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BAG PRESSURE INDICATING DEVICE FOR SUCTION CLEANERS

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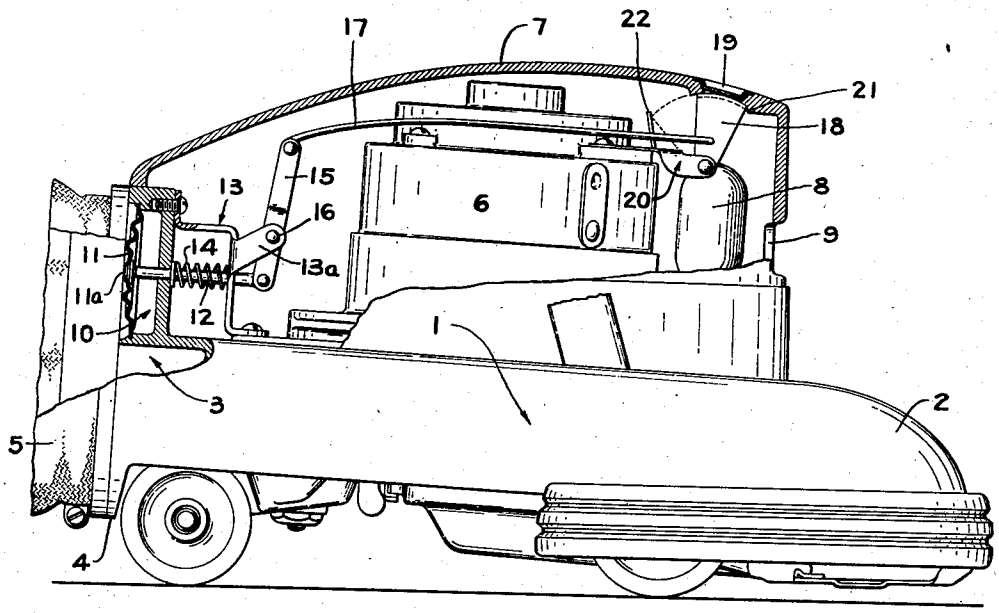


Fig. 1

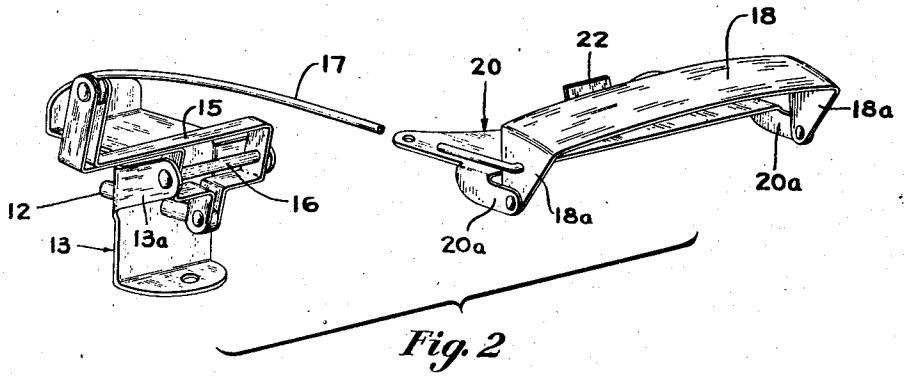


Fig. 2

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BAG PRESSURE INDICATING DEVICE FOR SUCTION CLEANERS

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4 Claims. (Cl. 116—65)

This invention relates to improvements in bag pressure indicators for suction cleaners and more particularly to means for warning the operator that the dirt bag has been filled beyond its normal capacity and should be emptied.

In the operation of suction cleaners of the portable hand-maneuvered type, the dirt-laden air is discharged into a bag made of a porous fabric capable of retaining the dirt but allowing the air to pass therethrough with a minimum of resistance. In the course of time, the bag becomes filled and, if not emptied of its contents periodically, the back pressure created at the discharge outlet from the fan chamber will materially reduce the cleaning effectiveness of the device.

Users of suction cleaners are prone to neglect the emptying of the dirt bag at regular intervals unless reminded of the necessity for so doing and, therefore, the object of the present invention is to provide an improved indicating device, the novel features thereof residing more particularly in the character of the signal displayed, namely, a shutter controlled window in the upper wall of the cleaner casing through which a light is made visible to the operator.

A preferred embodiment of the invention is disclosed in the accompanying drawing, in which:

Figure 1 is a general view in side elevation of a suction cleaner equipped with one of the novel indicating devices and with the upper portion of the cleaner casing shown in section to show the source of the light and the shutter controlling the same; and

Figure 2 is an enlarged detail view in perspective of the pressure actuated shutter mechanism.

The suction cleaner disclosed in Figure 1 may be typical of any standard make or design, although to carry out the present improvement it should be equipped with a headlight for illuminating the floor surface immediately ahead of the cleaner and a dome-like cover or hood not only extending over the motor and headlight but enclosing a space considerably greater than that occupied by both and extending lengthwise of the cleaner casing.

The main body or casing 1 includes the nozzle chamber 2 located at the forward end of the casing, and a fan chamber housing the suction fan and having a discharge outlet passage 3 terminating in a flanged connection 4 at the rear end of the casing. Detachably mounted to the flanged outlet connection 4 is a dirt bag 5 preferably of a porous woven fabric filtering material and into which the dirt laden air is discharged directly from the outlet passage 3 leading from the fan chamber.

Supported upon the casing 1 and having direct driving connection with the suction fan is an electric motor 6 located substantially centrally of the top wall of the casing 1. A dome-like hood or cover 7 is removably supported upon the casing 1 and extends from a point well forwardly of the motor to the outlet connection 4 at the rear of the cleaner casing. The walls of the hood 7 are spaced from the motor 6 on all sides, thus leaving chambers or compartments in front of and at the rear of the motor as well as an open space above. Located immediately in front of the motor is a lamp 8 mounted upright and positioned behind an aperture or window 9 in the front wall of the hood 7, and through which the light from the lamp is directed onto the floor ahead of the nozzle. The lamp receives its current from the same source as does the motor and it is to be assumed that the lamp is lighted while the cleaner is in operation.

Referring again to Figure 1, it will be noted that a portion of the outlet connection 4 immediately above the rear end of the exhaust passage 3, has the form of a shallow cylinder 10 opening rearwardly and directly to the upper portion of the bag mouth, and fitting over the open end of this cylinder is a diaphragm 11, preferably having the form of a concentrically corrugated, thin metal disc, although it may be of any other suitable material. This diaphragm has a centrally disposed button-like abutment 11a adapted to contact one end of a push rod 12 extending forwardly and axially through the vertical end wall of the cylinder and supported for endwise sliding movement in an L-shaped bracket 13 anchored at its ends by means of screws to the top wall of the casing 1 and the upper portion of the cylinder. Between the upright portion of the bracket 13 and the cylinder is a space occupied by a coiled spring 14 connected at its rearmost end to the rod 12 and acting to oppose the forward endwise movement thereof under the distortion of the diaphragm 11, as will presently be explained.

Pivotally connected with the forward extremity of the push rod 12, is a rocker arm 15 pivotally supported intermediate its ends on a transverse pin 16 extending between a pair of forwardly projecting ears 13a integral with the supporting bracket 13. The rocker arm assumes a general upright position with its upper end terminating substantially at the level of the motor top and to which is pivotally attached a light rod 17 ex-

tending forwardly over one side of the motor 6 and pivotally attached at its forward end to a shutter 18. And finally, there is provided in the top wall of the motor hood 7 and directly above the lamp 8 a transversely elongated window or aperture 19 preferably having a translucent panel of glass or like material which may be either clear or colored or having suitable words of warning in opaque letters applied thereto.

Now, as is readily apparent, the function of the shutter is to control the passage of light through the window. As clearly shown in Figure 2, the shutter 18 is a strip of light metal bent in U-shape with its end portions bent at right angles to form arms 18a, 18a having pivotal connection at their ends with a simple form of supporting bracket 20 adapted to be mounted on the top front edge of the motor casing 6 and having a pair of forwardly extending arms 20a, 20a to which the ends of the shutter are pivoted. The forward end of the shutter operating rod 17 is connected with the shutter by inserting its bent end through one of its end portions 18a.

In its normal position, the main body of the shutter lies just below the aperture 19 in the motor hood 7 and in such manner as to effectively prevent the passage of light therethrough. Moreover, the shutter is designed to swing through a limited arc of say, 30° and from the aperture closing position to the dotted line position indicated in Figure 1, in which the signal aperture is uncovered. Suitable stop members are provided for limiting the movements of the shutter in both directions, to wit, a shoulder 21 formed on the underside of the top wall of the motor hood 7 just forwardly of the window 19, and an upstanding finger 22 integral with the shutter supporting bracket 20.

From the foregoing description of the indicating mechanism, it is not difficult to understand the operation thereof: As heretofore pointed out, the diaphragm 11 is responsive to variations in pressure within the dirt bag 5 but undergoes no substantial distortion until a pressure detrimental to the performance is reached, whereupon the axial distortion of the diaphragm imparts an endwise movement to the push rod 12, and this movement is transmitted through the lever 15 to the rod 17 causing it to shift endwise and rearwardly swinging the shutter 18 into open position, uncovering the signal aperture 19. Needless to say, when the shutter opens, the illumination of the signal aperture informs the operator that the bag should be emptied immediately, and once the bag has been emptied and replaced, the shutter automatically shifts into closed position under the action of the spring 14 which is unaffected by the normal pressure within the bag.

A signal device of the type herein disclosed, is especially suited to cleaners equipped with a headlight since the same source of light can be utilized for both purposes merely by the provision of an aperture which can be readily seen by the operator, together with a simple shutter mechanism operatively connected with a pressure-responsive element. And again, an illuminated window or panel has the advantage of more readily attracting the attention of the operator than other types of visual signals, which depend on good lighting conditions to be seen. And finally, bearing in mind that the shutter may be automatically operated by a mechanism other than that specifically disclosed herein, and there is no intention of limiting the invention to the particular construction disclosed except insofar as it is defined in the appended claims.

I claim:

1. In a suction cleaner, a body formed with an aperture, an air passageway through said body, a light source in said body, a shutter mechanism including a shutter mounted in said body between said light source and said aperture, means connected to said shutter mechanism resistingly holding said shutter in light-sealing relationship to said aperture, and pressure-responsive means connected to said shutter exposed to the pressure of passageway air and operative upon a predetermined change in the pressure thereof to move said shutter against the force of said resisting means to open position to permit light rays to pass through said aperture.

2. In a suction cleaner having a suction system including an air conducting and filtering means for dirt-laden air, said filtering means being subject to variations in back pressure upon the deposition of foreign material thereat; means to indicate a predetermined increase in the back pressure of said filtering means comprising a body having a window, a light source exposed to said window, a shutter mechanism including a movable shutter positioned between said window and said light source, spring means holding said shutter in obstructing relationship to said window, and means responsive to a predetermined back pressure of said filtering means to overcome said spring means to move said shutter from between said light source and said window to permit light rays to pass through the latter.

3. In a section cleaner having a suction system including an air conducting and filtering means for dirt-laden air, said filtering means being subject to variations in back pressure upon the deposition of foreign material thereat; means to indicate a predetermined increase in the back pressure of said filtering means comprising a body having a window, a light source exposed to said window, a shutter mechanism including a movable pivoted shutter positioned between said window and said light source, means holding said shutter in said position, a pressure-responsive element exposed to the pressure of said filtering means on one of its sides and to atmospheric pressure upon its opposite side, and a linkage system interconnecting said pressure-responsive element and said shutter to transmit a moving force from the former to the latter, characterized in that said pressure-responsive element is inoperative to actuate said shutter with a pressure differential thereacross below a predetermined value.

4. In a bag condition indicator for suction cleaners, a body containing an aperture, a shutter mounted on said body adapted to close said aperture for one condition of cleanliness of said bag and to open said aperture for another condition of cleanliness of said bag, a light source in said body for projecting light through said aperture when the latter is open, means in said body responsive to conditions of said bag exposed to suction within said cleaner to open said shutter and a spring within said body for urging said condition responsive means to close said shutter, and means coupling said bag responsive means to said shutter to actuate the same and control the passage of light through said aperture.

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