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[54] MEANS FOR MAINTAINING THE SUCTION CAPACITY OF A VACUUM CLEANER

5 Claims, 2 Drawing Figs.

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 [51] Int. Cl. B01d 46/02
 [50] Field of Search..... 15/327,
 339, 352, 347; 55/368, 350, 376, 361, 378, 380,
 381, 366, 343, 341, 342, 274, 372, 419, 467, 484

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ABSTRACT: Means for maintaining the suction capacity of a vacuum cleaner by providing inlet means into the internal compartment of the vacuum cleaner comprising a manifold disposed through an inlet opening into said compartment and having at least two outlet ports in clearance position with respect to the inlet opening, the outlet ports being disposed in spaced relation to each other and also in-line and offset relation to the inlet opening, a filter receptacle being associated with each of the outlet ports, whereby the receptacle associated with the in-line port is adapted to first separate the dirt from an incoming stream of dirt-laden suction-induced air to be followed, if required, by the receptacle associated with the offset port.

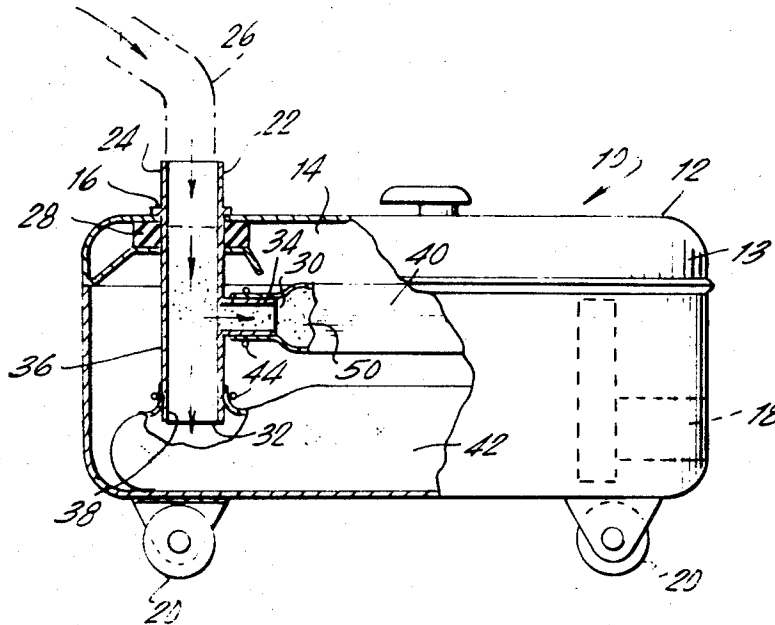


FIG. 1

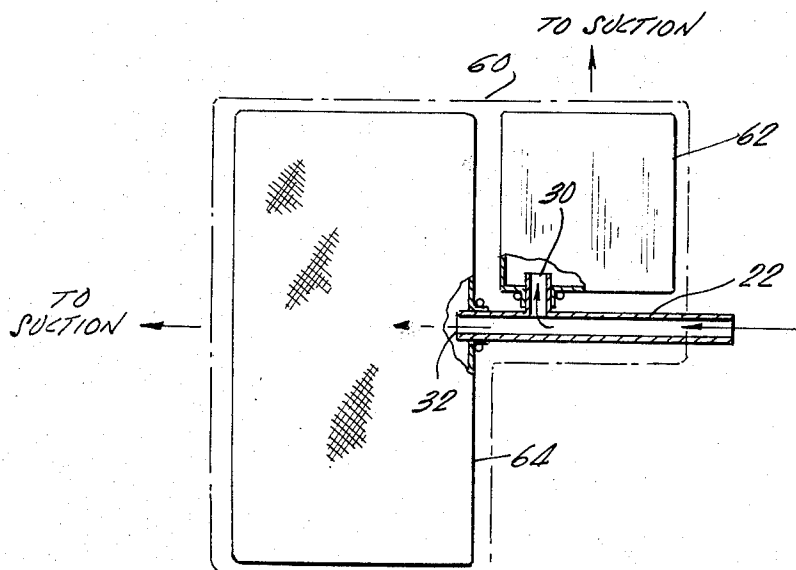
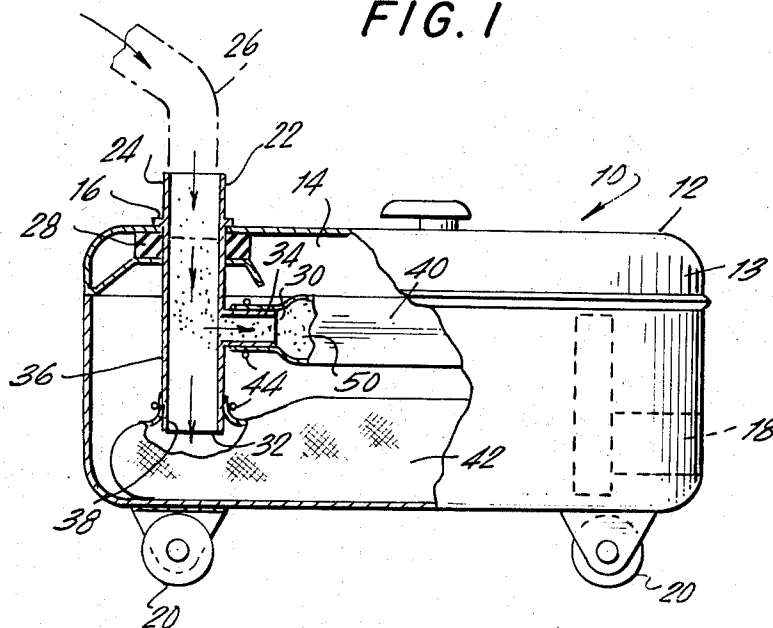


FIG. 2

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MEANS FOR MAINTAINING THE SUCTION CAPACITY OF A VACUUM CLEANER

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates generally to an improved vacuum cleaner system and more particularly to means for maintaining the suction capacity thereof.

2. Description of the Prior Art

The operation of conventional vacuum cleaner assemblies in which a disposable filter bag is employed to catch the dirt from a suction-introduced dirt-laden stream of air is of course well known. In these vacuum cleaners the air passes through the porous walls of the filter bag while the dirt is trapped in the bag. So long as there are unclogged wall openings through which air can pass the vacuum cleaner will continue to operate. However, the more dirt that fills the bag, the fewer free or unclogged wall openings are available and, consequently, there is an increasing reduction in the suction capacity of the vacuum cleaner, until finally when the bag is full there is little or no air passing through the filter bag, effectively preventing further cleaning action by the vacuum system. At this point the vacuum cleaner must be stopped and the bag replaced, or if it is a permanent-type bag, it must be emptied. It would, therefore, be of tremendous advantage if a vacuum assembly could be provided which would be able to filter dirt from dirt-laden air for a longer period of time, i.e., one in which the suction capacity thereof is maintained for prolonged intervals.

SUMMARY OF THE INVENTION

It is, therefore, among one of the principal objectives of the invention to provide a means for maintaining the suction capacity of a vacuum cleaner so that it will operate more efficiently and for a longer period of time than present-day vacuum cleaners.

In accordance with the invention there is now provided in a vacuum cleaner having inlet means, filter receptacle means including a porous wall associated with the inlet means, a suction-producing means for producing an airstream to flow from the inlet means and through the filter receptacle means for separating dirt entrained in said airstream and depositing said dirt in the filter receptacle means during the passage therethrough of the airstream from the inlet means and through the porous wall of the filter receptacle means, an improvement to said inlet means comprising a manifold conduit disposed through an inlet opening and having at least two outlet ports in clearance position with respect to the inlet opening, one of said outlet ports being disposed in line with the inlet opening and the other in offset relation thereto, and said filter receptacle means comprising a filter receptacle associated with each of said outlet ports whereby the receptacle on the in-line port is effective to first separate the dirt from the airstream to be followed, if required, by the receptacle associated with the offset port, i.e., whereby there is at least one receptacle which is unclogged and in effective communication with the suction-producing means so that flow of dirt-laden air is maintained:

BRIEF DESCRIPTION OF THE DRAWING

The invention will be hereinafter more fully described with reference to the accompanying drawing, in which:

FIG. 1 is a fragmented, partial sectional side view of a first embodiment of a vacuum cleaner according to the present invention; and

FIG. 2 is a top plan, fragmented, diagrammatic view of another type of vacuum cleaner embodying the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the FIGS. of the drawing, and specifically to FIG. 1, there is shown a vacuum cleaner 10 of generally conventional construction and comprising a housing 12 with a removable cover 13 defining an interior compartment 14 and an inlet opening 16 into the interior compartment. A motor 18 is provided for producing suction whereby dirt-laden air will be drawn into the interior compartment, as will be subsequently described. Two pairs of wheels 20, in spaced relation, are provided on the bottom exterior of the housing 12 for ease of movement of the vacuum cleaner from room to room. As is apparent, up to this point there has been described a generally conventional vacuum cleaner body.

In accordance with the invention the vacuum cleaner 10 is provided with means for maintaining its suction capacity which comprise a manifold conduit 22 communicating into the interior compartment 14 by means of the inlet opening 16, a minor portion 24 of the manifold conduit remaining exteriorly of the interior compartment so that an air intake hose 26 (shown by phantom lines) may be connected thereto. A support collar 28 secured along the inner periphery of the inlet opening 16 serves to hold the manifold conduit in place, i.e., in vertical relation to the interior compartment, and the manifold conduit may be, in turn, secured thereto either by force-fitting it through the collar 28 or by securing it thereto such as by soldering when metal is involved or suitable bonding when plastic is involved, it being understood that the construction of the invention cleaner may be of metal or plastic or a mixture of the two, as desired, this not being critical to the invention. The manifold conduit 22 is provided, within the interior compartment 14, with a first outlet port 32 and a second outlet port 30, said first and second outlet ports being in spaced relation in the flow direction of dirt-laden air inflowing into the housing 12 in response to the operation of the suction-producing motor 18 and also oriented in line and in offset relation to the conduit 22, as will be subsequently described. The first outlet port 30 is defined by a right-angle sidearm tubular member 34 integrally joined to the main tubular body portion 36 of the conduit, while the other outlet port 32 is defined by the lower open end 38 of the manifold conduit.

A separate filter bag, interposed between the manifold conduit 12 and suction motor 18, is removably attached to each outlet port. While the filter bag may be of the disposable paper type, preferably, a disposable paper bag 42 is secured to the first outlet port 32 by inserting its neck over tubular member 38, and a cloth or paper bag 40 (permanent or semipermanent) is inserted over the second outlet port 30 via its neck 34. Conventional O-rings 44 may be used to hold the necks of the bags in airtight relation over their respective outlet ports.

Describing now the operation of the invention, with the intake hose 26 attached, the motor 18 is turned on producing a suction sufficient to cause dirt-laden air to pass into the interior compartment in the direction of the arrows. Bags 42 and 40 by virtue of their porous-walled construction allow the air to pass through the bags without appreciably interfering with the suction action of the motor. When the dirt particles 50 entrained in the airstream reach the in-line-positioned outlet port 32 they are preferentially drawn into filter bag 42, the suction being inadequate at this time to affect the flow occurring past the outlet port 30. As shown above, the dirt particles 50 are drawn into the inlet opening 16 and continue to be drawn through the main tubular body portion 36. This drawing action caused by the suction maintains the dirt particles 50 in motion wherein the dirt particles 50 acquire a momentum before reaching the outlet port 30. This momentum moves the dirt particles 50 past the offset-positioned outlet port 30 towards the in-line positioned outlet port 32, wherein the suction from port 32 is not sufficient enough to affect the dirt particles 50 to move them from the path in which they are moving. As dirt particles 50 build up inside filter bag 42, there is a diminishment of suction at port 32 but the suction action nevertheless continues unabated because of the suction to

support airflow being applied through port 30, wherein the momentum of the dirt particles 50 acquired before reaching port 30 still tends to move the dirt particles past the port 30, as set forth above. When the filter bag 42 becomes full it is replaced, before any appreciable spillage of dirt is allowed to occur into the second filter bag 40. If care to avoid this is taken, then the second filter bag 40 may be used indefinitely. Of course, eventually it becomes advantageous to replace this bag 40 also: however this is only after a considerable number of filter bags 42 have been replaced.

While FIG. 1 has illustrated the invention as applied to the usual tank or cannister-type vacuum cleaner, reference to FIG. 2 will show the invention as applied to the "litter-vac" type, in which the prior art heretofore has been unable to provide a disposable inner bag because of its size and shape. Now, according to the invention two smaller inner bags can be provided to fit into a large outer bag.

The manifold conduit 22 of the invention is as earlier described, and it communicates into the interior of a large outer bag 60, shown by phantom lines. An inner in-line disposable paper bag 64 is secured to the first outlet port 32, and an inner permanent or semipermanent cloth or paper bag 62 is secured to the second outlet port 30, in a manner similar to that described in the embodiment of FIG. 1. Suitable conventional suction-producing means (not shown) are provided and the operation of the invention is identical to that described for FIG. 1. That is to say, when dirt particles entrained in the airstream reach the in-line outlet port 32 they are preferentially drawn into bag 64, and in subsequent operation airflow is supported by suction applied through the second outlet port 30 whereby there is no diminishment of suction air in the vacuum system.

Thus, it can be seen by the operation of the invention that a means has been found to maintain the suction capacity of a vacuum cleaner, or putting it another way, a means has been found so that initial suction pressure throughout the vacuum system is maintained fairly constantly throughout the vacuuming operation.

I claim:

1. In a vacuum cleaner having inlet means, filter receptacle means including a porous wall associated with the inlet means, and a suction-producing means for producing an airstream to flow from the inlet means and through the filter receptacle means for separating dirt entrained in said airstream and depositing the same in the filter receptacle means during the passage therethrough of the airstream from the inlet means

and thorough the porous wall of the filter receptacle means, said inlet means comprising a manifold conduit disposed through an inlet opening and having at least two outlet ports in clearance position with respect to the inlet opening, said outlet ports being respectively disposed in line with and in offset relation to the inlet opening, said offset ports being disposed between the inlet opening and said in-line outlet port, and said filter receptacle means comprising a filter receptacle associated with each of said outlet ports, wherein momentum of the dirt acquired before reaching said offset outlet port moves the dirt past said offset outlet port towards said in-line outlet port whereby said receptacle associated with said in-line outlet port is effective to separate the dirt from the airstream prior to said other outlet port.

2. A vacuum cleaner according to claim 1 wherein a disposable filter bag is secured to in-line outlet port and a semipermanent filter bag is secured to said other outlet port.

3. A vacuum cleaner according to claim 2 wherein said manifold conduit further comprises a main tubular body portion, said offset outlet port being defined by a right-angle sidearm member integrally joined to said body portion, said in-line outlet port being defined by the lower open end of said tubular body portion.

4. A vacuum cleaner comprising a housing defining an internal compartment, said housing having an inlet including a manifold conduit and a suction-producing means operatively arranged in clearance positions from each other within said internal compartment, said manifold conduit having at least two outlet ports in paced relation in the flow direction of dirt-laden air inflowing into said housing in response to the operation of said suction-producing means, and oriented in line with and in offset relation to said flow direction, said offset outlet port being disposed between said inlet and said in-line outlet port, and a separate filter bag removably operatively associated with each said outlet port located in an interposed position between said manifold conduit and said suction-producing means such that said inflowing dirt-laden air is drawn through said filter bags, wherein momentum of the dirt acquired before reaching said offset outlet port moves the dirt past said offset outlet port towards said in-line outlet port whereby said filter bag associated with said in-line outlet port is adapted to be filled prior to said filter bag associated with said offset outlet port.

5. A vacuum cleaner according to claim 4 wherein said filter bags are secured about each of said outlet ports.

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