JOINT FOR FILTER UNIT FOR SUCTION CLEANERS

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Fig. 1

Fig. 2

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The present invention relates to suction cleaners and more particularly to a new and improved filter adapter therefor.

Filter adapters heretofore proposed are objectionable for various reasons, chief among which are their mechanical complexity, high cost, difficulty to operate, tendency to rupture paper filters opposite the clamping means, and inadequate clearance between the seating tube and clamp for convenient replacement of the filter.

The present invention overcomes all of the above mentioned shortcomings of prior adapters and provides a very simple, inexpensive and highly effective construction. The unique clamping means forming an important feature of the invention acts to gather the filter neck tightly about the seating tube in an air-tight manner and to lock it in place positively. The clamp is so designed as to open easily, and in so doing, to move to a position entirely removed from the seating tube so as not to interfere in any manner with the removal or replacement of the filter.

Accordingly, it is an object of the present invention to provide a filter adapter for a suction cleaner or the like which is characterized by uniqueness, simplicity, low cost, ease of operation, effectiveness, and convenience.

Another object is the provision of a novel adapter and filter clamp which gathers the filter neck about a tubular support so as to form a frictional grip and seal between the filter inlet and the supporting tube.

A further object is the provision of an adapter and filter clamp which does not cause the filter to rupture opposite the clamping means.

These and other objects will become apparent from the following specification and an illustrative embodiment in which:

Figure 1 is a side view of a suction cleaner with the filter adapter shown in enlarged scale and in vertical section; and

Figure 2 is a top plan view on line 2—2 of Figure 1.

An illustrative embodiment of the invention is shown as comprising a suction cleaner 10 of any well known type. This cleaner includes a suction nozzle 11 and the usual motor-fan unit concealed by a hood 12. The cleaner body is supported on wheels 13 and a propelling handle 14 is pivotally connected to the cleaner body in any desired manner. The exhaust air passageway 15 is cast integrally with the cleaner body 10 and opens upwardly and rearwardly, as indicated in Figure 1.

The filter adapter assembly includes a bag ring 16 which can be removably secured to exhaust conduit 19 in any preferred manner. The inlet end of a flexible rubber bellows 17 is secured to the inner periphery of ring 16 as by a split ring keeper 18. The inlet end of the bellows serves as a sealing gasket between ring 16 and exhaust conduit 19. A tubular filter seating adapter 19 is attached to the upper end of bellows 17 by a sheet metal sleeve 20 which is locked in place on inwardly extending flange 21 by beading 22.

In order that flexible bellows 17 may be relieved of carrying the weight of tubular member 19 and the filter attached thereto, it is preferred to support the adapter pivotally from bag ring 16. To this end, the lower end of tube 19 is connected to the bag ring by means of a rigid, plate-like arm 23. As will be noted from the drawings, arm 23 overlies bellows 17 and is rigidly connected to the lower end of adapter tube 19. As shown, arm 23 is cast integrally with the lower, flanged end of tube 19. The lowermost end of arm 23 is pivotally connected to the upper side of ring 16 by a hinge 24. Torsion spring 25 surrounds the hinge and is of sufficient strength to support the adapter, the filter and any dirt contained therein.

It will therefore be understood that spring 25 acts normally to hold the adapter and the filter closely adjacent the underside of propelling handle 14. If the handle is lowered, the adapter and filter pivot downwardly about hinge 24. If, on the other hand, the handle is raised, spring 25 urges the adapter and filter to follow it upwardly.

Adapter tube 19 may be circular or of any other cross-sectional shape and its discharge end may be of smaller diameter than its lower inlet end to facilitate placement of a filter thereover. One or more longitudinally extending areas of its surface are depressed as indicated at 26. As here shown, there is only one longitudinal depression 26 extending upwardly from the base of member 19 and terminating somewhat short of the upper end of the adapter. In practice it has been found that one such depression is adequate and this is particularly true when using a filter bag having an inlet neck of reduced diameter as is common practice. However, if the adapter is designed for use with a filter having a large inlet neck, it may be desirable to have a plurality of depressions at spaced points around the adapter. The purpose of the depressions is to receive gathered portions of the filter neck in such manner that the filter firmly grips adapter tube 19. The manner in which
this is accomplished will become more apparent below.

The clamping device for gathering neck 27 of a paper filter 28 comprises a plate 29 pivotally connected to the upper end of arm 23 by a hinge 30. Resilient wire fingers 31 of the shape shown in Figure 1 are secured to the underside of plate 29 as by the lateral interted edges thereof. One end of a leaf spring keeper 32 is secured to the base of tubular member 19, while its free end is positioned to catch over the edge of opening 33 in plate 29. When so latched, spring 32 locks the filter clamp in the position shown in Figure 1. In this position, resilient fingers 31 gather the filter neck into depression 26 to lock the filter firmly on the adapter tube.

Operation

Let it be assumed that no filter is in place on the adapter and that the user wishes to prepare the cleaner for use. The upper end of the appearance covering 35 is detached from its conventional connection to handle 14 and hookless fastener 36 is opened to expose the adapter assembly. During this operation, it is preferable to leave the propelling handle in its vertical storage position so that it is out of the way. Clamping device 29 is next unlatched and pivoted upwardly until it rests against stop 37. The operator then takes a new paper filter bag 38 and telescopes its inlet end 27 downwardly over adapter tube 19. The filter neck is of sufficient diameter to slide easily over the adapter tube and, preferably, its end is cut off at an angle to the filter center line as an aid in guiding it onto the adapter. A notch 38 interfits with a locator abutment 39 located on the lower side of the adapter tube and assures that the longer side of the filter neck will overlie depression 25 in the adapter tube.

After the filter is in place, the operator simply pivots the clamping device downwardly until it is latched by leaf spring 32. As the clamping device pivots downwardly, resilient fingers 31 gather the underlying portions of the filter neck into depression 26 so that the neck grips the tube firmly and in a positive manner.

Not only is an airtight seal formed with the tube but the gripping action has been found so strong in practice that the filter cannot be removed without tearing it. Furthermore, the gripping action extends throughout the area of contact between the filter neck and the adapter tube.

This characteristic of my novel construction contrasts sharply with prior constructions in which the clamping action occurs only in the area directly opposite the wire or other clamping ring. And this is true whether the clamping ring of the prior art is of the expanding or contracting type.

To complete the assembly the operator merely places the upper, free end of the filter within envelope 35, pulls closure 35 downwardly and attaches the upper end of the envelope to handle 14. The cleaner is now ready for operation.

The removal of a dirty filter is even simpler than that just described for the assembly operation. Generally, the operation is merely reversed. That is, the envelope is detached from the handle, closure 35 is opened, and clamping device 29 is unlatched and swung upwardly. The filter is then withdrawn from the tube and taken to a place of disposal. A new filter is installed in the manner described above.

From the foregoing, it will be evident that the present device provides an adapter and a filter clamp thereof which is extremely simple in construction and in operation. Furthermore, the size of the filter neck may vary over a considerable range in view of the large gathering capacity of resilient fingers 31. These fingers act to gather all excess material of the filter and to draw it tightly about the tube. Thereafter the resiliency of fingers 31 permits them to give sufficiently to permit locking of the clamping device by leaf spring 32. It will also be observed that the clamping device is completely removed from the vicinity of the adapter tube during both the assembly of a fresh filter and the removal of a used one. If desired, the bottom of depression 26 may carry a sponge rubber pad or the like.

While I have shown and described but a single modification of my invention, it is to be understood that this modification is to be taken as illustrative only and not in a limiting sense. I do not wish to be limited to the particular structure shown and described, but to include all equivalent variations thereof except as limited by the scope of the claims.

I claim:

1. The combination with a suction cleaner of the type having a body, a motor-run unit, a propelling handle pivoted to said body and an exhaust air passageway, of a filter adapter assembly for releasably securing a paper filter to said exhaust air passageway, said adapter including a rigid cylindrical conduit, means for connecting the forward end thereof to said passageway, said elongated depression in the outer surface of said conduit restricted to one side thereof and extending lengthwise of said conduit, said depression being positioned to underlie the inlet end of a paper filter bag, means for gathering and clamping a filter onto said conduit comprising movable means mounted on said conduit near the forward end thereof, said gathering means being movable against the outer surface of a filter inlet in an area opposite said depression so as to depress said filter into said depression until said filter grips said conduit tightly and in an airtight manner, said gathering means also being movable away from said depression to release the same for withdrawal from said conduit and from said gathering means.

2. The combination defined in claim 1 including means for releasably locking said filter gathering means in a filter clamping position on said rigid cylindrical conduit.

3. The combination defined in claim 1 characterized in that said depression extends longitudinally of said cylindrical conduit from a point near the end of a filter mounted thereon to a point short of the discharge end of said conduit.

4. A filter adapter for use on a suction cleaner comprising a rigid tubular member having a longitudinally extending depression restricted to one side thereof, said member being adapted to receive the inlet end of a filter bag with a portion of said inlet overlying said depression, and filter clamping means pivotally mounted on said tubular member opposite one end of said depression including resilient means operable when pivoted downwardly against a filter neck to depress a portion thereof into said depression until said neck grips the peripheral surface of said tubular member firmly and in an airtight manner.

5. A filter adapter as defined in claim 4 in which said clamping means is movably to a point entirely removed from said depression so that a filter can be placed on said tubular member without interference from said clamping means.
6. A filter adapter for use on a suction cleaner comprising a tubular member adapted to receive a filter inlet thereover, said tubular member being provided with means restricted to one side thereof for gathering excess portions of a filter inlet so that the filter grips the surface of said member firmly and in an air tight manner, said filter gathering means including a movable member having means for pivotally connecting the same to said tubular member and having a resilient filter gathering element for contacting the outer surface of a filter inlet and gathering the same circumferentially about and into air tight contact with said tubular member.

7. A filter adapter for use on a suction cleaner as defined in claim 6 including means for locking said filter gathering means in position to clamp a filter inlet in place on said adapter.

8. A filter adapter for use on a suction cleaner comprising a tubular member the discharge end of which is formed to receive the inlet of a filter bag thereover, said member having an elongated depression extending longitudinally along one side thereof having one end terminating short of the discharge end of said tubular member, and means carried by said tubular member opposite the other end of said depression operable to gather the filter neck circumferentially about said tubular member until it grips said member tightly and to press the gathered portions into said depression.

9. A filter adapter for use on a suction cleaner comprising a tubular member, the inlet end of said member being formed for connection to the suction nozzle of a suction cleaner and the exhaust end being adapted to receive the inlet of a filter bag thereover, an elongated depression extending lengthwise of said member having one end merging with the outer surface of said member near but spaced from the exhaust end thereof, means carried by said adapter adjacent one end of said depression to gather a filter inlet circumferentially toward said depression from the opposite sides thereof until said inlet clamps the tubular member firmly and in an air tight manner, and means for locking said gathering means in said filter clamping position.

10. An adapter assembly for connection to a suction cleaner exhaust outlet comprising, a mounting ring, a tubular filter mounting member pivotally connected to said mounting ring in axially spaced relation thereto, said tubular member having an air inlet end and an air discharge end adapted to receive a filter bag, a flexible conduit inter-connecting said ring and the inlet end of said tubular member, said tubular member having an elongated depression extending lengthwise thereof positioned to underlie a filter bag inlet positioned theron, and filter clamping means movably mounted on said assembly opposite one end of said depression for clamping said filter inlet to said tubular member by gathering said inlet and pressing the same into said depression.

11. An adapter assembly as defined in claim 10 in which said filter clamping means is pivotally connected to said tubular member near the inlet end thereof so as to pivot toward and away from said depression, and latch means for locking said clamping means in its closed position against said tubular member.

12. An adapter assembly as defined in claim 10 in which said clamping means includes resilient means positioned to contact said filter inlet and press it into said elongated depression.

13. A filter adapter for use on a suction cleaner comprising a tubular member having a dirty air inlet end adapted to be connected with a carpet contacting suction nozzle and a dirty air discharge end adapted to telescopically receive and support the inlet end of a paper filter bag, at least one elongated depression in the outer surface of said tubular member extending lengthwise thereof and having one end merging with the outer surface of said member at a point spaced from the discharge end thereof, manually operable filter gathering means movably mounted on said member adjacent the opposite end of said depression from the end thereof which merges with the outer surface of said member, said gathering means being movable against the outer surface of a filter inlet telescoped over said tubular member from the discharge end so as to depress said inlet into said depression and thereby gather said inlet tightly about said member in an air tight manner, and means for releasably locking said gathering means in place on said tubular member.

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