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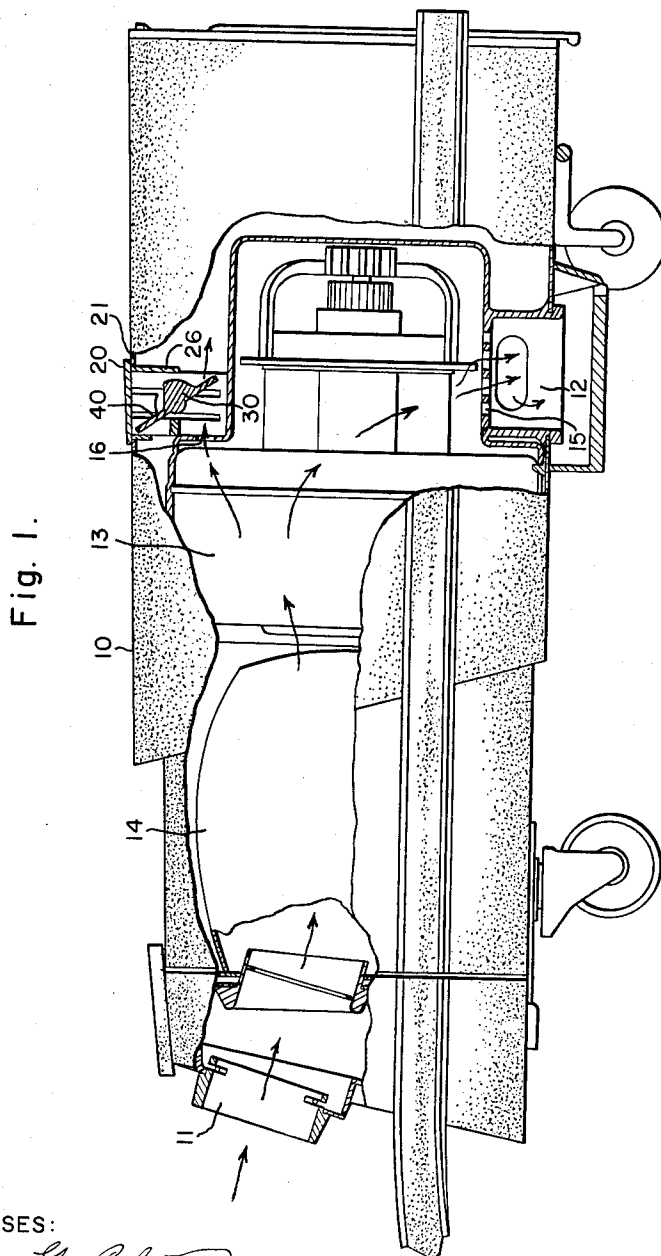
R. S. WATERS

3,210,793

VACUUM CLEANER FULL BAG INDICATOR

Filed March 16, 1964

2 Sheets-Sheet 1



WITNESSES:

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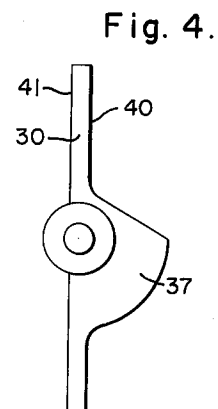
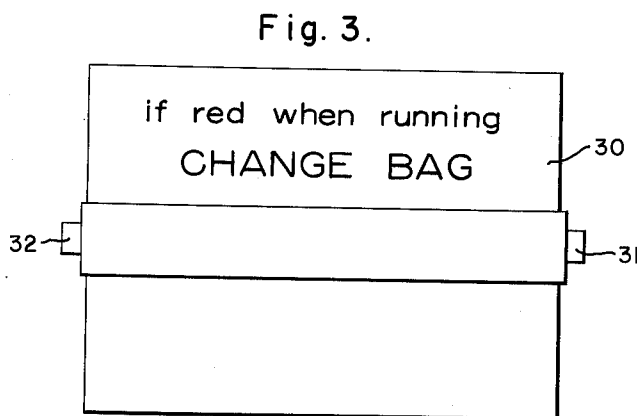
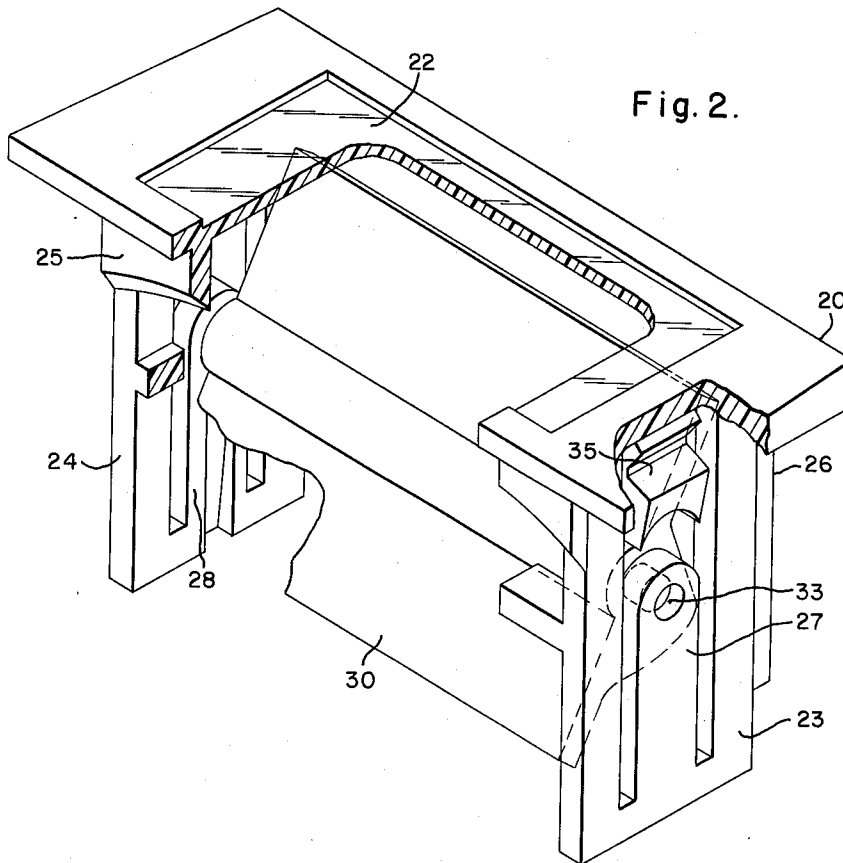
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2 Sheets-Sheet 2



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3,210,793

VACUUM CLEANER FULL BAG INDICATOR
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2 Claims. (Cl. 15—339)

The present invention relates to vacuum cleaner constructions and more particularly to a vacuum cleaner having a simple, reliable and inexpensive air flow indicator in combination therewith.

It is known that the flow of air through a vacuum cleaner decreases as the dirt accumulates in the dirt receptacle, and when disposable dirt bags are used, an indication of a full bag to be changed can be determined by the reduced air flow. In order to be practical, an air flow indicator for a vacuum cleaner should be as simple, reliable and inexpensive to manufacture as possible.

It is a principal object of the present invention to provide an improved vacuum cleaner having in combination therewith an air flow indicator that is simply comprised of a minimum of two parts that are easily incorporated in the vacuum cleaner housing and which will provide a highly visible indication of air flow in terms of bag condition such that a full bag requiring changing may be instantly determined while the vacuum cleaner is in operation.

In accordance with the invention, a vacuum cleaner housing containing a motor driven air pump to create a suction at an inlet opening and an exhaust at an exhaust outlet is provided with an indicator opening through which is inserted and secured an air flow indicator in a position to sense the flow of air through the housing. The indicator is simply comprised of a single piece of molded material having a transparent base member and depending side walls to which is movably mounted a vane member also molded in a single piece in a manner to be visible through the transparent base member. The vane is balanced or weighted to assume a first position in response to the force of gravity and to be movable to other positions proportional to air flow against the force of gravity, and the different positions of the vane as seen through the transparent base are indicative of the bag condition. Since the indicator vane is very sensitive to air flow, in accordance with the invention, means may be provided to divert only a portion of the air flow through the vacuum cleaner to the movable vane.

Further objects, features and the attendant advantages of the invention will be apparent with reference to the following specification and drawings, in which:

FIG. 1 is a side elevational view, partly in section, of a vacuum cleaner embodying the indicator of the invention;

FIG. 2 is an isometric view, partly broken away and partly in section, of the indicator enclosure with pivoted vane as removed from the vacuum cleaner housing;

FIG. 3 is a front view of the indicator vane; and

FIG. 4 is a side view of the indicator vane.

Referring to FIG. 1 of the drawings, a typical example of a vacuum cleaner embodying the indicator of the invention is shown to comprise the vacuum cleaner housing 10 having an air inlet 11 and an air exhaust outlet 12. A motor driven air pump is generally shown at 13 and a disposable dirt bag arrangement is generally shown at 14. The arrows on the drawing indicate the air flow from the inlet opening 11 to the exhaust outlet 12 through the dirt bag 14 as pumped by the air pump 13. It will be noted that most of the exhaust air passes through the plurality of openings in the exhaust outlet wall 15, but a small amount of air flow through the vacuum cleaner is diverted

through the opening 16 adjacent the air flow indicator of the invention to be described.

The air flow indicator of the invention is shown in greater detail in connection with FIGS. 2-4 of the drawings, but as shown by FIG. 1, the indicator enclosure 20 is received in an opening 21 of the vacuum cleaner housing 10 to be in a position adjacent the exhaust diversion outlet 16. More particularly, the indicator enclosure 20 is molded of a single piece of plastic material having a transparent base member 22 and dependent side walls 23, 24, 25 and 26. Each of the oppositely positioned depending side wall portions 23 and 24 are provided with integrally formed resilient tongue members 27 and 28 between which is pivotally positioned a movable vane member 30. The movable vane member 30 is provided with oppositely positioned pivot projections 31 and 32 which snap into position in the pivot holes, such as the pivot hole 33 of each of the resilient tongues 27 and 28, respectively.

As described above, it will be understood that the indicator element of the invention is very simply comprised of only two molded plastic elements, namely, the enclosure member 20 and the vane member 30. It is only necessary to snap the vane member 30 into position between the resilient tongue portions 27 and 28 in order to assemble the indicator element. In turn, the indicator element may be snapped into position within the opening 21 of the vacuum cleaner housing 10 with its base member generally in the plane of the surface of the housing 10 and can be retained in that position by means of the resilient retaining tab element, such as the tab element 35. The resilient retaining elements such as the element 35 are also integrally formed in the molding of the indicator enclosure 20. It should be understood, however, that the invention is not limited to the employment of a particular type of retaining tab, such as the tab just described and shown at 35 on FIG. 2 of the drawings and, for example, may be held in with screws, etc.

The pivoted vane 30 is also provided with a molded portion 37 which functions as a balance weight to cause the vane to normally assume the position shown by FIG. 2 of the drawings in response to the force of gravity. However, when the vacuum cleaner is in operation and air pump 13 is effective to pump air through the dirt bag 14, and assuming the dirt bag is not clogged, sufficient air flow passes through the opening 16 against the pivoted vane 30 to cause it to move to the position shown by FIG. 1 of the drawings. When the vane 30 is in the position shown by FIG. 1 of the drawings, only its back side surface 40 is visible through the transparent base window 22 of the indicator enclosure. If desired, the back surface may be painted black so that when the person using the vacuum cleaner sees the black surface through the indicator window 22, he knows that the dirt bag 14 is not clogged and that the vacuum cleaner pump 13 is operating effectively. On the other hand, should the dirt bag become clogged or should the air pump otherwise fail to function effectively, there will be insufficient air flow through the opening 16 to move the pivoted vane 30 from the position shown in FIG. 2 of the drawings so that the front surface 41 of the vane will be visible through the transparent window 22. If desired, the front surface 41 of the vane 30 may be painted red and may have lettering thereon in some contrasting color to advise the person using the vacuum cleaner that the dirt bag needs changing because it is apparently clogged as indicated by the reduced air flow sensed by the air flow indicator of the invention.

Although the indicator of the invention has been shown to be positioned to sense only a portion of exhaust air diverted through the opening 16, it should be understood that the invention is not limited to such precise arrange-

3

ment since the air flow indicator may be arranged to respond to any or all of the air flow passing through the vacuum cleaner as should be obvious to those skilled in the art. In addition, various other modifications may occur to those skilled in the art.

I claim as my invention:

1. A vacuum cleaner having an air flow indicator comprising in combination, a vacuum cleaner housing having inlet and exhaust openings and having mounted therein a motor driven air pump for creating a suction of air at said inlet and an exhaust of air at said outlet, an indicator opening in said housing, an indicator enclosure having a transparent base and dependent side walls mounted in the opening of said housing with the transparent base generally in the plane of the opening, an indicator vane movably mounted in said enclosure and balanced to be moved to a first position in response to the force of gravity, means to convey at least a portion of the air pumped by said motor against said vane to move said vane to another position against the force of gravity proportional to the air flow, the positions of said indicator vane being visible through said transparent base to thereby indicate the air flow through the vacuum cleaner, said indicator enclosure being formed of a single piece of molded material with two of its opposing dependent side walls having integrally formed therewith a pair of resilient pivot tongue members, said indicator vane comprising a generally planar member formed of a single piece of molded material and having opposing pivot projections adapted to be pivotally received between said pivot tongue members to thereby movably mount said indicator vane in said enclosure, said vane having a weight distribution to cause said vane to normally assume a first position in response to the force of gravity, and said means to convey air to said vane includes an opening in a side wall of said enclosure to pass a portion of the air flowing through the vacuum cleaner housing against the planar surface of said vane in a direction to exert a force to move said vane from the said first position to another position proportional to the air flow.

2. A vacuum cleaner having an exhaust pressure indicator comprising in combination, a vacuum cleaner hous-

4

ing having inlet and exhaust openings and having mounted therein a motor driven air pump for creating a suction of air at said inlet and an exhaust of air at said outlet, secondary exhaust means to bleed off and divert a portion of the exhaust air from said pump and exhaust opening, an opening in said housing near said secondary exhaust means, an indicator enclosure having a transparent base and dependent side walls mounted in the opening of said housing with the transparent base generally in the plane of the opening, an indicator vane movably mounted in said enclosure to be moved to a first position in response to the force of gravity, means to convey the diverted portion of exhaust air against said vane to move said vane to a second position against the force of gravity proportionally to the pressure of the diverted exhaust gas, the positions of said indicator vane being visible through said transparent base to thereby indicate the exhaust pressure of the vacuum cleaner, said indicator enclosure being formed of a single piece of molded material with two of its opposing dependent side walls having integrally formed therewith a pair of resilient pivot tongue members, said indicator vane comprising a generally planar member formed of a single piece of molded material and having opposing pivot projections adapted to be pivotally received between said pivot tongue members to thereby movably mount said indicator vane in said enclosure, said vane having a weight distribution to cause said vane to normally assume a first position in response to the force of gravity, and said means to convey includes an opening in a side wall of said enclosure to pass air flowing from said secondary exhaust means against the planar surface of said vane in a direction to exert a force to move said vane from the said first position to another position proportional to the air flow.

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