May 2, 1933. F. RIEBEL, JR 1,907,335

FILTERING ELEMENT

Filed Feb. 27, 1929

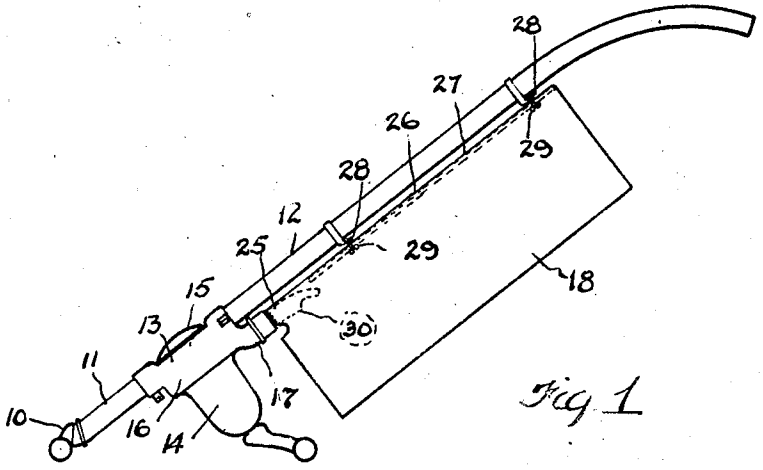


Fig. 1

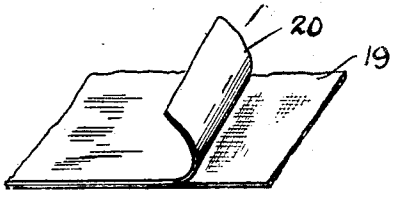


Fig. 2

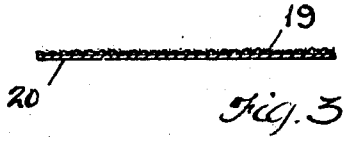
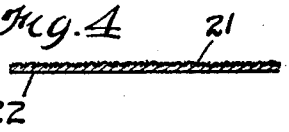


Fig. 3

Fig. 4



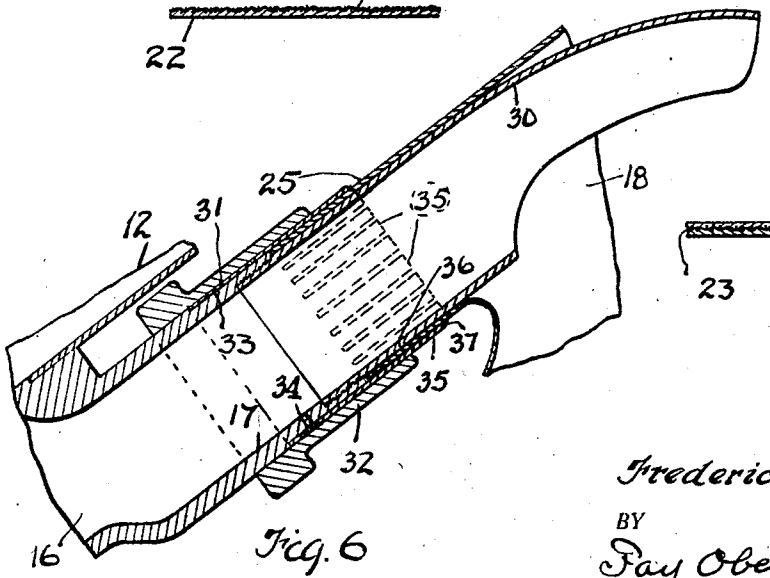


Fig. 6

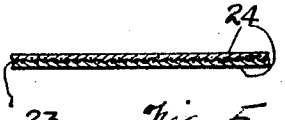


Fig. 5.

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1,907,335

UNITED STATES PATENT OFFICE

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FILTERING ELEMENT

Application filed February 27, 1929. Serial No. 342,978.

The present invention relates to suction cleaners, particularly to cleaners of the type wherein the handle is rigidly associated with the suction producing unit, i. e., does not hinge or pivot, and wherein the dust collecting apparatus is fixedly suspended beneath the handle. It has for its objects, to provide a novel and simple suction cleaner structure, wherein a dust collector is suspended from the handle, for quick detachment therefrom; to provide a novel and improved type of connection between the dust collector and the fan casing of the cleaner; and to provide an improved dust collector structure, embodying, among other features, a bag laminated of porous paper and cloth, adhesively secured together.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims; the annexed drawing and the following description setting forth in detail certain structure embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawing:—

Fig. 1 is a side elevational view of a vacuum cleaner embodying the present improvements; Fig. 2 is a perspective view of a partially separated section of bag material consisting of adhesively connected or joined layers of paper and cloth; Fig. 3 is a sectional view of the bag material shown in Fig. 2; Fig. 4 is a sectional view of another material consisting of relatively embedded layers of paper and cloth; Fig. 5 is a sectional view of still another material consisting of a layer of cloth sandwiched between two layers of paper; and Fig. 6 is a fragmentary vertical sectional view through the discharge pipe and bag neck connection illustrated in Fig. 1.

For purposes of illustration my invention is here shown in a portable electrically operated vacuum cleaner which consists of a wheel supported floor tool 10, a lower handle 11, an upper handle 12, a suction chamber 13, and a wheeled motor housing 14. An oscillatable valve 15 is so arranged in the suction chamber 13 that air may be sucked through either the handle 11 or the handle 12, the former of such handles communicating with the floor tool 10 and the latter thereof being adapted for connection with accessory cleaning devices such as brushes, nozzles, etc. The dust and dirt carrying currents of air developed by the revolving fan or blower within the casing 16 are discharged through the tube 71 into the air filtering and dust collecting receptacle 18, this receptacle having porous walls which function to first separate the entrained solid material and to then permit the purified air to escape into the outer atmosphere.

In detail, my present improvements include the provision of a dust collecting and air filtering receptacle in the form of a bag embodying or including a porous filtering material made up of a matted fibrous substance such as paper for example, and a reinforcing or strengthening reticulated substance, such as cloth for example. It is contemplated that the complete bag shall have layers of these or other similar materials in substantially permanent as distinguished from temporary or separable association. In one form, such a material consists of two or more adhesively joined layers or sheets of cloth and paper, the former in the finished bag being desirably although not necessarily disposed on the outside and the latter being preferably crinkled or of the creped variety in order to improve its filtering effectiveness by increasing its superficial area and porosity. Such a material is illustrated in Figs. 2 and 3 of the drawing and consists of superposed layers of cloth 19 and paper 20. In another form, the filtering material includes a layer of cloth 21 and a layer of paper 22 (see Fig. 4), such layers being relatively embedded and thus held in intimate association. In still another form, the filtering material contemplated by my invention consists of a cloth reinforcing layer 23 (see Fig. 5) which is sandwiched between two or more outer layers of paper 24, such layers being held together either adhesively or by intermatting of the fibers of the paper If of the sort shown in Fig. 4, or if of the in-

termatted kind described in connection with Fig. 5, my improved filtering material may be conveniently produced during the paper-making operation by appropriately arranging the cloth relatively to the pulp mixture from which the paper is made by allowing the water component to escape through the meshes of the Fourdrinier wire.

In manufacturing a receptacle or bag of the general type illustrated in Fig. 1 from any of the materials just described, a centrally folded blank is stitched in such a manner as to provide an interior space and a neck or mouth 25, such neck being arranged for attachment to the discharge tube 17. For preventing sagging of the upper edge 26, such edge is provided with a reinforcing strip 27, and if desired the material contiguous to the inlet neck may also be reinforced to obviate any likelihood of its becoming torn or otherwise damaged. For coacting with the handle hooks 28 and supporting the attached bag in the manner shown, the upper edge 26 may be provided with tape or like loops 29, these being stitched or otherwise secured in place. At this point, another form of my invention may be described; it consists of an arrangement of cloth and paper layers similar to that shown in Figs. 2 and 3, except that such layers are not directly fastened or bonded together but instead are only in contact, the marginal stitching or a closely enveloping relation serving to maintain the separate layers in permanent or integral association with each other.

The connecting device which is employed for securing the neck 25 in operative and non-leakable relation to the discharge tube 17 and its associated deflector or continuation 30 is clearly shown in Fig. 6 and consists of a ringlike member 31 and a slidable clamping sleeve 32. The member 31 desirably takes the form of an open annulus which is secured around the seat 33 by a suitable number of screws 34 and which is provided with a multiplicity of forwardly projecting fingers 35. Such fingers are resilient and have a natural set which impels them to move outwardly and away from the seat 36 on the outside of the deflector tube 30. The latter, it will be noted, is somewhat smaller in diameter than the adjacent section of the discharge tube 17 and together with the fingers 35 it forms an annular space for the reception of the end portion of the bag neck 25, such neck being preferably of greater radial dimensions than the receiving space so that the inner faces of the fingers 35 and their extreme turned ends 37 may obtain an adequate grip upon the bag neck material when such parts are forced inwardly from their normal outwardly sprung positions by an upward movement of the sleeve 32. When removing a bag from its operative connection with the other parts of the machine, the sleeve 32 is slid downwardly and off of the fingers 35, whereupon such fingers will spring outwardly and release the bag neck and permit of its withdrawal from the deflector 30. Ordinarily the improved bag provided by my invention will be made in such a manner that when dust and dirt to the extent of its holding capacity have been collected, such bag will be simply removed from the cleaner and then burned or otherwise disposed of, but if desired an emptying opening may be provided and each bag thusly adapted for repeated re-use before wear and service makes its replacement necessary.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the structure herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In combination with a vacuum cleaner having a discharge pipe, and a handle provided with hooks; a one-piece papery bag having a neck adapted for connection to said pipe, and loops adapted for coacting with said hooks.

2. In combination with a vacuum cleaner having a discharge pipe, and a handle; an air filtering and dust collecting bag constituted of matted material with a reticulated woven material formed integrally therewith and having an inlet neck adapted for connection with said pipe, means for supporting its upper edge relatively to said handle, said supporting means comprising a hook on the handle and a loop attached to said reinforcing means and receiving said hook and means for reinforcing such edge.

3. In combination with a vacuum cleaner having a discharge pipe, and a handle; an air filtering and dust collecting bag having an inlet neck adapted for connection with said pipe, stiffening means reinforcing the upper longitudinal edge of the bag, a hook on the handle, and a loop attached to said reinforcing means and receiving said hook.

4. In combination, a suction cleaner discharge pipe terminating in coaxial, spaced, tubular sleeves, the outer of which is compressible, a dust collecting bag having a neck received between said sleeves, and a member encircling the outer sleeve and adapted to compress it into engagement with said neck.

5. A suction cleaner pipe terminating in coaxial, spaced tubular sleeves, the outer sleeve comprising a plurality of spring fingers, a dust collecting bag having a neck received between said sleeve and a ring slidable axially over said fingers to compress them toward the inner sleeve.

6. In combination with a vacuum cleaner having a discharge pipe, and a handle; an air filtering and dust collecting bag having

an inlet neck adapted for connection with said pipe, stiffening means reinforcing the upper longitudinal edge of the bag, and co-acting separable devices on the handle and attached to said reinforcing means, for supporting the bag on the handle.

7. In combination with a vacuum cleaner having a handle; air filtering and dust collecting means comprising a bag having an upper longitudinal edge to lie parallel to and beneath said handle, stiffening means reinforcing said upper longitudinal edge a hook on the handle, and a loop attached to said reinforcing means and receiving said hook.

8. In combination with a vacuum cleaner having a handle; air filtering and dust collecting means comprising a bag having an upper longitudinal edge to lie parallel to and beneath said handle, stiffening means reinforcing said upper longitudinal edge, and co-acting separable devices on the handle and attached to said reinforcing means, for supporting the bag on the handle.

Signed by me, this 17th day of October, 1928.

FREDERICK RIEBEL, JR.