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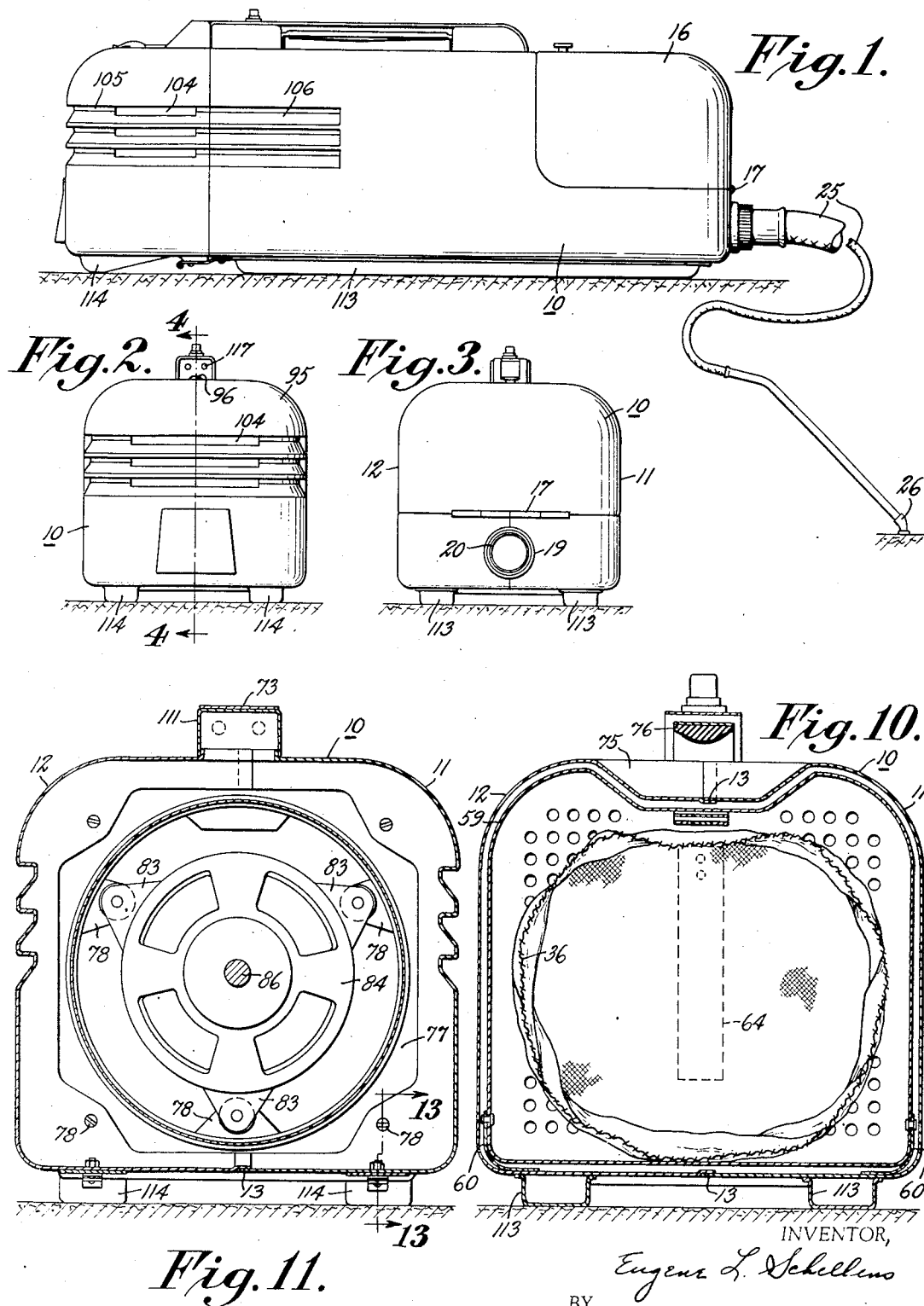
E. L. SCHELLENS

2,172,180

VACUUM CLEANER

Filed June 18, 1935

4 Sheets-Sheet 1



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Sept. 5, 1939.

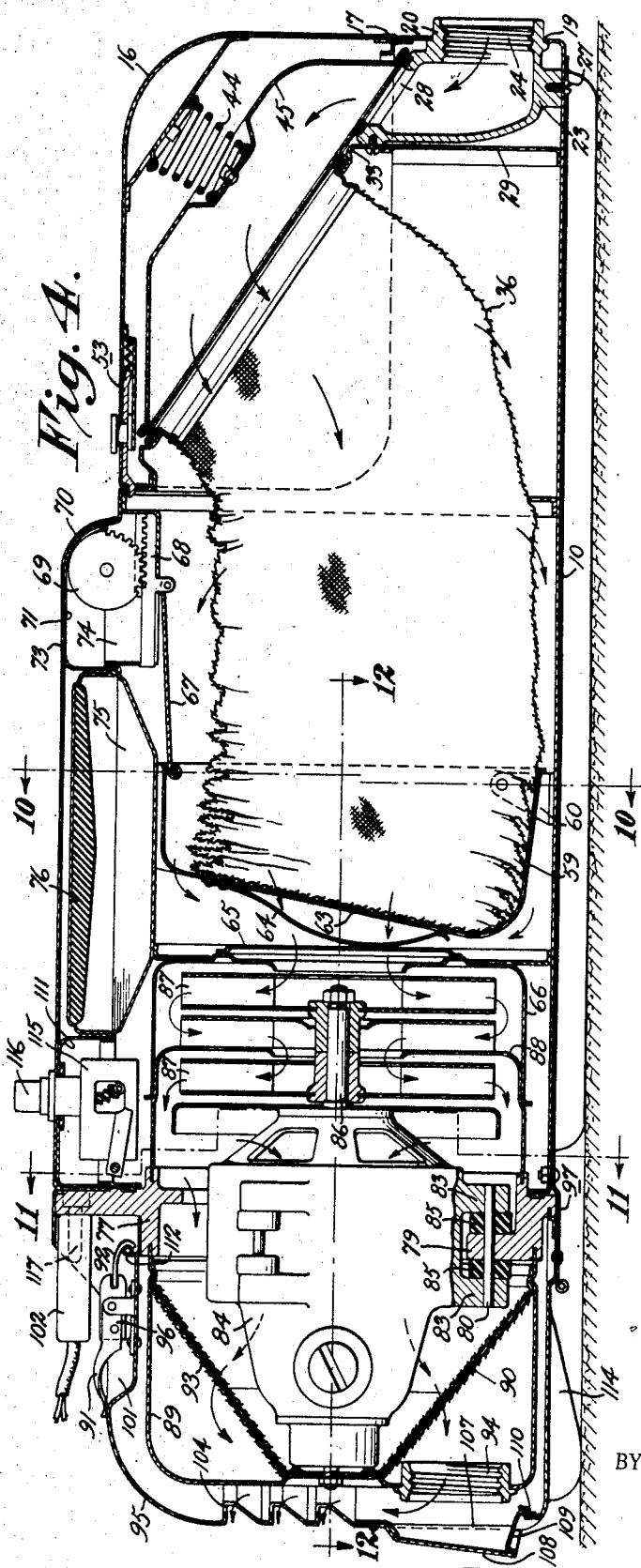
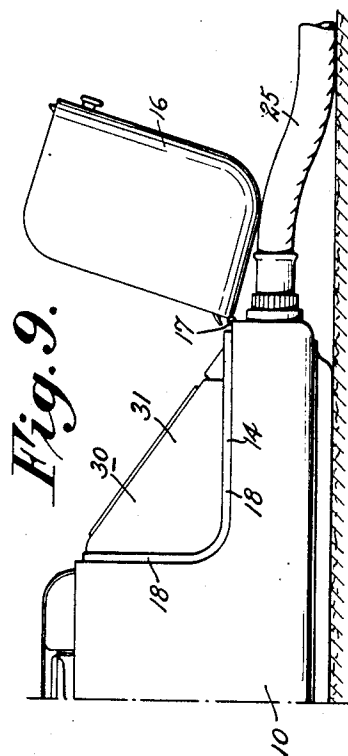
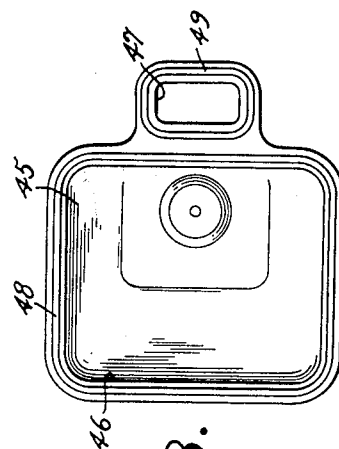
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VACUUM CLEANER

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4 Sheets-Sheet 2



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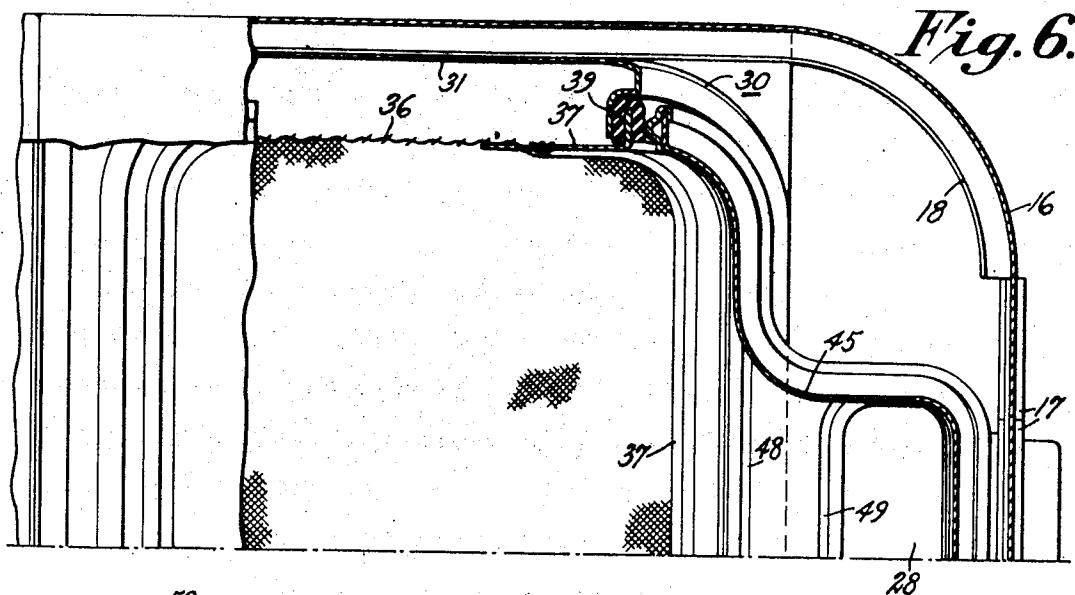
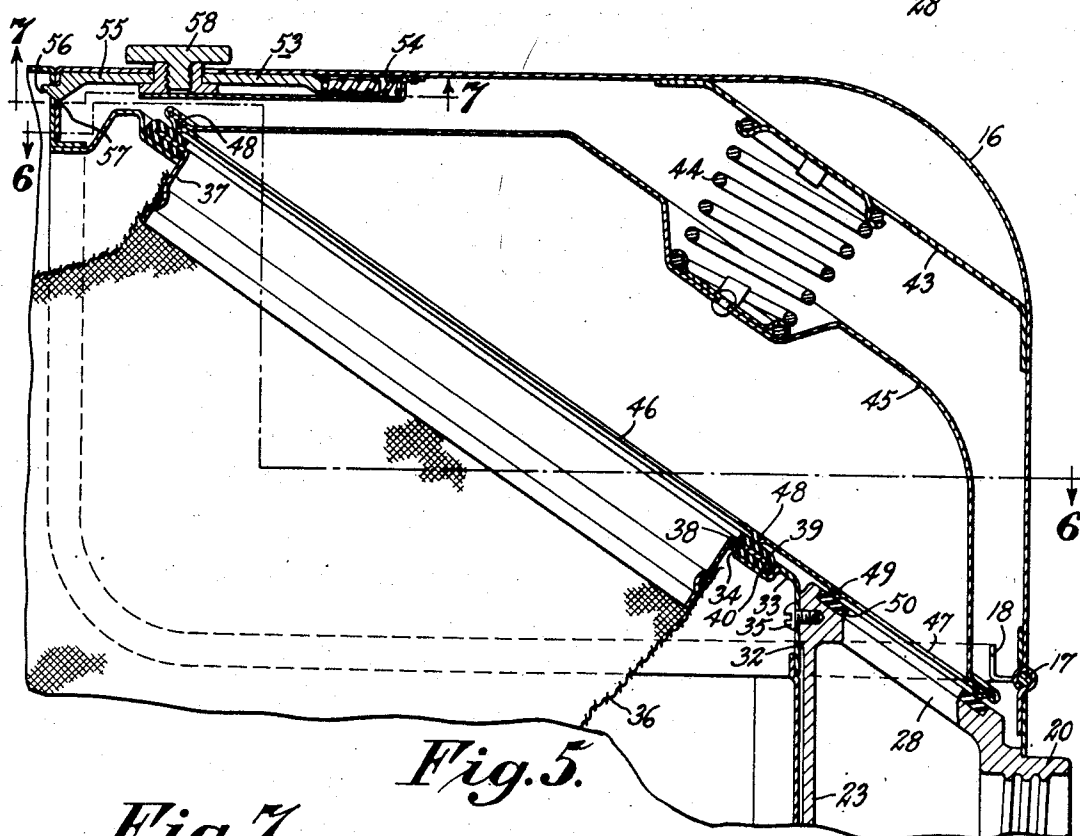
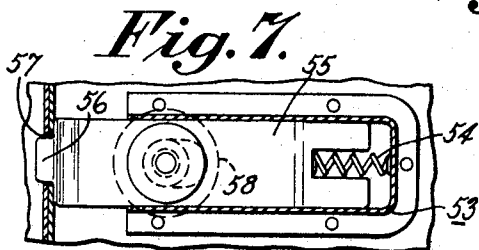
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VACUUM CLEANER

Filed June 18, 1935

4 Sheets-Sheet 3



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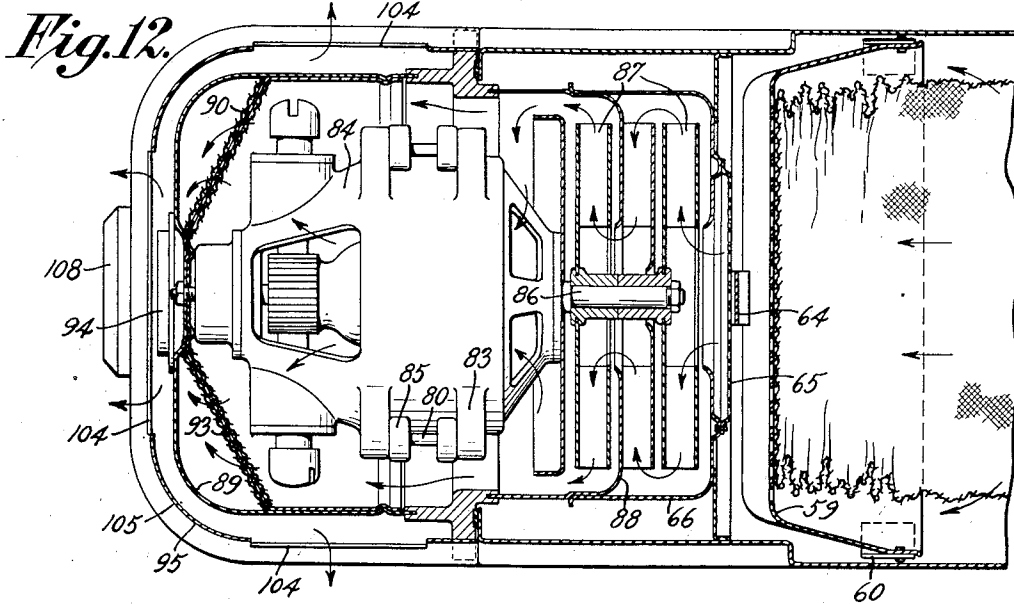
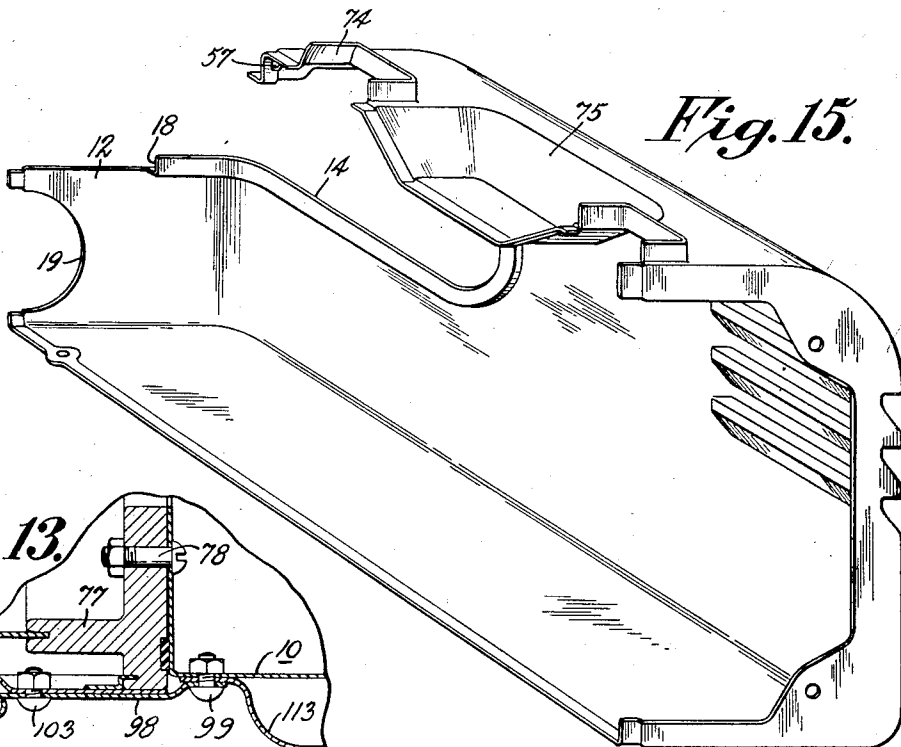
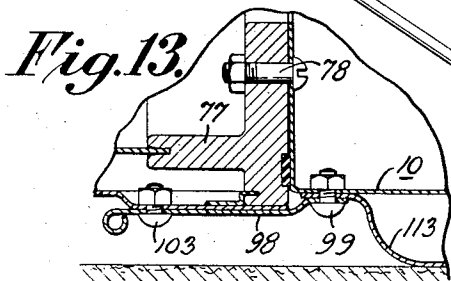
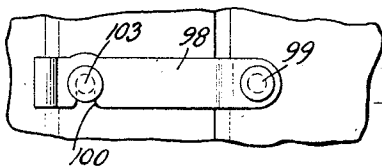
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VACUUM CLEANER

Filed June 18, 1935

4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,172,180

VACUUM CLEANER

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Application June 18, 1935, Serial No. 27,177

13 Claims. (Cl. 183—37)

The present invention relates to vacuum cleaners and more particularly to vacuum cleaners of the enclosed bag type.

The general object of my invention is to improve the construction of a vacuum cleaner of the type which is pulled around on the floor by means of a hose attached thereto. The invention is particularly directed to the vacuum cleaner unit and includes a novel shell construction of the casing and cooperating interior construction.

Cleaners of this type are constructed with a comparatively large opening through which the dust bag may be inserted and removed, and a cleaner member or cap is provided for closing this opening. Heretofore it has been the practice to connect the hose to this closure member or cap. Hence, the full pull of the hose is exerted on the cap and causes strain on the connection between the cap and the remainder of the casing. One of the objects is to obviate this and make the cap independent of the hose, which serves to pull the cleaner by connecting the hose to the cleaner proper instead of to the cap. If the cap is thus relieved of the strain of the hose, it can be of lighter construction, such as sheet metal, whereas with the hose connected to the cap it has usually been the custom to use a heavy die casting with stiff members for securing it to the casing, as it is very important to prevent leakage even under strain. Also, by this arrangement it is possible to locate the opening for the dust bag more advantageously with respect to the remainder of the casing inasmuch as it is independent of the hose, and hence it is not necessary to take into consideration the direction of the pull exerted by the hose.

A further advantage is that the dust bag may be removed for emptying without its being necessary to disconnect the suction hose.

By making the hose directly connected to the casing as distinguished from the dust bag cover opening the hose can be connected lower down with respect to the center of gravity of the unit, thereby facilitating the pulling of the cleaner unit around on the floor and reducing its tendency to tip. Even if the hose is connected to the casing underneath the dust bag opening, a large opening may be provided without increasing the height of the unit by forming the opening in an inclined wall. This also facilitates insertion and removal of the dust bag without standing the cleaner on end.

In carrying out my invention in a preferred embodiment, I divide the casing into four shell

parts, namely, two lateral plate members which form the lateral walls and which are bent to form parts of the top and bottom, an end member which may be made as a cup-shaped stamping and a cover which, due to the independence thereof from the hose connection, can be fitted into the casing in a manner to form a complete unit made entirely out of stampings which are easily manufactured, light in weight, and may be made in practically any shape desired.

Another object of the invention is the provision of improved mechanism for indicating when the dust separating member should be cleaned.

A further object of the invention is to provide a novel handle construction for a vacuum cleaner of this type.

Still another object is to form the casing of the cleaner with outlet louvers extending horizontally across one end of the casing or along the sides thereof, or both, so that air will be discharged at a low velocity. In this connection, provision is made whereby a hose or the like may be connected to the cleaner for blowing purposes and, when so connected, prevents the discharge of air through the louver openings.

A still further object of the invention is the provision of an improved filter having inclined surface, whereby a greater surface area is obtainable.

Also, an object of the invention is to so locate a releasable fastening member that it is protected from being accidentally released and is more or less hidden from view by an electric plug when the latter is in position.

Further objects and advantages of the present invention will be apparent from the following description taken in connection with the accompanying drawings which form part of this specification and of which:

Fig. 1 is a side view of a vacuum cleaner in accordance with the present invention;

Fig. 2 is a rear view of the device shown in Fig. 1;

Fig. 3 is a front view of the device shown in Fig. 1;

Fig. 4 is a cross-sectional view on an enlarged scale taken on the line 4—4 of Fig. 2;

Fig. 5 is a cross-sectional view of a portion of the device shown in Fig. 4, but taken on a still larger scale;

Fig. 6 is a cross-sectional view taken on the line 6—6 of Fig 5;

Fig 7 is a cross-sectional view taken on the line 7—7 of Fig 5;

Fig 8 is a bottom view of a member forming part of the vacuum cleaner;

Fig 9 is a side view of the front portion of the vacuum cleaner shown in Fig 1, but with a cover member in an open position;

Fig 10 is a cross-sectional view taken on the line 10—10 of Fig 4;

Fig. 11 is a cross-sectional view taken on the line 11—11 of Fig. 4;

Fig. 12 is a cross-sectional view taken on the line 12—12 of Fig. 4;

Fig. 13 is a cross-sectional view taken on the line 13—13 of Fig. 11;

Fig. 14 is a bottom view of a catch member; and

Fig. 15 is a perspective view of a member forming part of the casing.

As is shown in the drawings, reference character 10 designates generally a casing for enclosing the working parts of a vacuum cleaner. Casing

10 is made up of two parts 11 and 12, one of which is shown in perspective in Fig. 15. Each of these parts may be termed a lateral sheet plate member and comprises a sheet bent to form a side wall, and parts of the front, top and bottom walls of the casing. These two parts are joined together along a center line as is shown at 13, by being welded or united together, or in any other suitable manner so as to form an air-tight joint. The front upper end of casing 10 is cut away, as is shown at 14 in Figs. 9 and 15, for the purpose of providing an opening for the insertion and removal of a dust bag. A cup-shaped cover member 16 is hinged to the end of the casing at 17, and when in position as shown in Fig. 1, serves to close this dust bag opening. Casing 10 is formed with a flange 18 around this opening to receive the edge of cover 16 and, when the cover is closed, a smooth surface is provided.

The front lower end of casing 10 is formed with a circular opening 19, through which extends a cylindrical part 20 of an L-shaped casting 23. Cylindrical portion 20 is provided with internal threads 24 for receiving the threaded end of a suction hose 25. The other end of the hose may be connected to a cleaning tool 26. Member 23 is secured within casing 10 by means of one or more screws 27. The other leg of the L-shaped casting is formed with a rectangular opening 28, in an inclined plane, as is clearly shown in Figs. 4, 5 and 6.

A wall 29 of sheet metal is secured within casing 10 just behind member 23. Reference character 30 designates a member made of sheet metal and having vertical side walls 31, a vertical front wall 32, and an inclined upper wall 33. The lower and rear edges of side walls are flanged outwardly so as to extend under flange 18 and are there secured in air tight relation to the casing 10, as by welding. Inclined wall 33 lies in the same plane as does opening 28, and is formed with a rectangular opening 34. Casting 23 may be secured to vertical wall 32 by means of one or more screws 35. A dust bag 36 of cloth or other suitable material which permits the passage therethrough of air but is impervious with respect to dust, has its open mouth secured to a rectangular rim 37 provided with an outwardly extending flange 38. A packing member 39 is secured to flange 38. The size and shape of the rim 37 is such that the flange thereon may be seated in the recess 40 formed in inclined wall portion 33 around the opening 34.

Cover member 16 is provided with a plate or the like 43 secured therein, to which is secured one end of a coil spring 44. The other end of spring

44 is secured to an inner cover 45. A bottom view of cover 45 is shown in Fig. 8. This cover is generally dish-shaped and is formed with a large rectangular opening 46 and a small rectangular opening 47. Opening 46 is surrounded by a projecting bead 48 while opening 47 is surrounded by a similar bead 49. The size and shape of opening 46 is such that bead 48 will bear against the packing on the flange of rim 37 and thus force the packing tightly into the recess 40 so as to effect an air-tight seal therebetween and secure the bag in place. The size and shape of opening 47 are such that the bead 49 bears against a packing washer 50 surrounding opening 28. The resilient mounting of inner cover 45 within cover 16 by means of spring 44 enables the inner cover to be self-seating so that it will seal equally both the openings 28 and 34.

Cover 16 is retained in closed position by means of a spring actuated latch 53. A spring 54 tends to force bar 55 of the latch to the left, as viewed in Figs. 4 and 5, so as to retain the end 56 thereof in engagement with opening 57 formed in casing 10. A handle 58 may be moved to the right against the force of spring 54 to release the latch. Inasmuch as the hose is not connected to the cover, there is no strain imposed on the latter or on its connections to the rest of the casing.

The length of dust bag 36 is so chosen that the closed end thereof is received within a member 59 pivotally supported on ears 60 secured within the casing 10. The end wall 63 of member 59 is perforated so as to allow the passage of air there-through. A leaf spring 64 is secured at one end to wall 63 and bears against a perforated plate 65 which forms a guard for the inlet of fan housing 66. An arm 67 is pivotally secured at one end to the top of member 59 and at the other end to a reciprocally mounted rack 68. Rack 68 engages pinion 69 rotatably mounted in the upper part of the casing. A cylinder is secured to pinion 69 and is visible through an air-tight window 70 formed in an indicator housing 71 and a channel member 73, which is secured, as by welding, to the top of casing 10. Housing 71 closes an opening 74 formed in the top of the casing. The cylinder may be provided with colored sections or legends printed thereon, which are visible through window 70 as the cylinder is rotated and hence indicate the rotational position of the cylinder.

Behind opening 74 the casing is formed with a depressed portion 75. A rigid handle 76 overlies the depressed portion of the casing. If it is desired to lift the cleaner, the operator may grasp handle 76 by inserting his fingers in the depressed portion 75. Channel member 73 is extended over handle 76 and conceals it from view.

The rear end of housing 10 is secured to the motor ring 77, as by being bolted thereto by bolts 78 shown in Fig. 13. Ring 77 is provided with a plurality of inwardly extending lugs 79 formed with apertures which receive resilient pins 80. The ends of pins 80 are received in corresponding lugs 83 formed on the housing of the electric motor 84. Resilient washers 85 may be placed around pins 80 between lugs 78 and 83. Obviously, other means of supporting the motor within ring 77 may be employed.

To the forward end of motor shaft 86 is secured one or more fan rotors 87. In the embodiment illustrated two such rotors are shown. These rotors are contained within fan housing 88 which is provided with an intermediate wall 89 between the two rotors.

A filter housing 88 engages a groove in ring 77 and is secured in place by being bolted to motor 84, and surrounds the rear end of the motor. A perforated wall 90 is secured within housing 88 and filter cloth 93 may be supported on one or both sides of wall 90. The rear wall of housing 88 is provided with a threaded outlet connection 94 which is adapted to receive hose 25 when it is desired to use the device for blowing purposes.

A rear housing or cup-shaped member 95 is secured to casing 10 by means of a centrally located spring fastener 96 mounted in a depression 101 in the top of housing 95, and by preferably two pivoted latches 97 at the bottom. Spring fastener 96 includes an arm 91 which may be pivoted to a more or less vertical position in order to move catch 92 to the right, as viewed in Fig. 4, to release the latter from engagement with a projection 112 on casing 10. Latches 97 are shown more in detail in Figs. 13 and 14 and comprise an arm 98 pivoted to casing 10 at 99 and formed with a notch 100 extending in from one side thereof. Notch 100 is adapted to engage a headed pin 103 secured to rear housing 95. The sides and back of housing 95 are formed with a plurality of louver openings 104. Housing 95 is formed to give the appearance of louvers extending completely around both sides and the rear thereof, but openings 104 obviously have to be interrupted in order to provide connecting pieces of material 105. The louver appearance may also be continued for any desired distance along the sides of casing 10 as is shown at 106. However, no openings are here provided.

Housing 95 is provided with an opening 107 in alignment with connection member 94. This opening may be closed by a hinged cover member 108, provided with a resilient arm 109 which engages a catch 110.

Channel members 113 may be secured to the bottom of casing 10 adjacent each side thereof so as to provide supporting runners for the vacuum cleaner. Wedge-shaped runners 114 may be secured to the bottom of housing 95. An electric switch 115 may be suitably mounted within a switch housing 111 secured to casing 10 just behind handle 76, and is provided with a manipulating member 116 extending through openings formed in housing 111 and member 73, the latter extending over the housing. Contact prongs 117 are supported by ring 77 and an electric plug 102 may be attached thereto. When in position, plug 102 moves or less conceals spring fastener 96 and prevents arm 91 from being accidentally pivoted to release catch 92.

With the parts in the position shown in Figs. 1 and 4, the operation of the vacuum cleaner is as follows:

Rotation of fan rotors 87 by motor 84 causes air to be exhausted from the space within casing 10 around dust bag 36. This causes air to be drawn in through cleaning tool 26, hose 25, member 23, and into the space within inner cover 45. This air then passes into the open mouth of dust bag 36 and through the material of the dust bag. If tool 26 is passed over a dusty surface, dust is entrained in this air stream and is deposited within the dust bag. The air passes through the fan in the directions indicated by the arrows and passes through and around motor 84, thereby cooling the latter. The air then passes through the filter cloth 93, which serves to remove bacteria and very fine particles of dust which may have passed through the material of dust bag 36. The air is then discharged through

outlet 94 into the space between filter housing 88 and rear housing 95, cover member 108 being closed. This air escapes in a plurality of low velocity streams through the louver openings 104.

The dust bag 36 offers resistance to the flow of air therethrough and the presence of dust in the bag increases this resistance. As the resistance to flow increases due to the accumulation of dirt within the bag, the increased pressure difference inside and outside the bag causes the bag to exert a greater force against pivoted member 59. Member 59 is thereby caused to pivot in a counter-clockwise direction against the action of spring 64, and this movement is translated through arm 67 and rack 68 to pinion 69, which is caused to rotate in a clockwise direction. This rotation causes the cylinder visible through window 70 to rotate and, when sufficient dirt has been collected within the dust bag 36 to require its being emptied, the cylinder has been turned sufficiently so that a legend or a distinctive color comes into sight through window 70 and indicates to the operator that the bag should be emptied.

In order to remove bag 36 for the purpose of emptying it, it is only necessary to pivot cover 16 to the position shown in Fig. 9. This in no manner interferes with the connection of hose 24 to the inlet, and the bag may be removed without disconnecting the hose. When cover 16 is pivoted to the position shown in Fig. 9, inner cover member 45 moves with it, and rim 37 is exposed and may be grasped to remove the dust bag. Due to the fact that the mouth of the bag is retained in an inclined position, there will be no tendency for dirt to fall out when the cover 45 is removed. After the bag has been emptied, it may be reinserted by placing it in the opening 34 and, if the fan is started, the flow of air draws the bag into its proper position.

The hose may be used to pull the cleaner unit about the floor, but as aforesaid, this imposes no strain on the cover for the dust bag opening and does not tend to cause leakage therearound. Due to the fact that the opening 24, to which the hose is secured, is near the bottom of the unit and below the center of gravity thereof, there is no tendency for the cleaner to tip when being pulled, even if it comes in contact with a low obstruction.

If it is desired to employ the device for blowing purposes, hose 25 may be unscrewed from threaded opening 24, cover member 108 at the rear of the cleaner may be opened, and the hose screwed into outlet 94. Under these conditions all the air discharged from the fan will be forced to pass through the hose, inasmuch as the presence of the hose in outlet 94 prevents the flow of air into the space between housings 88 and 95.

In order to renew filter cloth 93, it is only necessary to remove rear housing member 95 by unfastening clips 96 and 97, whereupon the bolt, or nut thereon, securing filter housing 88 to the rear of the motor may be unscrewed and the filter housing and perforated wall 90 removed. Thereupon wall structure 90 may be removed from within housing 88 and the filter cloth replaced and the parts reassembled.

While one more or less specific embodiment of the invention has been described, it is to be understood that this has been done for purposes of illustration only, and that the scope of the invention is not to be limited thereby, but is to be gauged by the appended claims when viewed in the light of the prior art.

What is claimed is:

1. In a vacuum cleaner, a casing formed with a dust bag opening, a dust bag having an open mouth, said bag being insertable into the casing through said opening, a cover member for securing the open end of said bag in said opening and for covering said opening, said casing being formed with an air inlet opening, and means for conveying air from said inlet opening to the open mouth of said bag.

2. In a vacuum cleaner, a casing formed with a dust bag opening, a dust bag having an open mouth, said bag being insertable into the casing through said opening, a conduit having an opening outside said casing and an inner opening adjacent to said dust bag opening, and a member for holding the open end of said dust bag in said dust bag opening and covering both said dust bag opening and said inner opening and being formed with a passage for conducting air from said conduit to the open mouth of said dust bag.

3. In a vacuum cleaner, a casing formed with a dust bag opening, a dust bag having an open mouth, said bag being insertable into the casing through said opening, a conduit having an opening outside said casing and an inner opening adjacent to said dust bag opening, and a swingably mounted member for holding the open end of said dust bag in said dust bag opening and for covering both said dust bag opening and said inner opening and formed with a passage for conducting air from said conduit to the open mouth of said dust bag.

4. In a vacuum cleaner, a casing formed with a dust bag opening, a dust bag having an open mouth, said bag being insertable into the casing through said opening, a conduit having an opening outside said casing and an inner opening in the same plane with said dust bag opening, and a resiliently mounted member for covering both said dust bag opening and said inner opening and formed with a passage for conducting air from said conduit to the open mouth of said dust bag.

5. In a vacuum cleaner, a casing formed with a dust bag opening, a dust bag having an open mouth, said bag being insertable into the casing through said opening, a conduit having an opening outside said casing and an inner opening in the same plane with said dust bag opening, and a resiliently mounted member for clamping the open mouth of said dust bag in said dust bag opening and for covering both said dust bag opening and said inner opening and formed with a passage for conducting air from said conduit to the open mouth of said dust bag.

6. In a vacuum cleaner, a casing formed with a dust bag opening in an inclined plane, a dust bag having an open mouth, said bag being insertable into the casing through said opening, a conduit having an opening outside said casing and an inner opening in the same plane with said dust bag opening, and a member for holding the open end of said dust bag in said dust bag opening and covering both said dust bag opening and said inner opening and being formed with a passage for conducting air from said conduit to the open mouth of said dust bag.

7. In a vacuum cleaner, a casing formed with a dust bag opening, a dust bag having an open mouth, said bag being insertable into the casing through said opening, a conduit having an opening outside said casing and an inner opening ad-

acent to said dust bag opening, an outer cover member movably secured to said casing, and an inner cover member resiliently supported from said outer cover member so as to seal said dust bag opening and said inner opening, said inner cover member being formed with a passage for conducting air from said conduit to the open mouth of said dust bag.

8. In a vacuum cleaner, a casing formed with a dust bag opening in an inclined plane, a dust bag having an open mouth, said bag being insertable into the casing through said opening, a conduit having an opening outside said casing and an inner opening in the same plane with said dust bag opening, an outer cover member movably secured to said casing, and an inner cover member resiliently supported from said outer cover member so as to seal said dust bag opening and said inner opening, said inner cover member being formed with a passage for conducting air from said conduit to the open mouth of said dust bag.

9. In a vacuum cleaner, a casing formed with an inlet opening adjacent to one end thereof, said casing being formed with horizontally extending outlet louver openings in the side thereof adjacent to the other end, the lower part of said casing adjacent to said louver openings being imperforate and means for producing flow of air through said casing.

10. In a vacuum cleaner, a casing formed with an inlet opening adjacent to one end thereof, said casing being formed with horizontally extending outlet louver openings in the other end thereof and in the sides thereof adjacent to said other end, and means for producing flow of air through said casing.

11. In a vacuum cleaner, a casing, means for producing flow of air through said casing, a hollow member secured in said casing in the path of flow of air therethrough, said member having perforated inclined diverging walls, and filter material supported on said walls, said member being so positioned in said casing that the air flows through the perforated walls in a direction from the interior of said member to the exterior thereof.

12. In a vacuum cleaner, a casing, means for producing flow of air through said casing, a hollow member secured in said casing in the path of flow of air therethrough, said member having perforated inclined diverging walls, and filter material supported on both sides of said walls, said member being so positioned in said casing that the air flows through the perforated walls in a direction from the interior of said member to the exterior thereof.

13. In a vacuum cleaner, a casing having an inlet opening, said casing being formed with louver openings at one end thereof, a housing within said casing defining with said casing a space with which said louver openings communicate, said housing formed with an outlet opening therethrough communicating with said space, said casing formed with an opening in alignment with said outlet opening and communicating with said space, means for closing the last mentioned opening, and a conduit adapted to be freely inserted through said last mentioned opening and engageable in substantially airtight relation with said outlet opening.

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