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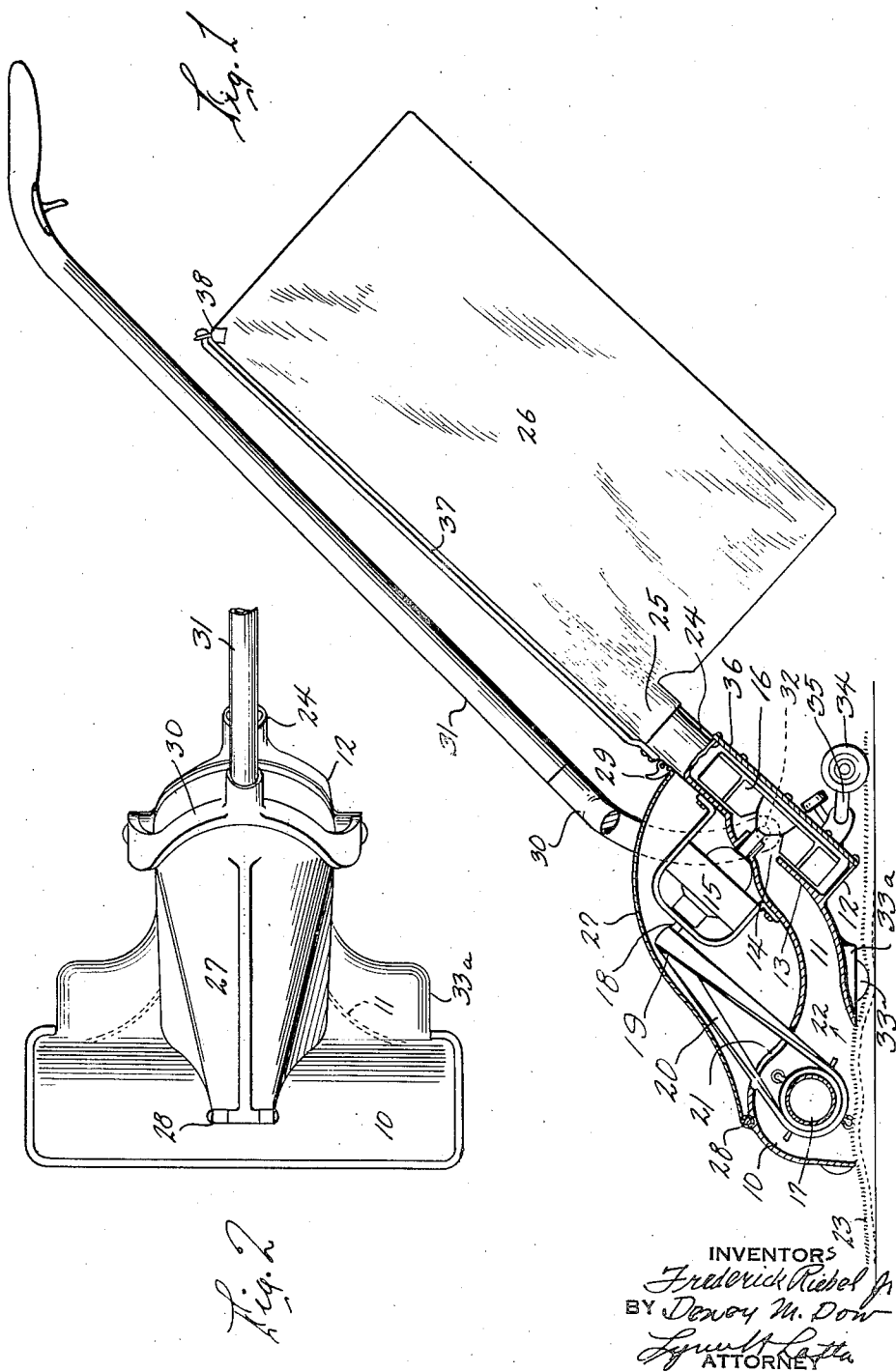
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2,140,651

VACUUM CLEANER

Filed Oct. 26, 1935

2 Sheets-Sheet 1



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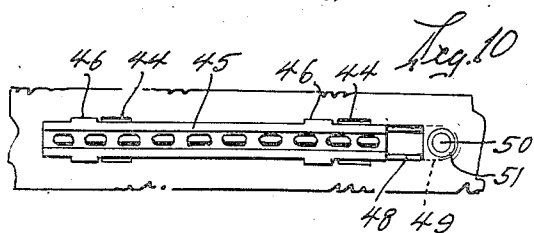
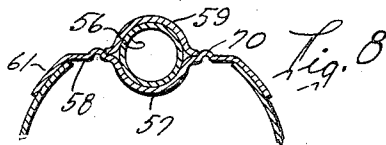
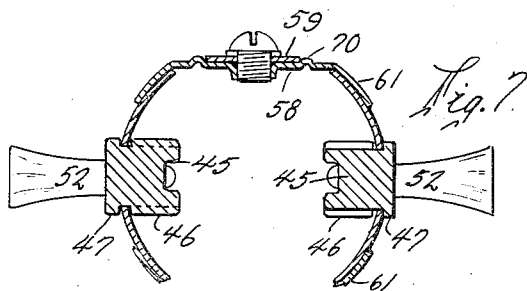
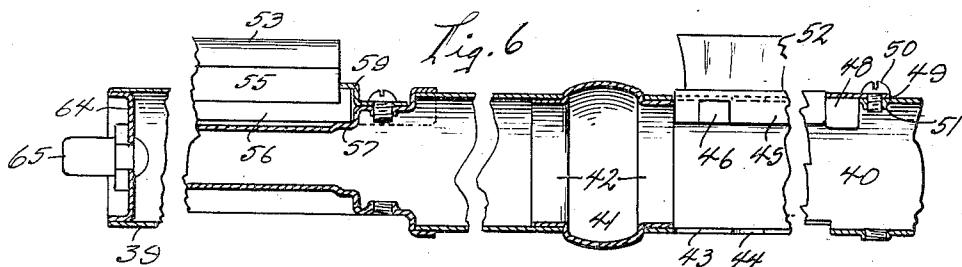
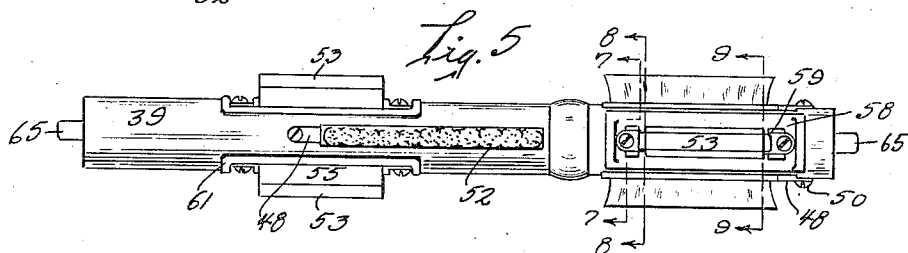
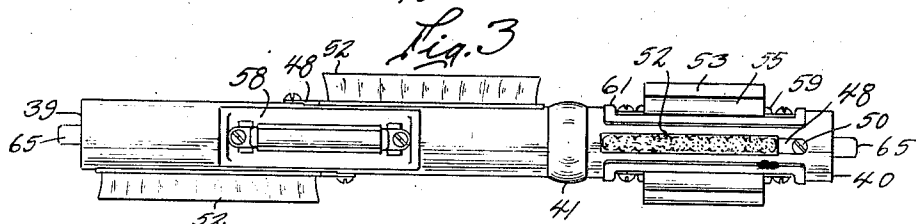
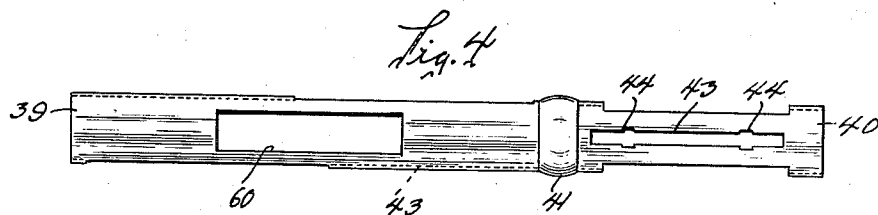


Fig. 9

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VACUUM CLEANER

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1 Claim. (Cl. 15—183)

This invention relates to suction cleaners, and has for its object to provide a novel arrangement of fan, fan motor, suction nozzle and motor driven rotary agitator, having the combination of the following advantages: agitator and fan driven from the same motor; agitator drive accessible from above; air path from nozzle through fan case and to bag a broad sweeping curve, almost a straight line, with substantially no bends; maximum effectiveness in lifting dirt into the bag; minimum clearance height above the floor.

Another object is to provide a novel rotary agitator, light in weight but sturdy, having brushing and flexible beating elements, detachably mounted, which is relatively more simple and inexpensive than prior structures of the same general type.

Another object is to provide novel and improved means for detachably securing an agitation element to a rotary agitator spindle of a hollow shell type.

Other objects of the invention will become apparent in the exemplification set forth in the following detailed description making reference to the appended drawings in which—

Fig. 1 is a vertical longitudinal sectional view through the body of a vacuum cleaner embodying the invention;

Fig. 2 is a plan view of the same;

Fig. 3 is a plan view of the rotary agitator embodied in the invention;

Fig. 4 is a plan view of the agitator shell;

Fig. 5 is a plan view of the agitator in a different position;

Fig. 6 is a longitudinal sectional view through parts of the agitator;

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

Fig. 8 is a cross sectional view taken on the line 8—8 of Fig. 5;

Fig. 9 is a cross sectional view taken on the line 9—9 of Fig. 5, and

Fig. 10 is an internal plan view of a section of the agitator illustrating the brush mounting.

The invention provides a suction chamber 10 formed on its rear side with a throat 11 which broadens out where it merges with the suction chamber, as indicated in dotted lines in Fig. 2. The rear end of the throat 11 is formed integrally with a downwardly and rearwardly opening fan case 12, separated from the throat 11 by a dividing wall 13 in the center of which is the fan inlet or "eye" 14.

The electric motor 15, which drives the fan 16 and rotary agitator 17 is mounted on top of the

throat 11 and fan case 12. The axis of the motor 15 and fan case 12 is downwardly and rearwardly inclined. The motor shaft 18 projects from both ends of the motor 15, one end of the shaft projecting downwardly through the throat 11 and into the fan case where it carries the fan 16 and the other end projecting upwardly and being provided with a pulley 19 which drives the belt 20 and furnishes power to the rotary agitator 17. The belt 20 projects through a slot 21 in the suction nozzle 10, and is quarter twisted.

The direction of rotation is as indicated by the arrow 22, and the rotary agitator sweeps the dust, etc., from the carpet 23 rearwardly into the throat 11. The passageway from the suction nozzle 10 through the throat 11, the eye of the fan 14, the fan case and the fan case discharge outlet 24, is a broad curve with no abrupt bends, sweeping first rearwardly and thence gradually upwardly until it is in direct alignment with the inlet neck 25 of the collecting bag 26. This is made possible by positioning the fan case low just clearing the carpet 23 and in an upwardly and rearwardly inclined plane, and positioning the throat 11 above the fan case.

The over-all height of the fan case and motor is reduced to a minimum by the forward tilting of the motor which brings the highest point of the pulley 19 below the level it would have to assume if positioned on a vertical axis. This forward tilting also brings the pulley 19 much closer to the agitator 17 than it would otherwise be possible. The positioning of the fan case in the upwardly and rearwardly inclined plane, makes it possible for the discharge outlet 24 to lie in the same plane as the fan case thus eliminating bends in said discharge outlet, i. e., the plane of the fan case is aligned with the axis of bag inlet neck 25.

Another advantage of the arrangement is the fact that the belt 20 lies almost wholly outside the dust laden air stream. It enters the suction chamber 10 above the throat 11 into which the dust is directly thrown from the agitator, so that there is a minimum tendency of that portion of the belt which lies inside the suction chamber to collect foreign material. The remainder of the belt lies wholly outside the suction passage and is encased in the motor chamber which is formed between the throat 11 and the cover 27.

The cover 27 is hinged at 28 to the suction chamber 10 and its open end latched as at 29 against the top of the fan case 12. The motor and belt are made accessible by unlatching the latch 29 and lifting the cover upwardly and for-

wardly. In doing so, it clears the fork 30 of the handle 31 which is hinged at 32 to the sides of the fan case 12.

The cleaner is supported upon front wheels 33, 5 mounted in wheel sockets 33a formed integrally with the throat 11, and rear wheels 34 mounted on adjustable bracket 35 attached to the rear side of the fan case 12 or fan case cover 36.

The bag 26 is supported by a mast 37, the lower 10 end of which is secured to the fan case 12 or outlet 24. Some type of detachable connection 38 is employed to suspend the upper end of the bag from the lower end of the mast 37.

The rotary agitator 17 comprises a hollow shell, 15 shown in Fig. 4 which is built up of two sections of metal tubing 39 and 40 respectively. The shell sections 39 and 40 are connected by a pulley 41 which is formed with opposite integral collars 42 secured in the ends of the shell sections 39 and 20 40. The pulley 41 is of thin tubing, rounded so as to extrude the center portion to a diameter greater than that of the shell sections 39 and 40 and to reduce the collar portion 42 to a diameter such as to fit within the shell sections. For the remov- 25 able brush elements, slots 43 are cut into the respective shell sections. Each slot 43 has spaced from its respective ends two sets of notches 44. Each brush element (Fig. 10) has a back 45 formed near its respective ends with two sets of 30 lugs 46 so positioned as to pass through the notches 44 when one end of the back is closely adjacent one end of the slot 43. In inserting the brush element, the lugs 46 are thus passed through the notches 44 and the brush element is thence 35 moved longitudinally to the position shown in Fig. 10 wherein the lugs are displaced from the notches 44 and are engaged beneath the wall regions defining the slot 43. To this end, the upper extremes of the lugs 46 are positioned below 40 the upper face of the brush back 45 (Fig. 6) so that the latter may project upwardly through the slot 43. That portion of the brush back 45 which projects above the surface of the shell is formed with longitudinal laterally extending flanges 47 45 which rest against the outer surface of the shell. By the co-operative engagement of lugs 46 and flanges 47 with the rear and outer surfaces of shell respectively, the brush element is thus held secure against radial displacement. In order to 50 prevent it from working back to a position where the lugs 46 could pass through the notches 44, we provide a securing element 48, U shape in cross section, the web of which is extended to form an end 49 through which a screw 50 secures it to the 55 shell 39 or 40 as the case may be. For the purpose, the shell is provided with screw threaded bosses 51. The securing element 48, is held against rotating around the axis of the screw 50 by the edges of slot 43 through the end region of 60 which it projects.

Secured in the back 45 are the usual brush bristles 52.

The beating elements (Fig. 9) each comprise 65 elongated channels 53 of smooth faced metal or the like and are secured to the edge 54 of a soft rubber strip 55. The opposite edge region of the

latter is mounted in a tubular trunnion member 56 the ends of which are journaled in sockets 57 (Fig. 8) in mounting plates 58, and removable bearing caps 59. The mounting plates 58 are secured in slots 60 cut in the shell member 39, 40, 5 and are provided with flanges 61 which are welded or otherwise suitably secured to the wall regions defining the slots 60. The slots 60 are wide enough so that the axes of the trunnions 56 are disposed substantially below the extended cylin- 10 drical contour of the shell 39, 40. This makes it possible to increase the radius height of the beater elements without increasing the over-all diameter of the agitator.

The rubber strip 55 has lateral wings 62 which 15 engage the flat surface of the mounting plate 58 and hold the beater element in the radially outstanding position while allowing it to recede under carpet contact.

Making the shell in two sections greatly facili- 20 tates the perforation of slots 43 and 60. The pulley 41 serves as the means for connecting the shell sections and holding them in axial alignment. Cylindrical seamless tubing is used to form the shell sections so as to assure accurate 25 axial alignment. In the ends of the shell sections are discs 64 on which are mounted stub shafts 65 by means of which the rotary agitator is journaled in the ends of suction chamber 10.

The mounting plates 58 are die-pressed sheet 30 metal and can be made very accurately uniform. By cutting away a shell as at 60 and inserting separate mounting plates, a difficulty which would be encountered if an attempt were made to simply 35 flatten the shell member 39 or 40 is entirely avoided. This difficulty would be the deforming of the adjacent regions of the tube out of true cylindrical shape.

We claim as our invention:

A rotary agitator adapted to be mounted in the 40 nozzle of a vacuum cleaner, said agitator comprising a thin walled tubular spindle and an agitating element detachably carried thereby, said spindle being provided with a slot extending longi- 45 tudinally thereof and having notches at its opposite sides, said agitating element including a back member of less length than said slot and having a width such that it will fit snugly between the sides of said slot, lugs on said back member in position to enter said notches when said back 50 member is inserted inwardly into said slot, means to limit the inward movement of said back member in said slot, the upper ends of said lugs cooperating with said last mentioned means to radially position said back by being received under the 55 walls adjacent the slot of said spindle upon longitudinal displacement of the back so that one end of said back member is in engagement with the adjacent end of said slot and an engagement member detachably secured to said spindle at the 60 other end of said slot and extending into that portion of the slot which is exposed by said longitudinal displacement.

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