

S. A. MOSS.
VACUUM CLEANER.
APPLICATION FILED FEB. 6, 1912.

1,198,945.

Patented Sept. 19, 1916.
6 SHEETS—SHEET 1.

Fig. 1.

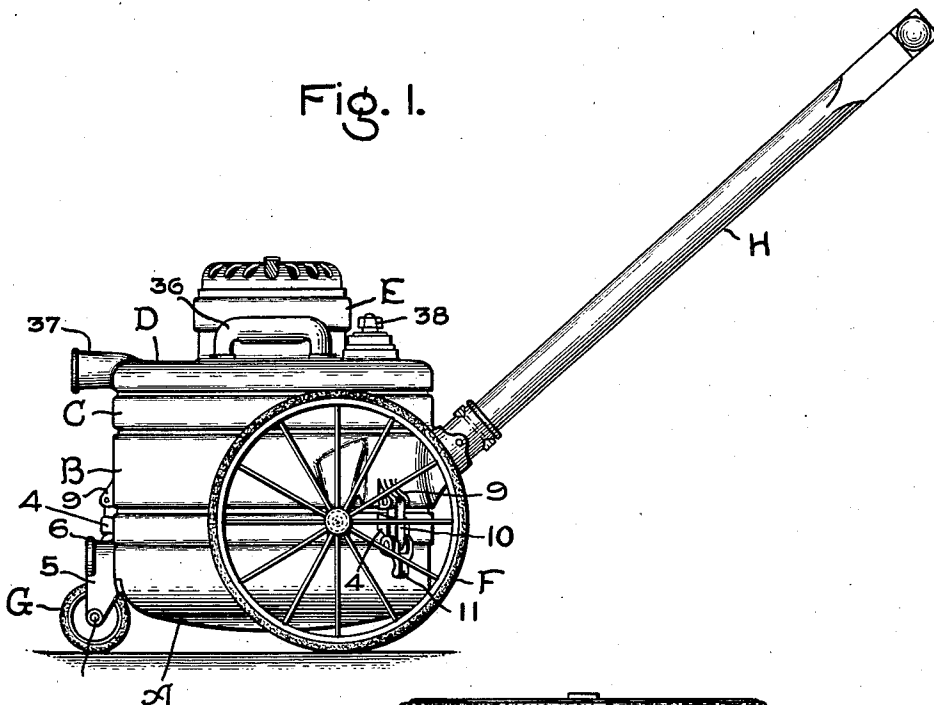
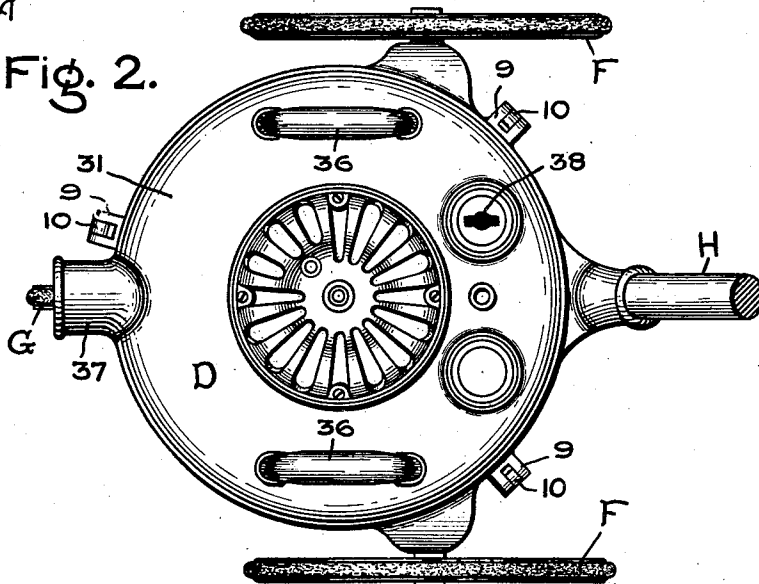


Fig. 2.



Witnesses

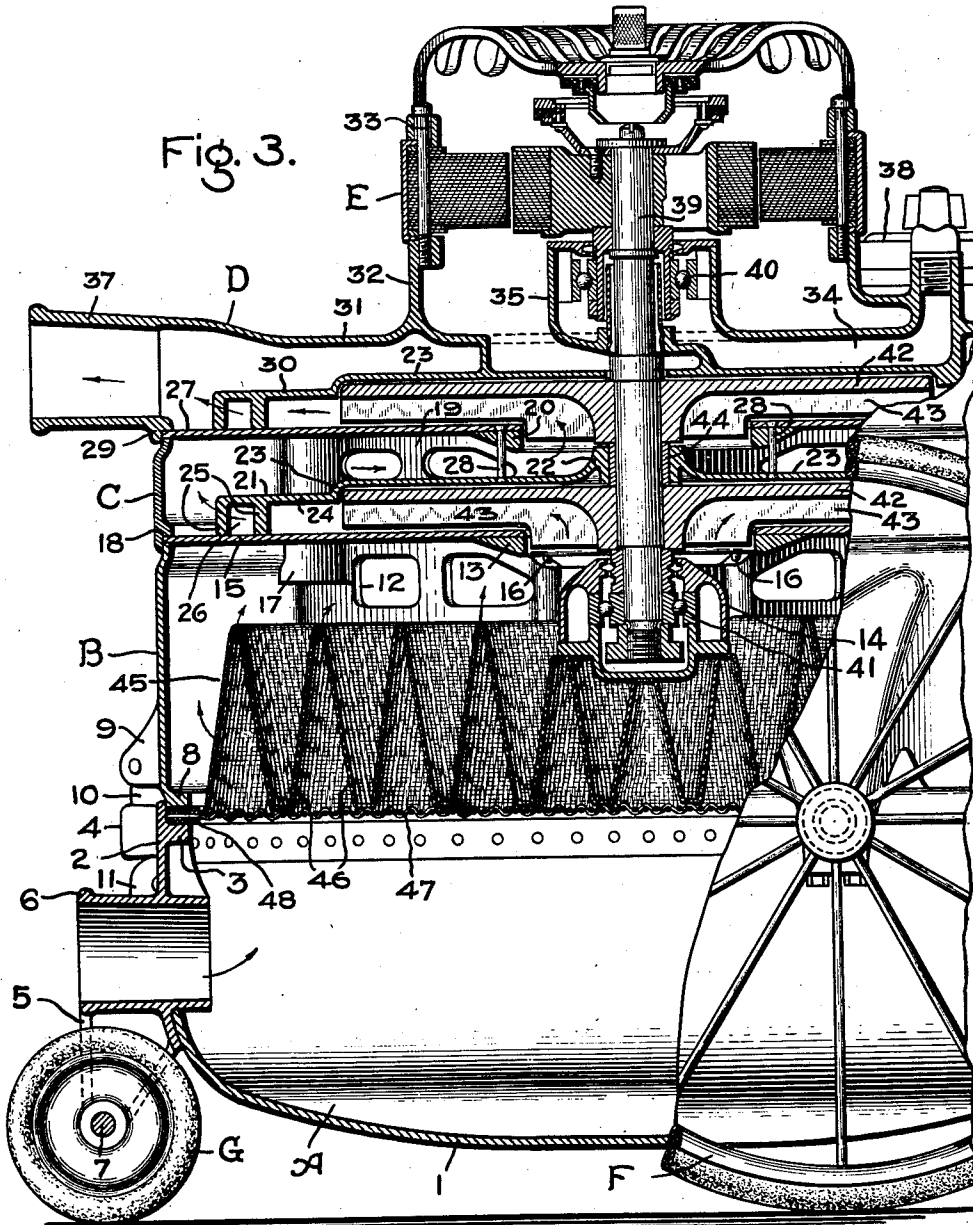
Marcus L. Byng.
J. Ellis Allen

Inventor,
Sanford A. Moss,
by *Wm. H. Davis*
Att'y.

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Marcus L. Byng.
J. Ellis Elv

Inventor,
Sanford A. Moss,
by *Wm. H. Davis*
Att'y.

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6 SHEETS—SHEET 3.

Fig. 4.

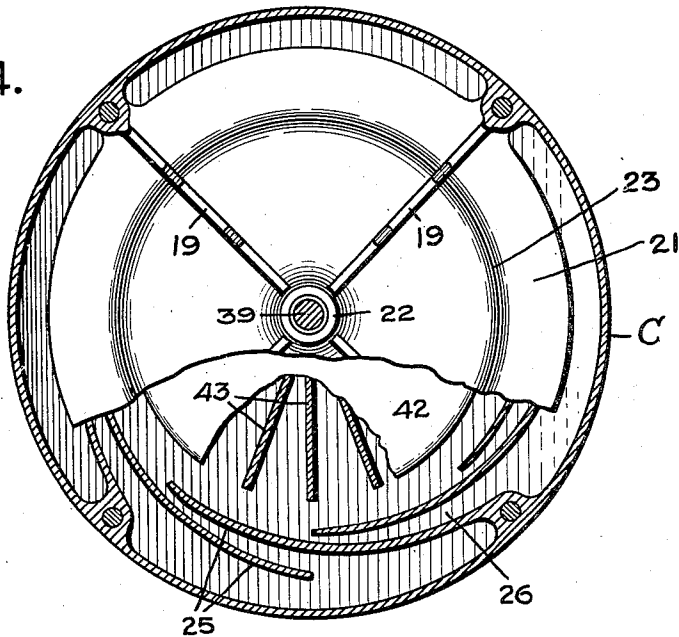
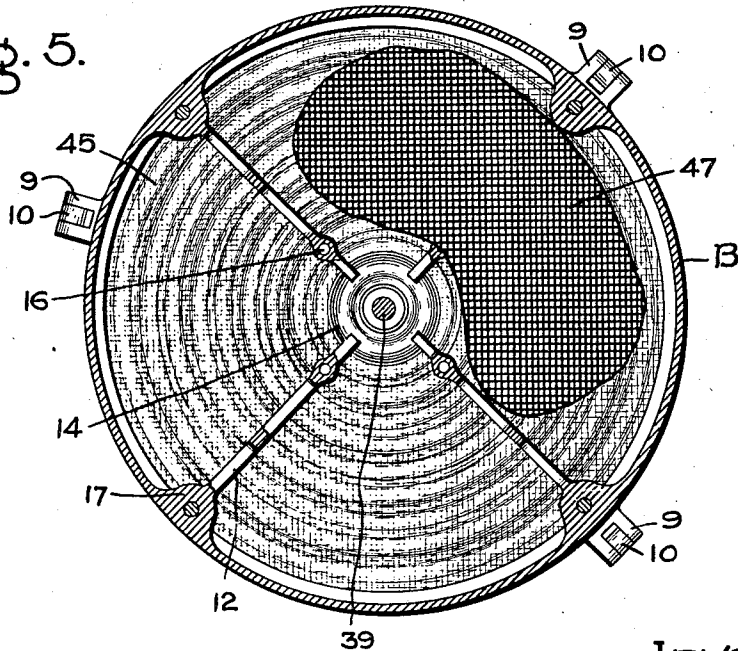


Fig. 5.



Witnesses:

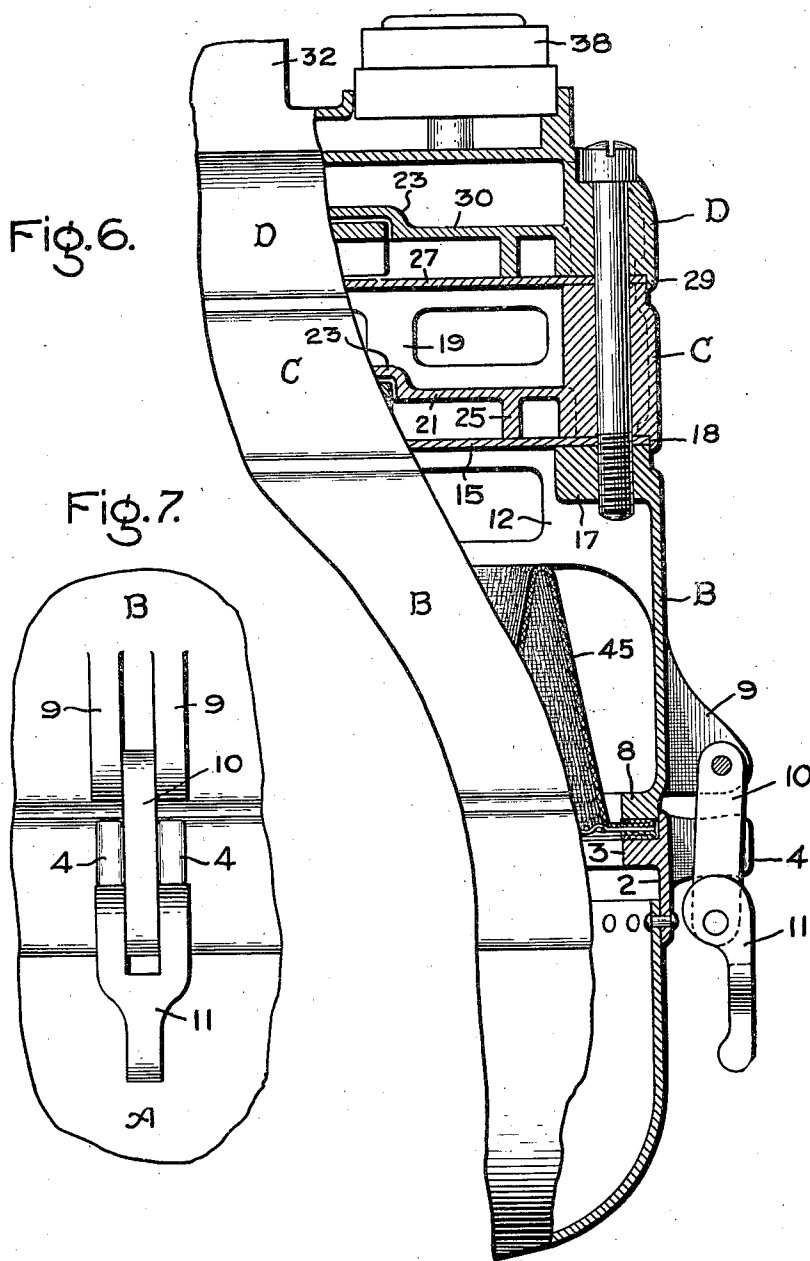
Marcus L. Byung
J. Elmer

Inventor,

Sanford A. Moss,
by *Wm. H. Davis*
Att'y

1,198,945.

Patented Sept. 19, 1916.
6 SHEETS—SHEET 4.



Witnesses:

Marcus L. Byng.
J. Ellis E. E.

Inventor
Sanford A. Moss
by *Alfred H. Davis*
Att.

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6 SHEETS—SHEET 5.

Fig. 8.

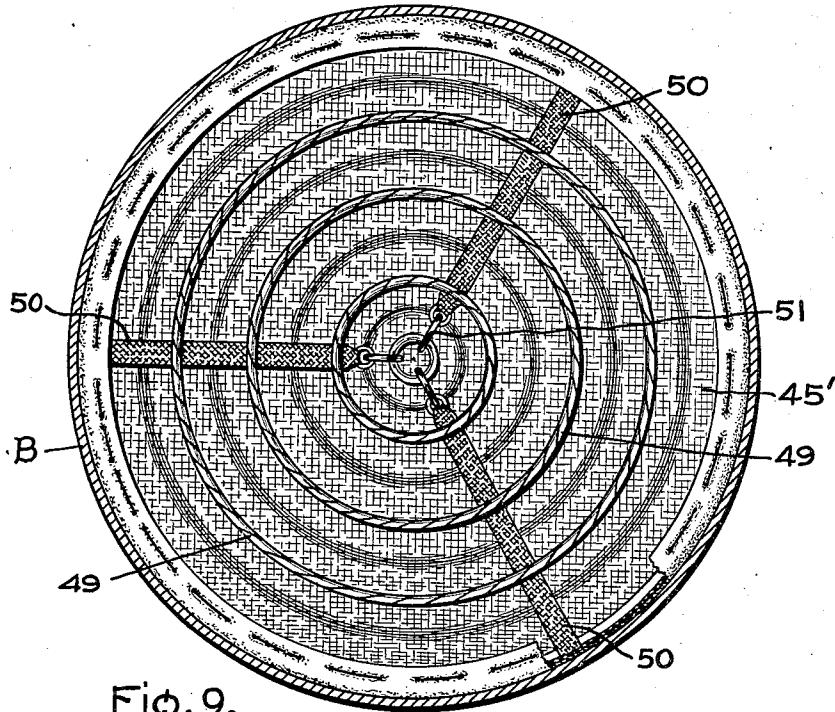
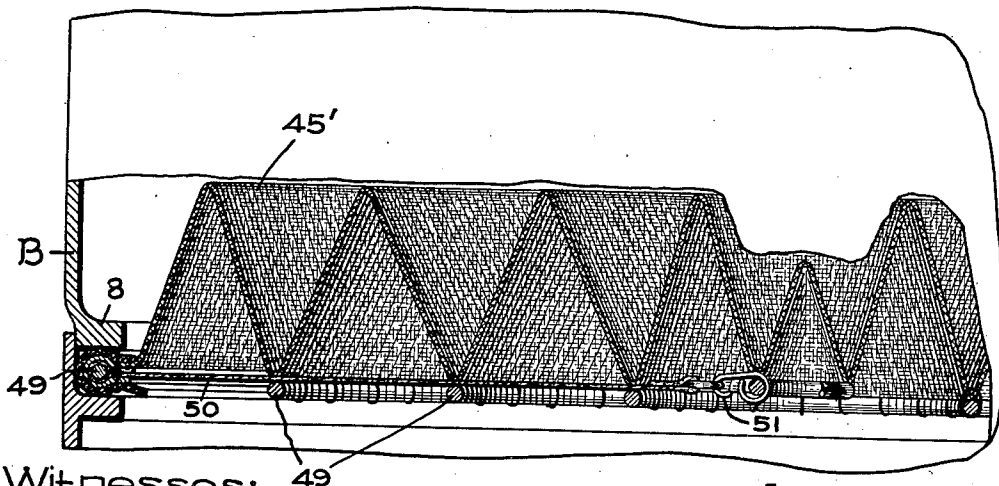


Fig. 9.



Witnesses:
Marcus L. Byng,
J. Ellis Elm

Inventor,
Sanford A. Moss,
by *Alfred S. Davis*
Att'y.

UNITED STATES PATENT OFFICE.

SANFORD A. MOSS, OF LYNN, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

VACUUM-CLEANER.

1,198,945.

Specification of Letters Patent. Patented Sept. 19, 1916.

Application filed February 6, 1912. Serial No. 675,834.

To all whom it may concern:

Be it known that I, SANFORD A. MOSS, a citizen of the United States, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Vacuum-Cleaners, of which the following is a specification.

The present invention relates to pneumatic devices for extracting, collecting and removing dirt, dust and lint from carpets, rugs, and the like, and more especially to vacuum cleaners in which a current of air is produced by creating a vacuum or partial vacuum at the surface of the carpet or rug.

The object of the present invention is to improve the construction of vacuum cleaners, particular reference being made to the means for separating the dust from the air as it passes through the apparatus.

For a consideration of what I believe to be novel and my invention, attention is directed to the accompanying description and the claims appended thereto.

One form of my invention is shown in the accompanying drawings forming a part of this specification, in which—

Figure 1 is a side elevation of the complete device; Fig. 2 is a top plan of the same with the handle broken away; Fig. 3 is a part side elevation and part vertical section of the device drawn to a larger scale; Fig. 4 is a broken sectional view of one of the exhaustor units; Fig. 5 is a horizontal section of the separator chamber showing the dust bag partly broken away; Fig. 6 is a broken side elevation and vertical section showing the means for clamping the dust pan and separator to the main part of the device; Fig. 7 is an elevation of one of the dust pan clamps; Fig. 8 is an under side view of a modified form of connection for the dust bag; Fig. 9 is a vertical section of the part shown in Fig. 8; and Fig. 10 is a side elevation of the complete device showing the method of disconnecting and removing the dust pan from the main portion.

The device has a cylindrical frame or casing comprising a dust pan A, a separator chamber shell B, an intermediate exhaustor unit C, a top exhaustor unit D superposed one upon the other, a motor frame E mounted upon the top unit D, two large rear wheels F and a small front wheel G whereby the device may be perambulated and a T-shaped

handle H extending rearwardly and upwardly from the separator shell B.

The dust pan A consists of a sheet metal shell 1 made cup-shaped and a ring 2 riveted to the edge of the shell 1 and provided with an inner flange 3, pairs of outwardly projecting lugs 4 and a downwardly extending bracket 5 in which is formed a tubular port 6 for attachment to the pipe of the collector tool (not shown) and bearings for the shaft 7 of the small wheel G.

The separator chamber shell B is formed at its lower edge with an inner flange 8 and with pairs of outwardly projecting lugs 9 carrying pivoted links 10 to which are pivoted eccentric clamping levers 11 adapted to engage lugs 4 on the dust pan to secure and support the latter upon the shell B. At the upper end of the shell B are a plurality of radial webs or spokes 12 with their upper and lower edges in parallel planes and connected at their inner ends by an integral ring 13 and a bearing cup 14. The upper end of the shell B is partially inclosed by a sheet metal disk 15 having an aperture corresponding to the bore of the ring 13 and secured in place by rivets 16 extending through the spokes or webs 12. The spokes or webs, at or near their points of connection with the shell B, are thickened to form bolt lugs 17.

The intermediate exhaustor unit shell C has a shoulder 18 formed at its lower edge so as to make a rabbeted joint over the edge of the disk 15 and the upper edge of the shell B. Extending radially inward are webs or spokes 19 similar to webs or spokes 12 of shell B connected at their inner ends by a ring 20, but instead of having their under edges free and formed parallel to the upper edge they are connected to a diaphragm 21 of less diameter than the inner diameter of the shell C with its center portion curved up at 22 and bored out for the passage of the motor shaft. The diaphragm 21 has its main central portion 23 offset above the outer portion 24, and at its outer edge are downwardly extending vanes 25 which are disposed spirally so as to overlap relative to each other and form between them discharge passages 26. As shown in Fig. 4, there are eight passages thus formed. The upper part of the unit C is closed by a sheet metal disk 27 of the same size and shape as

disk 15 and connected thereto by rivets 28 extending through the diaphragm 21.

The top unit shell D has a rabbeted shoulder 29 for making an air-tight joint over the disk 27 and upper edge of shell C and is provided with a diaphragm 30 shaped like diaphragm 21 and supported by the top shell portion 31 disposed in a plane above it so as to form an annular air passage between them. Extending upwardly from the shell portion 31 is a concentric ring 32 which serves as a support for the frame of the motor E and to which it is clamped by bolts 33. An oil duct 34 leads from one side of the bracket 32 to a central bearing cup 35. The shell D is also provided with two handles 36 on its upper surface and on opposite sides of the motor frame so that the device may be bodily lifted whenever occasion therefor arises, and at its periphery is formed a tubular exit port 37 for the discharge of the spent air current.

The motor E may be of any of the well known types of electric motors, and accordingly will not be described in detail. A snap switch 38 is conveniently mounted upon the upper surface of the shell D for controlling the electric current to the motor. The shaft 39 of the motor is supported upon ball bearings 40, 41, carried in the bearing cups 35 and 14, respectively. The shaft passes through the diaphragms 21 and 30. Between the offset portions 23 of the diaphragms 21 and 30 and the sheet metal disks 15 and 27 are disposed impeller wheels 42, each consisting of a flat plate with impeller vanes 43 extending downwardly therefrom and near their inner ends projecting into the apertures formed at the centers of the disks 15 and 27 and their supporting rings 13 and 20. The above mentioned inner ends are designed to receive the air and guide it with as little shock as possible into the spaces between the radial vanes 43 on the impeller. These impeller wheels are rigidly connected to the shaft 39 and driven thereby, and, in order to facilitate assembly and maintain them properly spaced from each other, a loose bushing 44 is inserted in the central aperture of the diaphragm 21 and engages at its ends with the adjacent surfaces of the hubs of the impeller wheels.

The shells B, C and D are conveniently secured in fixed relation to each other by bolts extending vertically through the web enlargements or lugs 17, as shown in Fig. 6.

It is apparent that any number of intermediate exhaustor units C may be added to the device, as shown in the drawing, in case a high degree of vacuum is desired or the single intermediate unit shown may be dispensed with in case a low pressure device is desired by merely supplying a motor shaft 39 of necessary length.

In the device shown in the drawings, the

air is drawn from the separator chamber through the annular space between the lower shaft bearing shell and the wall of the bore of the ring 13 where it is caught up by the inner depending edges of the impeller vanes 43 of the lower wheel and by centrifugal force produced therein thrown outwardly and tangentially at high velocity past the joint between the periphery of the wheel 42 and the shoulder of the offset portion 23 of the diaphragm into the diverging discharge passages 26, in which the velocity of the air is decreased.

Upon merging from the discharge passages 26, the air passes through the space between the diaphragm 21 and disk 27 to the opening at the center of the latter where it is caught up by the upper impeller wheel 42 and thrown by centrifugal force outwardly and tangentially into the diverging discharge passages of the upper diaphragm 30, from which it emerges into the annular space above the latter and passes from the machine through exit port 37 at or near atmospheric pressure. This arrangement of multiple exhaustor wheels and diverging passages enables me to maintain an entirely practical degree of vacuum in the separator chamber. I am able to maintain above two pounds vacuum with impeller wheels of less than nine inches in diameter driven at a speed of about 3500 R. P. M. It should be noted also that the exhaustor units are very compact and made up of parts so simple in design that they may be cast and machined with facility and at slight expense.

The means for straining out and separating the dust and dirt from the current of air produced by the machine consists, as shown in Figs. 3 and 5, of a large cone-shaped bag 45 of cloth or suitable foraminous material folded into concentric accordion plaits 46 with the lower or valley edges of the plaits attached to a disk of wire netting 47 and the edges of the bag and wire disk secured together by a cloth or felt binding 48 sewed or otherwise attached and adapted to be clamped between the flanges 3 and 8 on the dust pan A and the separator shell B. The bag 45 is otherwise unsupported and normally collapses upon the wire screen, but in the operation of the device it is distended, as indicated in Fig. 3, by the current of air drawn therethrough, and upon stopping of the impeller automatically collapses and dislodges more or less of the particles of dust and dirt adhering to its under surface so that they fall through the wire netting into the dust pan A.

In the modification of the separator bag 45', shown in Figs. 8 and 9, instead of the wire netting 47 there is employed a series of concentric rings 49 attached to the valleys of the plaits and to the periphery of the bag. Radial straps 50 of elastic mate-

rial are attached to the outer ring, pass over the intermediate rings and connect at their inner ends to hooks 51 carried by the central ring. When the straps 50 are unhooked, the bag may be unfolded and drawn out at full length of the cone and turned inside out if desired, for the purpose of dislodging particles of lint.

As shown in Fig. 10, the dust pan A may readily be detached from the rest of the machine by merely turning up the clamping levers 11 and tilting the machine backward on the axis of the large wheels F until the handle H rests upon the floor. The detachment of the pan releases the dust bag 45 with it, and the bag will serve as a sanitary cover for the pan and all impurities collected while being transferred to the ash heap and may there be freed of the matter collected without operator coming in contact therewith.

It is apparent that the relative location of the separator chamber and impeller units may be changed so that the air will be freed of its impurities after passing through the impeller instead of before and that many other changes in construction and arrangement of parts may be made without depart-

ing from my invention as set forth in the annexed claims.

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

1. A vacuum cleaner separator bag comprising a substantially flat pervious supporting structure and a conical sack of foraminous material secured to said support at its edge and also within its edge along a succession of annular folds, the portion of said sack between the folds being free to be distended upward or to collapse upon the support.

2. A vacuum cleaner separator bag comprising a substantially flat pervious supporting structure including a plurality of rings or hoops of different sizes arranged and secured one within another, and a sack of flexible foraminous material secured to said rings at suitable intervals and between them free to be distended upward or to collapse upon the support.

In witness whereof, I have hereunto set my hand this second day of February, 1912.

SANFORD A. MOSS.

Witnesses:

JOHN A. McMANUS, Jr.,
ROBERT SHAND.