

Nov. 3, 1942.

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2,300,705

SIGNAL MEANS FOR SUCTION CLEANERS

Filed Jan. 11, 1940

3 Sheets-Sheet 1

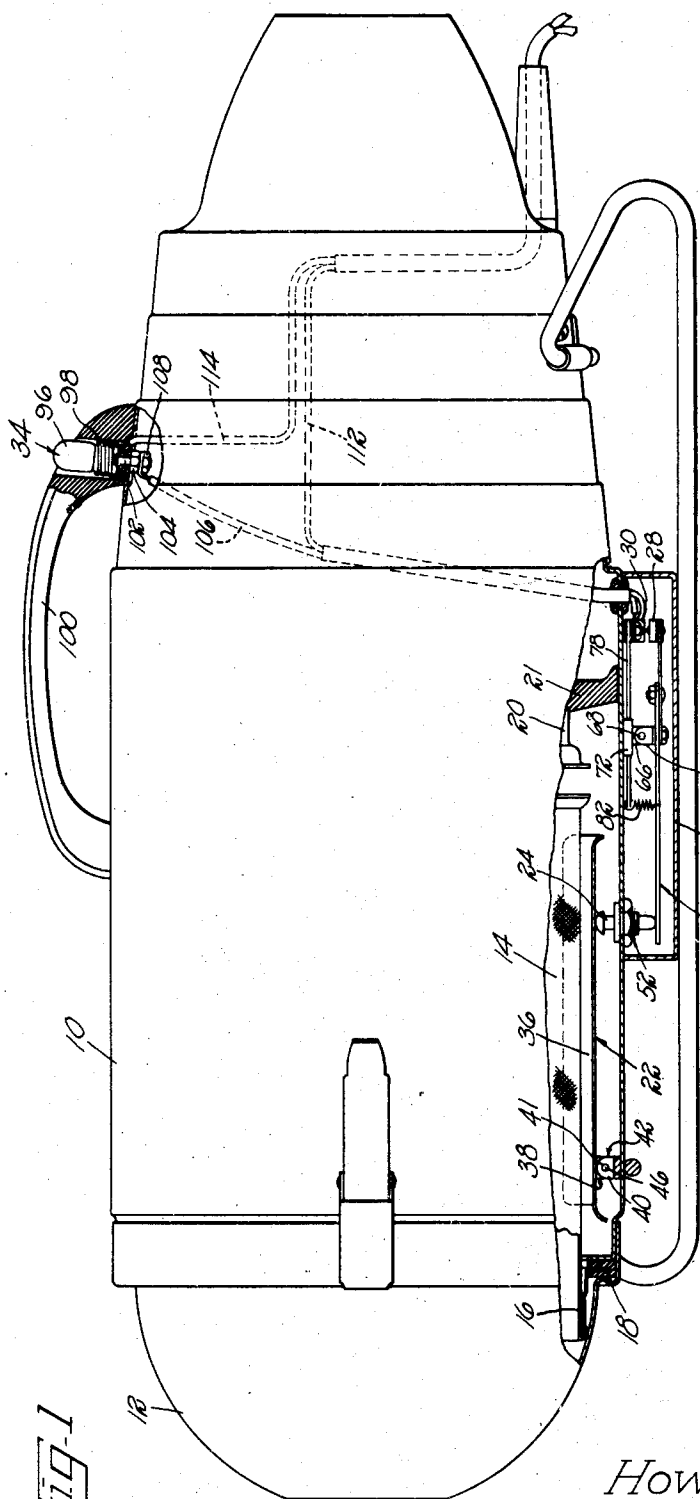


Fig. 1

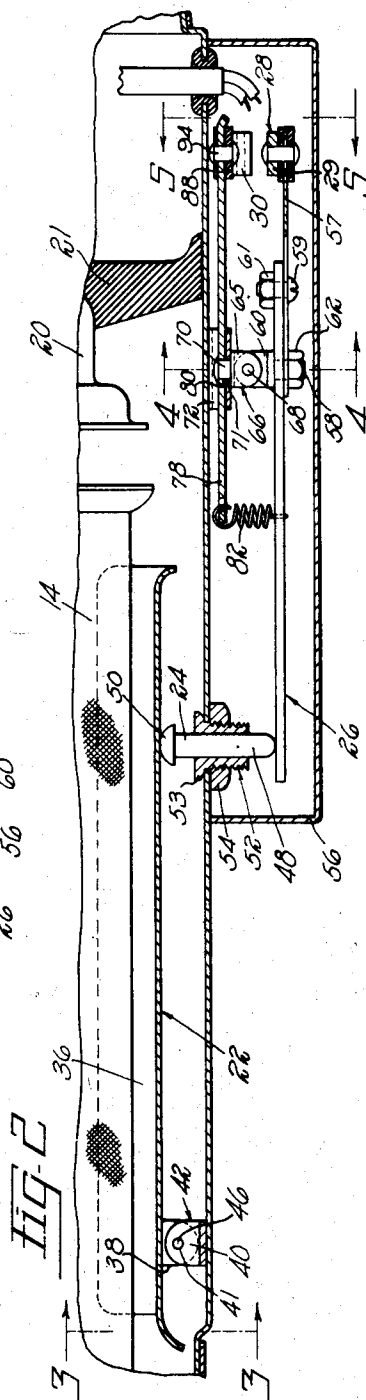


Fig. 2

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Fig. 3

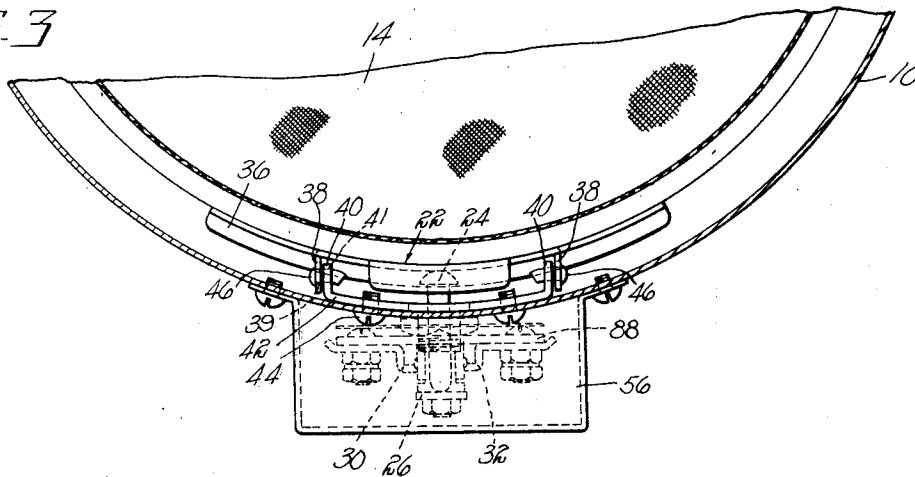


Fig. 4

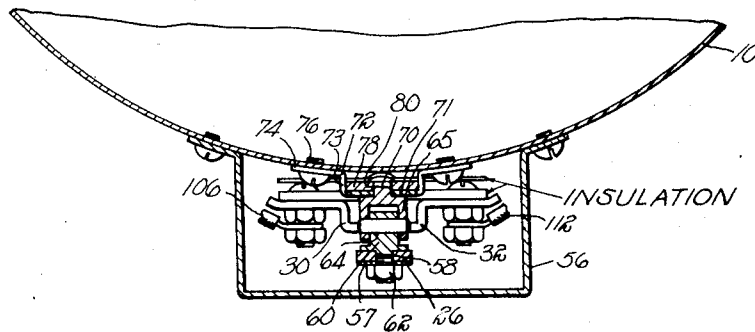
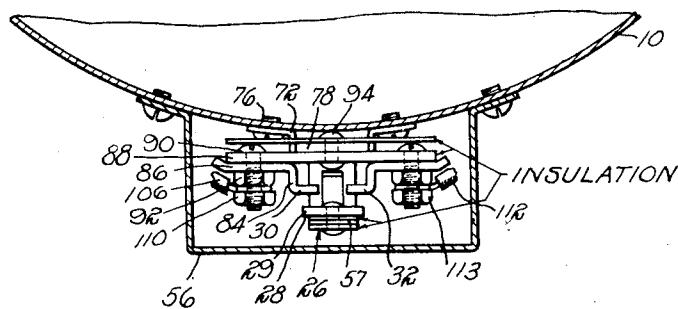


Fig. 5



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3 Sheets-Sheet 3

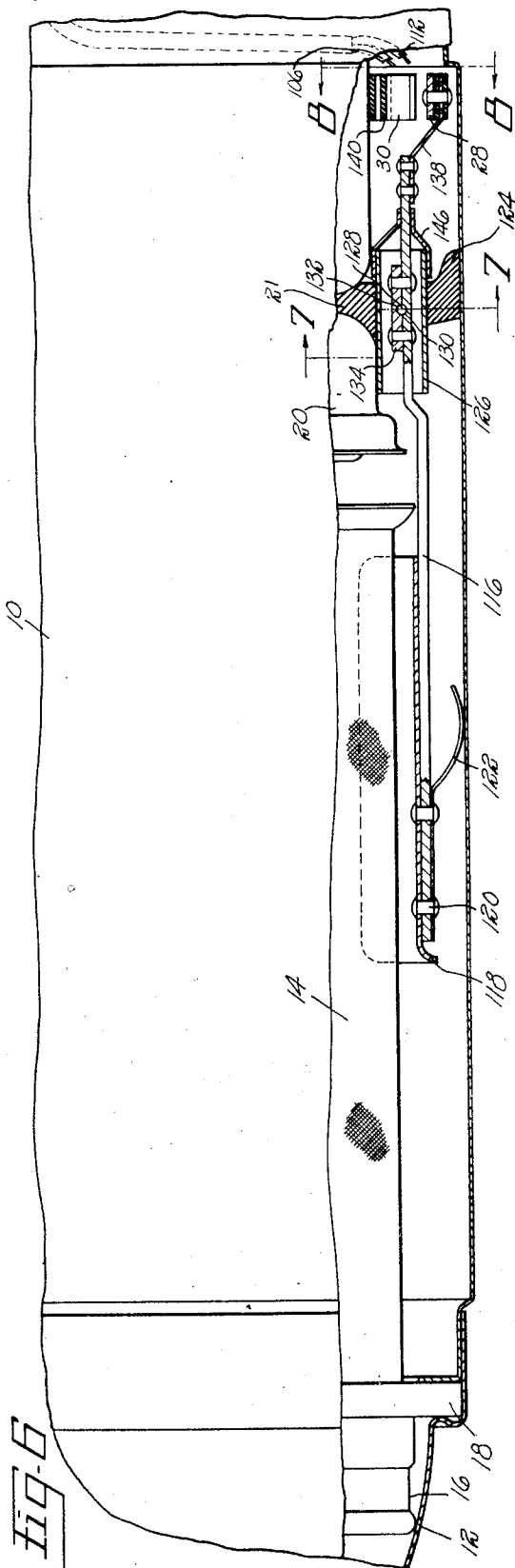


fig. 7

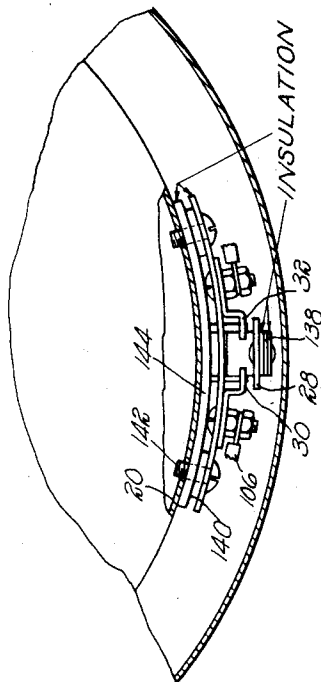
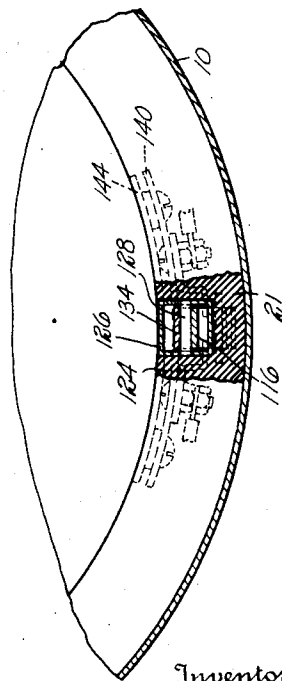


fig. 8



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UNITED STATES PATENT OFFICE

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SIGNAL MEANS FOR SUCTION CLEANERS

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Application January 11, 1940, Serial No. 313,389

1 Claim. (Cl. 177-311)

The present invention relates to vacuum cleaners and more particularly to signal means associated therewith for indicating when the efficiency thereof is impaired by the amount of dirt accumulated within the dust collector.

More particularly, the invention relates to vacuum cleaners of the type wherein the dust collector is positioned within the casing and in advance of the blower or suction producing means. In such cleaners, the dirt tends to pack against the walls of the dust collector, necessitating the passage of the incoming air initially through the dust and then through the bag. As a result, when a predetermined amount of dust is collected, the efficiency of the cleaner will rapidly drop off, even though the amount of dust collected is less than the full holding capacity thereof. In many instances, when the rapid efficiency drop results, the user, upon examining the bag and finding that the accumulated dust appears to be less than the capacity of the bag, concludes that there is an impairment in the mechanical blower producing means, failing to appreciate that the accumulated dust is the cause thereof.

The object of the present invention is to provide signal means operative when a predetermined amount of dust or dirt accumulated within the collector will result in a rapid drop in operating efficiency of the cleaner.

A still further object is the provision of signal means controlled by the weight of accumulated dust within the dust collector.

A still further object is the provision of signal means associated with the vacuum cleaner and characterized by its simplicity and efficiency in operation and its dependability and reliability in service and performance.

Other objects will be in part obvious and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements, and arrangement of parts which will be exemplified in the construction hereafter set forth and the scope of the application of which will be indicated in the appended claim.

In the accompanying drawings:

Figure 1 is a side elevation, partly in section and partly broken away, of the vacuum cleaner embodying the invention herein;

Fig. 2 is an enlarged view of the broken away portion of Fig. 1;

Figs. 3, 4, and 5 are views taken respectively on the lines 3-3, 4-4, and 5-5 of Fig. 2;

Fig. 6 is a view of a vacuum cleaner similar to

that of Fig. 1, but embodying another modification of the invention herein; and

Figs. 7 and 8 are views taken respectively on the lines 7-7 and 8-8 of Fig. 6.

Referring to the drawings, there is shown a vacuum cleaner of the cylindrical type having a cylindrical casing 10 closed at one end by a removable closure 12. Supported within the casing is a cylindrical dust collector 14 made of any suitable flexible material so woven as to allow the air to pass therethrough while retaining the dust therein. The bag 14 is clamped at its forward open end to a cylindrical ring 16 having a laterally extending flange 18 clamped between the body portion 10 and the end closure 12, whereby the axis of the bag will be positioned in alignment with the axis of the cleaner casing. The cleaner further includes a blower or suction producing means and a motor therefor mounted within an inner housing 20 located rearwardly of the dust collector and spaced from the casing by a gasket 21. Inasmuch as the foregoing is all of well-known construction, for purposes of simplicity the details are omitted herein.

In accordance with the invention herein, there is provided means associated with the dust collector 14 and responsive to the weight of dust collected therein for operating a suitable signal for indicating to the user that the dust accumulated within the collector is such that a drop in operating efficiency will thereafter occur unless the collector is cleaned. Referring initially to Figs. 1 to 5, the means for accomplishing this comprises generally a second class lever 22 fulcrumed at its forward end and adapted to pivot in a clockwise direction in direct response to the weight of the material accumulated within the collector 14. The movement of the lever 22 is transmitted through a slidable member 24 to the pressure end of a first class lever 26 adapted when pivoted to operate the signal means. In the embodiment illustrated, the lever 26 carries a contact 28 adapted to span a pair of circuit contacts 30 and 32 secured to the casing. When this occurs, a circuit will be completed through signal means 34 for visibly indicating to the user that the dust accumulated in the collector has reached a predetermined amount. Although visible signal means is shown, it is understood that any suitable electrically operated signal means could be utilized and, in like manner, the means responsive to the weight of material accumulated within the collector could also be utilized to operate suitable mechanical signal means.

More specifically, and for the purpose of illustrating a practical embodiment of the invention, the lever 22 may comprise a parti-cylindrical plate 36 provided adjacent its forward end with depending ears 38 spaced equally to either side of the center line thereof and having there-through aligned pivot pin receiving apertures 39. The ears 38 straddle the upwardly projecting ears 40 of a bracket 42 positioned on the casing with the ears 40 equally spaced to either side of the center line of the casing and secured thereon as by screws 44. The upstanding ears 40 are also provided with pivot receiving apertures 41 alignable with the apertures 39 of the ears 38 whereby when the parts are properly aligned the lever 22 may be secured to the bracket by pivot pins 46 having outer enlarged heads and their inner ends peened over to permanently secure the lever in place. Obviously, when so mounted the lever 22 underlies the collector 14 and with its center line located in the vertical plane through the collector and casing.

As previously indicated, the inner or weight receiving end of the lever 22 rests on a vertically slidable member 24; this member in the present embodiment consisting of a pin 48 having an enlarged head 50 directly supporting the lever. The pin 48 is slidable in a sleeve 52 having a body part extending through an aperture in the casing 10 and held in place by an enlarged collar 53 disposed in the casing and a lock nut 54 threadably received on the depending body part outside the casing.

For convenience in manufacture and assembly, the lever 26 and the switch contacts 28, 30, and 32 are all assembled in a unit which may then be secured to the bottom of the casing and enclosed by a cover 56 secured to the casing in any convenient way. In constructing the unit, the lever 26 may initially have secured thereto the spanning contact 28; the contact being a flat plate 29 riveted to, but insulated from, the free end of a flexible arm 57; the other end of the arm being fixed to the lever 26 by a bolt 59 extending through suitable apertures therein and secured in place by a nut 61.

To provide a fulcrum for the lever 26, it is provided intermediate of its ends with an aperture for receiving the depending stud 58 of a supporting arm 60 and then secured thereon by a lock nut 62. The supporting arm 60 is further provided with a transverse bore 64 alignable with apertures provided in the depending ears 65 of an inverted U-shaped bracket 66; the bore and apertures being adapted to receive a pivot pin 68 whereby the lever 26 is pivotally mounted on the bracket 66.

To support the pivot bracket 66, the base thereof has an upwardly projecting lug 70 extending through an aperture in the base 71 of a U-shaped supporting bracket 72; the extremities of the side legs 73 of bracket 72 having lateral arms 74 extending outwardly therefrom and curved to the contour of the bottom of the casing 10 and secured thereto as by screws 76. To further utilize the bracket 72 as a support for the contacts 30 and 32, the latter are carried on the inner end of a horizontally arranged arm 78 extending between the vertical legs of the bracket 72. Arm 78 is provided intermediate of its ends with an aperture 80 through which the upwardly projecting lug 70 of the pivot supporting bracket 66 also extends, and, when properly positioned, the upper end of the lug is peened over to positively secure the arm 78 in position.

To support the contacts 30 and 32 on the end of arm 78, they are each provided with a vertically extending portion 84 and a horizontally extending portion 86; the horizontally extending portions being secured to a transverse arm 88 by a bolt 90 extending through aligned apertures therein and secured by a nut 92. The transverse arm 88 is secured to the end of the arm 78 by a rivet 94 extending through suitable aligned apertures therein, and there may also be arranged above the arm 88 and secured thereon by the rivet 94 a transverse strip of insulating material to overlie the headed ends of the bolts 90.

At its forward end, the arm 78 also provides a support for one end of a spring 82; the spring depending therefrom and having its other end connected to the lever 26 intermediate of its pressure and its fulcrum and functioning to maintain the circuit closure in balanced open position when the dust bag 14 is empty.

As best seen in Fig. 1, the signal means comprises a bulb 96 receivable within a socket 98 secured to the casing 10 and preferably positioned within a vertical opening arranged in the casing handle 100, whereby the bulb will be afforded protection against breakage. The socket is secured to the casing by having a central contact 102 of such length that it extends through an aperture in the casing wall and is threaded on its inner end to receive a securing nut 104. The circuit through the switch closure and the signal means includes one lead 106 having one end secured to the central contact 102 of the socket by a nut 108 and its other end connected to the securing bolt 90 of the circuit contact 30 by a nut 110; a second lead 112 having one end connected to the securing nut 90 of the contact 32 by a nut 113 and its other end to a source of power; and a third lead 114 having one end connected to the shell of the socket 98 and its other end to the source of power.

With the device constructed in the aforementioned manner, when the cleaner is operated the collector 14 will assume the position indicated in Fig. 1; this position being due to the expansion thereof by the air therethrough. In the type of cleaner illustrated, the collector 14 will hold approximately five pounds of dirt or dust when it is completely filled, but when approximately a pound and a half of dust has been accumulated, the efficiency of the cleaner will rapidly drop off due to the increased resistance of air flow through the bag. As the dust accumulates, the collector 14 will sag and its weight be taken by the lever 22. As the weight increases, the lever will rotate about its fulcrum in a clockwise direction to depress the member 24 and in turn pivot the lever 26 in a counterclockwise direction, overcoming the tendency of the spring 82 to maintain the parts in balance and thus tend to close the signal switch by moving the contact 28 toward closed position. As the weight of accumulated dust increases, further movement of the contact 28 will result until the predetermined amount of dust collected within the collector is such that the contact 28 will span the contacts 30 and 32 closing the circuit through the signal means and warning the user that the bag should be cleaned.

Referring now to Figs. 6 to 8, there is shown another embodiment of the invention wherein the weight responsive and circuit closing means may be wholly positioned within the casing of the cleaner. To accomplish this, there is provided a first class lever 116 carrying on its weight receiving end a parti-cylindrical plate 118 underly-

ing the dust collector 14 and secured to the lever by rivets 120 and at its opposite end carries a spanning contact 28.

To fulcrum the lever in the casing 10, there is supported in the motor housing supporting gasket 124 a rectangular frame member 126 provided with aligned apertures for receiving a pivot pin 128. The lever is mounted on the pivot pin by providing in the upper surface thereof a semi-circular groove 130 mating with a semi-circular groove 132 provided in a plate 134 overlying and secured to the lever as by rivets 136; the mating grooves defining a bore through which pin 128 extends.

As in the first embodiment, the spanning contact 28 is carried by a spring finger 138 riveted to the lever 116 whereby movement of the lever in a counterclockwise direction will move the spanning contact into engagement with the circuit closing contacts 30 and 32 of similar construction to those of the first embodiment. However, for supporting the contacts 30 and 32 they are mounted on a semi-circular arm 140 secured to the motor housing 20 by screws 142; there being interposed between the arm 140 and the housing a strip of insulating material 144. The lever 116 is normally maintained in balance with the contacts open by a spring finger 122 secured to the under side of the lever by the rivets 120 and abutting against the inside of the casing 10.

In order to prevent dust from passing through the rectangular casing 126 mounted in the gasket 124, a flexible sleeve 146 may be mounted with one end engaging the casing 126 and the other end the lever 116. As the circuit, signal means, and operation thereof are similar to those in the first embodiment, they will not be further described herein.

There is thus shown two embodiments of means for indicating the operating condition of the suction cleaner, and in both embodiments a signal is energized when a predetermined capacity of the dust collector has been reached. If upon the energization of the signal the dust receptacle is removed and cleaned, the operation of the cleaner will at all times be maintained at maximum efficiency.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claim is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim as my invention:

25 In a bag condition responsive means for suction cleaners having a casing and a flexible inflatable dust collector within the casing, a member movably mounted on the cleaner casing underlying the dust collector and normally out of contact therewith when the collector is inflated and responsive to the weight of material after a predetermined amount has been collected therein to cause the collector to sag down onto the member, and means responsive to movement of the member.

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