



- (51) **International Patent Classification:**
A47L 9/16 (2006.01) *A47L 9/00* (2006.01)
A47L 5/36 (2006.01)
- (21) **International Application Number:**
PCT/CA2012/000184
- (22) **International Filing Date:**
2 March 2012 (02.03.2012)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
- | | | |
|------------|---------------------------|----|
| 13/039,426 | 3 March 2011 (03.03.2011) | US |
| 13/039,454 | 3 March 2011 (03.03.2011) | US |
| 13/039,524 | 3 March 2011 (03.03.2011) | US |
| 13/039,966 | 3 March 2011 (03.03.2011) | US |
| 13/039,565 | 3 March 2011 (03.03.2011) | US |
| 13/039,680 | 3 March 2011 (03.03.2011) | US |
| 13/039,761 | 3 March 2011 (03.03.2011) | US |
| 13/039,792 | 3 March 2011 (03.03.2011) | US |
| 13/039,643 | 3 March 2011 (03.03.2011) | US |
| 13/039,850 | 3 March 2011 (03.03.2011) | US |
| 13/039,891 | 3 March 2011 (03.03.2011) | US |
| 13/039,619 | 3 March 2011 (03.03.2011) | US |
| 13/039,984 | 3 March 2011 (03.03.2011) | US |
| 13/039,922 | 3 March 2011 (03.03.2011) | US |
- (71) **Applicant (for all designated States except US):** GBD CORP [BS/BS]; 1st Floor, Charlotte House, Charlotte Street, Nassau (BS).
- (72) **Inventor; and**
- (75) **Inventor/Applicant (for US only):** CONRAD, Wayne Ernest [CA/CA]; 9 King Lane, Hampton, Ontario L0B 1J0 (CA).
- (74) **Agent:** BERESKIN & PARR LLP/S.E.N.C.R.L.,s.r.l.; 40 King Street West, 40th Floor, Toronto, Ontario M5H 3Y2 (CA).
- (81) **Designated States (unless otherwise indicated, for every kind of national protection available):** AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) **Designated States (unless otherwise indicated, for every kind of regional protection available):** ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE,

[Continued on next page]

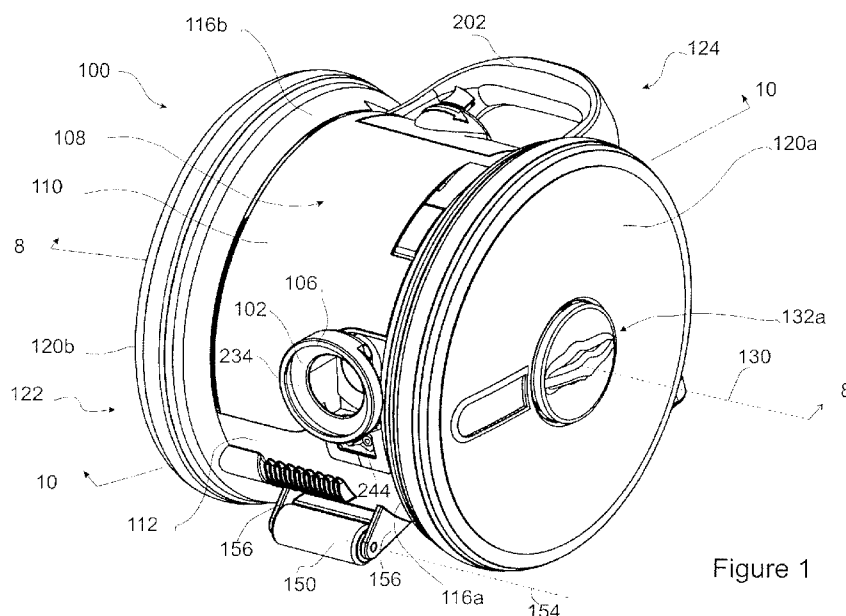
(54) **Title:** SURFACE CLEANING APPARATUS

Figure 1

(57) **Abstract:** A surface cleaning apparatus comprises an air flow path extending from a dirty air inlet to a clean air outlet. The surface cleaning apparatus includes a main body having a front end, a rear end, first and second opposed sidewalls. A cavity having an open upper end is positioned between the first and second opposed side walls. A suction motor provided in the air flow path. A cyclone bin assembly provided in the air flow path. The cyclone bin assembly may have opposed end walls and may be removably mounted in the cavity. Various design improvements are provided.



DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, **Published:**

LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE,

SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA,

GN, GQ, GW, ML, MR, NE, SN, TD, TG).

— *with international search report (Art. 21(3))*

TITLE: SURFACE CLEANING APPARATUS**RELATED APPLICATIONS**

[0001] This application claims the benefit of 35 USC 119 based on the priority of co-pending US Patent Application No. 13/039,426, filed March 3, 2011; US Patent Application No. 13/039,454, filed March 3, 2011; US Patent Application No. 13/039,524, filed March 3, 2011; US Patent Application No. 13/039,966, filed March 3, 2011; US Patent Application No. 13/039,565, filed March 3, 2011; US Patent Application No. 13/039,680, filed March 3, 2011; US Patent Application No. 13/039,761, filed March 3, 2011; US Patent Application No. 13/039,792, filed March 3, 2011; US Patent Application No. 13/039,643, filed March 3, 2011; US Patent Application No. 13/039,850, filed March 3, 2011; US Patent Application No. 13/039,891, filed March 3, 2011; US Patent Application No. 13/039,619, filed March 3, 2011; US Patent Application No. 13/039,984, filed March 3, 2011; and US Patent Application No. 13/039,922, filed March 3, 2011, and each of those applications being incorporated herein in their entirety by reference.

FIELD

[0002] The disclosure relates to surface cleaning apparatuses, such as vacuum cleaners.

INTRODUCTION

[0003] Various constructions for surface cleaning apparatuses, such as vacuum cleaners, are known. Currently, many surface cleaning apparatuses are constructed using at least one cyclonic cleaning stage. Air is drawn into the vacuum cleaners through a dirty air inlet and conveyed to a cyclone inlet. The rotation of the air in the cyclone results in some of the particulate matter in the airflow stream being disentrained from the airflow stream. This material is then collected in a dirt bin collection chamber, which may be at the bottom of the cyclone or in a direct collection chamber exterior to the cyclone chamber (see for example WO2009/026709 and

US 5,078,761). One or more additional cyclonic cleaning stages and/or filters may be positioned downstream from the cyclone.

[0004] Canister vacuum cleaners are also known. Cyclonic canister vacuum cleaners are known. In order to have a large dirt capacity, cyclonic canister vacuum cleaners have tended to be large, heavy and bulky, making them more difficult to use.

[0005] Various cyclonic designs for use in vacuum cleaners, such as upright or canister vacuum cleaners are known. The higher the efficiency of a cyclone at capturing the wide variety of material typically entrained in a dirty air stream by a vacuum cleaner or other surface cleaning apparatus, the cleaner the air returned to a room being cleaned or the lower the dependence may be on downstream air treatment members such as a second or third cyclonic stages and/or filters. By eliminating the need for, e.g., downstream second or third cyclonic stages, a vacuum cleaner may be smaller and lighter, thereby increasing the ease of moving and using the vacuum cleaner.

SUMMARY

[0006] The following summary is provided to introduce the reader to the more detailed discussion to follow. The summary is not intended to limit or define the claims.

[0007] According to one broad aspect, a surface cleaning apparatus is provided that has at least one cyclone chamber. The cyclone chamber is provided in a cyclone bin (which may also house a dirt collection chamber associated with the cyclone chamber). The cyclone bin is provided in a main body that has an open upper end and sidewalls. The sidewalls are configured to protect the cyclone bin and accordingly the surface cleaning apparatus may be more durable.

[0008] This embodiment is particularly preferred for use in a canister surface cleaning apparatus. For example, a canister vacuum cleaner may have a cyclone bin with a longitudinal axis (which is preferably removable), wherein the axis extends laterally with respect to a forward degree of motion, or along the forward direction of

motion. The main body adds weight and bulk to the vacuum cleaner. By reducing the size of the main body, the weight and bulk of the vacuum cleaner may be reduced. Providing sidewalls provides protection for the cyclone bin.

[0009] For example, the main body may have a cavity with the open upper end and the cyclone bin assembly may be removably mounted within the cavity. The cavity may be provided laterally between opposing sidewalls of the surface cleaning apparatus. Accordingly, the sidewalls may protect the opposed ends of the cyclone bin.

[0010] Another advantage may be that this configuration permits a more compact construction of the surface cleaning apparatus. For example, the cyclone chamber may be mounted transversely to the forward direction of motion. However, the sidewalls protect the opposed ends of the cyclone chamber.

[0011] In order to reduce the size and bulk of a vacuum cleaner, optionally, one or more operating components of the vacuum cleaner may be provided in the sidewalls, thereby permitting the sidewalls to perform more than one function.

[0012] In accordance with this aspect, a surface cleaning apparatus may comprise an air flow path extending from a dirty air inlet to a clean air outlet. The surface cleaning apparatus includes a main body having a front end, a rear end, first and second opposed sidewalls. A cavity having an open upper end may be positioned between the first and second opposed side walls. A suction motor provided in the air flow path. A cyclone bin assembly is provided in the air flow path. The cyclone bin assembly may have opposed end walls and may be removably mounted in the cavity. The first and second opposed sidewalls may be sized to protect the cyclone bin assembly from a side impact.

[0013] The sidewalls may overlie at least 50%, preferably at least 75%, and more preferably, may overlie essentially all of end walls of the cyclone bin assembly.

[0014] The cavity may be generally U shaped, and may have an open front end and an open rear end.

[0015] The cyclone bin assembly may comprise a cyclone chamber, and each of the first and second opposed sidewalls may comprise a wheel having a diameter larger than a diameter of the cyclone chamber.

[0016] Each of the first and second opposed sidewalls may comprise a wheel substantially the same size as the sidewall on which the wheel is provided.

[0017] Each of the first and second opposed sidewalls may comprise a wheel having a cross sectional area larger than a transverse cross sectional area of the cyclone bin assembly.

[0018] The cyclone bin assembly may comprise a cyclone chamber and an openable dirt collection chamber.

[0019] One of the end walls may be an openable wall of the dirt collection chamber.

[0020] The cyclone bin assembly may comprise a cyclone chamber that extends transversely or laterally, and the cyclone chamber comprising a tangential inlet that is provided at the front end of the surface cleaning apparatus.

[0021] The main body may comprise a suction hose connector upstream of the tangential inlet.

[0022] The main body may comprise a suction hose connector upstream of the cyclone bin assembly.

[0023] The cyclone bin assembly may comprise a cyclone chamber and a dirt collection chamber. The dirt collection chamber may be provided exterior to the cyclone chamber and may extend at least partially collinearly therewith.

[0024] The cyclone bin assembly may comprise a cyclone chamber and a dirt collection chamber. The surface cleaning apparatus may also comprise a pre-motor

filter which has a cross sectional area that is larger than a transverse cross sectional area of the cyclone chamber.

[0025] The pre-motor filter may be provided in one of the first and second opposed sidewalls.

[0026] The pre-motor filter may have a cross sectional area that is at least 50%, preferably at least 60% and more preferably at least 75% of a cross sectional area of the sidewall, and most preferably, may have a cross sectional area that is proximate that of the sidewall.

[0027] The cyclone bin assembly may sit on a platform in the cavity and the platform may comprise a portion of a housing for the suction motor.

[0028] At least one of the first and second opposed sidewalls may have a compartment that houses an operating component of the surface cleaning apparatus or a portion of the air flow path. The portion of the airflow path may comprise at least part of an air flow passage between the cyclone chamber and the suction motor.

[0029] The cyclone bin assembly may comprise a cyclone chamber and the suction motor and the cyclone chamber extend transversely.

[0030] The operating component may comprise at least one of a filter, batteries, a power cord spool and control electronics.

[0031] The operating component may comprise at least one of batteries, a power cord spool and control electronics, and the compartment may be openable. Each of the first and second opposed sidewalls may comprise a wheel and at least one of the wheels is removable to reveal the compartment.

[0032] According to another broad aspect of the teachings described herein, a cyclone bin assembly is removably mounted to a surface cleaning apparatus and, preferably, within a cavity of the surface cleaning apparatus. The cyclone bin assembly may include some or all of the operable (moveable) components of the locking mechanism. The actuator for the locking mechanism is preferably provided

adjacent or in sufficient proximity to a carry handle for the cyclone bin assembly such that the lock may be released while a user is holding the handle, thereby permitting one handed removal of the cyclone bin assembly.

[0033] Preferably, the cyclone bin assembly is removably mounted in a cavity of the surface cleaning apparatus. The cavity is preferably provided laterally between opposing sidewalls of the surface cleaning apparatus. The opposing sidewalls are preferably large enough to cover the transverse faces of the cyclone bin assembly. Accordingly, another advantage of this configuration may be that the sidewalls of the surface cleaning apparatus may help protect the cyclone bin assembly from side impacts, when the cyclone bin assembly is in the cavity.

[0034] The locking members, which may be, e.g., pins or other engagement members, engage a main body of the surface cleaning apparatus at least one location, and preferably two. The locking member is preferably configured to engage at least one of the sidewalls of the surface cleaning apparatus. Optionally, the locking member may comprise movable locking pins that may engage the sidewalls. A release member may be connected to the locking pins to allow a user to disengage the locking member.

[0035] In accordance with this aspect, a surface cleaning apparatus may comprise an air flow path extending from a dirty air inlet to a clean air outlet. The surface cleaning apparatus may also comprise a main body comprising a front end, a rear end, first and second opposed sidewalls. A cavity having an open upper end may be positioned between the first and second opposed side walls. A suction motor may be provided in the air flow path. A cyclone bin assembly may be provided in the air flow path. The cyclone bin assembly may have opposed end walls and may be removably mounted in the cavity. A locking member lockingly secures the cyclone bin assembly in the cavity. The locking member may engage at least one of the side walls.

[0036] The locking member may be engageable with each of the sidewalls.

[0037] The cyclone bin assembly further may comprise a handle and the locking member may comprise a release member proximate the handle.

[0038] The locking member may be operable by a user with a same hand as is used to grasp the handle.

[0039] The locking member may comprise a pair of pins that are engageable with the sidewalls.

[0040] The pins may be moveable in opposite directions.

[0041] The pins may be moveable transversely.

[0042] The locking member may be moveably transversely.

[0043] The first and second opposed sidewalls may be sized to protect the cyclone bin assembly from a side impact.

[0044] The sidewalls may overlie at least 75% of end walls of the cyclone bin assembly.

[0045] The sidewalls may overlie essentially all of end walls of the cyclone bin assembly.

[0046] The cyclone bin assembly may comprise a cyclone chamber and each of the first and second opposed sidewalls may comprise a wheel having a diameter larger than a diameter of the cyclone chamber.

[0047] Each of the first and second opposed sidewalls may comprise a wheel substantially the same size as the sidewall on which the wheel is provided.

[0048] Each of the first and second opposed sidewalls may comprise a wheel having a cross sectional area larger than a transverse cross sectional area of the cyclone bin assembly.

[0049] The main body may comprise a suction hose connector upstream of the cyclone bin assembly.

[0050] The cyclone bin assembly may comprise a cyclone chamber and a dirt collection chamber and the surface cleaning apparatus further may comprise a pre-motor filter which has a cross sectional area that may be larger than a transverse cross sectional area of the cyclone chamber.

[0051] A pre-motor filter may be provided in one of the first and second opposed sidewalls.

[0052] The pre-motor filter may have a cross sectional area that may be at least 60% of a cross sectional area of the sidewall.

[0053] The pre-motor filter may have a cross sectional area that may be proximate that of the sidewall.

[0054] At least one of the first and second opposed sidewalls may have a compartment that houses an operating component of the surface cleaning apparatus or a portion of the air flow path.

[0055] The portion of the airflow path may comprise at least part of an air flow passage between the cyclone chamber and the suction motor.

[0056] The cyclone bin assembly may comprise a cyclone chamber and the suction motor and the cyclone chamber extend transversely.

[0057] The operating component may comprise at least one of a filter, batteries, a power cord spool and control electronics.

[0058] The operating component may comprise at least one of batteries, a power cord spool and control electronics.

[0059] The compartment may be openable.

[0060] Each of the first and second opposed sidewalls may comprise a wheel and at least one of the wheels may be removable to reveal the compartment.

[0061] The locking member may include all moveable components that secure the cyclone bin assembly to the surface cleaning apparatus.

[0062] According to another broad aspect of the teachings described herein, a surface cleaning apparatus is rollingly supported by side wheels. At least one of the side wheels houses an operating component of the surface cleaning apparatus. An advantage of this design is that the wheels may perform two functions, namely to permit the surface cleaning apparatus to move and to also house an operating component of the surface cleaning apparatus, thereby permitting a reduction in the size, weight and bulk of the surface cleaning apparatus.

[0063] For example, at least one side wheel is preferably rotatably connected to each sidewall of a main body of a surface cleaning apparatus. One or more compartments may be defined between a sidewall and its corresponding side wheel. One or more of the compartments may contain one or more operating components of the surface cleaning apparatus, including, for example a filter, a controller, a power source and a cord wrap spool. The side wheel covering the compartment may be moveable to an open position (e.g., removable) to provide access to the compartment. Preferably, the wheel is removably mounted to the sidewall.

[0064] An advantage of this configuration is that a more compact surface cleaning apparatus may be provided. The use of space behind one or more wheels enables additional portions of the main body of a surface cleaning apparatus on which an air treatment member is provided, and preferably removably mounted, to be used to house components thereby permitting a reduction in the size, weight and bulk of the surface cleaning apparatus.

[0065] It may be necessary to access one or more of the operating components from time to time. By configuring a wheel of the removable or openable, a user may be able to inspect, clean and/or replace the components.

[0066] Another advantage of this configuration may be that the side wheels of the surface cleaning apparatus may help protect the operating components from side impacts.

[0067] Another advantage of this configuration may be that the sidewalls of the surface cleaning apparatus may help protect the air treatment member, which is preferably a cyclone bin assembly, from side impacts, when the air treatment member is in the cavity.

[0068] In accordance with this aspect, a surface cleaning apparatus may comprise an air flow path extending from a dirty air inlet to a clean air outlet and including an air treatment member and a suction motor. The surface cleaning apparatus may comprise a main body comprising a front end and a rear end, and a plurality of wheels. A compartment may be positioned inwards of one of the wheels. The compartment may be accessible when the one of the wheels is removed or moved to an open position.

[0069] One of the wheels may be removably mounted to the surface cleaning apparatus.

[0070] The compartment may house an operating component of the surface cleaning apparatus.

[0071] The operating component may comprise at least one of a filter, batteries, a power cord spool and control electronics.

[0072] The air treatment member may comprise a cyclone bin assembly having a cyclone chamber having a diameter. The operating component may comprise a filter that may have a cross sectional area that is larger than a transverse cross-sectional area of the cyclone chamber.

[0073] The main body may comprise first and second opposed sidewalls. The compartment may be provided in one of the sidewalls and the filter may have a cross sectional area that may be at least 50%, more preferably at least 60% and most preferably at least 75% of a cross sectional area of the sidewall.

[0074] The filter may have a cross sectional area that may be proximate that of the sidewall.

[0075] The main body may comprise first and second opposed sidewalls. The compartment may be provided in one of the sidewalls and one of the wheels may be provided on each sidewall.

[0076] The air treatment member may comprise a cyclone bin assembly and a cyclone chamber having a diameter. Each of the wheels provided on the sidewall may have a diameter larger than the diameter of the cyclone chamber.

[0077] The wheels may have a cross sectional area larger than a transverse cross sectional area of the cyclone bin assembly.

[0078] The sidewalls may overlie at least 50%, more preferably at least 60% and most preferably at least 75% of end walls of the cyclone bin assembly.

[0079] The sidewalls may overlie essentially all of end walls of the cyclone bin assembly.

[0080] The wheels provided on the sidewall may be substantially the same size as the sidewalls.

[0081] The main body may comprise a cavity having an open upper end positioned between the first and second opposed sidewalls and the cyclone bin assembly may be removably mounted in the cavity.

[0082] The cyclone bin assembly may seat on a platform in the cavity and the platform may comprise a portion of a housing for the suction motor.

[0083] The surface cleaning apparatus may also comprise at least one of, and preferably both, a front stabilizer wheel and a rear stabilizer wheel. If each of a front and a rear stabilizer wheel is provided, then the front stabilizer wheel and a rear stabilizer wheel may be positioned such that only one wheel may contact the floor at a time.

[0084] The wheels may be rotational mounted on bearing surfaces that are provided on the surface cleaning apparatus. The bearing surfaces may be threaded

mounted to the surface cleaning apparatus. For example, the surface cleaning apparatus may include an axle mount and the axle may be threadedly received in the axle mount. Further, for example, the wheels may have a central bore that may be rotatably mounted on the axle.

[0085] The wheels may be removable by rotation of the bearing surfaces in a direction opposite to a direction of forward rotation of the wheel.

[0086] The wheels may have a rim and the rim may overlie a portion of the main body.

[0087] The compartment may have a laterally extending perimeter wall and the rim may overlie at least a portion of the perimeter wall.

[0088] According to yet another broad aspect of the teachings described herein, a surface cleaning apparatus is provided that has side wheels and an air treatment member, such as a cyclone, and a filter housing, wherein the filter housing is positioned at least partially between sidewalls of the surface cleaning apparatus. For example, at least a portion of a filter housing, which is preferably a post-motor filter housing, may be positioned between the sidewalls, and may be provided in front of, or behind, the cyclone bin assembly. Portions of the filter housing may form part of the outer surface of the surface cleaning apparatus. The filter housing may be positioned so that at least a portion of the filter housing is positioned within the diameter of the side wheels. An advantage of this design is that the surface cleaning apparatus may be more compact (i.e. it helps reduce the overall size of the surface cleaning apparatus) and therefore the surface cleaning apparatus may be more maneuverable.

[0089] The air treatment member is preferably removably mounted within a cavity on the surface cleaning apparatus. The cavity may be provided laterally between opposing sidewalls of the surface cleaning apparatus. Preferably, the surface cleaning apparatus sidewalls are large enough to cover the transverse faces of the air treatment member.

[0090] The surface cleaning apparatus may be rollingly supported by side wheels. One side wheel is preferably rotatably connected to each sidewall.

[0091] In addition to the side wheels, the surface cleaning apparatus may comprise one or both of a front stabilizer wheel and a rear stabilizer wheel. The front and rear stabilizer wheels are provided on opposite sides of the axis of rotation of the side wheels. The surface cleaning apparatus is preferably configured so that only one of the front and rear stabilizer wheels rests on the ground at a time. If provided, the rear stabilizer wheel is preferably mounted on the underside of the filter housing. Accordingly, the filter housing may perform multiple functions.

[0092] Another advantage of this configuration may be that the sidewalls of the surface cleaning apparatus may help protect the air treatment member from side impacts, when the air treatment member is in the cavity. Further, the sidewall may assist in protecting the filter housing from side impacts.

[0093] In accordance with this aspect, a surface cleaning apparatus may comprise an air flow path extending from a dirty air inlet to a clean air outlet, an air treatment member, a suction motor and a filter housing. The surface cleaning apparatus may also comprise a main body comprising a front end, a rear end and a central portion. The air treatment member may be removably mounted to the central portion. A pair of spaced apart main wheels may be mounted to the main body on either side of the central portion and may have an axis of rotation. The filter housing may be located in the central portion forward or rearward of the air treatment member.

[0094] The axis of rotation may be located about midpoint along a length of the air treatment member.

[0095] The main body may comprise a first sidewall and a spaced apart second sidewall and the central portion may comprise a cavity located between the first sidewall and the second sidewall.

[0096] The cavity may be generally U shaped.

[0097] The main wheels may be provided on the sidewalls. At least one of the main wheels may be moveable to an open position (e.g., removable) to reveal a compartment that may house, e.g., a further filter (e.g., a pre-motor filter). The filter may have a cross sectional area that may be at least 50%, more preferably at least 60% and most preferably at least 75% of a cross sectional area of the sidewall.

[0098] The air treatment member may sit on a portion of a housing for the suction motor.

[0099] The cavity may have an open front end and an open rear end.

[00100] The surface cleaning apparatus may also comprise at least one of a front stabilizer wheel provided forward of the axis of rotation and a rear stabilizer wheel provided rearward of the axis of rotation.

[00101] The stabilizer wheel may be positioned laterally approximately midway between the main wheels.

[00102] The surface cleaning apparatus may comprise both the front stabilizer wheel and the rear stabilizer wheel.

[00103] The stabilizer wheels may be positioned such that only one of the stabilizer wheels may contact a floor on which the surface cleaning apparatus may be positioned at a time.

[00104] The surface cleaning apparatus may comprise only one of a front stabilizer wheel provided forward of the axis of rotation and a rear stabilizer wheel provided rearward of the axis of rotation.

[00105] The main wheels may be substantially the same size as the sidewalls.

[00106] The sidewalls may overlie at least 50%, more preferably at least 60% and most preferably at least 75% of end walls of the air treatment member.

[00107] The sidewalls may overlie essentially all of end walls of the air treatment member.

[00108] The stabilizer wheel may be provided on the filter housing.

[00109] The filter housing may house a post motor filter.

[00110] The filter housing may be at least partially nested between the main wheels.

[00111] The surface cleaning apparatus may also comprise a cord spool and an actuator for the cord spool may be provided on the filter housing.

[00112] At least two sides of the filter housing may form an outer surface of the surface cleaning apparatus.

[00113] The filter housing may be positioned forward of the air treatment member and a filter may be removable from the filter housing either in a downward direction or a forward direction.

[00114] The filter housing may be positioned rearward of the air treatment member and a filter may be removable from the filter housing either in a downward direction or a rearward direction.

[00115] According to yet another broad aspect of the teachings described herein, a surface cleaning apparatus has a main body having a pair of spaced apart side wheels. The surface cleaning apparatus is rollingly supported by the side wheels. Preferably, a side wheel is rotatably connected to each sidewall. At least one additional stabilizer wheel may be provided. The stabilizer wheel is provided forward or rearward of the axis of rotation of the side wheels. An advantage of this design is that the maneuverability of the surface cleaning apparatus may be increased. The side wheels, which preferably have a relatively large diameter, permit the surface cleaning apparatus to be moved over a surface. If a stabilizer wheel is provided at the rear end, the rear stabilizer wheel prevents the rear portion of the surface cleaning apparatus from dragging on the floor. Similarly, if a stabilizer wheel is provided at the front end, the rear stabilizer wheel prevents the front portion of the surface cleaning apparatus from dragging on the floor.

[00116] In use, the surface cleaning apparatus may be support by just two side wheels. The side wheels are preferably relatively large, so as to facilitate the movement of the surface cleaning apparatus over, e.g., a carpeted surface. For example, the sidewalls may overlie at least 50%, more preferably at least 60% and most preferably at least 75% of end walls of the air treatment member and the side wheels may overlie at least 50%, more preferably at least 60% and most preferably at least 75% of the sidewalls. In a preferred embodiment, the sidewalls overlie essentially all of the end walls of the air treatment member and the side wheels overlie essentially all of the sidewalls.

[00117] An air treatment member, which is preferably a cyclone bin assembly, is preferably removably mounted within a cavity on the surface cleaning apparatus and preferably transversely mounted. The cavity is provided laterally between opposing sidewalls of the surface cleaning apparatus.

[00118] One or more compartments may be defined between a sidewall and its corresponding side wheel. The compartments may contain one or more operating components of the surface cleaning apparatus, including, for example filters, controllers, power sources and cord wrap spools.

[00119] The side wheels may be moveable to an open position, e.g., removably mounted to the sidewalls. Removing the side wheels may allow a user to access the compartments in the sidewalls.

[00120] A filter housing may be provided in the air flow path. The filter housing houses an air filter. The filter housing may be positioned laterally between the sidewalls, and may be provided in front of, or behind, the cyclone bin assembly. Portions of the filter housing may form part of the outer surface of the surface cleaning apparatus. The filter housing may be positioned so that at least a portion of the filter housing is positioned within the diameter of the side wheels.

[00121] In addition to the side wheels, the surface cleaning apparatus may comprise one or both of a front stabilizer wheel and a rear stabilizer wheel. The front

and rear stabilizer wheels are provided on opposite sides of the axis of rotation of the side wheels. The surface cleaning apparatus is preferably configured so that only one of the front and rear stabilizer wheels rests on the ground at a time. The rear stabilizer wheel is preferably mounted to, and more preferably on the underside of, the filter housing.

[00122] Another advantage of this configuration is that the overall size of the surface cleaning apparatus may be reduced.

[00123] Another advantage of this configuration may be that a user may access operational components of the surface cleaning apparatus when the side wheels are detached from the sidewalls. This may allow a user to inspect, clean and/or replace the components.

[00124] Another advantage of this configuration may be that the sidewalls of the surface cleaning apparatus may help protect the cyclone bin assembly from side impacts, when the cyclone bin assembly is in the cavity.

[00125] In accordance with this aspect, a surface cleaning apparatus may comprise an air flow path extending from a dirty air inlet to a clean air outlet, an air treatment member and a suction motor. The surface cleaning apparatus may comprise a main body comprising a front end, a rear end, and a pair of spaced apart main wheels having an axis of rotation. The surface cleaning apparatus may also comprise at least one of a front stabilizer wheel provided forward of the axis of rotation and a rear stabilizer wheel provided rearward of the axis of rotation.

[00126] The surface cleaning apparatus may comprise both the front stabilizer wheel and the rear stabilizer wheel.

[00127] The stabilizer wheels may be positioned such that only one of the stabilizer wheels may contact the floor at a time.

[00128] The main body may comprise first and second opposed sidewalls and the main wheels may be provided on the sidewalls.

[00129] At least one of the first and second opposed sidewalls may have a compartment that houses an operating component of the surface cleaning apparatus or a portion of the air flow path. The portion of the airflow path may comprise at least part of an air flow passage between a cyclone chamber and the suction motor.

[00130] The operating component may comprise at least one of a filter, batteries, a power cord spool and control electronics.

[00131] At least one of the main wheels may be moveable to an open position (e.g., removable) to reveal the compartment.

[00132] The surface cleaning apparatus may comprise a cyclone bin assembly including a cyclone chamber and each of main wheels may have a diameter larger than a diameter of the cyclone chamber.

[00133] The main wheels may be substantially the same size as the sidewalls.

[00134] The main wheels have a cross sectional area larger than a transverse cross sectional area of the cyclone bin assembly.

[00135] The sidewalls may overlie at least 75% of end walls of the cyclone bin assembly.

[00136] The sidewalls may overlie essentially all of end walls of the cyclone bin assembly.

[00137] The surface cleaning apparatus may comprise a cavity that may have an open upper end positioned between the first and second opposed side walls and the cyclone bin assembly may be removably mounted in the cavity.

[00138] The cyclone bin assembly may sit on a platform in the cavity and the platform may comprise a portion of a housing for the suction motor.

[00139] The cavity may be generally U shaped.

[00140] The cavity may have an open front end and an open rear end.

[00141] The stabilizer wheel may be positioned laterally approximately midway between the main wheels.

[00142] The surface cleaning apparatus may comprise a filter housing and the stabilizer wheel may be provided on the filter housing.

[00143] The surface cleaning apparatus may comprise a post motor filter positioned laterally between the main wheels. The surface cleaning apparatus may comprise a rear stabilizer wheel and the rear stabilizer wheel may be provided on the post motor filter housing.

[00144] According to yet another broad aspect of the teachings described herein, a surface cleaning apparatus has a filter compartment which is positioned behind a wheel of the surface cleaning apparatus and which is closed on at least one side by a seal plate. The seal plate is positioned between one of the wheels and the filter compartment. The wheel is preferably moveable to an open position (e.g., removable) so as reveal the filter compartment and the seal plate is preferably openable (e.g., removable) to permit the filter to be removed for cleaning or replacement. The wheels have an axis of rotation wherein the axis of rotation may extend through the filter compartment.

[00145] The compartment may house a pre-motor filter compartment. Accordingly, the pre-motor filter is positioned in the compartment, between the sidewall and its corresponding wheel. The compartment is sealed with a seal plate positioned between the sidewall and the wheel. The seal plate is preferably transparent to allow visual inspection of the pre-motor filter.

[00146] An advantage of this design is that a relatively large filter may be provided while maintaining a smaller footprint of the surface cleaning apparatus. The filter compartment may be closed by a seal plate so as to provide a filter chamber that is essentially air tight while still permitting the wheel axle to project or extend through the filter or the seal plate may provide a mount for the wheel.

[00147] Preferably, the surface cleaning apparatus comprises a main body comprising spaced apart sidewalls and the filter compartment is provided in one of the sidewalls. Accordingly, the wheel covering the seal plate may be a side wheel.

[00148] The surface cleaning apparatus comprises an air treatment member, which may be a cyclone bin assembly, which may be removably mounted within a cavity on the surface cleaning apparatus. The cavity may be provided laterally between opposing sidewalls of the surface cleaning apparatus. The surface cleaning apparatus sidewalls are preferably large enough to cover the transverse faces of the cyclone bin assembly.

[00149] The surface cleaning apparatus may be rollingly supported by side wheels. One side wheel may be rotatably connected to each sidewall. The wheel covering the seal plate may be a side wheel.

[00150] One or more additional compartments may be defined between a sidewall and its corresponding side wheel. The compartments may contain one or more operating components of the surface cleaning apparatus, including, for example filters, controllers, power sources and cord wrap spools.

[00151] The side wheels may be removably mounted to the sidewalls. Removing the side wheels may allow a user to access the compartments in the sidewalls. Removing the side wheels may also allow access to the seal plate, and the underlying pre-motor filter. The axle for supporting the side wheel covering the seal plate preferably extends through the pre-motor filter chamber, and through the seal plate.

[00152] A further filter housing, e.g., a post-motor filter housing, may be positioned laterally between the sidewalls, and may be provided in front of, or behind, the air treatment member. Portions of the filter housing may form part of the outer surface of the surface cleaning apparatus. The filter housing may be positioned so that at least a portion of the filter housing is positioned within the diameter of the side wheels.

[00153] In addition to the side wheels, the surface cleaning apparatus may comprise one or both of a front stabilizer wheel and a rear stabilizer wheel. The front and/or rear stabilizer wheels are provided on opposite sides of the axis of rotation of the side wheels. The surface cleaning apparatus is preferably configured so that only one of the front and rear stabilizer wheels rests on the ground at a time. The rear stabilizer wheel may be mounted on the underside of the filter housing.

[00154] Another advantage of this configuration may be that a user may access operational components such as a pre-motor filter of the surface cleaning apparatus when the side wheels are detached from the sidewalls. This may allow a user to inspect, clean and/or replace the components.

[00155] Another advantage of this configuration may be that the seal plate, if transparent, allows a user to visually inspect the pre-motor filter without having to remove the seal plate.

[00156] Another advantage of this configuration may be that the sidewalls of the surface cleaning apparatus may help protect the cyclone bin assembly from side impacts, when the cyclone bin assembly is in the cavity.

[00157] In accordance with this aspect, a surface cleaning apparatus may comprise an air flow path extending from a dirty air inlet to a clean air outlet, an air treatment member and a suction motor. The surface cleaning apparatus may comprise a main body comprising a front end and a rear end. A filter compartment may be provided in the main body and may comprise an open portion. A pair of spaced apart wheels may have an axis of rotation and the axis of rotation may extend through the filter compartment. A seal plate may be used to sealingly close the open portion. The seal plate may be positioned between one of the wheels and the filter compartment.

[00158] A wheel axle may extend through the filter compartment and the seal plate.

- [00159] The seal plate may form a first seal with an outer perimeter of the filter compartment and a second seal adjacent the axle.
- [00160] The seal plate may have an outer surface that is provided with a wheel axle.
- [00161] The seal plate may form a seal with an outer perimeter of the filter compartment.
- [00162] The seal plate may have a transparent section.
- [00163] The seal plate may be transparent.
- [00164] The seal plate may be moveable to an open position.
- [00165] The seal plate may be removable.
- [00166] The filter compartment may be accessible when the one of the wheels is moved to an open position.
- [00167] One of the wheels may be removably mounted to the surface cleaning apparatus.
- [00168] The air treatment member may comprise a cyclone bin assembly having a cyclone chamber having a diameter. The filter may have a cross sectional area that is larger than a transverse cross sectional area of the cyclone chamber.
- [00169] The main body may comprise first and second opposed sidewalls. The filter compartment may be provided in one of the sidewalls. The sidewalls may overlie at least 50%, more preferably at least 60% and most preferably at least 75% of end walls of the air treatment member and the side wheels may overlie at least 50%, more preferably at least 60% and most preferably at least 75% of the sidewalls. In a preferred embodiment, the sidewalls overlie essentially all of the end walls of the air treatment member and the side wheels overlie essentially all of the sidewalls. The filter may have a cross sectional area that is at least 50%, more preferably at least 60% and most preferably at least 75% of a cross sectional area of the sidewall.

[00170] The filter may have a cross sectional area that may be proximate that of the sidewall.

[00171] The sidewalls may overlie essentially all of end walls of the cyclone bin assembly.

[00172] The spaced apart wheels may be provided on the sidewall and may be substantially the same size as the sidewalls.

[00173] The main body may comprise a cavity having an open upper end positioned between the first and second opposed sidewalls and the cyclone bin assembly may be removably mounted in the cavity.

[00174] The surface cleaning apparatus may comprise at least one of a front stabilizer wheel and a rear stabilizer wheel.

[00175] The surface cleaning apparatus may comprise a front stabilizer wheel and a rear stabilizer wheel. The stabilizer wheels may be positioned such that only one wheel may contact the floor at a time.

[00176] The main body may comprise first and second opposed sidewalls. The filter compartment may be provided in one of the sidewalls and the spaced apart wheels are provided on the sidewall.

[00177] According to yet another broad aspect of the teachings described herein, a surface cleaning apparatus has a filter compartment which is positioned behind a wheel of the surface cleaning apparatus and at least a portion of the filter is visible through the wheel (e.g., the wheel may be transparent or have a transparent section or a cut out). The filter compartment may be closed on one side by a seal plate. The seal plate or a portion thereof is preferably transparent to allow visual inspection of the pre-motor filter. The wheel is preferably moveable to an open position (e.g., removable) so as reveal the filter compartment. The wheel has an axis of rotation wherein the axis of rotation may extend through the filter compartment.

[00178] An advantage of this design is that a relatively large filter may be provided while maintaining a smaller footprint of the surface cleaning apparatus. Further, a user may visually inspect the filter without having to remove the seal plate or the wheel overlying the filter. Accordingly, a user may be able to view the filter and determine when the filter may need to be cleaned or replaced. The filter compartment may be closed by a seal plate so as to provide a filter chamber that is essentially air tight while still permitting the wheel axle to extend through the filter or the seal plate may provide a mount for the wheel.

[00179] The seal plate is preferably openable (e.g., removable) to permit the filter to be removed for cleaning or replacement. The filter compartment may house a pre-motor filter compartment. Accordingly, the pre-motor filter is positioned in the compartment, between the wall and its corresponding wheel.

[00180] Preferably, the surface cleaning apparatus comprises a main body comprising spaced apart sidewalls and the filter compartment is provided in one of the sidewalls.

[00181] The surface cleaning apparatus comprises an air treatment member, which may be a cyclone bin assembly, which may be removably mounted within a cavity on the surface cleaning apparatus. The cavity may be provided laterally between opposing sidewalls of the surface cleaning apparatus. The surface cleaning apparatus sidewalls are preferably large enough to cover the transverse faces of the cyclone bin assembly.

[00182] The surface cleaning apparatus may be rollingly supported by side wheels. One side wheel may be rotatably connected to each sidewall. Accordingly, the wheel covering the seal plate may be a side wheel and the side wheels may be removably mounted to the sidewalls.

[00183] One or more additional compartments may be defined between a sidewall and its corresponding side wheel. The compartments may contain one or

more operating components of the surface cleaning apparatus, including, for example filters, controllers, power sources and cord wrap spools.

Removing the side wheels may allow a user to access one or more compartments, in addition to the filter compartment, in the sidewalls.

[00184] A further filter housing, e.g., a post-motor filter housing, may be positioned laterally between the sidewalls, and may be provided in front of, or behind, the cyclone bin assembly. Portions of the filter housing may form part of the outer surface of the surface cleaning apparatus. The filter housing may be positioned so that at least a portion of the filter housing is positioned within the diameter of the side wheels.

[00185] In addition to the side wheels, the surface cleaning apparatus may comprise one or both of a front stabilizer wheel and a rear stabilizer wheel. The front and/or rear stabilizer wheels are provided on opposite sides of the axis of rotation of the side wheels. If both a front and a rear stabilizer wheel is provided, the surface cleaning apparatus is preferably configured so that only one of the front and rear stabilizer wheels rests on the ground at a time. The rear stabilizer wheel may be mounted to the filter housing and, preferably, on the underside of the filter housing.

[00186] An advantage of this configuration may be that a user may access operational components and/or a pre-motor filter of the surface cleaning apparatus when the side wheels are moved to an open position, e.g., detached from, the sidewalls. This may allow a user to inspect, clean and/or replace the components.

[00187] Another advantage of this configuration may be that transparent seal plate allows a user to visually inspect the pre-motor filter without having to remove the seal plate.

[00188] Another advantage of this configuration may be that the sidewalls of the surface cleaning apparatus may help protect the cyclone bin assembly from side impacts, when the cyclone bin assembly is in the cavity.

[00189] In accordance with this aspect, a surface cleaning apparatus may comprise an air flow path extending from a dirty air inlet to a clean air outlet, an air treatment member and a suction motor. The surface cleaning apparatus may comprise a main body comprising a front end, a rear end and a filter compartment. A pair of spaced apart wheels may be mounted to the surface cleaning apparatus. One of the wheels overlies the filter compartment and at least a portion of the filter is visible through the wheel.

[00190] The one of the wheels may have a window. Preferably, at least a portion of the one of the wheels is transparent.

[00191] The filter may have a downstream side and the downstream side may be visible through the wheel.

[00192] The surface cleaning apparatus may comprise a seal plate sealingly closing an open portion of the filter cavity.

[00193] The surface cleaning apparatus may comprise a wheel axle that extends through the filter compartment and the seal plate.

[00194] The seal plate may form a first seal with an outer perimeter of the filter compartment and a second seal adjacent the axle.

[00195] The seal plate may have an outer surface that is provided with a wheel axle.

[00196] The seal plate may form a seal with an outer perimeter of the filter compartment.

[00197] The seal plate may have a transparent section.

[00198] The seal plate may be transparent.

[00199] The seal plate may be moveable to an open position.

[00200] The seal plate may be removable.

[00201] The filter compartment may be accessible when the one of the wheels is moved to an open position. Preferably, one of the wheels may be removably mounted to the surface cleaning apparatus.

[00202] The main body may comprise first and second opposed sidewalls, and the filter compartment may be provided in one of the first and second opposed sidewalls

[00203] The filter compartment may be positioned in the air flow path between the air treatment member and the suction motor.

[00204] The air treatment member may comprise a cyclone chamber having a longitudinal axis that is generally parallel to an axle of the wheels.

[00205] The air treatment member may comprise a cyclone bin assembly having a cyclone chamber having a diameter. The filter may have a cross sectional area that is larger than a transverse cross sectional area of the cyclone chamber.

[00206] The main body may comprise first and second opposed sidewalls. The filter compartment may be provided in one of the sidewalls. The sidewalls may overlie at least 50%, more preferably at least 60% and most preferably at least 75% of end walls of the air treatment member and the side wheels may overlie at least 50%, more preferably at least 60% and most preferably at least 75% of the sidewalls. In a preferred embodiment, the sidewalls overlie essentially all of the end walls of the air treatment member and the side wheels overlie essentially all of the sidewalls.

[00207] The filter may have a cross sectional area that is at least 50%, more preferably at least 60% and most preferably at least 75% of a cross sectional area of the sidewall.

[00208] The filter may have a cross sectional area that is proximate that of the sidewall.

[00209] The main body may comprise first and second opposed sidewalls, the filter compartment may be provided in one of the sidewalls and the sidewalls may overlie essentially all of end walls of the cyclone bin assembly.

[00210] The spaced apart wheels may be provided on the sidewall and may be substantially the same size as the sidewalls.

[00211] The main body may comprise a cavity between the sidewalls that may have an open upper end positioned between the first and second opposed sidewalls and the cyclone bin assembly may be removably mounted in the cavity.

[00212] The main body may comprise first and second opposed sidewalls, the filter compartment may be provided in one of the sidewalls and the spaced apart wheels may be provided on the sidewall.

[00213] According to yet another broad aspect of the teachings described herein, a surface cleaning apparatus has a main body with a sidewall having a suction motor access opening. A side wheel is preferably provided on the sidewall in overlying relationship to the suction motor access opening. The side wheel may be moveable to an open position (e.g., removable) so as reveal the suction motor access opening.

[00214] An advantage of this configuration may be the overall size of the surface cleaning apparatus may be reduced. For example, by utilizing an outer side of the sidewalls to provide an access port, greater freedom may be obtained as to the placement of the suction motor without increasing the size of the surface cleaning apparatus so as to provide a front, rear or top positioned access port.

[00215] The surface cleaning apparatus comprises an air treatment member, which may be a cyclone bin assembly, which may be removably mounted within a cavity on the surface cleaning apparatus. The cavity may be provided laterally between opposing sidewalls of the surface cleaning apparatus. The surface cleaning apparatus sidewalls are preferably large enough to cover the transverse faces of the cyclone bin assembly.

[00216] One side wheel may be rotatably connected to each sidewall and the surface cleaning apparatus may be rollingly supported by the side wheels.

[00217] One or more compartments may be defined between a sidewall and its corresponding side wheel. The compartments may contain one or more operating components of the surface cleaning apparatus, including, for example filters, controllers, power sources and cord wrap spools.

[00218] Opening or removing one or both of the side wheels may allow a user to access the compartments in the sidewalls. Removing the side wheels may also allow access to a seal plate that closes a filter compartment for a pre-motor filter. The axle for supporting the side wheel covering the seal plate may extend through the pre-motor filter chamber, and through the seal plate.

[00219] A filter housing, e.g., a post-motor filter housing, may be positioned laterally between the sidewalls, and may be provided in front of, or behind, the cyclone bin assembly. Portions of the filter housing may form part of the outer surface of the surface cleaning apparatus. The filter housing may be positioned so that at least a portion of the filter housing is positioned within the diameter of the side wheels.

[00220] In addition to the side wheels, the surface cleaning apparatus may comprise one or both of a front stabilizer wheel and a rear stabilizer wheel. The front and rear stabilizer wheels are provided on opposite sides of the axis of rotation of the side wheels. The surface cleaning apparatus is preferably configured so that only one of the front and rear stabilizer wheels rests on the ground at a time. The rear stabilizer wheel may be mounted on the filter housing, preferably on an underside of the filter housing.

[00221] Another advantage of this configuration may be that a user may access operational components and/or a pre-motor filter of the surface cleaning apparatus when the side wheels are detached from the sidewalls.

[00222] Another advantage of this configuration may be that, if transparent, a seal plate allows a user to visually inspect the pre-motor filter without having to remove the seal plate.

[00223] Another advantage of this configuration may be that the sidewalls of the surface cleaning apparatus may help protect the cyclone bin assembly from side impacts, when the cyclone bin assembly is in the cavity.

[00224] In accordance with this aspect, a surface cleaning apparatus may comprise an air flow path extending from a dirty air inlet to a clean air outlet, an air treatment member and a suction motor. The surface cleaning apparatus may comprise a main body comprising a front end and a rear end, first and second opposed sidewalls and a suction motor housing. At least one of the first and second opposed sidewalls may have a suction motor access opening.

[00225] The suction motor may be positioned in the main body between the sidewalls.

[00226] The surface cleaning apparatus may be moveable in a forward direction and the suction motor may have a longitudinal axis that extends transverse to the forward direction.

[00227] The air treatment member may comprise a cyclone chamber having a longitudinal axis that is generally parallel to the longitudinal axis of the suction motor.

[00228] The suction motor may have an inlet end that is provided adjacent the suction motor access opening.

[00229] The surface cleaning apparatus may comprise a treated air flow passage extending from an outlet of the cyclone chamber to the suction motor. At least a portion of the treated air flow passage may be provided in one of the sidewalls.

[00230] The treated air flow passage may comprise a pre-motor filter that is positioned in one of the sidewalls.

[00231] The suction motor may have an inlet end that is provided adjacent the suction motor access opening.

[00232] The surface cleaning apparatus may comprise a treated air flow passage extending from an outlet of the air treatment member to the suction motor. At least a portion of the treated air flow passage may be provided in one of the sidewalls.

[00233] The treated air flow passage may comprise a pre-motor filter that is positioned in one of the sidewalls.

[00234] The pre-motor filter may have a cross sectional area that is at least 60% of a cross sectional area of the sidewall.

[00235] The filter may have a cross sectional area that is proximate that of the sidewall.

[00236] The pre-motor filter may be removably mounted and the suction motor access opening may be accessible when the pre-motor filter is removed.

[00237] The pre-motor filter may be provided in an openable sealed filter housing.

[00238] The surface cleaning apparatus may comprise a pair of wheels provided on the sidewalls and the filter housing may be accessible when one of the wheels is moved to an open position.

[00239] The surface cleaning apparatus may comprise a pair of wheels provided on the sidewalls and the suction motor access opening may be accessible when one of the wheels is moved to an open position. Preferably one of the wheels is removably mounted to the surface cleaning apparatus.

[00240] The surface cleaning apparatus may comprise an openable suction motor housing grill. The suction motor housing grill may cover the suction motor access opening when the suction motor housing grill is in a closed position.

[00241] The main body may comprise first and second opposed sidewalls and a cavity between the sidewalls that may have an open upper end positioned between the first and second opposed sidewalls. The air treatment member may be removably mounted in the cavity.

[00242] The air treatment member may sit on a platform in the cavity and the platform may comprise a portion of the suction motor housing.

[00243] The main body may comprise first and second opposed sidewalls. A filter compartment may be provided in one of the sidewalls. The sidewalls may overlie at least 50%, more preferably at least 60% and most preferably at least 75% of end walls of the air treatment member and the side wheels may overlie at least 50%, more preferably at least 60% and most preferably at least 75% of the sidewalls.

[00244] In a preferred embodiment, the sidewalls overlie essentially all of the end walls of the air treatment member and the side wheels overlie essentially all of the sidewalls.

[00245] The filter may have a cross sectional area that is at least 50%, more preferably at least 60% and most preferably at least 75% of a cross sectional area of the sidewall.

[00246] According to yet another broad aspect of the teachings described herein, a surface cleaning apparatus has a filter compartment which is positioned behind a wheel of the surface cleaning apparatus and an axle or an axle mount for a wheel defines an axis of rotation that projects through the filter compartment. The compartment may house a pre-motor filter compartment. For example, the axle for a wheel overlying part or all of the filter may extend through the filter. Alternately, the filter compartment may have an outer sidewall on which is provided an axle mount wherein the axle mount defines an axis of rotation that projects through the filter compartment.

[00247] The outer sidewall preferably comprises an openable seal plate. The seal plate, if provided, is positioned between one of the wheels and the filter compartment. Accordingly, the wheel may be mounted to the seal plate. The wheel is preferably moveable to an open position (e.g., removable) so as reveal the filter compartment (e.g., the seal plate if provided) and the seal plate is preferably openable to permit the filter to be removed for cleaning or replacement. Accordingly, the pre-motor filter is positioned in the compartment, between the sidewall and its corresponding wheel. The compartment may be sealed with a seal plate positioned between the sidewall and the wheel. The seal plate is preferably transparent to allow visual inspection of the pre-motor filter.

[00248] An advantage of this design is that a relatively large filter may be provided while maintaining a smaller footprint of the surface cleaning apparatus. The filter compartment may be closed by a seal plate so as to provide a filter chamber that is essentially air tight while still permitting the wheel axle to project or extend through the filter or the seal plate may provide a mount for the wheel.

[00249] Preferably, the surface cleaning apparatus comprises a main body comprising spaced apart sidewalls and the filter compartment is provided in one of the sidewalls.

[00250] The surface cleaning apparatus comprises an air treatment member, which may be a cyclone bin assembly, which may be removably mounted within a cavity on the surface cleaning apparatus. The cavity may be provided laterally between opposing sidewalls of the surface cleaning apparatus. The surface cleaning apparatus sidewalls are preferably large enough to cover the transverse faces of the cyclone bin assembly.

[00251] The surface cleaning apparatus may be rollingly supported by side wheels. One side wheel may be rotatably connected to each sidewall. Accordingly, the wheel may be a side wheel.

[00252] One or more additional compartments may be defined between a sidewall and its corresponding side wheel. The compartments may contain one or more operating components of the surface cleaning apparatus, including, for example filters, controllers, power sources and cord wrap spools.

[00253] The side wheels may be removably mounted to the sidewalls. Removing the side wheels may allow a user to access the compartments in the sidewalls. Removing the side wheels may also allow access to the seal plate, and the underlying pre-motor filter.

[00254] A further filter housing, e.g., a post-motor filter housing, may be positioned laterally between the sidewalls, and may be provided in front of, or behind, the cyclone bin assembly. Portions of the filter housing may form part of the outer surface of the surface cleaning apparatus. The filter housing may be positioned so that at least a portion of the filter housing is positioned within the diameter of the side wheels.

[00255] In addition to the side wheels, the surface cleaning apparatus may comprise one or both of a front stabilizer wheel and a rear stabilizer wheel. The front and rear stabilizer wheels are provided on opposite sides of the axis of rotation of the side wheels. The surface cleaning apparatus is preferably configured so that only one of the front and rear stabilizer wheels rests on the ground at a time. The rear stabilizer wheel may be mounted on the underside of the filter housing.

[00256] Another advantage of this configuration may be that a user may visually inspect the pre-motor filter without having to remove the seal plate or the side wheel overlying the pre-motor filter if each of the wheel and the seal plate are transparent or a portion thereof is transparent.

[00257] An advantage of this configuration may be that a user may access operational components and/or a pre-motor filter of the surface cleaning apparatus when the side wheels are detached from the sidewalls.

[00258] Another advantage of this configuration may be that the sidewalls of the surface cleaning apparatus may help protect the cyclone bin assembly from side impacts, when the cyclone bin assembly is in the cavity.

[00259] In accordance with this aspect, a surface cleaning apparatus may comprise an air flow path extending from a dirty air inlet to a clean air outlet, an air treatment member and a suction motor. The surface cleaning apparatus may comprise a main body comprising a front end and a rear end. A plurality of wheels may be rotatably mounted on to the surface cleaning apparatus. The surface cleaning apparatus may comprise a filter in a filter compartment wherein an axle or an axle mount for at least one of the wheels defines an axis of rotation that projects through the filter compartment and preferably extends through the filter.

[00260] The filter may be accessible when the one of the wheels is moved to an open position.

[00261] The one of the wheels may be removably mounted to the surface cleaning apparatus.

[00262] The air treatment member may comprise a cyclone bin assembly having a cyclone chamber having a diameter, wherein the filter may have a cross sectional area that is larger than a transverse cross sectional area of the cyclone chamber.

[00263] The main body further may comprise first and second opposed sidewalls and the surface cleaning apparatus may comprise a treated air flow passage extending from an outlet of the air treatment member to the suction motor. At least a portion of the treated air flow passage may be provided in one of the sidewalls.

[00264] The filter may be located in the treated air flow passage.

[00265] The main body may comprise first and second opposed sidewalls. The filter may be provided in one of the sidewalls and the filter may have a cross sectional area that is at least 60% of a cross sectional area of the sidewall.

[00266] The filter may have a cross sectional area that is proximate that of the sidewall.

[00267] The main body may comprise first and second opposed sidewalls. The filter may be provided in one of the sidewalls and one of the wheels is provided on each sidewall.

[00268] The air treatment member may comprise a cyclone bin assembly having opposed end walls and a cyclone chamber having a diameter. Each of the wheels provided on the sidewall may have a diameter larger than the diameter of the cyclone chamber.

[00269] The wheels provided on the sidewalls may have a cross sectional area larger than a transverse cross sectional area of the cyclone bin assembly.

[00270] The main body may comprise first and second opposed sidewalls. The filter compartment may be provided in one of the sidewalls. The sidewalls may overlie at least 50%, more preferably at least 60% and most preferably at least 75% of end walls of the air treatment member and the side wheels may overlie at least 50%, more preferably at least 60% and most preferably at least 75% of the sidewalls.

[00271] In a preferred embodiment, the sidewalls overlie essentially all of the end walls of the air treatment member and the side wheels overlie essentially all of the sidewalls.

[00272] The filter may have a cross sectional area that is at least 50%, more preferably at least 60% and most preferably at least 75% of a cross sectional area of the sidewall.

[00273] The sidewalls may overlie essentially all of end walls of the cyclone bin assembly.

[00274] The wheels provided on the sidewall may be substantially the same size as the sidewalls.

[00275] The main body further may comprise a cavity having an open upper end positioned between the first and second opposed sidewalls and the cyclone bin assembly is removably mounted in the cavity.

[00276] The cyclone bin assembly may sit on a platform in the cavity and the platform may comprise a portion of a housing for the suction motor.

[00277] The surface cleaning apparatus may comprise at least one of a front stabilizer wheel and a rear stabilizer wheel.

[00278] The surface cleaning apparatus may comprise a front stabilizer wheel and a rear stabilizer wheel wherein the stabilizer wheels are positioned such that only one wheel may contact the floor at a time.

[00279] The surface cleaning apparatus may comprise a treated air flow passage and the filter may be provided in the treated air flow passage. The treated air flow passage may comprise a conduit that extends through the filter.

[00280] The conduit may have an air outlet end adjacent the upstream side of the filter and air travels through the filter to the suction motor.

[00281] The at least one of the wheels may be removable by rotation of the wheel in a direction opposite to a direction of forward rotation of the wheel.

[00282] The surface cleaning apparatus includes an axle mount and the axle is mounted to the axle mount. The axle may be removably mounted to the axle mount. For example, the axle may be threadedly mounted to the axle mount.

[00283] One of the wheels may have a central bore that is rotatably mounted on the axle.

[00284] According to yet another broad aspect of the teachings described herein, a cyclone bin assembly comprises a dirt collection chamber having two portions wherein one of the portions, and preferably the downstream portion, has a dirt collection surface that is located behind or below (depending upon orientation) a

divider wall. Air may circulate or swirl in the portion of the dirt collection chamber above or in front of the divider wall. The divider wall is positioned to provide a partial break between the air that is in movement and the surface on which particulate matter may accumulate. The divider wall may cause air to travel above the settled particulate matter, thereby reducing re-entrainment. Further, the divider wall may direct air away from the surface on which particulate matter has accumulated and thereby provide a wind shadow in which light particulate matter may settle.

[00285] Preferably, air which has some entrained dirt leaves a cyclone chamber through, e.g., a slot outlet. The air may be directed to a first or upstream portion of the dirt collection chamber where particulate matter is deposited. The air may then travel to a second or downstream portion of the dirt collection chamber. The air circulates within the second portion wherein fine particulate matter may settle out. The air then returns to the cyclone chamber via the dirt outlet.

[00286] The dirt chamber may include a diverter wall separating the interior of the dirt collection chamber into two separate portions, connected by a passageway. Dirty air may flow through the passageway, between the first and second portions. The diverter wall is positioned proximate the dirt outlet of the cyclone chamber, and may be configured to accelerate the air flow passing through the passage. Alternately, or in addition, the dirt outlet of the cyclone chamber is asymmetrically arranged relative to the first and second portions so as to direct more airflow into the first portion of the dirt collection chamber than the second, downstream portion.

[00287] An advantage of this is that the percentage of finer particulate matter that is disentrained from the air stream may be increased.

[00288] In accordance with this aspect, a cyclone bin assembly may comprise a cyclone chamber having an air inlet, an air outlet, a dirt outlet and first and second opposed ends. The cyclone bin assembly may comprise a dirt collection chamber in communication with the dirt outlet and surrounding at least a portion of the cyclone chamber. The dirt collection chamber may comprise a first opposed end and a second

opposed end and may comprise a first portion and a second portion. The dirt outlet may be positioned adjacent the second opposed end of the dirt collection chamber. The first portion and the second portion may comprise discrete chambers that are separated from each other by a passage extending between the dirt outlet and a wall of the dirt collection chamber. The first and second portions may have first and second sides. The first side may be positioned adjacent the passage and the second side may be angularly spaced from the passage. The second portion may have a divider wall that extends inwardly towards the second opposed end of the dirt collection chamber from the first opposed end of the dirt collection chamber. The divider wall may be spaced from the second side.

[00289] The divider wall may be positioned adjacent the first side.

[00290] A portion of the wall facing the dirt outlet may extend inwardly towards the dirt outlet.

[00291] The cyclone chamber may have a longitudinal axis. The dirt outlet may have a height in a direction of the longitudinal axis and the portion of the wall may have a height so as to extend along the height of the dirt outlet.

[00292] The portion of the wall may extend away from the dirt outlet along at least a portion of a length of the cyclone chamber.

[00293] The dirt outlet may be positioned adjacent the second opposed end of the dirt collection chamber and the passage may terminate prior to the first opposed end of the dirt collection chamber.

[00294] A portion of the wall facing the dirt outlet may extend inwardly towards the dirt outlet.

[00295] A portion of the wall facing the dirt outlet may extend convexly inwardly towards the dirt outlet.

[00296] A vacuum cleaner may comprise an air flow path extending from a dirty air inlet to a clean air outlet, the air flow path including a suction motor in a suction

motor housing and may comprise the cyclone bin assembly. The portion of the wall may be configured to seat on a portion of the suction motor housing.

[00297] The vacuum cleaner may comprise an air flow path extending from a dirty air inlet to a clean air outlet. The air flow path may include a suction motor in a suction motor housing and the cyclone bin assembly. The first and second portions may be configured to be positioned on opposed sides of the suction motor.

[00298] The air inlet and the air outlet may be at the first opposed end of the cyclone chamber.

[00299] The cyclone chamber may comprise a sidewall extending between the first and second opposed ends and the dirt outlet may comprise a slot that is provided in the sidewall adjacent the second opposed end.

[00300] A portion of the sidewall may terminate prior to the second opposed end and defines a terminal end of the sidewall, the terminal end extending part way around the cyclone chamber.

[00301] The dirt outlet may have an angular extent around the cyclone chamber and a larger portion of the angular extent of the slot faces the first portion.

[00302] The cyclone chamber may have a direction of rotation and the first portion may be angularly positioned upstream of the second portion in the direction of rotation.

[00303] The cyclone chamber may have a longitudinal axis that is essentially horizontal.

[00304] The dirt outlet may be provided in a lower portion of the cyclone chamber and may have a portion that is positioned at an upper end of the dirt collection chamber.

[00305] The dirt outlet may have a portion that is positioned at an upper end of one of the first and second portions.

[00306] The dirt outlet may have a portion that is positioned at an upper end of the first portion.

[00307] The portion of the wall may be configured to produce an airstream travelling through the passage between the first and second portions that may have a velocity that is greater than a velocity of the airstream immediately upstream and downstream of the passage.

[00308] The cyclone chamber may have a direction of rotation and the first portion may be angularly positioned upstream of the second portion in the direction of rotation.

[00309] According to yet another broad aspect of the teachings described herein, a cyclone bin assembly comprises a dirt collection chamber having two portions. A cyclone chamber has a dirt outlet that is in communication with both portions of the dirt collection chamber and, the dirt outlet of the cyclone chamber is asymmetrically arranged relative to the first and second portions so as to direct more airflow into the first portion of the dirt collection chamber than the second, downstream portion.

[00310] Preferably, air which has some entrained dirt leaves a cyclone chamber through, e.g., a slot outlet. The air may be directed to a first or upstream portion of the dirt collection chamber where particulate matter is deposited. The air may then travel to a second or downstream portion of the dirt collection chamber. The air circulates within the second portion wherein fine particulate matter may settle out. The air then returns to the cyclone chamber via the dirt outlet. Accordingly, particulate matter may be collected in each portion and, more preferably, the first portion captures the larger particulate matter that is left in the air stream.

[00311] The dirt chamber may include a diverter wall separating or defining part of a passageway that divides the interior of the dirt collection chamber into two separate portions. Dirty air may flow through the passageway, between the first and second portions. The diverter wall is positioned proximate the dirt outlet of the cyclone

chamber, and may be configured to accelerate the air flow passing through the passage.

[00312] Optionally, one of the portions, and preferably the downstream portion, has a dirt collection surface that is located behind or below (depending upon orientation) a divider wall. Air may circulate or swirl in the portion of the dirt collection chamber above or in front of the divider wall. The divider wall is positioned to provide a partial break between the air that is in movement and the surface on which particulate matter may accumulate. The divider wall may cause air to travel above the settled particulate matter, thereby reducing re-entrainment. Further, the divider wall may direct air away from the surface on which particulate matter has accumulates and thereby provide a wind shadow in which light particulate matter may settle.

[00313] An advantage of this is that the percentage of particulate matter that is disentrained from the air stream may be increased.

[00314] In accordance with this aspect, a cyclone bin assembly comprises a cyclone chamber having an air inlet, an air outlet, a dirt outlet and first and second opposed ends. The cyclone bin assembly may comprise a dirt collection chamber in communication with the dirt outlet. The dirt bin may surround at least a portion of the cyclone chamber and comprising first and second portions. The first and second portions may comprise discrete chambers that are separated from each other by a passage extending between the dirt outlet and a wall of the dirt collection chamber. The dirt outlet may have an angular extent around the cyclone chamber and a larger portion of the angular extent of the slot may face the first portion.

[00315] The cyclone chamber may have a direction of rotation and the first portion may be angularly positioned upstream of the second portion in the direction of rotation.

[00316] The dirt collection chamber may comprise first and second opposed ends. The dirt outlet may be positioned adjacent the second end of the dirt collection chamber. The first and second portions may have first and second sides. The first

side may be positioned adjacent the passage and the second side may be angularly spaced from the passage. The second portion may have a divider wall that extends inwardly towards the second end of the dirt collection chamber from the first end of the dirt collection chamber and the divider wall may be spaced from the second side.

[00317] The divider wall may be positioned adjacent the first side.

[00318] A portion of the wall facing the dirt outlet may extend inwardly towards the dirt outlet.

[00319] A portion of the wall facing the dirt outlet may extend convexly inwardly towards the dirt outlet.

[00320] The cyclone chamber may have a longitudinal axis. The dirt outlet may have a height in a direction of the longitudinal axis and the portion of the wall may have a height so as to extend along the height of the dirt outlet.

[00321] The portion of the wall extends away from the dirt outlet along at least a portion of a length of the cyclone chamber.

[00322] The dirt collection chamber may comprise first and second opposed ends. The dirt outlet may be positioned adjacent the second end of the dirt collection chamber and the passage terminates prior to the first end of the dirt collection chamber.

[00323] A vacuum cleaner may comprise an air flow path extending from a dirty air inlet to a clean air outlet. The air flow path may include a suction motor in a suction motor housing and the cyclone bin assembly. The portion of the wall may be configured to seat on a portion of the suction motor housing.

[00324] A vacuum cleaner may comprise an air flow path extending from a dirty air inlet to a clean air outlet. The air flow path may include a suction motor in a suction motor housing and the cyclone bin assembly. The first and second portions may be configured to be positioned on opposed sides of the suction motor.

[00325] The air inlet and the air outlet may be at the first end of the cyclone chamber.

[00326] The dirt outlet may be spaced from the first end.

[00327] The dirt outlet may be at the second end of the cyclone chamber.

[00328] The cyclone chamber may comprise a sidewall extending between the first and second ends and the dirt outlet may comprise a slot that is provided in the sidewall adjacent the second end.

[00329] A portion of the sidewall may terminate prior to the second end and may define a terminal end of the sidewall. The terminal end may extend part way around the cyclone chamber.

[00330] The cyclone chamber may have a longitudinal axis that is essentially horizontal.

[00331] The dirt outlet may be provided in a lower portion of the cyclone chamber and may have a portion that may be positioned at an upper end of the dirt collection chamber.

[00332] The dirt outlet may have a portion that is positioned at an upper end of one of the first and second portions.

[00333] The dirt outlet may have a portion that may be positioned at an upper end of the first portion.

[00334] The portion of the wall may be configured to produce an airstream travelling through the passage between the first and second portions that may have a velocity that may be greater than a velocity of the airstream immediately upstream and downstream of the passage.

[00335] The cyclone chamber may have a direction of rotation and the first portion may be angularly positioned upstream of the second portion in the direction of rotation.

[00336] The dirt collection chamber may comprise first and second opposed ends, the dirt outlet is positioned adjacent the second end of the dirt collection chamber. The first and second portions have first and second sides. The first side positioned adjacent the passage and the second side angularly spaced from the passage. The second portion may have a divider wall that extends inwardly towards the second end of the dirt collection chamber from the first end of the dirt collection chamber and the divider wall may be spaced from the second side.

[00337] The divider wall may be positioned adjacent the first side.

[00338] According to yet another broad aspect of the teachings described herein, a cyclone bin assembly comprises a dirt collection chamber having two portions separated by a passage that includes a diverter wall. Dirty air may flow through the passageway, between the first and second portions. The diverter wall is positioned proximate the dirt outlet of the cyclone chamber, and may be configured to accelerate the air flow passing through the passage.

[00339] The dirt outlet of the cyclone chamber may be asymmetrically arranged relative to the first and second portions so as to direct more airflow into the first portion of the dirt collection chamber than the second, downstream portion.

[00340] Alternately, or in addition, one of the portions, and preferably the downstream portion, has a dirt collection surface that is located behind or below (depending upon orientation) the divider wall. Air may circulate or swirl in the portion of the dirt collection chamber above or in front of the divider wall. The divider wall is positioned to provide a partial break between the air that is in movement and the surface on which particulate matter may accumulate. The divider wall may cause air to travel above the settled particulate matter, thereby reducing re-entrainment. Further, the divider wall may direct air away from the surface on which particulate matter has accumulates and thereby provide a wind shadow in which light particulate matter may settle.

[00341] Preferably, air which has some entrained dirt leaves a cyclone chamber through, e.g., a slot outlet. The air may be directed to a first or upstream portion of the dirt collection chamber where particulate matter is deposited. The air may then travel to a second or downstream portion of the dirt collection chamber. The air circulates within the second portion wherein fine particulate matter may settle out. The air then returns to the cyclone chamber via the dirt outlet.

[00342] An advantage of this is that the percentage of finer particulate matter that is disentrained from the air stream may be increased.

[00343] In accordance with this aspect, a cyclone bin assembly comprises a cyclone chamber having an air inlet, an air outlet, a dirt outlet and first and second opposed ends. The cyclone bin assembly may comprise a dirt collection chamber in communication with the dirt outlet. The dirt bin may surround at least a portion of the cyclone chamber and comprising first and second portions. The first and second portions may comprise discrete chambers that are separated from each other by a passage extending between the dirt outlet and a wall of the dirt collection chamber. A portion of the wall facing the dirt outlet may extend inwardly towards the dirt outlet.

[00344] The cyclone chamber may have a longitudinal axis. The dirt outlet may have a height in a direction of the longitudinal axis and the portion of the wall may have a height so as to extend along the height of the dirt outlet.

[00345] The portion of the wall may extend away from the dirt outlet along at least a portion of a length of the cyclone chamber.

[00346] The dirt collection chamber may comprise a first opposed end and a second opposed end. The dirt outlet may be positioned adjacent the second end of the dirt collection chamber and the passage terminates prior to the first opposed end of the dirt collection chamber.

[00347] The portion of the wall facing the dirt outlet may extend convexly inwardly towards the dirt outlet.

[00348] A vacuum cleaner may comprise an air flow path extending from a dirty air inlet to a clean air outlet. The air flow path may include a suction motor in a suction motor housing and the cyclone bin assembly. The portion of the wall may be configured to sit on a portion of the suction motor housing.

[00349] A vacuum cleaner may comprise an air flow path extending from a dirty air inlet to a clean air outlet. The air flow path including a suction motor in a suction motor housing and the cyclone bin assembly. The first and second portions may be configured to be positioned on opposed sides of the suction motor.

[00350] The air inlet and the air outlet may be at the first opposed end of the cyclone chamber.

[00351] The dirt outlet may be spaced from the first opposed end.

[00352] The dirt outlet may be at the second end of the cyclone chamber.

[00353] The cyclone chamber may comprise a sidewall extending between the first and second opposed ends and the dirt outlet may comprise a slot that may be provided in the sidewall adjacent the second end.

[00354] A portion of the sidewall may terminate prior to the second end and may define a terminal end of the sidewall. The terminal end may extend part way around the cyclone chamber.

[00355] The dirt outlet may have an angular extent around the cyclone chamber and a larger portion of the angular extent of the slot faces the first portion.

[00356] The cyclone chamber may have a direction of rotation and the first portion may be angularly positioned upstream of the second portion in the direction of rotation.

[00357] The dirt collection chamber may comprise first and second opposed ends. The dirt outlet may be positioned adjacent the second end of the dirt collection chamber. The first and second portions have ends first and second sides. The first

side may be positioned adjacent the passage and the second side may be angularly spaced from the passage. The second portion may have a divider wall that extends inwardly towards the second end of the dirt collection chamber from the first opposed end of the dirt collection chamber and the divider wall may be spaced from the second side.

[00358] The divider wall may be positioned adjacent the first side.

[00359] The cyclone chamber may have a longitudinal axis that is essentially horizontal.

[00360] The dirt outlet may be provided in a lower portion of the cyclone chamber and may have a portion that is positioned at an upper end of the dirt collection chamber.

[00361] The dirt outlet may have a portion that is positioned at an upper end of one of the first and second portions.

[00362] The dirt outlet may have a portion that is positioned at an upper end of the first portion.

[00363] The portion of the wall may be configured to produce an airstream travelling through the passage between the first and second portions that may have a velocity that is greater than a velocity of the airstream immediately upstream and downstream of the passage.

[00364] The cyclone chamber may have a direction of rotation and the first portion may be angularly positioned upstream of the second portion in the direction of rotation.

[00365] The dirt collection chamber may comprise first and second opposed ends. The dirt outlet may be positioned adjacent the second end of the dirt collection chamber. The first and second portions may have first and second sides. The first side may be positioned adjacent the passage and the second side may be angularly spaced from the passage. The second portion may have a divider wall that extends

inwardly towards the second end of the dirt collection chamber from the first opposed end of the dirt collection chamber and the divider wall may be spaced from the second side.

[00366] The divider wall may be positioned adjacent the first side.

[00367] According to yet another broad aspect of the teachings described herein, a surface cleaning apparatus is provided with a main body comprising first and second opposed sidewalls wherein each of the first and second opposed sidewalls comprises a wheel having a diameter larger than the diameter of the cyclone chamber. Accordingly, the surface cleaning apparatus may be rollingly supported by side wheels. One side wheel may be rotatably connected to each sidewall.

[00368] An advantage of the design is that the side wheels may have a diameter to permit the surface cleaning apparatus to easily travel over carpet.

[00369] Another advantage of this configuration may be that the side wheels and/or the sidewalls of the surface cleaning apparatus may help protect the cyclone bin assembly from side impacts, when the cyclone bin assembly is in the cavity.

[00370] In addition to the side wheels, the surface cleaning apparatus may comprise one or both of a front stabilizer wheel and a rear stabilizer wheel. The front and rear stabilizer wheels are provided on opposite sides of the axis of rotation of the side wheels. The surface cleaning apparatus is preferably configured so that, if both the front and rear stabilizer wheels are provided, only one of the front and rear stabilizer wheels rests on the ground at a time.

[00371] Optionally, at least one of the first and second opposed sidewalls has a compartment that houses an operating component of the surface cleaning apparatus or a portion of the air flow path. For example, the compartment may house one or more operating components of the surface cleaning apparatus, including, for example filters, controllers, power sources and cord wrap spools. Preferably one or more pre-motor filters are positioned in the compartment, between the sidewall and its

corresponding side wheel. Alternately, or in addition, the compartment may comprise part or all of the air flow passage from the air outlet of an air treatment member (e.g., a cyclone chamber) to a suction motor inlet. A compartment may be behind each wheel. Further, one or more compartments may be defined between a sidewall and its corresponding side wheel.

[00372] The side wheels may be openably mounted (e.g., removable) to the sidewalls. Removing the side wheels may allow a user to access the compartments in the sidewalls. By removing or opening a wheel, a user may be able to inspect, clean and/or replace the components and/or remove a clog in the air flow passage.

[00373] An advantage of this configuration is that a more compact surface cleaning apparatus may be provided. The use of space in the sidewalls enables additional portions of the main body of a surface cleaning apparatus on which an air treatment member is provided, and preferably removably mounted, to be used to house components that may need access from time to time.

[00374] Another advantage of this configuration may be that a user may access operational components and/or a pre-motor filter of the surface cleaning apparatus when the side wheels are detached from the sidewalls.

[00375] The surface cleaning apparatus may comprise an air treatment member, which may be a cyclone bin assembly, which may be removably mounted within a cavity on the surface cleaning apparatus. The cavity may be provided laterally between opposing sidewalls of the surface cleaning apparatus. The surface cleaning apparatus sidewalls are preferably large enough to cover the transverse faces of the cyclone bin assembly.

[00376] A filter housing, e.g., a post-motor filter housing, may be positioned laterally between the sidewalls, and may be provided in front of, or behind, the cyclone bin assembly. Portions of the filter housing may form part of the outer surface of the surface cleaning apparatus. The filter housing may be positioned so that at least a portion of the filter housing is positioned within the diameter of the side wheels.

[00377] The sidewall defining the pre-motor filter compartment may comprise a removable portion of a suction motor housing, surrounding the suction motor. Removing the portion of suction motor housing allows the suction motor to be accessed. The removable portion of suction motor housing is accessible when the side wheel and pre-motor filters are removed.

[00378] The compartment may be sealed with a seal plate positioned between the sidewall and the side wheel. The seal plate is preferably transparent to allow visual inspection of the component in the compartment, e.g., a pre-motor filter. The seal plate is preferably removable to allow access to the pre-motor filter. The side wheel overlying the seal plate may comprise an inspection window or have at least a portion that is transparent.

[00379] An advantage of this configuration may be that a user may visually inspect the pre-motor filter without having to remove the seal plate or the side wheel overlying the pre-motor filter.

[00380] Another advantage of this configuration may be that the removable seal plate allows a user to access the pre-motor filter and a removable portion of the suction motor housing.

[00381] In accordance with this aspect, a surface cleaning apparatus may comprise an air flow path extending from a dirty air inlet to a clean air outlet. The surface cleaning apparatus may comprise a main body comprising a front end, a rear end, first and second opposed sidewalls, and a suction motor provided in the air flow path. A cyclone bin assembly may be provided in the air flow path. The cyclone bin assembly may have opposed end walls and may comprise a cyclone chamber having a diameter. Each of the first and second opposed sidewalls may comprise a wheel having a diameter larger than the diameter of the cyclone chamber.

[00382] The wheels may be substantially the same size as the sidewalls.

[00383] The wheels have a cross sectional area larger than a transverse cross sectional area of the cyclone bin assembly.

[00384] The main body may comprise first and second opposed sidewalls. A compartment, such as a filter compartment, may be provided in one of the sidewalls. The sidewalls may overlie at least 50%, more preferably at least 60% and most preferably at least 75% of end walls of the cyclone bin assembly and the side wheels may overlie at least 50%, more preferably at least 60% and most preferably at least 75% of the sidewalls.

[00385] In a preferred embodiment, the sidewalls overlie essentially all of the end walls of the cyclone bin assembly and/or the side wheels overlie essentially all of the sidewalls.

[00386] The filter may have a cross sectional area that is at least 50%, more preferably at least 60% and most preferably at least 75% of a cross sectional area of the sidewall.

[00387] The surface cleaning apparatus may comprise a cavity having an open upper end positioned between the first and second opposed side walls and the cyclone bin assembly may be removably mounted in the cavity.

[00388] The cyclone bin assembly may sit on a platform in the cavity and the platform may comprise a portion of a housing for the suction motor.

[00389] The cavity may be generally U shaped.

[00390] The cavity may have an open front end and an open rear end.

[00391] The cyclone bin assembly may comprise a cyclone chamber and an openable dirt collection chamber. One of the end walls may be an openable wall of the dirt collection chamber.

[00392] The cyclone bin assembly may comprise a cyclone chamber that extends transversely. The cyclone chamber may comprise a tangential inlet that is provided at the front end of the surface cleaning apparatus.

[00393] The main body may comprise a suction hose connector upstream of the tangential inlet.

[00394] The main body may comprise a suction hose connector upstream of the cyclone bin assembly.

[00395] The cyclone bin assembly may comprise a cyclone chamber and a dirt collection chamber. The dirt collection chamber may be provided exterior to the cyclone chamber and extends at least partially collinearly therewith.

[00396] The cyclone bin assembly may comprise a cyclone chamber and a dirt collection chamber. The surface cleaning apparatus further may comprise a pre-motor filter which may have a cross sectional area that is larger than a transverse cross sectional area of the cyclone chamber.

[00397] The pre-motor filter may be provided in one of the first and second opposed sidewalls.

[00398] The pre-motor filter may have a cross sectional area that is at least 60% of a cross sectional area of the sidewall.

[00399] The pre-motor filter may have a cross sectional area that is proximate that of the sidewall.

[00400] At least one of the first and second opposed sidewalls may have a compartment that houses an operating component of the surface cleaning apparatus or a portion of the air flow path.

[00401] The portion of the airflow path may comprise at least part of an air flow passage between the cyclone chamber and the suction motor.

[00402] The cyclone bin assembly may comprise a cyclone chamber and the suction motor and the cyclone chamber extend transversely.

[00403] The operating component may comprise at least one of a filter, batteries, a power cord spool and control electronics.

[00404] The operating component may comprise at least one of batteries, a power cord spool and control electronics.

[00405] The compartment may be openable.

[00406] Each of the first and second opposed sidewalls may comprise a wheel and at least one of the wheels may be openable to reveal the compartment.

[00407] The surface cleaning apparatus may comprise at least one of a front stabilizer wheel and a rear stabilizer wheel.

[00408] The surface cleaning apparatus may comprise a front stabilizer wheel and a rear stabilizer wheel. The stabilizer wheels may be positioned such that only one wheel may contact the floor at a time.

[00409] According to yet another broad aspect of the teachings described herein, a surface cleaning apparatus is provided with a main body comprising first and second opposed sidewalls wherein at least one of the first and second opposed sidewalls has a compartment that houses an operating component of the surface cleaning apparatus or a portion of the air flow path. For example, the compartment may house one or more operating components of the surface cleaning apparatus, including, for example filters, controllers, power sources and cord wrap spools. Preferably one or more-pre-motor filters are positioned in the compartment, between the sidewall and its corresponding side wheel. Alternately, or in addition, the compartment may comprise part or all of the air flow passage from the air outlet of an air treatment member (e.g., a cyclone chamber) to a suction motor inlet.

[00410] An advantage of this configuration is that a more compact surface cleaning apparatus may be provided. The use of space in the sidewalls enables

additional portions of the main body of a surface cleaning apparatus on which an air treatment member is provided, and preferably removably mounted, to be used to house components that may need access from time to time.

[00411] Preferably, side wheels overlie part or all of the sidewalls. Therefore, the compartment may be behind one or more wheels. Accordingly, the surface cleaning apparatus may be rollingly supported by side wheels. One side wheel may be rotatably connected to each sidewall. One or more compartments may be defined between a sidewall and its corresponding side wheel.

[00412] The side wheels may be openably mounted to the sidewalls. Removing the side wheels may allow a user to access the compartments in the sidewalls. By removing or moving a wheel to an open position, a user may be able to inspect, clean and/or replace the components. By removing or opening a wheel, a user may be able to inspect, clean and/or replace the components and/or remove a clog in the air flow passage.

[00413] The surface cleaning apparatus may comprise an air treatment member, which may be a cyclone bin assembly, which may be removably mounted within a cavity on the surface cleaning apparatus. The cavity may be provided laterally between opposing sidewalls of the surface cleaning apparatus. The surface cleaning apparatus sidewalls are preferably large enough to cover the transverse faces of the cyclone bin assembly.

[00414] A filter housing, e.g., a post-motor filter housing, may be positioned laterally between the sidewalls, and may be provided in front of, or behind, the cyclone bin assembly. Portions of the filter housing may form part of the outer surface of the surface cleaning apparatus. The filter housing may be positioned so that at least a portion of the filter housing is positioned within the diameter of the side wheels.

[00415] In addition to the side wheels, the surface cleaning apparatus may comprise one or both of a front stabilizer wheel and a rear stabilizer wheel. The front and rear stabilizer wheels are provided on opposite sides of the axis of rotation of the

side wheels. The surface cleaning apparatus is preferably configured so that only one of the front and rear stabilizer wheels rests on the ground at a time. The rear stabilizer wheel may be mounted on the underside of the filter housing.

[00416] The sidewall defining the pre-motor filter compartment may comprise a removable portion of a suction motor housing, surrounding the suction motor. Removing the portion of suction motor housing allows the suction motor to be accessed. The removable portion of suction motor housing is accessible when the side wheel and pre-motor filters are removed.

[00417] The compartment may be sealed with a seal plate positioned between the sidewall and the side wheel. The seal plate is preferably transparent to allow visual inspection of the component in the compartment, e.g., a pre-motor filter. The seal plate is preferably removable to allow access to the pre-motor filter. The side wheel overlying the seal plate may comprise an inspection window or at least a portion of it may be transparent.

[00418] Another advantage of this configuration may be that a user may visually inspect the pre-motor filter without having to remove the seal plate or the side wheel overlying the pre-motor filter.

[00419] An advantage of this configuration may be that a user may access operational components and/or a pre-motor filter of the surface cleaning apparatus when the side wheels are detached from the sidewalls or moved to an open position.

[00420] Another advantage of this configuration may be that the removable seal plate allows a user to access the pre-motor filter and a removable portion of the suction motor housing.

[00421] Another advantage of this configuration may be that the sidewalls of the surface cleaning apparatus may help protect the cyclone bin assembly from side impacts, when the cyclone bin assembly is in the cavity.

[00422] In accordance with this aspect, a surface cleaning apparatus may comprise an air flow path extending from a dirty air inlet to a clean air outlet. The surface cleaning apparatus may comprise a main body comprising a front end, a rear end, first and second opposed sidewalls, and a suction motor provided in the air flow path. At least one of the first and second opposed sidewalls may have a compartment that houses an operating component of the surface cleaning apparatus or a portion of the air flow path. A cyclone bin assembly may be provided in the air flow path. The cyclone bin assembly may have opposed end walls.

[00423] The portion of the airflow path may comprise at least part of an air flow passage between the cyclone chamber and the suction motor.

[00424] The cyclone bin assembly may comprise a cyclone chamber and the suction motor and the cyclone chamber extend transversely.

[00425] The operating component may comprise at least one of a filter, batteries, a power cord spool and control electronics.

[00426] The operating component may comprise at least one of batteries, a power cord spool and control electronics.

[00427] The compartment may be openable.

[00428] Each of the first and second opposed sidewalls may comprise a wheel. At least one of the wheels may be moveable to reveal the compartment.

[00429] The main body may comprise first and second opposed sidewalls. The filter compartment may be provided in one of the sidewalls. The sidewalls may overlie at least 50%, more preferably at least 60% and most preferably at least 75% of end walls of the air treatment member and the side wheels may overlie at least 50%, more preferably at least 60% and most preferably at least 75% of the sidewalls.

[00430] In a preferred embodiment, the sidewalls overlie essentially all of the end walls of the air treatment member and/or the side wheels overlie essentially all of the sidewalls.

[00431] The filter may have a cross sectional area that is at least 50%, more preferably at least 60% and most preferably at least 75% of a cross sectional area of the sidewall.

[00432] The sidewalls may overlie essentially all of end walls of the cyclone bin assembly.

[00433] The surface cleaning apparatus may comprise a generally U shaped cavity having an open upper end positioned between the first and second opposed side walls and the cyclone bin assembly may be removably mounted in the cavity.

[00434] The cyclone bin assembly may sit on a platform in the cavity and the platform may comprise a portion of a housing for the suction motor.

[00435] The cavity may have an open front end and an open rear end.

[00436] The cyclone bin assembly may comprise a cyclone chamber and each of the first and second opposed sidewalls may comprise a wheel having a diameter larger than a diameter of the cyclone chamber.

[00437] Each of the first and second opposed sidewalls may comprise a wheel substantially the same size as the sidewall on which the wheel is provided.

[00438] Each of the first and second opposed sidewalls may comprise a wheel having a cross sectional area larger than a transverse cross sectional area of the cyclone bin assembly.

[00439] The cyclone bin assembly may comprise a cyclone chamber and an openable dirt collection chamber. One of the end walls may be an openable wall of the dirt collection chamber.

[00440] The cyclone bin assembly may comprise a cyclone chamber that extends transversely. The cyclone chamber may comprise a tangential inlet that may be provided at the front end of the surface cleaning apparatus.

[00441] The main body may comprise a suction hose connector upstream of the tangential inlet.

[00442] The main body may comprise a suction hose connector upstream of the cyclone bin assembly.

[00443] The cyclone bin assembly may comprise a cyclone chamber and a dirt collection chamber. The dirt collection chamber may be provided exterior to the cyclone chamber and extends at least partially collinearly therewith.

[00444] The cyclone bin assembly may comprise a cyclone chamber and a dirt collection chamber and the surface cleaning apparatus may comprise a pre-motor filter which may have a cross sectional area that is larger than a transverse cross sectional area of the cyclone chamber.

[00445] The pre-motor filter may be provided in one of the first and second opposed sidewalls.

[00446] The pre-motor filter may have a cross sectional area that is at least 60% of a cross sectional area of the sidewall.

[00447] The pre-motor filter may have a cross sectional area that is proximate that of the sidewall.

DRAWINGS

[00448] Reference is made in the detailed description to the accompanying drawings, in which:

[00449] Figure 1 is a front perspective view of an embodiment of a surface cleaning apparatus;

[00450] Figure 2 is a left side elevation view of the surface cleaning apparatus of Figure 1;

[00451] Figure 3 is a rear lower perspective view of the surface cleaning apparatus of Figure 1;

[00452] Figure 4 is a partially exploded view of the surface cleaning apparatus of Figure 1, with the side wheels exploded;

[00453] Figure 5 is a partially exploded view of the surface cleaning apparatus of Figure 1, with a side wheel, seal plate and pre-motor filter exploded;

[00454] Figure 6 is a side view of the surface cleaning apparatus of Figure 1, with a side wheel, cover plate and pre-motor filter removed;

[00455] Figure 7 is a partially exploded view of the surface cleaning apparatus of Figure 1, with a side wheel, cover plate and cord wrap spool exploded;

[00456] Figure 7a is the partially exploded view of Figure 7, with the cord wrap spool in the cord wrap chamber;

[00457] Figure 8 is a section taken along line 8-8 in Figure 1;

[00458] Figure 9 is an enlarged view of a portion of Figure 8;

[00459] Figure 10 is a section taken along line 10-10 in Figure 1;

[00460] Figure 11 is a perspective view of the surface cleaning apparatus of Figure 1, with a cyclone bin assembly removed;

[00461] Figure 12 is a top perspective view of the cyclone bin assembly of Figure 11;

[00462] Figure 13 is perspective view of the cyclone bin assembly of Figure 12, with one end wall open;

[00463] Figure 14 is perspective view of the cyclone bin assembly of Figure 13, with one end wall removed; and,

[00464] Figure 15 is a section view taken along line 15-15 in Figure 14.

DETAILED DESCRIPTION

[00465] As exemplified in Figures 1 to 3, an embodiment of a surface cleaning apparatus 100 is shown. In the embodiment illustrated, the surface cleaning apparatus 100 is a canister vacuum cleaner.

General Overview

[00466] This detailed description discloses various features of surface cleaning apparatus 100. It will be appreciated that a particular embodiment may use one or more of these features. In appropriate embodiments, the surface cleaning apparatus 100 may be another type of surface cleaning apparatus, including, for example, a hand operable surface cleaning apparatus, an upright vacuum cleaner, a stick vac, a wet-dry vacuum cleaner and a carpet extractor.

[00467] Referring still to Figure 1, the surface cleaning apparatus 100 has a dirty air inlet 102, a clean air outlet 104 and an airflow passage extending therebetween. One or more air treatment members may be provided in the airflow passage to treat the air as it travels from the dirty air inlet 102 to the clean air outlet 104. The air treatment member may include any suitable air treatment apparatus and may be configured to separate dirt and other debris from the air travelling through the surface cleaning apparatus 100.

[00468] In the embodiment shown, the dirty air inlet 102 is the air inlet 234 of an optional suction hose connector 106 that may be connected to the downstream end of a flexible suction hose or any other type of suitable cleaning accessory tool, including, for example, a surface cleaning head, a wand and a nozzle. Hose connector 106 may be provided directly on the air treatment member or the body in which the air treatment member is housed. Any standard surface cleaning head may be provided on the upstream end of the flexible hose or wand. In some embodiments, a hose connector may not be used. Alternately, or in addition, the hose or wand may be connected directly to the air treatment member 108.

[00469] From the dirty air inlet 102, the airflow passage extends through the air treatment member 108 that may treat the air in a desired manner, including for example removing dirt particles and debris from the air. In appropriate embodiments, the air treatment member may include any suitable apparatus to help clean the air, including, for example, collection bags, filters, screens and other air filtration or treatment devices. The air treatment member may be configured to mechanically filter debris from the air, and optionally, may be configured to help remove odours or other impurities from the air passing through the apparatus 100.

[00470] Preferably, the air treatment member comprises at least one cyclone. For example, as shown in the illustrated example, the air treatment member 108 may comprise a cyclone bin assembly 110. Alternatively, or in addition, the air treatment member 108 may comprise a bag, a filter or other air treating means instead of or in addition to one or more cyclones. In some embodiments, the cyclone bin assembly may be of any design or it may use one or more features of the cyclone bin assembly disclosed herein.

[00471] The air treatment apparatus may be integrally formed with the main body 112 of the surface cleaning apparatus 100 or may be provided as a separate member or sub-assembly that may be connected to, and supported by the main body 112. Optionally, the air treatment member 108 may be removable or detachable from the main body 112. Providing a detachable air treatment member 108 may help facilitate emptying debris from the air treatment member 108. While it is preferred that the air treatment member is removably mounted to main body 112, in appropriate embodiment, the air treatment member may be fixed in main body 112.

[00472] The air treatment member 108 may be provided in any suitable location on the main body 112. For example, the air treatment member 108 may be provided toward the front of the main body 112 (in the direction of travel of the surface cleaning apparatus) or toward the rear of the main body 112 or centrally between the front and the rear of main body 112. In the illustrated example the air treatment member 108 is

provided centrally and toward the top of the surface cleaning apparatus 100. In this configuration a user pulling the surface cleaning apparatus 100 behind them along a surface may be able to visually inspect the air treatment member 108 by simply glancing backwards in the direction of the surface cleaning apparatus 100. If the air treatment member 108 is transparent or includes a window portion, the user may be able to determine if the surface cleaning apparatus 100 is approaching its dirt storage capacity. Alternatively, the air treatment member 108 may be provided toward the back, or optionally, toward the bottom of the surface cleaning apparatus 100 so as to lower the centre of gravity.

[00473] A suction motor 111 (Figure 8) is preferably mounted within a main body 112 of the surface cleaning apparatus 100 in the fluid flow path and is in fluid communication with the cyclone bin assembly 110. Preferably, the suction motor 111 is positioned downstream from the air treatment member 108 so that dirt and debris is separated from the air before it reaches the suction motor 111 (i.e., a clean air motor).

[00474] In the illustrated example, the body 112 of the surface cleaning apparatus 100 is configured as a rolling or canister-type body that is intended to roll or slide along a surface (e.g. a floor). The body 112 may also be configured to support a plurality of components, modules or sub-components, including, for example, the air treatment member 108 and the suction motor 111. The body 112 may be formed in any shape that is suitable for receiving and supporting any given combination or sub-combination of components including the air treatment member, the suction motor, accessories and the like.

[00475] The surface cleaning apparatus is preferably adapted for movement across a floor and preferably uses wheels, slides, a rotating belt or the like. When configured as a canister, the body 112 may include two or more wheels, rollers or other type of rolling support members. The wheels may be any suitable size and formed from any suitable material, including, for example, rubber, plastic and metal.

[00476] The spacing and configuration of the wheels on the body may be selected to provide a desired combination of balance, ground clearance, maneuverability and/or other characteristics. Optionally, the supporting wheels may be substantially identical to each other. Alternatively, the supporting wheels may include a combination of wheels of different configurations. Optionally, some or all of the wheels may be rotationally connected to the body about a vertical axis (e.g. caster-like wheels) so that the wheels may travel along a surface by rotating about respective horizontal rotation axes and turn by rotating about a generally vertical axis.

[00477] The clean air outlet 104, which is in fluid communication with an outlet of the suction motor 111, is preferably provided in the body 112. In the illustrated example, the dirty air inlet 102 is preferably located toward the front 122 of the surface cleaning apparatus 100, and the clear air outlet is preferably located toward the rear 124. Alternatively, the outlet 104 and inlet 102 may be provided in other locations on the body 112 or may be provided on a separate component.

[00478] It will be appreciated that, depending upon the aspects that are incorporated into a surface cleaning apparatus, some of the exemplified features may not be used or may be varied so as to be of any design known in the art.

Sidewalls

[00479] In accordance with one aspect, which may be used by itself or with any other embodiment disclosed herein, a surface cleaning apparatus is provided with sidewalls that are constructed and/or configured to protect or assist in protecting the cyclone bin and accordingly the surface cleaning apparatus may be more durable.

[00480] As exemplified in Figure 11, the body 112 of the surface cleaning apparatus 100 preferably is a rollable, canister-type body that comprises a platform 114 and two opposing sidewalls 116a, 116b that cooperate to define a central cavity 118. The surface cleaning apparatus 100 also preferably comprises two main side

wheels 120a, 120b, that are preferably rotatably coupled to the sidewalls 116a and 116b, respectively.

[00481] In the illustrated example, the sidewalls 116a and 116b are generally continuous planar sidewalls that cover the entire sides of the air treatment member. It will be appreciated that, the sidewalls 116a and 116b may be non-planar and may include a plurality of different surfaces and/or may be formed from a plurality of different members or panels. Further, the sidewalls need not be solid but may be a lattice or the like.

[00482] The sidewalls may be configured to cover or overlie a sufficient portion of the lateral faces of one or more components supported by the body 112, including for example the air treatment member, the suction motor, filters and/or other components so as to protect the one or more components for impact. Accordingly, the sidewalls may be formed in any suitable shape or size that covers a portion of the surface cleaning apparatus components. Accordingly, the sidewalls 116a and 116b may be configured so that they will protect the air treatment member 108 from side impacts. The sidewalls preferably overlie at least 50%, preferably at least 75%, and more preferably, may overlie essentially all of end walls of the air treatment member 108.

[00483] To provide a desired level of protection, the sidewalls may have generally solid, continuous outer surfaces. Alternatively, the sidewalls may include one or more openings. Optionally, the openings provided in the sidewall may be relatively small, for example smaller than the size of objects like the corners of furniture, etc., that are likely to impact the surface cleaning apparatus, so that the sidewalls may still offer protection to the body 112 and components mounted thereon. For example, a sidewall formed from a mesh or screen-like panel, or including a plurality of apertures, etc., formed from a material of sufficient strength, may provide a desired level of impact protection to covered components and may also allow ventilation or other additional benefits.

[00484] The sidewalls 116a and 116b may be integrally formed with other portions of the body 112, or may be provided as discrete members that may be fastened to the body 112. The sidewalls 116a and 116b may be formed from plastic, metal and/or any other material having sufficient strength.

[00485] Optionally, in addition to protecting some components of the surface cleaning apparatus 100, the sidewalls 116a and 116b may be configured to support or connect to a variety of components or modules, including, for example, the side wheels 120a and 120b.

Side Wheels

[00486] In accordance with another aspect, which may be used by itself or with any other embodiment disclosed herein, a surface cleaning apparatus is provided with side wheels that are constructed and/or configured to protect or assist in protecting the cyclone bin and accordingly the surface cleaning apparatus may be more durable.

[00487] The side wheels may be provided outboard of the body 112 so that the wheels define an outermost portion of the surface cleaning apparatus 100. For example, wheels may be provided on the sidewalls. In this configuration, the wheels may help protect other portions of the body 112 and surface cleaning apparatus 100 from impacts and/or damage when the surface cleaning apparatus 100 is in use, for example, if the body 112 contacts a wall or a piece of furniture. In this configuration, the wheels may be formed from a material and/or configured with sufficient strength and toughness to withstand such impacts. The wheels may be the same shape or a different shape to the sidewalls that they overlie.

[00488] Preferably, as shown in the illustrated example, the body sidewalls 116a,b are generally circular and cover substantially the entire side faces of the surface cleaning apparatus 100. One main side wheel 120a, 120b is coupled to the outer face of each body sidewall 116a and 116b, respectively. Optionally, the side wheels 120a, 120b may have a larger diameter 126 than the body sidewalls 116a,b and may completely cover the outer faces of the sidewalls 116a,b.

[00489] The side wheels may have a diameter larger than the diameter of a cyclone chamber of the air treatment member, and may overlies at least 75%, and preferably essentially all, of end walls of a cyclone bin assembly of the air treatment member.

[00490] Optionally, the sidewalls may be configured to be covered by side wheels 120a and 120b the sidewalls 116a and 116b may be sized so that they are smaller than the diameter of the side wheels. Optionally, the sidewalls may be generally circular in shape. Alternatively, the sidewalls 116a and 116b may have a non-circular shape that is sized and configured not to interfere with the operation of the side wheels 120a and 120b.

Rotation Mount for the Main Side Wheels

[00491] Each side wheel 120a,b is rotatably supported, e.g., by a corresponding axle mount 128a, 128b, which extends from the body sidewalls 116a and 116b, respectively. The main side wheels 120a (Figure 6) and 120b (Figure 7) are rotatable about a primary axis of rotation 130. In the illustrated example, the primary axis of rotation 130 passes through the cyclone bin assembly 110 (see for example Figure 8).

[00492] The axle mounts 128a and 128b may be integrally formed with the body 112 or, alternatively, may be provided as separate members that are attached to the sidewalls 116a and 116b. The axle mounts 128a and 128b may be formed from any suitable material having sufficient strength to carry at least a portion of the weight of the surface cleaning apparatus 100 and to accommodate a rotatable connection to the side wheels 120a and 120b. While illustrated as generally cylindrical members, the axle mounts 128a and 128b may be any suitable size and/or shape to accommodate a given set of side wheels 120a and 120b.

[00493] Alternatively, instead of extending from the sidewalls 116a and 116b, the axle mounts 128a and 128b may be provided on, and/or, extend from another portion of the surface cleaning apparatus 100, including, for example, the cover plates 310 (as explained later in greater detail). Optionally, the axle mounts 128a and 128b may be

detachable from the main body 112 of the surface cleaning apparatus. For example, axle mounts 128a and 128b extending from the cover plates 310 may be removable from the surface cleaning apparatus 100 with the cover plates 310. It will also be appreciated that opposed side wheels may be mounted on a single axle.

Openable Wheels

[00494] In accordance with another aspect, which may be used by itself or with any other embodiment disclosed herein, one or more wheels may be openable to provide access to the interior of the surface cleaning apparatus. For example, when open, access may be provided to one or more of a motor access cover, an operating component of the surface cleaning apparatus, a filter and an air flow passage.

[00495] In accordance with this aspect, at least one of the side wheels 120a,b may be openable, and preferably detachable (removable) from the body 112. As exemplified in Figures 4-9, both side wheels 120a and 120b are detachably coupled to their corresponding axle mounts 128a and 128b by axles comprising threaded hub assemblies 132a and 132b, respectively, and may be removed from the body 112. Alternatively, the wheels 120a and 120b may be rotatably connected to the surface cleaning apparatus 100 using any suitable connector, including, for example, pins, pivot joints and other rotatable fasteners.

[00496] Removing the side wheels 120a, 120b from the body 112, or otherwise positioning them in an open configuration, may allow a user to access a variety of components located in compartments between the side wheels 120a and 120b and the corresponding sidewalls 116a and 116b, as explained in greater detail below.

[00497] For clarity, reference will now be made to Figure 9, which is an enlarged view of hub assembly 132b, and it is understood that analogous features are provided on hub assembly 132a and may be referenced herein using the same references

numbers having an “a” suffix. The illustrated hub assembly 132b provides a rotational mount for wheel 120b and may be of various designs.

As exemplified, hub assembly 132b comprises a threaded socket 134b and mating threaded lug 136b. The threaded inserts 138b provide a threaded central bores for receiving the mating threaded shafts 140b on the lugs 136b. The sockets and lugs may be formed from any suitable material, including, for example plastic and metal.

[00498] In the illustrated example, each threaded socket 134b comprises a threaded insert member 138b, that is positioned within a corresponding axle mount 128b, and preferably non-rotatably and non-removably mounted, in axle mount 128b. The threaded insert 138b may be non-rotatably fastened to the axle mount 128b, for example by using a screw or other fastener, a sliding locking fit, an adhesive and the like. Each lug 136b comprises a thread shaft 140b extending from a head 142b. The threaded shaft 140b has external threads for engaging the threaded bore of the threaded insert 138b.

[00499] Alternatively, instead of providing a separate thread insert member, the socket 134b may comprise integral threads formed on the inner surfaces of the axle mount 128b. Alternately the sidewalls may include a bearing, bushing or the like.

[00500] In the illustrated example, the heads 142a, 142b are configured to be engaged by a user. Each lug 136a, 136b is rotatable between a locked and an unlocked position relative to its insert 138a, 138b. In the unlocked position, the lugs 136a, 136b may be axially inserted and removed from the inserts 138a, 138b. Removing the lugs 136a, 136b from the inserts 138a, 138b may allow a user to remove the side wheels 120a and 120b retained by the lugs 136a and 136b, respectively. To re-attach the side wheels 120a, 120b, a user may position the side wheel 120a, 120b over the corresponding sidewall 116a, 116b, insert the lugs 136a, 136b into the treaded inserts 138a, 138b and then rotate the lugs 136a, 136b, in a locking direction 144a (Figure 2), 144b (Figure 11), into the locked position to retain the wheels 120a, 120b in their operating position.

[00501] In the illustrated example, the heads 142a and 142b are sized and shaped to be grasped by the bare fingers of a user. Configuring the heads 142a, 142b to be grasped by the bare fingers of a user may help facilitate the attachment and release of the lugs 136a, 136b from the threaded inserts 138a, 138b by hand, without requiring additional tools. Alternatively, or in addition to be graspable by bare fingers, the heads 136a, 136b may be configured to be engaged by a tool, including, for example, a screw driver, socket, allen key and wrench. When assembled in the manner shown in Figure 8, both the lugs 136a, 136b and threaded inserts 138a, 138b remain fixed and do not rotate relative to the body 112 when the surface cleaning apparatus 100 is in use.

[00502] Referring again to Figure 9, lug 136b comprises a wheel bearing surface 146b configured to rotatably support an inner edge 148b of a corresponding the side wheel 116b. Allowing rotation between the wheel bearing surface 146b and the inner edge 148b of the wheel 120b facilitates rotation of the side wheel 120b relative to the body 112. Optionally, the interface between the wheel bearing surface 146b and the inner edge 148b of the side wheel 120b may be lubricated or otherwise treated to help reduce friction at the interface may be provided. In some examples, a rotary bearing or other type of bearing apparatus may be used to support the side wheels 120a and 120b on the hub assemblies 132a and 132b. In the illustrated example, the wheel bearing surfaces 146 on the lug portions 136a, 136b are identical, and the inner edges 148 of the side wheels 120a, 120b are identical. Providing identical wheel bearing surfaces 146a, 146b and inner edge surfaces 148a, 148b may allow the side wheels 120a, 120b to be interchangeable, such that each side wheel 120a, 120b may be used on either side of the surface cleaning apparatus 100.

[00503] Preferably, the friction between the wheel bearing surface 146b and the inner edge 148b of the side wheel 120b is sufficiently low to allow the side wheel 120b to rotate relative to the lug 136b without exerting a significant rotation torque on the lug 132b. However, in some circumstances, the side wheels 120a, 120b may exert a

rotational torque on the lugs 136a, 136b. Optionally, the threads on the lugs 136a, 136b and inserts 138a, 138b may be configured so that the direction of forward rotation 147 of a side wheel, for example side wheel 120a in Figure 2, coincides with the locking direction 144a of the corresponding lug, for example lug 136a. In this configuration, the locking direction 144a of the lug 136a may be opposite the locking direction 144b of lug 136b. Providing lugs 136a, 136b with threads configured to having opposing locking directions 144a, 144b may enable each lug 136a, 136b to have a locking direction 144a, 144b that coincides with the forward direction of rotation of the side wheel 120a, 120b. Preferably, as shown in the illustrated example, the locking direction 144a of lug 136a is counter-clockwise (as viewed in Figure 2), and the locking direction 144b of lug 136b is clockwise (as viewed in Figure 11).

[00504] In this configuration, when the surface cleaning apparatus 100 is being pulled in a forward direction, rotational torque exerted by the side wheels 120a, 120b on the lugs 136a, 136b may drive the lugs 136a, 136b toward their locked positions. This may help reduce the chances of a lug 136a, 136b becoming unintentionally loosened or unscrewed by the rotation of the side wheels 120a, 120b. Alternatively, the lugs 136a and 136b may have any other suitable configuration.

[00505] It will be appreciated that, in an alternate embodiment, the side wheel may be moveable to an open position in which access may be provided to the interior of the surface cleaning apparatus but is still attached to the surface cleaning apparatus. Alternately, or in addition, the wheel may be rotatably mounted by any other means known in the art and the axle mount may be located on an alternate portion on the surface cleaning apparatus.

[00506] As exemplified in Figures 4 and 8, optionally, each wheel 120a, 120b may comprise a tire 149a, 149b extending around the perimeter of the wheel. The tires 149a, 149b may be formed from a different material than the wheels 120a, 120b. Optionally, the tire 149a, 149b may be formed from a material that is softer than the

wheel material, for example rubber, which may help increase the traction of the wheels 120a, 120b.

[00507] Preferably, the main side wheels 120a, 120b are configured to carry a majority of the load of the surface cleaning apparatus 100, when the surface cleaning apparatus 100 is in use. In the example illustrated, the surface cleaning apparatus 100 may ride solely or primarily on the side wheels 120a, 120b when it is being pulled in a forward or backward direction by a user. Alternatively, the surface cleaning apparatus 100 may be configured so that additional support wheels will contact the ground, in addition to the side wheels 120a and 120b, when the surface cleaning apparatus is in use.

Stabilizer Wheels

[00508] In accordance with another aspect, which may be used by itself or with any other embodiment disclosed herein, the surface cleaning apparatus 100 may include one or more stabilizer member in addition to the main side wheels 120a and 120b. For example, in the illustrated example the body 112 is primarily supported by two main side wheels 120a and 120b. In this configuration, the body 112 may be unbalanced and tend to rotate forward or backward about the axis of rotation of the wheels 120a and 120b. Such rotation may cause parts of the body 112 to contact or drag on the ground and may cause damage to the surface cleaning apparatus. Dragging portions of the body 112 on the ground may also impede the maneuverability and performance of the surface cleaning apparatus.

[00509] Preferably, the surface cleaning apparatus 100 may include at least one stabilizer member to help prevent such unwanted pivoting of the body 112. The stabilizing member may extend from the body 112 to contact the ground thereby stabilizing the body 112. The stabilizing member may be a rolling support member or may be a non-rolling member, including, for example, a slide, a supporting leg or foot. The stabilizer members may be static members or alternatively, may be movable or

deployable members that may extend when the body 112 is moved into a predetermined position. For example, a stabilizing leg member may be configured to be retracted when the surface cleaning apparatus 100 is in normal use, and may extend when the surface cleaning apparatus 100 is at rest, or if the body 112 pivots beyond a predetermined orientation.

[00510] The stabilizer members may be configured to be in contact, for example rolling contact or sliding contact, with the ground when the surface cleaning apparatus is in use, or may be spaced away from the ground during normal use. Limiting the number of contact points between the surface cleaning apparatus 100 and the ground may help improve maneuverability of the surface cleaning apparatus 100.

[00511] Optionally, the stabilizer members may be stabilizer wheels connected to the body 112. The stabilizer wheels may be any suitable type of wheel or roller member. Preferably, the stabilizer member is configured to not contact the floor when the surface cleaning apparatus is being moved forwardly or rearwardly.

[00512] In accordance with this aspect, the surface cleaning apparatus 100 may comprise one or more stabilizer wheels, in addition to the side wheels 120a, 120b. Preferably, the stabilizer wheels are configured to help support the surface cleaning apparatus 100 in a generally horizontal position as exemplified in Figure 2 when the surface cleaning apparatus 100 is at rest. Optionally, one or more of the stabilizer wheels may be configured to not contact the ground when the body 112 is horizontal, and contact the ground when the body 112 rotates forward, or backward (.e.g., about the axles of the side wheels, by a predetermined amount. Configuring the stabilizer wheels in this manner may help prevent the surface cleaning apparatus 100 from over-rotating in a forward or backward direction.

[00513] Preferably, if both front and rear stabilizer wheels are provided, then the stabilizer wheels are positioned such that only one will contact a horizontal floor surface at a time. This configuration may help prevent over-rotation of the body 112 and may still provide a desired amount of maneuverability when the surface cleaning

apparatus 100 is in use. The surface cleaning apparatus 100 may include one or more front stabilizer members and/or one or more rear stabilizer members.

[00514] As exemplified in Figures 1-4, the surface cleaning apparatus 100 comprises a front stabilizer wheel 150 and a rear stabilizer wheel 152. The front stabilizer wheel may be any suitable type of wheel member and in the example illustrated is a cylindrical, roller-type wheel mounted toward the front of the body 112 by a pair of mounting brackets 156. The front stabilizer wheel is rotatable about an axis 154 of rotation that is generally parallel to the primary axis of rotation 130 and is provided forward of the primary axis of rotation 130. Optionally, the front stabilizer wheel may be rotationally mounted about a vertical axis to the body 112,

[00515] The front stabilizer wheel 150 may be located at any suitable location on the front portion of the surface cleaning apparatus 100. The front stabilizer wheel 150 may be coupled to the body 112 as illustrated, or optionally, may be coupled to another component, including, for example, the cyclone bin assembly. Optionally, the front stabilizer wheel 150 may be located so that the axis of rotation 154 is positioned outside the diameter or perimeter 126 of the side wheels 120a, 120b. Alternatively, the axis of rotation 154 may be within the diameter 126 of the side wheels 120a and 120b. In this configuration, the front stabilizer wheel 150 may be sized such that at least a portion of the front stabilizer wheel 150 extends outside the diameter 126.

[00516] When the surface cleaning apparatus 100 is in a generally horizontal configuration, for example when it is in use, the front stabilizer wheel 150 may be spaced above the floor (see Figure 2). When the surface cleaning apparatus 100 pivots forward, the front stabilizer wheel 150 may contact the ground. With the front stabilizer wheel 150 on the ground, the surface cleaning apparatus 100 is supported in a generally stable rest position by three points of contact (the side wheels 120a, 120b and the front stabilizer wheel 150).

[00517] Optionally, one or more rear stabilizer wheel may be provided at any suitable location toward the rear of the body 112. Preferably, as shown in the example

illustrated, the rear stabilizer wheel 152 is a swivelable, caster-type wheel. The rear stabilizer wheel 152 may be swivelably mounted in a recess 158 on the underside of a post-motor filter housing 160 (see also Figure 10), which extends from the rear of the body 112. Alternatively, the rear stabilizer wheel 152 may be mounted to any other suitable location on the body 112.

[00518] The rear stabilizer wheel 152 is preferably mounted behind the primary axis of rotation 130. Optionally, the rear stabilizer wheel 152 may be mounted outside the diameter 126 of the side wheels 120a and 120b.

[00519] In the illustrated example, the rear stabilizer wheel 152 may be in rolling contact with the ground when the surface cleaning apparatus 100 is in the generally horizontal position. In this configuration, the rear stabilizer wheel 152 may help support the surface cleaning apparatus 100 when it is in use, and may help limit rearward rotation of the body 112.

[00520] Optionally, the front and rear stabilizer wheels 150, 152 may be configured so that only one of the stabilizer wheels 150, 152 may contact the ground at any given time when the vacuum cleaner is on a horizontal surface. This prevents both stabilizer wheels 150, 152 from simultaneously contacting the ground when the vacuum cleaner is used on a horizontal surface. If both stabilizer wheels contact the ground at the same time, this may interfere with the steering of the surface cleaning apparatus 100. In the example illustrated, the rear stabilizer wheel 152 is lifted out of contact with the ground when the front stabilizer wheel 150 is in contact with the ground, and vice versa. Alternatively, the surface cleaning apparatus 100 may be configured so that both the front and rear stabilizer wheels 150 and 152 may contact the ground simultaneously.

Removable Cyclone Bin Assembly

[00521] In accordance with another aspect, which may be used by itself or with any other embodiment disclosed herein, the air treatment member comprises at least one dirt collection chamber for at least one cyclone which is removable from the surface cleaning apparatus for emptying.

[00522] As exemplified in Figures 8, 10, 11, 13 and 14, cyclone bin assembly 110 includes a cyclone chamber 162 and a dirt collection chamber 164. As explained above, the cyclone chamber 162 and dirt collection chamber 164 may be of any suitable configuration and may be sized to be supported on the body 112. Optionally, some or all of the cyclone bin assembly 110 may be transparent to allow a user to visually inspect the contents of one or both of the cyclone chamber 162 and dirt collection chamber 164. The cyclone chamber 162 may be configured to separate dirt and debris from the air flow and the dirt collection chamber 164 may be configured to receive and retain the separated dirt and debris.

[00523] Preferably, as exemplified, the cyclone bin assembly 110 is detachably mounted in the cavity 118, laterally between the sidewalls 116a, 116b and side wheels 120a, 120b. Positioning the cyclone bin assembly 110 in the cavity 118, between the body sidewalls 116a, 116b may help protect the cyclone bin assembly 110 from side impacts, for example if the surface cleaning apparatus 100 contacts a piece of furniture or other obstacle. Preferably, the body sidewalls 116a, 116b have a larger cross-sectional area than the cyclone bin assembly 110. More preferably, the transverse faces of the cyclone bin assembly 110 are entirely covered by the body sidewalls 116a, 116b. Configuring the cyclone bin assembly 110 to be removable from the cavity may help facilitate emptying the dirt collection chamber 164.

[00524] The cavity 118 may be any suitable shape and configuration to accommodate at least a portion of the cyclone bin assembly 118 in a secure manner. The cavity 118 may be generally U-shaped as illustrated, or may be any other suitable shape. For example, the cavity need not have open front and rear portions, and may be configured to also substantially cover the front and back of the cyclone bin

assembly. This configuration may provide added protection for the front and back of the cyclone bin assembly, and may provide a different aesthetic appearance for the surface cleaning apparatus.

[00525] Optionally, the sidewalls 116a and 116b and wheels 120a and 120b need not cover all of the transverse faces of the cyclone bin assembly 110. For example, portions of the cyclone bin assembly 110 may extend above the edge of the wheels 120a and 120b (as illustrated in Figure 2). In this configuration portions of the cyclone bin assembly 110 may project beyond the edges of the sidewalls 116a and 116b, but the sidewalls 116a and 116b may still provide protection from side impact. Alternatively, portions of the cyclone bin assembly 110 may extend beyond the front or rear edges or the tops of the wheels 120a and 120b (as illustrated in Figure 2), and/or portions of the cyclone bin assembly 110 may be exposed via one or more apertures in the sidewalls 116a and 116b and/or wheels 120a and 120b.

[00526] As exemplified in Figure 13, a preferred cyclone chamber is provided. As illustrated, the cyclone chamber 162 is bounded by a sidewall 166, a first end wall 168 and a second end wall 170. A tangential air inlet 172 is provided in the sidewall of the cyclone chamber 162 and is in fluid communication with the dirty air inlet 102. Air flowing into the cyclone chamber 162 via the air inlet may circulate around the interior of the cyclone chamber 162 and dirt particles and other debris may become disentrained from the circulating air. Alternatively, the cyclone chamber 162 may be of any suitable configuration.

[00527] A slot 180 formed between the sidewall 166 and the second end wall 170 may serve as a cyclone dirt outlet 180 (Figure 8). Debris separated from the air flow in the cyclone chamber 162 may travel from the cyclone chamber 162, through the dirt outlet 180 to the dirt collection chamber 164.

[00528] Air may exit the cyclone chamber 162 via an air outlet. In the illustrated example, the cyclone air outlet includes a vortex finder 182 (Figures 8, 13). Optionally, a removable screen 183 may be positioned over the vortex finder 182. The cyclone

chamber 162 extends along a longitudinal cyclone axis 184. In the example illustrated, the longitudinal cyclone axis is aligned with the orientation of the vortex finder 182 and is generally transverse to the direction of movement of the surface cleaning apparatus 100. The cyclone chamber 162 has a generally circular cross sectional shape (taken in a plane perpendicular to the cyclone axis) and has a cyclone diameter 186.

[00529] Optionally, the cavity 118 may be configured to receive the cyclone bin assembly 110 in any suitable orientation. For example, the cavity 118 may be configured to receive the cyclone bin assembly so that the cyclone chamber 162 is generally horizontal and the cyclone axis 184 is generally parallel to, orthogonal to or at any suitable angle relative to the axis of rotation 130. Alternatively, the cyclone chamber 162 may be positioned as a substantially upright or vertical cyclone, such that the axis 184 extends generally vertically, or in any other suitable orientation.

[00530] The dirt collection chamber 164 may be any suitable shape and may be configured so that it at least partially surrounds the cyclone chamber 162 and fits within the cavity 118. The dirt collection chamber 164 may also be shaped to at least partially surround one or more other portions of or components on the surface cleaning apparatus 100. In the illustrated example, the dirt collection chamber 164 comprises a sidewall 174, a first end wall 176 and an opposing second end wall 178. Preferably, as shown in the illustrated example, at least a portion of the dirt collection chamber sidewall 174 is integral with a portion of the cyclone chamber sidewall 166, and at least a portion of the first cyclone end wall 168 is integral with a portion of the first dirt collection chamber end wall 176. Alternatively, the cyclone chamber sidewalls 166 may be discrete and separate from the dirt collection chamber sidewall 174. In such a configuration, the dirt collection chamber 164 may entirely surround the cyclone chamber 162.

[00531] In the illustrated example, a lower surface 188 of the cyclone bin assembly 110 is preferably configured to rest on the platform 114, and the first and

second end walls 168, 170 of the cyclone bin assembly 110 may be shaped to engage the inner surfaces of the body sidewalls 116a, 116b, respectively. The upper portion of the cyclone bin assembly 110 (as viewed when installed in the cavity 118) may have a radius of curvature that generally corresponds to the radius of curvature of the body sidewalls 116a, 116b and the side wheels 120a, 120b. Matching the curvature of the cyclone bin assembly 110 with the curvature of the side wheels 120a, 120b may help facilitate mounting of the cyclone bin assembly 110 within the body 112, so that the walls of the cyclone bin assembly 110 do not extend radially beyond the body sidewalls 116a, 116b or main side wheels 120a, 120b.

[00532] Preferably, at least one of the walls of the dirt collection chamber 164, or a portion thereof, is openable and/or detachable to allow dirt to be emptied from the dirt collection chamber 164. Optionally, opening the dirt collection chamber 164 may simultaneously open the cyclone chamber 162. This may help facilitate emptying and/or cleaning of the cyclone chamber 162. As exemplified in Figure 13, the second dirt collection chamber end wall 178 is preferably pivotally connected to the dirt collection chamber sidewall 174. The second dirt collection chamber end wall 178 may be opened to empty dirt and debris from the interior of the dirt collection chamber 164. Optionally, the cyclone chamber is openable concurrently with the dirt collection chamber. Accordingly, in the illustrated example, the second cyclone end wall 170 is integral with and is openable with the second dirt collection chamber end wall 178. Opening the second cyclone end wall 170 may allow dirt and debris to be emptied from the cyclone chamber 162. The second dirt collection chamber sidewall 178 may be retained in the closed position by a releasable latch 204.

[00533] Optionally, the screen 183 and/or the vortex finder 182 may be removable from the cyclone chamber 162 and may be removed when the second dirt collection chamber end wall 178 is open. Alternatively, the cyclone chamber need not include a screen 183 or vortex finder 182.

Cyclone Assembly Bin Lock

In accordance with another aspect, which may be used by itself or with any other embodiment disclosed herein, the air treatment member, which preferably comprises a cyclone assembly, is lockably receivable in the main body. A locking mechanism assists in securing the cyclone assembly to the body 112 when the surface cleaning apparatus 100 is in use. The locking mechanism may be any suitable type of releasable locking mechanism and may be used to secure the cyclone bin assembly 110 to any suitable part of the surface cleaning apparatus 100, including, for example, the platform 114 and/or the sidewalls 116a and 116b. The locking mechanism may be a mechanical locking mechanism and may include a plurality of suitable fasteners including, for example, pins, latches, clips, magnets and buckles. Alternatively, the cyclone bin assembly 110 may be configured to rest on the body 112 and to stay in position without the need for a locking mechanism.

[00534] As exemplified in Figures 11-14, a releasable bin locking mechanism 190 may be used to secure the cyclone bin assembly 110 within the cavity 118. Preferably, the bin locking mechanism 190 retains the cyclone bin assembly 110 within the cavity 118 by engaging at least one of the body sidewalls 116a, 116b, although the cyclone bin assembly may alternately, or in addition, be secured to the platform 114.

[00535] In the illustrated example, the bin locking mechanism 190 comprises a mechanical linkage locking member comprising an actuating lever 192 pivotally connected to the cyclone bin assembly 110 and a pair of locking pins 194 movably connected to the actuating lever 192. A release member 196, that is configured to be engaged by a user, is connected to the actuating lever 192. Corresponding locking cavities 198 for engaging the locking pins 194 are provided in the body sidewalls 116a, 116b. In the illustrated example, the locking cavities 198 are shaped to slidably receive the locking pins 194. Pivoting the actuating lever 192 causes the locking pins 194 to move between a locked position, in which the locking pins 194 extend into the locking cavities 198, and a retracted position in which the locking pins 194 are free

from the locking cavities 198. Optionally, the bin locking mechanism 190 may include a biasing member, for example spring 200, for biasing the actuating lever 192 and locking pins 194 toward the locked position. It will be appreciated that a single locking pin 194 may be used. Also, other locking mechanisms may be utilized.

[00536] A handle 202 may be provided on the top of the cyclone bin assembly 110. The handle 202 is configured to be grasped by a user. When the cyclone bin assembly 110 is mounted on the body 112, the handle 202 may be used to manipulate the surface cleaning apparatus 100. When the cyclone bin assembly 110 is removed from the body 112, the handle 202 may be used to carry the cyclone bin assembly 110, for example to position the cyclone bin assembly 110 above a waste receptacle for emptying. In the illustrated example, the handle 202 is connected to the dirt collection chamber sidewall 174. The handle may be any suitable shape that may be grasped by a user, and may extend from any portion of the cyclone bin assembly 110.

[00537] Preferably, the handle 202 is in close proximity to the release member 196 of the bin locking mechanism 190. Placing the handle 202 and release member 196 in close proximity may allow a user to release the bin locking mechanism 190 and lift the cyclone bin assembly 110 out of the cavity 118 with a single hand. Accordingly, the actuator (e.g., release member 196) for the locking mechanism may be located such that the actuator may be operated simultaneously when a user grasps handle 202, thereby permitting one handed operation of the bin removal. Alternatively, the locking mechanism 190 may be spaced apart from the handle 202 such that two hands are required for a user to extract the cyclone bin assembly 100 from the body 112.

Configuration of the Dirt Collection Chamber

[00538] In accordance with another aspect, which may be used by itself or with any other embodiment disclosed herein, the cyclone bin assembly 110, and the dirt collection chamber 164, may be shaped to engage or fit around other components of

the surface cleaning apparatus. For example, unlike cyclone chamber 162, which is preferably cylindrical in shape, the dirt collection chamber 164 may be of any shape that conveniently fits with the body 112. The dirt collection chamber 164 may include one or more cavities or recesses to accommodate other surface cleaning apparatus features or components. The dirt collection chamber 164 may be formed as a generally integral member, or may be formed from a plurality of separate panels or members. Configuring the dirt collection chamber to fit over and/or around other portions of the surface cleaning apparatus 100 may help reduce the overall size of the surface cleaning apparatus 100, and/or provide a desired aesthetic appearance.

[00539] As exemplified in Figures 11-14, the dirt collection chamber sidewall 174 comprises a recess 206 that is shaped to receive a corresponding portion of the body 112. In the illustrated example, the platform 114 comprises a generally planar bearing surface 208 for supporting the cyclone bin assembly 110. The platform 114 also comprises at least a portion of the suction motor housing 210 surrounding the suction motor 111. In this example, the recess 206 in the dirt collection chamber sidewall 174 is shaped to receive the portion of the motor housing 210 projecting above the planar bearing surface 208.

[00540] Preferably, at least a portion of the dirt collection chamber 164 surrounds at least a portion of the suction motor 111 and the suction motor housing 210. In this example, at least a portion of the dirt collection chamber 164 is positioned between the cyclone chamber 162 and the suction motor housing 210 (and the suction motor 111 therein). The shape of the recess 206 is preferably selected to correspond to the shape of the suction motor housing 210. Preferably, the suction motor housing 210 is shaped to conform to the shape of the suction motor 111. Accordingly, the suction motor housing 210 may have a first portion 210a that overlies the suction fan and a second portion 210b that overlies the motor section. Configuring the dirt collection chamber 164 to at least partially surround the suction motor housing 210 may help reduce the overall size of the surface cleaning apparatus 100, and/or may help

increase the capacity of the dirt collection chamber 164. Alternately, or in addition, the dirt collection chamber 164 may surround at least a portion of the cyclone chamber 162.

Diverter Wall

[00541] Dirt entering the dirt collection chamber 164 from the cyclone chamber 162 may tend to travel in a generally consistent direction or pattern. That is, when the cyclone is operating in a steady state condition, it may tend to eject dirt and debris from the dirt outlet in a generally uniform manner. This may tend to cause dirt and debris to accumulate in one region or portion of the dirt collection chamber 164. Such a concentration of dirt within one region of the dirt collection chamber 164 may interfere with operation of the surface cleaning apparatus. In accordance with another aspect, which may be used by itself or with any other embodiment disclosed herein, at least a portion of the dirt exiting the cyclone chamber 162 is diverted or redirected toward another portion of the dirt collection chamber 164. This may help distribute the dirt and debris more evenly within the dirt collection chamber 164. The dirt collection chamber 164 may be shaped to cause such re-direction. Optionally, the dirt collection chamber 164 may be configured to include one or more diverters that may be located within the expected path of dirt and debris exiting the cyclone chamber 162.

[00542] The diverter members may be any suitable type of member that is capable of deflecting at least some of the dirt exiting the cyclone chamber 162. Optionally, the diverter may be a solid plate, or may be configured as a screen-like member having a plurality of apertures. The diverter members may be integrally formed with the dirt collection chamber 164, or may be provided as a separate member. Optionally, the diverter may be adjustable or re-configurable to allow varying amounts of the dirt to be deflected. The diverter may be formed from any suitable material that may adequately withstand exposure to the high speed air flow and dirt particles exiting the cyclone chamber 162, including, for example plastic and metal.

[00543] The diverter may be positioned in any suitable or otherwise desired location within the dirt collection chamber 164. Preferably, the diverter may be positioned generally opposite, or in proximity to the dirt outlet of the cyclone chamber 162. The diverter may be centered and/or symmetrical relative to the dirt outlet of the cyclone chamber. Alternatively, the diverter may be offset or spaced apart from the geometric centre of the dirt outlet of the cyclone chamber.

[00544] In the illustrated example, the dirt collection chamber 164 may include one or more internal diverter walls. The diverter walls may help separate the dirt collection chamber 164 into separate dirt collection portions. Preferably, the diverter wall may be positioned opposite the dirt outlet 180 of the cyclone chamber 162. Providing the diverter wall opposite the dirt outlet 180 may help divide the incoming dirt particles and other debris between the first and second dirt collection portions.

[00545] In the illustrated example, the dirt collection chamber 164 includes a diverter wall 212 that is positioned opposite the dirt outlet 180 and may extend along substantially the entire height 230 (Figure 15) of the cyclone chamber 162. As exemplified in Figure 15, diverter wall 212 may be formed by the portion of the recess that seats on the second portion 210b of motor housing 210 that overlies the motor section.

[00546] In this example, the diverter wall 212 is a curved sub-portion of the dirt collection chamber sidewall 174, which comprises the inner surface of the recess 206 described above. Alternatively, the diverter wall 212 may be a separate member or rib extending from the dirt collection chamber sidewall 174.

[00547] The diverter wall 212 may be shorter than the cyclone chamber 162, or may extend along substantially the entire length of the cyclone chamber 162. Preferably, the diverter wall 212 overlies at least a portion of the dirt outlet 180 to intercept dirt particles exiting the outlet 180. In other embodiments, diverter wall 212 may extend all the way to end wall 176 or may terminate prior thereto and preferably at a location spaced from dirt outlet 180 towards end wall 176. Terminating the

diverter wall 212 before it reaches the end wall 176 may help facilitate the movement of air and/or dirt between the first and second collection portions 216 and 218. This may help balance the level of dirt in each collection portion 216 and 218.

[00548] In the example illustrated, the diverter wall 212 partially divides the dirt collection chamber 164 and defines a first dirt collection portion 216 on a first side of the diverter wall 212, and a second dirt collection portion 218 on an opposing second side of the diverter wall 212. In the illustrated example the diverter wall 212 does not extend all the way to cyclone sidewall 166 and the first and second dirt collection portions 216, 218 are not fluidly isolated from each other. In this configuration, a relatively narrow throttling passage 220 is defined between the diverter wall 212 and the cyclone sidewall 166. Air, and possibly dirt or other debris, may pass through the throttling passage 220 when moving from the between collection portions 216 and 218.

[00549] When the surface cleaning apparatus is in use, dirty air from the cyclone chamber 162 may exit the dirt outlet 180 and flow into the dirt collection chamber 164, as illustrated using arrows 222. The dirty air flowing through the dirt collection chamber 164 may carry entrained fine dirt particles, and other debris. The air may continue to circulate within the dirt collection chamber 164 and the passage 220 is configured to allow dirty air, containing dirt particles and other debris to flow between the first and second dirt collection portions 216, 218.

Asymmetrical Dirt Inlet

[00550] In accordance with another aspect, which may be used by itself or with any other embodiment disclosed herein, the dirt outlet 180 is asymmetrically positioned relative to the first and second dirt collection portions 216, 218. That is, the dirt outlet 180 is configured so that the geometric centre of the dirt outlet 180, represented by radially oriented axis 224, is located within the first dirt collection portion 216.

[00551] Preferably, this aspect is used in conjunction with the diverter wall. In such a configuration, the centre of the dirt outlet 180 is not aligned with the diverter wall 212. Configuring the dirt outlet 180 in this manner may help direct dirty air exiting the dirt outlet 180 toward the first dirt collection portion 216. This may help direct a larger portion of the dirt toward the first collection portion 216, which has a larger storage capacity than the second collection portion 218. Alternatively, the dirt outlet 180 may be configured so that it is symmetrically positioned relative to the dirt collection portions 216, 218.

[00552] In operation, preferably, the air exits the dirt air outlet 180 and enters the first collection portion 216. The air travels to or towards the distal part 216a of the dirt collection chamber 164 and then turns to return through first part 216 towards passage 220. Some of the entrained dirt will be disentrained as the air changes direction in part 216.

[00553] To help facilitate disentrainment of more dirt particles, it may be beneficial to alter the conditions of the air circulating within the dirt collection chamber 164. Changes to the conditions to circulating air may include altering the velocity of the air and/or placing a variety of features or obstacles in the path of the air to re-direct the air flow in a pre-determined manner.

[00554] In the illustrated example, passage 220 is preferably narrower than the portion of the dirt chamber upstream thereof. Passing the air flow through a narrow throat section may cause an increase in the velocity of the air travelling from the first collection portion 216 to the second collection portion 218, through passage 220. In particular, as the dirty air moves from the relatively large volume of dirt collection portion 216 to the relatively narrow passage 220, the velocity of the air, and the fine particles entrained therein, may increase. The air exiting the passage 220 may then travel to, or at least toward, the distal part 218a of the second collection portion 218 and may then be routed to return to the cyclone chamber 162 via the dirt outlet 180.

[00555] As the air travels along this path, some of the entrained dirt may be disentrained as the air changes direction within second portion 218. Further, when the dirty air flow exits the passage 220 and enters the relatively larger volume of dirt collection portion 218, the velocity of the dirty air may decrease, which may also help disentrain the fine dirt particles traveling with the dirty air flow. Accordingly, passage 220 may be used to increase the velocity of the air stream and may help facilitate finer dirt being deposited in second portion 218. Passing over by the divider wall 212 may also create eddy currents or other types of air flow disruptions, which may also help facilitate fine particle disentrainment. From dirt collection portion 218, the air may re-enter the cyclone chamber 162 through the dirt outlet 180 and exit via the vortex finder 182.

[00556] Optionally, instead of having a curved, convex shape, the diverter wall 212 may have another cross-sectional shape including, for example an angled or triangular cross-section and a rectangular cross-section. Any shape which reduces the width of passage 220, relative to the first and second collection portions 216 and 218, may be used (i.e., a portion of the wall facing the dirt outlet extends inwardly towards the dirt outlet 180).

Secondary Divider

[00557] In accordance with another aspect, which may be used by itself or with any other embodiment disclosed herein, one or more of the collection portions 216 and 218 may be further divided or sub-divided by one or more divider members and/or surface features. These dividing features may be configured to help direct air flow in a desired direction and/or may help separate dirt from the air flow circulating within the dirt collection chamber 164. The dividers may be used to form pockets, chambers or other sorts of features to help separate dirt from the air flow and retain dirt within the collection portions 216 and 218. The dividers may be any suitable structural member and may be formed from any suitable material. The dividers may integral with the dirt

collection chamber 164, cyclone chamber 162, or both, or may be formed from separate members. This aspect is preferably used in conjunction with at least one of the diverter and the asymmetrical inlet, and more preferably with both.

[00558] In the illustrated example, the dirt collection chamber 164 may comprise a secondary divider in the second dirt collection portion 218. The secondary divider comprises a secondary divider ridge 226 formed in the dirt collection chamber sidewall and extending inwardly from the end wall opposite the dirt outlet 180. In the example illustrated, the secondary divider ridge 226 extends from the second end wall 178 and preferably terminates prior to the first end wall 176, which also comprises the clean air outlet of the cyclone chamber 162. The secondary divider ridge 226 extends from the cyclone chamber sidewall 174 to the dirt collection chamber sidewall 166. Alternatively, the divider ridge 226 need not extend fully between the cyclone chamber sidewall 174 and the dirt collection chamber sidewall 166.

[00559] Providing a secondary divider ridge 226 in the dirt collection portion 218 may help direct air circulating within the second collection portion 218 toward the dirt outlet 180, as illustrated by arrows 222. The secondary divider ridge 226 may also help create additional eddy currents and/ or other flow disruptions that may help facilitate the disentrainment of fine dirt particles from the air flow 222. Directing the air flow toward the dirt outlet 180 may help create a relatively calm region, having relatively low air flow velocity, downstream from the secondary divider ridge 226 towards second end wall 176, in which fine dirt particles may accumulate. Providing a relatively calm region may help reduce re-entrainment of the fine particles that settle in the calm region into the air flow re-entering the dirt outlet 180. That is, the divider wall 226 may create a wind shield or relief within the second collection portion 218 thereby inhibiting reentrainment of fine dirt particles that have settled in second portion 218. This may help facilitate retention of the fine dirt particles within the dirt collection chamber 218, and may help reduce the amount of fine dirt particles being carried downstream from the cyclone chamber 162. Reducing the amount of dirt flowing

downstream from the cyclone chamber 162 may help reduce the amount of dirt present to foul the suction motor 111 and/or the pre-motor filters.

[00560] As exemplified in Figure 15, the height 228 of the secondary diverting ridge (the distance it extends inwardly from lower surface 188) may be between about 5% and about 95% of the height 230 of the cyclone chamber 162. Preferably, the height 228 of the secondary diverting ridge 226 is less than about 66% of the height of the cyclone 230, and more preferably is approximately 30% of the cyclone height 230. Preferably, the secondary dividing ridge 226 does not extend into the dirt outlet 180.

[00561] Optionally, the diverting ridge 226 may be integrally formed with a portion of the cyclone bin assembly 110. In the example illustrated, the secondary diverting ridge 226 comprises a portion of a sidewall 232 of the tangential air inlet 172. This may help reduce the overall size of the cyclone bin assembly 110. Alternatively, the secondary diverting ridge 226 may be a separate member extending from the second end wall 178, and need not comprise or be coincident with any portion of the tangential air inlet 172.

[00562] The diverting ridge 226 may be of any suitable shape. While illustrated as having a curved, convex cross-sectional shape, the secondary diverting ridge 226 may have any other suitable cross-sectional shape, including, for example a triangular cross-section and a rectangular cross-section.

[00563] While the example illustrated is a horizontal or transverse cyclone configuration, the diverter wall 212, secondary dividing ridge 226 and dirt outlet 180 alignment features described above may also be used, individually or in combination, in a vertically oriented cyclone bin assembly 110.

Suction Hose Connector

[00564] In accordance with another aspect, which may be used by itself or with any other embodiment disclosed herein, a suction hose connector may be provided on

the surface cleaning apparatus 100 to allow a suction hose, cleaning wand or other suitable cleaning tool to be attached to the surface cleaning apparatus 100. The suction hose connector may be any suitable type of connector and may be any shape and/or size that is compatible with the corresponding suction hose or other tools. Preferably, the suction hose connector may be a detachable type connector so that the suction hose may be detached from the surface cleaning apparatus 100 when desired, for example to facilitate cleaning and/or storage.

[00565] The suction hose connector may be provided at any suitable location on the surface cleaning apparatus, including, toward the front of the surface cleaning apparatus, on an upper portion, on a lower portion and toward the back of the surface cleaning apparatus.

[00566] The suction hose connector may have at least one end or opening that is in fluid communication with the cyclone bin assembly 110. This allows air passing through the suction hose connector to flow into the cyclone bin assembly 110 for treatment. Optionally, the suction hose connector may be coupled directly to the air inlet on the cyclone bin assembly 110. Alternatively, one or more intervening conduits or hoses may provide an air flow path between the suction hose connector and the cyclone bin assembly 110.

[00567] Optionally, the suction hose connector may be coupled to the cyclone bin assembly so that it is removable from the body 112 with the cyclone bin assembly 110. In this configuration, the suction hose (or other cleaning tool) may be separated from the surface cleaning apparatus when the cyclone bin assembly 110 is removed, for example to empty the dirt collection chamber 164. Alternatively, the suction hose connector may remain fixed to the body 112 when the cyclone bin assembly 110 is removed. This may allow the suction hose (or other cleaning tool) to remain fixed to the body 112 when the cyclone bin assembly 110 is removed. An advantage of this configuration may be that the user does not have to handle or carry the suction hose (or other cleaning tool) when transporting the cyclone bin assembly 110 away from the

body 112, for example when emptying the cyclone bin assembly 110. This may reduce the weight that a user has to carry when separating the cyclone bin assembly 110 from the body 112.

[00568] At least a portion of the suction hose connector may be surrounded by, or nested within, other components of the surface cleaning apparatus. For example, portions of the suction hose connector may be at least partially surrounded by portions of the cyclone bin assembly 110. Nesting at least a portion of the suction hose connector within the cyclone bin assembly 110 may help reduce the overall size of the surface cleaning apparatus. Optionally, the cyclone bin assembly 110 may be configured so that it only fits over the suction hose connector in one predetermined orientation. In this configuration, the suction hose connector may also function as an alignment or guidance member to help align the cyclone bin assembly 110 relative to the body 112 when the cyclone bin assembly 110 is placed on the body 112. Portions of the suction hose connector may function as guide or camming surfaces, and may engage corresponding surfaces on the cyclone bin assembly 110 when the cyclone bin assembly 110 is being mounted.

[00569] As exemplified in Figures 10 and 11, the suction hose connector 106 is connected to the body 112, and remains connected to the body 112 when the cyclone bin assembly 110 is removed. Optionally, the suction hose connector 106 may be fixedly connected to the body 112 or integrally formed therewith, or may be separately detachable from the body 112.

[00570] The suction hose connector 106 comprises an air inlet 234 that is connectable to the suction hose, and an opposing air outlet 236. A throat portion 238 of the suction hose connector 106 extends between the air inlet 234 and air outlet 236. Coupling the suction hose connector 106 to the body 112 (e.g., securing it to body 112 or forming it as part of body 112) may help facilitate the removal of the cyclone bin assembly 110 (for example to empty the dirt collection chamber 164) while leaving a suction hose connected to the body 112, via the suction hose connector 106.

[00571] The air outlet 236 is configured to connect to the tangential air inlet 172 of the cyclone chamber 162, and may be connected using any suitable connector. Preferably, as illustrated, a sealing face 240 on the tangential air inlet 172 is shaped to match the shape of the air outlet 236 of the suction hose connector 106. Optionally, a gasket, or other type of sealing member, may be provided at the interface between the sealing face 240 and the air outlet 236.

[00572] The air outlet 236 of the suction hose connector 106 and the sealing face 240 of the tangential air inlet 172 are preferably configured so that the sealing face 240 may slide relative to the air outlet 236 (vertically in the illustrated example) as the cyclone bin assembly 110 is being placed on, or lifted off of the platform 114. Lowering the cyclone bin assembly 110 onto the platform 114 may slide the sealing face 240 into a sealing position relative to the air outlet 236. Optionally, the air outlet 236 and the sealing face 240 are configured so that they may be engaged with each other, and disengaged from each other without the use of separate fastener members. This may facilitate one-handed placement and removal of the cyclone bin assembly 110, as described previously. Alternatively, the connection between the suction hose connector 106 and the cyclone bin assembly 110 may include any suitable fasteners or connection members.

[00573] Preferably, as exemplified, the sealing face 240 (and preferably part or all of the hose connector) is recessed within the cyclone bin assembly 110. In the illustrated example, the cyclone bin assembly 110 includes a notch 242 configured to receive the throat portion of the suction hose connector 106 when the cyclone bin assembly 110 is placed on the platform. With the cyclone bin assembly 110 on the platform, at least a portion of the throat 238 and the air outlet 236 are nested within cyclone bin assembly 110. Nesting at least a portion of the suction hose connector 106 within the cyclone bin assembly 110 may also help reduce the overall length of the surface cleaning apparatus 100.

[00574] Optionally, the suction hose connector 106 may serve as an alignment member to help guide the cyclone bin assembly 110 into a desired orientation when bin assembly 110 is remounted on platform 114.

[00575] Alternatively, in other embodiments the suction hose connector 106 may be fixedly connected to the cyclone bin assembly 110, and may be removable from the body 112 with the cyclone bin assembly 110.

[00576] As exemplified in Figure 1, an electrical power connector 244 is provided adjacent the suction hose connector 106. The electrical power connector 244 may be configured to receive a mating power coupling and may provide power to a cleaning tool, including, for example a surface cleaning head with a powered rotating brush. The electrical power connector may be of any suitable configuration that is compatible with a suction hose, surface cleaning head or other cleaning tool that may be connected to, and powered by, the surface cleaning apparatus 100.

[00577] Alternatively, the electrical power connector 244 may be provided in another location on the surface cleaning apparatus 100 spaced apart from the suction hose connector 106, or the surface cleaning apparatus 100 may not include an electrical power connector.

Filter Chamber, Seal Plate and Foam Structure

[00578] Air exiting the cyclone bin assembly 110 flows downstream to the suction motor 111 and may be ejected via the clean air outlet. A plurality of filters and other suitable members may be positioned in respective filter chambers provided within the air flow path between the cyclone bin assembly 110 and the suction motor 111, and optionally downstream from the suction motor 111. The size and shape of the filters may be selected based on the operating characteristics of a given surface cleaning apparatus.

[00579] For example, the filters may be of any suitable configuration and may be formed from any suitable material that is capable of filtering dirt particles from the air flowing through the filter. Optionally, the filters may be configured to have a relatively large surface area in the direction of air flow, and a relatively thin thickness in the air flow direction. This may help facilitate filtration of the air without creating an undesirably high impedance or back pressure in the air flow.

[00580] The filters may become clogged or fouled during use. Optionally, the filters may be removable from the surface cleaning apparatus 100 to help facilitate maintenance. Filters that have been removed from the surface cleaning apparatus may be replaced with new filters, or cleaned and then re-inserted within the surface cleaning apparatus 100. Preferably, the filters are positioned in openable chambers that may be accessed by a user.

[00581] The filters may be configured to be placed around or within other components or features of the surface cleaning apparatus 100. Nesting the filters in and/or around other components may help reduce the overall size of the surface cleaning apparatus 100.

[00582] In accordance with another aspect, which may be used by itself or with any other embodiment disclosed herein, a seal plate is provided to close an open side of a filter chamber. Preferably, the seal plate is openable and, more preferably, it is removable so as to provide access to the filter chamber.

[00583] As exemplified in Figures 4, 5, 6 and 8, air exiting the cyclone chamber 162 flows to a suction motor inlet 246 via a filter chamber 248. The filter chamber 248 is provided downstream from the cyclone air outlet. In the illustrated example, the filter chamber 248 comprises a recessed chamber in the body sidewall 116a that is enclosed by a seal plate 250, which is preferably openable. A sealing gasket 254 or other means of creating an air tight compartment may be preferably provided at the interface between an annular rim 252 of the sidewall 116a and the seal plate 250 to help provide an air-tight filter chamber 248. Providing an air tight seal on the filter

chamber 248 may help prevent leakage and/or may help prevent unwanted ambient air from being drawn into the air flow path.

[00584] Preferably, as illustrated, the filter chamber 248 extends over substantially the entire sidewall 116a and overlies substantially all of the transverse cross sectional area of cyclone chamber 162, dirt collection chamber 164 and suction motor 111. Alternatively, the filter chamber 248 may cover only a portion of the sidewall 116a and/or a portion of the transverse face of the cyclone bin assembly 110 and the suction motor 111.

[00585] A pre-motor filter 256 is provided in the filter chamber 248 to filter the air before it enters the suction motor inlet. Preferably, as illustrated, the pre-motor filter 256 is sized to cover substantially the entire transverse area of the filter chamber 248, and to overlie substantially all of the transverse cross sectional area of the cyclone chamber 162, dirt collection chamber 164 and suction motor 111. Alternatively, the pre-motor filter 256 may have any suitable cross sectional area and may cover only a portion of the transverse faces of the cyclone bin assembly 110 and/or the suction motor 111.

[00586] Optionally, the filters may be multi-layer or multi-part filters comprises of two or more separate members. These separate filter members may have similar or different properties. For example, a two-piece filter may include one relatively fine filtration layer (e.g., felt) that is downstream from a coarser filtration layer (e.g., foam). Preferably, as illustrated, the pre-motor filter 256 comprises first and second pre-motor filters 256a, 256b.

[00587] When a filter is positioned within its filter chamber, it may define a sub-chamber or plenum on the upstream side of the filter, downstream side of the filter, or both, or neither. Providing an airflow plenum adjacent the sides of the filter may help facilitate distribution of air flow across substantially the entire cross-sectional area of the filter. Such plenums may be of any suitable size and configuration, and need not be of equal size or of equal height or volume across the surface area of the filter. To

help provide the air flow plenums, the filter may be supported away from the solid walls of its respective filter chamber by any suitable filter spacing and supporting apparatus. For example, a plurality of separate ribs may be provided to support a filter in an intermediate position within its respective filter chamber (that is spaced apart from both of the filter chamber endwalls), and to resist movement of the filter when subjected to air flow. Optionally, the supporting apparatus may be configured to allow airflow there through to maintain airflow circulation within the air plenum that contains the supporting apparatus.

[00588] In the illustrated example, the filter chamber 248 comprises an air inlet chamber 258 on the upstream side 272 of the pre-motor filter 256, and an air outlet chamber 260 on the opposing downstream side of the pre-motor filter 256. Air may travel from the air inlet chamber 258 to the air outlet chamber 260 by flowing through the pre-motor filter 256.

[00589] Preferably, as exemplified,, the upstream side 272 of the pre-motor filter is the outward facing face of the pre-motor filter 256. Accordingly, the air inlet chamber 258 may be fluidly connected to the vortex finder 182 by an inlet conduit 262 that extends through a first aperture 264 in the pre-motor filter 256. The air outlet chamber 260 is in fluid communication with the inlet 246 of the suction motor 111. Alternatively, the surface cleaning apparatus 100 may be configured so that the upstream side 272 of the pre-motor filter is the inward facing face of the pre-motor filter 256.

[00590] To help position the pre-motor filter 256 within the interior of the chamber 248, the pre-motor filter 256 may be supported by a plurality of support ribs 266 extending from the sidewall 116a into the air outlet chamber 260. Cutouts, or any other suitable openings or features, may be provided in the ribs 266 to allow air to circulate within the air outlet chamber 266 and flow toward the suction motor inlet 246.

[00591] In accordance with another aspect, which may be used by itself or with any other embodiment disclosed herein, the filters, and their respective filter chambers, may surround or partially-surround other components. For example, the

pre-motor filter may surround an axle mount or other feature extending from the sides of the surface cleaning apparatus 100. In the illustrated example, the axle mount 128a for supporting the side wheel 120a is provided on the main body 112 and accordingly extends through the air filter chamber 248, a second aperture 268 in the pre-motor filter 256 and through an axle mount aperture 270 in the seal plate 250 (Figure 5). In this configuration the pre-motor filter 256 surrounds the axle mount 128a. Alternatively, the pre-motor filter 256 may only partially surround the axle mount 128a.

[00592] To help provide a sealed filter chamber 248, the axle mount aperture 270 in the seal plate 250 is configured to provide an air-tight seal against the axle mount 128a. Optionally, a sealing gasket or the like may be provided at the interface between the seal plate 250 and the axle mount 128a. In this configuration the pre-motor filter 256 surrounds the axle mount 128a.

[00593] In the illustrated example, the seal plate 250 is removable, when the side wheel 120a is moved to an open position or detached, to allow a user to access the pre-motor filter 256. Alternatively, instead of being removable, the seal plate 250 may be movably attached to the body 112, for example pivotally connected to the sidewall 116a, such that the seal plate 250 may be opened without being completely detached from the body 112.

[00594] Preferably, the seal plate 250 is transparent, or at least partially transparent. Providing a transparent seal plate 250 may help facilitate visual inspection of the upstream side 272 of the pre-motor filter 256 while the seal plate 250 is in place. When the seal plate 250 is removed, the pre-motor filter 256 may be removed, for example for cleaning or replacement.

Openable Suction Motor Housing

[00595] In accordance with another aspect, which may be used by itself or with any other embodiment disclosed herein, the suction motor may be provided within an

accessible chamber or housing within the body 112. Placing the suction motor in a housing that may be accessed by a user may help facilitate access to the suction motor, for example for maintenance or replacement. The housing may be any suitable housing member, and may include any suitable type of openable or removable access panel or door. As exemplified in Figure 6, optionally a portion of the suction motor housing 210 may be removably connected to the body 112. Preferably, the removable portion 274 of the suction motor housing 210 comprises the suction motor air inlet 246. More preferably, the removable portion 274 of the suction motor housing is large enough to allow access to and/or removal of the suction motor 111 from the body 112. In the illustrated example, the removable portion 274 of the suction motor housing 210, and optionally the suction motor 111, are accessible through the air filter chamber 248 and may be accessed when the seal plate 250 and pre-motor filter 256 are removed. Removable portion 274 may comprise an air intake grill and may be secured to the main body 112 by any means, such as screws or the like.

Bleed Valve

[00596] In accordance with another aspect, which may be used by itself or with any other embodiment disclosed herein, a bleed valve 276 is optionally provided to supply clean air to the suction motor inlet. The bleed valve may be of any suitable configuration, and may be provided at any suitable position on the surface cleaning apparatus, upstream from the suction motor 111. Optionally, the bleed valve may be in communication with the air flow path upstream from the suction motor 111 and downstream from the pre-motor filter 256. In this position, air supplied to the suction motor 111 from the bleed valve need not pass through the pre-motor filter 256. This may help provide an uninterrupted air flow path from the bleed valve to the suction motor 111. Alternatively, the bleed valve may be connected to the air flow path upstream from the pre-motor filter 256.

[00597] In the illustrated example a bleed valve air outlet 278 is in fluid communication with the air outlet chamber 260 and may introduce clean air into the air outlet chamber 260 downstream from the pre-motor filter 256. Air introduced by the bleed valve 276 may flow through the optional cutouts in the supporting ribs 266, as described above. The bleed valve 276 may be a pressure sensitive valve that is opened when there is a blockage in the air flow path upstream from the suction motor 111. In the illustrated example, the bleed valve 276 is parallel with the suction motor 111. A bleed valve inlet 280 is provided toward the front of the body 112, but may be provided at any other suitable location on the body 112. In this configuration, the bleed valve 276 may be able to provide air to the suction motor 111 in the event that the pre-motor filter 256 is blocked or clogged.

Filter Window in the Side Wheel

[00598] In accordance with another aspect, which may be used by itself or with any other embodiment disclosed herein, the surface cleaning apparatus is configured to permit a user to inspect the upstream side of the pre-motor filter (or any other filter) without having to remove the filter from the surface cleaning apparatus 100. For example, if some or all of the upstream side of the pre-motor filter is covered by a seal plate, side wheel or other vacuum component, it may be desirable to configure such components to allow visual inspection of the underlying filter. Components intended to provide air tight containment (such as the seal plate) may be provided with transparent portions (or be entirely transparent). Components that do not form part of the air flow path, such as the wheels, may be provided with one or more transparent portions, apertures, gaps, openings or other suitable features to allow a user to see through some, or all, of the component.

[00599] Preferably, as exemplified, the side wheel 120a covering the seal plate 250 includes at least one transparent region 282, and the seal plate 250 is formed almost entirely from transparent plastic. Providing a transparent region 282 in the side

wheel 120a may allow a user to visually inspect the upstream side 272 pre-motor filter 256 while the side wheel 120a is in place, i.e., without having to remove or reposition the wheel 120a. In the illustrated example, the side wheel 120a includes a transparent plastic window 282 positioned within a corresponding aperture in the wheel 120a.

[00600] The transparent window 282 may be of any suitable size and shape, and may be any desired size. For example, the window 282 may be sized so that a user may view a pre-determined desired amount of the pre-motor filter 256 through the window. In the illustrated example, the window 282 is oriented in a generally radial orientation, and extends from the hub 132a to the peripheral edge of the side wheel 120a. Providing a radially oriented window 282 may allow a user to inspect a relatively large portion of the surface of the pre-motor filter 256 as the side wheel 120a is rotated into different positions relative to the body 112, thereby sweeping the window 282 over the surface of the transparent seal plate 250 and underlying pre-motor filter 256. Alternatively, instead of being configured in a radial orientation, the window 282 may be configured in an annular configuration (optionally concentrically aligned with the side wheel 120a) or other suitable configuration.

[00601] Optionally, the seal plate 250 need not be entirely transparent, and may only contain transparent portions positioned to underlie the window(s) 282 in the wheel 120a. Alternatively, the seal plate 250 may be substantially entirely transparent to allow a user to simultaneously inspect substantially all of the upstream side of the pre-motor filter 256 when the wheel 120a is removed.

[00602] Optionally, the side wheel 120a may include more than one window 282.

[00603] It will be appreciated that an analogous filter chamber 248 may be provided alternately, or in addition, for a post motor filter, and may include some or all of the features described herein, either alone or in combination with each other.

Post Motor Filter Housing

[00604] In accordance with another aspect, which may be used by itself or with any other embodiment disclosed herein, a filter housing is provided in a central portion of the main body. Spaced apart wheels are provided on the main body, either side of the central portion. The filter housing may house one or more filter members may be provided downstream from the suction motor 111. Such post-motor filters may be configured to clean the air exiting the suction motor before it is ejected into the surrounding environment. The post-motor filter may be any suitable filter member and may be formed from any suitable material. Preferably, the post-motor filter is located in a respective filter chamber that may be accessed by a user to facilitate inspection and replacement of the post-motor filter. The post-motor filter chamber may be provided in any suitable location on the body 112, and/or optionally may be provided within a dedicated post-motor filter housing.

[00605] As exemplified in Figures 6 and 10, from the suction motor inlet 246, the air is drawn through the suction motor 111 and ejected via a suction motor outlet 284 and into a post-motor filter chamber 286, within the post-motor filter housing 160. The post-motor filter chamber 286 contains an air inlet chamber 288 and an optional post-motor filter 290, including, for example a HEPA filter. In the illustrated example, the post-motor filter chamber 286 also comprises the clean air outlet 104, on the downstream side of the post-motor filter 290. A grill 292 may be used to cover the clean air outlet 104. The grill 292 may be removable to allow removal of the post-motor filter 290.

[00606] The post-motor filter chamber 286 may extend into the body 112 of the surface cleaning apparatus 100. In the illustrated example, a portion of post-motor filter chamber 286 is positioned transversely between the body sidewalls 116a, 116b and the side wheels 120a, 120b. Preferably, at least a portion of the post-motor filter 290 is positioned between the sidewalls 116a, 116b and within the diameter 126 of the side wheels 120a, 120b. Configuring the post-motor filter chamber 286 to extend between the sidewalls 116a, 116b and inside the diameter 126 of side wheels 120a,

120b may help reduce the overall length of the surface cleaning apparatus 100, as opposed to providing the entirety of the post-motor filter chamber 286 outside the diameter 126 of the side wheels 120a, 120b.

[00607] In the example illustrated, an exposed upper wall 294 of the post-motor filter housing 160 has a smaller surface area than the opposing lower wall 296. Preferably, the lower wall 296 or the end wall 300 may be openable to allow access to the post-motor filter 290, for example for inspection and replacement. In the illustrated example, the lower wall 296 is detachable from the post-motor filter housing sidewall 298 to allow access to the post-motor filter 290. A sealing gasket may be provided at the interface between the lower wall and the sidewall to help seal the post-motor filter chamber 248. Providing a removable lower wall 296 or end wall 300 may help facilitate removal of a post-motor filter 290 that has a larger area than the exposed upper wall 294, particularly if the post-motor filter 290 is rigid (for example a HEPA filter cartridge). Optionally, instead of being removable, the lower wall 296 may include an openable door to allow access to the post-motor filter 290. Alternatively, the upper wall 194, sidewall 298 and/or end wall 300 of the post-motor filter housing may be openable to allow access to the post-motor filter 290.

[00608] In the example illustrated, the post-motor filter housing 160 is positioned at the rear of the surface cleaning apparatus 100. Alternatively, the post-motor filter housing 160 may be positioned toward the front of the surface cleaning apparatus 100, or at another suitable location on the body 112.

Cord Wind Spool

[00609] The surface cleaning apparatus 100 is preferably powered by an electric suction motor and may include other electric components. Optionally, the surface cleaning apparatus may be configured to be plugged into an electrical socket, powered by an onboard battery, or both. If the surface cleaning apparatus 100 is configured to be connected to an electrical socket, it preferably includes an electrical cord. The

length of the electrical cord may be selected to allow a user to have a desired operating range while the surface cleaning apparatus is plugged in (e.g. without having to transfer to another electrical socket).

[00610] Optionally, the electrical cord may be stored onboard the surface cleaning apparatus 100. Preferably, the electrical cord may be stored at least partially within the body 112 of the surface cleaning apparatus. If the cord is configured to be stored within an internal cavity, the length of the cord may also be based on the internal storage space within the body 112.

[00611] In accordance with another aspect, which may be used by itself or with any other embodiment disclosed herein, the electrical cord is preferably self-retracting and may be retracted into the onboard storage cavity without requiring significant user effort. Optionally, the cord may be wound around an onboard spool or other suitable cord holding apparatus. The cord holding apparatus may be driven by a suitable driving apparatus (e.g. an onboard motor) that may be selectably triggered by the user. The trigger for the cord winding apparatus may be provided close to the ground so that it may be triggered by a user's foot. Using a foot switch may help reduce the need for the user to bend over while operating the surface cleaning apparatus or when retracting the electrical cord.

[00612] Optionally, the cord winding apparatus may include an onboard power supply that is separate from the power received from the electrical socket. This may be advantageous because it may allow the cord winding apparatus to continue operating after the electrical cord has been disconnected from the electrical socket, thereby severing the primary power source of the surface cleaning apparatus.

[00613] As exemplified in Figures 7-10, , the surface cleaning apparatus 100 may comprise an internal electrical cord winding apparatus. In the illustrated example, the electrical cord winding apparatus is preferably a powered cord winder apparatus that includes a cord wrap spool 302 and a cord wrap motor 304. An electrical cord that is wrapped around the spool 302 may be drawn through a cord aperture 306 in the body

112 (Figure 10). The cord aperture 306 may be of any suitable size and configuration to accommodate a given electrical cord, and may be positioned at any suitable location on the body 112. Optionally, the cord aperture 306 may include rollers or other guide members to help guide the cord through the aperture 306.

[00614] In the example illustrated, the cord wrap spool 302 is rotatably received in a cord wrap chamber 308 (Figure 7a). The cord wrap chamber 308 may be any suitable chamber or recess on the surface cleaning apparatus 100 that is sized to accommodate the electrical cord. The cord wrap chamber need not be sealed with an air tight seal. Optionally, the cord wrap chamber may be openable to allow a user to access its interior.

[00615] In the example illustrated the cord wrap chamber 308 comprises a recess in the sidewall 116b. Optionally, a cover plate 310 may be connected to the sidewall 116b to enclose the cord wrap chamber 308, and contain the cord wrap spool 302. The cover plate 310 may be openable, and is preferably removable to allow a user to access the cord wrap chamber 308.

[00616] In the illustrated example, the cord wrap spool 302 is rotatable about axle mount 128b, and has a spool axis of rotation 312 that is coincident with the primary axis of rotation 130. Alternatively, the axis of rotation 312 may be spaced apart from the axis 130, and may not be parallel to the axis 130.

[00617] The cord wrap spool 302 comprises a mounting collar 314 that is non-rotatably connected to the axle mount 128b. As exemplified in Figure 9, an inward bearing surface 316 on the spool 302 is slidably supported on a complementary collar bearing surface 318 to allow rotation of the spool 302 relative to the body 112. Alternatively, a roller bearing, ball bearing, bushing or other type of bearing apparatus may be provided between the spool 302 and the axle mount 128b.

[00618] The cord warp spool 302 may be driven by the cord wrap motor 304. Operation of the cord wrap motor 304 may be controlled by an onboard controller 320 that is triggered by a cord wrap switch 322 (see also Figure 6). Power for the cord

wrap motor 304 may be provided by an onboard operating component, including, for example, an onboard power source 324. Providing an onboard power source 324 enables the cord wrap spool 302 to be driven to wind the electrical cord even after the electrical cord has been unplugged from the wall socket. The onboard power source 324 may be any type of portable power source, including, for example, one or more batteries contained in a battery compartment 326. Optionally, the batteries may be rechargeable and may be recharged when the electrical cord is plugged in.

[00619] The controller 320, power source 324 and other components related to the cord winding apparatus may be positioned in any suitable compartment or chamber on the body 112. As exemplified in Figures 7 and 8, in the illustrated example, one or more operating components such as the controller 320 and onboard power source 324 are located in an accessory chamber 328 defined between the outer surface of the cover plate 310 and the side wheel 120b. In the example illustrated, the controller 320 and onboard power source 324 are connected to the outer surface of the cover plate 310.

[00620] As exemplified in Figure 9, the cord wrap spool 302 may comprise an inner flange 330 and an outer flange 332 to help retain the electrical cord wrapped on the spool 302. The inner surfaces of the flanges 330, 332 are separated by a spool width 334. Preferably, the spool width 334 is selected so that it is not an even multiple of the diameter of the electrical cord, for example a standard 4.5 millimeter diameter electrical cord that is to be wrapped on the spool 302. Selecting a spool width 334 that is not an even multiple of the electrical cord diameter, for example setting the spool width to approximately 12 millimeters, may help reduce binding or jamming of the electrical cord as it is wound, or unwound from the spool 302. Preferably, the spool width is between 10% and 90% of the length of the number of widths of the electrical cord that may fit across the spool, and preferably between 20 and 80%.

[00621] In the example illustrated, the peripheral edge of the inner flange 330 comprises a plurality of gear teeth 336. The teeth 336 on the perimeter of the inner

flange 330 are configured to mesh with the teeth on a drive sprocket 338 that is coupled to the cord wrap motor 304. In this configuration, rotation of the sprocket 338 of the cord wrap motor 304 may cause rotation of the spool 302. Alternatively, instead of integrating gear teeth on the inner flange 330, the spool 302 may be connected to the cord wrap motor 304 using another drive train apparatus, including, for example, a belt drive and a gear train.

[00622] Optionally, the cord wrap motor 304 may include a clutch or other disengagement member to decouple the rotation of the spool 302 and the motor when desired, for example when the electrical cord is being unwound from the spool 302. Alternatively, the cord wrap motor 304 may remain drivingly connected to the spool 302 and may be driven in reverse when a user pulls the cord from the spool 302. In this configuration, the controller 320 may include a protection module to help prevent electrical current generated by the rotating motor from damaging or overloading the controller 320.

[00623] The cord wrap switch 322 may be any type of electrical switch, or other type of actuator, accessible to the user of the surface cleaning apparatus 100. In the example illustrated, the cord wrap switch comprises a cord wrap pedal 322 that is electrically connected to the controller 320. The cord wrap pedal 322 is preferably pivotally mounted to the rear end of the post-motor filter housing 160, and may pivot between an "off" position and an "on" position. When the cord wrap pedal 322 is pivoted to the on position, the cord wrap motor 304 is activated and the electrical cord may be wound around the spool 302.

[00624] Preferably, the cord wrap pedal 322 is biased toward the off position. Biasing the pedal 322 toward the off position may help prevent the cord wrap switch being inadvertently activated when the surface cleaning apparatus 100 is in use.

[00625] Alternatively, instead of a foot-actuated pedal 322, the cord wrap switch may be a button, lever or other type of actuator. Optionally, the cord wrap switch may

be configured to be engaged by the hands of a user, instead or, or in addition to, being configured to engage a user's foot.

[00626] Optionally, the controller 320 may be configured to operate the cord wrap motor 304 at a generally constant wrap speed. The wrap speed may be selected so that the velocity of the tip of the electrical cord is maintained below a predetermined threshold as the cord is wrapped around the spool 302. For example, the cord wrap motor 304 may be configured to rotate at about 100 rpm, which may help limit the velocity at the tip of the cord to between about 5 meters per second and about 0.5 meters per second, and may allow the electrical cord to be wound in between about 5 seconds and about 30 seconds.

[00627] Optionally, the controller 320 may be configured to disengage or deactivate the cord wrap motor 304 if the cord wrap spool 302 becomes jammed or otherwise stops rotating, even while the cord wrap pedal 322 is depressed. In the example illustrated, the controller 320 is configured to monitor the electrical current drawn by the cord wrap motor 304. If the spool 302 stops rotating, the sprocket 338 will stop rotating and the current drawn by the cord wrap motor 304 may increase. In response to such a current increase, the controller 320 may reduce or eliminate the power supplied to the cord wrap motor 304. Reducing the power supplied to a non-rotating motor may help reduce motor burn out. Alternatively, instead of monitoring cord wrap motor current, the controller 320 may be configured to monitor rotation of the spool 302, comprise an end stop sensor or switch, or monitor other suitable factors to help determine when the spool 302 has stopped rotating.

[00628] The cord wrap motor 304 may operate continuously while the user depresses the cord wrap pedal 322. Providing a continuous, sustained wrapping motion may help facilitate the wrapping of relatively long electrical cords, for example cords in excess of 5.5 meters feet, around the spool 302. In contrast, known spring biased cord winding spools may not be able to provide the sustained wrapping motion to wrap long cords.

[00629] Optionally, a manual drive mechanism may be provided to help wind the cord wrap spool 302 if the onboard power source is depleted. For example, a hand crank or other type of manual actuator may be connected to the spool 302 to enable a user to manually wind in the electrical cord.

[00630] It will be appreciated that the following claims are not limited to any specific embodiment disclosed herein. Further, it will be appreciated that any one or more of the features disclosed herein may be used in any particular combination or sub-combination, including, without limitation, the cord spool, the protective sidewalls, the cyclone bin assembly lock, an openable or removable wheel to access a component of the surface cleaning apparatus, the positioning and/or configuration of the post motor filter housing, the use of one or more stabilizer wheels, the seal plate, the pre-motor filter window in a wheel, the openable suction motor housing, the wheel axle extending through the filter, The divided dirt collection chamber with the diverter, the asymmetrical orientation of the dirt outlet 180, the threaded wheels, the passage 220 for the divided dirt collection chamber, the side wheels and positioning an operating component in a sidewall of the main body 112.

[00631] 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.

CLAIMS:

1. A surface cleaning apparatus comprising:
 - a) an air flow path extending from a dirty air inlet to a clean air outlet;
 - b) a main body comprising a front end, a rear end, first and second opposed sidewalls, a cavity having an open upper end positioned between the first and second opposed side walls, and a suction motor provided in the air flow path; and,
 - c) a cyclone bin assembly provided in the air flow path, the cyclone bin assembly having opposed end walls and being removably mounted in the cavity, wherein the first and second opposed sidewalls are sized to protect the cyclone bin assembly from a side impact.
2. The surface cleaning apparatus of claim 1 wherein the sidewalls overlie at least 75% of end walls of the cyclone bin assembly.
3. The surface cleaning apparatus of claim 1 wherein the sidewalls overlie essentially all of end walls of the cyclone bin assembly.
4. The surface cleaning apparatus of claim 1 wherein the cavity is generally U shaped.
5. The surface cleaning apparatus of claim 1 wherein the cavity has an open front end and an open rear end.
6. The surface cleaning apparatus of claim 1 wherein the cyclone bin assembly comprises a cyclone chamber and each of the first and second opposed sidewalls comprises a wheel having a diameter larger than a diameter of the cyclone chamber.
7. The surface cleaning apparatus of claim 1 wherein each of the first and second opposed sidewalls comprises a wheel substantially the same size as the sidewall on which the wheel is provided.

8. The surface cleaning apparatus of claim 1 wherein each of the first and second opposed sidewalls comprises a wheel having a cross sectional area larger than a transverse cross sectional area of the cyclone bin assembly.
9. The surface cleaning apparatus of claim 1 wherein the cyclone bin assembly comprises a cyclone chamber and an openable dirt collection chamber.
10. The surface cleaning apparatus of claim 9 wherein one of the end walls is an openable wall of the dirt collection chamber.
11. The surface cleaning apparatus of claim 1 wherein the cyclone bin assembly comprises a cyclone chamber that extends transversely, the cyclone chamber comprising a tangential inlet that is provided at the front end of the surface cleaning apparatus.
12. The surface cleaning apparatus of claim 1 wherein main body comprises a suction hose connector upstream of the tangential inlet.
13. The surface cleaning apparatus of claim 1 wherein main body comprises a suction hose connector upstream of the cyclone bin assembly.
14. The surface cleaning apparatus of claim 1 wherein the cyclone bin assembly comprises a cyclone chamber and a dirt collection chamber and the dirt collection chamber is provided exterior to the cyclone chamber and extends at least partially collinearly therewith.
15. The surface cleaning apparatus of claim 1 wherein the cyclone bin assembly comprises a cyclone chamber and a dirt collection chamber and the surface cleaning apparatus further comprises a pre-motor filter which has a cross sectional area that is larger than a transverse cross sectional area of the cyclone chamber.

16. The surface cleaning apparatus of claim 15 wherein the pre-motor filter is provided in one of the first and second opposed sidewalls.

17. The surface cleaning apparatus of claim 16 wherein the pre-motor filter has a cross sectional area that is at least 60% of a cross sectional area of the sidewall.

18. The surface cleaning apparatus of claim 15 wherein the pre-motor filter has a cross sectional area that is proximate that of the sidewall.

19. The surface cleaning apparatus of claim 1 wherein the cyclone bin assembly seats on a platform in the cavity and the platform comprises a portion of a housing for the suction motor.

20. The surface cleaning apparatus of claim 1 wherein at least one of the first and second opposed sidewalls has a compartment that houses an operating component of the surface cleaning apparatus or a portion of the air flow path.

21. The surface cleaning apparatus of claim 20 wherein the portion of the airflow path comprises at least part of an air flow passage between the cyclone chamber and the suction motor.

22. The surface cleaning apparatus of claim 21 wherein the cyclone bin assembly comprises a cyclone chamber and the suction motor and the cyclone chamber extend transversely.

23. The surface cleaning apparatus of claim 20 wherein the operating component comprises at least one of a filter, batteries, a power cord spool and control electronics.

24. The surface cleaning apparatus of claim 20 wherein the operating component comprises at least one of batteries, a power cord spool and control electronics.

25. The surface cleaning apparatus of claim 20 wherein the compartment is openable.

26. The surface cleaning apparatus of claim 25 wherein each of the first and second opposed sidewalls comprises a wheel and at least one of the wheels is removable to reveal the compartment.

27. A surface cleaning apparatus comprising:

- a) an air flow path extending from a dirty air inlet to a clean air outlet;
- b) a main body comprising a front end, a rear end, first and second opposed sidewalls, a cavity having an open upper end positioned between the first and second opposed side walls, and a suction motor provided in the air flow path;
- c) a cyclone bin assembly provided in the air flow path, the cyclone bin assembly having opposed end walls and ,
- d) a locking member lockingly securing the cyclone bin assembly in the cavity, the cyclone bin assembly being removably mounted in the cavity.

28. The surface cleaning apparatus of claim 27 wherein the locking member is engageable with at least one of the sidewalls.

29. The surface cleaning apparatus of claim 27 wherein the locking member is engageable with each of the sidewalls.

30. The surface cleaning apparatus of claim 27 wherein the cyclone bin assembly further comprises a handle and the locking member comprises a release member proximate the handle.

31. The surface cleaning apparatus of claim 27 wherein the locking member is operable by a user with a same hand as is used to grasp the handle.

32. The surface cleaning apparatus of claim 27 wherein the locking member comprises a pair of pins that are engageable with the sidewalls.

33. The surface cleaning apparatus of claim 32 wherein pins are moveable in opposite directions.

34. The surface cleaning apparatus of claim 33, wherein the pins are moveable transversely.

35. The surface cleaning apparatus of claim 27 wherein the locking member is moveably transversely.

36. The surface cleaning apparatus of claim 27 wherein the first and second opposed sidewalls are sized to protect the cyclone bin assembly from a side impact.

37. The surface cleaning apparatus of claim 27 wherein the sidewalls overlie at least 75% of end walls of the cyclone bin assembly.

38. The surface cleaning apparatus of claim 27 wherein the sidewalls overlie essentially all of end walls of the cyclone bin assembly.

39. The surface cleaning apparatus of claim 27 wherein the cyclone bin assembly comprises a cyclone chamber and each of the first and second opposed sidewalls comprises a wheel having a diameter larger than a diameter of the cyclone chamber.

40. The surface cleaning apparatus of claim 27 wherein each of the first and second opposed sidewalls comprises a wheel substantially the same size as the sidewall on which the wheel is provided.

41. The surface cleaning apparatus of claim 27 wherein each of the first and second opposed sidewalls comprises a wheel having a cross sectional area larger than a transverse cross sectional area of the cyclone bin assembly.

42. The surface cleaning apparatus of claim 27 wherein the main body comprises a suction hose connector upstream of the cyclone bin assembly.

43. The surface cleaning apparatus of claim 27 wherein the cyclone bin assembly comprises a cyclone chamber and a dirt collection chamber and the surface cleaning

apparatus further comprises a pre-motor filter which has a cross sectional area that is larger than a transverse cross sectional area of the cyclone chamber.

44. The surface cleaning apparatus of claim 27 wherein a pre-motor filter is provided in one of the first and second opposed sidewalls.

45. The surface cleaning apparatus of claim 44 wherein the pre-motor filter has a cross sectional area that is at least 60% of a cross sectional area of the sidewall.

46. The surface cleaning apparatus of claim 45 wherein the pre-motor filter has a cross sectional area that is proximate that of the sidewall.

47. The surface cleaning apparatus of claim 27 wherein at least one of the first and second opposed sidewalls has a compartment that houses an operating component of the surface cleaning apparatus or a portion of the air flow path.

48. The surface cleaning apparatus of claim 47 wherein the portion of the airflow path comprises at least part of an air flow passage between the cyclone chamber and the suction motor.

49. The surface cleaning apparatus of claim 48 wherein the cyclone bin assembly comprises a cyclone chamber and the suction motor and the cyclone chamber extend transversely.

50. The surface cleaning apparatus of claim 47 wherein the operating component comprises at least one of a filter, batteries, a power cord spool and control electronics.

51. The surface cleaning apparatus of claim 47 wherein the operating component comprises at least one of batteries, a power cord spool and control electronics.

52. The surface cleaning apparatus of claim 47 wherein the compartment is openable.

53. The surface cleaning apparatus of claim 52 wherein each of the first and second opposed sidewalls comprises a wheel and at least one of the wheels is removable to reveal the compartment.

54. The surface cleaning apparatus of claim 27 wherein the locking member includes all moveable components that secure the cyclone bin assembly to the surface cleaning apparatus.

55. A surface cleaning apparatus comprising:

- a) an air flow path extending from a dirty air inlet to a clean air outlet and including an air treatment member and a suction motor;
- b) a main body comprising a front end and a rear end;
- c) a plurality of wheels; and,
- d) a compartment positioned inwards of one of the wheels, wherein the compartment is accessible when the one of the wheels is removed or moved to an open position.

56. The surface cleaning apparatus of claim 55 wherein the one of the wheels is removably mounted to the surface cleaning apparatus.

57. The surface cleaning apparatus of claim 55 wherein the compartment houses an operating component of the surface cleaning apparatus.

58. The surface cleaning apparatus of claim 57 wherein the operating component comprises at least one of a filter, batteries, a power cord spool and control electronics.

59. The surface cleaning apparatus of claim 57 wherein the air treatment member comprises a cyclone bin assembly having a cyclone chamber having a diameter, wherein the operating component comprises a filter that has a cross sectional area that is larger than a transverse cross sectional area of the cyclone chamber.

60. The surface cleaning apparatus of claim 59 wherein the main body comprises first and second opposed sidewalls, the compartment is provided in one of the sidewalls and the filter has a cross sectional area that is at least 60% of a cross sectional area of the sidewall.

61. The surface cleaning apparatus of claim 60 wherein the filter has a cross sectional area that is proximate that of the sidewall.

62. The surface cleaning apparatus of claim 55 wherein the main body comprises first and second opposed sidewalls, the compartment is provided in one of the sidewalls and one of the wheels is provided on each sidewall.

63. The surface cleaning apparatus of claim 62 wherein the air treatment member comprises a cyclone bin assembly and a cyclone chamber having a diameter and each of the wheels provided on the sidewall have a diameter larger than the diameter of the cyclone chamber.

64. The surface cleaning apparatus of claim 63 wherein the wheels have a cross sectional area larger than a transverse cross sectional area of the cyclone bin assembly.

65. The surface cleaning apparatus of claim 63 wherein the sidewalls overlie at least 75% of end walls of the cyclone bin assembly.

66. The surface cleaning apparatus of claim 63 wherein the sidewalls overlie essentially all of end walls of the cyclone bin assembly.

67. The surface cleaning apparatus of claim 62 the wheels provided on the sidewall are substantially the same size as the sidewalls.

68. The surface cleaning apparatus of claim 63 wherein the main body further comprises a cavity having an open upper end positioned between the first and second opposed sidewalls and the cyclone bin assembly is removably mounted in the cavity.

69. The surface cleaning apparatus of claim 68, wherein the cyclone bin assembly seats on a platform in the cavity and the platform comprises a portion of a housing for the suction motor.

70. The surface cleaning apparatus of claim 62 further comprising at least one of a front stabilizer wheel and a rear stabilizer wheel.

71. The surface cleaning apparatus of claim 62 further comprising a front stabilizer wheel and a rear stabilizer wheel wherein the stabilizer wheels are positioned such that only one wheel may contact the floor at a time.

72. The surface cleaning apparatus of claim 55 wherein the one of the wheels is rotational mounted on a bearing surface that is provided on the surface cleaning apparatus.

73. The surface cleaning apparatus of claim 72 wherein the bearing surface is threaded mounted to the surface cleaning apparatus.

74. The surface cleaning apparatus of claim 73 the one of the wheels is removable by rotation of the bearing surface in a direction opposite to a direction of forward rotation of the wheel.

75. The surface cleaning apparatus of claim 55 wherein the one of the wheels has a rim and the rim overlies a portion of the main body.

76. The surface cleaning apparatus of claim 75 wherein the compartment has a laterally extending perimeter wall and the rim overlies at least a portion of the perimeter wall.

77. The surface cleaning apparatus of claim 55 wherein the surface cleaning apparatus includes an axle mount and the axle is threadedly received in the axle mount.

78. The surface cleaning apparatus of claim 77 wherein the one of the wheels has a central bore that is rotatably mounted on the axle.

79. A surface cleaning apparatus comprising:

- (a) an air flow path extending from a dirty air inlet to a clean air outlet and comprising an air treatment member, a suction motor and a filter housing;
 - (b) a main body comprising a front end, a rear end and a central portion, wherein the air treatment member is removably mounted to the central portion;
 - (c) a pair of spaced apart main wheels mounted to the main body on either side of the central portion and having an axis of rotation; and,
- wherein the filter housing is located in the central portion forward or rearward of the air treatment member.

80. The surface cleaning apparatus of claim 79 wherein the axis of rotation is located about midpoint along a length of the air treatment member.

81. The surface cleaning apparatus of claim 79 wherein the main body comprises a first sidewall and a spaced apart second sidewall and the central portion comprises a cavity located between the first sidewall and the second sidewall.

82. The surface cleaning apparatus of claim 81 wherein the cavity is generally U shaped.

83. The surface cleaning apparatus of claim 82 wherein the main wheels are provided on the sidewalls.

84. The surface cleaning apparatus of claim 79 wherein air treatment member seats on a portion of a housing for the suction motor.

85. The surface cleaning apparatus of claim 81 wherein the cavity has an open front end and an open rear end.

86. The surface cleaning apparatus of claim 79 further comprising at least one of a front stabilizer wheel provided forward of the axis of rotation and a rear stabilizer wheel provided rearward of the axis of rotation.

87. The surface cleaning apparatus of claim 86 wherein the stabilizer wheel is positioned laterally approximately midway between the main wheels.

88. The surface cleaning apparatus of claim 86 further comprising both the front stabilizer wheel and the rear stabilizer wheel.

89. The surface cleaning apparatus of claim 88 wherein the stabilizer wheels are positioned such that only one of the stabilizer wheels may contact a floor on which the surface cleaning apparatus is positioned at a time.

90. The surface cleaning apparatus of claim 79 further comprising only one of a front stabilizer wheel provided forward of the axis of rotation and a rear stabilizer wheel provided rearward of the axis of rotation.

91. The surface cleaning apparatus of claim 82 the main wheels are substantially the same size as the sidewalls.

92. The surface cleaning apparatus of claim 91 wherein the sidewalls overlie at least 75% of end walls of the air treatment member.

93. The surface cleaning apparatus of claim 91 wherein the sidewalls overlie essentially all of end walls of the air treatment member.

94. The surface cleaning apparatus of claim 86 wherein the stabilizer wheel is provided on the filter housing.

95. The surface cleaning apparatus of claim 79 wherein the filter housing houses a post motor filter.
96. The surface cleaning apparatus of claim 79 wherein the filter housing is at least partially nested between the main wheels.
97. The surface cleaning apparatus of claim 79 further comprising a cord spool and an actuator for the cord spool is provided on the filter housing.
98. The surface cleaning apparatus of claim 79 wherein at least two sides of the filter housing form an outer surface of the surface cleaning apparatus.
99. The surface cleaning apparatus of claim 79 wherein the filter housing is positioned forward of the air treatment member and a filter is removable from the filter housing either in a downward direction or a forward direction.
100. The surface cleaning apparatus of claim 79 wherein the filter housing is positioned rearward of the air treatment member and a filter is removable from the filter housing either in a downward direction or a rearward direction.
101. A surface cleaning apparatus comprising:
- a) an air flow path extending from a dirty air inlet to a clean air outlet and comprising an air treatment member and a suction motor;
 - b) a main body comprising a front end, a rear end, and a pair of spaced apart main wheels having an axis of rotation; and,
 - c) at least one of a front stabilizer wheel provided forward of the axis of rotation and a rear stabilizer wheel provided rearward of the axis of rotation.
102. The surface cleaning apparatus of claim 101 further comprising both the front stabilizer wheel and the rear stabilizer wheel.

103. The surface cleaning apparatus of claim 102 wherein the stabilizer wheels are positioned such that only one of the stabilizer wheels may contact the floor at a time.

104. The surface cleaning apparatus of claim 101 wherein the main body further comprises first and second opposed sidewalls and the main wheels are provided on the sidewalls.

105. The surface cleaning apparatus of claim 104 wherein at least one of the first and second opposed sidewalls has a compartment that houses an operating component of the surface cleaning apparatus or a portion of the air flow path.

106. The surface cleaning apparatus of claim 105 wherein the portion of the airflow path comprises at least part of an air flow passage between a cyclone chamber and the suction motor.

107. The surface cleaning apparatus of claim 105 wherein the operating component comprises at least one of a filter, batteries, a power cord spool and control electronics.

108. The surface cleaning apparatus of claim 107 wherein at least one of the main wheels is moveable to an open position to reveal the compartment.

109. The surface cleaning apparatus of claim 101 further comprising a cyclone bin assembly including a cyclone chamber and each of main wheels has a diameter larger than a diameter of the cyclone chamber.

110. The surface cleaning apparatus of claim 104 the main wheels are substantially the same size as the sidewalls.

111. The surface cleaning apparatus of claim 109 wherein the main wheels have a cross sectional area larger than a transverse cross sectional area of the cyclone bin assembly.

112. The surface cleaning apparatus of claim 109 wherein the sidewalls overlie at least 75% of end walls of the cyclone bin assembly.

113. The surface cleaning apparatus of claim 109 wherein the sidewalls overlie essentially all of end walls of the cyclone bin assembly.

114. The surface cleaning apparatus of claim 109 further comprising a cavity having an open upper end positioned between the first and second opposed side walls and the cyclone bin assembly is removably mounted in the cavity.

115. The surface cleaning apparatus of claim 114 wherein the cyclone bin assembly seats on a platform in the cavity and the platform comprises a portion of a housing for the suction motor.

116. The surface cleaning apparatus of claim 114 wherein the cavity is generally U shaped.

117. The surface cleaning apparatus of claim 116 wherein the cavity has an open front end and an open rear end.

118. The surface cleaning apparatus of claim 101 wherein the stabilizer wheel is positioned laterally approximately midway between the main wheels.

119. The surface cleaning apparatus of claim 101 further comprising a filter housing and the stabilizer wheel is provided on the filter housing.

120. The surface cleaning apparatus of claim 101 further comprising a post motor filter positioned laterally between the main wheels, the surface cleaning apparatus comprises a rear stabilizer wheel and the rear stabilizer wheel is provided on the post motor filter housing.

121. A surface cleaning apparatus comprising:

- (a) an air flow path extending from a dirty air inlet to a clean air outlet and including an air treatment member and a suction motor;
- (b) a main body comprising a front end and a rear end;
- (c) a filter compartment provided in the main body and comprising an open portion;
- (d) a pair of spaced apart wheels having an axis of rotation wherein the axis of rotation extends through the filter compartment; and,
- (e) a seal plate sealingly closing the open portion, the seal plate positioned between one of the wheels and the filter compartment.

122. The surface cleaning apparatus of claim 121 further comprising a wheel axle that extends through the filter compartment and the seal plate.

123. The surface cleaning apparatus of claim 122 wherein the seal plate forms a first seal with an outer perimeter of the filter compartment and a second seal adjacent the axle.

124. The surface cleaning apparatus of claim 121 wherein the seal plate has an outer surface that is provided with a wheel axle.

125. The surface cleaning apparatus of claim 124 wherein the seal plate forms a seal with an outer perimeter of the filter compartment.

126. The surface cleaning apparatus of claim 121 wherein the seal plate has a transparent section.

127. The surface cleaning apparatus of claim 121 wherein the seal plate is transparent.

128. The surface cleaning apparatus of claim 121 wherein the seal plate is moveable to an open position.

129. The surface cleaning apparatus of claim 128 wherein the seal plate is removable.

130. The surface cleaning apparatus of claim 121 wherein the filter compartment is accessible when the one of the wheels is moved to an open position.

131. The surface cleaning apparatus of claim 130 the one of the wheels is removably mounted to the surface cleaning apparatus.

132. The surface cleaning apparatus of claim 121 wherein the air treatment member comprises a cyclone bin assembly having a cyclone chamber having a diameter, and the filter has a cross sectional area that is larger than a transverse cross sectional area of the cyclone chamber.

133. The surface cleaning apparatus of claim 121 wherein the main body comprises first and second opposed sidewalls, the filter compartment is provided in one of the sidewalls and the filter has a cross sectional area that is at least 60% of a cross sectional area of the sidewall.

134. The surface cleaning apparatus of claim 133 wherein the filter has a cross sectional area that is proximate that of the sidewall.

135. The surface cleaning apparatus of claim 133 wherein the sidewalls overlie essentially all of end walls of the cyclone bin assembly.

136. The surface cleaning apparatus of claim 133 wherein the spaced apart wheels are provided on the sidewall and are substantially the same size as the sidewalls.

137. The surface cleaning apparatus of claim 133 wherein the main body further comprises a cavity having an open upper end positioned between the first and second opposed sidewalls and the cyclone bin assembly is removably mounted in the cavity.

138. The surface cleaning apparatus of claim 121 further comprising at least one of a front stabilizer wheel and a rear stabilizer wheel.

139. The surface cleaning apparatus of claim 138 further comprising a front stabilizer wheel and a rear stabilizer wheel wherein the stabilizer wheels are positioned such that only one wheel may contact the floor at a time.

140. The surface cleaning apparatus of claim 121 wherein the main body comprises first and second opposed sidewalls, the filter compartment is provided in one of the sidewalls and the spaced apart wheels are provided on the sidewall.

141. A surface cleaning apparatus comprising:

a) an air flow path extending from a dirty air inlet to a clean air outlet and including an air treatment member and a suction motor;

b) a main body comprising a front end, a rear end and a filter compartment; and,

c) a pair of spaced apart wheels mounted to the surface cleaning apparatus wherein one of the wheels overlies the filter compartment and at least a portion of the filter is visible through the wheel.

142. The surface cleaning apparatus of claim 141 wherein the one of the wheels has a window.

143. The surface cleaning apparatus of claim 141 wherein at least a portion of the one of the wheels is transparent. .

144. The surface cleaning apparatus of claim 141 wherein the filter has a downstream side and the downstream side is visible through the wheel.

145. The surface cleaning apparatus of claim 141 further comprising a seal plate sealingly closing an open portion of the filter cavity.

146. The surface cleaning apparatus of claim 145 further comprising a wheel axle that extends through the filter compartment and the seal plate.

147. The surface cleaning apparatus of claim 146 wherein the seal plate forms a first seal with an outer perimeter of the filter compartment and a second seal adjacent the axle.

148. The surface cleaning apparatus of claim 145 wherein the seal plate has an outer surface that is provided with a wheel axle.

149. The surface cleaning apparatus of claim 148 wherein the seal plate forms a seal with an outer perimeter of the filter compartment.

150. The surface cleaning apparatus of claim 145 wherein the seal plate has a transparent section.

151. The surface cleaning apparatus of claim 145 wherein the seal plate is transparent.

152. The surface cleaning apparatus of claim 145 wherein the seal plate is moveable to an open position.

153. The surface cleaning apparatus of claim 152 wherein the seal plate is removable.

154. The surface cleaning apparatus of claim 141 wherein the filter compartment is accessible when the one of the wheels is moved to an open position.

155. The surface cleaning apparatus of claim 154 wherein the one of the wheels is removably mounted to the surface cleaning apparatus.

156. The surface cleaning apparatus of claim 141 wherein the main body further comprises first and second opposed sidewalls, and the filter compartment is provided in one of the first and second opposed sidewalls

157. The surface cleaning apparatus of claim 156 wherein the filter compartment is positioned in the air flow path between the air treatment member and the suction motor.

158. The surface cleaning apparatus of claim 141 wherein the air treatment member comprises a cyclone chamber having a longitudinal axis that is generally parallel to an axle of the wheels.

159. The surface cleaning apparatus of claim 141 wherein the air treatment member comprises a cyclone bin assembly having a cyclone chamber having a diameter, and the filter has a cross sectional area that is larger than a transverse cross sectional area of the cyclone chamber.

160. The surface cleaning apparatus of claim 141 wherein the main body comprises first and second opposed sidewalls, the filter compartment is provided in one of the sidewalls and the filter has a cross sectional area that is at least 60% of a cross sectional area of the sidewall.

161. The surface cleaning apparatus of claim 160 wherein the filter has a cross sectional area that is proximate that of the sidewall.

162. The surface cleaning apparatus of claim 141 wherein the main body comprises first and second opposed sidewalls, the filter compartment is provided in one of the sidewalls and the sidewalls overlie essentially all of end walls of the cyclone bin assembly.

163. The surface cleaning apparatus of claim 162 wherein the spaced apart wheels are provided on the sidewall and are substantially the same size as the sidewalls.

164. The surface cleaning apparatus of claim 162 wherein the main body further comprises a cavity between the sidewalls that has an open upper end positioned between the first and second opposed sidewalls and the cyclone bin assembly is removably mounted in the cavity.

165. The surface cleaning apparatus of claim 141 wherein the main body comprises first and second opposed sidewalls, the filter compartment is provided in one of the sidewalls and the spaced apart wheels are provided on the sidewall.

166. A surface cleaning apparatus comprising:

a) an air flow path extending from a dirty air inlet to a clean air outlet and including an air treatment member and a suction motor; and,

b) a main body comprising a front end, a rear end, first and second opposed sidewalls and a suction motor housing, at least one of the first and second opposed sidewalls has a suction motor access opening.

167. The surface cleaning apparatus of claim 166 wherein the suction motor is positioned in the main body between the sidewalls.

168. The surface cleaning apparatus of claim 166 wherein the surface cleaning apparatus is moveable in a forward direction and the suction motor has a longitudinal axis that extends transverse to the forward direction.

169. The surface cleaning apparatus of claim 168 wherein the air treatment member comprises a cyclone chamber having a longitudinal axis that is generally parallel to the longitudinal axis of the suction motor.

170. The surface cleaning apparatus of claim 168 wherein the suction motor has an inlet end and the inlet end is provided adjacent the suction motor access opening.

171. The surface cleaning apparatus of claim 169 further comprising a treated air flow passage extending from an outlet of the cyclone chamber to the suction motor

and at least a portion of the treated air flow passage is provided in one of the sidewalls.

172. The surface cleaning apparatus of claim 171 wherein the treated air flow passage comprises a pre-motor filter that is positioned in one of the sidewalls.

173. The surface cleaning apparatus of claim 166 wherein the suction motor has an inlet end and the inlet end is provided adjacent the suction motor access opening.

174. The surface cleaning apparatus of claim 166 further comprising a treated air flow passage extending from an outlet of the air treatment member to the suction motor and at least a portion of the treated air flow passage is provided in one of the sidewalls.

175. The surface cleaning apparatus of claim 174 wherein the treated air flow passage comprises a pre-motor filter that is positioned in one of the sidewalls.

176. The surface cleaning apparatus of claim 175 wherein the pre-motor filter has a cross sectional area that is at least 60% of a cross sectional area of the sidewall.

177. The surface cleaning apparatus of claim 175 wherein the filter has a cross sectional area that is proximate that of the sidewall.

178. The surface cleaning apparatus of claim 175 wherein the pre-motor filter is removably mounted and the suction motor access opening is accessible when the pre-motor filter is removed.

179. The surface cleaning apparatus of claim 178 wherein the pre-motor filter is provided in an openable sealed filter housing.

180. The surface cleaning apparatus of claim 179 further comprising a pair of wheels provided on the sidewalls and the filter housing is accessible when one of the wheels is moved to an open position.

181. The surface cleaning apparatus of claim 166 further comprising a pair of wheels provided on the sidewalls and the suction motor access opening is accessible when one of the wheels is moved to an open position.

182. The surface cleaning apparatus of claim 181 wherein the one of the wheels is removably mounted to the surface cleaning apparatus.

183. The surface cleaning apparatus of claim 166 further comprising an openable suction motor housing grill, the suction motor housing grill covering the suction motor access opening when the suction motor housing grill is in a closed position.

184. The surface cleaning apparatus of claim 166 wherein the main body further comprises first and second opposed sidewalls and a cavity between the sidewalls that has an open upper end positioned between the first and second opposed sidewalls and the air treatment member is removably mounted in the cavity.

185. The surface cleaning apparatus of claim 184 wherein the air treatment member seats on a platform in the cavity and the platform comprises a portion of the suction motor housing.

186. A surface cleaning apparatus comprising:

- a) an air flow path extending from a dirty air inlet to a clean air outlet and including an air treatment member and a suction motor;
- b) a main body comprising a front end and a rear end;
- c) a plurality of wheels rotatably mounted on to the surface cleaning apparatus; and,

d) a filter in a filter compartment wherein an axle or an axle mount for at least one of the wheels defines an axis of rotation that projects through the filter compartment.

187. The surface cleaning apparatus of claim 186 wherein the filter is accessible when the one of the wheels is moved to an open position.

188. The surface cleaning apparatus of claim 187 the one of the wheels is removably mounted to the surface cleaning apparatus.

189. The surface cleaning apparatus of claim 186 wherein the air treatment member comprises a cyclone bin assembly having a cyclone chamber having a diameter, wherein the filter has a cross sectional area that is larger than a transverse cross sectional area of the cyclone chamber.

190. The surface cleaning apparatus of claim 186 wherein the main body further comprises first and second opposed sidewalls and the surface cleaning apparatus further comprises a treated air flow passage extending from an outlet of the air treatment member to the suction motor and at least a portion of the treated air flow passage is provided in one of the sidewalls.

191. The surface cleaning apparatus of claim 190 wherein the filter is located in the treated air flow passage.

192. The surface cleaning apparatus of claim 186 wherein the main body further comprises first and second opposed sidewalls, the filter is provided in one of the sidewalls and the filter has a cross sectional area that is at least 60% of a cross sectional area of the sidewall.

193. The surface cleaning apparatus of claim 192 wherein the filter has a cross sectional area that is proximate that of the sidewall.

194. The surface cleaning apparatus of claim 186 wherein the main body further comprises first and second opposed sidewalls, the filter is provided in one of the sidewalls and one of the wheels is provided on each sidewall.

195. The surface cleaning apparatus of claim 194 wherein the air treatment member comprises a cyclone bin assembly having opposed end walls and a cyclone chamber having a diameter and each of the wheels provided on the sidewall has a diameter larger than the diameter of the cyclone chamber.

196. The surface cleaning apparatus of claim 195 wherein the wheels provided on the sidewalls have a cross sectional area larger than a transverse cross sectional area of the cyclone bin assembly.

197. The surface cleaning apparatus of claim 195 wherein the sidewalls overlie at least 75% of end walls of the cyclone bin assembly.

198. The surface cleaning apparatus of claim 195 wherein the sidewalls overlie essentially all of end walls of the cyclone bin assembly.

199. The surface cleaning apparatus of claim 194 the wheels provided on the sidewall are substantially the same size as the sidewalls.

200. The surface cleaning apparatus of claim 195 wherein the main body further comprises a cavity having an open upper end positioned between the first and second opposed sidewalls and the cyclone bin assembly is removably mounted in the cavity.

201. The surface cleaning apparatus of claim 200 wherein the cyclone bin assembly seats on a platform in the cavity and the platform comprises a portion of a housing for the suction motor.

202. The surface cleaning apparatus of claim 194 further comprising at least one of a front stabilizer wheel and a rear stabilizer wheel.

203. The surface cleaning apparatus of claim 194 further comprising a front stabilizer wheel and a rear stabilizer wheel wherein the stabilizer wheels are positioned such that only one wheel may contact the floor at a time.

204. The surface cleaning apparatus of claim 186 further comprising a treated air flow passage and the filter is provided in the treated air flow passage and the treated air flow passage comprises a conduit that extends through the filter.

205. The surface cleaning apparatus of claim 204 wherein the conduit has an air outlet end adjacent the upstream side of the filter and air travels through the filter to the suction motor.

206. The surface cleaning apparatus of claim 186 wherein at least one of the wheels is removable by rotation of the wheel in a direction opposite to a direction of forward rotation of the wheel.

207. The surface cleaning apparatus of claim 186 wherein the surface cleaning apparatus includes an axle mount and the axle is mounted to the axle mount.

208. The surface cleaning apparatus of claim 186 wherein the surface cleaning apparatus includes an axle mount and the axle is removably mounted to the axle mount.

209. The surface cleaning apparatus of claim 208 wherein the axle is threadedly mounted to the axle mount.

210. The surface cleaning apparatus of claim 208 wherein one of the wheels has a central bore that is rotatably mounted on the axle.

216. The cyclone bin assembly of claim 214 wherein a portion of the wall facing the dirt outlet extends inwardly towards the dirt outlet.

217. The cyclone bin assembly of claim 215 wherein the cyclone chamber has a longitudinal axis, the dirt outlet has a height in a direction of the longitudinal axis and the portion of the wall has a height so as to extend along the height of the dirt outlet.

218. The cyclone bin assembly of claim 216 wherein the portion of the wall extends away from the dirt outlet along at least a portion of a length of the cyclone chamber.

219. The cyclone bin assembly of claim 214 wherein the dirt outlet is positioned adjacent the second opposed end of the dirt collection chamber and the passage terminates prior to the first opposed end of the dirt collection chamber.

220. The cyclone bin assembly of claim 214 wherein a portion of the wall facing the dirt outlet extends inwardly towards the dirt outlet.

221. The cyclone bin assembly of claim 214 wherein a portion of the wall facing the dirt outlet extends convexly inwardly towards the dirt outlet.

222. A vacuum cleaner comprising an air flow path extending from a dirty air inlet to a clean air outlet, the air flow path including a suction motor in a suction motor housing and the cyclone bin assembly of claim 220, wherein the portion of the wall is configured to seat on a portion of the suction motor housing.

223. A vacuum cleaner comprising an air flow path extending from a dirty air inlet to a clean air outlet, the air flow path including a suction motor in a suction motor housing and the cyclone bin assembly of claim 214, wherein the first and second portions are configured to be positioned on opposed sides of the suction motor.

224. The cyclone bin assembly of claim 214 wherein the air inlet and the air outlet are at the first opposed end of the cyclone chamber.

225. The cyclone bin assembly of claim 214 wherein the cyclone chamber comprises a sidewall extending between the first and second opposed ends and the dirt outlet comprises a slot that is provided in the sidewall adjacent the second opposed end.

226. The cyclone bin assembly of claim 225 wherein a portion of the sidewall terminates prior to the second opposed end and defines a terminal end of the sidewall, the terminal end extending part way around the cyclone chamber.

227. The cyclone bin assembly of claim 214 wherein the dirt outlet has an angular extent around the cyclone chamber and a larger portion of the angular extent of the slot faces the first portion.

228. The cyclone bin assembly of claim 227 wherein the cyclone chamber has a direction of rotation and the first portion is angularly positioned upstream of the second portion in the direction of rotation.

229. The cyclone bin assembly of claim 214 wherein the cyclone chamber has a longitudinal axis that is essentially horizontal.

230. The cyclone bin assembly of claim 229 wherein the dirt outlet is provided in a lower portion of the cyclone chamber and has a portion that is positioned at an upper end of the dirt collection chamber.

231. The cyclone bin assembly of claim 229 wherein the dirt outlet has a portion that is positioned at an upper end of one of the first and second portions.

232. The cyclone bin assembly of claim 229 wherein the dirt outlet has a portion that is positioned at an upper end of the first portion.

233. The cyclone bin assembly of claim 214 wherein the portion of the wall is configured to produce an airstream traveling through the passage between the first

and second portions that has a velocity that is greater than a velocity of the airstream immediately upstream and downstream of the passage.

234. The cyclone bin assembly of claim 214 wherein the cyclone chamber has a direction of rotation and the first portion is angularly positioned upstream of the second portion in the direction of rotation.

235. A cyclone bin assembly comprising:

a) a cyclone chamber having an air inlet, an air outlet, a dirt outlet and first and second opposed ends; and,

b) a dirt collection chamber in communication with the dirt outlet ,surrounding at least a portion of the cyclone chamber and comprising first and second portions, the first and second portions comprising discrete chambers that are separated from each other by a passage extending between the dirt outlet and a wall of the dirt collection chamber,

wherein the dirt outlet has an angular extent around the cyclone chamber and a larger portion of the angular extent of the slot faces the first portion.

236. The cyclone bin assembly of claim 235 wherein the cyclone chamber has a direction of rotation and the first portion is angularly positioned upstream of the second portion in the direction of rotation.

237. The cyclone bin assembly of claim 236 wherein the dirt collection chamber comprises first and second opposed ends, the dirt outlet is positioned adjacent the second end of the dirt collection chamber, the first and second portions have first and second sides, the first side positioned adjacent the passage and the second side angularly spaced from the passage, the second portion has a divider wall that extends inwardly towards the second end of the dirt collection chamber from the first end of the dirt collection chamber and the divider wall is spaced from the second side.

238. The cyclone bin assembly of claim 237 wherein the divider wall is positioned adjacent the first side.

239. The cyclone bin assembly of claim 235 wherein a portion of the wall facing the dirt outlet extends inwardly towards the dirt outlet.

240. The cyclone bin assembly of claim 235 wherein a portion of the wall facing the dirt outlet extends convexly inwardly towards the dirt outlet.

241. The cyclone bin assembly of claim 239 wherein the cyclone chamber has a longitudinal axis, the dirt outlet has a height in a direction of the longitudinal axis and the portion of the wall has a height so as to extend along the height of the dirt outlet.

242. The cyclone bin assembly of claim 241 wherein the portion of the wall extends away from the dirt outlet along at least a portion of a length of the cyclone chamber.

243. The cyclone bin assembly of claim 242 wherein the dirt collection chamber comprises first and second opposed ends, the dirt outlet is positioned adjacent the second end of the dirt collection chamber and the passage terminates prior to the first end of the dirt collection chamber.

244. A vacuum cleaner comprising an air flow path extending from a dirty air inlet to a clean air outlet, the air flow path including a suction motor in a suction motor housing and the cyclone bin assembly of claim 239, wherein the portion of the wall is configured to seat on a portion of the suction motor housing.

245. A vacuum cleaner comprising an air flow path extending from a dirty air inlet to a clean air outlet, the air flow path including a suction motor in a suction motor housing and the cyclone bin assembly of claim 235, wherein the first and second portions are configured to be positioned on opposed sides of the suction motor.

246. The cyclone bin assembly of claim 235 wherein the air inlet and the air outlet are at the first end of the cyclone chamber.

247. The cyclone bin assembly of claim 246 wherein the dirt outlet is spaced from the first end.

248. The cyclone bin assembly of claim 247 wherein the dirt outlet is at the second end of the cyclone chamber.

249. The cyclone bin assembly of claim 235 wherein the cyclone chamber comprises a sidewall extending between the first and second ends and the dirt outlet comprises a slot that is provided in the sidewall adjacent the second end.

250. The cyclone bin assembly of claim 249 wherein a portion of the sidewall terminates prior to the second end and defines a terminal end of the sidewall, the terminal end extending part way around the cyclone chamber.

251. The cyclone bin assembly of claim 235 wherein the cyclone chamber has a longitudinal axis that is essentially horizontal.

252. The cyclone bin assembly of claim 251 wherein the dirt outlet is provided in a lower portion of the cyclone chamber and has a portion that is positioned at an upper end of the dirt collection chamber.

253. The cyclone bin assembly of claim 252 wherein the dirt outlet has a portion that is positioned at an upper end of one of the first and second portions.

254. The cyclone bin assembly of claim 253 wherein the dirt outlet has a portion that is positioned at an upper end of the first portion.

255. The cyclone bin assembly of claim 235 wherein the portion of the wall is configured to produce an airstream traveling through the passage between the first

and second portions that has a velocity that is greater than a velocity of the airstream immediately upstream and downstream of the passage.

256. The cyclone bin assembly of claim 235 wherein the cyclone chamber has a direction of rotation and the first portion is angularly positioned upstream of the second portion in the direction of rotation.

257. The cyclone bin assembly of claim 22 wherein the dirt collection chamber comprises first and second opposed ends, the dirt outlet is positioned adjacent the second end of the dirt collection chamber, the first and second portions have first and second sides, the first side positioned adjacent the passage and the second side angularly spaced from the passage, the second portion has a divider wall that extends inwardly towards the second end of the dirt collection chamber from the first end of the dirt collection chamber and the divider wall is spaced from the second side.

258. The cyclone bin assembly of claim 257 wherein the divider wall is positioned adjacent the first side.

259. A cyclone bin assembly comprising:

a) a cyclone chamber having an air inlet, an air outlet, a dirt outlet and a first opposed end and a second opposed end; and,

b) a dirt collection chamber in communication with the dirt outlet and surrounding at least a portion of the cyclone chamber and comprising a first portion and a second portion, the first and second portions comprising discrete chambers that are separated from each other by a passage extending between the dirt outlet and a wall of the dirt collection chamber,

c) wherein a portion of the wall facing the dirt outlet extends inwardly towards the dirt outlet.

260. The cyclone bin assembly of claim 259 wherein the cyclone chamber has a longitudinal axis, the dirt outlet has a height in a direction of the longitudinal axis and the portion of the wall has a height so as to extend along the height of the dirt outlet.

261. The cyclone bin assembly of claim 260 wherein the portion of the wall extends away from the dirt outlet along at least a portion of a length of the cyclone chamber.

262. The cyclone bin assembly of claim 259 wherein the dirt collection chamber comprises a first opposed end and a second opposed end, the dirt outlet is positioned adjacent the second end of the dirt collection chamber and the passage terminates prior to the first opposed end of the dirt collection chamber.

263. The cyclone bin assembly of claim 259 wherein the portion of the wall facing the dirt outlet extends convexly inwardly towards the dirt outlet.

264. A vacuum cleaner comprising an air flow path extending from a dirty air inlet to a clean air outlet, the air flow path including a suction motor in a suction motor housing and the cyclone bin assembly of claim 259, wherein the portion of the wall is configured to seat on a portion of the suction motor housing.

265. A vacuum cleaner comprising an air flow path extending from a dirty air inlet to a clean air outlet, the air flow path including a suction motor in a suction motor housing and the cyclone bin assembly of claim 259, wherein the first and second portions are configured to be positioned on opposed sides of the suction motor.

266. The cyclone bin assembly of claim 259 wherein the air inlet and the air outlet are at the first opposed end of the cyclone chamber.

267. The cyclone bin assembly of claim 266 wherein the dirt outlet is spaced from the first opposed end.

268. The cyclone bin assembly of claim 267 wherein the dirt outlet is at the second end of the cyclone chamber.

269. The cyclone bin assembly of claim 259 wherein the cyclone chamber comprises a sidewall extending between the first and second opposed ends and the dirt outlet comprises a slot that is provided in the sidewall adjacent the second end.

270. The cyclone bin assembly of claim 269 wherein a portion of the sidewall terminates prior to the second end and defines a terminal end of the sidewall, the terminal end extending part way around the cyclone chamber.

271. The cyclone bin assembly of claim 259 wherein the dirt outlet has an angular extent around the cyclone chamber and a larger portion of the angular extent of the slot faces the first portion.

272. The cyclone bin assembly of claim 271 wherein the cyclone chamber has a direction of rotation and the first portion is angularly positioned upstream of the second portion in the direction of rotation.

273. The cyclone bin assembly of claim 272 wherein the dirt collection chamber comprises first and second opposed ends, the dirt outlet is positioned adjacent the second end of the dirt collection chamber, the first and second portions have ends first and second sides, the first side positioned adjacent the passage and the second side angularly spaced from the passage, the second portion has a divider wall that extends inwardly towards the second end of the dirt collection chamber from the first opposed end of the dirt collection chamber and the divider wall is spaced from the second side.

274. The cyclone bin assembly of claim 273 wherein the divider wall is positioned adjacent the first side.

275. The cyclone bin assembly of claim 259 wherein the cyclone chamber has a longitudinal axis that is essentially horizontal.

276. The cyclone bin assembly of claim 275 wherein the dirt outlet is provided in a lower portion of the cyclone chamber and has a portion that is positioned at an upper end of the dirt collection chamber.

277. The cyclone bin assembly of claim 275 wherein the dirt outlet has a portion that is positioned at an upper end of one of the first and second portions.

278. The cyclone bin assembly of claim 277 wherein the dirt outlet has a portion that is positioned at an upper end of the first portion.

279. The cyclone bin assembly of claim 259 wherein the portion of the wall is configured to produce an airstream travelling through the passage between the first and second portions that has a velocity that is greater than a velocity of the airstream immediately upstream and downstream of the passage.

280. The cyclone bin assembly of claim 259 wherein the cyclone chamber has a direction of rotation and the first portion is angularly positioned upstream of the second portion in the direction of rotation.

281. The cyclone bin assembly of claim 280 wherein the dirt collection chamber comprises first and second opposed ends, the dirt outlet is positioned adjacent the second end of the dirt collection chamber, the first and second portions have first and second sides, the first side positioned adjacent the passage and the second side angularly spaced from the passage, the second portion has a divider wall that extends inwardly towards the second end of the dirt collection chamber from the first opposed end of the dirt collection chamber and the divider wall is spaced from the second side.

282. The cyclone bin assembly of claim 281 wherein the divider wall is positioned adjacent the first side.

283. A surface cleaning apparatus comprising:

- a) an air flow path extending from a dirty air inlet to a clean air outlet;
- b) a main body comprising a front end, a rear end, first and second opposed sidewalls, and a suction motor provided in the air flow path; and,
- c) a cyclone bin assembly provided in the air flow path, the cyclone bin assembly having opposed end walls and comprising a cyclone chamber having a diameter,

wherein each of the first and second opposed sidewalls comprises a wheel having a diameter larger than the diameter of the cyclone chamber.

284. The surface cleaning apparatus of claim 283 the wheels are substantially the same size as the sidewalls.

285. The surface cleaning apparatus of claim 283 wherein the wheels have a cross sectional area larger than a transverse cross sectional area of the cyclone bin assembly.

286. The surface cleaning apparatus of claim 283 wherein the sidewalls overlie at least 75% of end walls of the cyclone bin assembly.

287. The surface cleaning apparatus of claim 283 wherein the sidewalls overlie essentially all of end walls of the cyclone bin assembly.

288. The surface cleaning apparatus of claim 283 further comprising a cavity having an open upper end positioned between the first and second opposed side walls and the cyclone bin assembly is removably mounted in the cavity.

289. The surface cleaning apparatus of claim 288 wherein the cyclone bin assembly seats on a platform in the cavity and the platform comprises a portion of a housing for the suction motor.

290. The surface cleaning apparatus of claim 288 wherein the cavity is generally U shaped.

291. The surface cleaning apparatus of claim 288 wherein the cavity has an open front end and an open rear end.

292. The surface cleaning apparatus of claim 283 wherein the cyclone bin assembly comprises a cyclone chamber and an openable dirt collection chamber, wherein one of the end walls is an openable wall of the dirt collection chamber.

293. The surface cleaning apparatus of claim 283 wherein the cyclone bin assembly comprises a cyclone chamber that extends transversely, the cyclone chamber comprising a tangential inlet that is provided at the front end of the surface cleaning apparatus.

294. The surface cleaning apparatus of claim 283 wherein the main body comprises a suction hose connector upstream of the tangential inlet.

295. The surface cleaning apparatus of claim 283 wherein the main body comprises a suction hose connector upstream of the cyclone bin assembly.

296. The surface cleaning apparatus of claim 283 wherein the cyclone bin assembly comprises a cyclone chamber and a dirt collection chamber and the dirt collection chamber is provided exterior to the cyclone chamber and extends at least partially collinearly therewith.

297. The surface cleaning apparatus of claim 283 wherein the cyclone bin assembly comprises a cyclone chamber and a dirt collection chamber and the surface cleaning apparatus further comprises a pre-motor filter which has a cross sectional area that is larger than a transverse cross sectional area of the cyclone chamber.

298. The surface cleaning apparatus of claim 297 wherein the pre-motor filter is provided in one of the first and second opposed sidewalls.

299. The surface cleaning apparatus of claim 298 wherein the pre-motor filter has a cross sectional area that is at least 60% of a cross sectional area of the sidewall.

300. The surface cleaning apparatus of claim 297 wherein the pre-motor filter has a cross sectional area that is proximate that of the sidewall.

301. The surface cleaning apparatus of claim 283 wherein at least one of the first and second opposed sidewalls has a compartment that houses an operating component of the surface cleaning apparatus or a portion of the air flow path.

302. The surface cleaning apparatus of claim 301 wherein the portion of the airflow path comprises at least part of an air flow passage between the cyclone chamber and the suction motor.

303. The surface cleaning apparatus of claim 302 wherein the cyclone bin assembly comprises a cyclone chamber and the suction motor and the cyclone chamber extend transversely.

304. The surface cleaning apparatus of claim 302 wherein the operating component comprises at least one of a filter, batteries, a power cord spool and control electronics.

305. The surface cleaning apparatus of claim 301 wherein the operating component comprises at least one of batteries, a power cord spool and control electronics.

306. The surface cleaning apparatus of claim 301 wherein the compartment is openable.

307. The surface cleaning apparatus of claim 306 wherein each of the first and second opposed sidewalls comprises a wheel and at least one of the wheels is openable to reveal the compartment.

308. The surface cleaning apparatus of claim 283 further comprising at least one of a front stabilizer wheel and a rear stabilizer wheel.

309. The surface cleaning apparatus of claim 283 further comprising a front stabilizer wheel and a rear stabilizer wheel wherein the stabilizer wheels are positioned such that only one wheel may contact the floor at a time.

310. A surface cleaning apparatus comprising:

- a) an air flow path extending from a dirty air inlet to a clean air outlet;
- b) a main body comprising a front end, a rear end, first and second opposed sidewalls, and a suction motor provided in the air flow path, at least one of the first and second opposed sidewalls has a compartment that houses an operating component of the surface cleaning apparatus or a portion of the air flow path; and,
- c) a cyclone bin assembly provided in the air flow path, the cyclone bin assembly having opposed end walls.

311. The surface cleaning apparatus of claim 310 wherein the portion of the airflow path comprises at least part of an air flow passage between the cyclone chamber and the suction motor.

312. The surface cleaning apparatus of claim 311 wherein the cyclone bin assembly comprises a cyclone chamber and the suction motor and the cyclone chamber extend transversely.

313. The surface cleaning apparatus of claim 310 wherein the operating component comprises at least one of a filter, batteries, a power cord spool and control electronics.

314. The surface cleaning apparatus of claim 310 wherein the operating component comprises at least one of batteries, a power cord spool and control electronics.

315. The surface cleaning apparatus of claim 310 wherein the compartment is openable.

316. The surface cleaning apparatus of claim 315 wherein each of the first and second opposed sidewalls comprises a wheel and at least one of the wheels is moveable to reveal the compartment.

317. The surface cleaning apparatus of claim 310 wherein the sidewalls overlie at least 75% of end walls of the cyclone bin assembly.

318. The surface cleaning apparatus of claim 310 wherein the sidewalls overlie essentially all of end walls of the cyclone bin assembly.

319. The surface cleaning apparatus of claim 310 further comprising a generally U shaped cavity having an open upper end positioned between the first and second opposed side walls and the cyclone bin assembly is removably mounted in the cavity.

320. The surface cleaning apparatus of claim 319 wherein the cyclone bin assembly seats on a platform in the cavity and the platform comprises a portion of a housing for the suction motor.

321. The surface cleaning apparatus of claim 319 wherein the cavity has an open front end and an open rear end.

322. The surface cleaning apparatus of claim 310 wherein the cyclone bin assembly comprises a cyclone chamber and each of the first and second opposed sidewalls comprises a wheel having a diameter larger than a diameter of the cyclone chamber.

323. The surface cleaning apparatus of claim 310 wherein each of the first and second opposed sidewalls comprises a wheel substantially the same size as the sidewall on which the wheel is provided.

324. The surface cleaning apparatus of claim 310 wherein each of the first and second opposed sidewalls comprises a wheel having a cross sectional area larger than a transverse cross sectional area of the cyclone bin assembly.

325. The surface cleaning apparatus of claim 310 wherein the cyclone bin assembly comprises a cyclone chamber and an openable dirt collection chamber, wherein one of the end walls is an openable wall of the dirt collection chamber.

326. The surface cleaning apparatus of claim 310 wherein the cyclone bin assembly comprises a cyclone chamber that extends transversely, the cyclone chamber comprising a tangential inlet that is provided at the front end of the surface cleaning apparatus.

327. The surface cleaning apparatus of claim 310 wherein main body comprises a suction hose connector upstream of the tangential inlet.

328. The surface cleaning apparatus of claim 310 wherein main body comprises a suction hose connector upstream of the cyclone bin assembly.

329. The surface cleaning apparatus of claim 310 wherein the cyclone bin assembly comprises a cyclone chamber and a dirt collection chamber and the dirt collection chamber is provided exterior to the cyclone chamber and extends at least partially collinearly therewith.

330. The surface cleaning apparatus of claim 310 wherein the cyclone bin assembly comprises a cyclone chamber and a dirt collection chamber and the surface cleaning apparatus further comprises a pre-motor filter which has a cross sectional area that is larger than a transverse cross sectional area of the cyclone chamber.

331. The surface cleaning apparatus of claim 330 wherein the pre-motor filter is provided in one of the first and second opposed sidewalls.

332. The surface cleaning apparatus of claim 330 wherein the pre-motor filter has a cross sectional area that is at least 60% of a cross sectional area of the sidewall.

333. The surface cleaning apparatus of claim 330 wherein the pre-motor filter has a cross sectional area that is proximate that of the sidewall.

211. The surface cleaning apparatus of claim 208 wherein the axis of rotation that projects through the filter.

212. The surface cleaning apparatus of claim 186 wherein the one of the wheels is rotational mounted on a bearing surface and the bearing surface is threadedly mounted to the surface cleaning apparatus.

213. The surface cleaning apparatus of claim 212 the one of the wheels is removable by rotation of the bearing surface in a direction opposite to a direction of forward rotation of the wheel.

214. A cyclone bin assembly comprising:

- a) a cyclone chamber having an air inlet, an air outlet, a dirt outlet and first and second opposed ends; and,

- b) a dirt collection chamber in communication with the dirt outlet and surrounding at least a portion of the cyclone chamber, the dirt collection chamber comprising a first opposed end and a second opposed end and comprising a first portion and a second portion, the dirt outlet is positioned adjacent the second opposed end of the dirt collection chamber;

- c) the first portion and the second portion comprising discrete chambers that are separated from each other by a passage extending between the dirt outlet and a wall of the dirt collection chamber, the first and second portions have first and second sides, the first side positioned adjacent the passage and the second side angularly spaced from the passage; and,

- d) the second portion has a divider wall that extends inwardly towards the second opposed end of the dirt collection chamber from the first opposed end of the dirt collection chamber and the divider wall is spaced from the second side.

215. The cyclone bin assembly of claim 214 wherein the divider wall is positioned adjacent the first side.

1/16

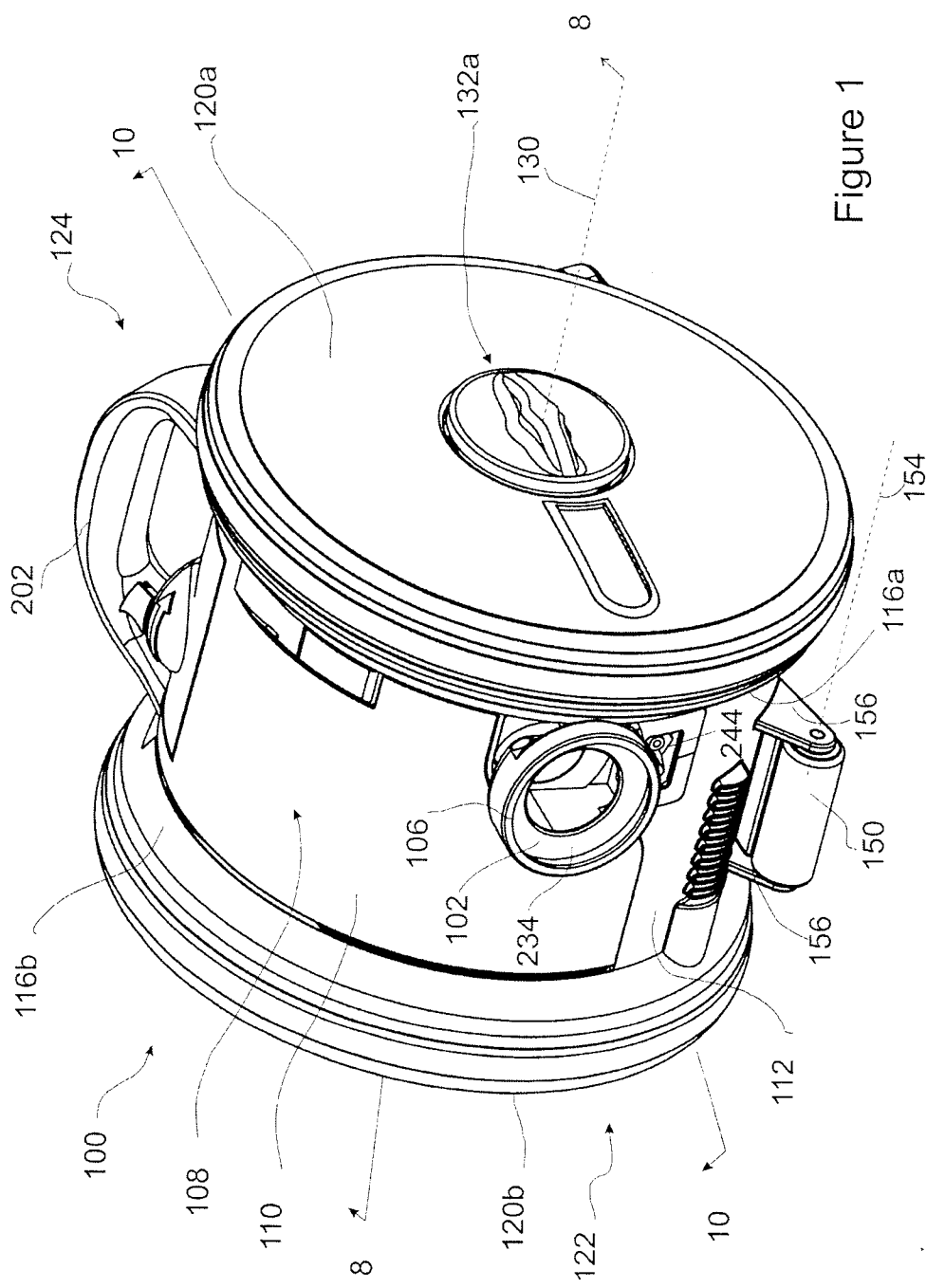


Figure 1

2/16

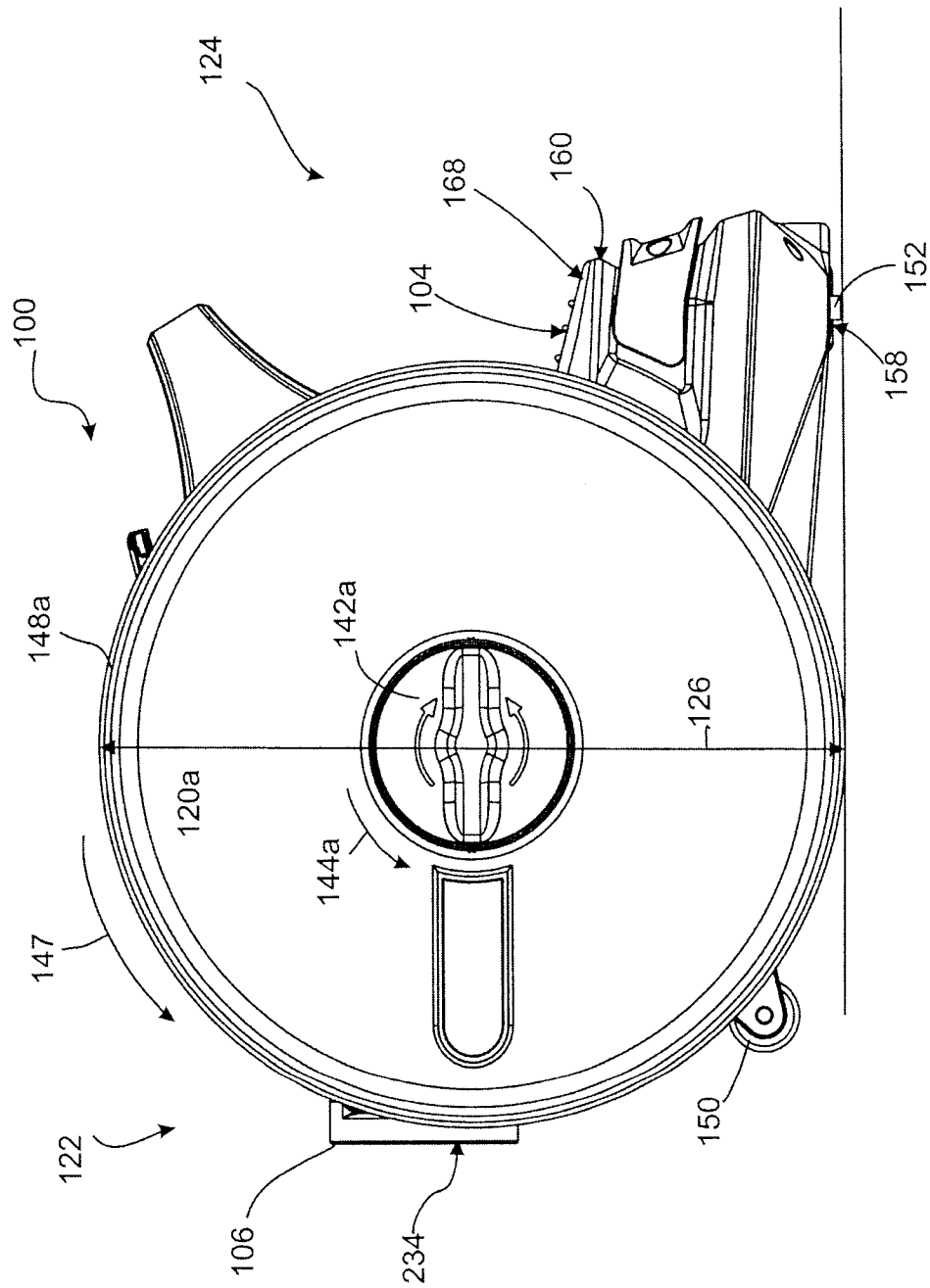


Figure 2

3/16

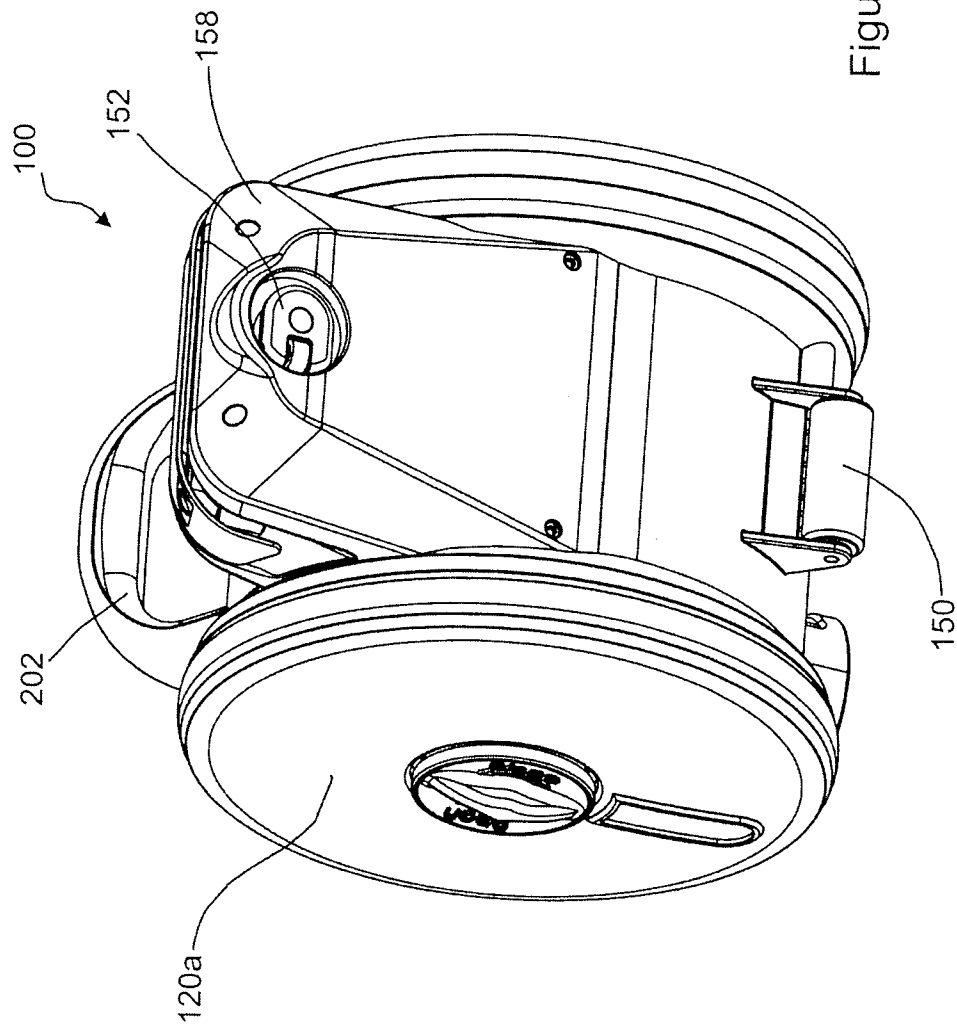


Figure 3

4/16

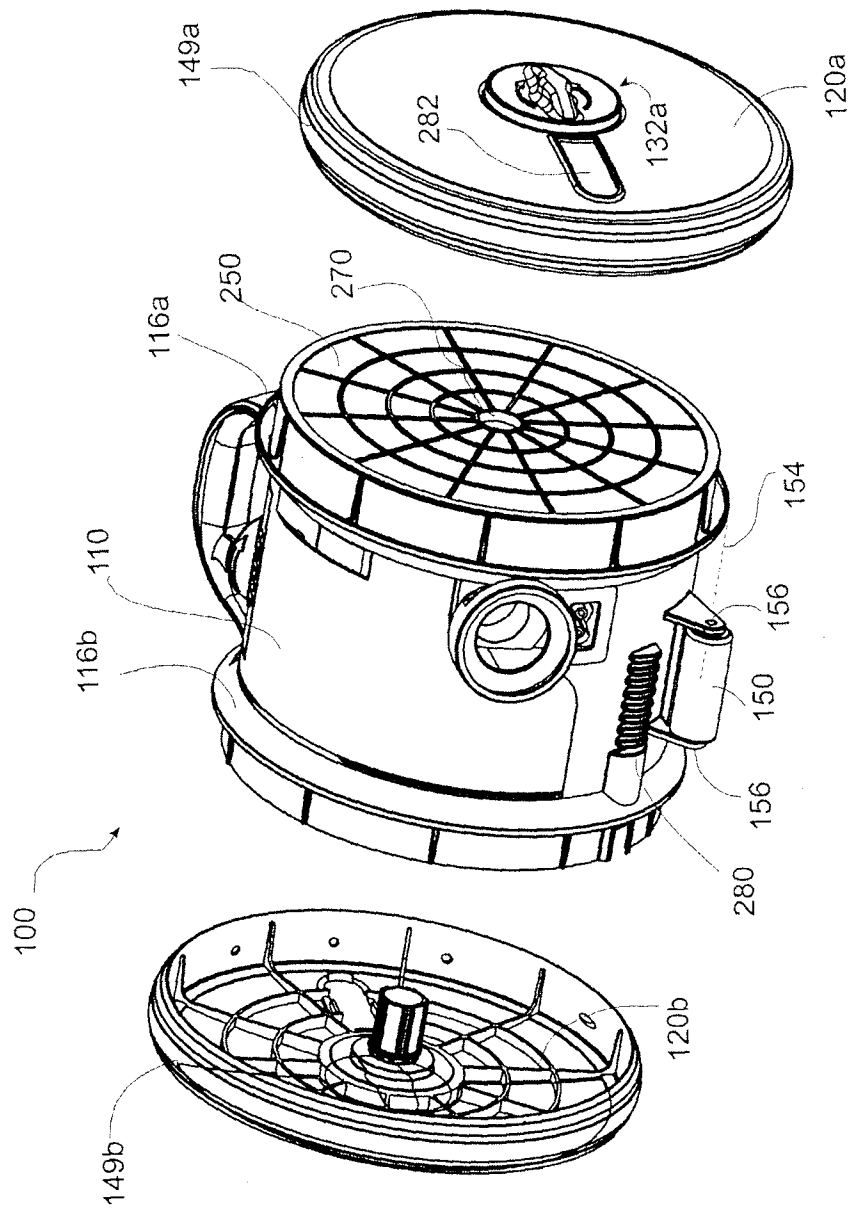


Figure 4

5/16

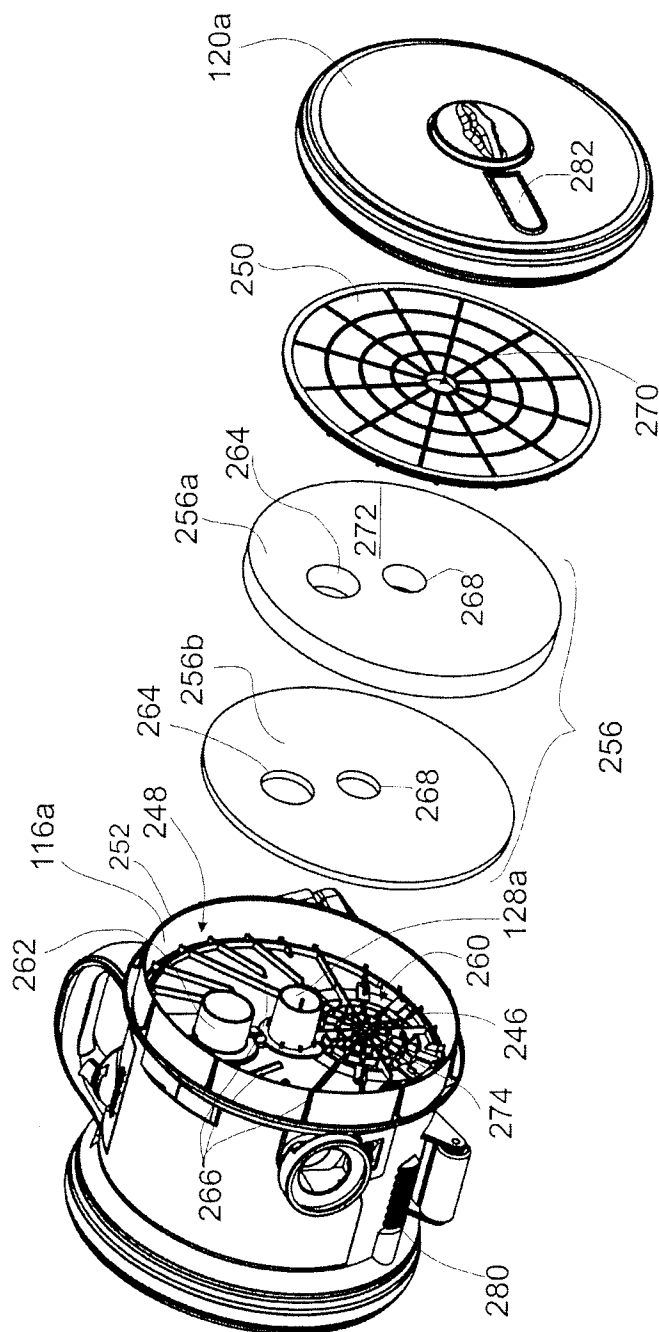


Figure 5

6/16

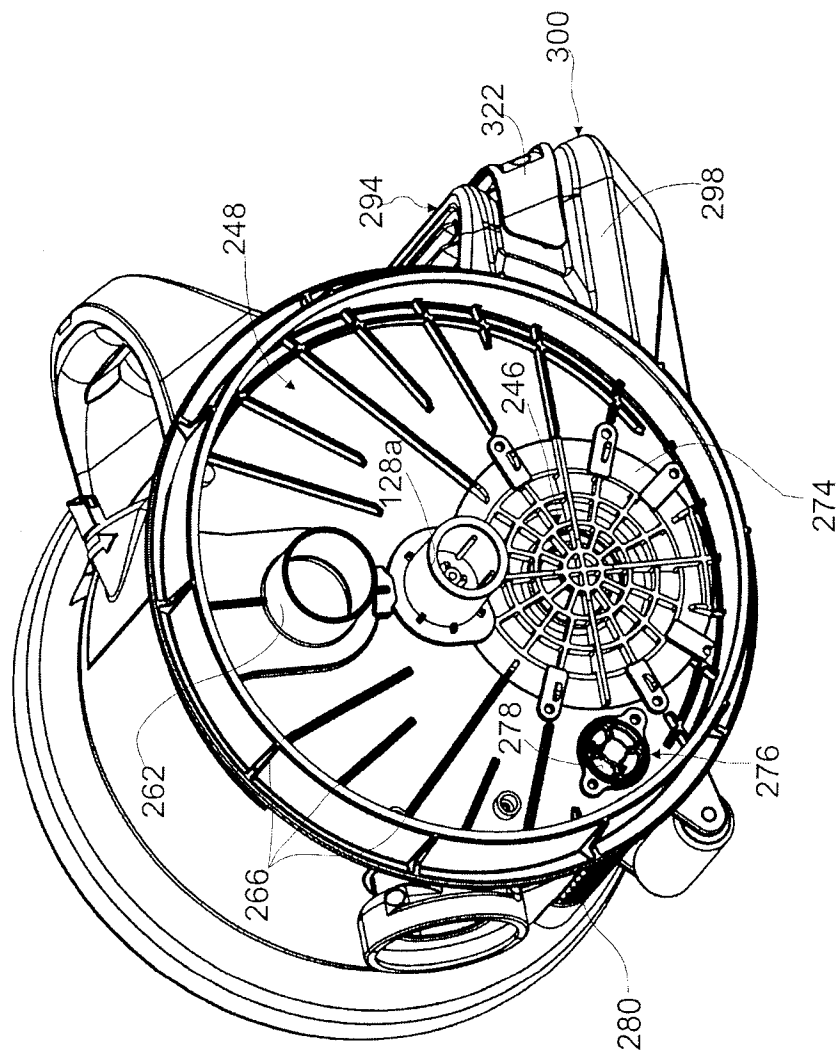


Figure 6

7/16

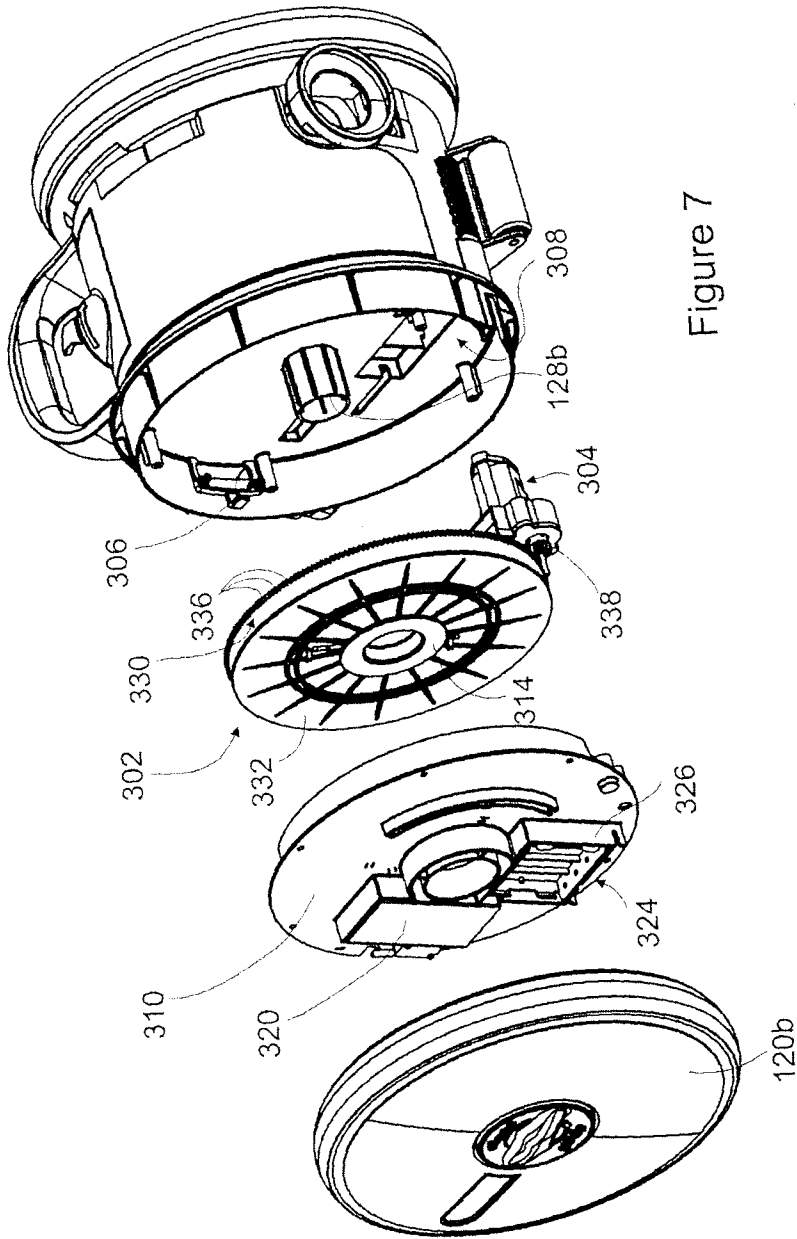


Figure 7

8/16

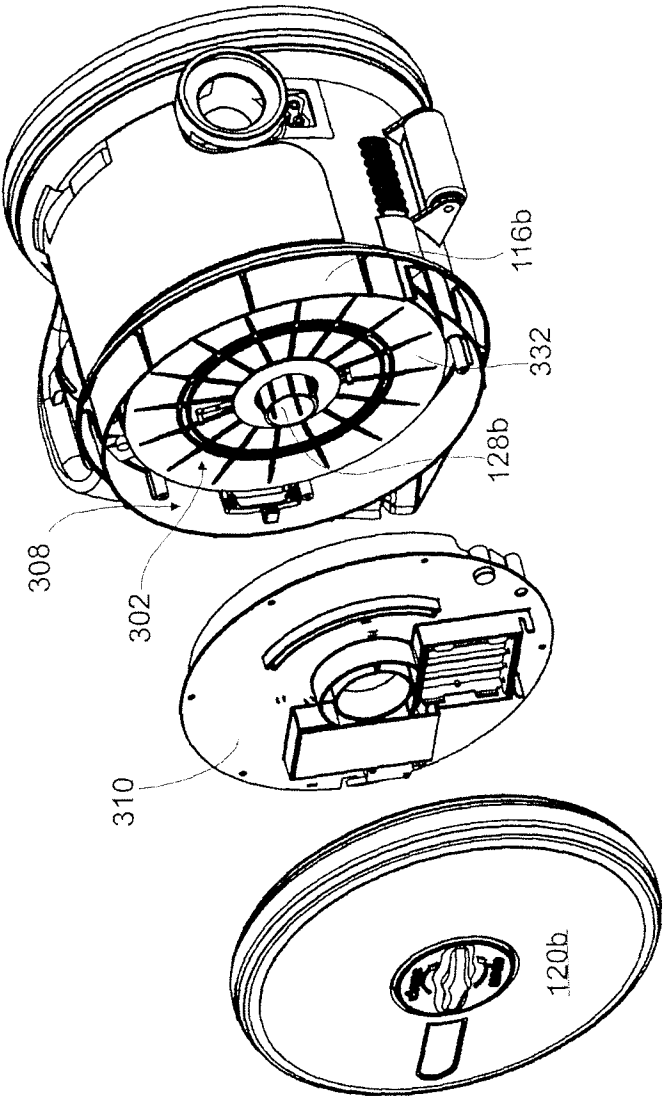


Figure 7a

9/16

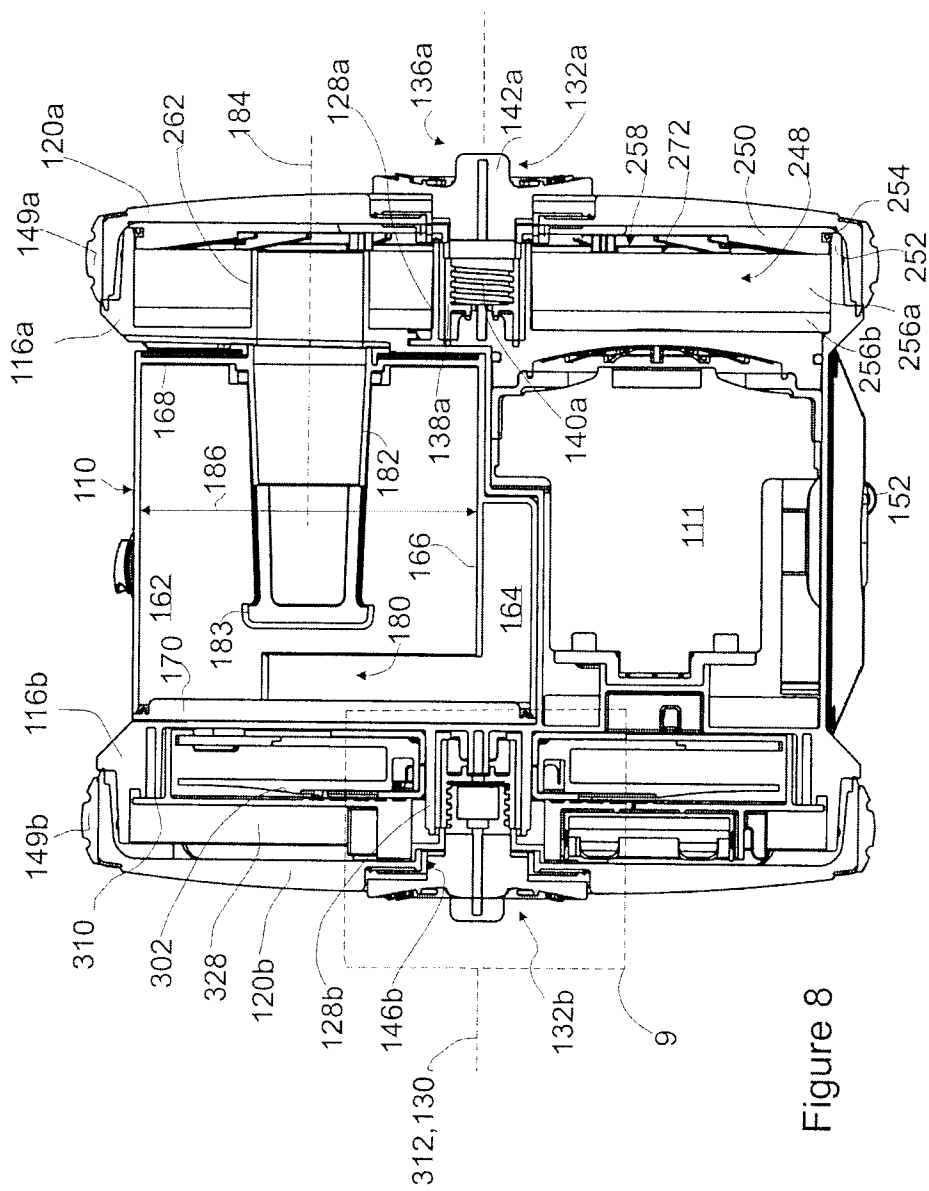


Figure 8

10/16

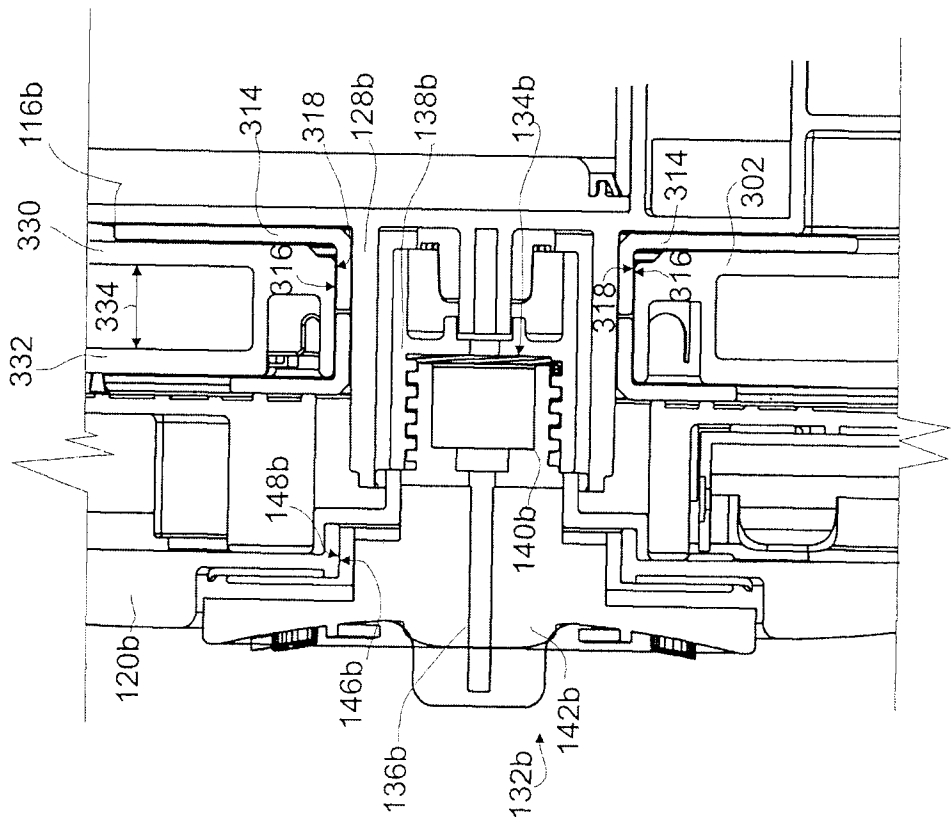


Figure 9

11/16

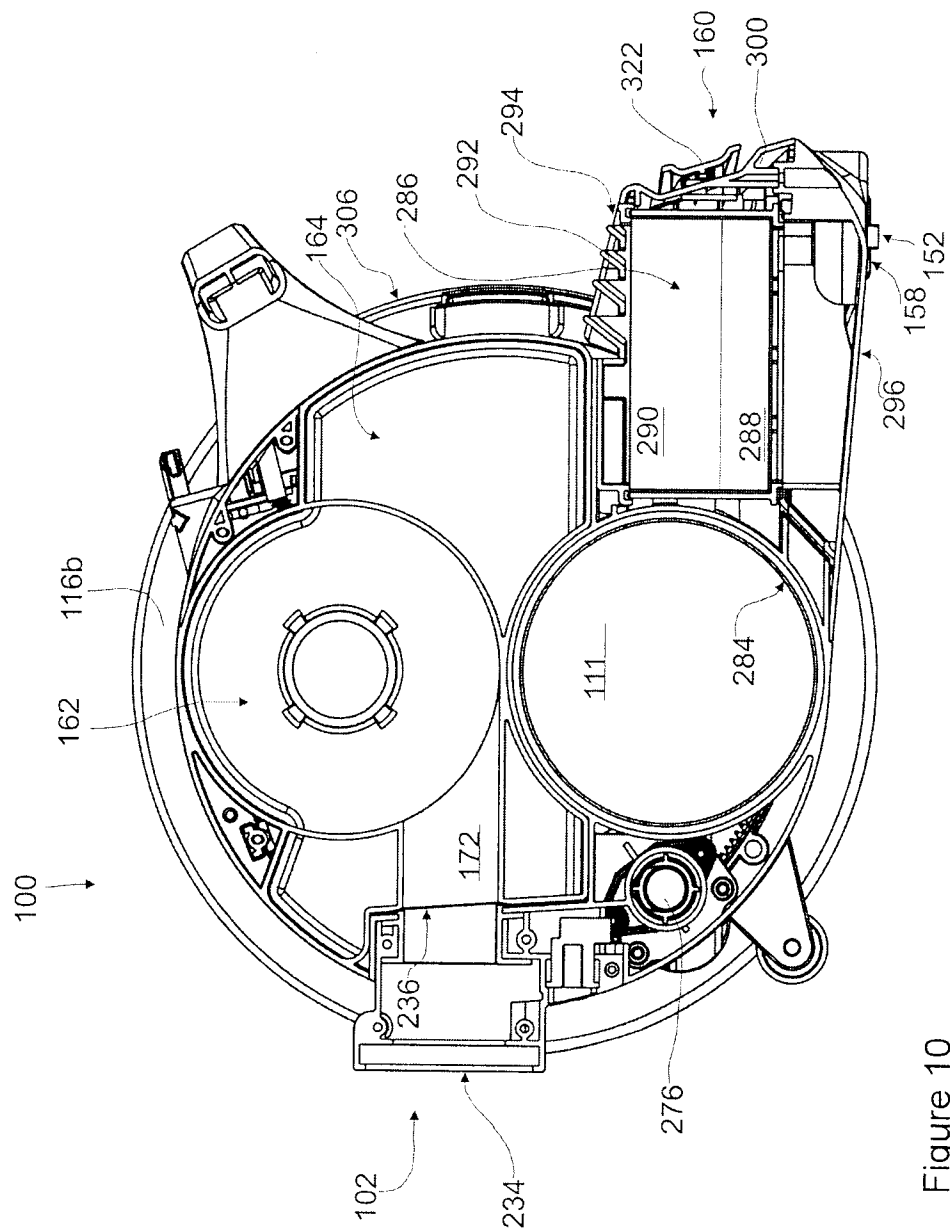


Figure 10

12/16

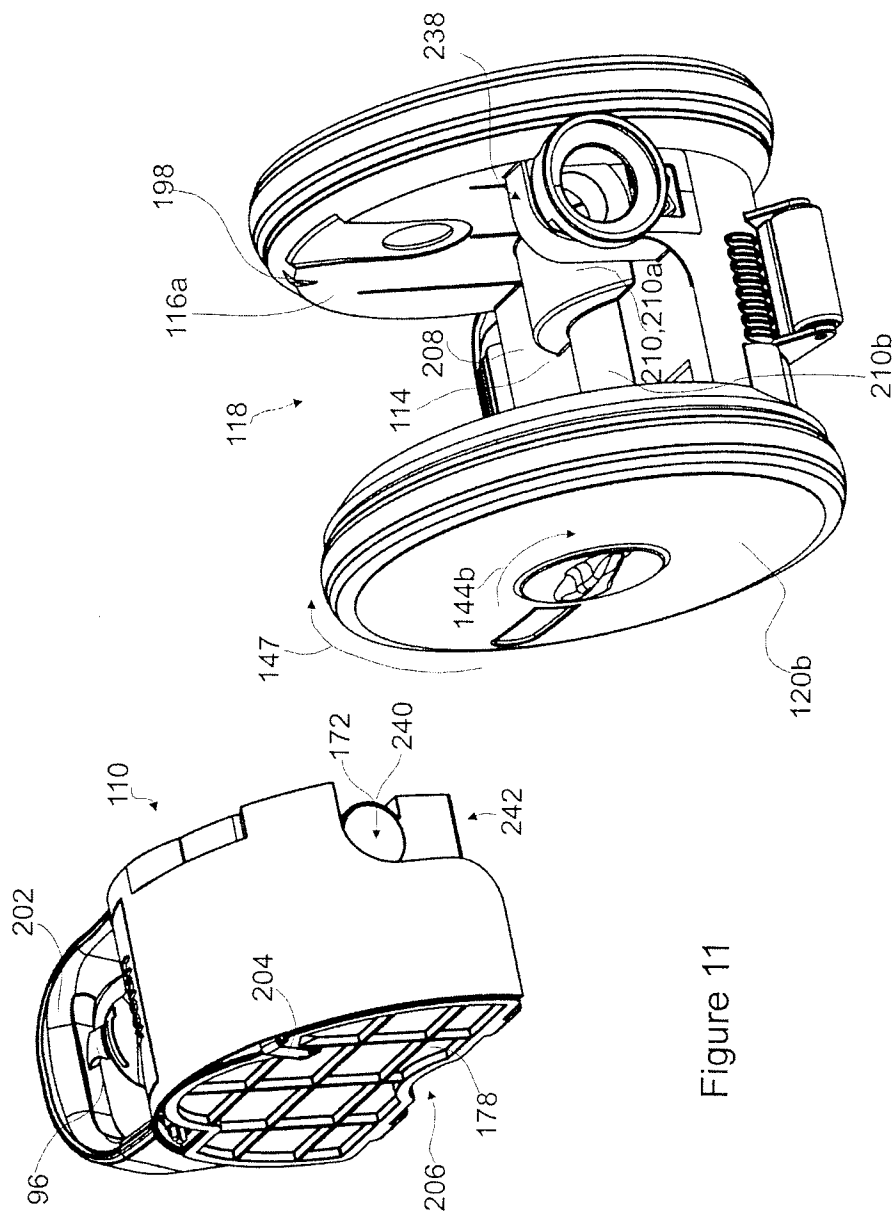


Figure 11

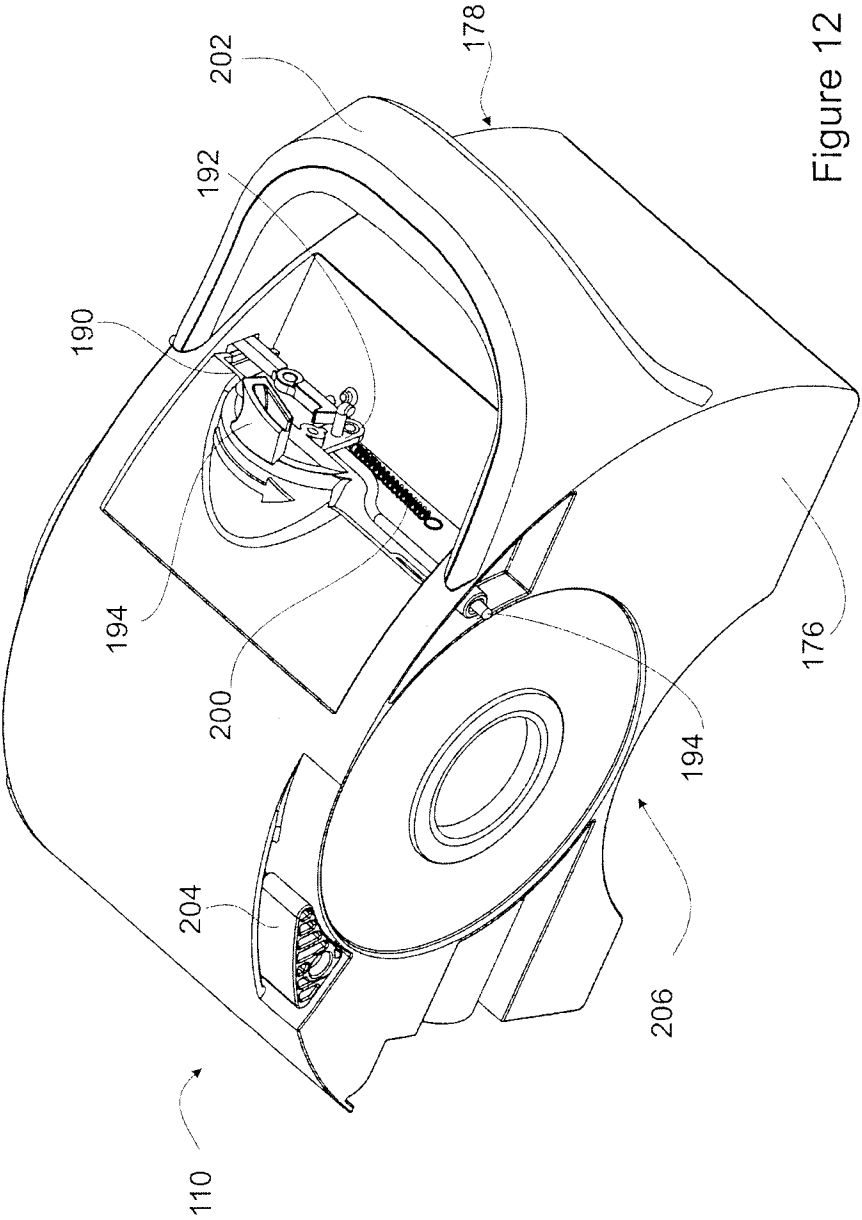


Figure 12

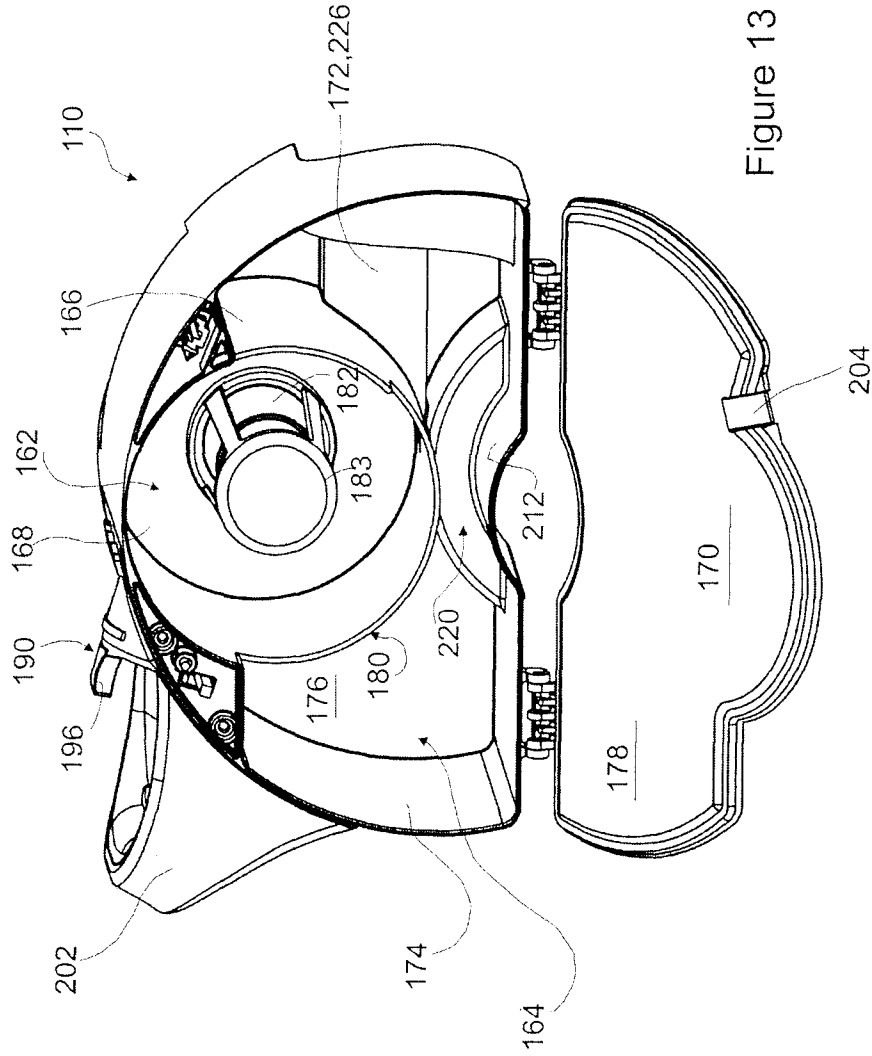


Figure 13

15/16

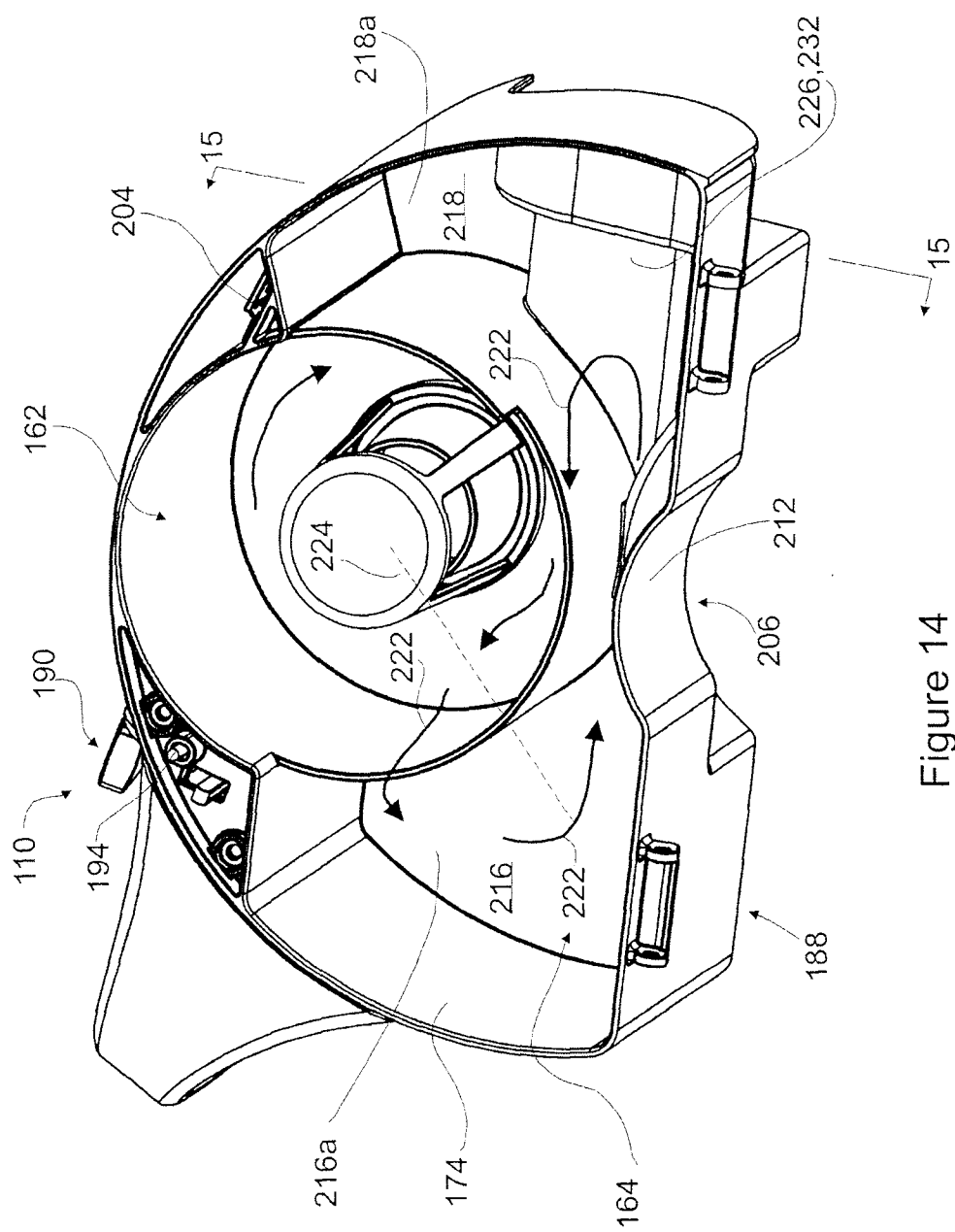


Figure 14

16/16

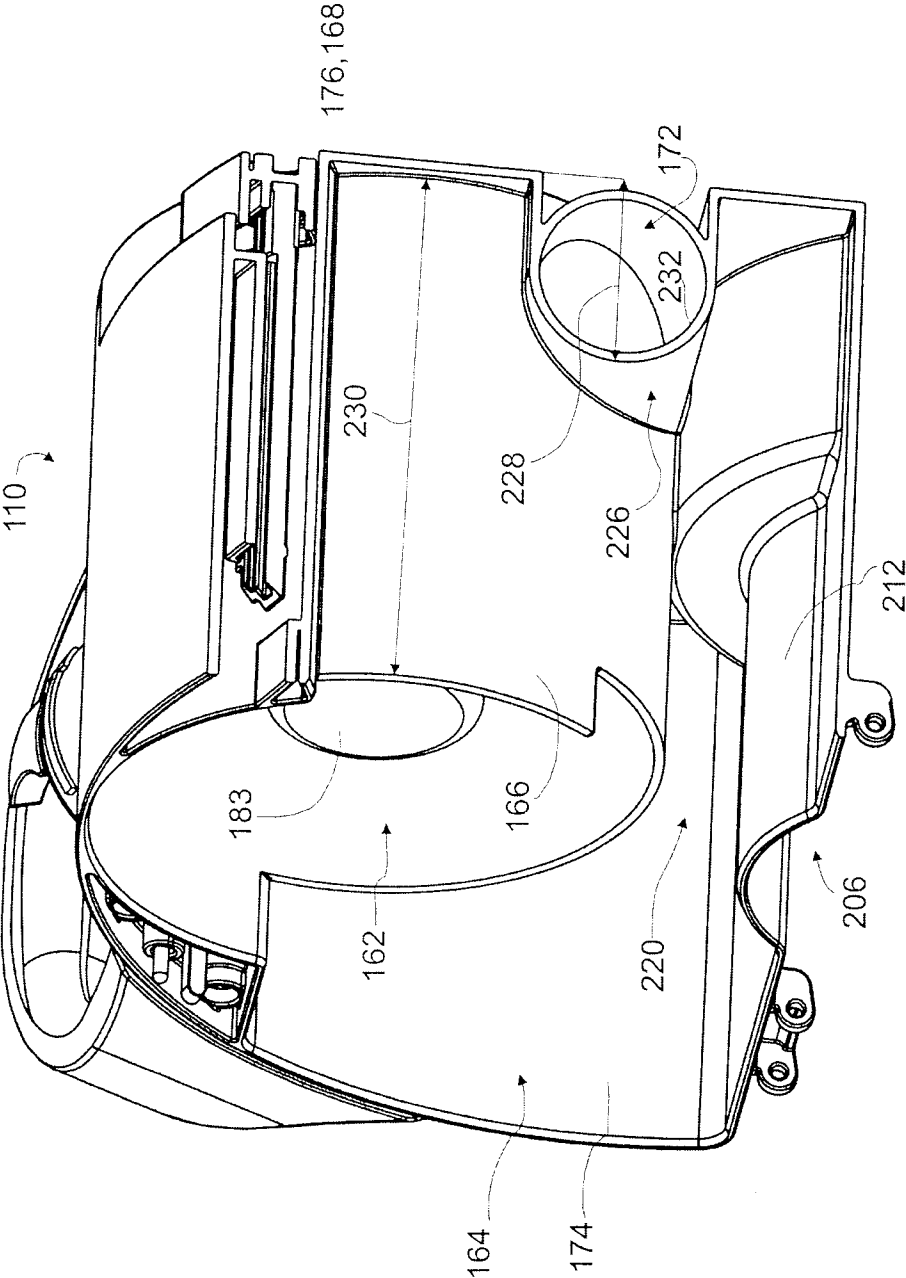


Figure 15

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2012/000184

A. CLASSIFICATION OF SUBJECT MATTER

IPC: **A47L 9/16** (2006.01) , **A47L 5/36** (2006.01) , **A47L 9/00** (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 9/16**, **A47L 5/36**, **A47L 9/00**

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)

Epoque (Epodoc), Total Patents(Major text databases), Google, Canadian Patents database Keywords: cyclon*, ((dirt or dust) and (collection chamber or cup or bin or chamber)), protection, rib or wall, wheel, motor prefilter

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO2010/112880A1 (Dyson, J et al.) 7 October 2010 (07.10.2010) *Abstract; Fig. 6; Fig. 11; pg. 26, lines 7-18*	1, 4-14, 19-26
X Y	WO2009/053676A2 (Courtney, S) 30 April 2009 (30.03.2009) *Abstract; Fig. 1-5 *	1, 4-14, 19-23, 25-26 15-18
X Y	EP2201875A2 (Luo, M et al.) 30 June 2010 (30.06.2010) *Abstract; Fig. 2-5 *	1-3, 6, 9-15, 19 15-18
X	EP1674009 A2 (Hwang, M et al.) 28 June 2006 (28.06.2006) *Abstract; Fig. 3; Fig. 9*	1-3, 9-14, 19
A	JP2002-355198 (Koichi, U et al.) 10 December 2002 *Fig. 3; Fig. 12*	1-26
A	US2621756 (Senne, E) 16 December 1952 *Fig. 1; Fig. 3; Fig. 10*	1-26

☐ 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

30 May 2012 (30-05-2012)

Date of mailing of the international search report

06 June 2012 (06-06-2012)

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

Sean Wilkinson (819) 934-9086

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 :

Continued in Supplemental Box .

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. : 1-29

- 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.

Unity Continued

The claims are directed to a plurality of inventive concepts as follows:

Group A - Claims 1-26 are directed to protective side walls of a vacuum housing.

Group B - Claims 27-54 are directed to locking a cyclonic bin to a housing.

Group C - Claims 55-78, 121-165, 186-213 are directed to a component located on a housing behind a wheel.

Group D - Claims 79-100 are directed to a filter housing adjacent an air treatment member.

Group E- Claims 101-120 are directed to stabilizer wheels.

Group F - Claims 166-185, 310-333 are directed to side walls of a vacuum housing having a component therein.

Group G - Claims 214-282 are directed to discrete chambers that are separated by a passage.

Group H- Claims 283-309 are directed to the diameter of a wheel being larger than the diameter of the cyclonic chamber.

The claims must be limited to one inventive concept as set out in Rule 13 of the PCT.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CA2012/000184

Patent document Cited in Search report	Publication Date	Patent Family Member(s)	Publication Date
WO2010112880 A1	07-10-2010	EP2413760 A1	08-02-2012
		KR20110131235 A	06-12-2011
		AU2010231168 A1	22-09-2011
		CA2754958 A1	07-10-2010
		JP2010240450 A	28-10-2010
		CN101849802 A	06-10-2010
		US2010242215 A1	30-09-2010
		GB2469049 A	06-10-2010
WO2009053676 A2	30-04-2009	CN101455540 A	17-06-2009
		CN101455540B B	09-02-2011
		JP2009101162 A	14-05-2009
		KR20100083160 A	21-07-2010
		EP2214544 A2	11-08-2010
		AU2008315788 A1	30-04-2009
		AU2008315788B B2	21-07-2011
		US2009106932 A1	30-04-2009
		US8112842 B2	14-02-2012
		GB2453995 A	29-04-2009
		GB2453995 B	25-01-2012
EP2201875 A2	30-06-2010	CN101756675 A	30-06-2010
		AU2009227855 A1	08-07-2010
		US2010154367 A1	24-06-2010
		US8062398 B2	22-11-2011
EP1674009 A2	28-06-2006	RU2304424 C1	20-08-2007
		KR20060074618 A	03-07-2006
		KR100697429B B1	20-03-2007
US2621756 A	16-12-1952	- -	
JP2002355198 A	10-12-2002	- -	