May 14, 1957 C. E. MEYERHOEFER 2,792,076

FILTER BAG

Filed April 22, 1954

Fig. 1

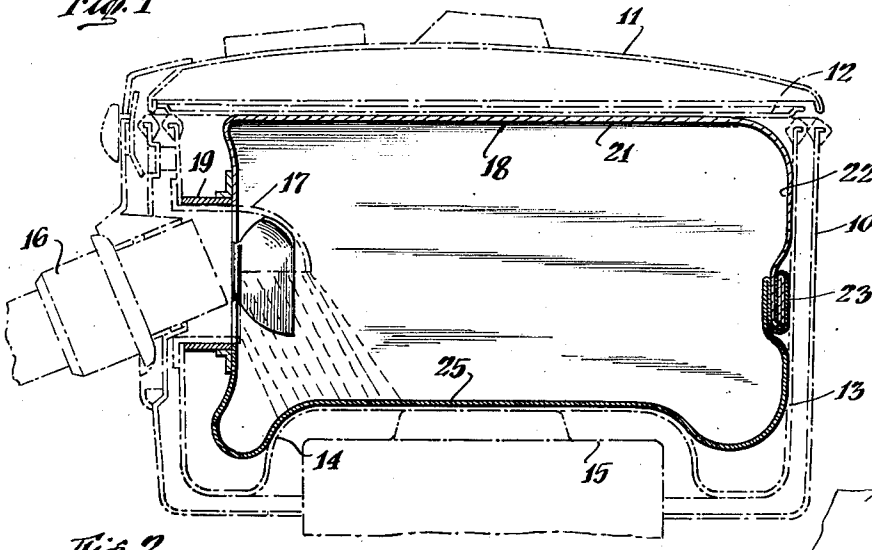


Fig. 6

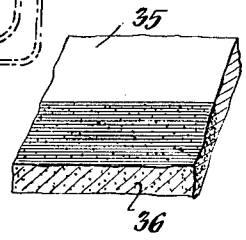
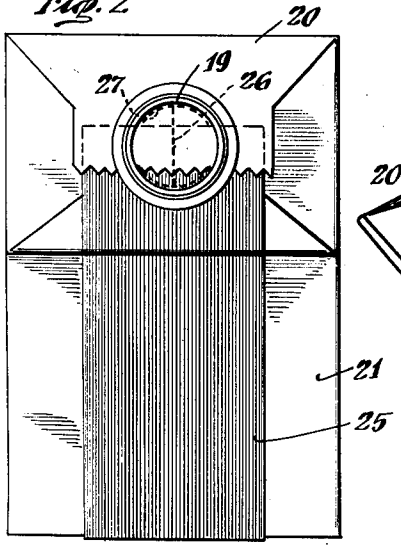


Fig. 2



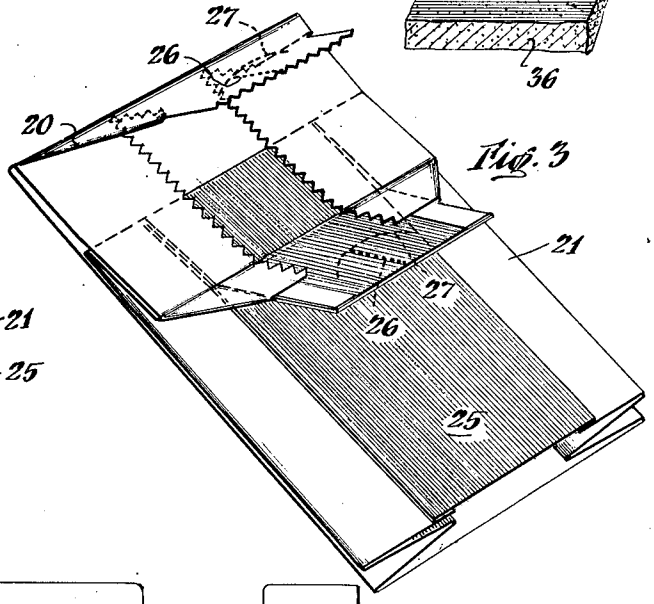
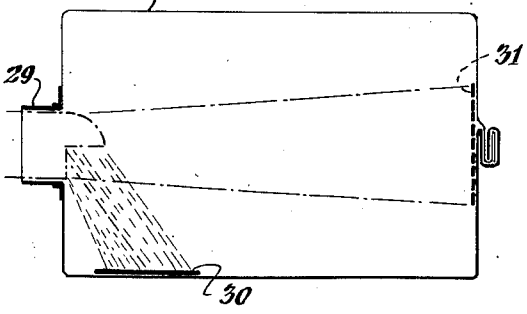


Fig. 3

Fig. 4



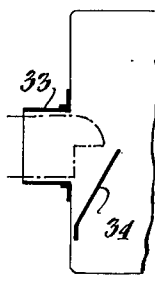


Fig. 5

INVENTOR
Carl E. Meyerhoefer
BY
Kane, Dalsimer and Kane
ATTORNEYS

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FILTER BAG

Carl E. Meyerhoefer, Brooklyn, N. Y., assignor to Lewyt Corporation, Brooklyn, N. Y., a corporation of New York

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5 Claims. (Cl. 183—51)

This invention relates to a structurally and functionally improved filter bag and especially a unit intended for use in connection with vacuum cleaners; the present invention also teaching a novel combination of filter bag structure and such vacuum cleaners.

It is an object of the invention to furnish a unit of this type by means of which penetration of its body or wall by the high velocity impingement of dirt particles thereagainst, will be prevented.

Still another object is that of designing filter which will be less susceptible to weakening and rupturing than heretofore and which may be economically manufactured by quantity production machinery and methods at less cost than air-pervious bags as heretofore designed.

With these and other objects in mind, reference is had to the attached sheet of drawings illustrating practical embodiments of the invention and in which:

Fig. 1 is a sectional side view taken through a portion of a vacuum cleaner assembly and showing one form of the present filter bag in association therewith;

Fig. 2 is a face view of that bag;

Fig. 3 is a perspective view of the bag in partially assembled condition;

Fig. 4 illustrates an alternative form of bag structure and shows that structure in a somewhat diagrammatic manner;

Fig. 5 is a view similar to Fig. 4 but showing a still further arrangement of parts; and

Fig. 6 is a fragmentary perspective view of a portion of the bag body and illustrating in enlarged scale and in section, a still further structure provided in accordance with the present invention.

Referring primarily to Fig. 1, the numeral 10 indicates the upper casing portion of a vacuum cleaner assembly which is closed by a lid 11 conveniently mounted by a hinge (not shown). Disposed within this lid is a disk-type filter 12 of air pervious material. The general construction involved is substantially identical with that disclosed in United States Patent 2,716,465 dated August 30, 1955.

As taught in that application, the upper casing portion 10 encloses an imperforate trough having an open upper face and side walls 13 spaced from the inner face of the casing walls. Due to the spacing, passages for the flow of air are present. The base of this trough, as indicated at 14, may include an upwardly bulged or pedestal portion 14. Below this, a motor blower unit 15 is disposed.

As also disclosed in the prior application, a coupling for a hose 16 is provided in association with casing portion 10. The latter mounts in line with the opening defined by this collar or coupling, a deflector shield 17, the base of which may be circular in section and the inner end of which terminates in a downwardly and inwardly opening hood. A bag of air-porous paper is disposed within trough 13 and includes a body 18. The latter is formed with an opening adjacent its forward end and which opening is defined by a collar 19. This collar encircles the

fitting or inlet unit 17 in the manner shown in Fig. 1. Under these circumstances, and with the motor blower unit 15 operating, dust-laden air will be drawn through the hose coupling and deflector 17 into the interior of the bag 18. Therefore, as indicated, dust-laden particles will be directed against the inner face of the base portion or lower surface of the bag as shown in this figure. In that area, the bag is supported by the upwardly bulged part 14 of the trough. The air will distend the bag so that it substantially fills the trough with its rear end braced against the adjacent surface of the latter and its upper surface bearing against parts of the filter assembly 12.

Even if the base portion of the trough be corrugated, a minimum amount of filtered air will pass through the adjacent bag wall, although the latter be formed of air-porous paper. Rather, the greatest amount of the air will move upwardly through the bag in the direction of filter 12. Thereupon, it will pass through the bag wall and the filter assembly 12 and reverse its course to flow between the inner face of casing section 10 and trough 13 toward the motor blower unit. From the latter, it will be discharged through a suitable outlet or outlets as disclosed in my prior patent. It is found that in the case of air-porous paper providing the surface against which the dust particles impinge upon their entrance into the bag and due to the velocity of particle movement they are forced through the paper. This will occur throughout the area indicated by the flow lines in Fig. 1. Upon the bag being filled and removed, the adjacent base portion 14 of the trough will be covered with such particles.

By means of the present teachings, this objectionable result is avoided. More particularly and as shown in Figs. 2 and 3, the upper or outer end of the bag may be defined by a square area 20, centrally of which collar 19 is mounted by having its flange glued or otherwise secured adjacent the bag opening. The side walls 21 of the bag extend from the rectangular end thereof and terminate in a base portion 22, within which there may be incorporated a suitable number of folds 23 to provide a seal at this point. All of these parts are generally manufactured of air-pervious paper with the exception only of collar 19.

However, as shown in Figs. 2 and 3, a central area preferably extending within and from end portion 20, through the adjacent side wall surface and the continuation of that surface within base portion 22, are interrupted or eliminated. The gap or space is filled by a strip 25 conveniently of kraft paper which is not air pervious and which costs only a fraction of the cost per pound of the paper which is air-pervious and which constitutes the remainder of the bag. The parts of end portion 20 and including also the strip 25 are conveniently each formed with lines of weakening 26 within the area defined by collar 19. When the assembly of the bag has been completed, these lines will overlap so that, in effect, a straight line of weakening is present and adjacent the ends of which arcuate lines of weakening 27 exist.

It follows as a consequence of this structure, the application of the bag to the fixture or deflector 17, will result in the end wall of the bag opening along the lines of weakening 26 and 27. In effect, flaps will thus be furnished which remain integrally united with the bag body. The collar 19 and its associated flange being wholly outside of the bag, it is apparent that they will not interfere with the hinging or swinging action of the flaps. Accordingly, no interference with incoming dust-laden air will occur incident to the use of these flaps—which when the bag is mounted—will be swung to wholly open positions. However, with cover 11 swung upwardly, the bag may be removed by simply withdrawing collar 19 over the fixture 17. With that action, air and the mass of foreign material (dust, dirt particles,

etc.) will be subjected to a slight compressive action resulting in the flaps shifting outwardly to positions at which they are substantially co-extensive with the outer surface **20**. Thus they will function as a check valve structure to prevent an escape of dust and dirt particles from the bag interior as the latter is removed from trough **13** and subsequently disposed of.

It will be observed in connection with the strip of impervious material that the bag is mounted within the trough to have this strip lie in contact with the base portion **14** of that unit, with a fixture or deflector **17** of the type shown and described. Therefore, incoming air laden with foreign material will be deflected downwardly onto the surface of strip **25**. The particles of foreign material will, under these circumstances, simply rebound from the surface of that strip. Due to the character of the latter, no impingement between these particles and the strip will occur such that the dust particles are forced through or into the paper. At the same time, the filtering action of the bag will not be impaired because the amount of air normally passing between its lower surface (when in applied position) and the base **14** of the trough is of minimum quantity. It follows that when the bag is removed from the trough, the latter will be left in completely clean condition with no dirt discoloration appearing on the inner surface of the trough base.

As will be understood by those conversant with bag-making machines, the cost of manufacture in applying a separate strip **25** to be incorporated in the body of the bag will not, in effect, be increased over a bag in which all side walls are of the same gauge and material and integral with each other. However, the cost of material such as kraft paper is only fractional in comparison with proper air-porous paper. Therefore, with a large quantity of bags involved, the over-all cost of manufacture will be materially reduced. The same results of lack of penetration of the bag body by dirt particles may, of course, be achieved by constructions other than that illustrated in Figs. 1, 2 and 3. A slightly increased factor of cost will be involved under ordinary constructions.

Thus, as in Fig. 4, a bag has been indicated at **28** which may be wholly formed of air-porous paper and provided with a collar **29** to receive the fixture or deflector of the vacuum cleaning apparatus. If that deflector be of the type heretofore described in connection with the reference numeral **17**, then a strip in the form of a layer **30** of relatively hard and air-impervious material such as kraft paper may be applied to the inner face of the bag as indicated in Fig. 4. It could, of course, be applied to the outer face but this is not preferred. In any event, this layer **30** will be in the direct path of the air blast as discharged into the interior of the bag. Therefore, dust particles and other foreign material moving at high velocity and impinging against this area will not penetrate the wall of the bag. Rather they will simply rebound from layer **30**. As also shown in this figure, a strip involving a layer **31** might be applied, for example, to the base portion of the bag and at a zone adjacent its sealing folds. Such application would be resorted to where the fixture of the vacuum cleaner assembly involved no deflecting hood and the air discharged directly toward the base portion of the bag as has been indicated in Fig. 4. Again the same results would follow.

In Fig. 5, a bag has been indicated at **32** provided with a collar **33**. It will be assumed that a fixture or deflector similar to that indicated at **17** is employed. Under these circumstances, a separate flap strip **34** might be secured to the inner face of the bag top at a point adjacent but spaced from the bore of collar **33**. This flap again could be formed of kraft paper. Disposed in this manner and with the parts operating, it would in no way obstruct the flow of incoming, dust-laden air. It would, however, prevent the particles carried by that air from impinging directly on the relatively soft and porous surface of the bag body **32**. Accordingly, these particles would not penetrate that bag body, but would rather come to rest within the same.

Finally as in Fig. 6, a still further form of structure might be utilized. In that view, the numeral **35** indicates a fragment of the bag body formed of air-porous paper. A selected strip or area of this body could be coated or treated to prevent penetration thereof by particles impinging directly against that area. To this end, a latex compound or a plastic such as melamine could be employed. Other materials could obviously also be utilized. Those materials would preferably be in liquid form. Surface coating of one or both faces of the area in question could be resorted to. Also, if desired, complete impregnation of that area could occur, as indicated at **36**. Additionally somewhat the same results may be achieved by overlapping portions of the air-pervious bag material in a zone or zones which are in line with the blast of incoming dirt-laden air. It is apparent that with the thickening of the body which follows in this zone or zones by such an expedient air will encounter much increased resistance in attempting to pass through such a zone. The desired effect might be enhanced in following this expedient incident to the use of a layer of adhesive securing the overlapping body portions to each other to define a properly impervious strip. In any event, an air-impervious surface would be furnished to achieve the desired results.

Thus, among others, the several objects of the invention as specifically aforenoted are achieved. Obviously numerous changes in construction and rearrangements of the parts might be resorted to without departing from the spirit of the invention as defined by the claims.

I claim:

1. For use with vacuum cleaners having a compartment defined by a rigid wall to accommodate and support a filter bag to be discarded after it has once been filled with dust and similar material, a bag comprising a single-thickness side wall consisting of air-pervious paper except for a gap extending axially throughout the length of the bag, a strip of air-impervious material secured to said pervious paper and filling said gap to provide—together with said pervious layer—the complete side wall of said bag.

2. In a filter bag as defined in claim 1, said air-impervious layer comprising paper, said strip and side walls of the pervious paper adjacent said gap presenting edge zones, the edge zones of said strip overlapping and being secured to the edge zones of the adjacent pervious paper and the surface of said strip resisting abrasion by particles of foreign material drawn into the vacuum cleaner and discharged into said bag.

3. In a filter bag as defined in claim 1, an end wall forming a part of said bag and provided with an opening, a collar secured to said bag in line with said opening and said collar being formed of a non-metallic material.

4. In a filter bag as defined in claim 3, flaps integral with the material of the side wall and said flaps extending in line with the bore of and underlying said collar.

5. In a filter bag as defined in claim 4, the strip providing said air-impervious layer being formed of paper having resistance to abrasion, both said strip and the air-pervious paper adjacent said gap providing edge zones and the edge zones of said strip overlapping and being secured to the edge zone of the adjacent pervious paper.

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