Dirt Entrapping Device for Observing the Operation of Vacuum Cleaners

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This invention relates to vacuum cleaners and is particularly concerned with means for inspecting the operation of such cleaners.

In the use of vacuum cleaners and particularly in the demonstration of the operation of cleaners, it is often desirable to watch the flow of dust and dirt and to take samples thereof. Such dust and dirt is, of course, collected in the bag or dirt compartment of the cleaner and may be inspected by emptying such bag or compartment from time to time. However, inspection of the operation may be desirable without stopping the operation of the device and the present invention is designed to accomplish this end.

Thus, it is among the generic objects of the present invention to provide means for inspecting the foreign matter drawn in by a vacuum cleaner without the necessity of stopping the operation thereof.

A further object of the invention is to provide means by which the flow of dust or dirt laden air may be visually examined as it flows towards the air cleaning or separating means of the cleaner.

Another object of the invention is to provide means for separating dust and dirt from the dirt and dust laden air drawn in by the cleaner before such air reaches the vacuum cleaner proper.

A still further object of the invention is to provide means for temporarly separating dirt and dust from the dirt and dust laden air before it enters the cleaner body and thereafter returning such dirt and dust to the air stream.

Another object of the invention is to provide a dust sampler which may be applied in the suction line of a cleaner to retain and display dust and dirt being drawn in by the vacuum cleaner.

With these and other objects and advantages of the invention in view, reference may be had to the following specification taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a view of a vacuum cleaner, hose and cleaning tool having the present invention assembled therewith;

Fig. 2 is a detailed side elevation partly broken away of the present invention;

Fig. 3 is a top plan view of the device as shown in Fig. 2;

Fig. 4 is a fragmentary sectional view taken on the line 4—4 of Fig. 3 with the device in dust detaining position;

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 2, and

Fig. 6 is a view similar to Fig. 4 with the device in dust passing position.

In general terms, the invention may be defined as a dust detaining device adapted for insertion in the suction line of a cleaner as for instance, between the hose and wand of a cleaner assembly and including a flow dividing means and a movable screen so arranged that in one position most of the foreign matter is trapped while in another the foreign matter flows freely through the device. The arrangement is such that in the latter free flowing position the foreign matter previously detained is swept out of the device by the air flowing therethrough. The device preferably includes a transparent and removable chamber in which the dust or dirt lodges when inspection and/or sampling is in progress.

Referring more particularly to the drawings, in Fig. 1 the device is indicated by the numeral 10 and includes an intake tube 11 and an outlet tube 12. The intake tube 11 is shown as fitted to the wand 13 to the opposite end of which is applied a suitable cleaning tool 16. The outlet tube 12 of the device is shown as applied to the conventional bent and tapered end 16 of a cleaning hose 16. The hose in turn is attached to the suction end of a conventional vacuum cleaner indicated at 17. It will, of course, be understood that the particular cleaner, hose, wand and cleaning tool are merely shown by way of illustration and form no part of the present invention. Obviously the device could be applied at other points in the suction line and could be used with other types of cleaners and suction arrangements.

Suffice it therefore to point out that the device is intended for application to the suction end of the cleaner in such manner that the dust and dirt laden air is caused to pass therethrough.

Referring now to the detailed Figs. 2 through 6, inclusive, showing the preferred structural embodiment of the inventive concept it will be seen that the device comprises a body 20 which may be in the form of a casting having an upwardly extending inlet tube 21 to which is secured the downwardly curved end 22 of the inlet tube 11. The plane of the inlet tubes 21 and 22 are shown as being common to the body 20 while an outlet tube 23 extends outwardly and upwardly from the body to engage the downwardly curved end 24 of the outlet tube 12. By this arrangement, it will be seen that the tubes 11 and 12 will be parallel to each other, the inlet tube 11 being in the plane of the body 20. Each of tubes 11 and 12 is suitably tapered as shown at 25 and 26 or otherwise formed to provide convenient coupling means for attachment in the suction line of a cleaner.

Within the body 20 and extending from a point midway thereof to within the tube 21 of the inlet tube 11 is fixed an upwardly curved transversely extending baffle 27 which divides the air flowing through tube 21. The baffle is preferably arranged to conform to the curvature imparted to the incoming air stream by the curvature of end 22 and tube 21. By this curvature of the tube, centrifugal forces will cause the heavier of the dust and dirt particles to follow the outer
wall and thus pass beneath the baffle 27 and into the glass cup or sampling chamber 28 which is removable secured to the open mouth of the body 20 by the handle 25 as shown at 29. The portion of the air flowing above the baffle, together with the lighter particles, may pass directly to the outlet tube 23 without entering the chamber 28.

Fivottally mounted within the body 20 is a screen 30 which may be swung from the horizontal position shown in Fig. 4 to the vertical position shown in Fig. 6 by manipulation of an external actuating finger 31 operating between stops 32 on the exterior of the body 20.

In the operation of the device when applied in the suction line and with the screen 30 in horizontal position as shown in Fig. 4 and extending from the baffle to the opposite wall of the body 20, the major portion of the dust and dirt carried by the incoming air stream passes below the baffle and thus is removed by the screen 30. Thus the dirt is visible to an observer of the device and if desired, the entrapped dirt may be removed with the chamber 28 for inspection. If, however, merely the rate of dirt pickup is to be observed, after a desired amount has been trapped in the chamber, the screen is raised to the position shown in Fig. 6 and the air current sweeps the accumulated dust from the chamber 28 and out through the tube 12. With the screen in the position shown in Fig. 6, it will be noted that the relatively clean air passing above the baffle 27 flows through the screen in reverse direction, thus cleaning the screen. Any fine dirt deposited on the right hand side of the screen while the latter is in the position shown in Fig. 6 will be removed immediately by the air passing below the baffle when the screen is returned to the position shown in Fig. 4.

From the foregoing it will be seen that the present invention provides a novel, simple, efficient device for providing visual inspection of dirt passing into the cleaner with means to entrap such dirt and remove a sample for testing if desired. It will be understood, of course, that the invention is not limited to the specific structure shown and that numerous changes and modifications thereof may be resorted to without departure from the spirit or scope of the invention as outlined in the appended claims.

What I claim is:

1. An inspection device for vacuum cleaners comprising a chamber, a baffle within said chamber for dividing the flow of air through the chamber, and a screen in said chamber for restraining the passage therethrough of foreign matter carried by the air, and means to selectively position said screen to selectively restrain foreign matter carried by air flowing from either side of the baffle.

2. An inspection device for vacuum cleaners comprising a chamber, a baffle within said chamber for dividing the flow of air through the chamber, and a screen in said chamber for restraining the foreign matter carried by the air, means for moving said screen to selectively restrain foreign matter carried by air flowing from either side of the baffle, and a removable foreign matter receptacle carried by said chamber.

3. An inspection device for vacuum cleaners comprising a chamber, a baffle within said chamber for dividing the flow of air through the chamber, a screen in said chamber for restraining foreign matter carried by air passing on one side of the baffle, means for moving said screen to selectively restrain foreign matter carried by air flowing from either side of the baffle, and a transplant permitting visual inspection of the flow of air through said chamber.

4. An inspection device for vacuum cleaners comprising a chamber, a baffle within said chamber for dividing the flow of air through the chamber, a screen in said chamber for restraining foreign matter carried by air passing on one side of the baffle, means for moving said screen to selectively restrain foreign matter carried by air flowing from either side of the baffle, a removable foreign matter receptacle carried by said chamber, and means permitting visual inspection of the flow of air through said chamber.

5. An inspection device for vacuum cleaners comprising a chamber, a baffle within said chamber for dividing the flow of air through the chamber, a screen in said chamber for restraining foreign matter carried by air passing on one side of the baffle, means for moving said screen to selectively restrain foreign matter carried by air flowing from either side of the baffle, and a removable foreign matter receptacle carried by said chamber, said receptacle being transparent to permit visual inspection of material passing through said chamber.

6. An inspection device for vacuum cleaners comprising a chamber, a baffle within said chamber for dividing the flow of air and air borne foreign matter therein into two air streams and directing air containing the greater part of the entrained foreign matter into one of said air streams, a screen in said chamber for restraining foreign matter carried by air passing on one side of the baffle, and means to selectively position said screen to selectively restrain foreign matter carried by either of said air streams.

7. An inspection device for vacuum cleaners comprising a chamber, a baffle within said chamber for dividing the flow of air and air borne foreign matter therein into two air streams, a screen in said chamber, means for positioning said screen with one side thereof facing the air passing on one side of said baffle for restraining foreign matter carried by such air and for selectively positioning said screen with the other side thereof facing the air passing on the opposite side of said baffle, whereby foreign matter which has adhered to the screen in one position is removed when the screen is shifted to the other position.

ARNOLD H. BEEDEE.

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