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W. J. DAUGHERTY

2,484,491

MOVABLE FILTER TYPE SUCTION CLEANER

Filed July 16, 1947

2 Sheets-Sheet 1

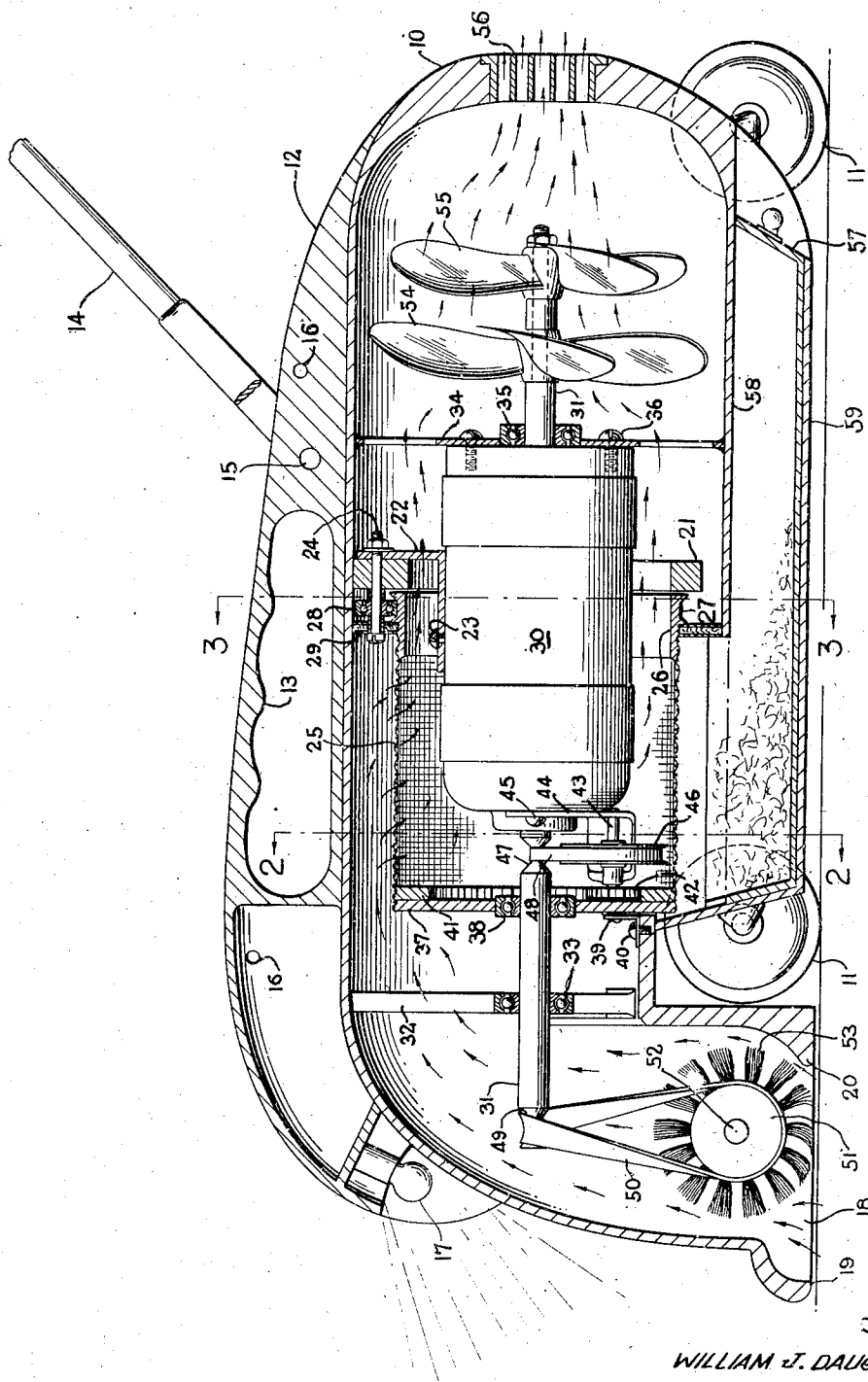


FIG. 1

Inventor

WILLIAM J. DAUGHERTY

Burns & Doane

Attorneys

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W. J. DAUGHERTY

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2 Sheets-Sheet 2

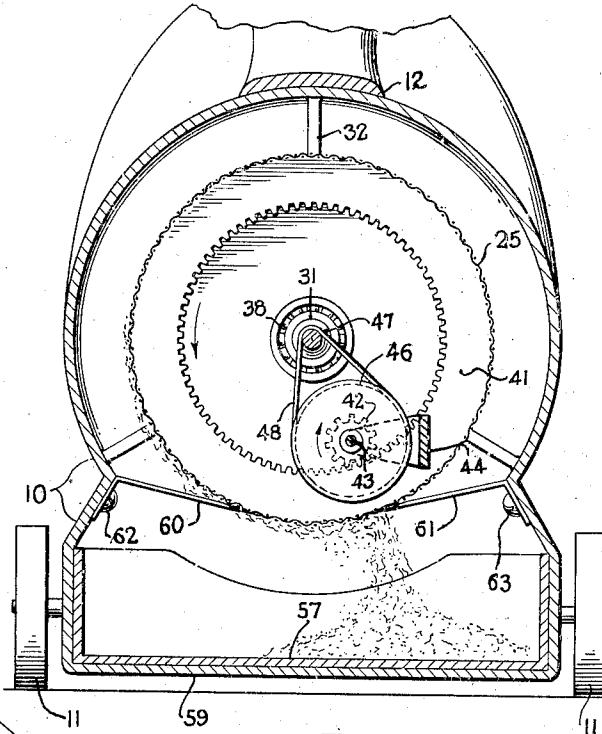


FIG. 2

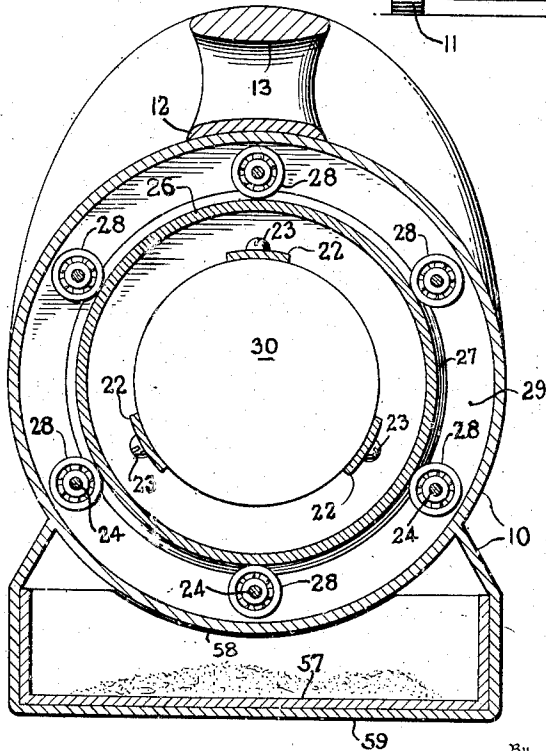


FIG. 3

Inventor

WILLIAM J. DAUGHERTY

By

Burns + Doane

Attorneys

UNITED STATES PATENT OFFICE

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MOVABLE FILTER TYPE SUCTION CLEANER

William J. Daugherty, Cleveland, Ohio

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4 Claims. (Cl. 183—63)

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The present invention relates to an improved suction cleaner.

It is the purpose and object of the present invention to provide a suction cleaner that is self-contained and requires no bag for receiving the dirt picked up by the cleaner.

Additionally, it is the purpose and object of the invention to provide such a bagless suction cleaner which is free from excessive vibration and one in which the action of centrifugal force is not relied upon to effect separation and collection of the dirt.

More specifically, it is the purpose and object of the invention to provide a suction cleaner in which the dirt laden air is drawn through a suction port and thence through a slowly rotating filter, the dirt retained on the filter being automatically removed and deposited in a removable dirt receiving drawer.

Further and additional objects and advantages of the invention will be made apparent as the description proceeds, which will be given in relation to the accompanying drawings forming a part hereof and in which:

Figure 1 is a longitudinal sectional view through the housing of the suction cleaner showing the operative parts thereof;

Fig. 2 is a cross sectional view on the line 2—2 of Figure 1; and

Fig. 3 is a cross sectional view on the line 3—3 of Figure 1.

The suction cleaner embraces the main housing 10 mounted on rollers 11 for ease of movement over the floor. The housing 10 is provided with a streamline upward extension 12 provided with a convenient hand grip 13 by which the entire suction cleaner can be readily picked up and carried by the operator. Additionally, the streamline upper extension 12 is constructed to receive a long handle 14, as indicated at 15, through the medium of which the suction cleaner may be pushed over the floor in conventional manner. Additionally, the streamline upper extension 12 is provided with transverse openings 16 through the medium of which a shoulder strap, not shown, may be connected to the suction cleaner for ready portability of the same. The forward end of the streamline upper extension 12 provides a mounting and shield for a light bulb 17 which casts its light directly on the floor in advance of the suction cleaner.

The main body portion of the housing 10 terminates at its forward end in a suction nozzle 18 having a front wall 19 and a rear wall 20. The suction nozzle 18 extends laterally of the housing

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and provides an elongated slot or opening through which the dust laden air is drawn.

Coming now to the operating elements of the suction cleaner, a motor supporting ring 21 is firmly fixed throughout a substantial part of its circumference to the inner wall of the main housing 10. At suitably spaced points circumferentially of the motor supporting ring 21, there are positioned specially formed motor mount angle irons 22, one leg of each of which is concave, as shown in Fig. 3, to thereby accurately fit the motor casing, which is held in place by the screws 23. The motor support angle irons 22 are mounted on the motor supporting ring 21 through the medium of bolts 24, which serve not only the function of securing the motor mount angle irons 22 to the motor supporting ring 21, but also as the support for one end of the cylindrical filter 25. The cylindrical filter 25 is provided at the end thereof, adjacent the motor supporting ring 21, with an annular bearing ring 26 provided with a bearing raceway 27, in which the dust proof bearings 28, mounted on the bolts 24, are adapted to run (see Fig. 3). The bolts 24 additionally carry upon the bearings 28 what may be termed a labyrinth seal 29 completely encircling the filter supporting ring 26 and sealing off the dust area from the bearings 28 and the raceway 27.

An electric motor 30 is held in place within the angle irons 22 by the screws 23. The motor shaft 31 extends both forwardly and rearwardly of the motor. A spider support 32 is secured to the housing 10 forwardly of the motor 30 and the filter 25 and carries a ball bearing support 33 for the forwardly extending portion of the motor shaft 31. A second spider support 34 is provided immediately rearwardly of the motor which carries a suitable ball bearing support 35 for the rearwardly extending portion of the motor shaft 31. The rear end of the motor is also anchored to the spider support 34 through the screws 36. The forward end of the cylindrical filter 25 is secured to a circular plate 36 supported on the forwardly extending portion 31 of the motor shaft through the medium of the ball bearing 38 similar to the bearings 33 and 35. A steadying strut 39 is secured to the main housing by screw 40 and bears against the forward side of the plate 37 when the same is rotated. Suitable anti-friction means may be provided between the strut 39 and the plate 37. Secured to the plate 37 is a ring or sun gear 41 through the medium of which the rotating filter 25 is driven by the small gear 42 mounted on the shaft 43 carried by the bracket

44, secured to the forward end of the motor casing by the screw 45. Also mounted on the shaft 43 is a pulley wheel 46 in alignment with the pulley channel 47 in the forwardly extending portion of the motor shaft 31. A belt 48, trained over the belt channel 47 of the motor shaft 31 and the pulley 46 affords the drive from the motor shaft through the pulley to the gear 42 and thence to the ring gear 41 affixed to the plate 37, with which the circular filter 25 is rotated. The rear end of the circular filter 25 which, as described, is affixed to the supporting ring 26, rides freely in the bearings 28. At the extreme forward end of the motor shaft 31, a second belt channel 49 is provided for receiving the belt 50, which is trained around a pulley wheel 51 on the shaft 52 of the rotary brush 53, which extends transversely of the housing and acts upon the carpet throughout the length of the channel nozzle 18.

The dual impeller fans 54 and 55 are mounted on the rearwardly extending portion of the motor shaft 31. The blades of these fans are set to create suction through the nozzle 18 and to discharge air through the rear openings 56 in the housing 10.

A dust and dirt drawer 57 is removably received between the lower walls 58 and 59 of the housing 10. The drawer 57 is adapted to be withdrawn rearwardly of the suction cleaner to be emptied and replaced. This drawer 57 has a reasonably tight friction fit between the walls 58 and 59. The wall 58 terminates coincident with the labyrinth seal 29 and thus the space immediately below the rotating filter 25 is open into the drawer 57. A pair of spring pressed plates 60 and 61 are affixed to the inner wall of the housing 10 as indicated at 62 and 63 respectively. The free edges of these spring plates extend into close proximity of the periphery of the rotating filter 25. The spring plate 60 thus acts to seal the drawer 57 from one side of the filter 25 and the plate 61 acts to seal the drawer 57 from the opposite side of the rotating filter 25. In addition, the free edge of the plate 61 is set in sufficiently close juxtaposition to the periphery of the rotating filter 25 to act as a scraping element to free the rotating filter 25 of dust and dirt carried thereby as each successive portion of the circumference of the rotating filter 25 passes the free edge of the plate 61 (see Fig. 2).

When current is supplied to the motor 30, the following actions occur. The dual fans 54 and 55, mounted on the rearwardly extending portion of the motor shaft 31, set up suction and draw dirt and dust laden air from the floor or carpet up through the suction nozzle 18. The release of dirt and dust from the floor and carpet is facilitated by the action of the rotating brush 53, driven from the forwardly extending portion of the motor shaft 31 through the belt 50. The dust and dirt laden air passes upwardly and about the arms of the spider 32 and thence into the annular space surrounding the rotating filter 25 above the plates 60 and 61. The air is forced to pass through the rotating filter 25, on the outer circumference of which the dirt and dust is collected. The dust-free air enters the interior of the rotating filter 25 and circulates around and past the motor 30, effectively cooling the same. The dust-free air passes between the radially extending arms of the motor mount angle irons 22, thence through the openings in the spider support 34 where it is picked up by the blades of the dual fans 54 and 55 and expelled from the rear of the housing through the openings 56. The

filter 25 rotates at an appropriate speed predetermined by the gear ratio between the gear 42 and ring gear 41 driven from the motor shaft 31 by the belt 38. The sealing plate 60 is sufficiently resilient and has its free edge spaced far enough from the periphery of the rotating screen 25 to permit the dirt and dust carried by the rotating filter to readily pass into the drawer 57, whereas the plate 61 is so set and has its free edge sufficiently close to the periphery of the rotating filter screen 25, to retain the dust and dirt carried by the screen into the drawer 57.

It will be appreciated that whereas the dual fans for creating suction are carried directly by the motor shaft and, therefore, partake of the speed of rotation of the motor shaft, the filter is differentially driven and moves at a much slower predetermined speed.

From the foregoing, it will be apparent that the present invention provides a compact, unitary suction cleaner of the bagless type of simple and practical design and construction.

Having thus described my invention, what I claim is:

1. In a suction cleaner a unitary housing, a motor having its shaft extending longitudinally of the housing mounted in said housing, a plurality of suction inducing fans carried on the motor shaft rearwardly of the motor, a rotating cylindrical filter screen rotatably carried by said motor shaft and positioned between the suction end of the housing and the discharge end of the housing, and means embracing gear reduction means for driving the rotating cylindrical filter screen from the motor shaft.

2. In a suction cleaner a unitary housing, a motor supporting ring affixed to the interior of the housing intermediate the ends thereof, a motor carried by said motor supporting ring with its shaft extending longitudinally of said housing, supporting webs affixed to said housing and positioned forwardly and rearwardly of the motor, each of said webs carrying a bearing support for the motor shaft, at least one suction fan mounted on the motor shaft rearwardly of the motor, a rotating cylindrical filter at least in part surrounding said motor, and means for driving said rotating cylindrical filter from said motor shaft at a lower rate of speed than the speed of the suction inducing fans.

3. In a suction cleaner a unitary housing, a motor mounted within the housing with its motor shaft extending in opposite directions from the motor, a suction inducing fan mounted on one end of the motor shaft, a cylindrical filter within the housing rotatably mounted on said motor shaft, means for removing dust and dirt from the cylindrical filter, and means including gear reduction elements actuated by said motor shaft for effecting rotation of said cylindrical filter on said motor shaft.

4. In a suction cleaner a unitary housing, a motor supporting ring carried by said housing, a motor mounted in said ring with the motor shaft thereof extending in opposite directions from the motor, at least one suction inducing fan carried at one end of the motor shaft, a rotating cylindrical filter at least partially surrounding the motor and mounted for rotation on the motor shaft, and means for rotating said rotating filter about the motor shaft at a slower rate of speed than the speed of rotation of the motor shaft.

WILLIAM J. DAUGHERTY.

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