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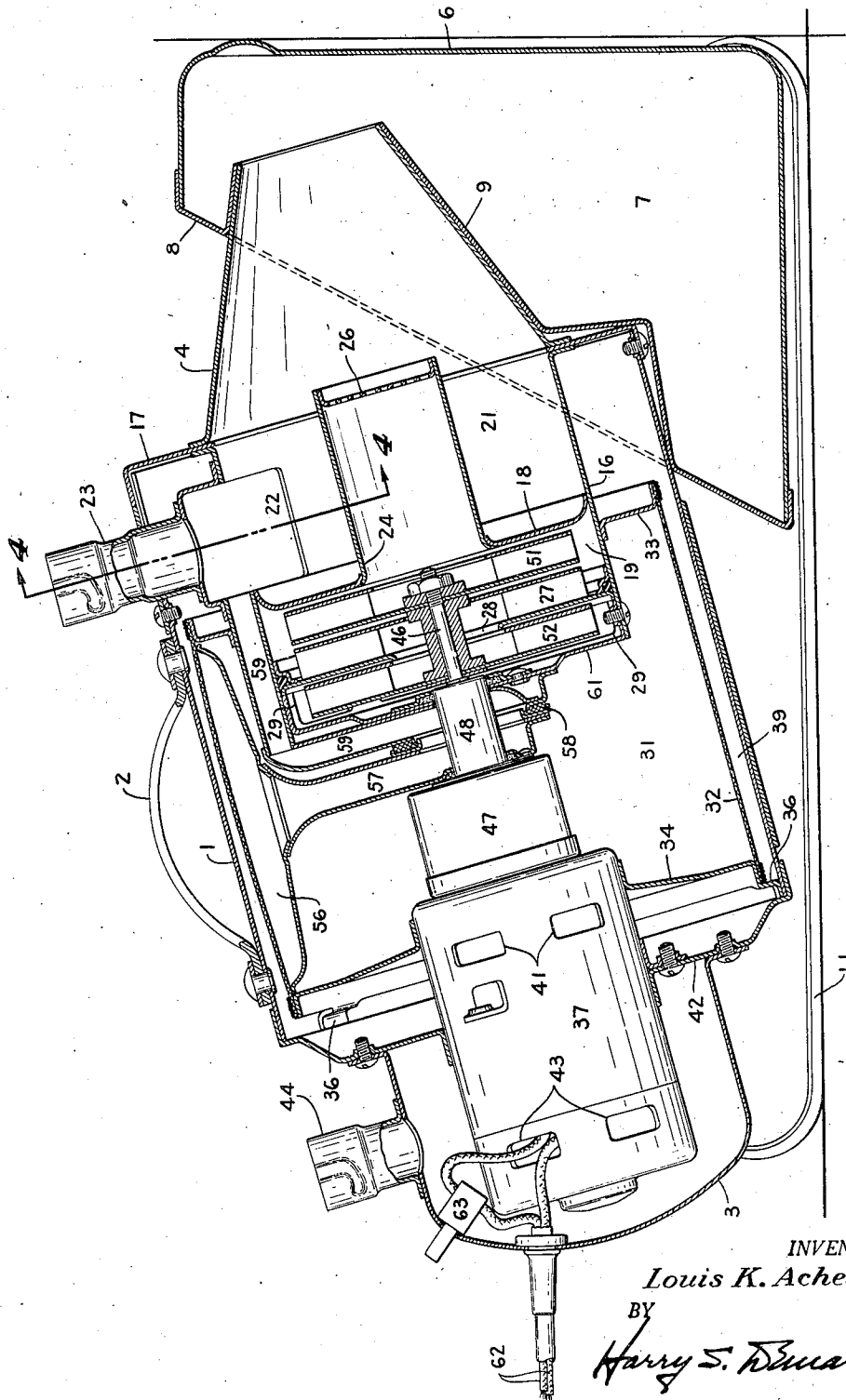
L. K. ACHESON

2,436,159

SUCTION CLEANER.

Filed April 26, 1943

2 Sheets-Sheet 1



INVENTOR.

Louis K. Acheson

BY

Harry S. Bunnell

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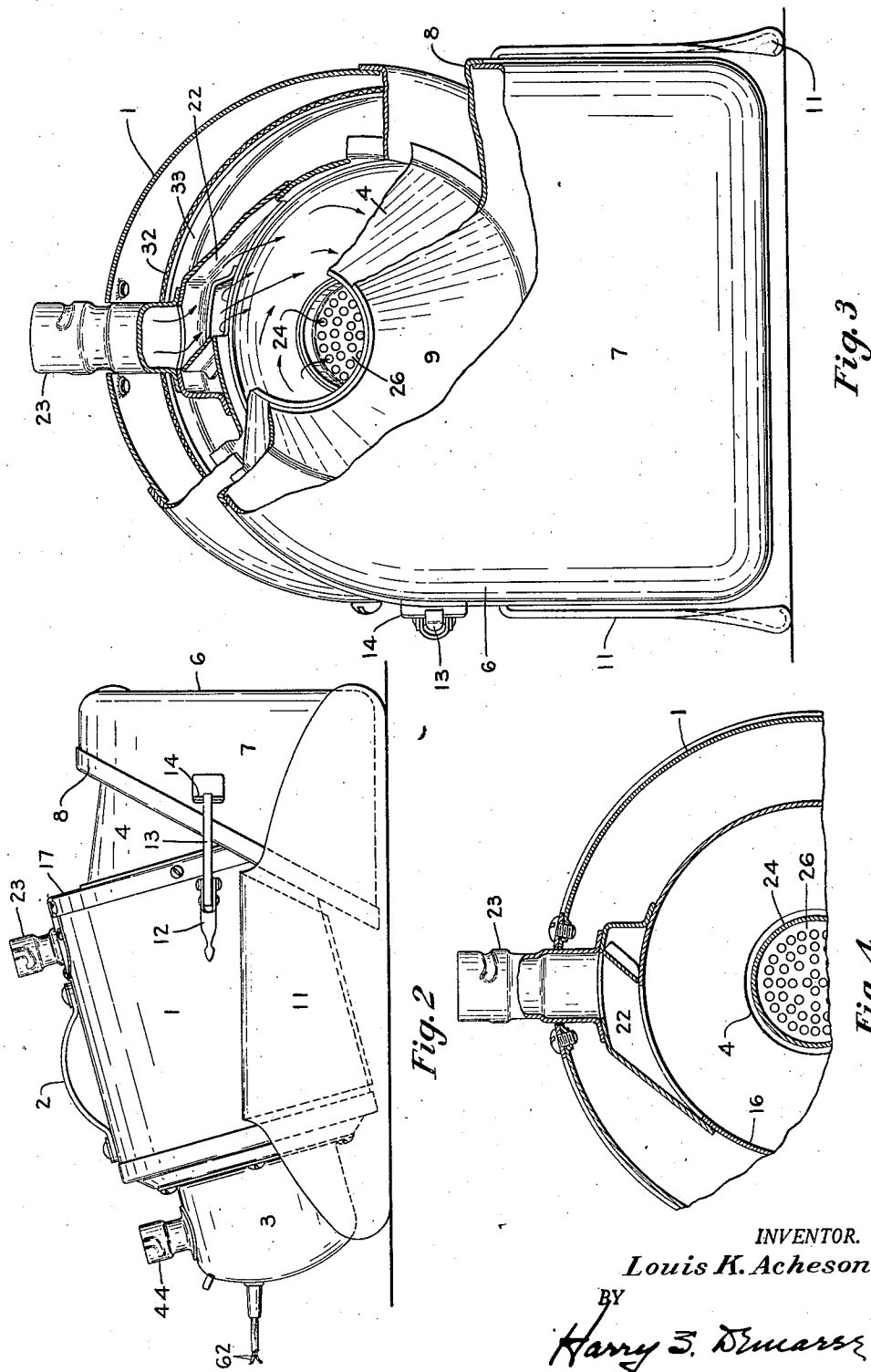
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2 Sheets-Sheet 2



INVENTOR.

Louis K. Acheson

BY

Harry S. Demaree

UNITED STATES PATENT OFFICE

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SUCTION CLEANER

Louis K. Acheson, North Canton, Ohio, assignor
to The Hoover Company, North Canton, Ohio,
a corporation of Ohio

Application April 26, 1943, Serial No. 484,512

5 Claims. (Cl. 183-57)

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The present invention relates to suction cleaners in general and more particularly to a new and novel arrangement of parts in a suction cleaner of the type incorporating an initial dirt separator, suction-creating means, and a final dirt separator. More particularly, the invention relates to the arrangement of structural parts in a cleaner of the type mentioned to provide compactness, greater stability, lower height and other desirable characteristics and without sacrifice of cleaning effectiveness and efficiency.

It is an object of the present invention to provide a new and improved suction cleaner. It is another object of the invention to provide a new and novel arrangement of parts in a suction cleaner incorporating an initial dirt separator, suction-creating means, and a final dirt separator. A further object of the invention is to provide a low height canister type cleaner of the type incorporating an initial dirt separator, a final dirt separator, and suction-creating means, the major axis of the unit being substantially horizontal. A still further object of the invention is to provide a new and novel arrangement of parts in a suction cleaner of the type having an initial dirt separator, suction-creating means, and a final dirt separator in combination with automatic means for cleaning the final separator and returning the dirt therefrom to the initial separator which is characterized by the substantially horizontal arrangement of the major axes of the separators. A still further object of the invention is to provide a suction cleaner incorporating a whirl chamber formed with a substantially horizontal major axis. These and other objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawings to which they relate.

Referring now to the drawings in which a preferred embodiment of the present invention is illustrated and in which the same reference character refers to the same part throughout:

Figure 1 is a vertical section through a cleaner constructed in accordance with a preferred embodiment of the invention;

Figure 2 is a side elevation of the cleaner illustrated in Figure 1;

Figure 3 is an end view of the cleaner with certain parts broken away; and

Figure 4 is a partial section upon the line 4-4 of Figure 1 and shows the inlet connection to the initial dirt separator.

The patent to Bible 2,247,472 discloses a new and novel arrangement of parts for a suction

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cleaner in which the dirt-laden air stream enters the cleaner at an initial dirt separator, is drawn therefrom in a nearly cleaned condition by the suction-creating means, and is exhausted from those means into a final dirt separator which functions to remove all the escaped material. Manually operable means are provided by Bible which are adapted to remove the collected foreign material from the final separator and to return it to the initial separator for removal in order to reduce the back pressure in the final separator. The present invention relates to an improvement upon the type of machine disclosed in the Bible patent and particularly to a machine of that type in which the major axis of the machine extends substantially horizontally. In the suction cleaner constructed in accordance with the present invention the major axis of the suction-creating means, the driving motor, and the initial dirt separator extend substantially horizontally and the large part of the foreign material which is removed in the whirl chamber escapes therefrom in a substantially horizontal direction instead of dropping from that chamber vertically into a dirt container as in Bible. Additionally, automatic means which are driven by the cleaner motor are provided which remove the foreign material from the final dirt separator and return it to the initial separator without the assistance of the operator.

Returning now to the drawings the cleaner constructed in accordance with the present invention is seen to comprise exteriorly a main casing 1 to which is attached a handle 2 and which is formed at one end as a motor hood 3 and at the opposite end as a truncated cone 4 which, as will later become apparent, is a part of the initial dirt separator which may be of the vertical whirl type. These parts are seated at an angle, as clearly illustrated in Figures 1 and 2, upon a base 6 comprising a dirt receptacle or container 7 which is formed with a removable front wall 8. Wall 8 includes a seat portion 9 which is adapted to seat removably the conical portion 4 of the casing 1, seated in the slightly inclined position. Rigid runners 11 extend along each side of the cleaner and provide side supports for the main body portion comprising casing 1 and the motor hood 3, and also for the removable dirt container 7, as is clearly illustrated in Figures 2 and 3. A manually operable latch 12 upon each side of casing 1 includes a hook portion 13 to cooperate with an abutment 14 upon the container 7 to secure removably the casing structure to the base structure.

Within the main casing 1 is positioned a sec-

ond inner cylindrical casing 16 which is fixedly carried by the end wall 17 of the casing 1 and is aligned with the adjacent truncated cone 4. A transverse substantially vertical wall 18 extends across the casing 16 to form upon one side a fan chamber 19 and upon its opposite side a whirl chamber 21 which includes both the space within the casing 16 and the space within the cone 4. The whirl chamber 21 is formed with an inlet chamber 22 to which connects an inlet port 23 extended outwardly through the enclosing main casing 1 and adapted to seat removably a dusting tool unit. The inlet to the fan chamber 19 is formed by an elongated inlet 24 which extends into the whirl chamber 21 to the conical portion 4 being provided at its outer end with a strainer plate 26.

Fan chamber 19 is divided into a first stage opening directly into inlet 24 and into a second stage by a rigid fixed deflector 27 which includes a multiplicity of vanes and an inlet 28. Fan chamber 19 in its second stage is provided with a plurality of exhaust ports 29 which connect the fan chamber with a final dirt separator or filter chamber 31 the outer wall of which is defined by a cylindrical filter 32 of suitable air-permeable dirt-impermeable material which is positioned concentrically within the main casing 1. One end of filter 32 is supported adjacent the fan chamber 19 by an encircling collar or end plate 33 which is sealed to the casing 16 being flanged upon its inner and outer peripheries. The opposite end of the filter chamber 31 is closed by a plate 34 carried in spaced relationship to the casing 1 by a plurality of spiders indicated at 36. Plate 34 is suitably shouldered to seat the filter 32 and is also flanged centrally to seat the casing of a motor 37 which extends therethrough. The space within the main casing 1 and around the cylindrical filter 32 forms a discharge chamber 39 which is open around plate 34 to the apertures 41 formed in the casing of motor 37. A second motor-supporting closure plate 42 in the hood 3 prevents the air from passing along the outside of the motor. The escaping air passes through the apertures 41 into the motor casing and escapes therefrom through the apertures 43 upon the opposite side of the plate 42 and makes its final escape from the motor hood 3 through the exhaust port 44 which is similar to inlet port 23 in that it is adapted to receive and seat a dusting tool unit.

The shaft 46 of motor 37 extends forwardly through a casing 47, a sleeve 48, and into the fan chamber 19 where it carries suction-creating fans 51 and 52 within the first and second stages respectively.

A filter-cleaning unit is provided for the filter 32 and comprises a nozzle 56 which is rotatably carried by a conduit seat 57 mounted for rotation about the sleeve 48 on a bearing 58. Nozzle 56 and its conduit seat 57 are rotated by the motor shaft 46 through the agency of certain power-transmitting speed-reducing means provided within the casing 47 and which in their specific construction form no part of this invention but which may be of the type disclosed and illustrated in my co-pending application Serial No. 484,510, now Patent 2,406,733, dated September 3, 1946. Conduit seat 57 opens into a similarly formed seat which is provided in a conduit 59 immediately adjacent the end wall 61 of the fan chamber 19. Conduit 59 extends along the side of the fan chamber and connects to the inlet chamber 22 of the whirl chamber 21 so that at all times,

with the cleaner in operation, the conduit 59 is supplied with any suction which is present and available to the inlet port 23.

As in the usual suction cleaner the driving motor 37 is provided with a source of power comprising incoming power leads 62 which pass through a manually operable switch 63 which enables the operator to control the flow of current to the motor and so the operation of the machine.

The operation of the cleaner is as follows. The operator having attached a suitable dusting tool hose with a cleaning nozzle at its end to the inlet port 23, he energizes the motor 37 by closing the manually operable switch 63. Current passes through the driving motor and the motor shaft 46 rotates and with it the suction-creating fans 51 and 52 and the speed-reducing mechanism within the casing 47. The rotation of the suction-creating fans 51 and 52 creates a reduced pressure within the whirl chamber 21 which in turn is effective in the inlet 23 and the dusting tool hose and nozzle attached thereto and also within the conduits 59 and 57 and so in the filter-cleaning nozzle 56. As the operator moves the main cleaning nozzle at the end of the hose over the surface to be cleaned the incoming flow of air carries dirt and foreign material into the cleaner where it enters the whirl chamber 21 tangentially. The foreign material is thrown by centrifugal force to the periphery of the casing 16 and as it rotates it is forced by the new incoming air into the truncated cone 4 and makes its exit from the forward end thereof into the dirt container 7 dropping to the lower part thereof below the cone 4. The cleaned air is drawn through the inlet 24 into the fan chamber and is exhausted therefrom through the exhaust port 29 into the filter chamber 31. This air which enters chamber 31 is nearly clean and carries only a very small percentage of the total dirt which enters the machine yet a part which is objectionable to the user as it is capable of creating a dust smell in any escaping air. Whatever foreign material is carried in the air as it enters chamber 31 is removed therefrom as the air passes outwardly through the enclosing cylindrical filter 32 into the discharge chamber 39. From chamber 39 the air passes through the apertured motor casing 37 as described and finally exhausts through the exhaust outlet 44 from the motor hood 3.

As stated, the suction of the machine is effective within the nozzle 56 which, during operation is rotated about the motor axis under the actuation of the speed-reducing mechanism within the casing 47. Nozzle 56 is of substantially the same length as the width of the filter 32 and as it moves in its orbit it contacts the entire inner surface of filter 32 and removes therefrom, by virtue of the flow of cleaning air which is drawn from discharge chamber 39 backwardly into the nozzle, all foreign material which has collected upon the filter 32. This foreign material in collecting upon filter 32 has become agglomerated and upon being conveyed through conduits 57 and 59 to the whirl chamber 21 again enters the incoming dirt-laden air stream and this time in its passage through the whirl chamber is removed, probably because of being in an agglomerated and enlarged condition. This operation of the filter-cleaning nozzle 56 is continuous and serves to maintain the back pressure in the filter chamber at a reasonable point and one which does not

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restrict in an objectionable manner the flow of cleaning air through the machine.

In due time it will become necessary to empty the dirt container 7. This is accomplished by manually releasing the latches 12 upon the opposite sides of the main casing 1 of the machine. The hooks 13 are displaced from the cooperating abutments 14 carried by the container and it is then possible for the operator to lift the removable casing from the base 6 including the dirt container 7 by a lifting and separating force exerted by use of the handle 2. Once the main portion of the cleaner is removed from the container it is then possible for the operator to remove the cover plate 8, it being advisable before doing so to tilt the base structure on its side with the end wall of the container at the bottom. Cover 8 is easily displaceable and when removed it is then possible for the operator to dump the foreign material from the open-sided dirt pan in an obvious manner. The replacing of the machine in its base is the reverse operation, the cover plate 8 being first positioned and thereafter the machine inserted with the truncated cone 4 sitting within its seat 9 and the motor 3 being supported at the opposite end of the runners 11. The machine is then again ready for operation.

I claim:

1. In a suction cleaner, an initial dirt separator of the vortical whirl type and including a converging conical discharge outlet at one end and having its major axis inclined at an acute angle to the horizontal, suction-creating means connected to said separator and including fans rotatable about said axis, a final dirt separator to receive air exhausted from said suction-creating means, a driving motor including a shaft extended through said final dirt separator and carrying said fans, means driven by said motor to remove dirt from said final dirt separator and return it to said initial dirt separator, and a removable dirt container removably connected to the outlet of and positioned in nested relationship to said initial dirt separator.

2. In a suction cleaner an initial dirt separator of the vortical whirl type and including a converging conical outlet at one end, suction-creating means connected to said separator to draw clean air from the opposite end of said separator and including fans rotatable about an axis inclined at an acute angle to the horizontal, a final dirt separator to receive air exhausted from said suction-creating means, a driving motor including a shaft extended at an acute angle to the horizontal and through said final dirt separator and carrying said fans, means driven by said motor to remove dirt from said final dirt separator and return it to said initial dirt separator, and a supporting base for the aforementioned structure including horizontally extended runners positioned thereunder, and a closed dirt container interiorly connected to and supported by the outlet of said initial separator.

3. In a suction cleaner, an initial dirt separator of the vortical whirl type and including a converging conical dirt discharge outlet at one end and having its major axis substantially horizontal, suction-creating means connected to said separator and including fans rotatable about an

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axis extended at an acute angle to the horizontal, a final dirt separator to receive air exhausted from said suction-creating means and including a cylindrical filter, a driving motor including a shaft extended at an acute angle to the horizontal and passing through said cylindrical filter and carrying said fans in said fan chamber, a filter-cleaning nozzle mounted for rotation about said motor shaft in contact with said filter, speed-reducing means connecting said shaft to said nozzle, an air conduit connecting said nozzle to said initial separator to return collected foreign material thereto, and a dirt container removably connected to the discharge outlet of said initial dirt separator.

4. In a suction cleaner, a unitary body including a dirt separator of the vortical whirl type having only two outlets, a converging conical dirt discharge outlet for all separated dirt at one end and a clean air discharge outlet only at the opposite end, and also including suction-creating means to draw cleaned air from said clean air discharge outlet, the major axes of said separator and said suction-creating means being aligned and extending at an acute angle to the horizontal, and a closed removable dirt container interiorly connected to said dirt discharge outlet, supported on said outlet, and forming an end of said cleaner.

5. In a suction cleaner, a unitary body including a dirt separator of the vortical whirl type having two outlets only, a converging conical dirt discharge outlet for all dirt separated by said separator at one end and a clean air discharge outlet at the opposite end, and also including suction-creating means to draw cleaned air from said clean air discharge outlet, the major axes of said separator and said suction-creating means being aligned and extending at an acute angle to the horizontal to tilt said discharge outlet upwardly, a removable dirt container open only to said dirt discharge outlet nested under said outlet to provide dirt storage space thereunder, the tilting outlet permitting an enlarged dirt storage space, and manually operable means releasably securing said container to said outlet.

LOUIS K. ACHESON.

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