Feb. 25, 1941. C. O. ERNOLF 2,232,906

VACUUM CLEANER

Filed Aug. 19, 1936

Fig. 1.

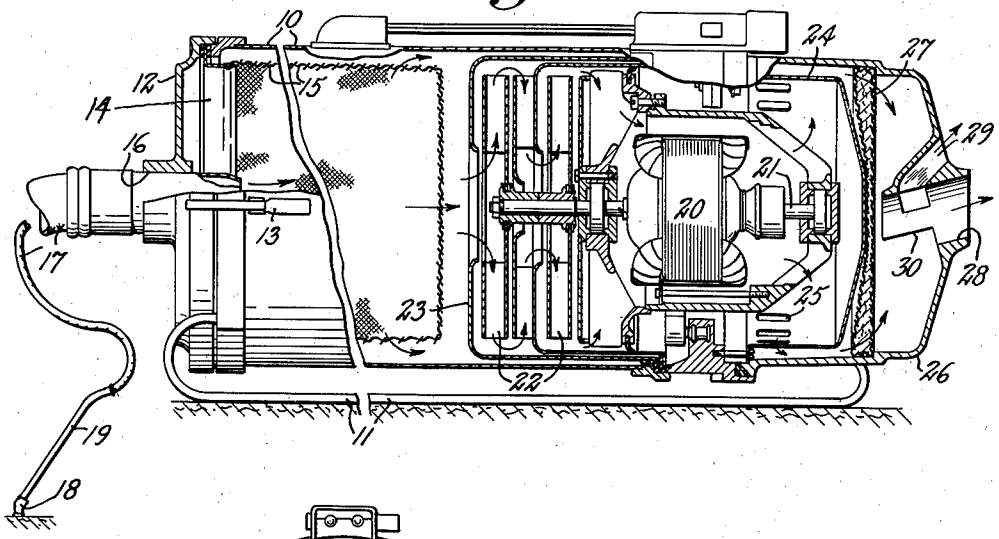


Fig. 2.

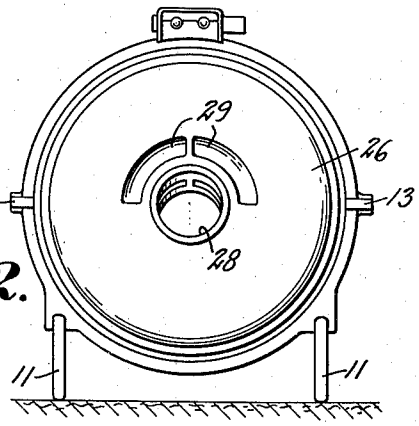


Fig. 3.

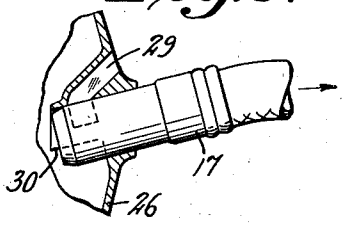


Fig. 4.

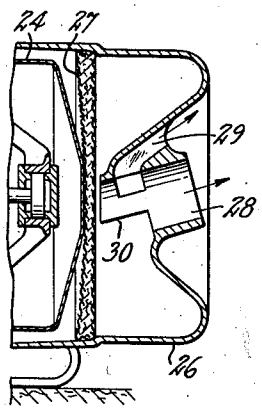
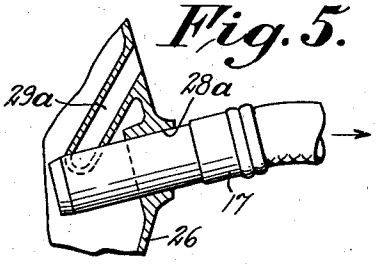


Fig. 5.



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VACUUM CLEANER

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In Germany August 19, 1935

4 Claims. (Cl. 230—47)

My invention relates to vacuum cleaners and more particularly to vacuum cleaners which are adapted to be employed for blowing air as well as for cleaning by suction.

More particularly, my invention relates to vacuum cleaners having a dust bag and a motor fan unit enclosed within a casing which is adapted to have connected thereto a hose for the purpose of conveying air either to or from the casing, depending on whether the device is being used as a suction cleaner or as a blower. In a cleaner of this type, it is desirable to provide as large an exhaust opening as possible in order to maintain the back pressure acting against the fan at as low a value as possible. On the other hand, the size of the exhaust opening must be such as to accommodate a hose of convenient dimensions.

According to my invention, several exhaust openings are provided so as to give a large total area, and are so arranged that the insertion of a hose or the like in one of these openings automatically closes the remaining openings so that all of the air exhausted by the fan is caused to flow into the hose. Moreover, this is accomplished without the use of a valve or any moving parts whatsoever, with the exception of the hose.

Another object of my invention is to so arrange the exhaust openings that all of the air discharged from the cleaner, particularly when the hose is not attached to the exhaust opening, is directed upwardly and away from the surface on which the cleaner unit is supported.

Further objects and advantages of my invention will be apparent from the following description considered in connection with the accompanying drawing, which forms a part of the specification and of which:

Fig. 1 is a side view, partially in cross-section, of one embodiment of my invention;

Fig. 2 is an end view of the device shown in Fig. 1;

Fig. 3 is a view of a portion of the device shown in Fig. 1 with a hose connected in an exhaust opening;

Fig. 4 is a view showing a portion of a vacuum cleaner similar to that shown in Fig. 1, but including another embodiment of my invention;

Fig. 5 shows a still further embodiment of my invention.

Referring more particularly to Fig. 1, reference character 10 designates a hollow casing adapted to be supported horizontally above a horizontal surface, as by runners 11. One end of the casing 10 is closed by means of a cover member 12 removably secured to the casing proper by any suitable means, such as spring clips 13. A ring 14 is clamped between cover 12 and casing 10 and supports the open mouth of a dust bag 15. Cover member 12 is provided with an inlet opening 16 adapted to receive one end of a hose 17. The other end of hose 17 may be connected to a suction nozzle 18 and a rigid hollow handle member 19 may be interposed between the hose and the nozzle.

Suitably mounted within casing 10 is an electric motor 20 having an armature shaft 21 upon which is mounted a centrifugal fan comprising rotors 22 within fan housing 23. A motor shield 24 may be secured to the casing so as to enclose the end of the motor opposite the fan. Shield 24 is provided with openings 25 for the passage of air.

Secured to casing 10 in any suitable manner, such as by spring clips similar to those shown at 13, is a cup-shaped member 26. A filter member 27 may be disposed across member 26 rearwardly of motor shield 24 and so arranged that all of the air passing through the casing must pass through the filter.

Member 26 is formed with a main exhaust opening 28 having a bore the same as that of inlet opening 16 whereby it is adapted to receive the end of hose 17. Opening 28 is inclined upwardly and is of sufficient length so that air discharged therefrom is directed upwardly and away from the surface supporting the cleaner. Member 26 is also formed with one or more exhaust openings 29 in addition to opening 28. As shown, two openings 29 having an arcuate form are provided. The inner ends of openings 29 communicate with the bore of opening 28, while the outer ends are open to the atmosphere. The general direction of openings 29 is also upwardly so that air discharged therefrom is directed away from the surface.

The apparatus operates as follows:

Rotation of rotors 22 by motor 20 causes air to be drawn in through nozzle 18, handle 19, hose 17 and inlet opening 16 into the interior of dust bag 15. If the nozzle is passed over a dusty surface, dust will be entrained with this air and deposited within the dust bag. The air passes through the dust bag to the fan from where it is discharged through the motor and through the openings 25 in motor shield 24 to within cup-shaped member 26. From here the air passes through filter 27 and to the atmosphere through exhaust opening 28 and exhaust openings 29. The total area of openings 28 and 29

is sufficiently great so that a minimum back pressure is imposed on the fan, thereby increasing the effectiveness of the latter. The bore of opening 28 is cut away at its lower part as shown at 30 whereby air passing particularly through the lower part of the filter may flow without interference through the openings 29.

If it is desired to employ the device for blowing, hose 17 is removed from inlet opening 16 and inserted in exhaust opening 28 as is shown in Fig. 3, the nozzle 18 and perhaps the hollow handle having been removed. In this position the end of the hose closes the inner ends of openings 29, thereby preventing the flow of air therethrough and assuring that all of the air passes into the hose. When used for blowing, the cover 12 and dust bag 15 may be removed in order to minimize the resistance to flow of air from the atmosphere to the fan.

The embodiment shown in Fig. 4 is in all respects similar to that discussed above with the exception that the end of cup-shaped member 26 is dished inwardly in order that the outer end of opening 28 will be protected from injury in the event that the vacuum cleaner is accidentally dropped on its end.

In the embodiment shown in Fig. 5 the opening 29*a* does not communicate with the bore of exhaust opening 28*a* but the inner end of the former opening terminates in a curved surface, which is a continuation of the curved surface of the upper part of the opening 28*a*. Thus, when the end of hose 17 is inserted into opening 28*a*, the innermost part of the end contacts the ends of the walls defining opening 29*a* and prevents flow of air through openings 29*a*.

While in the embodiments illustrated, hose 17 has been shown as retained in inlet opening 16 and exhaust openings 28 or 28*a* by means of a jam fit, it will be understood by those skilled in the art that any other well known type of connection may be employed.

While I have shown several more or less specific embodiments of my invention it is understood that this has been done for purposes of illustration only and that they do not constitute any limitation of the invention, the scope of which is to be determined by the appended claims viewed in the light of the prior art. Moreover, the material of member 26 which surrounds the dished portion provides a supporting rim of a diameter substantially as great as that of the member 26, which rim is disposed in a plane normal to the lengthwise extent of the casing 10, whereby the cleaner may be stood on end in spite of the fact that the exhaust passage formed by upwardly inclined bore 28 is of sufficient length to cause the air flowing therethrough to be directed upwardly.

What I claim is:

1. In a vacuum cleaner, a casing adapted to be supported on a horizontal surface and formed with an inlet opening, means for inducing flow of air through said casing, said casing having a first exhaust opening and a second exhaust opening arranged in a substantially vertical wall of said casing and which are both normally open for the flow therethrough of air, and a hose engageable within said first exhaust opening to receive air discharged therethrough, the inner end of said second exhaust opening terminating in line with the side of said first exhaust opening whereby said hose closes said second exhaust opening when engaged in said first exhaust opening, said second exhaust opening being disposed above the first, both of said exhaust openings being arranged to discharge air upwardly away from said surface.

2. In a vacuum cleaner, a casing formed with an inlet opening, a motor-fan unit in said casing for inducing flow of air through said inlet opening, said casing having a cylindrical passage forming a main exhaust opening and another passage communicating with said cylindrical passage at one side and forming an auxiliary exhaust opening, both of said exhaust openings being normally unobstructed for flow of air therethrough the opposite side of said cylindrical passage being cut away, and a hose having a cylindrical end insertable into said main exhaust opening to a point beyond the point of communication of said auxiliary exhaust opening whereby the latter is closed by said hose.

3. In a vacuum cleaner, an elongated casing formed with an inlet opening at one end, means for supporting said casing horizontally on a horizontal surface, a motor-fan unit in said casing for inducing flow of air through said inlet opening, a cup-shaped member secured to the other end of said casing and having an inwardly dished end formed with a first exhaust opening of appreciable length and a second exhaust opening, both of said openings being inclined upwardly and away from said surface and the outer ends of said openings terminating within the hollow formed by said dished end, and a hose member receivable within said first exhaust opening, the inner end of said second exhaust opening terminating relative to said first exhaust opening so that the side of said hose member closes said second exhaust opening when received in said first exhaust opening.

4. In a vacuum cleaner, an elongated casing formed with an inlet opening at one end, means for supporting said casing horizontally on a horizontal surface, a motor fan unit in said casing for inducing flow of air through said inlet opening, and a cup shaped member secured to the other end of said casing and having an inwardly dished end formed with an exhaust opening inclined upwardly and away from said surface and of sufficiently great length so as to cause the air leaving said exhaust opening to flow in a similarly inclined direction, the outer end of said opening terminating within the hollow formed by said dished end, the portion of said member which borders said inwardly dished end providing a supporting rim disposed in a plane normal to the lengthwise extent of said casing and substantially as wide as said end cap.

CARL OSKAR ERNOLF.