Aug. 6, 1946. W. E. BIBLE 2,405,129

VACUUM CLEANING SYSTEM

Original Filed Feb. 10, 1941

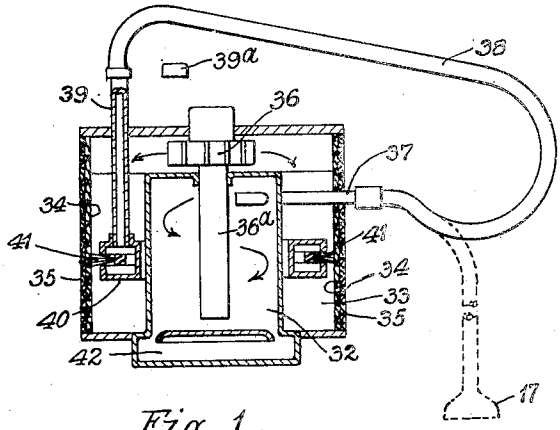

Fig. 1.

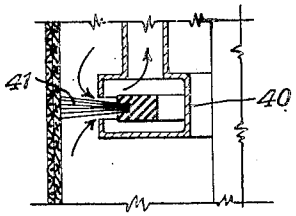

Fig. 2.

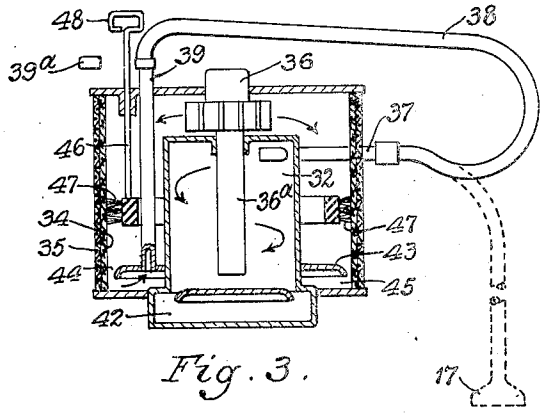

Fig. 3.

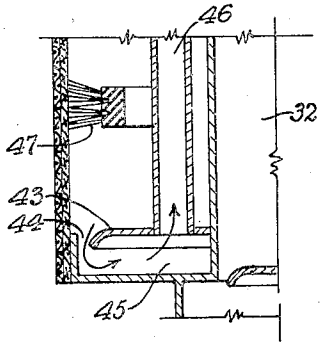

Fig. 4.

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VACUUM CLEANING SYSTEM

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3 Claims. (Cl. 183—57)

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This invention relates to vacuum cleaning systems and more particularly to methods and structure for cleaning the filter of a vacuum cleaning system to remove accumulated debris which interferes with the passage of air.

The present application is a division of copending application Serial No. 378,236 filed February 10, 1941.

In the usual vacuum cleaning apparatus a fabric bag or drum is employed to remove foreign particles from the incoming air stream. The pores or interstices of the fabric quickly become clogged with dust and lint which create a back pressure on the blower thereby greatly reducing the effective suction of the cleaner. The only provision usually made for cleaning the bag is to provide for its removal for dumping purposes. Such a procedure removes only the loose coarse dirt and the filter itself remains clogged with debris.

The principal object of the present invention is to provide means for completely cleaning the cleaner filter medium by the action of mechanical cleaning means combined with a flow of cleaning air; and to accomplish the foregoing within the system or machine by the use of the regular vacuum blower or suction-creating means and without removal of the filtering devices. Other objects and advantages reside in the details of construction of the invention, which is designed for simplicity, economy and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention reference is had to the accompanying drawing in which like reference characters indicate like parts throughout.

All of the views of the drawing are diagrammatic and details of construction have been omitted but their provision is well within the skill of anyone familiar with the art.

In the drawing:

Figure 1 illustrates a preferred embodiment of the invention in which the filter unit is cleaned by fabric agitation and a cleaning flow of air; and

Figure 2 is an enlarged detail section of the filter-contacting cleaning element; and

Figure 3 is a showing of a second preferred embodiment of the invention in which only the filter-contacting brush is movable; and

Figure 4 is an enlarged detail sectional view illustrating a portion of the apparatus shown in Figure 3.

Referring now particularly to Figures 1 and 2, in which the first preferred embodiment of the invention is illustrated, a motor-driven suction-creating unit or blower is shown and indicated by the reference character **36**. The inlet or suction conduit **36***a* extends upwardly into the unit **36** from within an enclosed cylindrical chamber **32** having an enlarged base portion **42**. Chamber **32** comprises a whirl chamber in which dirt is separated from its carrying air and **42** forms the dust pan for the chamber. The suction conduit **36***a* leads from a depending axial position within the cyclone or whirl chamber **32**. A suction intake or nipple **37** enters tangentially into the whirl chamber to conduct dirt-laden air thereinto from an air hose **38** which, in normal use for vacuum cleaning purposes, is provided at its outer end with a suitable cleaning nozzle **17** as is indicated in dotted lines.

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Enclosing the whirl chamber **32** is a filter chamber **33** the surrounding cylindrical wall of which is formed by a fabric filter wall **34** which may be provided with a suitable surrounding screen **35** to prevent outward movement of the wall. Filter chamber **33** encloses the whirl chamber **32** in airtight relationship, the intake **37** extending through the filter chamber wall into the whirl chamber and the only connection between the two being through the exhaust ports of the suction-creating or blowing unit **36**.

As is clear from a consideration of Figure 1 the suction-creating unit **36** draws air axially from the whirl chamber through the inlet **36***a* and discharges it radially into the filter chamber **33**.

In the normal use of the cleaner the dirt-laden air enters through the cleaner nozzle **17**, passes first through the whirl chamber where practically all of the foreign material is removed to be deposited within the dust pan **42**. A small percentage of the suspended foreign material, however, escapes to be drawn with the air through the conduit **36***a* into the suction-creating unit **36** to be exhausted within the filter chamber **33**. This small percentage of foreign material will then be removed from the air as it passes through the filter fabric wall **34** into the surrounding atmosphere. The efficiency of the machine, however, is dependent in large part upon the resistance to the flow of cleaning air through filter **34** remaining at a low figure. This requires that the final filter not become clogged with foreign material. To insure that this condition will maintain and to eliminate the necessity of removing this filter for purposes of cleaning, as in the ordinary cleaner, there is incorporated into the

cleaner constructed in accordance with the present invention means by which the filter 34 is cleaned in situ. These will now be described.

Within the filter chamber 33 and surrounding the whirl chamber 32 there is provided a ring-like brush-carrying nozzle 40. Nozzle 40 is provided with a slot around its periphery, as is clearly shown in Figure 2, and projecting outwardly therethrough is the bristle portion of an annular brush 41 which contacts the inner side of the cylindrical fabric wall of filter 34. Nozzle 40 is itself carried by a vertically movable suction tube or pipe 39 which, in the filter-cleaning operation, has its upper open end connected to the end of the air hose 38 from which the nozzle 17 has been removed, and as illustrated in full lines in Figure 1. Normally in the operation of the machine the top of the suction tube 39 is closed, as by a removable cap 39*a*.

It is readily seen that as the brush-carrying nozzle 40 is raised and lowered by the operator, through an actuating force exerted upon the conduit 39, the brush 41 will, through its contact with the inner side of the filter wall, dislodge the adhering foreign material and this material will immediately be drawn by suction into the nozzle 40 through the peripheral slot therein. The dirt-laden air entering nozzle 40 will pass through the air hose 38 and from thence into the whirl chamber 32 to be deposited finally within the dust pan 42 of that chamber. After the vertical reciprocation of the nozzle 40 several times within the filter chamber, the air hose 38 can be disconnected from the conduit 39, nozzle 17 again attached thereto, the cap 39*a* placed in closure relationship to the conduit 39 and the cleaner will again be ready for normal operation.

Referring now to Figures 3 and 4, in particular, the second preferred embodiment of the invention is disclosed and is seen in its general outline to be very similar to that first described. In this embodiment of the invention, however, the vertical air conduit 39 which carried the nozzle 40 in the first embodiment of the invention is fixedly positioned within the filter chamber and in place of the nozzle 40 there is provided a rim-like bottom plate 43. Conduit 39 opens to the under side of plate 43 and the latter forms a circular slot 44 between its own peripheral edge and the surrounding filter wall 34. A solid annular brush 47 is provided in this embodiment of the invention which is positioned in contact with the inner wall of the filter fabric 34, as in the first embodiment. Here, however, the brush is supported by its own vertical shaft 46 the upper end of which is provided with a handle portion 49.

Brush 47 is vertically movable within the filter chamber in the manner of the nozzle 40 and brush 41 of the first embodiment. In this embodiment, however, vertical reciprocation of the brush serves to dislodge foreign material from the cylindrical

wall of filter 34 and this material then falls downwardly through the slot 44 to be drawn upwardly from a position below the bottom plate 43 into the conduit 39. The dirt-laden air then, as in the first embodiment, makes its way via the air hose 38 to the whirl chamber where it is separated and finally deposited within the dust pan 42. In this embodiment, as in the first embodiment, air hose 38 is adapted to carry the nozzle 17 or to be connected to the top of the air conduit 39 upon the removal of the normal closure cap 39*a* thereof. In normal cleaning use this machine functions identically with that first described.

I claim:

1. In a suction cleaner, a whirl chamber adapted to be connected to a cleaning nozzle to separate dirt from air passing therethrough, a suction-creating unit connected to said whirl chamber to draw air therefrom, and a filter chamber including a filter connected to said suction-creating means to receive and filter air exhausted therefrom, a movable brush in said filter chamber to dislodge foreign material from said filter, a fixed suction intake in said filter chamber to remove said foreign material dislodged by said brush and positioned adjacent said brush in one of its positions, and air-conducting means connecting said intake to said whirl chamber to convey said foreign material thereto.

2. In a suction cleaner, a whirl chamber adapted to be connected to a cleaning nozzle to separate dirt from air passing therethrough, a suction-creating unit connected to said whirl chamber to draw air therefrom, and a filter chamber including a filter connected to said suction-creating means to receive and filter air exhausted therefrom, a movable brush in said filter chamber to dislodge dirt from said filter, a stationary filter intake adjacent the bottom of said chamber to remove dirt dislodged by said brush and positioned adjacent said brush in one of its positions, air-conducting means connecting said intake to said whirl chamber, and manually operable means to actuate said brush.

3. In a suction cleaner, a whirl chamber adapted to be connected to a cleaning nozzle to separate dirt from air passing therethrough, a suction-creating unit connected to said whirl chamber to draw air therefrom, and a filter chamber including a cylindrical filter connected to said suction-creating means to receive and filter air exhausted therefrom, a ring-like brush movable longitudinally of said cylindrical filter to dislodge collected dirt therefrom, manually operable means to propel said brush, a stationary suction intake within said filter chamber to remove said dirt dislodged by said brush and positioned adjacent said brush in one of its positions, and air-conducting means connecting said intake to said whirl chamber.

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