Aug. 18, 1970 L. A. WOLF 3,524,211

VACUUM CLEANER WITH AIR DIRECTOR TUBE

Filed July 5, 1968 2 Sheets-Sheet 1

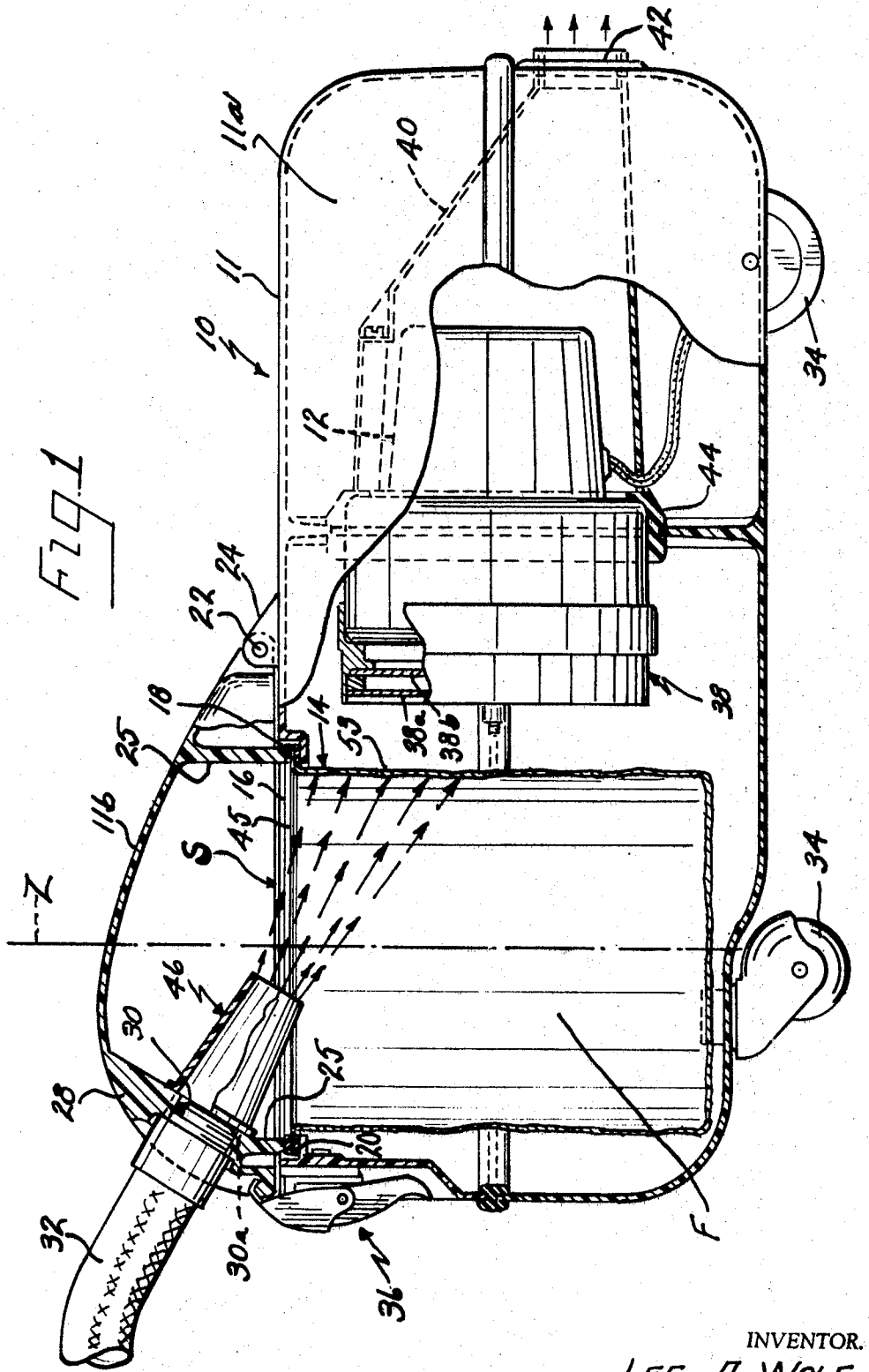


FIG. 1

INVENTOR.
LEE A. WOLF
BY
Baldwin, Egan, Walling & Fetzer
ATTORNEYS

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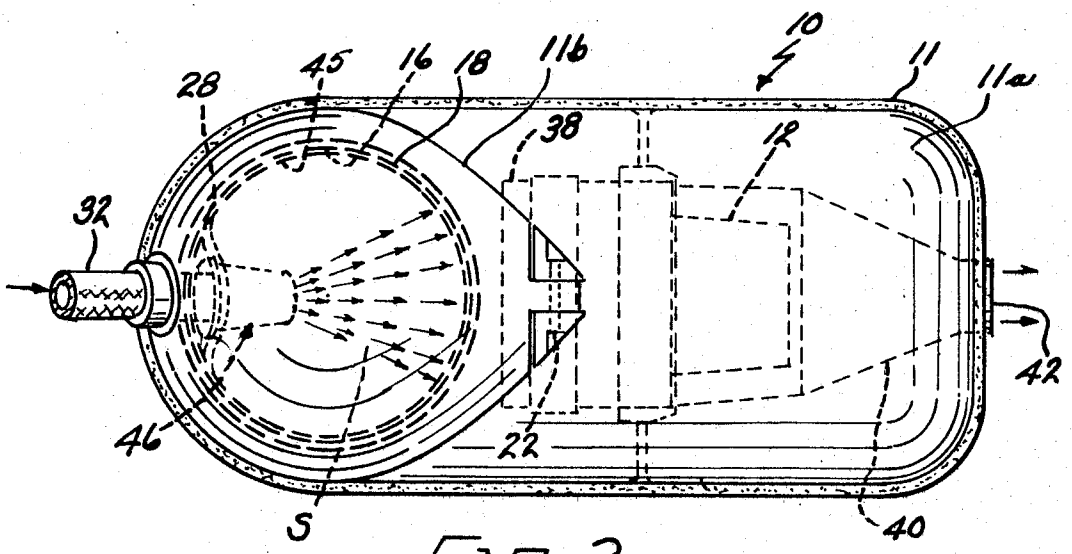


Fig. 2

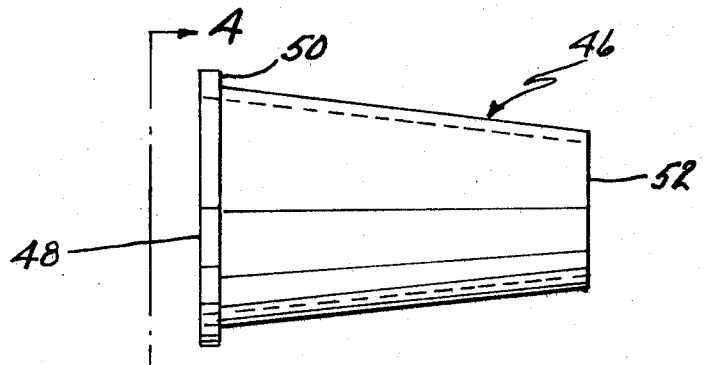


Fig. 3

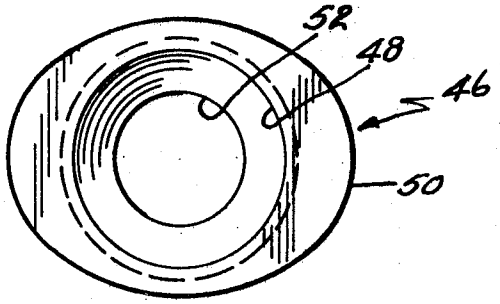


Fig 4

INVENTOR.
LEE A. WOLF
BY
Baldwin, Egan, Walling & Fetzer
ATTORNEYS

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3,524,211

VACUUM CLEANER WITH AIR DIRECTOR TUBE

Lee A. Wolf, Cincinnati, Ohio, assignor to Haley Corporation, Cincinnati, Ohio, a corporation of Ohio

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Int. Cl. A47l 5/36
U.S. Cl. 15—327 8 Claims

ABSTRACT OF THE DISCLOSURE

A cannister-type vacuum cleaner comprising a casing having a suction unit mounted in the casing and a dust collecting unit such as a formanious dust bag, mounted in the casing and having air directing means extending interiorly of the casing and adapted to direct the air flow toward the interior of the foraminous wall of the dust collecting unit, thereby maintaining at least a portion of the foraminous wall clear of a layer of debris and thus maintaining the cleaning efficiency of the vacuum cleaner.

This invention relates in general to vacuum cleaners and more particularly to vacuum cleaners of the enclosed bag type or as generally known in the art, cannister-type vacuum cleaners.

In a cannister-type vacuum cleaners, the cleaner casing conventionally has a dust separator opening therein in which is mounted a dust bag with a cover closing the opening, and the conventional air hole in the casing is generally adapted to be attached by means of a flexible hose to a cleaning tool, thus communicating the tool with the dust bag, the latter collecting the dust and dirt therein upon operation of the cleaner. As the cleaner is operated, the dust bag fills up with dust and dirt, and usually the foraminous walls of the dust bag become lined with a layer of dust and debris, which cuts down on the effectiveness of the suction produced by the suction unit of the vacuum cleaner. This accumulation of a layer of debris on the interior of the foraminous wall of the dust bag not only materially decreases the efficiency of the suction of the cleaner, but if allowed to accumulate over too long a period of time without cleaning the bag may even result in the burning out of the motor of the suction unit.

The present invention provides a novel vacuum cleaner of the enclosed bag or cannister type which includes an air director means coacting with the usual air hole in the cleaner, for directing the air stream against the interior surface of the foraminous wall of the dust bag, so as to effectively maintain at least a portion of the foraminous wall substantially clear of debris and dust, thereby maintaining the suction efficiency of the cleaner.

Accordingly, an object of the invention is to provide a novel vacuum cleaner of the enclosed bag type or cannister type.

Another object of the invention is to provide a novel vacuum cleaner of the enclosed bag or cannister type which includes means coacting with the air hole in the cleaner for directing the flow of inlet air against a portion of the interior of the associated dust bag, for maintaining such portion substantially free of debris or dust.

A further object of the invention is to provide a novel cleaner of the enclosed bag type which includes a tubular-like member coacting with the air inlet hole of the cleaner and with the dust bag in the cleaner, for directing the air stream toward the interior of a side of the generally vertically oriented dust bag, for maintaining at least a portion of the side clear of debris, so that the suction efficiency of the cleaner is maintained.

A still further object of the invention is to provide a novel cannister-type vacuum cleaner which includes a

housing having a dust separator opening therein with a dust bag mounted in the opening and a closure for the dust separator opening with the closure having an air hole therein adapted for connection to a cleaning tool or the like for cleaning a surface and with the cleaning tool communicating via the air hole with the dust bag, and with there being an air director tube coacting with the air hole for directing the stream of air against an interior side surface section of the bag adjacent the upper portion thereof, thereby maintaining the suction efficiency of the suction unit of the cleaner even through the dust bag becomes substantially filled with debris picked up from the surface being cleaned.

A still further object of the invention is to provide a novel air director tube adapted for use with a cannister type vacuum cleaner for maintaining the efficiency of the cleaner even through the dust bag of the cleaner is not emptied as often as desirable.

Other objects and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a partially broken, partially sectioned side elevational view of an enclosed bag-type vacuum cleaner embodying the invention;

FIG. 2 is a reduced size, top plan view of the cleaner illustrated in FIG. 1;

FIG. 3 is an enlarged side elevational view of the air director tube illustrated in FIG. 1;

FIG. 4 is an end elevational view of the air director tube taken generally along the plane of line 4—4 of FIG. 3, looking in the direction of the arrows.

Referring now again to the drawings there is illustrated a cannister type or enclosed bag-type vacuum cleaner **10** which includes a casing **11** housing a suction creating means **12**, such as a combined fan and electrical motor unit, and a dust collecting unit **14**, such as a foraminous dust bag or dirt collecting receptacle, mounted in the casing **11** upstream from the suction unit **12**. The casing **11** in the embodiment illustrated may comprise a longitudinally elongated body shell **11***a* which is provided in the embodiment illustrated with a top circular opening **16** in which the dust collecting unit or bag **14** is removably disposed, and a pivoted closure member **11***b* for opening **16**. Bag **14** may be provided with a detachable resilient ring **18** which is mounted on the circular flange **20** defining the opening **16**.

Closure member or cover **11***b* in the embodiment illustrated is pivoted as at **22** to lugs **24** on the vacuum cleaner body **11***a*. Cover **11***b* is of hollow construction and of streamlined dome-like exterior configuration, and embodies a generally circular continuous flange **25** thereon projecting from the underside thereof, which is adapted to engage the resilient sealing ring **18** and seal the cover with respect to the body **11***a* and the sealing ring. The cover may include a forward diagonally oriented wall portion **28** which has an air hole **30** therethrough communicating the interior of the cover with the exterior fo the casing. Hole **30** may be threaded as at **30***a* and is adapted to receive a conventional flexible hose **32** which in turn is adapted for coupling to a conventional cleaning tool (not shown) for cleaning a surface or the like.

The casing **11** may have traction means **34** which in the embodiment illustrated are wheels rotatably mounted thereon, for facilitating movement of the vacuum cleaner along a floor surface, and with the vacuum cleaner being adapted for instance to be pulled along a floor surface by an operator moving the aforementioned cleaning tool and hose **32**.

A releasable latching mechanism **36** may be provided for securely latching the cover **11***b* to the body **11***a* for maintaining an airtight relationship between the cover and the body shell via the sealing ring **18**.

The suction unit 12 may have replaceable filter means 38 mounted thereon in encompassing relation, including removable filter discs 38*a*, 38*b*, for filtering the air passing through the fan of the suction unit. An exhaust housing 40 may coact with the fan of the suction unit 12, for directing the air flow from the pressure side of the fan toward the rearward exit opening 42 in the exhaust housing. Opening 42 is disposed rearwardly of the cleaner body shell 11*a* and may facilitate movement of the vacuum cleaner along a floor surface. The suction unit 12 may be mounted on anti-vibration gasket 44 which coacts with web means 46 formed on the interior of the body 11*a* for mounting the suction unit in a generally longitudinally oriented condition in the body, thus maintaining the lengthwise axis of the suction unit substantially horizontal and in general alignment with the vertical axis of the dust collecting unit 14.

The dust collecting unit 14 may be formed of any suitable material or materials, such as cloth or paper, having at least predetermined portions of the side wall thereof foraminous for the passage of air therethrough coming from the flexible hose through the air hole 30, while retaining the dust and other debris on the interior of the dust collecting bag. As can be seen in FIG. 1, bag 14 is closed at its bottom end and open at its upper end to form inlet aperture 45 to the bag.

Mounted on wall portion 28 of the cover 11*b* and disposed in encircling relationship to the air hole 30, there is provided air directing means 46 for directing the air stream entering the vacuum cleaner casing at hole 30 toward the interior surface of a side wall portion of the dust collecting unit 14. Air director means 46 in the embodiment illustrated comprises a tubular-like member of circular configuration in cross-section, with the entry end 48 of member 46 being provided with a flange 50, which may be attached by any suitable means, and for instance by an adhesive, to the wall portion 28 of the cover 11*b*. The entry end opening in member 46 is of substantially the same diameter as the diameter of the air hole 30 in the cover 11*b* and thus forms a continuation of the air hole. Member 46 tapers inwardly toward its exit end 52, to form a venturi-like arrangement which increases the velocity of the air flow at the exit end as compared to the entry end of member 46.

Member 46, in the embodiment illustrated, is directed diagonally downwardly at an angle of approximately 30° with respect to the horizontal, with the air stream S being directed toward the confronting interior surface of upper portion 53 of the dust collecting unit 14. The comparatively high velocity impingement of the air stream on the confronting interior surface of the dust bag maintains such impinged area of the dust bag clear of debris and dust, with the dust and debris tending to be urged below the air stream and toward the forward portion F of the dust bag. This effectively maintains a portion of the interior of the foraminous side wall of the dust bag open for passage of the air stream therethrough while trapping the dust on the interior of the bag, thus maintaining the efficiency of the suction produced by suction unit 12.

As can be best seen in FIG. 1, member 46 extends from air hole 30 closely adjacent to the vertical transverse plane Z passing through the vertical axis of the dust bag, with a portion of the exit end 52 of member 46 being disposed below the horizontal plane of the inlet aperture 45 to the dust bag. Moreover the lengthwise axis of the air director member 46 intersects the confronting interior surface of the dust bag above a horizontal plane passing through the longitudinal axis of the suction unit 12 which as aforementioned is mounted in generally longitudinally extending relation in the body housing 11*a* of the vacuum cleaner. Such an arrangement helps to insure that the portion of the dust bag disposed in confronting relation to the air director exit end 52 will be maintained debris-free as long as possible, while the bag is filling with debris and dust from a surface being cleaned, therefore maintaining the suction efficiency of the suction unit.

A specific dimensional arrangement for member 46 which has been found to operate highly effectively in vacuum cleaners having a vacuum suction at air hole 30 within a range of between approximately 55 to 100 inches of water lift and with a dust bag of approximately 6¾" diameter is an air director member having a length of approximately 2¾", an entry end opening of approximately 1 9/16" and an exit end opening of approximately 1⅛", resulting in a director tube converging at an angle from the entry end to the exit end at approximately 5° with respect to the horizontal (as viewed in FIG. 3).

It will be seen that with the air director member attached to the cover 11*b* of the vacuum cleaner casing, the cover can be readily pivoted upwardly upon unlatching of latch mechanism 36, to permit ready accessibility to the dust collecting bag, and without any interference whatsoever with removal of the dust collecting unit.

From the foregoing discussion and accompanying drawings it will be seen that the invention provides a novel vacuum cleaner of the enclosed bag type and having air directing means coacting with the air hole in the casing of the vacuum cleaner for maintaining the suction efficiency of the suction unit even though the dust collecting unit becomes substantially filled with dust and debris.

The terms and expressions which have been used are used as terms of description and not of limitation and there is no intention in the use of such terms and expressions of excluding any equivalents of any of the features shown or described.

I claim:

1. In a canister-type vacuum cleaner comprising, a casing having a suction air hole therein, said hole being adapted to receive a vacuum cleaner hose or the like for communication with the interior of said casing, a suction unit in said casing, a dust collecting unit in said casing disposed forwardly of said suction unit, said dust collecting unit havnig an air inlet aperture and comprising a generally vertically oriented bag having a side wall comprised of air permeable material and being open at the top thereof to form said inlet aperture, and means coacting with said hole and extending interiorily of said casing toward said side wall for directing air flow occasioned by energization of said suction unit, from said suction air hole toward said side wall, said suction air hole being disposed at a higher elevation than said aperture, said means comprising a tubular-like member coupled to said suction air hole and extending diagonally downwardly toward said side wall, said tubular-like member comprising an inlet opening at one end and an outlet opening at the other end, said outlet opening being of a smaller size than said inlet opening, said outlet opening being disposed generally adjacent to a transverse vertical plane passing through the central vertical axis of said bag and disposed generally adjacent to a horizontal plane in which is disposed said inlet aperture in said bag, said air flow from said outlet opening being adapted to strike said side wall in a diagonally downwardly direction commencing generally adjacent the upper end thereof to maintain at least a portion of said side wall clear of dust and debris, the impact of the blast of air from said member against said side wall being disposed generally above a horizontal plane passing through the vertical midpoint of said bag.

2. A vacuum cleaner in accordance with claim 1 wherein said tubular-like member is tapered in a lengthwise direction commencing at said inlet end.

3. A vacuum cleaner in accordance with claim 1 wherein said tubular-like member includes a flange on the inlet end thereof attached to said casing and in encompassing relation to said hole.

4. A vacuum cleaner in accordance with claim 1 wherein said diagonal direction of said tubular-like member is at an angle of approximately 30 degrees with respect to the horizontal.

5. A vacuum cleaner in accordance with claim 1 wherein said casing comprises a longitudinally elongated hollow body, said body including an opening in the top thereof providing accessibility to the interior of said body and closure means for said body opening, said dust collecting unit being disposed in said body opening with the inlet aperture thereof disposed in a substantially horizontal plane generally coplanar with the plane body of said opening, said dust collecting unit separating said suction unit from said hole whereby the air stream produced by said suction unit has to flow through said dust collecting unit, said hole being disposed in said closure above said inlet aperture, and said tubular-like member being mounted on said closure for movement therewith and extending diagonally downwardly toward said side wall in the direction of said suction unit in the closed position of said closure.

6. A vacuum cleaner in accordance with claim 5 wherein said closure comprises a dome-like member movably mounted to said housing, said tubular-like member in the closed position of said closure extending downwardly toward the plane of said inlet aperture at an angle of approximately 30 degrees with respect to the horizontal with at least a portion of the outlet end of said tubular-like member projecting below the plane of said inlet aperture.

7. A vacuum cleaner in accordance with claim 6 wherein said dust collecting unit comprises a generally vertically oriented flexible dust bag having foraminous sides and a

bottom portion, said suction unit being mounted generally longitudinally in said housing so that the longitudinal axis of said suction unit is substantially horizontal, the lengthwise axis of said tubular-like member intersecting said side wall of said dust bag above a horizontal plane passing through said axis of said suction unit, said tubular-like member extending away from said closure toward said suction unit and terminating forwardly of said vertical plane.

8. A vacuum cleaner in accordance with claim 7 wherein said tubular-like member is of circular configuration in transverse cross section.

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ROBERT W. MITCHELL, Primary Examiner

U.S. Cl. X.R.

15—352; 55—301, 472