

April 1, 1952

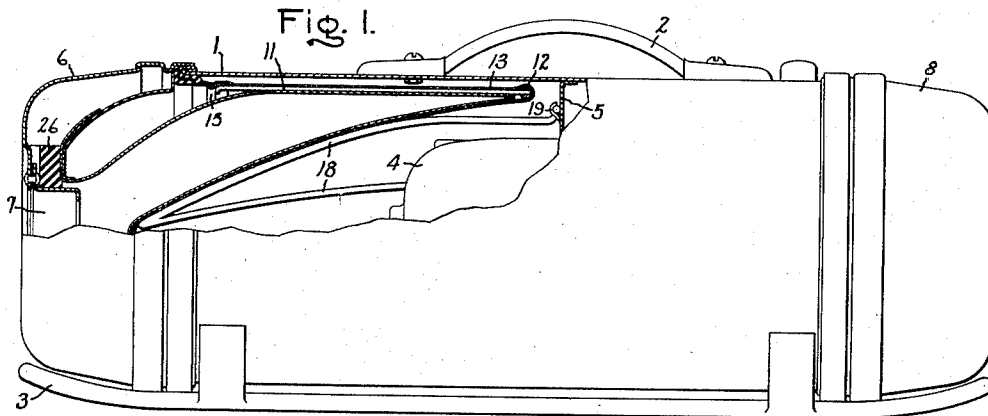
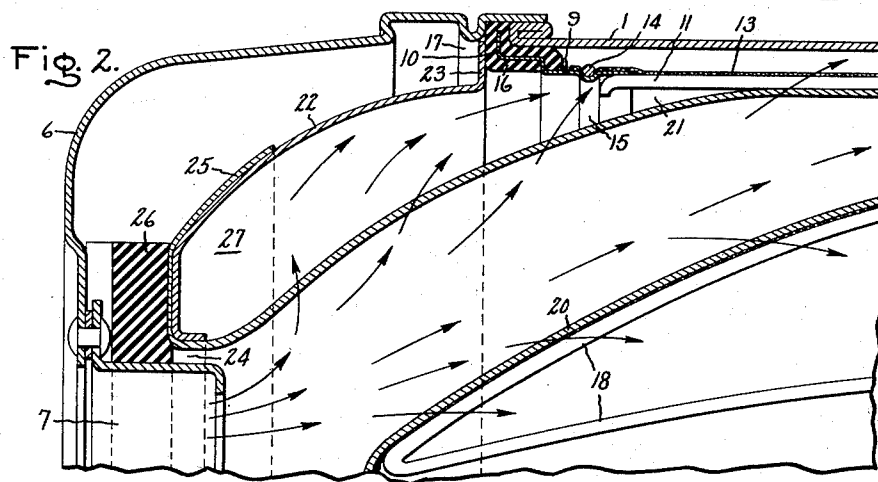
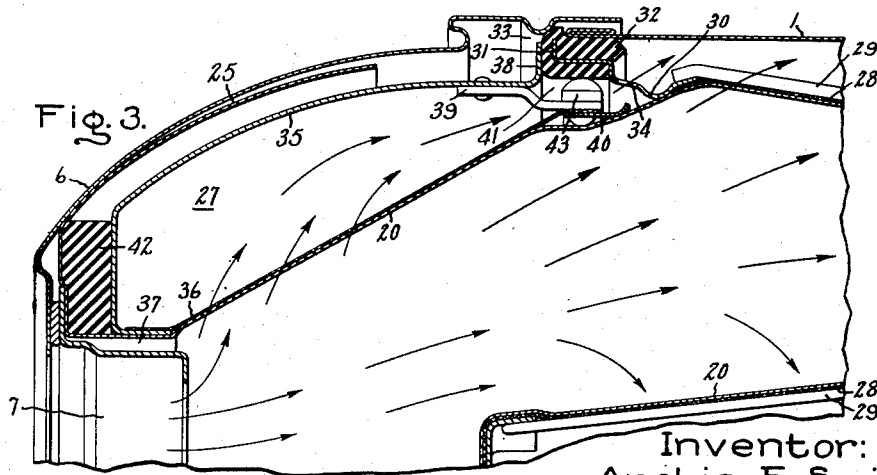
A. E. SMITH

2,591,382

SCREEN SUPPORTED PAPER BAG FOR TANK CLEANERS

Filed Oct. 30, 1948

2 SHEETS—SHEET 1



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2 SHEETS—SHEET 2

Fig. 4.

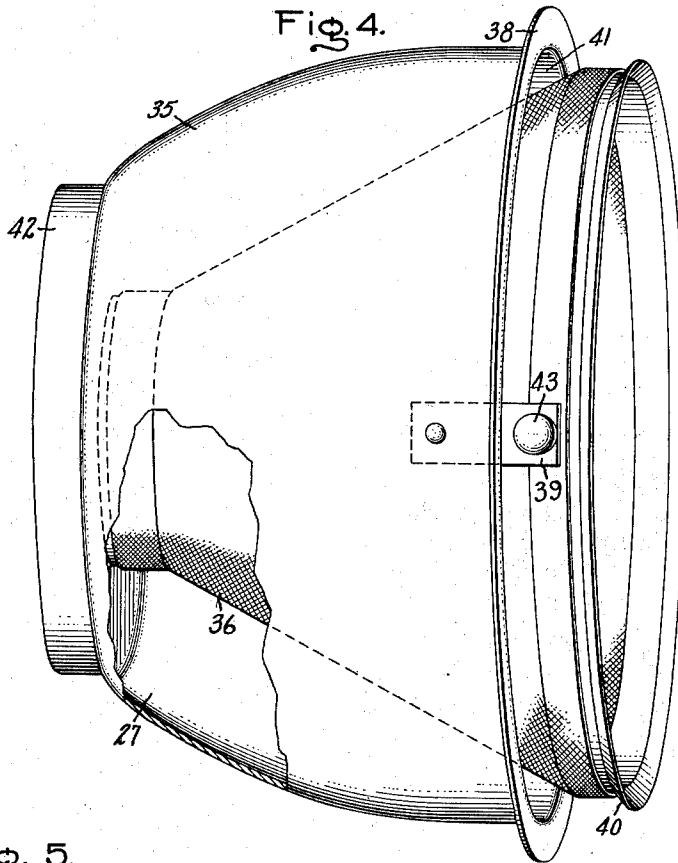


Fig. 5.

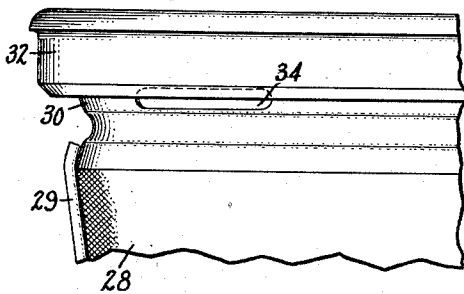


Fig. 6.

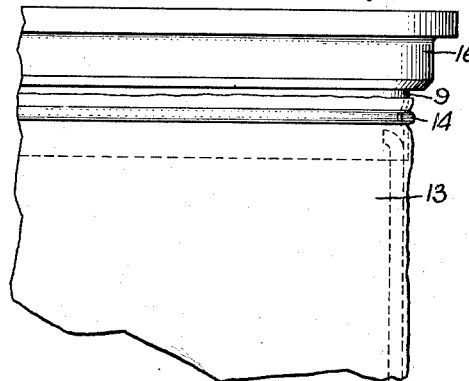
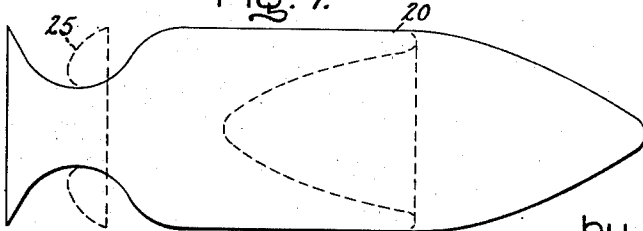


Fig. 7.



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UNITED STATES PATENT OFFICE

2,591,382

SCREEN SUPPORTED PAPER BAG FOR
TANK CLEANERSArchie E. Smith, Stratford, Conn., assignor to
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Application October 30, 1948, Serial No. 57,558

6 Claims. (Cl. 183—51)

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My invention relates to vacuum cleaners and more particularly to disposable dust bags for vacuum cleaners. Although the invention will be shown and described in connection with tank-type cleaners, it is obvious that it is not confined to vacuum cleaners of that type.

One of the annoying tasks in using most present vacuum cleaners is the necessity of emptying the dust bag from time to time as it becomes filled with dust. Various expedients for eliminating the emptying of vacuum cleaner bags have been tried from time to time, and among the more successful of these has been the provision of an inner disposable liner for the usual cloth bag of the cleaner. These liners have been made of inexpensive porous paper and when it is desired to empty the dust out of the regular bag, the disposable liner, together with the accumulated dust is removed from the bag and thrown away, being replaced by another, clean, liner.

My invention relates to a disposable dust bag for a vacuum cleaner, which may be used as a liner for a conventional cloth dust bag, or alternatively, as the only dust collector in a cleaner. In the latter case, provision may be made for a screen wire or other permanent bag support if the disposable liner is made of material so weak it would tear when subjected to the weight of dirt in a full bag or the maximum fan-pressure due to a dirt-sealed bag or both. One object of my invention is to increase the dust filtering area in cleaners, and particularly in cleaners using disposable dust bags. Still another object of my invention is to provide for a disposable bag in standard designs of cleaners without making major modification to the cleaner structure. A further object of my invention is to provide an improved form of disposable dust bag and associated structures so that the bag can be inserted in the cleaner and removed easily without subjecting the user to the handling of dirty surfaces.

All of these objects and others are obtained by making a bag of special design, and by adding a few simple parts to conventional vacuum cleaner constructions.

Other objects and the details of that which I believe to be novel and my invention will be clear from the following description and claims taken with the accompanying drawings in which are illustrated two examples of vacuum cleaners embodying the present invention and incorporating disposable dust bags.

In the drawing Fig. 1 is a side elevation view

of a known type of vacuum cleaner with parts broken away in order to show one form of my invention; Fig. 2 is an enlarged section of the parts shown in the upper left-hand corner of Fig. 1; Fig. 3 is a view similar to Fig. 2 but showing a modified form of my invention; Fig. 4 is a perspective of one of the parts shown in Fig. 3, with portions broken away for clarity; Fig. 5 is a fragmentary elevation of the bag supporting frame of Fig. 3; Fig. 6 is a fragmentary elevation of a conventional vacuum cleaner bag such as is used with the form shown in Figs. 1 and 2, and Fig. 7 is a more or less diagrammatic layout of a dust collecting bag according to my invention.

Because my invention is designed for application to known types of vacuum cleaner constructions, this specification will be clear if known structures are first described. In both of the forms shown in the drawing, the cleaner is of tank-type having the usual cylindrical cleaner body 1 which may carry a handle 2, skids or runners 3 and other appropriate parts such as a means for connection to electrical power, a switch, and other devices which are not shown. Mounted within the body is the usual motor 4 which may be supported by a motor mounting ring or wall 5 within the interior of the cleaner body. A fan (not shown) is driven by the motor and produces a flow of air therethrough.

At one end of the cleaner is an end cap 6 provided with the usual air inlet 7 which is adapted for connection to an attachment hose which carries the cleaning attachments.

At the other end of the body is provided another end cap 8 which has the usual air outlet (not shown). The end caps are removably held on the ends of the body by any suitable means, as is usual.

In Figs. 1 and 2 and more particularly in Fig. 6 I have shown a type of cloth dust collecting bag which has been previously used with vacuum cleaners of the above-described character. This bag assembly includes an upper or outer metal ring 9 with outturned edge 10. Secured to this ring as by brazing, welding, or the like, are a series of spaced bag supporting rods 11 which may be held together at their opposite ends by a frame ring 12. On the outside of this generally cylindrical frame a dust filtering bag 13 of cloth or other suitable material is secured as by wire ring 14 which passes around the open mouth of the bag and is tightly seated in the annular groove 15 near one end of the ring 9.

The other end of this bag ring, including the

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outturned portion 10, is covered with rubber which serves as a sealing gasket 16 between the end of the cleaner body and an annular shoulder 17 on the end cap of the cleaner. This sealing gasket, according to my invention, may be used to serve other purposes as will later appear.

In operation of a cleaner of the type so far described, air enters through the inlet 7, passes through the surfaces of the bag beyond the bag supporting ring 9, and filtered air then goes through the cleaner to the outlet in the other end cap. In order to increase the filtering area of the bag as well as to make the cleaner more compact, an inner somewhat conical bag frame may be used, composed of the wires 18 which are supported in any suitable fashion, for instance, by bent lugs 19 on the motor mounting frame 5.

The improvements according to my invention are based upon an open mouth dust collecting bag of special shape, this bag being indicated by the numeral 20 wherever it appears in the drawings. In Fig. 7 the solid lines indicate the shape of the bag before it is inserted in the cleaner, and the dash lines show the positions of parts of the bag when in use. In the form of Figs. 1 and 2 this inner bag is shaped so that it closely conforms to the shape of the bottom and most of the sides of the cloth bag 13. At a point near the mouth of the cloth bag, the inner bag starts to reduce in diameter so that it is spaced away from the cloth bag and the bag frame as indicated at 21. The neck of this inner bag continues to be reduced in diameter so that it approaches the diameter of the inlet 7.

The inner bag is removably supported in the proper position within the cleaner by means of the cloth bag and its frame, and by a removable dome-like bell or support 22 which has an outturned flange 23 adapted to seat and seal against the gasket 16. The mouth of the inner bag 20 passes through a central opening 24 of this bell, and the bag is then flared outwardly so that it can be turned back on itself and seat around the outside end of the supporting bell as shown at 25.

An annular sealing cushion or gasket 26 of sponge rubber or other suitable material, makes a proper seal between the end cap, the outside of the bell 22, and the outturned end portion 25 of the bag 20. As will be seen from an inspection of the drawings the portion 25 of the bag 20 is thus located entirely outside of the air stream going through the cleaner, and consequently outside of the areas which may collect dirt or dust during operation of the cleaner. The gasket 26 in the form of Figs. 1 and 2 may be cemented or otherwise suitably secured to the end cap. It should be resilient enough so that a proper seal with the bell and with the end of the bag will be made at this point and also that the flange 23 on the bell will be pressed firmly against the gasket 16.

The bag 20 may be made of porous paper or similar felted material which need not have much strength, as compared to the usual cloth vacuum cleaner bag. However, this bag should have good dust filtering properties and be capable of withstanding tearing stresses to some degree so that it may be handled as hereinafter described. Suitable materials for this purpose are readily available and need not be further described.

When using the dust collecting bag of my invention, we will assume that we have simply a

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standard cleaner with the conventional cloth dust bag in place. The end cap 6 has been removed, and it is desired to use the dust collecting bag of my invention. The first step in using the bag 20 is to insert the same within the already existing cloth bag of the cleaner. The frame members 11 of the cloth bag and the frame 18, if used, help guide the disposable bag into proper position. The mouth of the bag 20 is then gathered together by hand and pushed through the opening 24 of the bell 22. The bell is then seated against the gasket 16 and the flared outer end of the bag is turned backward to the position 25 on the outside of the bell around the bell opening. It being understood that the sealing gasket 26 has previously been placed in proper position, the end cap 6 is then applied to the cleaner body and secured in place, sealing the inner parts in their proper positions. The cleaner can then be operated and air will flow substantially in the direction of the arrows in Fig. 2. It is to be noted that in addition to the normal air flow through the usual cloth bag and bag frame, there will also be a flow of air through the dust filtering bag, in the portion between the bell opening 24 and the space 21, into the area marked 27 inside of the bell. Because the space 21 is below the edge of the ring 9, air can flow from the space 27, through the bag 13 to normal exhaust. The bag area between the opening 24 and the space 21 represents an added filtering surface which in some cases may amount to as much as 20 per cent of additional filtering area.

To remove the dust collector bag, all that is necessary is to release the end cap and remove it, gather up the clean outer edge 25 of the bag, twist it closed, remove the bell 22, and lift the bag out by its clean twisted end. The bag, together with the dust contained therein may be thrown away, burned, or otherwise disposed of and a clean bag inserted and used as above described.

The advantage of the form of Figs. 1 and 2 is that if a replacement bag is not available, the cleaner can be used without the disposable bag in the conventional manner, whether with or without the bell 22. However, in cases where a supply of disposable bags is assured, or if a more permanent type of filter support is desired, the form of Figs. 3 through 5 is to be preferred. This second form has certain other advantages which will be obvious from the description.

In this form, the cleaner has the body, end cap 6 and inlet opening 7 previously described, but does not use a cloth bag as a support for the disposable bag. In place of the cloth bag of the first form this second form uses a stiff support in the form of a perforated metal or wire screen 28 supported in the cleaner as by a suitable wire frame 29 which is secured to a ring 30. This ring 30 has an outturned edge 31 similar to the edge 10 of the cloth dust bag assembly, and is surrounded by a rubber gasket 32 which has sealed engagement with an annular ridge 33 on the end cap in a manner similar to that of the other form. Located at intervals on the ring 30 are slots or holes 34 which, when the ring is in place, are spaced from the walls of the cleaner body 1. I prefer to use six of these holes or slots around the circumference of the ring 30 although it is obvious that any other suitable number might be used. The purpose of these openings will appear later.

A bell or dome 35 similar to the dome 22 of

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the first form is used to provide a support for the open end of the internal dust collector bag as before described. But in this form the bell is provided with additional structure for supporting a portion of the filtering bag. The additional support is in the form of a cone of perforated metal or wire screen 36 which extends from an opening 37 in the end of the bell to a point near a flange 38 which extends around the edge of the bell. A suitable number of spaced brackets 39 hold a screen supporting ring 40 in spaced relation to the edge of the bell, as is shown most clearly in Fig. 4. The screen is suitably secured to the ring 40 and also to the inside of the opening 37, leaving a space 27 inside of the bell as in the first form. A space 41 is thereby provided between the edge of the bell and the ring 40 for flow of air from the space 27. This space 41 in function may be compared with the space 21 of the first form, when the openings 34 through the ring 30 are regarded as a continuation of this space.

A sponge rubber sealing gasket 26 might be provided and positioned as in the first form shown, but I have elected to show another manner of mounting the gasket in connection with this second form. As illustrated, I may provide a gasket 42 which is cemented or otherwise suitably secured to the end of the bell 35. When the end cap of the cleaner is put in place, and the dust collecting bag 20 is properly positioned around the bell end, this sealing gasket 42 will provide a seal between the end cap and the dust bag, the gasket itself acting as a seal in this case between the end of the bag and the bell. As before, the turned back portion 25 on the end of the dust collecting bag is in a dust free area outside of the bell and between the gaskets 42 and 32.

In this form the screen cone 36 supports the dust collecting bag away from the inside of the bell and provides a definite air passage for filtering between the opening 37 of the bell and the ring 40 below the bell. The arrows in Fig. 3 show a flow of air not only through the disposable dust bag opposite screen 28 but also through the bag between the reduced neck portion and the base of the cone 36. Air from the area 27 flows through the space 41 and then through the openings 34 to the space outside of the screen 28. It will be noted that the lower edge of the ring 40 extends below the openings 34 so that there is no chance that the bag will collapse against these openings to prevent air flow from the space 27.

Brackets 39 can serve an additional function through the provision of spaced button 43. These buttons help position the bottom of the bell within the gasket ring 30 while the bell is being inserted within the cleaner. For this reason, the outside of the buttons is rounded as shown.

Manipulation of the parts of the form shown in Figs. 3 through 5 is identical with that of the first form. However, because the supporting structures are made of stiff material such as wire screen, they are much more permanent than the cloth bag which supports the dust collector of Figs. 1 and 2. Furthermore, the screen cone 36 together with the associated spacing elements insure that the tapered throat area of the bag will be used for filtering. This is not always positive in the form of Figs. 1 and 2 because of the necessity of holding the dimensions of the bag and supporting structure to reasonable manufacturing tolerances. Then, if the bag were made a little bit too big, or not properly positioned,

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there might be no space 21 as shown in the first form.

Regarding the bag form itself, the shape shown in Fig. 7 has some advantages over other shapes which might also be used according to my invention. It should be obvious that the tapering of the bag from the generally cylindrical body shape to the reduced diameter at the neck portion permits a close approximation to the dimensions of the air inlet at this end while at the same time it provides a full diameter bag elsewhere for filtering dust laden air. Not so obvious is the point that this reduced neck assists in closing the end of the bag by twisting, when it is desired to dispose of the bag. Because the bag is never emptied in the usual sense, there is no objection to a reduced bag diameter at this point. The flared open mouth is useful in providing an increased area for handling the bag as well as in affording the needed substantially increased diameter so that the bag can be easily turned back on itself into the gasketed area outside of the dust-laden air stream.

The conical closed end of the bag is provided to increase the filtering area, being turned inwardly in use as indicated at the right hand end of Fig. 7. However, it should be obvious that the closed end might be made in any other shape desired, depending upon the filtering area requirements or the individual design of the cleaner with which it is used.

As will be evident from the foregoing description, certain aspects of my invention are not limited to the particular details of construction of the examples illustrated, and I contemplate that various and other modifications and applications of the invention will occur to those skilled in the art. It is therefore my intention that the appended claims shall cover such modifications and applications as do not depart from the true spirit and scope of my invention.

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

1. In a vacuum cleaner having a disposable dust collecting bag removably mounted within the cleaner body, the bag having an open mouth with an outwardly flared end portion including a smaller part and a larger part adapted for closing and handling the bag upon removal from the body, that improvement which comprises a support entirely within said cleaner body surrounding the smaller part of said flared end portion of said bag, said support being removably mounted within said cleaner body and said bag being removably held by said support with the larger part of said flared end portion extending through and positioned outwardly against the support, and a resilient annular gasket releasably sealing the outwardly positioned part of the bag end portion to the support and the support to said cleaner body, said gasket constituting the sole means resiliently holding the flared bag end between the support and the body.

2. In a vacuum cleaner of the type having a body with a removable end cap and an air inlet in the end cap, that improvement which comprises a disposable dust collecting bag of flexible porous filtering material removably mounted in said body, a porous dust bag support in the body, a non-porous supporting bell independently removably mounted on said body under said end cap and having an opening opposite said air inlet, a tapered neck and flared open mouth on said bag, a porous cone-shaped support in said bell for supporting the tapered neck within the

bell but spaced therefrom, the flared mouth of the bag extending through the bell opening to the outside of the bell inside the end cap, and a resilient seal, and removably securing the mouth of the bag to the bell around said inlet and said bell opening and sealing said flared mouth from said air inlet.

3. In a vacuum cleaner of the type having a body with a removable end cap and an air inlet in the end cap, that improvement which comprises a flexible, porous dust filtering bag removably mounted in said body, a bag supporting bell removably mounted with respect to said bag, said end cap and said body, said bell being located inside said end cap, said bell having an opening therein opposite said air inlet of substantially the same size as said inlet, an open ended mouth on the bag with a reduced diameter neck portion extending into the bell and through the bell opening, a flared outer end on the bag extending to the outside of the bell around said opening, and an annular gasket sealing the outside of the bell and the flared end of said bag mouth from the air inlet and from the bell opening, said gasket resiliently clamping the neck of the bag between said bell and said end cap around said air inlet and bell opening, thereby supporting said bag, when said end cap is in place.

4. In a vacuum cleaner of the type having a generally cylindrical open-ended tank with a removable end cap for the open end and an air inlet opening in the end cap, that improvement which comprises a disposable flexible, porous dust collecting bag having a body adapted to be removably received in said tank upon removal of said end cap, a porous dust bag support in said tank for receiving and supporting said bag body, a non-porous bag supporting bell removably mounted under said end cap with edges extending to the cylindrical sides of the tank and having an opening opposite said air inlet of substantially the same size as said inlet, a neck portion on said bag of substantially less diameter than said body of said bag extending inside said bell and spaced therefrom excepting at said bell opening, a flared open mouth on said neck of substantially greater diameter than said neck portion, the neck portion extending through said opening in said bell and said flared mouth being folded back against the outside of said bell around said opening, a resilient annular gasket extending between said end cap and said bell around said inlet and said bell opening, said gasket constituting the sole means removably sealing and holding the mouth of said bag between said bell and cap outside of said bell but inside of said end cap when said cap is in place, and a resilient gasket sealing said bell at its edge from said tank sides, whereby the flared mouth portion of said bag is sealed from air flow outside of the bell but under the cap.

5. In a vacuum cleaner of the type having a body with an end cap removably mounted thereon and an air inlet for a suction hose in the end cap, that improvement which comprises a disposable, porous, flexible, dust filtering bag with a main portion removably mounted in said body, a porous dust bag support for said main bag portion in the body, a non-porous bag supporting bell mounted in said body, removably held therein

by and under said end cap, and removable from said body independently of both said end cap and said dust bag when said end cap is removed, said bell, when held in place, having an opening located opposite said end cap air inlet, a neck portion on said bag tapering inwardly from the main bag portion and supported in spaced relation inside the major portion of the bell, an outwardly flared open mouth on said bag, said flared mouth extending through the bell opening to the outside of the bell under the end cap, and a resilient annular sealing gasket extending and pressing between the bell and the end cap around the bell opening and air inlet, said gasket resiliently holding the bell in the body and securing the flared mouth of the bag around the bell opening and sealing it from the air inlet when said end cap is in place.

6. In a suction cleaner having an open ended body containing an air flow producing unit, an end cap with a centrally disposed inlet opening at its apex removably closing the open end of the body, and a porous bag support with a marginal resilient gasket seated on said open end, said bag support extending into said body and held in place in said body by said end cap, that improvement in a disposable dirt filtering arrangement for said cleaner comprising an air impervious dome-shaped member removably held by said end cap extending between said resilient gasket on said bag support and the apex of said end cap, said dome-shaped member having a central opening adjacent said end cap inlet when said cap and dome are in place, a compressible annular seal surrounding said cap inlet and said dome opening between the cap and dome at the apex and completing a sealed space between the cap and dome outside of air flow from the inlet through the cleaner body, a bag of flexible porous dust filtering material with a main portion removably held in said porous bag support, a neck portion on said bag tapering from said main body portion to a diameter substantially equal to said opening in the dome-shaped member, said neck extending inside of but spaced from said dome, with its end portion extending through said dome opening, a flared open mouth on said bag of increased diameter extending from said neck and folded outside of said dome into said sealed space, said neck and mouth being thereby sealed from air entering the inlet in the end cap.

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