Aug. 17, 1943. R. E. DUNBAR 2,327,181

VACUUM CLEANER

Filed April 30, 1940

Fig. 1.

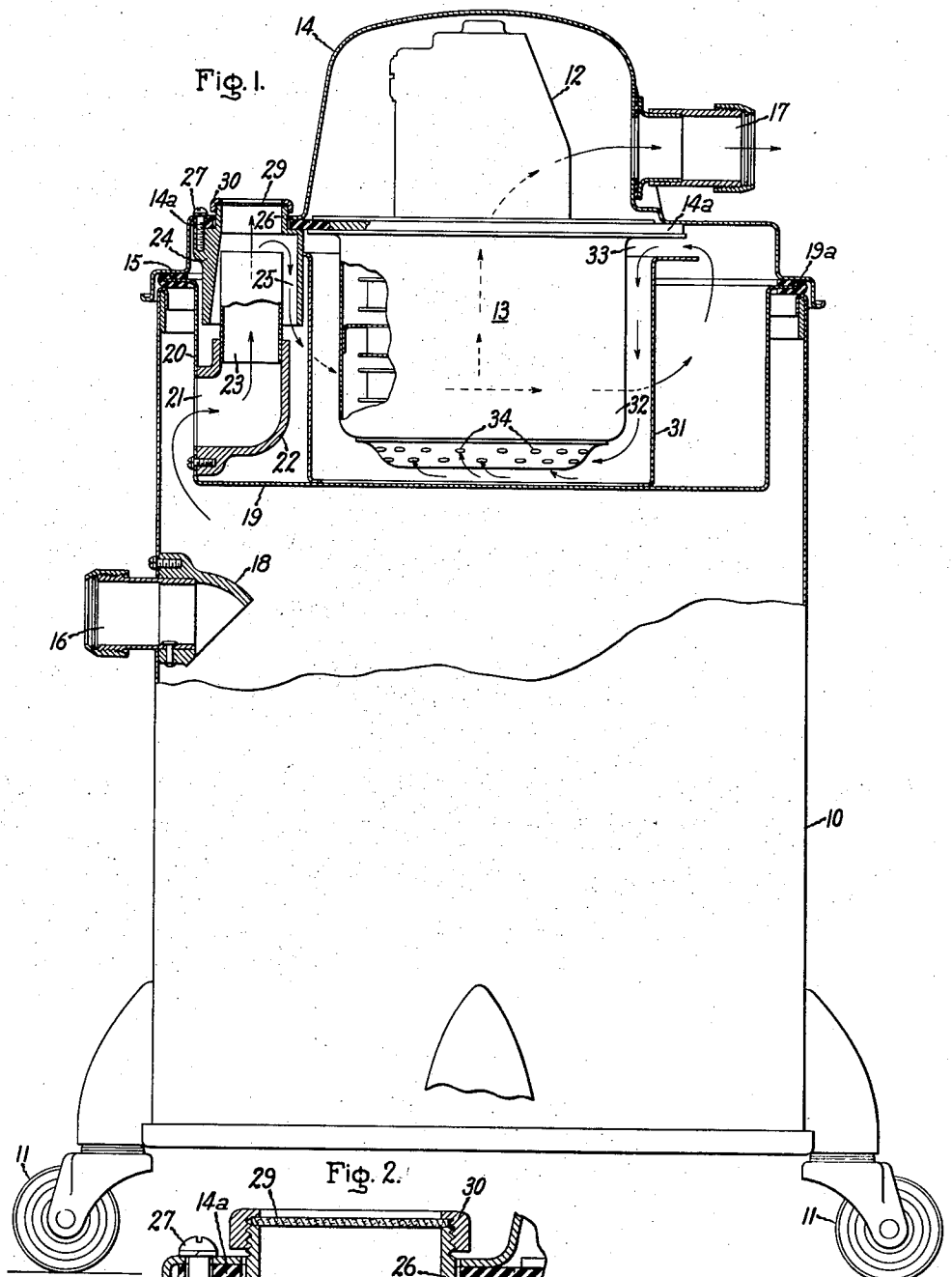
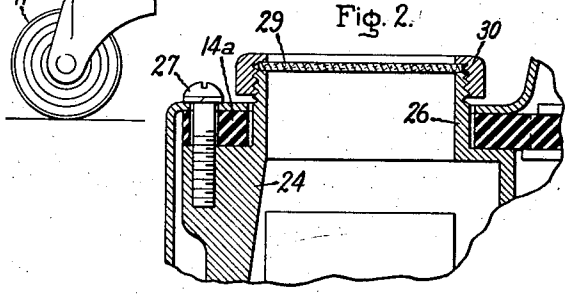


Fig. 2.



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VACUUM CLEANER

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8 Claims. (Cl. 183—37)

My invention relates to a safety device for vacuum cleaners of the type having the suction producing and the dirt collecting means arranged within a casing which is connected by means of a hose to a suction nozzle movable over the surface being cleaned.

This type of vacuum cleaner is often used to pick up wet suds from carpets, floors and the like which have been cleaned by a suitable cleansing agent such as soap and water. When such is the case, wet suds and dirt are picked up and carried through the suction nozzle and hose and deposited within the cleaner. This material builds up in the cleaner as a frothy liquid and the foam rises much above the level of the liquid. It has been found that under certain conditions the foam rises so high that it is drawn into the suction fan and the connected drive motor, causing serious damage.

It is an object of my invention to provide an improved construction in vacuum cleaners of this type embodying a safety device for automatically stopping the suction action of the machine at the intake when the foam rises to a point where it may cause damage.

It is a further object of my invention to provide a safety device of the character described that will be simple, dependable in operation, and cheap to manufacture.

Further objects and advantages of my invention will become apparent as the following description proceeds, and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

In the accompanying drawing, Fig. 1 is an elevation view, partly in section, of a vacuum cleaner embodying my invention. Fig. 2 is an enlarged fragmentary view in section of the safety device.

Referring to the drawing, there is shown a vacuum cleaner having a vertical casing or receptacle 10 mounted on casters 11. At the top of the casing 10 is a motor fan unit comprising a motor 12 connected to a multi-stage suction fan 13. The motor fan unit is supported from the inner edge of a rubber ring 14a the outer edge of which is fixed to the under side of a cover 14 seated on a gasket 15 on the upper edge of the casing.

In normal operation an air stream carrying suds and dirt is drawn through a nozzle and hose (not shown) into the casing through inlet 16 and deflected toward the bottom of the casing by a deflector 18. Air is then drawn upwardly through a complex path comprising a series of passages and baffles to be further described, through the suction fan, and is finally discharged from the outlet 17.

Depending from the top of the casing is a pan 19, the diameter of which is less than that of the casing so as to provide a space therebetween. The pan 19 is supported by a flange 19a surrounded by the gasket 15 and resting on the upper edge of the casing. The vertical wall 20 of the pan 19 has a hole at 21 which with the connected elbow 22 and the tube 23 forms a passageway for the outgoing air drawn out of the casing by the suction fan. The tube 23 extends vertically part way into a cylindrical member 24 the inner diameter of which is somewhat larger than the outer diameter of the tube 23 so as to provide an air passageway 25. The cylindrical member 24 has a portion 26 extending upwardly through a hole in the cover member 14, the member 24 being secured to the cover by any suitable means such as a fastening screw 27. The rubber ring 14a serves as a gasket for the joint between the cover and the member 24. The upper end of the member 24 is normally closed by a vacuum sealing diaphragm 29 held in place by a nut 30 screwed to member 24. Any other type of readily detachable securing means may be used to hold the diaphragm to the member 24. The purpose of the diaphragm will be described below.

An annular baffle 31 surrounds the suction fan 13 and is supported by the pan 19 being located in nested relation therewith. The baffle 31 forms a series of air passages with the pan 19 and the suction fan casing 32 so the air in passing from the casing 10 to the outlet 17 must follow a tortuous path thereby decreasing the possibility of foreign material coming in contact with the suction fan and the drive motor.

As indicated by the arrows on the drawing, air passes upwardly from the casing 10 through the elbow 22 and the pipe 23 from whence it is forced to make a reverse turn downwardly through the passage 25. The air then passes around the baffle 31 and over the top through the path 33, downwardly along the fan casing 32 and then upwardly through the fan intake holes 34. From the fan the air is discharged upwardly through the discharge 17.

During the operation of the vacuum cleaning machine, should the foam in the casing 10 reach such a high level that it commences to be drawn through the serially connected air passages to the suction fan, it is desirable that this action be automatically stopped at once to prevent damage. To accomplish this the vacuum sealing diaphragm 29 is formed of a material, such as paper toweling, which during normal operation of the cleaner will be substantially impervious to the passage of air and strong enough to withstand the force caused by the difference in air pressure existing in the opposite sides thereof, but which when wet will rupture and destroy the vacuum in the casing 10 caused by the suction fan. Thus, when the foam or suds rises and passes upward-

ly through the tube 23, it wets the diaphragm 29 causing it to rupture and break the vacuum in the casing 10. When this occurs, atmospheric air rushes inwardly through the ruptured diaphragm 29 and passes directly to the suction fan, thereby effectually short-circuiting or by-passing the air path to the fan and precluding the upward flow of air and foam from the casing 10 through the pipe 23.

To assist in the above described action of my safety device, it is to be noted that I have provided a construction such that when the air passes upwardly through the pipe 23 it must make a sharp reverse turn to pass in a downward direction. By virtue of this construction any foam or suds entrained in the air are hurled against the diaphragm 29 to more rapidly wet it and cause rupture thereof. It will be understood, however, that this particular construction is not essential to the operation of my invention.

When the diaphragm 29 ruptures during operation of the machine the suction in the pickup nozzle immediately stops and the operator must empty the machine of collected material before further use. After the machine has been emptied, the ruptured diaphragm is removed by unscrewing the nut 30 and is replaced by a new one, this operation being very easily and quickly performed and the machine is again ready for use.

Thus it will be seen that I have provided a safety device which is positive in operation, inexpensive and simple to manufacture, and which will act to effectively protect a vacuum cleaning machine being used to pick up wet material either of the liquid type or of a type having a tendency to froth and foam in the machine.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. In a vacuum cleaner, a receptacle provided with an aperture normally closed by a vacuum sealing diaphragm, an inlet communicating with said receptacle, suction producing means connected to said receptacle to maintain a vacuum therein for causing material to be collected to flow through said inlet into said receptacle, said vacuum sealing diaphragm being formed of material adapted to rupture and destroy said vacuum when wetted by the material collected in said receptacle.

2. In a vacuum cleaner, a receptacle, an inlet communicating with said receptacle, suction producing means to maintain normally a vacuum in said receptacle for causing material to be collected to flow through said inlet into said receptacle, a passageway connecting said suction producing means and said receptacle, said passageway being provided with an opening communicating with the exterior of said receptacle, a vacuum sealing diaphragm normally closing said opening, said diaphragm being formed of a material adapted to rupture and break said vacuum when wetted by liquid withdrawn from said receptacle.

3. In a vacuum cleaner, a receptacle provided with an inlet and an aperture normally closed by a vacuum sealing diaphragm formed of material adapted to lose its strength on becoming wetted, suction producing means for maintaining a vcuum in said receptacle to cause a flow of material to be collected through said inlet into said receptacle, a passageway with a sharp bend connecting the interior of said receptacle to said suction producing means, a portion of said passageway adjacent said sharp bend being defined by said vacuum sealing diaphragm whereby liquid withdrawn from said receptacle through said passageway will be thrown against said diaphragm to cause rupture thereof and break said vacuum.

4. In a vacuum cleaner for collecting a wet foamy material, a receptacle provided with an aperture in the upper portion thereof, said aperture being normally closed by a vacuum sealing diaphragm, an inlet communicating with said receptacle, suction producing means connected to said receptacle to maintain a vacuum therein for causing the material to be collected to flow through said inlet into the lower portion of said receptacle, said vacuum sealing diaphragm being formed of material adapted to rupture and break said vacuum when wetted by foam collected in said receptacle.

5. In a vacuum cleaner for collecting a wet foamy material, a receptacle, an inlet for said receptacle, suction production means for normally causing material to be collected to flow through said inlet into said receptacle, a passageway connecting said suction producing means to said receptacle, a bypass connecting said passageway with the exterior of said receptacle, a diaphragm adjacent said passageway normally closing said bypass, said diaphragm being formed of a material adapted to rupture and open said bypass upon becoming wetted by the passage of foam through said passageway whereby said suction producing means is rendered ineffective to cause the flow of material through said inlet.

6. In a vacuum cleaner for collecting a wet foamy material, a receptacle provided with an inlet and an aperture normally closed by a vacuum sealing diaphragm formed of material adpated to lose its strength on becoming wetted, suction producing means for maintaining a vacuum in said receptacle to cause a flow of material to be collected through said inlet into said receptacle, a passageway with a sharp bend connecting the interior of said receptacle to said suction producing means, a portion of said passageway adjacent said sharp bend being defined by said vacuum sealing diaphragm whereby foam entrained in the fluid withdrawn from said receptacle through said passageway will be thrown against said diaphragm to cause rupture thereof and break said vacuum.

7. In a vacuum cleaner for collecting foamy liquid material, a receptacle, an inlet to said receptacle for said material, a motor suction fan unit for withdrawing air from the receptacle, a passage leading from above the normal level of foam in the receptacle to the fan unit, and means including a member of a material adapted to lose its strength upon being wetted for rendering the cleaner ineffective to cause flow of material through said inlet upon flow of liquid through said passage.

8. In a vacuum cleaner for collecting foamy liquid material, a receptacle, an inlet to said receptacle for said material, a motor suction fan unit for withdrawing air from the receptacle, a passage leading from above the normal level of foam in said receptacle to the fan unit, and means including a replaceable member arranged to be distorted when wetted by foam flowing through said passage for indicating the occurrence of said flow to the operator.

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