/093189	2014-12-17
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.			Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

			Remove
Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[j] (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.			Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	10452-P46958US04
	Application Number	
Title of Invention	SURFACE CLEANING APPARATUS	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	10452-P46958US04
	Application Number	
Title of Invention	SURFACE CLEANING APPARATUS	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 — Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

● Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	Omachron Intellectual Property Inc.		
Mailing Address Information For Applicant:			
Address 1	9 King Lane		
Address 2			
City	Hampton	**State/Province**	ON
Country	CA	Postal Code	L0B 1J0
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	10452-P46958US04
	Application Number	
Title of Invention	SURFACE CLEANING APPARATUS	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Philip C. Mendes da Costa/			Date (YYYY-MM-DD)	2016-03-30
First Name	Philip	Last Name	C. Mendes da Costa	Registration Number	33106

Additional Signature may be generated within this form by selecting the Add button. Add

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	10452-P46958US04
	Application Number	
Title of Invention	SURFACE CLEANING APPARATUS	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/AIA/01 (06-12)
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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	SURFACE CLEANING APPARATUS

As the below named inventor, I hereby declare that:

This declaration is directed to:

☒ The attached application, or

☐ United States application or PCT international application number _____

filed on _____.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Wayne Ernest Conrad Date (Optional): _____

Signature: Wayne Conrad

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
15/085,830	03/30/2016	3723	2400	10452-P46958US04	18	1

CONFIRMATION NO. 9332

FILING RECEIPT

1059
BERESKIN & PARR LLP/S.E.N.C.R.L., s.r.l.
40 KING STREET WEST
40th Floor
TORONTO, ON M5H 3Y2
CANADA

Date Mailed: 04/14/2016

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Wayne Ernest Conrad, Hampton, CANADA;

Applicant(s)

Omachron Intellectual Property Inc., Hampton, CANADA;

Power of Attorney: The patent practitioners associated with Customer Number 01059

Domestic Priority data as claimed by applicant

This application is a CON of 14/822,211 08/10/2015
which claims benefit of 62/093,189 12/17/2014

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 04/13/2016

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/085,830**

Projected Publication Date: 07/21/2016

Non-Publication Request: No

Early Publication Request: No

Title

SURFACE CLEANING APPARATUS

Preliminary Class

015

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

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Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

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For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

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Title 35, United States Code, Section 184

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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 15/085,830

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	280
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	600
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	720
TOTAL CLAIMS (37 CFR 1.16(i))	18 minus 20 =	*			OR	x 80 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1 minus 3 =	*				x 420 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						800
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	2400

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	15085830
	Filing Date	2016-03-30
	First Named Inventor	CONRAD, Wayne E.
	Art Unit	3723
	Examiner Name	N/A
	Attorney Docket Number	10452-P46958US04

U.S.PATENTS						Remove
Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	8484799	B2	2013-07-16	Conrad	
	2	8225456	B2	2012-07-24	Håkan et al.	
	3	8161599	B2	2012-04-24	Griffith et al.	
	4	8156609	B2	2012-04-17	Milne et al.	
	5	8152877	B2	2012-04-10	Greene	
	6	8117712	B2	2012-02-21	Dyson et al.	
	7	8062398	B2	2011-11-22	Luo et al.	
	8	8021453	B2	2011-09-20	Howes	

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	9	7979959	B2	2011-07-19	Courtney	
	10	7938871	B2	2011-05-10	Lloyd	
	11	7931716	B2	2011-04-26	Oakham	
	12	7922794	B2	2011-04-12	Morphey	
	13	7867308	B2	2011-01-11	Conrad	
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	15	7805804	B2	2010-10-05	Loebig	
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	18	7776120	B2	2010-08-17	Conrad	
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	20	7740676	B2	2010-06-22	Burnham et al.	
	21	7628831	B2	2009-12-08	Gomiciaga-Pereda et al.	
	22	7597730	B2	2009-10-06	Yoo et al.	
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	31	7377007	B2	2008-05-27	Best	
	32	7370387	B2	2008-05-13	Walker et al.	
	33	7354468	B2	2008-04-08	Arnold et al.	
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	43	6968596	B2	2005-11-29	Oh et al.	
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	45	6896719	B2	2005-05-24	Coates et al.	
	46	6874197	B1	2005-04-05	Conrad	
	47	6868578	B1	2005-03-22	Kasper	
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	53	6712868	B2	2004-03-30	Murphy et al.	
	54	6648934	B2	2003-11-18	Choi et al.	
	55	6625845	B2	2003-09-30	Matsumoto et al.	
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	62	6553613	B2	2003-04-29	Onishi et al.	
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	75	6080022	A	2000-06-27	Shaberman et al.	
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	Attorney Docket Number	10452-P46958US04

	86	5078761	A	1992-01-07	DYSON JAMES	
	87	4944780	A	1990-07-31	Usmani	
	88	4905342	A	1990-03-06	Ataka	
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	90	4853008	A	1989-08-01	Dyson	
	91	4826515	A	1989-05-02	DYSON JAMES	
	92	4486207	A	1984-12-04	Baillie	
	93	4382804	A	1983-05-10	MELLOR FRED	
	94	4373228	A	1983-02-15	DYSON JAMES	
	95	4307485	A	1981-12-29	Dessig	
	96	4236903	A	1980-12-02	Malmsten	

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	97	4187088	A	1980-02-05	HODGSON	
	98	4097381	A	1978-06-27	RITZLER BO	
	99	3988133	A	1976-10-26	Schady	
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	101	3933450	A	1976-01-20	Percevaut	
	102	3898068	A	1975-08-05	McNeil et al.	
	103	3822533	A	1974-07-09	ORANJE L	
	104	3684093	A	1972-08-15	KONO	
	105	3675401	A	1972-07-11	CORDES RONALD A	
	106	3582616	A	1971-06-01	WROB	
	107	3561824	A	1971-02-09	HOMAN	

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	Attorney Docket Number	10452-P46958US04

	108	3530649	A	1970-09-29	PORSCH FRED W et al.	
	109	3518815	A	1970-07-07	PETERSON CARL M et al.	
	110	3426513	A	1969-02-11	BAUER KURT	
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	Attorney Docket Number	10452-P46958US04

	14	International Search Report and Written Opinion received in connection to international patent application No. PCT/CA2015/050661, mailed on October 19, 2015
	15	United States Office Action, dated Feb. 16, 2011, for U.S. application no. 11/953,292.
	16	United States Office Action, dated Jul. 22, 2010, for U.S. application no. 11/953,292.
	17	Euro-Pro Shark Cordless Hand Vac Owner's Manual, published in 2002
	18	International Preliminary Examination Report on International application No. PCT/CA2015/051332, dated March 7, 2016

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Examiner Signature		Date Considered	

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[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	15085830
	Filing Date	2016-03-30
	First Named Inventor	CONRAD, Wayne E.
	Art Unit	3723
	Examiner Name	N/A
	Attorney Docket Number	10452-P46958US04

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

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See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Philip C. Mendes da Costa/	Date (YYYY-MM-DD)	2016-05-12
Name/Print	Philip C. Mendes da Costa	Registration Number	33106

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
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Application Number	15085830
Filing Date	2016-03-30
First Named Inventor	CONRAD, Wayne E.
Art Unit	3723
Examiner Name	N/A
Attorney Docket Number	10452-P46958US04

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	7429284	B2	2008-09-30	OH, Jang-Keun	
	2	7563298	B2	2009-07-21	OH, Jang-Keun	
	3	5970572	A	1999-10-26	Thomas	
	4	8673487	B2	2014-03-18	CHURCHILL, John	
	5	6640385	B2	2003-11-04	OH et al.	
	6	9192269	B2	2015-11-24	CONRAD	
	7	4980945		1991-01-01	Bewley	
	8	5309600		1994-05-10	Weaver et al.	

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	9	5054157		1991-10-08	Werner et al.	

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20060254226	A1	2006-11-16	Kyong-hui JEON	
	2	20100132319	A1	2010-06-03	ASHBEE et al.	
	3	20110023261	A1	2011-02-03	Proffitt, II et al.	
	4	20140137362	A1	2014-05-22	SMITH	
	5	20140137363	A1	2014-05-22	WILSON	
	6	20140137364	A1	2014-05-22	STICKNEY ET AL.	
	7	20140208538	A1	2014-07-31	VISEL et al.	
	8	20060288516	A1	2006-12-28	SAWALSKI, Michael M.	

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	9	20090282639	A1	2009-11-19	DYSON et al.	
	10	20100083459	A1	2010-04-08	BESKOW et al.	
	11	20140182080	A1	2014-07-03	LEE et al.	
	12	20120222260	A1	2012-09-06	CONRAD	
	13	20070136984	A1	2007-06-21	Hsu	

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	1	2484587	CA	A1	2005-04-15	BLACK & DECKER INC.		
	2	2008088278	WO	A2	2008-07-24	AKTIEBOLAGET ELECTROLUX		
	3	02/017766	WO	A3	2002-03-07	ROYAL APPLIANCE MFG. CO.		
	4	2508035	GB		2014-05-21	DYSON TECHNOLOGY LIMITED		

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	Art Unit	3723
	Examiner Name	N/A
	Attorney Docket Number	10452-P46958US04

	5	2308360	EP	A2	2011-04-13	WAI L.Y.		
	6	1594386	EP	B1	2009-04-15	AKTIEBOLAGET ELECTROLUX		
	7	202932850	CN	U	2013-05-15	SOZHOU PFEIFFER ELECTRIC CO LTD		
	8	97/20492	WO	A1	1997-06-12	DOWNHAM		
	9	2848173	EP	A1	2015-03-18	LIM		
	10	1815777	EP	A1	2007-08-08	STOLLE		
	11	2007104238	WO	A1	2007-09-20	Borinato et al.		

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Signature	/Philip C. Mendes da Costa/	Date (YYYY-MM-DD)	2016-05-12
Name/Print	Philip C. Mendes da Costa	Registration Number	33106

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Electronic Acknowledgement Receipt

EFS ID:	25762840
Application Number:	15085830
International Application Number:	
Confirmation Number:	9332
Title of Invention:	SURFACE CLEANING APPARATUS
First Named Inventor/Applicant Name:	Wayne Ernest Conrad
Customer Number:	1059
Filer:	Philip C. Mendes da Costa/Lissette Escobar
Filer Authorized By:	Philip C. Mendes da Costa
Attorney Docket Number:	10452-P46958US04
Receipt Date:	12-MAY-2016
Filing Date:	30-MAR-2016
Time Stamp:	15:51:58
Application Type:	Utility under 35 USC 111(a)

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Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	P46958US04_IDS_ltr.pdf	166785 f06c478700870e9b5bbd01be1279d571dce46520	no	2

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2	Information Disclosure Statement (IDS) Form (SB08)	P46958US04_IDS_Part1.pdf	621020 833acceb445e7d240395c31b36ba3fd53f2a15d3	no	35
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3	Information Disclosure Statement (IDS) Form (SB08)	P46958US04_IDS_Part2.pdf	613659 e03d053af8a80e2d920025de90e68d23fe42f33c	no	7
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4	Foreign Reference	FPD1.pdf	349320 92db6d1415f3e07a8c5e330d87d37ed0cc9c5edc	no	28
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5	Foreign Reference	FPD2.pdf	157393 a8164afc44515f88e4291267c9a0cfda0ad3dc26	no	23
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6	Foreign Reference	FPD4.pdf	601084 bb0ffe95f599ba662473b4fc051ef999538cb0cc	no	39
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24	Foreign Reference	FPD22.pdf	2160426 8d4f73d25588afdf0a83ca0d0460cb2e37a63984	no	33
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28	Foreign Reference	FPD26.pdf	645849 be2b3e4508afbb05848b362aba3559d27ea395b0	no	18
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29	Foreign Reference	FPD3_.pdf	17598387 0c3d34bbbbefdf9be5606ab7c83ec250b08e7573	no	17
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30	Foreign Reference	FPD27.pdf	901471 d88241bb9ee1127baccbde0e189b140d44f98d62	no	57
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31	Foreign Reference	FPD28.pdf	294065 3838cfa0218c476aa15d679cf72d412a2859eff4	no	17
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32	Foreign Reference	FPD29.pdf	301010 9b5d24fb922111fab1affa7d9807305710324e14	no	17
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33	Foreign Reference	FPD30.pdf	201255 d95a6fd83a2f86b391576ece6a74c62054d6cd8c	no	12
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34	Foreign Reference	FPD31.pdf	1334622 e1b7046376b31cdc62b941598e5646da87a7b955	no	21
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35	Foreign Reference	FPD32.pdf	655307 7cdef96231a88ca77000d5c7d926d0bc21f5dc1e	no	35
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36	Foreign Reference	FPD33.pdf	451835 4898f6e44dc88760d15964df60124c5ef3e59477	no	6
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Information:					

38	Foreign Reference	FPD35.pdf	983202 12c435a1f574d3a5921a98358bf159a3d94ee5dc	no	30
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44	Foreign Reference	FPD41.pdf	612202 93977f2d7b2c24450d834a85389ec8ef19c604b5	no	37
Warnings:					
Information:					
45	Foreign Reference	FPD42_AU112778.pdf	343262 670278410d8e9c33d71bdb9d3e7a7ae4c10ae9ef	no	3
Warnings:					
Information:					
46	Foreign Reference	FPD43.pdf	197297 e617552d5da39a81d0fa90cc30aba530e15658f9	no	9
Warnings:					
Information:					

47	Foreign Reference	FPD44.pdf	334654 4fa39081463bdcdd3d68874c80b9483215095a24	no	21
Warnings:					
Information:					
48	Foreign Reference	FPD45.pdf	1360123 8c1733b79c1ae43fa2711f33bd588dedb2ef5d62	no	26
Warnings:					
Information:					
49	Foreign Reference	FPD46.pdf	417416 aa463204fa5874a4a19aefad24a6836b893175a0	no	15
Warnings:					
Information:					
50	Foreign Reference	FPD47.pdf	701104 d064f9420123c6e265861fde021f8116aada4eb6	no	14
Warnings:					
Information:					
51	Foreign Reference	FPD48.pdf	201180 29729c8b867a6d259fdc1bec3cfeea49bf1105f5	no	15
Warnings:					
Information:					
52	Foreign Reference	FPD49.pdf	290744 829aa358cb00534f7c2a8b3d2851a5e19972b012	no	18
Warnings:					
Information:					
53	Foreign Reference	FPD50_.pdf	17591907 613f26a365c337a62768fe4ee86a670451745bf4	no	17
Warnings:					
Information:					
54	Foreign Reference	FF1_WO9720492A1.pdf	644344 3ceb5b4abf942a1fc00463c8ec7d7f8d2446973a	no	44
Warnings:					
Information:					
55	Foreign Reference	FF2_EP2848173.pdf	376492 0e0f016a82b7fa5acfa3e30f595c126c23b95df6	no	23
Warnings:					
Information:					

56	Foreign Reference	FF3_EP1815777A1.pdf	182854 53755a2825680e7b0612522d1ea15604dd778b59	no	9
Warnings:					
Information:					
57	Foreign Reference	FF4_GB2508035B.pdf	5212750 8c27aae4116713131e14b465d4a176b2550a9931	no	59
Warnings:					
Information:					
58	Foreign Reference	FF5_EP2308360B1.pdf	6272743 04bc309b53f54697fe284a940c021f70f8bc1dae	no	21
Warnings:					
Information:					
59	Foreign Reference	FF6_EP1594386B1.pdf	6597020 bf6c3dcb625d0c0dbaea1a5594a35c84dc59a507	no	15
Warnings:					
Information:					
60	Foreign Reference	FF7_CN202932850U.pdf	502346 bc30b63cf09c68bd16a5e32477b719f1974e27ff	no	6
Warnings:					
Information:					
		Total Files Size (in bytes):	109471024		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

<u>National Stage of an International Application under 35 U.S.C. 371</u>
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

<u>New International Application Filed with the USPTO as a Receiving Office</u>
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Bereskin & Parr
INTELLECTUAL PROPERTY LAW

May 12, 2016

Philip C. Mendes da Costa
B.Sc. (Chem. Eng.), LL.B.
416 957 1695 pmdcosta@bereskinparr.com

Your Reference: 10452- P46958US04

INFORMATION DISCLOSURE STATEMENT
UNDER 37 CFR.1.56 and 37 CFR 1.97(b)(1) and (3)

The Commissioner of Patents
and Trademarks
Washington, D.C.
U.S.A 20231

Dear Commissioner:

Re: United States Patent Application Serial No. 15/085,830
For: SURFACE CLEANING APPARATUS
Filed: March 30, 2016
Applicant: Omachron Intellectual Property Inc.

In accordance with 37 CFR 1.97 and 1.98, and in recognition of the duty of disclosure set forth in 37 CFR 1.56, applicant hereby submits an Information Disclosure Statement including (1) a listing of patents and other publications of which applicant is aware on form PTO/SB/08a; (2) a copy of each listed item.

In accordance with the requirements of 1.97(b)(1) and (3), this Information Disclosure Statement is filed within three months of the filing date of the application or before the mailing date of a first Office Action on the merits, whichever event occurs last.

The filing of this statement shall not be construed as an admission that the information cited in the attached statement is, or is considered to be, material to patentability (37 CFR 1.97(h)), nor as an admission that it constitutes prior art.

(A) List of References

A list of the patents and other publications of which the applicant is aware is set out in the attached PTO Form SB08a which is attached hereto.

(B) Copies of References

Copies of the foreign and non-patent literature references are enclosed. Due to a large number of cited references, this Information Disclosure Statement is being submitted in two parts.

For the record, the Applicant draws to the attention of the Examiner to the following co-pending applications:

United States Patent Application No 15/088876;

United States Patent Application No.15/085762; and

United States Patent Application No. 15/089017.

In view of the forgoing, it is respectfully submitted that the Information Disclosure Statement should be considered at this time by the Examiner.

Respectfully submitted,

BERESKIN & PARR LLP/S.E.N.C.R.L., s.r.l.

P. Mendes da Costa

Philip C. Mendes da Costa
Registration No. 33,106
/le
Encl

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference 10452-113	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/CA2007/000380	International filing date *(day/month/year)* 09 March 2007 (09.03.2007)	Priority date *(day/month/year)* 10 March 2006 (10.03.2006)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant GBD CORP.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 16 September 2008 (16.09.2008)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Athina Nickitas-Etienne e-mail: pt04.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BERESKIN & PARR
P.O. Box 401
40 King Street West
TORONTO, Ontario
Canada, M5H 3Y2

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)* 24 July 2007 (24-07-2007)

Applicant's or agent's file reference
10452-113

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/CA2007/000380	09 March 2007 (09-03-2007)	10 March 2006 (10-03-2006)

International Patent Classification (IPC) or both national classification and IPC
IPC: ***B04C 5/185*** (2006.01) , ***A47L 9/16*** (2006.01) , ***B04C 5/04*** (2006.01) , ***B07B 7/08*** (2006.01)

Applicant
GBD CORP. ET AL

1. This opinion contains indications relating to the following items :

[X]	Box No. I	Basis of the opinion
[ ]	Box No. II	Priority
[ ]	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
[ ]	Box No. IV	Lack of unity of invention
[X]	Box No. V	Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
[ ]	Box No. VI	Certain documents cited
[X]	Box No. VII	Certain defects in the international application
[X]	Box No. VIII	Certain observations on the international application

2. **FURTHER ACTION**
If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/CA	Date of completion of this opinion	Authorized officer
Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 001-819-953-2476	16 July 2007 (16-07-2007)	Pierre Cuerrier 819-997-4379

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WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/CA2007/000380

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   [X] the international application in the language in which it was filed

   [ ] a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. [ ] This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of :

   a. type of material

      [ ] a sequence listing

      [ ] table(s) related to the sequence listing

   b. format of material

      [ ] on paper

      [ ] in electronic form

   c. time of filing/furnishing

      [ ] contained in the international application as filed.

      [ ] filed together with the international application in electronic form

      [ ] furnished subsequently to this Authority for the purposes of search.

4. [ ] In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments :

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Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	2-3, 5-6, 10-14, 20, 23-27, 30-43	YES
	Claims	1, 4, 7-9, 15, 16-19, 21-22, 28-29	NO
Inventive step (IS)	Claims	2-3, 5-6, 20, 39	YES
	Claims	1, 4, 7-15, 16-19, 21-29, 30-38, 40-43	NO
Industrial applicability (IA)	Claims	1-43	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1 = WO 06/026,414 A2 (ARNOLD, A. et al.)
D2 = CA 1,218,962 (BOADWAY, J.)
D3 = US 2003/0159411 A1 (HANSEN, S. et al.)

D1 discloses a cyclonic separation device for a vacuum cleaner comprising a dirty air inlet (204), a handle (203), a cyclone separator having an outer wall (15), a fluid inlet (24) downstream from the dirty air inlet and a fluid outlet (31), a plate (36) having a cyclone chamber surface and positioned to substantially divide the cyclone separator into a cyclone chamber (19) and a dirt collection chamber (20), a passage extending between the cyclone chamber and the dirt collection chamber, the passage configured such that dirt travels at least outwardly as the dirt travels through the passage (Figures 9 and 10), and an air flow motor (206). The plate (36) comprises a disc positioned adjacent the cyclone chamber end of the dirt collection chamber and the dirt collection chamber extends under at least a portion of the disc (see Figures 9, 10 and 13). D1 discloses a flow director (29) positioned above the plate (36), an annular dirt collection region collinear with the cyclone chamber, a tube (31) having an inlet and extending along the axis of the cyclone chamber to a position below the fluid inlet and having an end that is spaced from the plate (36). The bottom (104) of the dirt collection chamber is openable via a hinge (107).

Claims 1, 4, 7, 8, 9, 15, 16, 19, 21, 22, 28 and 29 do not comply with PCT Article 33(2). D1 disclosed the claimed subject matter before the claim date. Also, claims 1, 4, 7, 8, 9, 15, 16, 19, 21, 22, 28 and 29 do not comply with PCT Article 33(3) for lacking an inventive step.

Claims 10, 23 and 36 define a screen in covering relation to the inlet of the air flow tube. D3 (paragraph [0055]) teaches the use of a screen element to cover a fluid outlet in a similar context. Claims 10, 23 and 36 therefore lack inventive ingenuity having regard to D1 in view of D3 (PCT Article 33(3)).

D2 discloses a cyclone of traditional design equipped with a blunt cone plate (14) which allows the boundary layer material to leave without the inner fluid by blocking the vortex while permitting the boundary layer fluid with its content of heavy material to leak away through a gap between the end (15) of the cyclone cone (13) and the blunt cone plate (14). The cyclone separator has an outwardly extending portion (see Fig. 2) such that the outer perimeter of the dirt collection chamber is larger than the outer perimeter of the cyclone chamber. Furthermore, the blunt cone plate (14) is positioned below the outwardly extending portion and the dirt collection chamber extends under at least a portion of the blunt cone plate.

Claims 16, 17, 18 and 19 do not comply with PCT Article 33(2). D1 disclosed the claimed subject matter before the claim date. Also, claims 16, 17, 18 and 19 do not comply with PCT Article 33(3) for lacking an inventive step.

Claims 11-14, 24-27 and 30-33 define relative dimensions of the passage as it relates to the diameter adjacent the fluid inlet. These dimensions could have easily been determined by a technician skilled in the art through routine experimentation. Claims 11-14, 24-27, 30-35, 37-38 and 40-43 therefore lack inventive ingenuity having regard to either D1 or D2 in view of general knowledge in the art (PCT Article 33(3)).

The industrial applicability of claims 1-43 is clear (PCT Article 33(4)).

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Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted :

The drawings and/or the description do not comply with Rule 11.13(l) of the PCT. Reference signs not mentioned in the description shall not appear in the drawing, and vice versa. Reference characters 10, 12 and 13 (all on page 39) do not seem to appear in the drawings.

The drawings and/or the description do not comply with Rule 11.13 of the PCT. Reference character 27e on Fig. 6e should probably read 27a (see page 54, line 6 and pag 56, line 7). Also, in Fig. 7b, one of the occurrences of reference character 59 should be replaced by reference character 60 (see page 55, line 10).

The description does not comply with PCT Article 6. A statement, such as found on page 77, which implies that the protection sought may be expanded to cover the "spirit" of the invention, should be removed.

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Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made :

Claims 16 and 30 are broader in scope than the teaching of the description. To comply with Article 6 of the PCT the claims must specify that the cyclone separator is used in a surface cleaning apparatus.

Claims 3, 18 and 37 are unclear and do not comply with Article 6 of the PCT. The expression "outwardly extending portion" (claim 3, line 3) lacks a proper antecedent basis with respect to claims 1, 16 and 30-33, respectively.

Claim 37 does not comply with Article 6 of the PCT. The claim shall be clear and concise. Claim 37 depends upon itself.

In claims 3, 18 and 37, the word "then" should read "than".

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2007/000380

A. CLASSIFICATION OF SUBJECT MATTER
IPC: ***B04C 5/185*** (2006.01) , ***A47L 9/16*** (2006.01) , ***B04C 5/04*** (2006.01) , ***B07B 7/08*** (2006.01)
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC[8]: B04C, A47L, B07B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)
Delphion, Canadian Patents Database

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 06/026,414 A2 (ARNOLD, A. et al.) 9 March 2006 (09-03-2006) * Abstract, page 13, line 15 - page 16, line 3, claims, figs. 9, 10, 13 *	1, 4, 7- 9, 11-15, 16, 19, 21, 22, 24-29, 30-33, 35, 40-43
Y		10, 23, 36
X	CA 1,218,962 A1 (BOADWAY, J) 10 March 1987 (10-03-1987) * Page 8, line 19 - page 10, line 19, Fig. 2 *	16-19, 24-27, 30-35, 37-38
Y	US 2003/0159411 A1 (HANSEN, S. et al.) 28 August 2003 (28-08-2003) * the whole document *	10, 23, 36

[ ] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
14 May 2007 (14-05-2007)	24 July 2007 (24-07-2007)

Name and mailing address of the ISA/CA	Authorized officer
Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 001-819-953-2476	Pierre Cuerrier 819- 997-4379

Dyson Ex1004
Page 293

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CA2007/000380

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
WO2006026414 A2	09-03-2006	US20060207231 A1	21-09-2006
		US20060042206 A1	02-03-2006
		US20060042206 A1	02-03-2006
CA1218962 A1	10-03-1987	US4842145 A	27-06-1989
		US4712867 A	15-12-1987
		US4389307 A	21-06-1983
		EP068792 A2	05-01-1983
		DE3279026 C0	20-10-1988
US20030159411 A1	28-08-2003	US20050125940 A1	16-06-2005
		US20050125939 A1	16-06-2005
		US20040216263 A1	04-11-2004
		US20020011050 A1	31-01-2002
		US7188388 B1	13-03-2007

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PATENT COOPERATION TREATY

(18)

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BERESKIN & PARR

PCT

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

BERESKIN & PARR
40 King Street West
40th Floor
Toronto, Ontario
M5H 3Y2
CANADA

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Rule 71.1)

Date of mailing *(day/month/year)*	26.10.2001
Applicant's or agent's file reference: 10452-30	**IMPORTANT NOTIFICATION**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/CA00/00873	26/07/2000	27/07/1999

Applicant: G.B.D. CORPORATION et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/	Authorized officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Riebel, O Tel.+49 89 2399-2967

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
10452-30		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/CA00/00873	26/07/2000	27/07/1999
International Patent Classification (IPC) or national classification and IPC B04C5/181		
Applicant G.B.D. CORPORATION et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 10 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
26/02/2001	26.10.2001
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Mayer, R Telephone No. +49 89 2399 2094

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/CA00/00873

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:
Description, pages:

1-28	as originally filed			

Claims, No.:

1-55	as received on	16/07/2001	with letter of	13/07/2001

Drawings, sheets:

1/15-15/15	as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   - ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
   - ☐ the language of publication of the international application (under Rule 48.3(b)).
   - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   - ☐ contained in the international application in written form.
   - ☐ filed together with the international application in computer readable form.
   - ☐ furnished subsequently to this Authority in written form.
   - ☐ furnished subsequently to this Authority in computer readable form.
   - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
   - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   - ☐ the description, pages:
   - ☐ the claims, Nos.:

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	
	No:	Claims	1,20,25,39,47
Inventive step (IS)	Yes:	Claims	
	No:	Claims	2-19,21-24,26-38, 40-46,47-55
Industrial applicability (IA)	Yes:	Claims	1-55
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Item V:

1. Independent claims 1, 20,25,39,47 are not consider novel:

1.1 US-A-4486207 discloses a separator with a cyclone chamber, means for introducing and removing, separation means 121 having holes 124 so that particles pass therethrough to particle receiving means 126 (see figures 7,8 and the corresponding text). Consequently, all the features of claim 1 are disclosed.

1.2 All the features of claims 20, 25 and 39 are also known from US-A-4486207 for the same reasons as given in paragraph 1.1.

1.3 All the features of claims 1, 20, 25 and 39 are also known from WO-A-98/43721 (fig. 5), DE-C-875134 (Abb. 1), US-A-2981369 (fig. 3), DE-C-4232382 (fig. 1) and US-A-3988132 (fig. 1).

1.4 WO-A-98/43721 discloses a vacuum cleaner comprising all the features of claim 47 (see figures 1,5 and the corresponding text).

2. Having regard to the dependent claims, the features of these claims, insofar as they are not known from the documents cited in the Search Report for the same purpose as in your application, are generally known to a person skilled in the art, and, therefore, do not add an inventive step to the claims from which they depend.

3. The industrial applicability is obvious.

Item VII:

The description is adapted to the claim, and the prior art known from US-A-4486207, WO-A-98/43721, DE-C-875134, US-A-2981369, DE-C-4232382 nd US-A-3988132 is not cited in the description.

Item VIII:

Independent claims 1, 25 and 39 are not concise as required by Article 6 since each one defines a separator and repeats much of the content of the others. Therefore, it is appropriate to have a single independent claim defining separator.

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BERESKIN & PARR
P.O. Box 401
40 King Street West
TORONTO, Ontario
Canada, M5H 3Y2

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)* 21 April 2008 (21-04-2008)

Applicant's or agent's file reference
10452-179

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/CA2007/002211	11 December 2007 (11-12-2007)	12 December 2006 (12-12-2006)

International Patent Classification (IPC) or both national classification and IPC
IPC: ***A47L 9/00*** (2006.01), ***A47L 11/30*** (2006.01), ***A47L 9/10*** (2006.01), ***A47L 9/16*** (2006.01)

Applicant
GBD CORP. ET AL

1. This opinion contains indications relating to the following items :

[X]	Box No. I	Basis of the opinion
[ ]	Box No. II	Priority
[ ]	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
[ ]	Box No. IV	Lack of unity of invention
[X]	Box No. V	Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
[ ]	Box No. VI	Certain documents cited
[ ]	Box No. VII	Certain defects in the international application
[ ]	Box No. VIII	Certain observations on the international application

2. **FURTHER ACTION**
If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

dd ent July 01/08 NK
dd ent Oct 12/08 NK

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/CA	Date of completion of this opinion	Authorized officer
Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 001-819-953-2476	15 April 2008 (15-04-2008)	Siavash Mohajer 819- 934-3466

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Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   [X] the international application in the language in which it was filed

   [ ] a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. [ ] This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of :

   a. type of material

      [ ] a sequence listing

      [ ] table(s) related to the sequence listing

   b. format of material

      [ ] on paper

      [ ] in electronic form

   c. time of filing/furnishing

      [ ] contained in the international application as filed.

      [ ] filed together with the international application in electronic form

      [ ] furnished subsequently to this Authority for the purposes of search.

4. [ ] In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments :

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Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	2-4, 7, 8, 10-13, 16-18, 21, and 23-26	YES
	Claims	1, 5, 6, 9, 14, 15, 19, 20, and 22	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-26	NO
Industrial applicability (IA)	Claims	1-26	YES
	Claims	None	NO

2. Citations and explanations :

D1: EP 0 489 468 A1 (WEISTRA, M.) 10 JUNE 1992 (10.06.1992)
D2: US 2006/0207055 A1 (IVARSSON, B. et al.) 21 SEPTEMBER 2006 (21.09.2006)

D1 disclosed a surface cleaning apparatus comprising a fluid flow path extending from a dirt inlet (15) to a clean fluid outlet (19) and a fluid flow motor (4) positioned in the fluid flow path (col. 3, line 56 - col. 4, line 1); a cyclonic cleaning stage (3) provided in the fluid flow path and comprising a cyclone chamber (10); at least one dirt chamber (5b) in fluid communication with the cyclone chamber and positioned below the cyclone chamber (figs. 1, 3, and 4), the dirt chamber having an upper portion proximate the cyclone chamber, a lower portion, a central axis extending vertically between the upper portion and the lower portion, and a dirt chamber inlet (11) spaced from the central axis (figs. 1 and 4).

D2 disclosed an upright vacuum comprising a plurality of cyclones in parallel (paragraphs 007-009).

Novelty:
Claims 2-4, 7, 8, 10-13, 16-18, 21, and 23-26 are novel and do comply with Article 33(2) of the PCT. Document D1 is considered the closest prior art. The subject matter of claims 2-4 and 16-18 differ from D1 in that although off-center, D1 does not teach or fairly suggest the relative location of the dirt chamber inlet with respect to dirt chamber. With regards to claims 7 and 21, D1 fails to disclose a plate positioned inside the dirt chamber. With regards to claims 8 and 23, D1 does not disclose a perimeter on the upper portion of the dirt chamber. With regards to claims 10-13, D1 fails to disclose the shape and size of the applicant's apparatus. With regards to claims 24-26, D1 fails to disclose a combination of cyclonic stages either in parallel or series.

Claims 1, 5, 6, 9, 14, 15, 19, 20, and 22 are not novel and do not comply with Article 33(2) of the PCT. D1 disclosed the subject matter of claims 1, 14, and 15. With regards to claims 5, 6, 19, 20, and 22, it can be seen in figures 1 and 4 that the cyclonic cleaning stage comprises a dirt outlet positioned at the dirt chamber inlet (11), which is defined in an upper surface of the dirt chamber. Additionally, the dirt chamber inlet is created by an opening in a plate that is adjacent to the cyclonic cleaning stage and the dirt chamber. With regards to claim 9, it can be seen from figures 1 and 4 that the longitudinal axis of the cyclone chamber is spaced apart from the central axis of the dirt chamber.

Inventive Step:

Since claims 1, 5, 6, 9, 14, 15, 19, 20, and 22 are not novel, they also do not involve an inventive step. As such, they do not comply with Article 33(3) of the PCT.

Claims 2-4, 8, 10-13, 16-18, 23, and 24 do not comply with Article 33(3) of the PCT. The subject matter of these claims would have been obvious to a person skilled in the art or science to which they pertain, having regard to D1 in view of common knowledge in the art. Claims 2-4, 8, 10-13, 16-18, and 23 merely recite design features and do not involve an inventive step over D1. The problems solved by said claims would have been obvious to a person skilled in the art having prior knowledge of D1. With regards to claim 24, it would have been obvious to a person skilled in the art to create multiple cyclonic stages in an iterative way to further filter dirty air. Multiple instances of the alleged invention can be connected together to achieve this.

Continued in Supplemental Box on page 4...

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Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**

Continuation of: Box No. V

Claims 7, 21, 25, and 26 do not comply with Article 33(3) of the PCT. The subject matter of these claims would have been obvious to a person skilled in the art or science to which they pertain, having regard to D1 in view of D2. D1 disclosed the subject matter of the above claims with the exception of the plate being located inside the dirt chamber and multiple cyclones being connected together in parallel. D2 disclosed both of these features. The structure (112, 118, 104') acts as the plate of claims 7 and 21 and is located inside the dirt chamber. Therefore, it would have been obvious for a person skilled in the art having prior knowledge of D1 and D2 to arrive at the subject matter of the above claims.

Industrial Applicability:
The subject matter of claims 1-26 is considered to be industrially applicable and thus complies with the requirements of Article 33(4) of the PCT.

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PATENT COOPERATION TREATY

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From the INTERNATIONAL SEARCHING AUTHORITY

To:
BERESKIN & PARR
P.O. Box 401
40 King Street West
TORONTO, Ontario
Canada, M5H 3Y2

RECEIVED
APR 29 2008
BERESKIN & PARR

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

	Date of mailing *(day/month/year)* 21 April 2008 (21-04-2008)
Applicant's or agent's file reference 10452-179	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. PCT/CA2007/002211	International filing date *(day/month/year)* 11 December 2007 (11-12-2007)

Applicant
GBD CORP. ET AL

00 ent June 21/08 NR

1. [X] The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19 :
   The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46) :

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

   Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

   For more detailed instructions, see the notes on the accompanying sheet.

2. [ ] The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. [ ] **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that :

   [ ] the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

   [ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

   Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90*bis*.1 and 90*bis*.3, respectively, before the completion of the technical preparations for the international publication.

   The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

   In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

   See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the ISA/CA Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 001-819-953-2476	Authorized officer Carole Millaire 819- 994-6587

Form PCT/ISA/220 (October 2005) *(See notes on accompanying sheet)*

NOTES TO FROM PCT/ISA/220

These Notes are intended to give instructions concerning the filing of amendments under Article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the *PCT Applicant's Guide*, a publication of WIPO.

In these Notes, "Article," "Rule" and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions, respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report and the written opinion of the International Searching Authority, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only (see *PCT Applicant's Guide*, Volume I/A, Annexes B1 and B2).

The attention of the applicant is drawn to the fact that amendments to the claims under Article 19 are not allowed where the International Searching Authority has declared, under Article 17(2), that no international search report would be established (see *PCT Applicant's Guide,* Volume I/A, paragraph 296).

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Preliminary Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When? Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How? Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)) :

The amendments must be submitted with a letter.
The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").
The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

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The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

(i) the claim is unchanged;
(ii) the claim is cancelled;
(iii) the claim is new;
(iv) the claim replaces one or more claims as filed;
(v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter :

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."

2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."

3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."

4. [Where various kinds of amendments are made]:
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under Article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments and any accompanying statement, under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the time of filing the amendments (and any statement) with the International Bureau, also file with the International Preliminary Examining Authority a copy of such amendments (and of any statement) and, where required, a translation of such amendments for the procedure before that Authority (see Rules 55.3(a) and 62.2, first sentence). For further information, see the Notes to the demand form (PCT/IPEA/401).

If a demand for international preliminary examination is made, the written opinion of the International Searching Authority will, except in certain cases where the International Preliminary Examining Authority did not act as International Searching Authority and where it has notified the International Bureau under Rule 66.1*bis*(b), be considered to be a written opinion of the International Preliminary Examining Authority. If a demand is made, the applicant may submit to the International Preliminary Examining Authority a reply to the written opinion together, where appropriate, with amendments before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later (Rule 43*bis*.1(c)).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, upon entry into the national phase, a translation of the claims as amended under Article 19 may have to furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see the *PCT Applicant's Guide*, Volume II.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 10452-179	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below
International application No. **PCT/CA2007/002211**	International filing date *(day/month/year)* 11 December 2007 (11-12-2007)	(Earliest)Priority date *(day/month/year)* 12 December 2006 (12-12-2006)
Applicant GBD CORP. ET AL		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language**, the international search was carried out on the basis of:

      [X] the international application in the language in which it was filed

      [ ] a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

   b. [ ] This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

   c. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I

2. [ ] **Certain claims were found unsearchable** (see Box No. II)

3. [ ] **Unity of invention is lacking** (see Box No. III)

4. With regard to the **title**,

   [X] the text is approved as submitted by the applicant

   [ ] the text has been established by this Authority to read as follows :

5. With regard to the **abstract**,

   [X] the text is approved as submitted by the applicant

   [ ] the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings**,

   a. the figure of the **drawings** to be published with the abstract is Figure No. 2b

      [ ] as suggested by the applicant

      [X] as selected by this Authority, because the applicant failed to suggest a figure

      [ ] as selected by this Authority, because this figure better characterizes the invention

   b. [ ] none of the figures is to be published with the abstract

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2007/002211

A. CLASSIFICATION OF SUBJECT MATTER
IPC: ***A47L 9/00*** (2006.01) , ***A47L 11/30*** (2006.01) , ***A47L 9/10*** (2006.01) , ***A47L 9/16*** (2006.01)
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC (2006.01): A47L/all, B01D 45/all,
USC: 55/all, 15/all

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)
Delphion, Canadian Patent Database, WEST (cyclone, dirt chamber, axis, off-center OR offset, inlet)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	EP 0 489 468 A1 (WEISTRA, M.) 10 JUNE 1992 (10.06.1992) *Entire Document*	1-6, 8-20, and 22-24 7, 21, 25, and 26
Y	US 2006/0207055 A1 (IVARSSON, B. et al) 21 SEPTEMBER 2006 (21.09.2006) *Paragraphs 007-009 & Figure 1, 4, 6, and 7*	7, 21, 25, and 26
A	US 5,287,591 A (RENCH, G. et al) 22 FEBRUARY 1994 (22.02.1994) *Figures 1 & 3*	1-26
A	US 5,307,538 A (RENCH, G. et al) 03 MAY 1994 (03.05.1994) *Figures 1 & 3*	1-26
A	US 5,363,535 A (RENCH, G. et al) 15 NOVEMBER 1994 (15.11.1994) *Figures 1 & 3*	1-26
A	US 3,543,325 A (HAMRICK, J.) 01 DECEMBER 1970 (01.12.1970) *Figure 8*	1-26

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 March 2008 (18-03-2008)	21 April 2008 (21-04-2008)
Name and mailing address of the ISA/CA Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 001-819-953-2476	Authorized officer Siavash Mohajer 819- 934-3466

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4,523,936 A (DISANZA, W.) 18 JUNE 1985 (18.06.1985) *Figure 2*	1-26

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
EP0489468 A1	10-06-1992	JP6052749U U	19-07-1994
		NL9002668 A	01-07-1992
		US5135552 A	04-08-1992
US2006207055 A1	21-09-2006	AU2006227345 A1	28-09-2006
		EP1874171 A2	09-01-2008
		WO2006102147 A2	28-09-2006
US5287591 A	22-02-1994	EP0734217 A1	02-10-1996
		JP9506529T T	30-06-1997
		US5363535 A	15-11-1994
		WO9516382 A1	22-06-1995
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PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

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To:

BERESKIN & PARR LLP/S.E.N.C.R.L.,S.R.L.
Scotia Plaza
40 King Street West, 40th Floor
TORONTO, Ontario
Canada, M5H 3Y2

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

TS 35

Date of mailing *(day/month/year)*	19 October 2015 (19-10-2015)
Applicant's or agent's file reference P46581PC00 - 10452	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. **PCT/CA2015/050661**	International filing date *(day/month/year)* 15 July 2015 (15-07-2015)

Applicant
OMACHRON INTELLECTUAL PROPERTY INC.

dd ext Rec 19/1

1. ☑ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:
The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46).

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

How? Directly to the International Bureau of WIPO preferably through ePCT or on paper to, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 to 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the any request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

The applicant may **submit comments on an informal basis on the written opinion of the International Searching Authority** to the International Bureau. These comments will be made available to the public after international publication. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established.

Shortly after the expiration of **18 months from the priority date, the international application will be published** by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90*bis*.1 and 90*bis*.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for **entry into the national phase** before those designated Offices. In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months. For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

Within **19 months from the priority date, the applicant may request that a supplementary international search be carried out** by a different International Searching Authority that offers this service (Rule 45*bis*.1). The procedure for requesting supplementary international search is described in the *PCT Applicant's Guide*, International Phase, paragraphs 8.006-8.032.

Name and mailing address of the ISA/CA Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 819-953-2476	Authorized officer Jean-Luc Robert (819) 639-5169

Form PCT/ISA/220 (July 2014)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below
P46581PC00		

International application No.	International filing date *(day/month/year)*	(Earliest)Priority date *(day/month/year)*
PCT/CA2015/050661	15 July 2015 (15-07-2015)	18 July 2014 (18-07-2014)

Applicant

OMACHRON INTELLECTUAL PROPERTY INC.

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 7 sheets.

☑ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of:

☑ the international application in the language in which it was filed.

☐ a translation of the international application into which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (see Box No. II).

3. ☑ **Unity of invention is lacking** (see Box No. III).

4. With regard to the **title**,

☑ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☑ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

a. the figure of the **drawings** to be published with the abstract is Figure No. 9

☐ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☑ as selected by this Authority, because this figure better characterizes the invention.

b. ☐ none of the figures is to be published with the abstract.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2015/050661

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of the first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claim Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claim Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claim Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Group A, Claims 1-20: A hand carryable surface cleaning apparatus comprising a cyclone bin having an air outlet provided at an upper end of the cyclone bin assembly.

Group B, Claims 21- 40: A hand carryable surface cleaning apparatus comprising a locking mechanism selectively securing the cyclone bin assembly to the body of the apparatus comprising an actuator on a cyclone bin assembly.

Group C, Claims 41- 60: A hand carryable surface cleaning apparatus comprising a suction motor oriented at an angle to a vertical and horizontal axis.

Group D: Claims 61-83 A hand carryable surface cleaning apparatus comprising a dirt collection chamber extending under at least a portion of a suction motor.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☑ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claim Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant=s protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2015/050661

A. CLASSIFICATION OF SUBJECT MATTER
IPC: ***A47L 5/24*** (2006.01), ***A47L 5/26*** (2006.01), ***A47L 5/30*** (2006.01), ***A47L 9/16*** (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC: A47L (2006.01), A47L 5/* (2006.01), A47L 9/* (2006.01), A47L 5/24 (2006.01), A47L 9/16 (2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)
Questel-Orbit. Keywords: bin, chamber, container, receptacle, cyclon*, hand, held, portable, latch*, lock*, actuator, motor, angl*, inclin*, recess*, cavity, above, over, under, below, seal*

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO2008088278A2, (BESKOW, J. et al.) 24 July 2008 (24-07-2008) *whole document*	1-20, 41-46, 57, 59, 61, 67, 72-75, and 81-83
X	US20120222260A1, (CONRAD, W. E.) 06 September 2012 (06-12-2012) *whole document*	1-3, 10
X	WO0217766A2, (MURPHY, J. S. et al.) 07 March 2002 (07-03-2002) *whole document*	1-4, 10-13, 17, 18
A	EP2308360A2, (WAI, L. Y.) 13 April 2011 (13-04-2011) *whole document*	

☑ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

*	Special categories of cited documents:
"A"	document defining the general state of the art which is not considered to be of particular relevance
"E"	earlier application or patent but published on or after the international filing date
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O"	document referring to an oral disclosure, use, exhibition or other means
"P"	document published prior to the international filing date but later than the priority date claimed
"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&"	document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 September 2015 (10-09-2015)	19 October 2015 (19-10-2015)

Name and mailing address of the ISA/CA	Authorized officer
Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 001-819-953-2476	Shawn De Salvo (819) 934-4270

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP1594386A1, (MIEFALK, H. et al.) 16 November 2005 (16-11-2005) *whole document*	
A	CA2484587A1, (MOONEY, P. W.) 15 April 2005 (15-04-2005) *whole document*	
A	CN202932850U, (WANG, W.) 15 May 2013 (15-05-2013) *whole document*	
A	GB2508035A, (WILSON, H. G.) 21 May 2014 (21-05-2014) *whole document*	

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
WO2008088278A2	24 July 2008 (24-07-2008)	WO2008088278A2	24 July 2008 (24-07-2008)
		WO2008088278A3	04 September 2008 (04-09-2008)
		CN101448447A	03 June 2009 (03-06-2009)
		CN101448447B	27 June 2012 (27-06-2012)
		CN101460083A	17 June 2009 (17-06-2009)
		CN101460083B	13 August 2014 (13-08-2014)
		CN101583302A	18 November 2009 (18-11-2009)
		CN101583302B	23 January 2013 (23-01-2013)
		CN102283611A	21 December 2011 (21-12-2011)
		CN102283611B	16 July 2014 (16-07-2014)
		CN102302349A	04 January 2012 (04-01-2012)
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		EP2007264A1	31 December 2008 (31-12-2008)
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		EP2012638A4	22 September 2010 (22-09-2010)
		EP2012638B1	19 June 2013 (19-06-2013)
		EP2111144A2	28 October 2009 (28-10-2009)
		EP2111144A4	02 March 2011 (02-03-2011)
		EP2111144B1	10 December 2014 (10-12-2014)
		ES2531518T3	16 March 2015 (16-03-2015)
		SE0700143L	20 July 2008 (20-07-2008)
		SE531125C2	23 December 2008 (23-12-2008)
		US2010083459A1	08 April 2010 (08-04-2010)
		US7882593B2	08 February 2011 (08-02-2011)
		US2010017997A1	28 January 2010 (28-01-2010)
		US8151411B2	10 April 2012 (10-04-2012)
		US2010242209A1	30 September 2010 (30-09-2010)
		US8302251B2	06 November 2012 (06-11-2012)
		US2010024154A1	04 February 2010 (04-02-2010)
		US8424154B2	23 April 2013 (23-04-2013)
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		US8689395B2	08 April 2014 (08-04-2014)
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		US8567008B2	29 October 2013 (29-10-2013)
		US2012222250A1	06 September 2012 (06-09-2012)
		US8601641B2	10 December 2013 (10-12-2013)
		US2012222236A1	06 September 2012 (06-09-2012)
		US8646146B2	11 February 2014 (11-02-2014)
		US2012222237A1	06 September 2012 (06-09-2012)
		US8683644B2	01 April 2014 (01-04-2014)
		US2012222251A1	06 September 2012 (06-09-2012)
		US2012222259A1	06 September 2012 (06-09-2012)
		WO2012119221A1	13 September 2012 (13-09-2012)

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Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
WO0217766A2	07 March 2002 (07-03-2002)	WO0217766A2	07 March 2002 (07-03-2002)
		WO0217766A3	13 February 2003 (13-02-2003)
		AU8859001A	13 March 2002 (13-03-2002)
		AU2001288590B2	21 September 2006 (21-09-2006)
		CA2420598A1	07 March 2002 (07-03-2002)
		CA2420598C	21 October 2008 (21-10-2008)
		DE60116336D1	02 February 2006 (02-02-2006)
		DE60116336T2	31 August 2006 (31-08-2006)
		EP1315442A2	04 June 2003 (04-06-2003)
		EP1315442B1	28 December 2005 (28-12-2005)
		US2002026775A1	07 March 2002 (07-03-2002)
		US6712868B2	30 March 2004 (30-03-2004)
		US2004163201A1	26 August 2004 (26-08-2004)
		US7052523B2	30 May 2006 (30-05-2006)
EP2308360A2	13 April 2011 (13-04-2011)	EP2308360A2	13 April 2011 (13-04-2011)
		EP2308360A3	26 February 2014 (26-02-2014)
		EP2308360B1	24 June 2015 (24-06-2015)
		CN102038464A	04 May 2011 (04-05-2011)
		CN102038464B	25 December 2013 (25-12-2013)
		HK1153369A1	16 May 2014 (16-05-2014)
		JP2011078757A	21 April 2011 (21-04-2011)
		JP5649390B2	07 January 2015 (07-01-2015)
		US7789922B1	07 September 2010 (07-09-2010)
		US2010257825A1	14 October 2010 (14-10-2010)
		US8167964B2	01 May 2012 (01-05-2012)
EP1594386A1	16 November 2005 (16-11-2005)	EP1594386A1	16 November 2005 (16-11-2005)
		EP1594386B1	15 April 2009 (15-04-2009)
		AT428340T	15 May 2009 (15-05-2009)
		AT503414T	15 April 2011 (15-04-2011)
		AT538708T	15 January 2012 (15-01-2012)
		BRPI0407257A	31 January 2006 (31-01-2006)
		BRPI0407257B1	03 February 2015 (03-02-2015)
		DE202004021292U1	21 June 2007 (21-06-2007)
		DE602004020587D1	28 May 2009 (28-05-2009)
		DE602004032068D1	12 May 2011 (12-05-2011)
		EP1969988A2	17 September 2008 (17-09-2008)
		EP1969988A3	21 January 2009 (21-01-2009)
		EP1969988B1	30 March 2011 (30-03-2011)
		EP2201881A1	30 June 2010 (30-06-2010)
		EP2201881B1	28 December 2011 (28-12-2011)
		ES2310163T1	01 January 2009 (01-01-2009)
		ES2310163T3	22 August 2011 (22-08-2011)
		ES2325535T3	08 September 2009 (08-09-2009)
		ES2380732T3	17 May 2012 (17-05-2012)
		SE0300355D0	10 February 2003 (10-02-2003)
		US2007271724A1	29 November 2007 (29-11-2007)
		US8225456B2	24 July 2012 (24-07-2012)
		US2013031742A1	07 February 2013 (07-02-2013)
		US8607406B2	17 December 2013 (17-12-2013)
		WO2004069021A1	19 August 2004 (19-08-2004)

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
CA2484587A1	15 April 2005 (15-04-2005)	CA2484587A1	15 April 2005 (15-04-2005)
		CA2484587C	25 January 2011 (25-01-2011)
		AT437599T	15 August 2009 (15-08-2009)
		AU2004220716A1	05 May 2005 (05-05-2005)
		AU2004220716B2	12 May 2011 (12-05-2011)
		AU2011201938A1	19 May 2011 (19-05-2011)
		AU2011201938B2	09 February 2012 (09-02-2012)
		CN1626025A	15 June 2005 (15-06-2005)
		CN1626025B	13 April 2011 (13-04-2011)
		CN101822506A	08 September 2010 (08-09-2010)
		DE602004022234D1	10 September 2009 (10-09-2009)
		EP1523916A2	20 April 2005 (20-04-2005)
		EP1523916A3	26 April 2006 (26-04-2006)
		EP1523916B1	29 July 2009 (29-07-2009)
		EP1958560A1	20 August 2008 (20-08-2008)
		EP1958560B1	10 April 2013 (10-04-2013)
		NZ535942A	30 November 2006 (30-11-2006)
		NZ544120A	31 August 2007 (31-08-2007)
		NZ544121A	31 May 2007 (31-05-2007)
		US2009144931A1	11 June 2009 (11-06-2009)
		US7845046B2	07 December 2010 (07-12-2010)
		US2011030164A1	10 February 2011 (10-02-2011)
		US8549704B2	08 October 2013 (08-10-2013)
		US2005081321A1	21 April 2005 (21-04-2005)
CN202932850U	15 May 2013 (15-05-2013)	None	
GB2508035A	21 May 2014 (21-05-2014)	GB201220884D0	02 January 2013 (02-01-2013)
		GB2508035B	11 March 2015 (11-03-2015)
		AU2013349441A1	28 May 2015 (28-05-2015)
		CN103860103A	18 June 2014 (18-06-2014)
		JP2014100572A	05 June 2014 (05-06-2014)
		KR20150092575A	15 July 2015 (15-07-2015)
		US2014137363A1	22 May 2014 (22-05-2014)
		US8925145B2	06 January 2015 (06-01-2015)
		WO2014080179A1	30 May 2014 (30-05-2014)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BERESKIN & PARR LLP/S.E.N.C.R.L.,S.R.L.
Scotia Plaza
40 King Street West, 40th Floor
TORONTO, Ontario
Canada, M5H 3Y2

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	19 October 2015 (19-10-2015)
Applicant's or agent's file reference P46581PC00	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/CA2015/050661	15 July 2015 (15-07-2015)	18 July 2014 (18-07-2014)

International Patent Classification (IPC) or both national classification and IPC
IPC: ***A47L 5/24*** (2006.01), ***A47L 5/26*** (2006.01), ***A47L 5/30*** (2006.01), ***A47L 9/16*** (2006.01)

Applicant
OMACHRON INTELLECTUAL PROPERTY INC.

1. This opinion contains indications relating to the following items:

- [x] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [x] Box No. IV Lack of unity of invention
- [x] Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

dd May 18/16 E

Name and mailing address of the ISA/CA	Date of completion of this opinion	Authorized officer
Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 001-819-953-2476	14 October 2015 (14-10-2015)	Shawn De Salvo (819) 934-4270

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/CA2015/050661

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

☑ the international application in the language in which it was filed.

☐ a translation of the international application into which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a)).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:

a. ☐ forming part of the international application as filed:

☐ in the form of an Annex C/ST.25 text file.

☐ on paper or in the form of an image file.

b. ☐ furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.

c. ☐ furnished subsequent to the international filing date for the purposes of international search only:

☐ in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).

☐ on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

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Box No. IV Lack of unity of invention

1. ☐ In response to the invitation (Form PCT/ISA/206) to pay additional fees the applicant has, within the applicable time limit:

   ☐ paid additional fees

   ☐ paid additional fees under protest and, where applicable, the protest fee

   ☐ paid additional fees under protest but the applicable protest fee was not paid

   ☐ not paid additional fees

2. ☑ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

   ☐ complied with.

   ☑ not complied with for the following reasons:

WO2008088278A2, (BESKOW, J. et al.) 24 July 2008 (24-07-2008) discloses a hand carryable surface cleaning apparatus 1 comprising a body 19 housing a suction motor 33 and comprising a dirty air inlet 9; a cyclone bin assembly 7 removably mounted to the body, the bin assembly comprising a cyclone bin assembly air inlet 22 in fluid communication with the dirty air inlet 9 when the cyclone bin assembly is mounted to the body, the cyclone bin assembly 7 comprising a cyclone bin assembly air inlet 22 provided at an upper end of the cyclone bin assembly 7, a cyclone chamber 21 and a dirt collection chamber; an air flow path extending from the dirty air inlet 9 to a clean air outlet 37 and including the suction motor 33 and the cyclone chamber 21, wherein the cyclone bin assembly 7 is partially nested in the body when the cyclone bin assembly is mounted to the body.

In view of WO2008088278A2, there are no features common to all the claims which could form a single inventive concept. The claims therefore must be directed to multiple alleged inventions as follows

Group A, Claims 1-20: A hand carryable surface cleaning apparatus comprising a cyclone bin having an air outlet provided at an upper end of the cyclone bin assembly.

Group B, Claims 21- 40: A hand carryable surface cleaning apparatus comprising a locking mechanism selectively securing the cyclone bin assembly to the body of the apparatus comprising an actuator on a cyclone bin assembly.

Group C, Claims 41- 60: A hand carryable surface cleaning apparatus comprising a suction motor oriented at an angle to a vertical and horizontal axis.

Group D: Claims 61-83 A hand carryable surface cleaning apparatus comprising a dirt collection chamber extending under at least a portion of a suction motor.

4. Consequently, this opinion has been established in respect of the following parts of the international application:

   ☑ all parts.

   ☐ the parts relating to claim Nos.

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Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	21-40, 47-56, 58, 60, 62-66, 68-71 and 76-80	YES
	Claims	1-20, 41-46, 57, 59, 61, 67, 72-75, and 81-83	NO
Inventive step (IS)	Claims	21-40, 47-56, 58, 60, 62-66, 68-71 and 76-80	YES
	Claims	1-20, 41-46, 57, 59, 61, 67, 72-75, and 81-83	NO
Industrial applicability (IA)	Claims	1-83	YES
	Claims	NONE	NO

2. Citations and explanations:

D1: WO2008088278A2, (BESKOW, J. et al.) 24 July 2008 (24-07-2008)
D2: US2012022260A1, (CONRAD, W. E.) 06 September 2012 (06-12-2012)
D3: WO0217766A2, (MURPHY, J. S. et al.) 07 March 2002 (07-03-2002)

NOVELTY (N)

Group A: Claims 1-20

Claims 1-20 are not novel and therefore do not comply with PCT Article 33(2).

Regarding claims 1 and 13 document D1 discloses a hand carryable surface cleaning apparatus 1 comprising a body 19 housing a suction motor 33 and comprising a dirty air inlet 9; a cyclone bin assembly 7 removably mounted to the body, the bin assembly comprising a cyclone bin assembly air inlet 22 in fluid communication with the dirty air inlet 9 when the cyclone bin assembly is mounted to the body,the cyclone bin assembly 7 comprising a cyclone bin assembly air inlet 22 provided at an upper end of the cyclone bin assembly 7, a cyclone chamber 21 and a dirt collection chamber; an air flow path extending from the dirty air inlet 9 to a clean air outlet 37 and including the suction motor 33 and the cyclone chamber 21, wherein the cyclone bin assembly 7 is partially nested in the body when the cyclone bin assembly is mounted to the body.

With regard to the additional features of claim 2, D1 discloses a recess provided in the lower side of the body 19 in which the cyclone bin assembly (D) is received.

With regard to the additional features of claim 3, D1 discloses an entire length of the cyclone bin assembly 7 received in the recess 60.

With regard to the additional features of claim 4, D1 discloses a cyclone bin assembly air inlet 22 is provided at an upper end of the cyclone bin assembly 7.

With regard to the additional features of claims 5 and 8, D1 discloses a cyclone bin assembly air outlet is provided at an upper end of the cyclone bin assembly 7.

With regard to the additional features of claims 6, 9 and 16, D1 discloses an upper portion of the cyclone bin assembly 7 received in the recess and a pre motor screen 31 positioned above the recess.

With regard to the additional features of claim 7, D1 discloses a recess provided in the lower side of the body 19 in which entirety of the cyclone bin assembly 7 is received and an cyclone bin assembly air inlet 22 is provide at an upper end of the cyclone bin assembly 7.

[X] Continued in Supplemental Box

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Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**

Continuation of: BoX V

With regard to the additional features of claim 10, D1 discloses the body 19 comprises a conduit 18 extending from a dirty air inlet 9 to a conduit air outlet 20, the conduit extending linearly.

With regard to the additional features of claims 11 and 17, D1 discloses the body 19 comprises a conduit 18 extending from a dirty air inlet 9 to a conduit air outlet 20, the outlet 20 extending at an angle to the direction of airflow through the conduit and the cyclone bin assembly air inlet 22 extends in a mating angle.

With regard to the additional features of claims 12 and 18, D1 discloses the body 19 has a carry handle and the carry handle remains with the body 19 when the cyclone bin assembly 7 is removed.

With regard to the additional features of claim 14, D1 discloses the cyclone bin assembly air outlet is provided at an upper end of the cyclone bin assembly.

With regard to the additional features of claim 15, D1 discloses the cyclone bin assembly is removable as a sealed unit other than the cyclone bin assembly air inlet 22 and the cyclone bin assembly air outlet.

Regarding claims 1-3 and 10, document D2 discloses a hand carryable surface cleaning apparatus 100 comprising a body 112 housing a suction motor 114 and comprising a dirty air inlet 102; a cyclone bin assembly 110 removably mounted to the body, the bin assembly comprising a cyclone bin assembly air inlet 128 in fluid communication with the dirty air inlet 102 when the cyclone bin assembly is mounted to the body, a cyclone chamber 118 and a dirt collection chamber 120; an air flow path extending from the dirty air inlet 102 to a clean air outlet 104 and including the suction motor 114 and the cyclone chamber 118, wherein the cyclone bin assembly 110 is partially nested in the body when the cyclone bin assembly is mounted to the body. A recess extends into the lower half of the body 112 in which the cyclone bin assembly is received. The entirety of the cyclone bin assembly 110, including an upper portion, is received in the recess. a conduit 108 extending from the dirty air inlet 102 to a conduit air outlet 130.

Regarding claims 1-4, 10-13, 17, and 18, document D3 discloses a hand carryable surface cleaning apparatus (A) comprising a body (B) housing a suction motor (G) and comprising a dirty air inlet 104; a cyclone bin assembly (D) removably mounted to the body, the bin assembly comprising a cyclone bin assembly air inlet 110 in fluid communication with the dirty air inlet 104 when the cyclone bin assembly is mounted to the body, a cyclone chamber (F) and a dirt collection chamber 30; an air flow path extending from the dirty air inlet 104 to a clean air outlet 22 and including the suction motor (G) and the cyclone chamber (F), wherein the cyclone bin assembly (D) is partially nested in the body when the cyclone bin assembly is mounted to the body.
A recess 60 provided in the lower side of the body (B) in which the cyclone bin assembly (D) is received. An upper portion of the cyclone bin assembly (D) received in the recess 60. A cyclone bin assembly air inlet 110 is provide at an upper end of the cyclone bin assembly (D). The body (B) having a conduit 102 extending from the dirty air inlet 104 to a conduit air outlet 110 wherein the conduit extends linearly. The conduit air outlet 108 extends at an angle to the direction of airflow through the conduit and the cyclone bin assembly air inlet 110 extends at a mating angle. The body (B) has a handle 80 which remains with the body (B) when the cyclone bin assembly (D) is removed.

Therefore, claims 1-20 are not novel.

Group B: Claims 21-40

Claims 21-40 are novel and therefore comply with PCT Article 33(2). Document D1 is considered to represent the closest prior art. However, none of the cited documents discloses a locking mechanism comprising an actuator disposed on the cyclone bin assembly. Claims 21-40 are therefore novel.

Group C: Claims 41-60

Claims 41-46, 57 and 59 are not novel and therefore do not comply with PCT Article 33(2).

Regarding claim 41, document D1 discloses a hand carryable surface cleaning apparatus 1 comprising a body 19 housing a suction motor 33 and comprising a handle; a cyclone bin assembly 7 mounted to the body 19; an air flow path extending from a dirty air inlet 19 to a clean air outlet 37 and including the suction motor 33 and the cyclone bin assembly 7, wherein the suction motor is oriented at an angle to a vertical axis and a horizontal axis.

[X] Continued in Supplemental Box

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**

Continuation of: Box V

With regard to the additional features of claim 42, D1 discloses the suction motor 33 is forward of the handle.

With regard to the additional features of claim 43, D1 discloses the suction motor extends at an angle of about 5 degrees to 45 degrees to the vertical axis.

With regard to the additional features of claims 44 and 46, D1 discloses the handle oriented at an angle to the vertical axis and the horizontal axis.

With regard to the additional features of claim 45, D1 discloses the motor and handle are generally parallel.

With regard to the additional features of claim 57, D1 discloses handle provided at a rear end of the body 19.

With regard to the additional features of claim 59, D1 discloses the cyclone bin assembly 7 comprises a dirt collection chamber which extends under the suction motor.

Therefore, claims 41-46, 57 and 59 are not novel

Claims 47-50 are novel and therefore comply with PCT Article 33(2). Document D1 is considered to represent the closest prior art. However, none of the cited documents discloses a centre of gravity below and upper end of the cyclone bin assembly. Claims 47-50 are therefore novel.

Claims 51-55 are novel and therefore comply with PCT Article 33(2). Document D1 is considered to represent the closest prior art. However, none of the cited documents discloses a pre-motor filter positioned above the suction motor. Claims 51-55 are therefore novel.

Claims 56 and 58 are novel and therefore comply with PCT Article 33(2). Document D1 is considered to represent the closest prior art. However, none of the cited documents discloses a handle mounted to the upper and lower portions of the body. Claims 56 and 58 are therefore novel.

Claim 60 is novel and therefore complies with PCT Article 33(2). Document D1 is considered to represent the closest prior art. However, none of the cited documents disclose a cyclone bin assembly having a base on which the hand carryable surface cleaning apparatus can stand. Claim 60 is therefore novel.

Group D: Claims 61-80

Claims 61, 67, 72-75, and 81-83 are not novel and therefore do not comply with PCT Article 33(2).

Regarding claims 61 and 81, document D1 discloses a hand carryable surface cleaning apparatus 1 comprising a body 19 housing a suction motor 33 oriented forwardly; a cyclone bin assembly 7 mounted to the body 19 and comprising a cyclone chamber 21 and a dirt collection chamber, wherein the dirt collection chamber extends under a portion of the suction motor; and air flow path extending from a dirty air inlet 19 to a clean air outlet 37 and including the suction motor 33 and the cyclone bin assembly 7.

With regard to the additional features of claim 67, D1 discloses the dirt collection chamber extends forwardly of the cyclone chamber.

With regard to the additional features of claim 72, D1 discloses a pre-motor filter 31 positioned in a pre-motor filter chamber 30 and air exits upwardly from the cyclone bin assembly 7 to the pre-motor filter chamber 30.

With regard to the additional features of claim 73, D1 discloses the cyclone bin assembly 7 is removable as a sealed unit other than the cyclone bin assembly air inlet 22 and the cyclone bin assembly air outlet.

[X] Continued in Supplemental Box

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Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**

Continuation of: Box V

With regard to the additional features of claim 74 and 75, D1 discloses the body 19 is provided with a handle and the suction motor is positioned forward of the handle. The handle is orientated as an angle to the vertical and horizontal axes.

With regard to the additional features of claim 82, D1 discloses the suction motor 33 oriented at an angle to the vertical and horizontal axes.

With regard to the additional features of claim 83, D1 discloses the suction motor 33 positioned between the handle and the cyclone bin assembly.

Therefore, claims 61, 67, 72-75, and 81-83 are not novel

Claims 62-66, 68-71, and 76-80 are novel and therefore comply with PCT Article 33(2). Document D1 is considered to represent the closest prior art. However, none of the cited documents discloses the dirt collection chamber extending rearward of the cyclone chamber; the dirt collection chamber comprises a stand; the center of gravity of the hand carryable surface cleaning apparatus is positioned below an upper end of the cyclone pin assembly; or the handle mounted to upper and lower portions of the body. Claims 68-71, and 76-80 are therefore novel.

INVENSTIVE STEP (IS)

Group A: Claims 1-20

Claims 1-20 do not involve an inventive step and therefore do not comply with PCT Article 33(3). Given the above novelty objection, claims 1-20 do not involve an inventive step.

Group B: Claims 21-40

Claims 21-40 involve an inventive step and therefore comply with PCT Article 33(3). A locking mechanism comprising an actuator disposed on the cyclone bin assembly is not obvious to a person skilled in the art from the cited documents, when taken individually or in any combination. Claims 21-40 therefore involve an inventive step.

Group C: Claims 41-60

Claims 41-46, 57 and 59 do not involve an inventive step and therefore do not comply with PCT Article 33(3). Given the above novelty objection, claims 41-46, 57 and 59 do not involve an inventive step.

Claims 47-56, 58, and 60 involve an inventive step and therefore comply with PCT Article 33(3). A centre of gravity below and upper end of the cyclone bin assembly; a pre-motor filter positioned above the suction motor; a handle mounted to the upper and lower portions of the body or a cyclone bin assembly having a base on which the hand carryable surface cleaning apparatus can stand is not obvious to a person skilled in the art from the cited documents, when taken individually or in any combination. Claims 47-56, 58, and 60 therefore involve an inventive step.

Group D: Claims 61-83

Claims 61, 67, 72-75, and 81-83 do not involve an inventive step and therefore do not comply with PCT Article 33(3). Given the above novelty objection, claims 61, 67, 72-75, and 81-83 do not involve an inventive step.

Claims 68-71 and 76-80 involve an inventive step and therefore comply with PCT Article 33(3). the dirt collection chamber extending rearward of the cyclone chamber; the dirt collection chamber comprises a stand; the center of gravity of the hand carryable surface cleaning apparatus is positioned below an upper end of the cyclone pin assembly; or the handle mounted to upper and lower portions of the body. is not obvious to a person skilled in the art from the cited documents, when taken individually or in any combination. Claims 68-71 and 76-80 therefore involve an inventive step.

INDUSTRIAL APPLICABILITY (IA)

The subject matter of claims 1-83 is considered to be industrially applicable and thus complies with the requirements of PCT Article 33(4).

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PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:

BERESKIN & PARR LLP/S.E.N.C.R.L.,S.R.L.
Scotia Plaza
40 King Street West, 40th Floor
TORONTO, Ontario
Canada, M5H 3Y2

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing *(day/month/year)*	07 March 2016 (07-03-2016)
Applicant's or agent's file reference P46958PC00	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. **PCT/CA2015/051332**	International filing date *(day/month/year)* 16 December 2015 (16-12-2015)
Applicant OMACHRON INTELLECTUAL PROPERTY INC.	

1. ☑ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith

Filing of amendments and statement under Article 19:
The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

How? Directly to the International Bureau of WIPO preferably through ePCT or on paper to, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 to 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the any request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

The applicant may **submit comments on an informal basis on the written opinion of the International Searching Authority** to the International Bureau. These comments will be made available to the public after international publication. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established.

Shortly after the expiration of **18 months from the priority date, the international application will be published** by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90*bis*.1 and 90*bis*.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for **entry into the national phase** before those designated Offices. In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months. For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

Within **19 months from the priority date, the applicant may request that a supplementary international search be carried out** by a different International Searching Authority that offers this service (Rule 45*bis*.1). The procedure for requesting supplementary international search is described in the *PCT Applicant's Guide*, International Phase, paragraphs 8.006-8.032.

Name and mailing address of the ISA/CA Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 819-953-2476	Authorized officer Chantal Hébert (819) 639-4268

Form PCT/ISA/220 (July 2014)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference P46958PC00	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below
International application No. **PCT/CA2015/051332**	International filing date *(day/month/year)* 16 December 2015 (16-12-2015)	(Earliest)Priority date *(day/month/year)* 17 December 2014 (17-12-2014)

Applicant
OMACHRON INTELLECTUAL PROPERTY INC.

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

☑ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of:

☑ the international application in the language in which it was filed.

☐ a translation of the international application into which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (see Box No. II).

3. ☑ **Unity of invention is lacking** (see Box No. III).

4. With regard to the **title**,

☑ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☑ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

a. the figure of the **drawings** to be published with the abstract is Figure No. 4

☐ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☑ as selected by this Authority, because this figure better characterizes the invention.

b. ☐ none of the figures is to be published with the abstract.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2015/051332

A. CLASSIFICATION OF SUBJECT MATTER
IPC: *A47L 11/00* (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC: A47L 11/00 (2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
CPC: A47L5/22

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)
Questel Orbit (Fampat); Keywords (hand_vac+, hand_held portable, dual_mode, dual_motor, second 3d motor)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO9720492 (DOWNHAM et al.) 12 June 1997 (1997-06-12) *Figs.1&4*	1-36
A	US4980945 (BEWLEY) 01 January 1991 (1991-01-01) *whole document*	1-36
A	US5309600 (WEAVER et al.) 10 May 1994 (1994-05-10) *whole document*	1-36
A	EP2848173 (LIM) 18-03-2015 (2015-03-18) *whole document*	1-36
A	US5054157 (WERNER et al.) 08 October 1991(1991-10-08) *whole document*	1-36

☑ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier application or patent but published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 06 March 2016 (06-03-2016)	Date of mailing of the international search report 07 March 2016 (07-03-2016)
Name and mailing address of the ISA/CA Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 819-953-2476	Authorized officer Jarret Diggins (819) 639-7846

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP1815777 (STOLLE) 8 August 2007 (2007-08-08) *whole document*	1-36
A	US2007136984 (HSU) 21 June 2007 (2007-06-21) *whole document*	1-36

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CA2015/051332

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
WO9720492A1	12 June 1997 (12-06-1997)	WO9720492A1	12 June 1997 (12-06-1997)
		AU726494B2	09 November 2000 (09-11-2000)
		AU1037597A	27 June 1997 (27-06-1997)
		AU1037697A	27 June 1997 (27-06-1997)
		CA2239503A1	12 June 1997 (12-06-1997)
		CA2239584A1	12 June 1997 (12-06-1997)
		DE69607031D1	13 April 2000 (13-04-2000)
		DE69607031T2	03 August 2000 (03-08-2000)
		EP0868140A1	07 October 1998 (07-10-1998)
		EP0868140B1	08 March 2000 (08-03-2000)
		GB9524751D0	07 February 1996 (07-02-1996)
		GB2307848A	11 June 1997 (11-06-1997)
		GB9524774D0	07 February 1996 (07-02-1996)
		GB2307849A	11 June 1997 (11-06-1997)
		GB9810398D0	15 July 1998 (15-07-1998)
		GB2321395A	29 July 1998 (29-07-1998)
		GB2321395B	06 October 1999 (06-10-1999)
		JP2000505662A	16 May 2000 (16-05-2000)
		JP2005161091A	23 June 2005 (23-06-2005)
		PL327064A1	23 November 1998 (23-11-1998)
		PL182813B1	29 March 2002 (29-03-2002)
		SE9603114D0	28 August 1996 (28-08-1996)
		SE9603114L	01 March 1998 (01-03-1998)
		SE514314C2	12 February 2001 (12-02-2001)
		US6122796A	26 September 2000 (26-09-2000)
		WO9720491A1	12 June 1997 (12-06-1997)
US4980945A	01 January 1991 (01-01-1991)	US4980945A	01 January 1991 (01-01-1991)
		CA2030629A1	28 May 1991 (28-05-1991)
		CA2030629C	03 October 1995 (03-10-1995)
US5309600A	10 May 1994 (10-05-1994)	US5309600A	10 May 1994 (10-05-1994)
		AU6173794A	29 August 1994 (29-08-1994)
		CA2155873A1	18 August 1994 (18-08-1994)
		EP0683638A1	29 November 1995 (29-11-1995)
		US5524321A	11 June 1996 (11-06-1996)
		US5715566A	10 February 1998 (10-02-1998)
		WO9417716A1	18 August 1994 (18-08-1994)
EP2848173A1	18 March 2015 (18-03-2015)	EP2848173A1	18 March 2015 (18-03-2015)
		CN104414586A	18 March 2015 (18-03-2015)
		KR20150028184A	13 March 2015 (13-03-2015)
		KR20150129562A	20 November 2015 (20-11-2015)
		US20150059118A1	05 March 2015 (05-03-2015)
US5054157A	08 October 1991 (08-10-1991)	None	
EP1815777A1	08 August 2007 (08-08-2007)	EP1815777A1	08 August 2007 (08-08-2007)
		WO2007088192A1	09 August 2007 (09-08-2007)
US2007136984A1	21 June 2007 (21-06-2007)	None	

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BERESKIN & PARR LLP/S.E.N.C.R.L., S.R.L.
Scotia Plaza
40 King Street West, 40th Floor
TORONTO, Ontario
Canada, M5H 3Y2

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TS35 | 693

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	7 March 2016 (07-03-2016)
Applicant's or agent's file reference P46958PC00 – 16952	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/CA2015/051332	16 December 2015 (16-12-2015)	17 December 2014 (17-12-2014)

International Patent Classification (IPC) or both national classification and IPC
IPC: ***A47L 11/00*** (2006.01)

Applicant
OMACHRON INTELLECTUAL PROPERTY INC.

1. This opinion contains indications relating to the following items:

- ☑ Box No. I — Basis of the opinion
- ☐ Box No. II — Priority
- ☐ Box No. III — Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☑ Box No. IV — Lack of unity of invention
- ☑ Box No. V — Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI — Certain documents cited
- ☐ Box No. VII — Certain defects in the international application
- ☐ Box No. VIII — Certain observations on the international application

dd 06/17/2016 ms

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/CA	Date of completion of this opinion	Authorized officer
Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 001-819-953-2476	06 March 2016 (06-03-2016)	Jarret Diggins (819) 639-7846

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Page 331

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/CA2015/051332

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

☑ the international application in the language in which it was filed.

☐ a translation of the international application into which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:

a. ☐ forming part of the international application as filed:

☐ in the form of an Annex C/ST.25 text file.

☐ on paper or in the form of an image file.

b. ☐ furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.

c. ☐ furnished subsequent to the international filing date for the purposes of international search only:

☐ in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).

☐ on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

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Box No. IV **Lack of unity of invention**

1. ☐ In response to the invitation (Form PCT/ISA/206) to pay additional fees the applicant has, within the applicable time limit:

   ☐ paid additional fees

   ☐ paid additional fees under protest and, where applicable, the protest fee

   ☐ paid additional fees under protest but the applicable protest fee was not paid

   ☐ not paid additional fees

2. ☑ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

   ☐ complied with.

   ☐ not complied with for the following reasons:

Groups A and B comprise the following which is well known in the art: a surface cleaning apparatus comprising: a surface cleaning head having a dirty air inlet; b. an upright section moveably mounted to the surface cleaning head, the upright section moveable between a plurality of reclined floor cleaning positions; a portable vacuum cleaner removably mounted to the upright section, the portable vacuum cleaner unit comprising an air treatment members:

Group A (Claims 1-24): further comprises an auxiliary dirt collection assembly removably mounted to the upright section wherein, in a first upright mode of operation, the auxiliary dirt collection assembly is removed from the upright section and the hand vacuum cleaner is in airflow communication with the dirty air inlet and, in a second upright mode of operation, the multimode surface cleaning apparatus is operable with the auxiliary dirt collection assembly mounted to the upright section.

Group B Claims 25-36: further comprises a portable unit suction motor in the air flow path; and, an upstream dirty-air/suction motor in the air flow path downstream from the dirty air inlet and upstream from the portable vacuum cleaner wherein the surface cleaning apparatus is operable in an upright mode in which the portable vacuum cleaner unit is mounted to the upright section and the portable vacuum cleaner unit is operable in a portable mode wherein the portable vacuum cleaner unit is detached from the upright section.

4. Consequently, this opinion has been established in respect of the following parts of the international application:

   ☑ all parts.

   ☐ the parts relating to claim Nos.

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Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-36	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-36	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-36	YES
	Claims	NONE	NO

2. Citations and explanations:

D1: WO9720492 (DOWNHAM et al.) 12 June 1997 (1997-06-12)

NOVELTY

Claims 1-36 are novel and do comply with Article 33(2) of the PCT. Document D1 teaches a surface cleaning apparatus comprising: a surface cleaning head (3) having a dirty air inlet (4); an upright section (16) moveably mounted to the surface cleaning head, the upright section moveable between a plurality of reclined floor cleaning positions; a portable vacuum cleaner (2) removably mounted to the upright section, the portable vacuum cleaner unit comprising an air treatment members; further comprising an auxiliary dirt collection assembly (20) removably mounted to the upright section wherein, further comprises a portable unit suction motor (22) in the air flow path; and, an upstream dirty-air/suction motor (11) in the air flow path downstream from the dirty air inlet, wherein the surface cleaning apparatus (2) is operable in an upright mode in which the portable vacuum cleaner unit is mounted to the upright section and the portable vacuum cleaner unit is operable in a portable mode wherein the portable vacuum cleaner unit is detached from the upright section.

The subject matter of claim 1 differs from the prior art in that in a first upright mode of operation, the auxiliary dirt collection assembly is removed from the upright section and the hand vacuum cleaner is in airflow communication with the dirty air inlet and, in a second upright mode of operation, the multimode surface cleaning apparatus is operable with the auxiliary dirt collection assembly mounted to the upright section.

The subject matter of claim 25 differs from the prior art in the upstream dirty-air/suction motor (11) is in the air flow path downstream from the dirty air inlet and upstream from the portable vacuum cleaner.

INVENTIVE STEP

Claims 1-36 do comply with Article 33(3) of the PCT.

The subject matter of claim 1 is considered to involve an inventive step since the prior art does not fairly suggest that in a first upright mode of operation, the auxiliary dirt collection assembly is removed from the upright section and the hand vacuum cleaner is in airflow communication with the dirty air inlet and, in a second upright mode of operation, the multimode surface cleaning apparatus is operable with the auxiliary dirt collection assembly mounted to the upright section.

The subject matter of claim 25 is considered to involve an inventive step since the prior art does not fairly suggest the upstream dirty-air/suction motor (11) is in the air flow path downstream from the dirty air inlet and upstream from the portable vacuum cleaner.

INDUSTRIAL APPLICABILITY

The subject matter of claims 1-36 is considered to be industrially applicable and thus complies with the requirements of Article 33(4) of the PCT.

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Electronic Acknowledgement Receipt

EFS ID:	25763089
Application Number:	15085830
International Application Number:	
Confirmation Number:	9332
Title of Invention:	SURFACE CLEANING APPARATUS
First Named Inventor/Applicant Name:	Wayne Ernest Conrad
Customer Number:	1059
Filer:	Philip C. Mendes da Costa/Lissette Escobar
Filer Authorized By:	Philip C. Mendes da Costa
Attorney Docket Number:	10452-P46958US04
Receipt Date:	12-MAY-2016
Filing Date:	30-MAR-2016
Time Stamp:	16:00:07
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Foreign Reference	FF8_WO9720492A1.pdf	3680483 deccff8e3d013e964f53b51a9c4055a4019173f9	no	44

Warnings:	
Information:	

2	Foreign Reference	FF9_EP2848173A1.pdf	6619903 0b0821ae9c95dff699b1c3a6db78df53b99c8c2c	no	23
Warnings:					
Information:					
3	Foreign Reference	FF10_EP1815777A1.pdf	4341318 00671a21dc6229769b7211782ca53109ea8f93b3	no	9
Warnings:					
Information:					
4	Foreign Reference	FF11_WO2007104238A1.pdf	1888574 4ba6a62cc14c80bf996fbfd896a1a1c0dcf0a584	no	18
Warnings:					
Information:					
5	Non Patent Literature	NPL1.pdf	296864 e3fa2c770d13aeb6c0e2ba238a869b361be85879	no	8
Warnings:					
Information:					
6	Non Patent Literature	NPL2.PDF	1107756 569c1db0fb170266cf76ef149aa227562c3dbb61	no	7
Warnings:					
Information:					
7	Non Patent Literature	NPL3_CN.pdf	1463720 2d71773df5dac3803abfe44a76c6c76c4648cd36	no	6
Warnings:					
Information:					
8	Non Patent Literature	NPL4.pdf	287089 719818bdc55bab94a8314f826b812874cc86bf88	no	9
Warnings:					
Information:					
9	Non Patent Literature	NPL5.pdf	314927 8ab1715cbfc0d9ffa7e14aae3c4f2619a0d9393f	no	8
Warnings:					
Information:					
10	Non Patent Literature	NPL6.PDF	404289 f32ddc72ccefc1d43e96ecc792b7e078363471f8	no	10
Warnings:					
Information:					

11	Non Patent Literature	NPL7_cordless.pdf	1011752 4ad8bfd72e3adb8c9135b0f886d9a60837ec49e9	no	14
Warnings:					
Information:					
12	Non Patent Literature	NPL8_Makita.pdf	9452553 65ab8c67583ebb915bea221b3d820c3ac8e81339	no	32
Warnings:					
Information:					
13	Non Patent Literature	NPL9_EPO.pdf	566454 5337de44848688319a6d1ef79d9554050612c5b2	no	6
Warnings:					
Information:					
14	Non Patent Literature	NPL10_EPO.pdf	1215759 a5746ffc4d3f00876264a52bd911fad85157b3d7	no	7
Warnings:					
Information:					
15	Non Patent Literature	NPL11_iprp.pdf	422507 f91b9c6a0ca653e2f70d409766aef362bcf19806	no	5
Warnings:					
Information:					
16	Non Patent Literature	NPL12.pdf	85139 6417122ae22c3f1c8e006086dcf302bc964447b2	no	2
Warnings:					
Information:					
17	Non Patent Literature	NPL13.pdf	608162 d2243905dd296336400717cb82bbaaf5940f2bf4	no	11
Warnings:					
Information:					
18	Non Patent Literature	NPL14_ISR.pdf	19123704 487371b2ef680ce5144bd2327764a2a9d624c882	no	15
Warnings:					
Information:					
19	Non Patent Literature	NPL15.pdf	230997 6ed3969757098020960732045bfcaf26e7c6fb46	no	7
Warnings:					
Information:					

20	Non Patent Literature	NPL16.pdf	233599 c0d807236b2089eeb357671af6359d9f964a3b1d	no	7
Warnings:					
Information:					
21	Non Patent Literature	NPL17_Shark_Manual.pdf	1024647 46f9ec0fb5a1838290eaccdcbca10e3f8023cd8b	no	14
Warnings:					
Information:					
22	Non Patent Literature	NPL18_ISR_WO.pdf	1235066 6c066e467ebff1b6a05f591456d9e97efd814097	no	9
Warnings:					
Information:					
		Total Files Size (in bytes):	55615262		

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<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

<u>National Stage of an International Application under 35 U.S.C. 371</u>
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

<u>New International Application Filed with the USPTO as a Receiving Office</u>
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/085,830	03/30/2016	Wayne Ernest Conrad	10452-P46958US04

CONFIRMATION NO. 9332

1059
BERESKIN & PARR LLP/S.E.N.C.R.L., s.r.l.
40 KING STREET WEST
40th Floor
TORONTO, ON M5H 3Y2
CANADA

PUBLICATION NOTICE

OC000000084524823

Title:SURFACE CLEANING APPARATUS

Publication No.US-2016-0206163-A1
Publication Date:07/21/2016

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	15085830
Filing Date	2016-03-30
First Named Inventor	Wayne Ernest Conrad
Art Unit	3723
Examiner Name	-
Attorney Docket Number	10452-P46958US04

U.S.PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

If you wish to add additional U.S. Patent citation information please click the Add button.

U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

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FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	101061932	CN	A	2007-10-31	KWONNIE ELECTRICAL PRODUCTS LIMITED		☐

If you wish to add additional Foreign Patent Document citation information please click the Add button

NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	15085830
	Filing Date	2016-03-30
	First Named Inventor	Wayne Ernest Conrad
	Art Unit	3723
	Examiner Name	-
	Attorney Docket Number	10452-P48958US04

	1		☐

If you wish to add additional non-patent literature document citation information please click the Add button

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	15085830
Filing Date	2016-03-30
First Named Inventor	Wayne Ernest Conrad
Art Unit	3723
Examiner Name	-
Attorney Docket Number	10452-P46958US04

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Kevin Shipley/	Date (YYYY-MM-DD)	2016-10-17
Name/Print	Kevin Shipley	Registration Number	67487

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	27257561
Application Number:	15085830
International Application Number:	
Confirmation Number:	9332
Title of Invention:	SURFACE CLEANING APPARATUS
First Named Inventor/Applicant Name:	Wayne Ernest Conrad
Customer Number:	1059
Filer:	Kevin Shipley/Lynn Irvine
Filer Authorized By:	Kevin Shipley
Attorney Docket Number:	10452-P46958US04
Receipt Date:	19-OCT-2016
Filing Date:	30-MAR-2016
Time Stamp:	11:37:35
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	sIDS_Transmittal_Letter.pdf	136688 3164926c03716cd3d43aaceb178a0f1ca565215f	no	2
Warnings:					

Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	PTO_SB_08a_as_filed.pdf	599893 7729595d65a0495e70c5f3f599f9ef3a0656ab56	no	4
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Foreign Reference	CN101061932A.pdf	627032 dc42ee6fe5b3fd1c5e4b52cffbe3fb2f3f603ec1	no	20
Warnings:					
Information:					
		Total Files Size (in bytes):	1363613		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

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National Stage of an International Application under 35 U.S.C. 371

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New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Bereskin & Parr
INTELLECTUAL PROPERTY LAW

October 19, 2016

Kevin Shipley B.A., B.E.Sc. (Mech. Eng.), J.D.
416 957 1669 kshipley@bereskinparr.com

Our Reference: 10452-P46958US04

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT UNDER CFR.1.56 and CFR 1.97(b)(1) or (3)

The Commissioner of Patents
and Trademarks
Washington, D.C.
U.S.A 20231

Dear Commissioner:

Re: United States Patent Application No. 15/085,830
Title: SURFACE CLEANING APPARATUS
Applicant: Omachron Intellectual Property Inc.
Filed: March 30, 2016

In accordance with 37 CFR 1.97 and 1.98, and in recognition of the duty of disclosure set forth in 37 CFR 1.56, the applicant hereby submits an Information Disclosure Statement including a listing of patents and other publications of which the applicant is aware on PTO form SB08a.

In accordance with the requirements of 1.97(b)(3), this Information Disclosure Statement is filed before the mailing date of a first Office Action on the merits.

The filing of this statement shall not be construed as an admission that the information cited in the attached statement is, or is considered to be, material to patentability (37 CFR 1.97(h)), nor as an admission that it constitutes prior art.

(A) List of References

A list of the patents and other publications of which the applicant is aware is set out in the attached PTO Form SB08a which is attached hereto.

(B) Copies of References

Copies of the foreign references are enclosed.

Accordingly, the applicant submits that the Information Disclosure Statement is properly considered at this time.

Respectfully submitted,

BERESKIN & PARR LLP/S.E.N.C.R.L., s.r.l.

Kevin Shipley
Registration No. 67,487
/li
Encls.

Bereskin & Parr
INTELLECTUAL PROPERTY LAW

Appl. No	:	15/085,830	Confirmation No.: 9332
Inventor	:	Wayne Ernest Conrad	
Filed	:	March 30, 2016	
Title	:	SURFACE CLEANING APPARATUS	
TC./A.U.	:	3723	
Examiner	:	N/A	
Docket No.	:	10452-P46958US04	
Customer No.	:	001059	

Date: November 24, 2016

Honorable Commissioner for Patents
P. O. Box 1450
Alexandria, Virginia 22313–1450

PRELIMINARY AMENDMENT

Sir:

Please amend the application as follows:

Amendments to the Claims are reflected in the listing of claims, which begins on page 2 of this paper.

Remarks/Arguments begin on page 5 of this paper.

Bereskin & Parr LLP
6750 Century Avenue, Suite 101, Mississauga, Ontario, Canada L5N 2V8
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TORONTO MISSISSAUGA WATERLOO MONTRÉAL

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A hand vacuum cleaner having a front end having a dirty air inlet, a clean air outlet, an upper end and a bottom, the hand vacuum cleaner comprising:

   (a) a main body comprising an upper end, a lower end, a front end, a rear end and a handle having an upper end and a lower end and being inclined forwardly at an angle that is less than 30 degrees from a vertical axis, the main body housing a suction motor and fan assembly, the suction motor and fan assembly having a suction motor axis of rotation; and,

   (b) a cyclone unit comprising a cyclone having a cyclone axis of rotation, a cyclone air inlet, a cyclone air outlet,

   wherein when the hand vacuum cleaner is positioned with the bottom on a horizontal surface, the cyclone axis of rotation is generally horizontal.

2. (Original) The hand vacuum cleaner of claim 1 wherein the handle is provided at a rear end of the main body.

3. (Original) The hand vacuum cleaner of claim 2 wherein the handle has a handle axis that intersects the suction motor axis of rotation.

4. (Original) The hand vacuum cleaner of claim 2 wherein the handle has a handle axis that intersects the suction motor.

5. (Original) The hand vacuum cleaner of claim 2 wherein the handle has a handle axis that extends upwardly and forwardly with respect to the cyclone axis of rotation.

6. (Original) The hand vacuum cleaner of claim 1 wherein the main body comprises a suction motor and fan assembly housing and the handle extends upwardly from the suction motor and fan assembly housing.

7. (Original) The hand vacuum cleaner of claim 1 wherein the handle has a hand grip portion that extends upwardly and forwardly when the hand vacuum cleaner is positioned with the bottom on a horizontal surface.

8. (Original) The hand vacuum cleaner of claim 1 wherein when the hand vacuum cleaner is positioned with the bottom on a horizontal surface, the suction motor axis of rotation is generally horizontal.

9. (Original) The hand vacuum cleaner of claim 1 wherein when the hand vacuum cleaner is positioned with the bottom on a horizontal surface, the suction motor axis of rotation is positioned below the cyclone axis of rotation.

10. (Original) The hand vacuum cleaner of claim 1 wherein the cyclone has a front end wall having the cyclone air inlet and a rear end wall having the cyclone air outlet.

11. (Original) The hand vacuum cleaner of claim 1 wherein the cyclone axis of rotation is generally parallel to the suction motor axis of rotation.

12. (Original) The hand vacuum cleaner of claim 1 wherein the cyclone unit is provided on the front end of the main body.

13. (Original) The hand vacuum cleaner of claim 1 wherein the dirty air inlet is provided on a front end of the cyclone unit.

14. (Original) The hand vacuum cleaner of claim 1 wherein the dirty air inlet comprises an inlet passage that extends longitudinally between an inlet end and an outlet end and has a longitudinal passage axis, the outlet end communicates with the cyclone air inlet and the longitudinal passage axis intersects the handle.

15. (Original) The hand vacuum cleaner of claim 14 wherein the handle has a hand grip portion that extends upwardly and forwardly when the hand vacuum cleaner is positioned with the bottom on a horizontal surface.

16. (Original) The hand vacuum cleaner of claim 14 wherein the suction motor axis of rotation is positioned below the cyclone axis of rotation when the hand vacuum cleaner is positioned with the bottom on a horizontal surface.

17. (Original) The hand vacuum cleaner of claim 15 wherein the longitudinal passage axis is generally coaxial with the cyclone axis of rotation.

18. (Original) The hand vacuum cleaner of claim 14 wherein the suction motor axis of rotation is positioned below longitudinal passage axis when the hand vacuum cleaner is positioned with the bottom on a horizontal surface.

19. (New) The hand vacuum cleaner of claim 7, wherein the upper end of the handle is connected to the body at a location that is closer to the upper end of the hand vacuum cleaner than an upper end of the hand grip portion.

REMARKS/ARGUMENTS

Remark Regarding Claim Amendments

Claim 1 has been amended to recite that handle has an upper end and a lower end and being inclined forwardly at an angle that is less than 30 degrees from a vertical axis. New dependent claim 19 has been added, and depends from claim 7. Support for this subject matter can be found in the application as filed, including in Figures 1-5.

No new matter has been added by way of these amendments. Entry of these amendments is respectfully requested.

Conclusion

In light of the applicant's amendments to the claims and the foregoing Remarks, it is respectfully submitted that the present application is in condition for allowance. Should the Examiner have any remaining concerns which might prevent the prompt allowance of the application, the Examiner is respectfully invited to contact the undersigned at the telephone number appearing below.

No Disclaimers or Disavowals

Although the present communication may include alterations to the application or claims, or characterizations of claim scope or referenced art, applicant is not conceding in this application that previously pending claims are not patentable over the cited references. Rather, any alterations or characterizations are being made to facilitate expeditious prosecution of this application. Applicant reserves the right to peruse at a later date any previously pending or other broader or narrower claims that capture any subject matter supported by the present disclosure, including subject matter found to be specifically disclaimed herein or by any prior prosecution. Accordingly, reviewers of this or any parent, child or related prosecution history shall not reasonably infer that

applicant has made any disclaimers or disavowals of any subject matter supported by the present specification.

Please charge any additional fees including any fees for additional claims or extension of time or credit or overpayment to deposit account number 022095.

Respectfully submitted,

BERESKIN & PARR LLP/S.E.N.C.R.L., s.r.l.

By _____

Kevin Shipley
Reg. No. 67487
Tel: (416) 957-1669

Electronic Acknowledgement Receipt

EFS ID:	27611366
Application Number:	15085830
International Application Number:	
Confirmation Number:	9332
Title of Invention:	SURFACE CLEANING APPARATUS
First Named Inventor/Applicant Name:	Wayne Ernest Conrad
Customer Number:	1059
Filer:	Kevin Shipley/Lynn Irvine
Filer Authorized By:	Kevin Shipley
Attorney Docket Number:	10452-P46958US04
Receipt Date:	25-NOV-2016
Filing Date:	30-MAR-2016
Time Stamp:	09:52:08
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		Preliminary_Amendment.pdf	529979 99ec8886d9ad268ae878ee1fad9e2607e86cb338	yes	6

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Preliminary Amendment	1	1
	Claims	2	4
	Applicant Arguments/Remarks Made in an Amendment	5	6
Warnings:			
Information:			
	Total Files Size (in bytes):	529979	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 15/085,830	Filing Date 03/30/2016	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	11/25/2016	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 19	Minus	** 20	= 0	X $80 =	0
	Independent (37 CFR 1.16(h))	* 1	Minus	***3	= 0	X $420 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	**0**

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LDRC
LYNN NELSON

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Bereskin & Parr
INTELLECTUAL PROPERTY LAW

Appl. No	:	15/085,830	Confirmation No.: 9332
Inventor	:	Wayne Ernest Conrad	
Filed	:	March 30, 2016	
Title	:	SURFACE CLEANING APPARATUS	
TC./A.U.	:	3723	
Examiner	:	N/A	
Docket No.	:	10452-P46958US04	
Customer No.	:	001059	

Date: September 13, 2017

Honorable Commissioner for Patents
P. O. Box 1450
Alexandria, Virginia 22313–1450

PRELIMINARY AMENDMENT

Sir:

Please amend the application as follows:

Amendments to the Claims are reflected in the listing of claims, which begins on page 2 of this paper.

Remarks/Arguments begin on page 5 of this paper.

Bereskin & Parr LLP
6750 Century Avenue, Suite 101, Mississauga, Ontario, Canada L5N 2V8
Tel: 905.812.3600 Fax: 905.814.0031 bereskinparr.com
TORONTO MISSISSAUGA WATERLOO MONTRÉAL

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A hand vacuum cleaner having a front end having a dirty air inlet, a clean air outlet, an upper end and a bottom, the hand vacuum cleaner comprising:

   (a) a main body comprising an upper end, a lower end, a front end, a rear end and a handle having an upper end and a lower end and being inclined forwardly at an angle that is less than 30 degrees from a vertical axis, the main body housing a suction motor and fan assembly, the suction motor and fan assembly having a suction motor axis of rotation; and,

   (b) a cyclone unit comprising a cyclone having a cyclone axis of rotation, a cyclone air inlet, a cyclone air outlet, a front end and a rear end,

   wherein when the hand vacuum cleaner is positioned with the bottom on a horizontal surface, the cyclone axis of rotation is generally horizontal and extends between the front and rear ends of the cyclone.

2. (Original) The hand vacuum cleaner of claim 1 wherein the handle is provided at a rear end of the main body.

3. (Original) The hand vacuum cleaner of claim 2 wherein the handle has a handle axis that intersects the suction motor axis of rotation.

4. (Original) The hand vacuum cleaner of claim 2 wherein the handle has a handle axis that intersects the suction motor.

5. (Original) The hand vacuum cleaner of claim 2 wherein the handle has a handle axis that extends upwardly and forwardly with respect to the cyclone axis of rotation.

6. (Original) The hand vacuum cleaner of claim 1 wherein the main body comprises a suction motor and fan assembly housing and the handle extends upwardly from the suction motor and fan assembly housing.

7. (Original) The hand vacuum cleaner of claim 1 wherein the handle has a hand grip portion that extends upwardly and forwardly when the hand vacuum cleaner is positioned with the bottom on a horizontal surface.

8. (Original) The hand vacuum cleaner of claim 1 wherein when the hand vacuum cleaner is positioned with the bottom on a horizontal surface, the suction motor axis of rotation is generally horizontal.

9. (Original) The hand vacuum cleaner of claim 1 wherein when the hand vacuum cleaner is positioned with the bottom on a horizontal surface, the suction motor axis of rotation is positioned below the cyclone axis of rotation.

10. (Original) The hand vacuum cleaner of claim 1 wherein the cyclone has a front end wall having the cyclone air inlet and a rear end wall having the cyclone air outlet.

11. (Original) The hand vacuum cleaner of claim 1 wherein the cyclone axis of rotation is generally parallel to the suction motor axis of rotation.

12. (Original) The hand vacuum cleaner of claim 1 wherein the cyclone unit is provided on the front end of the main body.

13. (Original) The hand vacuum cleaner of claim 1 wherein the dirty air inlet is provided on a front end of the cyclone unit.

14. (Original) The hand vacuum cleaner of claim 1 wherein the dirty air inlet comprises an inlet passage that extends longitudinally between an inlet end and an outlet end and has a longitudinal passage axis, the outlet end communicates with the cyclone air inlet and the longitudinal passage axis intersects the handle.

15. (Original) The hand vacuum cleaner of claim 14 wherein the handle has a hand grip portion that extends upwardly and forwardly when the hand vacuum cleaner is positioned with the bottom on a horizontal surface.

16. (Original) The hand vacuum cleaner of claim 14 wherein the suction motor axis of rotation is positioned below the cyclone axis of rotation when the hand vacuum cleaner is positioned with the bottom on a horizontal surface.

17. (Original) The hand vacuum cleaner of claim 15 wherein the longitudinal passage axis is generally coaxial with the cyclone axis of rotation.

18. (Original) The hand vacuum cleaner of claim 14 wherein the suction motor axis of rotation is positioned below longitudinal passage axis when the hand vacuum cleaner is positioned with the bottom on a horizontal surface.

19. (Previously Presented) The hand vacuum cleaner of claim 7, wherein the upper end of the handle is connected to the body at a location that is closer to the upper end of the hand vacuum cleaner than an upper end of the hand grip portion.

REMARKS/ARGUMENTS

Remark Regarding Claim Amendments

Claim 1 has been amended to recite that handle has an upper end and a lower end and being inclined forwardly at an angle that is less than 30 degrees from a vertical axis. New dependent claim 19 has been added, and depends from claim 7. Support for this subject matter can be found in the application as filed, including in Figures 1-5.

No new matter has been added by way of these amendments. Entry of these amendments is respectfully requested.

Conclusion

In light of the applicant's amendments to the claims and the foregoing Remarks, it is respectfully submitted that the present application is in condition for allowance. Should the Examiner have any remaining concerns which might prevent the prompt allowance of the application, the Examiner is respectfully invited to contact the undersigned at the telephone number appearing below.

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applicant has made any disclaimers or disavowals of any subject matter supported by the present specification.

The Applicant believes that no additional fees are due in conjunction with filing of this amendment. However, should such additional fees become due, the Commissioner is authorized to charge any deficiencies necessary for entry of this amendment from our Deposit Account No. 022095.

Favourable consideration of this amendment is respectfully requested.

Respectfully submitted,

BERESKIN & PARR LLP/S.E.N.C.R.L., s.r.l.

/Philip C. Mendes da Costa/

Philip C. Mendes da Costa
Reg. No. 33,106
Tel: 416.957.1695

Electronic Acknowledgement Receipt

EFS ID:	30355781
Application Number:	15085830
International Application Number:	
Confirmation Number:	9332
Title of Invention:	SURFACE CLEANING APPARATUS
First Named Inventor/Applicant Name:	Wayne Ernest Conrad
Customer Number:	1059
Filer:	Philip C. Mendes da Costa/Snezana Lisowsky
Filer Authorized By:	Philip C. Mendes da Costa
Attorney Docket Number:	10452-P46958US04
Receipt Date:	13-SEP-2017
Filing Date:	30-MAR-2016
Time Stamp:	17:15:34
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Preliminary Amendment	P46958US04_Preliminary_Amendment_2017_09_13.pdf	112970 bfb10e204fbace1fcc98c57cf6c81fea6544b535	no	6
Warnings:					

Information:	
Total Files Size (in bytes):	112970

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New Applications Under 35 U.S.C. 111

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National Stage of an International Application under 35 U.S.C. 371

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New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.