Dec. 8, 1942. W. LEATHERS 2,304,309

VERTICAL-AXIS CANISTER-TYPE VACUUM CLEANER

Filed Oct. 17, 1939

Fig. 1.

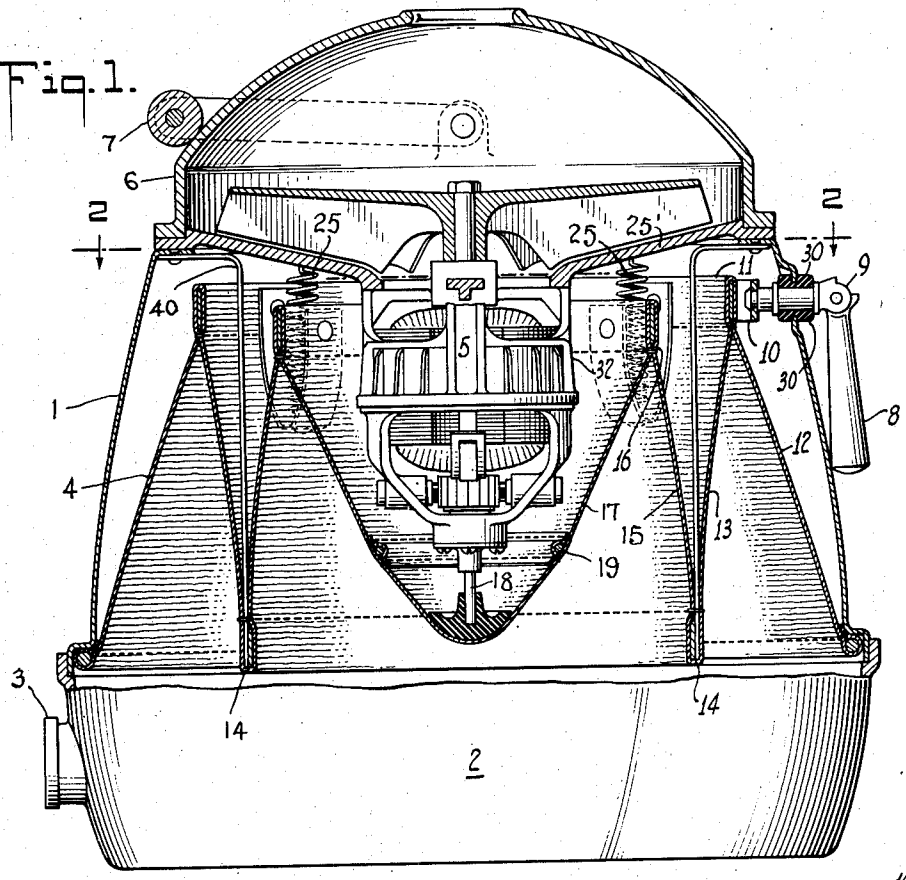


Fig. 5.

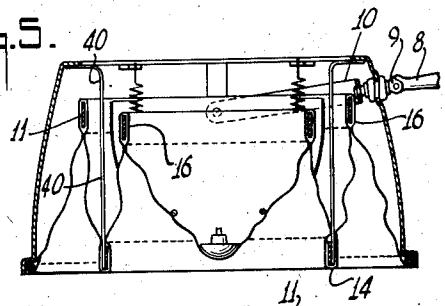


Fig. 2.

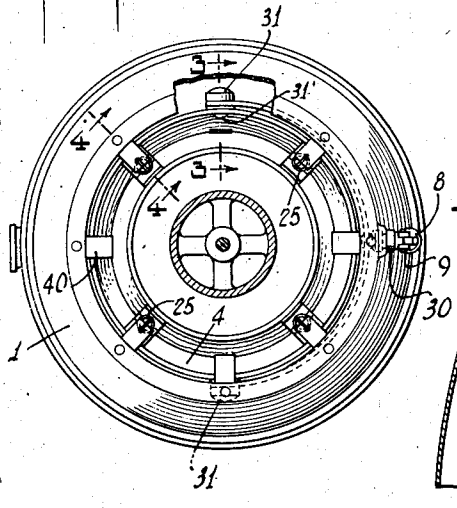


Fig. 4

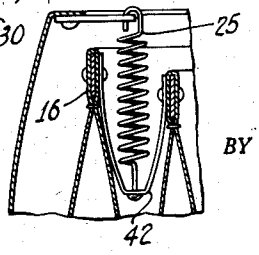
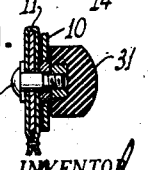


Fig. 3.



INVENTOR.

BY Wm. Leathers

Patented Dec. 8, 1942 2,304,309

UNITED STATES PATENT OFFICE

2,304,309

VERTICAL-AXIS CANISTER-TYPE VACUUM CLEANER

Ward Leathers, Brooklyn, N. Y., assignor to Quadrex Corporation, New York, N. Y., a corporation of Delaware

Application October 17, 1939, Serial No. 299,819

4 Claims. (Cl. 183—58)

My invention pertains particularly to portable vertical-axis canister-type vacuum-cleaners, of the type also set forth in my co-pending applications for Letters Patent, Serial Nos. 209,909, 216,011, 218,646, 218,647, 222,817, 286,832, 299,130 and 371,602.

An object of this present invention is to increase the filtering area of a fabric filter for increasing the air-flow through the cleaner without, at the same time, increasing the bulk of the machine. I have provided, in the applications for Letters Patent above mentioned, for several types of filter-shaking devices. In the present invention, however, I prefer to use the handle on the side of the cleaner (as in application Serial No. 209,909, Figure 5) which is joined to a bow on the inside of the cleaner which in turn is held to a filter-ring by means of trunnions. The bottom side of the filter, that exposed to the dirt-laden-air, is free from all obstructions or means of support (excepting only the outside rim).

An object of my invention is to reduce weight and bulk of the machine by disposing the motor-suction-unit within the inner portion of the filter and a large diameter single stage fan immediately above the filter.

I have hereinafter set forth my invention so those familiar with these arts may understand it, and have appended a drawing, of which:

Figure 1 is a partial cross-section and partially broken-away elevational view of my cleaner.

Figure 2 is a partially broken-away and partially cross-sectioned horizontal view of my cleaner taken at the dotted line 2—2 of Figure 1.

Figure 3 is a cross-sectional detail taken at the dotted line 3—3 of Figure 2.

Figure 4 is a vertical section of a detail showing the yieldable means for holding the filter upward in position taken at the dotted line 4—4 of Figure 2.

Figure 5 is a diagrammatic cross-section of my cleaner illustrating its looseness when moved to one of its cleaning positions.

A main shell 1 is disposed immediately above a dirt-receptacle 2 which has a connection 3 for the cleaning hose. Within the main shell 1 is my filtering mechanism 4 and motor-suction-unit 5. Above the shell 1 is a housing 6 which supports a bail-handle 7. A filter shaker handle 8 disposed on the side of the main shell 1 is held by a horizontal hinge 9 to an internal bow 10. The bow is trunnioned to a ring 11, both of which are preferably made of clock-spring-strip. The filter, which is generally characterized by the numeral 4, consists of four sections, as follows: a truncated conical section 12 which is joined between the base of the shell 1 and the ring 11; an inverted truncated cone 13 joined between the ring 11 and a similar but smaller ring 14, also preferably made of clock-spring-strip, at the bottom of the filter; a truncated conical section 15 joined between the latter ring and a similar but still smaller ring 16 at the top of the filter; and finally an inverted conical center section 17 the apex of which is coaxial with the machine and held downward by a support 18 projecting downward from the motor-suction-unit 5. The point wherein this filter structure differs essentially from that of my co-pending patent application, Serial No. 209,909, is that the middle sections of the filter 13 and 15, which substantially double the filtering capacity of the filter without materially increasing it over-all diameter or height, are held in a highly flexible and easily shakable manner by novel means consisting of strips of clock-spring joined between the rings 11 and 16, held to them in suitable manner. Strips of clock-spring 40 extending downward between ring 11 and ring 16 and rigidly joined to the ring 14 hold the ring 14 in place. Highly yieldable means, such as springs 25, hold the entire filter structure, including the bow, upward in normal position, the springs being joined to the fan case 25'. The filter is held in place by the outer rim attachment of the filter to the shell 1, the ring 14 and the center apex of the inner cone 17 held downward by the center support 18. Preferably the filter fabric is sewn around the rings 11, 14, and 16, in order to make reliable and dust-tight attachment thereto. When the hinged handle 8 is brought to a horizontal position rotation-stops on the hinge 9 enable the operator to depress the inner tips of the bow 10 against the resistance of the springs 25 by means of the flexible joint 30 in the wall of the cleaner. This flexible joint may very conveniently consist of comparatively thick, soft-rubber washers, normally under compression, one inside and one outside of the shell 1. When the handle is so raised, and the bow so depressed, and the handle is moved sidewise for shaking purposes, the spring strips 40 and 42 joining the rings together or to the case should be disposed in positions to exercise their highest degree of spring vitality in the interest of shaking every portion of the filter. In the practical carrying out of this process it is desirable to provide rubber bumpers 31, covering the trunnion joints 31', for contact with the

inside of the shell 1. When the filter-shaker-handle 8 is raised, the bow depressed, and the handle violently agitated sidewise, the filter violently expels any dirt that clings thereto, causing it to fall into the dirt-receptacle 2. Heretofore, complex filters for use with portable vacuum-cleaners have provide to be "holders" of the sticky, clinging, wood-dirt-grease mixture characteristic of "household dirt" as collected by vacuum-cleaners. The present invention provides a large area filter of small bulk with a free and open under side for gravity dirt release and means of loosening the fabric and violently shaking all the filter verticallly and sidewise. A wire ring 19 sewn into the center section of the filter 17 near the apex helps to hold that portion of the filter from collapsing on the suction side.

The means of holding the lower filter ring 14 has as its essential feature the supporting of the ring 14 on strips of clock-spring 40 which hold the ring firmly in place. It is joined at the top in a removable manner to the case 1. I prefer to use four of these strips 40 for support of the ring 14. In construction, they are rigidly joined to the ring 14 before the ring is sewn into the filter. The upper rings 11 and 16 may be joined together in flexible and desired manner by means of four flat spring bows 42, each of which are joined to spring 25. When the rings 11 and 16 are depressed by the bow 10 and are shaken sidewise by the handle 8 they are interrupted in their lateral movement by the strips 40. The agitation from the handle 8 is thereby transmitted to the ring 14 and thence to substantially the entire filter. It should be noted that when rings 11 and 16 are depressed by the bow 10 and the ring 14 is held from the top by the strips 40, all four sections of the filter 12, 13, 15 and 17 are loosened, which adds greatly to the effectiveness of their shaking.

I have herein set forth my invention in understandable terms, but I wish to make note that the embodiment illustrated and described, although now of preferred form, may be varied within the scope of the claims.

What I claim is:

1. In a portable, vertical-axis, hose-type vacuum-cleaner, a substantially round, pan-like dirt-receptacle at the bottom, a co-axial housing manually removably joined thereabove and thereto, the said housing surrounding a co-axial, vertical-axis, filter comprising a truncated cone peripherally joined at its point of greatest diameter to the lower portion of said housing and at its top to a ring, a second but inverted truncated cone joined between said ring at the top and a second ring at the bottom, a third truncated cone joined to the said second ring at the bottom and to a third ring at the top, the said third ring being smaller than the first ring, a fourth cone joined to the said third ring and with its apex downward and means of manually shaking the first mentioned ring sidewise actuatable exteriorly of the cleaner, and resilient means of transmitting the agitation of the first mentioned means from the first ring to the said third ring.

2. In a portable, vertical-axis, hose-type vacuum-cleaner, a substantially round, pan-like dirt-receptacle at the bottom, a co-axial housing manually removably joined thereabove and thereto, the said housing surrounding a co-axial, vertical-axis, filter comprising a truncated cone peripherally joined at its point of greatest diameter to the lower portion of said housing and at its top to a ring, a second but inverted truncated cone joined between said ring at the top and a second ring at the bottom, a third truncated cone joined to the said second ring at the bottom and to a third ring at the top, the said third ring being smaller than the first ring, a fourth cone joined to the said third ring and with its apex downward and means of manually shaking the first mentioned ring sidewise actuatable exteriorly of the cleaner, and resilient means of transmitting the agitation of the first mentioned means from the first ring to the said second and third rings.

3. Same as claim 2, but further characterized by the second mentioned means being composed of flat springs disposed with their flat faces parallel.

4. In a portable, vertical-axis, hose-type vacuum-cleaner, a substantially round, pan-like dirt-receptacle at the bottom, a co-axial housing manually removably joined thereabove and thereto, the said housing surrounding a co-axial, vertical-axis, filter comprising a truncated cone peripherally joined at its point of greatest diameter to the lower portion of said housing and at its top to a ring, a second but inverted truncated cone joined between said ring at the top and a second ring at the bottom, a third truncated cone joined to the said second ring at the bottom and to a third ring at the top, the said third ring being smaller than the first ring, a fourth cone joined to the said third ring and with its apex downward and the first mentioned ring being trunnioned to a bow agitatable sidewise from a handle exteriorly of the cleaner, the second said ring held non-yieldable-vertically by members extending downward from a non-yielding support at the top, and the third ring yieldably joined to the first ring for purposes of releasing tension in filter and of shaking it.

WARD LEATHERS.