

July 1, 1969

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3,452,385

AIR FLOW INDICATOR FOR VACUUM CLEANER APPARATUS

Filed Dec. 1, 1966

FIG. 1

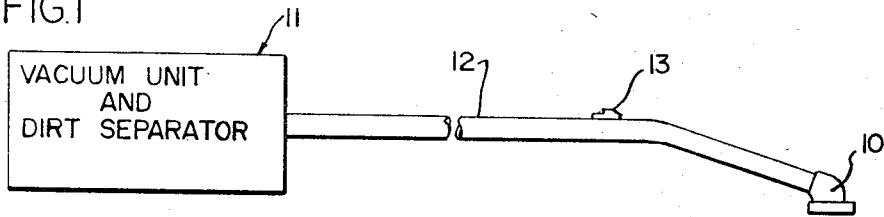


FIG. 2

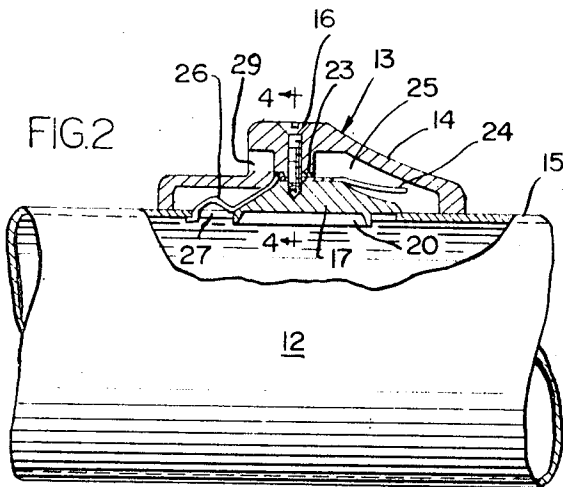


FIG. 4

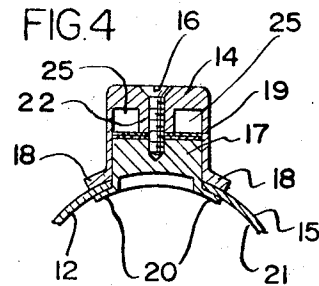
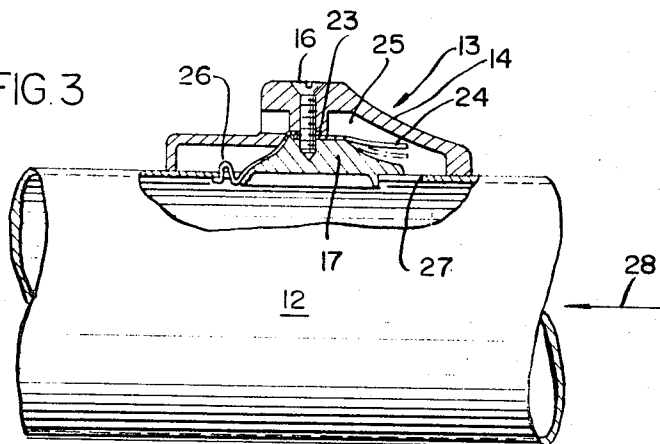


FIG. 3



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1

3,452,385

AIR FLOW INDICATOR FOR VACUUM CLEANER APPARATUS

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Filed Dec. 1, 1966, Ser. No. 598,341

Int. Cl. A47I 9/00

U.S. Cl. 15—339

5 Claims

ABSTRACT OF THE DISCLOSURE

A vacuum cleaner apparatus having conduit means leading to a dirt separating portion in which the rate of air flow in the conduit varies inversely with the amount of dirt in the separating portion and a signal device activated by air flow together with means for subjecting the signal device to the air flow in the conduit means when desired to produce an air flow induced signal which will indicate when the air flow is not operating properly such as when the separating portion becomes obstructed with an excessive amount of dirt.

This invention relates to an improved vacuum cleaner apparatus having a signal device to indicate a malfunction of the apparatus such as when the dirt separator is overloaded with dirt and thus needs to be emptied or replaced in the case of those units having replaceable separators.

As is well known vacuum cleaner apparatus function by setting up a stream of fluid such as air containing entrapped solid particles identified generally as dirt and directing this air through a separator where the dirt is removed usually by means of a filter device. Eventually, of course, the separator becomes filled with dirt to the point where the vacuum cleaner no longer functions properly and efficiently. The apparatus of this invention provides an improved means for indicating when such a condition has been reached.

One of the features of this invention therefore is to provide an improved vacuum cleaner apparatus comprising air conduit means leading to a dirt separating portion of the apparatus in which the rate of air flow in the conduit means varies inversely with the amount of dirt in the separating portion, an air flow actuated signal device and means for selectively subjecting the signaling device to the air flow in the conduit means to provide a signal in the device when air flow in the conduit means is at a sufficient rate to indicate proper operation of the cleaner apparatus and with the absence of a signal thereby indicating a malfunction of the apparatus which may be either mechanical or caused by an excessive amount of dirt in the separating portion.

Other features of the invention will be apparent from the following description of one embodiment thereof taken in conjunction with the accompanying drawings. Of the drawings:

FIGURE 1 is a schematic view illustrating a vacuum cleaner apparatus embodying the invention.

FIGURE 2 is a fragmentary side elevational view partially in section and partially broken away for clarity of illustration of a portion of the apparatus of FIGURE 1.

FIGURE 3 is a view similar to FIGURE 2 but showing the operating parts in a different position.

FIGURE 4 is a fragmentary sectional view taken substantially along line 4—4 of FIGURE 2.

FIGURE 1 illustrates schematically a typically vacuum cleaner apparatus in which a cleaning tool 10 such as a surface cleaning floor nozzle is connected to a vacuum creating and dirt separating unit 11 by means of an air

2

conduit means 12. The air conduit means 12 when the apparatus is functioning conveys dirt laden air from the nozzle 10 to the unit 11 in which the dirt is separated from the air as by passing it through a filter with the air then being exhausted. As can be seen, this apparatus 10—12 can be either the type of unit that is propelled over a floor by a handle, a canister unit or one of the centrally installed apparatus in which the unit 11 is in a location such as a basement with branches of the conduit 12 going throughout the house so that the cleaning tool 10 may be plugged into it as desired.

As indicated above, when the cleaner apparatus is functioning properly the dirt laden air stream is drawn from the cleaning tool 10 through the air conduit 12. However, as the dirt separator in the unit 11 becomes increasingly filled with dirt the resistance to air flow increases so that the rate of flow in the conduit 12 and the suction in the tool 10 becomes ineffective. This of course would also occur if there was a mechanical malfunction of the apparatus. In order to determine easily when such a malfunction occurs the apparatus includes a signal device 13.

In the illustrated embodiment the signal device 13 is located for cooperation with the air conduit 12. Means are provided for selectively subjecting the signal device 13 to the conduit 12 to produce a signal in the device 13 when air flow in the conduit 12 is at a sufficient rate to indicate that the cleaner apparatus is operating properly. In the illustrated embodiment this is accomplished as follows.

The signal device 13 comprises a cover 14 adapted to be manually engaged to slide it back and forth along the outer surface 15 of the conduit 12. In the illustrated embodiment the position of the device 13 in FIGURE 2 shows one end of its range of longitudinal movement on the conduit 12 while FIGURE 3 illustrates the position at the opposite end of its path of movement.

The cover 14 is connected as by means of a screw 16 to a member 17 serving as a nut. The cover 14 as is shown in FIGURE 4 is provided with edge flanges 18 bearing against the outer surface 15. These flanges 18 are located on the extreme ends of parallel sides 19 of the cover 14.

The nut member 17 is provided with similar flanges 20 but bearing against the inner surface 21 of the conduit 12. Thus the flanges 20 of the nut 17 and the flanges 18 of the cover 14 are positioned against the inner and outer surfaces of the conduit 12 so as to be slidable longitudinally on the conduit.

The screw 16 extends through a central portion 22 of the cover 14 which bears against the top of the nut member 17 and grasps the base end 23 of a vibratory noise producing reed 24 therebetween. The remainder of the cover 14 is spaced from the nut member 17 to provide an air passage 25 between the cover 14 and nut 17 having one end 29 open to the atmosphere.

The nut 17 as illustrated in FIGURE 2 is located in an opening 27 in the conduit 12. The signal device 13 which includes the cover 14, nut 17 and reed 24 is urged and held in a forward direction or toward the cleaning tool 10 by means of a distortable spring 26. In this position the forward end of the passage 25 is out of communication with the interior of the conduit 12. However, when the signal device 13 is moved to its rearward position, as shown in FIGURE 3, the front of the passage 25 is in communication with the interior of the conduit 12 as it overlaps the front edge of the conduit opening 27. Thus the cover 14 of the signal device operates as a valve means to open and close the opening 27.

When the vacuum cleaner apparatus is in operation and the user desires to determine if the apparatus is functioning properly or is malfunctioning, as could be caused

3

by an excessive amount of dirt in the separator, he merely moves the device 13 rearwardly along the conduit surface 15 from the position of FIGURE 2 to the position of FIGURE 3. The passage 25 is thereupon in communication with the interior of the conduit 12. If the apparatus is functioning properly the flow of air through the conduit 12 as indicated by the arrow 28 and thus through the passage 25 is sufficiently strong as to vibrate the reed 24 and produce an audible signal. This indicates to the user that the cleaner is operating properly. However, if there is a malfunction, such as a complete failure of operation particularly of a remote vacuum cleaner unit or by an excessive amount of dirt, the air flow 28 will be so small as to be incapable of operating the audible portion 24 of the signal device and this lack of a signal will immediately indicate the malfunction.

By provision of the return spring 26 as soon as the user has received the signal if the apparatus is functioning properly he merely needs to release the cover 14 and the spring 26 will automatically return it to its normal position as illustrated in FIGURE 2.

Having described our invention as related to the embodiment shown in the accompanying drawings, it is our intention that the invention be not limited by any of the details of description, unless otherwise specified, but rather be construed broadly.

The embodiment of the invention in which an exclusive property or privilege is claimed is defined as follows:

1. Vacuum cleaner apparatus, comprising: air conduit means leading to a dirt separating portion of the cleaner apparatus in which the rate of air flow in the conduit means varies inversely with the amount of dirt in said separating portion; a signal device activated by air flow; and means for selectively subjecting said signal device to the air flow conditions in said conduit means to produce an air flow induced signal in said device when air flow in the conduit means is at a sufficient rate to indicate

4

proper operation of said cleaner apparatus, the absence of such air flow induced signal thereby indicating a malfunction of the vacuum cleaner apparatus.

2. The apparatus of claim 1 wherein said means for selectively subjecting said signal device to the air flow conditions in said conduit means comprises an air flow passage means leading to said conduit and with which said signal device is operably associated, and valve means between said passage and said conduit means.

3. The apparatus of claim 2 wherein said air conduit means comprises a suction tube for dirt laden air leading from a cleaning tool, and said air flow passage means has one end open to ambient atmosphere for selectively bleeding air into said suction tube.

4. The apparatus of claim 3 wherein said tube has an aperture therein and said valve means comprises a manually operable member movable on said suction tube selectively to open and close said aperture and containing said air flow passage means, and said signal device comprises an audible signal member in said passage means.

5. The apparatus of claim 4 wherein said signal member comprises a vibratory reed.

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U.S. Cl. X.R.

15—419; 116—112, 114