May 13, 1952

M. C. DIPPEL
SELF-SEALING BAG FOR SEPARATING
DUST FROM AN AIR STREAM

2,596,807

Filed April 5, 1949

3 Sheets-Sheet 1

Fig. 1

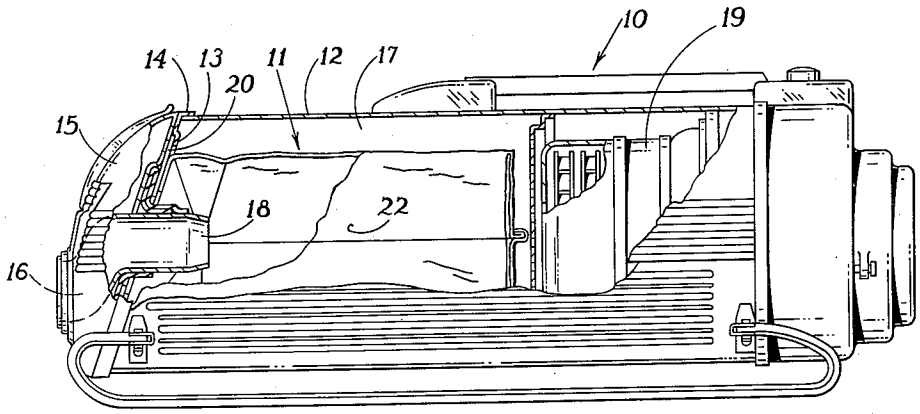


Fig. 2

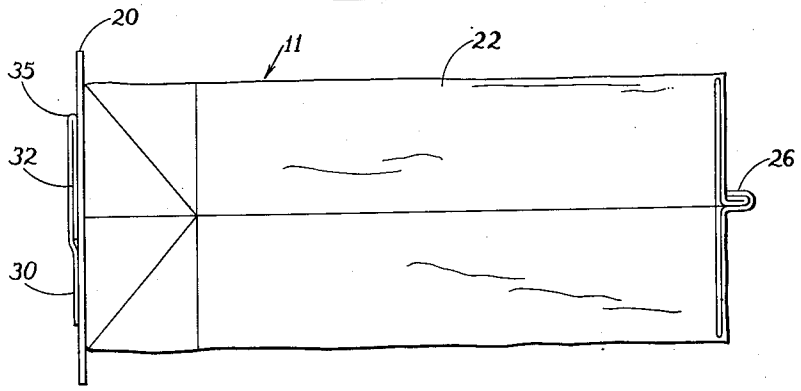
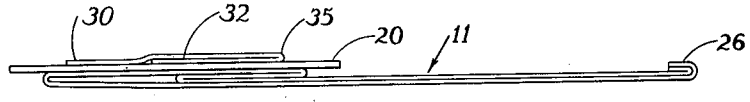


Fig. 3



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Fig. 4

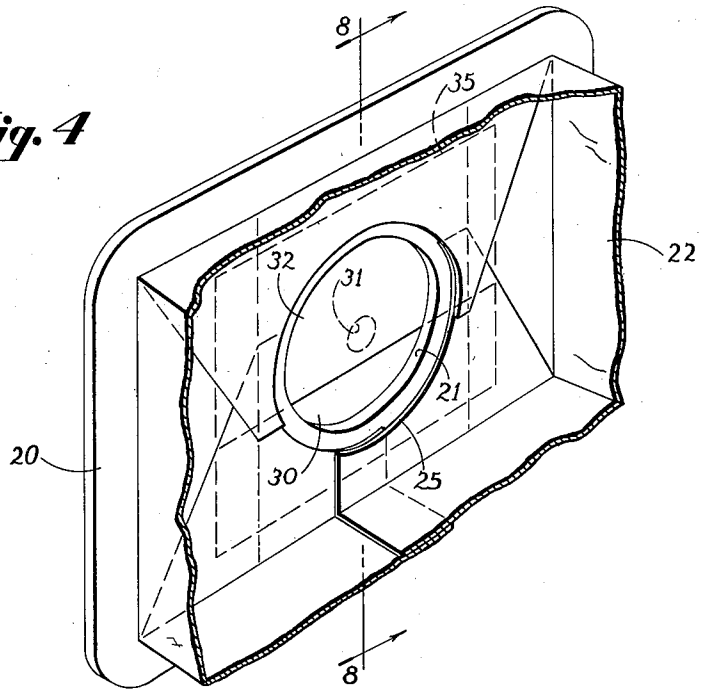
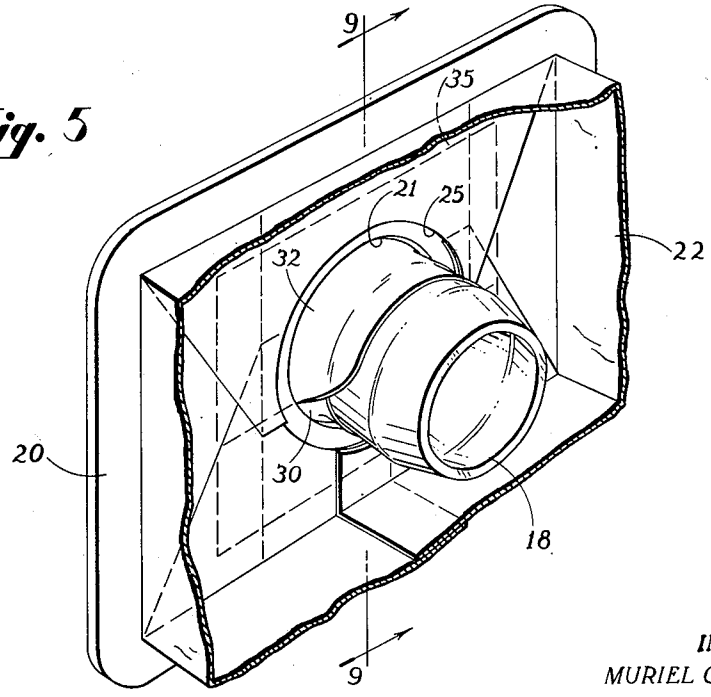


Fig. 5



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Fig. 6

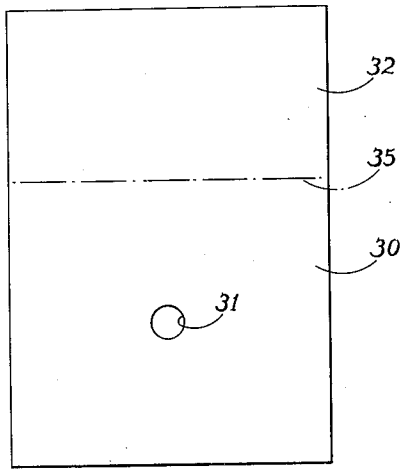


Fig. 7

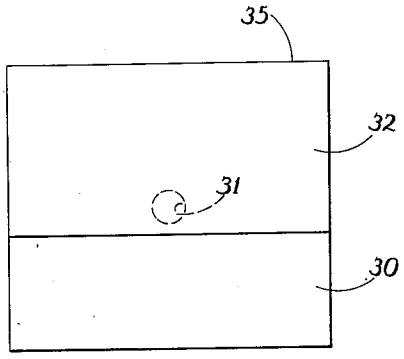


Fig. 8

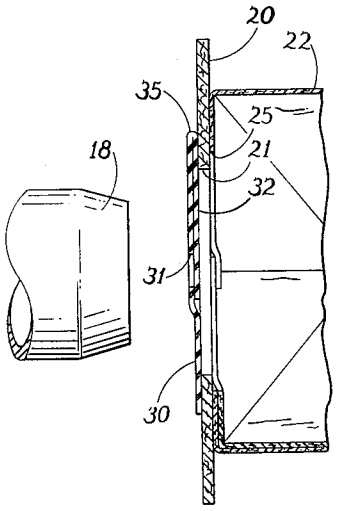
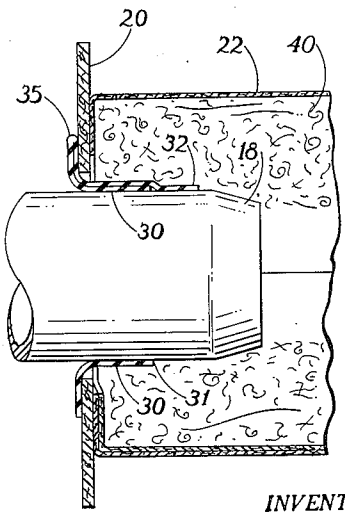


Fig. 9



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Patented May 13, 1952 2,596,807

UNITED STATES PATENT OFFICE

2,596,807

SELF-SEALING BAG FOR SEPARATING DUST FROM AN AIR STREAM

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Application April 5, 1949, Serial No. 85,491

7 Claims. (Cl. 183—51)

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This invention relates to a self-sealing container, and more particularly to a dust collecting device adapted for use in a vacuum cleaner.

Heretofore a number of different devices have been proposed for separating entrained particles from the suction current of cleaning air used in the operation of the conventional type of vacuum cleaner. Although a cloth bag has been almost universally used in the past, more recently a modified disposable paper receptacle pervious to air but impervious to dust, lint, hair, threads and the like has met with considerable public acceptance. However, many difficulties have accompanied the adoption of the more obvious modifications of this common paper bag type of dust receptacle. Such problems as for example excessive cost, undue complexity of structure, difficulty of removal of contaminated bags or containers filled with dirt, etc., have arisen.

In view of this ineffective adaptation of dust containers as heretofore devised to solve this particular problem, it is an object of this invention to provide a low cost disposable paper container which makes possible the most efficient collection, and rapid and easy disposal of dust and dirt collected in the conventional types of so-called vacuum or suction cleaning machines.

In addition to such an economical and convenient solution for the conventional cleaning problem, a still further object hereof is to provide a highly flexible selectively pervious dust container which is readily foldable or collapsible to occupy the least possible space and thus facilitate storage in an easily accessible place, on the cleaner if necessary, and to provide such a container as is readily extensible into fully opened condition in and of itself and solely by initiating vacuum cleaner operation after being once mounted and sealed in position within the cleaner.

Another object is to provide such a self-opening and self-sealing dust container for use in the conventional type of vacuum cleaner.

Still other and further objects and advantages of this invention will become apparent, and similar and analogous objects will suggest themselves and be readily comprehended by those versed in the related art, upon further examining the examples given in the following specification, particularly when considered in conjunction with the appended drawings forming a part of this disclosure and in which:

Figure 1 is a side view, partly in section and with another part of the outer casing broken away, showing a dust collecting container in

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accordance with this invention in position in a tank type vacuum cleaner;

Figure 2 is a side view of the dust collecting container shown in Fig. 1, in a fully extended condition;

Figure 3 is a side view of the same dust collecting container shown in Fig. 2, but in a fully collapsed and folded condition suitable for storage;

Figure 4 is a perspective view of the interior of a fully extended container with part of the pervious material forming the dust storage portion of the container torn away in order to show more clearly the inner construction of one modification embodying the novel self-opening and self-sealing principles disclosed and described herein;

Figure 5 is a perspective view similar to that shown in Fig. 4, but showing the dust conveying nozzle extending through the pressure distended and expandedly opened resilient sealing element incorporated in this embodiment of the invention and further showing the inner resilient sealing flap in upwardly diverted position so that dirt-laden air can be introduced directly into the interior of the container;

Figure 6 shows the sealing member in full view before folding the inner sealing flap into final position;

Figure 7 shows the inner sealing flap of Fig. 6 in position and the entire sealing unit ready for mounting over the opening in a dust container bag;

Figure 8 is a cross-sectional view taken on the line 8—8 of Fig. 4 prior to the insertion of the dust conveying nozzle through the sealing member; and

Figure 9 is a cross-sectional view taken on the line 9—9 of Fig. 5 showing the relationship of the various elements of the nozzle and sealing member after insertion of the nozzle into the bag interior.

Referring now more particularly to the figures and especially to Fig. 1, a conventional tank type of vacuum cleaner 10 is shown fitted with a dust collecting bag 11 embodying structure in accordance with this invention, the dust bag being placed in operative position within the cleaner casing 12. The bag or container 11 is held in place by the insertion of the bag and the placement of the end plate member or disc 20 of dust bag 11 onto a seat 13 formed in flange 14 which in turn is a part of cleaner casing 12. A removable cover 15 keeps the left-hand end of the casing 12 closed and seals the dust bag 11 within

body chamber 17 in dust collecting position within seat 13. Dust inlet passage 16, to the outer end of which a flexible dust collecting hose is connectable, has an inner end 18 forming a nozzle which extends some distance into the interior of dust bag 11 through an opening or centrally located aperture 21, Fig. 4, cut in end plate 20. A motor fan unit 19 in the opposite end of the body chamber completes the vacuum cleaner assembly.

Plate member 20 is preferably formed of relatively stiff material to which the flexible side walls 22 of dust bag 11 are secured. It is firmly clamped within seat 13 by cover or closure member 15 when the latter is locked in place. Dust-laden air is then conveyed directly into the interior of bag 11, the air passing through the porous walls 22 of the container or dust bag 11, while the entrained dirt is filtered out and remains entrapped within the bag 11.

The walls of the container are preferably flexible and foldable in the conventional manner for convenient packaging and storage, as shown in Figs. 2 and 3. The bottom (left end in Fig. 2) of the bag is adhesively or otherwise secured to the inner side of end plate 20 and has a hole, opening or aperture 25, Fig. 4, coextensive with or slightly larger than that cut in end plate 20, for the facile insertion therethrough of nozzle 18. The open end of bag 11, opposite the end secured to disc 20, is closed in any suitable manner. As shown in Figs. 2 and 3 this closure is effected by folding over, gluing or sewing the four side walls together across this open end when the container is in collapsed condition, as shown at 26.

As is well known, a number of different devices have been heretofore suggested for sealing bags, both self-sealing devices and others, viz., folded paper flaps, distensible rubber sheets, interleaved iris type elements, etc., among various others. However, such devices have been both complex and expensive. Frequently they have proved ineffective in practice, many operated only under small pressure leaks, while still others failed to retain small dust particles.

The closure element shown in detail in Figs. 4 to 9 and more particularly the subject-matter of this invention is a highly effective and efficient self-opening and self-closing sealing device. It includes a distensible member 30, Fig. 4, originally of rectangular shape having a lower area of substantially square configuration in the center of which is a hole or aperture 31 punched therethrough. The upper flap portion 32 is folded down on line 35 so as to overlap the center opening 31, as shown in Fig. 7. This folded unit is then adhesively or otherwise secured to the outer face of disc 20, in sealing orientation with respect to opening 21, the downwardly folded flap being immediately adjacent and partially covering the opening 21, see Figs. 4 and 8.

By the term distensible as used with reference to member 30 is meant any rubber-like material, one that is stretchable and returnable upon release substantially to its former size as contrasted to a foldable material which folds and/or unfolds.

In operation, responsive to the pressure exerted by the insertion of a filling tube, 18, Figs. 5 and 9, the aperture 31 in the elastic sealing member 30 expands and opens out to a wider and wider diameter until it finally allows the end of the tube 18 to protrude therethrough. The sealing flap 32 is simultaneously pushed upwards as in Fig. 5 and away from its sealing engagement with the inner side of opening 31.

When the tube is withdrawn, the aperture 31 in the elastic sealing member 30 returns to its former small diameter Fig. 4 and the flap 32 comes down to seal the opening 31 (see Fig. 8). The entrapped dust 40 behind the flap 32 presses the latter in sealing position.

Although a detailed description has been given with particular reference to a self-sealing bag device and more especially one where a distensible member is used together with an auxiliary closure flap, it is to be understood that the invention may be variously otherwise embodied and that its scope is to be determined solely by the following claims.

What I claim is:

1. A container of flexible material having a plurality of pairs of side walls, material forming an extension at one end of each side wall being folded at right angles to the respective wall when the container is in extended condition to form an end portion, an end plate member of relatively stiff material secured to said end portion, said plate member and end portion having an aperture communicating with the interior of said container, means for closing the aperture in said plate member, said closing means comprising a first sheet of elastic material having an aperture in its surface, and an additional sheet of elastic material forming a sealing flap for said aperture in said closing member.

2. A container of flexible material having a plurality of pairs of side walls, material forming an extension at one end of each side wall being folded at right angles to the respective wall when the container is in extended condition to form an end portion, an end plate member of relatively stiff material secured to said end portion, said plate member and end portion having an aperture communicating with the interior of said container, means for closing the aperture in said plate member, said closing means comprising a sheet of elastic material having an aperture in its surface an a portion thereof folded over on itself to form a sealing flap for said aperture in said closing member.

3. A container of flexible material having a plurality of pairs of side walls, material forming an extension at one end of each side wall being folded at right angles to the respective wall when the container is in extended condition to form an end portion, an end plate member of relatively stiff material secured to said end portion, said plate member and end portion having an opening communicating with the interior of said container, means for closing the opening in said plate member, said closing means comprising a first sheet of elastic material having an aperture in its surface, and an additional sheet of material extending over a portion of said opening to form a partial closure therefor, said additional sheet overlapping the aperture in the elastic sheet material to form a complete closure for said aperture.

4. A container of flexible material having a plurality of pairs of side walls, material forming an extension at one end of each side wall being folded at right angles to the respective wall when the container is in extended condition to form an end portion, an end plate member of relatively stiff material secured to said end portion, said plate member and end portion having an opening communicating with the interior of said container, means for closing the opening in said plate member, said closing means comprising a first sheet of elastic material having an aperture in its surface, and an additional sheet of mate-

rial extending over a portion of said opening in said plate member, said additional sheet overlapping the aperture in the elastic sheet material to form a complete closure for said aperture.

5. A disposable dust bag for separating and collecting dust from the air stream of a vacuum cleaner having an inlet tube, said bag having a body of relatively porous pliable material and having a relatively stiff wall portion provided with an opening for the reception of said inlet tube, a thin sheet of stretchable and elastic material secured to said end wall portion and extending over said opening, said sheet being formed with an aperture registering with said opening and normally of substantially less area than the cross-sectional area of said inlet tube, said sheet being stretchable by the insertion of said inlet tube to enlarge the area of said aperture sufficiently to receive the tube therethrough, the elasticity of said sheet causing said aperture to return to its normal small area upon the withdrawal of said tube to thereby substantially obstruct the opening in said wall, and a sheet of flexible material normally extending over a portion of said opening and completely covering said aperture when the latter is of normal area.

6. A disposable dust bag for separating and collecting dust from the air stream of a vacuum cleaner having an inlet tube, said bag having a body of relatively porous pliable material and having a relatively stiff wall portion provided with an opening for the reception of said inlet tube, a thin sheet of stretchable and elastic material secured to said wall portion and extending over said opening, said sheet being formed with an aperture registering with said opening and normally having an area substantially less than the cross-sectional area of said inlet tube, said sheet being stretchable by the insertion of said inlet tube into said opening to enlarge the area of said aperture sufficiently to receive the tube therethrough, and a second sheet of stretchable and elastic material secured to said wall portion at opposite sides of said opening and normally extending across a portion of said opening and completely covering said aperture when the latter is of normal area, said second sheet being stretchable by the insertion of said tube into said opening to displace said second sheet to one side of said tube, the elasticity of said sheets, upon the withdrawal of said tube, causing said aperture to return to its normal small area and said

second sheet to return to its normal position covering said aperture.

7. A disposable dust bag for separating and collecting dust from the air stream flowing through the inlet tube of a vacuum cleaner, said bag having a body of relatively porous pliable material with a relatively stiff wall portion having an opening of a size to receive the inlet tube, a thin sheet of stretchable and elastic material secured to said stiff wall portion over said opening and having an aperture in registration with said opening and of a size substantially less than that of the cross-sectional area of said inlet tube, whereby a substantial amount of said material intervenes the peripheries of said aperture and said opening to thereby substantially obstruct said opening, said sheet of material being adapted to be stretched upon the insertion of the inlet tube through said opening and through said aperture and to return to the position obstructing said opening when said inlet tube is withdrawn from said aperture and opening, the stretching of said sheet resulting in the substantial enlargement of said aperture to snugly receive said tube, said sheet of stretchable and elastic material having the aperture, due to the elasticity of the sheet, contracting upon withdrawal of the tube so that the aperture returns to its normal small size, the sheet accordingly substantially obstructing the escape of the contents of the bag when it is in filled condition.

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