Oct. 3, 1939. R. T. WHITE 2,174,730

VACUUM CLEANER BAG

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Fig. 1.

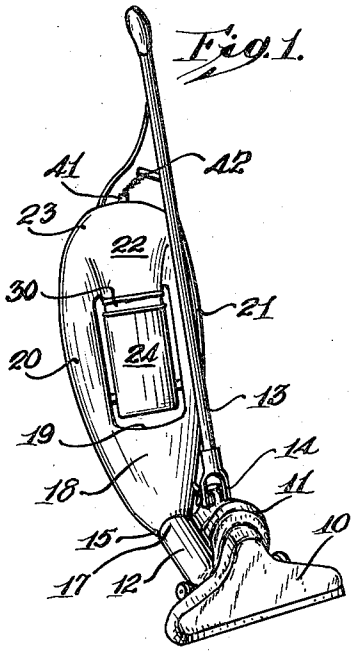


Fig. 2.

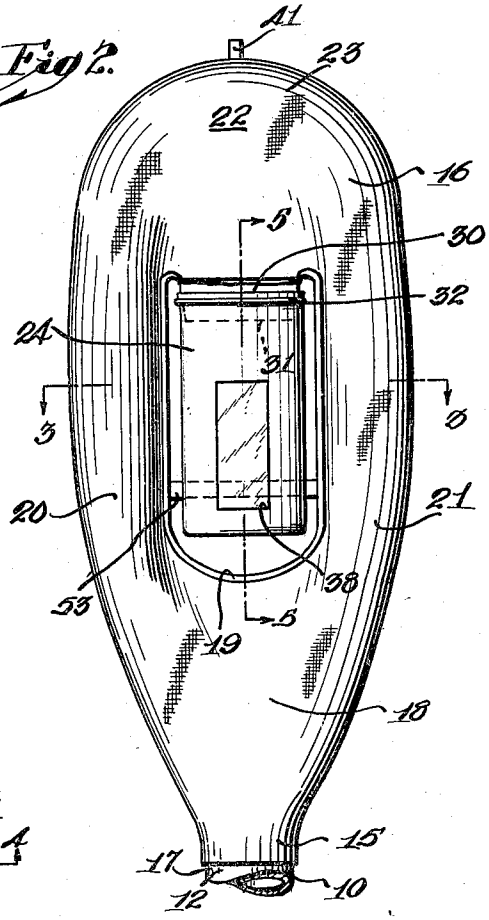


Fig. 3.

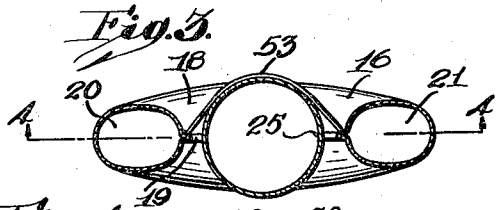


Fig. 4.

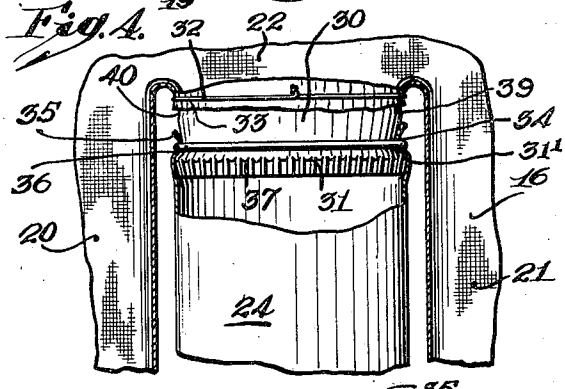


Fig. 5.

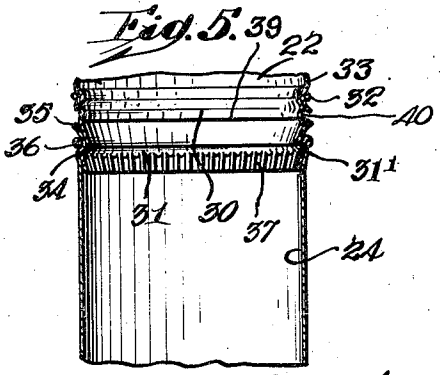
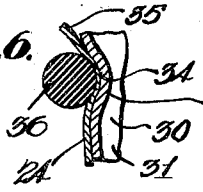


Fig. 6.



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VACUUM CLEANER BAG

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Fig. 7.

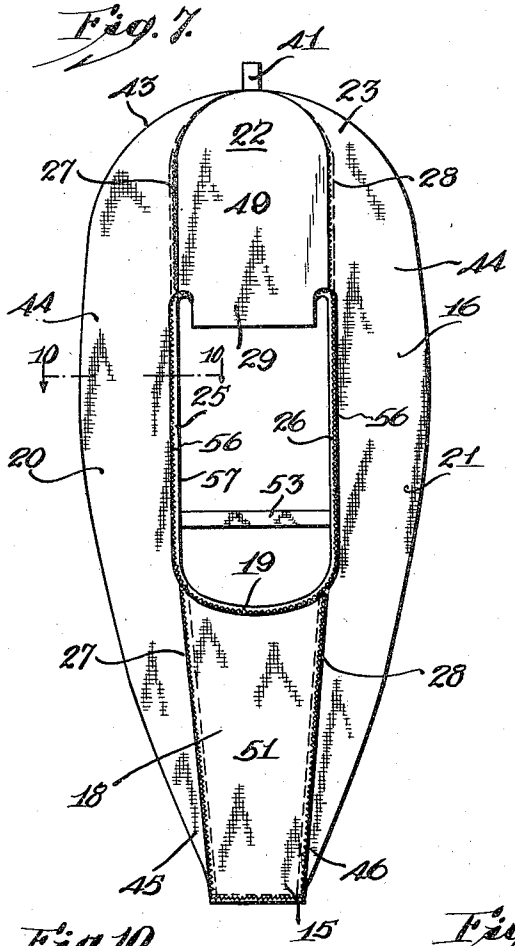


Fig. 8.

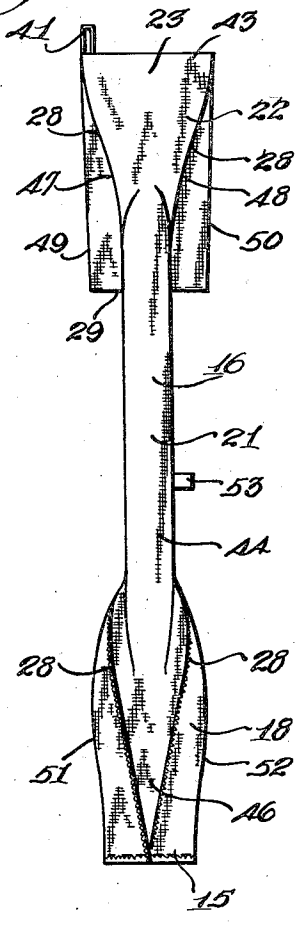


Fig. 10.

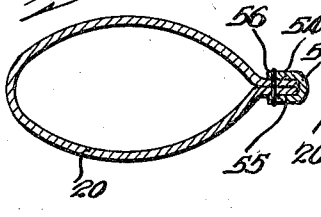
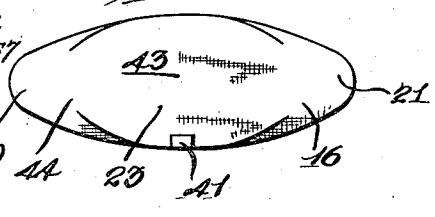


Fig. 9.



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UNITED STATES PATENT OFFICE

2,174,730

VACUUM CLEANER BAG

Raymond T. White, Philadelphia, Pa.

Application July 10, 1936, Serial No. 89,933

2 Claims. (Cl. 183—51)

My invention relates to the dust-receiving bags for vacuum cleaners.

The main purpose of my invention is to provide rapid and complete settling of the dust from the cleaner.

A further purpose is to divide the dust-laden air from the vacuum cleaner along side passages, uniting their content from opposite directions in a quiet zone from which the dust carried by the air columns drops into a container beneath the quiet zone.

A further purpose is to balance the air currents to discharge from the cleaner, dividing the discharge and uniting the divided parts immediately over a bag or other receiver for the dust.

A further purpose is to provide a removable dust-receiving bag in balanced position with respect to the air-receiving-cleaner bag whereby the bag is made readily accessible and in position to receive the discharge from the cleaner to maximum advantage.

A further purpose is to facilitate the attachment and removal of a dust-receiving bag.

A further purpose is to improve the construction of the bag as a finished bag and to facilitate the manufacture of the bag at a minimal price.

A further purpose is to make outer channeled parts of the bag and the top of a mixing chamber between them preferably of outwardly unrestrained bands of pervious fabric with side walls uniting them to form an upper mixing chamber open downwardly between the channeled or tubular parts and to form an inlet chamber connecting with the vacuum cleaner from similar tubular members and intervening sides.

Further purposes will appear in the specification and in the claims.

I have preferred to illustrate my invention by one form only, selecting a form which is practical, effective, inexpensive and which at the same time well illustrates the principles of my invention.

Figure 1 is a perspective view of a vacuum cleaner with a bag embodying my invention.

Figure 2 is an elevation of the bag of Figure 1.

Figure 3 is a section taken upon Figure 2 upon the line 3—3.

Figure 4 is a fragmentary longitudinal section of the structure of Figure 2 corresponding in position to line 4—4 of Figure 3.

Figure 5 is a fragmentary section taken in the position of line 5—5 of Figure 2.

Figure 6 is an enlarged fragmentary section of Figure 5.

Figure 7 is a front view, corresponding generally to Figure 2 but omitting the dust-receiving bag intended primarily to illustrate a preferred arrangement of the sheets of fabric from which the bag is made.

Figure 8 is a side elevation of the structure seen in Figure 7.

Figure 9 is a top plan view of the bag as seen in Figures 7 and 8.

Figure 10 is a section of Figure 7 taken upon the line 10—10.

In the figures similar numerals indicate like parts.

The vacuum cleaner 10, motor 11, discharge tube 12 and handle 13, pivoted at 14 are intended to represent any type of vacuum cleaner, as my dust bag may be used with any cleaner having a discharge pipe for dust-laden air, to which discharge pipe the lower part 15 of the dust bag 16 may be connected.

The lower end or inlet of the dust bag is of tubular shape in order that it may fit the discharge end 17 of the outlet tube 12.

The inlet 15 expands into a distributing chamber 18 bounded on the outside by the outer surface of the bag and limited at 19 at its upper end along a line intended to assist in guiding the dust-laden air content to the outer divided channels 20 and 21 by which the air is carried in "parallel" on opposite sides to a settling chamber 22 within the dome 23.

The side channels 20 and 21 are preferably tubular and from a fluid standpoint are arranged in "parallel". Though this is itself valuable and though part of the claims are directed to the advantage of having streams of this character united from opposite directions in the settling chamber there is also more specific novelty in the way in which the bag is constructed from strips of fabric which will be pointed out in detail in connection with the showing of Figures 7–9.

Whatever the way in which the parallel side passages and the settling chamber are made, it is quite desirable that the fluid friction be low, particularly in these passages and that the fluid pumped through them in parallel be so directed that the dust carrying flow from one channel be opposite that from the other. The two columns of dust-laden air are thus robbed of their velocity and the flow in each is that only which replaces the air filtered through the fabric of the bag. The dust will then separate out within the dead air space formed where the two columns meet more easily than would otherwise be true and will drop down through this dead air space

and through a central opening in the bottom of the dome into a dust receiver 24 supported between the side channels.

In addition to the desirability of having the side passages "parallel" for fluid flow and spaced in order that when re-united the fluid from them may meet to the best advantage in the dome, the spacing of these side fluid passages is desirable because of the advantage of having an opening within the bag for location, placement and removal of the dust collector bag 24. This opening is provided by sealing the passages 20 and 21 along their inner edges at 25 and 26, spacing them to provide the space occupied by the dust collector bag 24.

The sealing of the passages along their interiors at 25 and 26 may be continuous with the sealing at 19 at the bottom and the sealing provided by the inwardly directed seams 27 and 28 by which the lower ends 29 of the fabric forming the lower wall structure of the dome is united to form a guide for directing dust into the dust collector bag 24.

As shown the fabric below the dome is united in any suitable way to the upper part 30 of a fitting or band 31. The fabric is united to the band by a ring 32 holding the otherwise open fabric within a groove 33. This is preferably a more or less permanent fastening, since normally there will not be need of separation of these parts.

The lower part of the band 31 provides a groove at 34 as a seat within which the upper end 35 of the dust collector bag may be drawn by a rubber ring or other suitable fastener 36. The lower part of the band is crimped at 37 to reduce its diameter and taper it from the outer edge 31' of the groove downwardly so that it will act as a cone in guiding the bag into the position where the rubber ring 36 can retain it.

Above the groove 34 the fitting or band 31 is again tapered upwardly and outwardly, over a shoulder 39 to another groove 40 to which the rubber ring 36—preferably of circular cross section—may be rolled and within which it will be retained while the dust collector bag is being fitted to place. The ring 36 can then be snapped down the second taper into place about the top of the dust collector bag.

It is the intention to make the application and the removal of the dust collector bag so easy and free from special bag features of attachment as to permit the use of cheap paper bags which may be thrown away along with the dirt which is in them; but at the same time to permit the use, if desired, of bags having special features of value in the bags themselves which may be used over and over again. Such a feature appears in the bag shown in Figure 2 where a sight opening 38 is provided through which the extent of filling of the dust collector bag may be watched. This need not appreciably increase the expense as the sight opening can be provided simply by oiling a portion of the bag.

In operation the dust-laden air is pumped by the vacuum cleaner through its discharge 12 into the inlet at the lower end of the dust collecting bag. Within the space 18 the air divides along the two side passages 20 and 21 of the bag shown in Figure 2 and passes up through these channel passages, preferably of equal cross section, into the dome where they meet again, and deposit their dust into the receptacle at the lower end of the dome.

The material of the bag may offer any desired extent of resistance to the leakage of air through it. In its entirety it must provide for leakage of air as fast as pumped, but this leakage of air preferably takes place to a greater extent in the upper part of the dust bag than in the lower part of the dust bag. This avoids the reduction of speed of flow of dust-laden air through the passages 20 and 21 such as would take place if any considerable leakage of air occurred below the passages or in the lower parts of these passages. For this reason it is desired to have the bulk at least of leakage take place from the dome.

Whatever and wherever the leakage takes place, each column stops the movement of the other. Together they produce a substantially dead air zone which greatly assists in the gravity separation of dust particles from the air.

The dust bag may be attached by a fastener 41 to any suitable hook or support 42 upon the handle 13 as in the case of other pervious dust bags.

The bag is shown in Figures 7, 8 and 9 in a position selected primarily for its advantage in illustration but which is not accurate from the standpoint of the collapsed bag nor of the bag when the air is on.

In Figures 7, 8 and 9, a simple construction is shown by which the flow along the tubular passages and in the dome to the point at which the balanced opposed flows produce the quiet zone may be facilitated and by which at the same time the appearance of the bag may be greatly improved with a minimum of waste of material cut. In these figures the perimeter 43 of the dome is formed of a band 44 of material extending around it and down the sides of the bag. The width of the band at the dome is preferably the same as the circumference of each of the walls of the side passages, but at the inlet end may be desirably tapered at 45, 46 as shown. A convenient construction places the seams 47 and 48 at the junction between the perimeter of the dome and the front and rear dome walls 49, 50.

Throughout the passages 20 and 21 the edges 25 and 26 of the band 44 are united one to the other to complete the inner walls of the passages and preferably by a seam which leaves no rough edges projecting into the passages.

The front and rear lower walls are seen at 51 and 52.

The bag 24 is supported laterally by a strap 53 which also supports the passage walls against undue separation.

It will be evident that the seams should themselves be little resistant to the passage of dust-laden air along them. This can be accomplished very easily by any of a number of well known means of which one is shown in Figure 10 where the fabric is united with the edges turned outwardly (and for appearance sake bound).

In Figure 10 the section of one of the tubular side channels is shown for the purpose merely of indicating one form of seam which reduces the fluid friction within the passage. In itself the edges 54 and 55 are united by stitching at 56 so that the edges lie away from the passage; and the seam for appearance sake is covered with a binding 57.

It will be evident that the present construction provides an expansion space in the inlet, rounded contacting surfaces from the inlet into the tubular side passages and from the tubular side passages into the dome, with no place for the dust to rest, but instead a wholly open lower interior of the dome leading to the dust collector bag. As a result there are no parts of the bag to collect and hold the dust and which have to

be cleaned more than can be done during operation by tapping the exterior surface of the bag. As against the objectionable character of many cleaner bags that they have to be separately dumped and "beaten" to get the dust out, the present invention removes all of the dust from the bag proper in the normal operation of the device and leaves only a collected mass of refuse and dust in the dust-collector bag which may be removed without dispersion of the dust and generally under very sanitary conditions. The dust-collector bag can be removed from the cleaner bag in the room in which the cleaner is operated.

It will be further evident that the elimination of dust collection within the main bag is greatly facilitated by the substantial freedom from seams and by the fact that the seams which appear extend in the direction in which the air travels.

It will further be evident that the bellying of the outer band in my preferred form as best seen in Figure 7 contributes to the rounding of the guiding walls so as to reduce friction and thereby reduce the deposit of dust within the main bag.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain part or all of the benefits of my invention without copying the structure shown, and I, therefore, claim all such in so far as they fall within the reasonable spirit and scope of my invention.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A dust bag for vacuum cleaners comprising an outer pervious strip of substantially uniform width forming top and sides of a dome, the strip being united one edge to the other beneath the dome on each side to form tubular side conduit passages extending down toward the inlet from the vacuum cleaner, front and rear dome walls and front and rear lower walls united to the strip, the dome walls above, the others below the tubular passages, whereby the lower part of the dust bag forms a receiving chamber and the conduit sides provide passage to the dome, there being a space between the conduit passages for deposit of the dust from the dome.

2. A vacuum cleaner bag comprising straight pervious side strips forming top and sides of the upper part of the cleaner united edge to edge of the strip at each side at intermediate points to form spaced passages and tapered at the lower end, in combination with front and rear dome sections united to the strip, open between the lower ends of these dome sections and front and rear lower sections united to the strip to form a receiving compartment at the lower end of the bag.

RAYMOND T. WHITE.