June 30, 1942. G. P. DAIGER 2,287,867

SUCTION CLEANER

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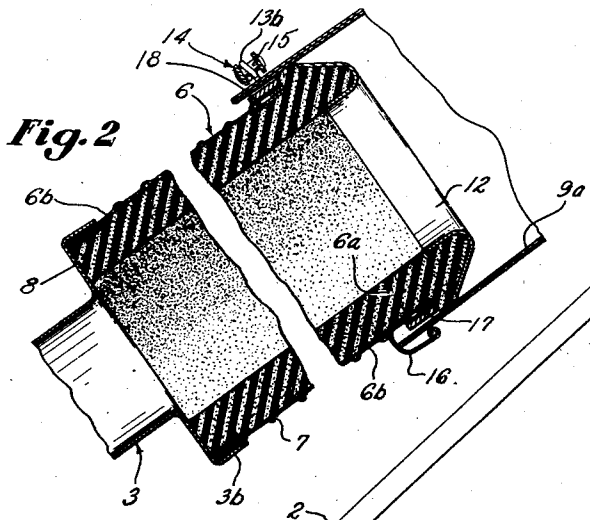


Fig. 2

Fig. 1

Fig. 3

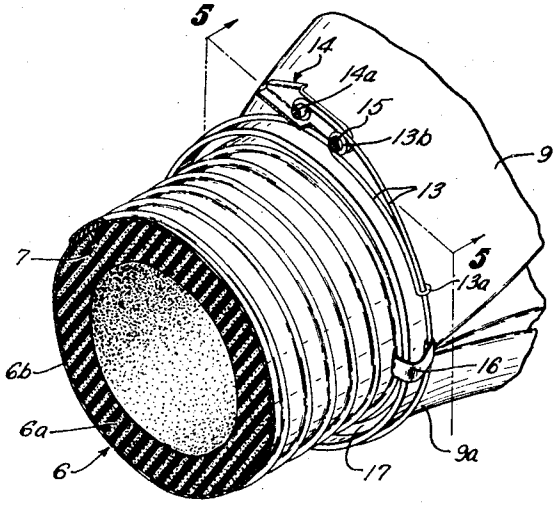


Fig. 4

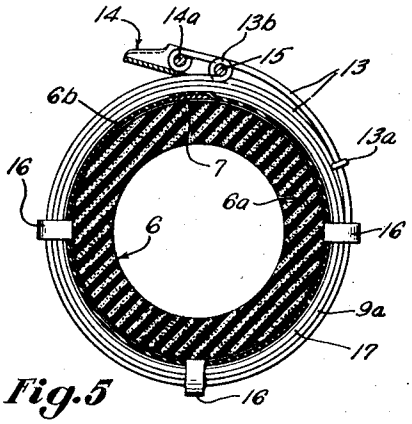


Fig. 5

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SUCTION CLEANER

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6 Claims. (Cl. 181—42)

This invention relates to improvements in suction cleaners and more particularly to an improved dirt or filter bag assembly including a muffler interposed between the exhaust outlet from the cleaner body and the inlet to the filter bag.

As the name suggests, a muffler is an element intended to reduce in a large measure the noise emanating from the exhaust outlet and attending the passage of air through the fan chamber. One of the most satisfactory mufflers is the tubular sleeve of sponge rubber of generous thickness, having a length anywhere from 6 to 10 inches and an internal diameter equal to or slightly larger than the mean diameter of the exhaust outlet from the fan chamber. Without going into a lengthy discussion of the acoustical properties of such a muffler, it is sufficient to point out that the sponge rubber with its surface of cellular texture exposed to the air discharged from the exhaust outlet has the property of absorbing an appreciable volume of the noise and to that extent contributes to greater quietness of operation in a degree well justifying the added expense of including the muffler in the cleaner assembly.

Bearing in mind, however, that the dirt or filter bag is ordinarily supported beneath and by the handle and that the latter has pivotal connection with the cleaner body to swing freely in a vertical direction during the forward or rearward movement of the cleaner over the carpet surface, the muffler must be flexible in order to flex with the bag and prevent the latter from giving way under the strain within a comparatively short time.

It is therefore with the idea of eliminating the disadvantages that otherwise might arise from the presence of a muffler that the present improved arrangement of bag and muffler mounting has been devised.

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

Figure 1 is a general view in side elevation of a suction cleaner disclosing a satisfactory arrangement wherein the muffler, with a filter bag attached at the outer end thereof, is enclosed within an outer envelope;

Figure 2 is an enlarged detail view of the muffler with its bag attaching clamp as it appears in longitudinal section;

Figure 3 is a fragmentary detail view in longitudinal section through the outer end portion of the muffler and showing the details of the clamping ring mounting;

Figure 4 is a perspective view of the outer end portion of the muffler with the inlet end of the dirt bag clamped thereto; and

Figure 5 is a cross sectional view through the muffler as taken on line 5—5 of Figure 4 and showing the details of the clamping ring in its clamping position.

In its general aspects, the cleaner herein disclosed may represent any one of several standard makes of portable, handle-maneuvered suction cleaners, and consists of a wheeled body or casing 1 having a nozzle extending across its forward end with its suction mouth in close proximity to the carpet surface, and a motor-driven fan rotating at high speed within a fan chamber communicating with the nozzle and having a rearwardly facing outlet connection to which a dirt bag or some suitable intermediate connecting fixture has detachable mounting. A handle 2 has pivotal connection with the cleaner body and during normal cleaning operation the handle extends rearwardly at an angle of approximately 45 degrees to the floor level and at the same time is free to swing upwardly and downwardly as the cleaner body is maneuvered over the carpet being cleaned.

Referring to the improved bag and muffler assembly herein disclosed, the member having immediate connection with the exhaust outlet from the cleaner body is a muffler supporting fitting 3 having a collar or flange 3a at its lower end and designed to bear flush against the flanged outlet connection 4 of the cleaner body and to be fastened thereto by means of a pair of clamping bolts 5, one on each side. The main part of the fitting 3 is a short tube forming an extension of the exhaust passage from the fan chamber and extends outwardly and upwardly at an angle of approximately 45 degrees to the horizontal. At its outer end the fitting 3 is provided with a collar 3b of increased diameter forming an outwardly facing flanged seat for the lower end of the muffler element 6 which extends therebeyond at the same angle as the fixture 3.

The muffler 6 embodies the general type of construction heretofore mentioned, namely, a tubular sleeve of soft pliable sponge rubber 6a, preferably encased throughout its length by a thin covering of a suitable flexible sheet material 6b which may also be of rubber and reinforced by light wire 7 wrapped around the sponge rubber body of the muffler in the form of a coil and

concealed beneath the outer covering sheet 6b as clearly shown in Figures 2 and 3.

Before proceeding with the discussion of the muffler construction, it might be well to point out that while the muffler is inherently flexible throughout its length, it is preferred to stiffen the muffler slightly by the coiled wire 7 so as to avoid the possibility of excessive distortion such as might result in kinking and consequent obstruction of the otherwise free passage of the air therethrough.

Now, as clearly shown in Figure 2, the base of the muffler fits snugly within the flanged seat 3b of the angular fitting 3 and, reinforced by a metal band 8, is permanently attached to its seat in any suitable manner.

The outer end of the muffler supports the lower or inlet end of a dirt or filter bag 9, the same being preferably made of a special paper, porous in character and having sufficient tensile strength to withstand the pressures to which it is subjected. As clearly shown in Figure 1, the filter bag 9 is preferably enclosed within an outer covering or envelope 10, later to be described in greater detail, but which for the present may be regarded as a support for the filter bag having detachable connection at its upper end with the upper end portion of the handle 2 through an extensible connecting member in the form of a coil spring 11.

The inner filter bag 9 is fashioned with a restricted neck portion 9a at its lower end but sufficiently large to slip over the outer end of the muffiler, the latter having a flange at its outer extremity covered with a metallic protecting ring 12.

As a suitable means of securing the neck portion of the filter bag 9 to the outer end of the muffler, a simple form of clamp is provided, the same surrounding the outer end of the muffler immediately inwardly beyond the flanged outer end. The clamp consists primarily of a length of stiff wire 13 encircling the muffler and operating after the manner of a slip noose formed by a loop 13a at one end. The noose-like clamping ring is contracted and expanded by means of a toggle lever 14 pivotally supported at a distance circumferentially removed from the loop 13a by forming a loop or single turn 13b in the body of the wire ring 13 and inserting a pin 15 through the loop to form the pivot for the clamping lever 14, as clearly shown in Figures 4 and 5. Beyond the pivoted end of the clamping lever 14 is another pin 14a which forms an anchor for the other or free end of the flexible wire ring 13, so that by swinging the clamping lever 14 from left to right, as shown in Figures 4 and 5, the clamping ring is expanded by the loosening of the noose-like arrangement and, by throwing the lever over to the left, the ring is contracted. Thus, if the lower end or neck portion of the filter bag 9 is inserted over the end of the muffler and within the clamping ring 13, the manipulation of the clamping lever 14 in the manner indicated will securely fasten the filter bag to the muffler.

To complete the mounting of the wire clamping ring 13, three flexible U-shaped fingers 16 are spaced at intervals around the end of the muffler and act to support the clamping ring in a concentric relation to the muffler and more particularly to the outer surface of a ring 17 of flexible material surrounding the muffler just beyond its flanged end and forming a resilient seat against which the neck portion of the bag is clamped by the contractible wire ring 13. These supporting fingers 16 consist of flexible metal strips bent in U-shape with their free ends extended toward the outer end of the muffler and their extremities looped around the wire ring 13 loosely to permit the latter to slide as it is contracted and expanded. The base portions of these fingers are suitably anchored as by welding to a metal band 18 lying just beneath the resilient band 17, or as integral parts thereof.

Referring now to the outer envelope 10, the same is preferably made of a light porous fabric serving primarily to conceal the filter bag 9 as well as the muffler 6 and its mounting fixture 3. Thus, as clearly shown in Figure 1, the lower end of the envelope 10 is clamped around the flanged portion 3a of the attaching fitting so that no part of the fitting beyond or the muffler is exposed.

At frequent intervals during the operation of the cleaner the filter bag must be removed and either emptied of its contents, or a new bag installed in its place. Hence, the outer envelope is made so that it will open along its underside and throughout its entire length as by means of a zipper type of fastening. By this arrangement, the filter bag becomes readily accessible for emptying and replacement or renewal, as the case may be.

But regardless of whether the filter bag 9 is concealed within an outer and separate envelope 10 or is suspended directly from the handle at its upper end by the same means which supports the outer envelope, a certain degree of flexing movement is continually going on throughout the length of the muffler and the neck portion of the filter bag as the handle swings upwardly and downwardly during the maneuvering of the cleaner over the carpet surface. Obviously then, if the muffler were of a rigid construction the flexing would take place at the juncture of the filter bag and it would very likely rupture within a comparatively short time, thus necessitating the replacement of the entire bag. However, by constructing the muffler in such a manner that it is uniformly flexible throughout its entire length, it is possible for the filter bag and the muffler to flex together with the swinging movement of the handle and thus relieve the bag of the excessive strain which otherwise would lead to premature failure. On the other hand it is desirable that the muffler be sufficiently stiff to provide a firm support for the lower end of the filter bag but not so flexible that it is likely to kink when it is subjected to an extreme degree of flexing, as for instance, when the handle is swung upwardly into a vertical position. It is for this reason that it may be desirable to reinforce the muffler lengthwise by wrapping it with the coil wire or treating it in some other manner to bring about the same effect.

Having set forth a preferred embodiment of the invention, but without any desire to limit it to the precise disclosure herein, I claim:

1. A bag-mounting muffler adapted to be attached to the exhaust outlet of a suction cleaner, comprising a tubular member of resilient flexible sound-absorbing material reinforced throughout its length by a length of wire wound in the form of a helix, whereby said tubular member is prevented from collapsing upon flexure within its length, a fitting attached to one end of said tubular member for connection with the exhaust outlet from said cleaner, and a con-

tractible clamping ring surrounding the outer end of said tubular member for the attachment of a filter bag thereto.

2. In a suction cleaner of the type having a body including an exhaust outlet, a handle pivotally connected to said body, and a bag supported at its upper end from said handle and angularly movable thereby, a flexible bag-supporting muffler comprising a fitting removably connected to said exhaust outlet, a flexible tubular member of sound-absorbing material carried by said fitting and interiorly connected therethrough to said exhaust outlet, means restricting flexure of said tubular member to a maximum sufficient to prevent collapse thereof internally, and bag-retaining means supported at the outer end of said tubular member and removably seating said bag, whereby the bag is movably connected to the cleaner body exhaust outlet.

3. In a suction cleaner of the type having a body including an exhaust outlet, a handle pivotally connected to said body, a bag supported at its upper end from said handle and angularly movable thereby, and a flexible bag-mounting muffler comprising a fitting removably connected to said exhaust outlet, a flexible tubular member of sound-absorbing material carried by said fitting and interiorly connected therethrough to said exhaust outlet, bag-seating-and-clamping means at the outer end of said tubular member removably seating said bag, and flexible means reinforcing said tubular member between said fitting and said bag-seating-and-clamping means to enable it to support a bag at said bag-seating-and-clamping means and to restrict flexure of said tubular member to a maximum sufficient to prevent collapse thereof internally, whereby said bag is movably connected to said body.

4. In a suction cleaner of the type having a body including an exhaust outlet, a handle pivotally connected to said body, and a bag supported at its upper end from said handle and angularly movable thereby, a bag-mounting muffler including a tubular air conducting body flexible throughout its entire length, means at one end of said tubular body connecting it to said exhaust outlet, means at the other end of said tubular body connecting it to said bag, characterized in that said muffler supports the lower end of said bag for movement relative to the exhaust outlet upon pivotal movement of the cleaner handle.

5. In a sound-absorbing muffler for attachment to the exhaust outlet of a suction cleaner and to a cleaner dust bag and to be flexed upon the movement of the cleaner bag in cleaner operation, a fitting adapted to seat upon a cleaner exhaust outlet, a flexible hollow tubular member of sound-absorbing material of a type restraining sliding contact adapted to convey dirt-laden air, carried at one end by said fitting, and extended freely therefrom, a smooth-surfaced rigid protecting collar enclosing the outer end of said tubular member and forming a guide to direct a bag mouth to enclosing relationship with said tubular member, and manually operable bag clamp encircling said tubular member adjacent said collar adapted to receive and clamp a bag to said member.

6. In a sound-absorbing muffler for attachment to the exhaust outlet of a suction cleaner and to a cleaner dust bag and to be flexed upon the movement of the cleaner bag in cleaner operation, a fitting adapted to seat upon a cleaner exhaust outlet, a flexible hollow tubular member of sound-absorbing material of a type restraining sliding contact adapted to convey dirt-laden air, carried at one end by said fitting and extended freely therefrom, a smooth-surfaced protecting collar enclosing the outer end of said tubular member and forming a guide to direct a bag mouth to enclosing relationship with said tubular member, a manually operable bag clamp encircling said tubular member adjacent said collar adapted to receive and clamp a bag to said member, and a helical wire encircling said tubular body between said fitting and said clamp to prevent collapse of said tubular member internally upon excessive flexure.

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