

May 3, 1932.

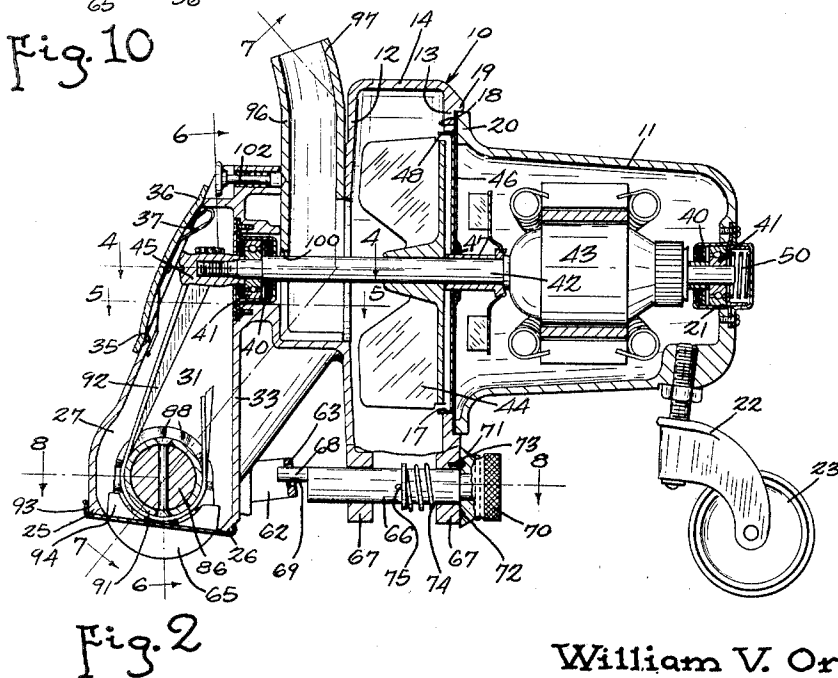
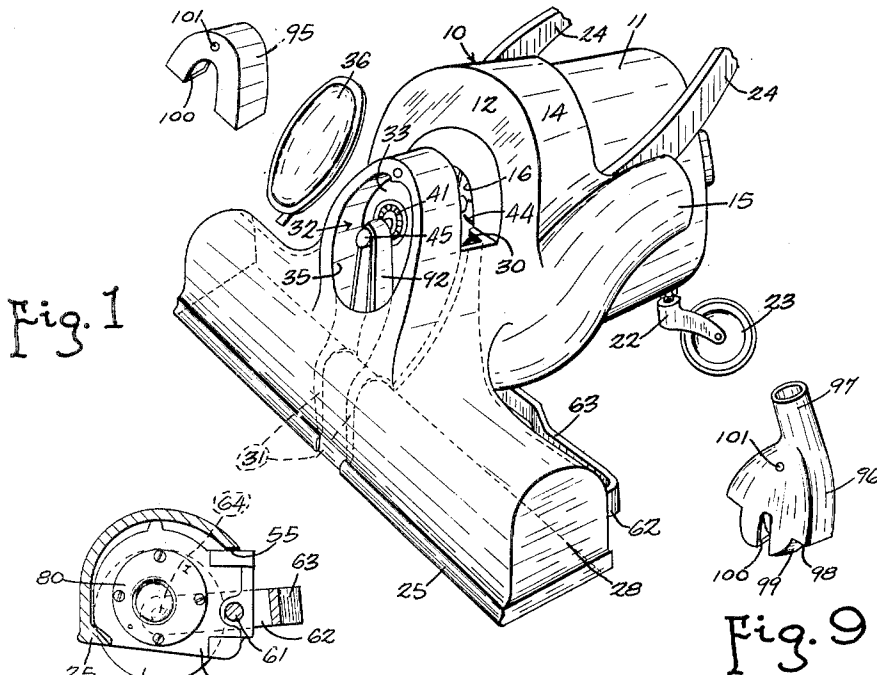
W. V. ORR

1,856,136

SUCTION CLEANER

Filed Nov. 12, 1927

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

Fig. 12

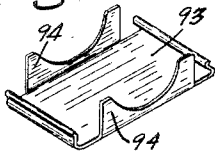


Fig. 3

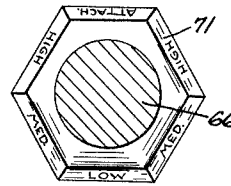
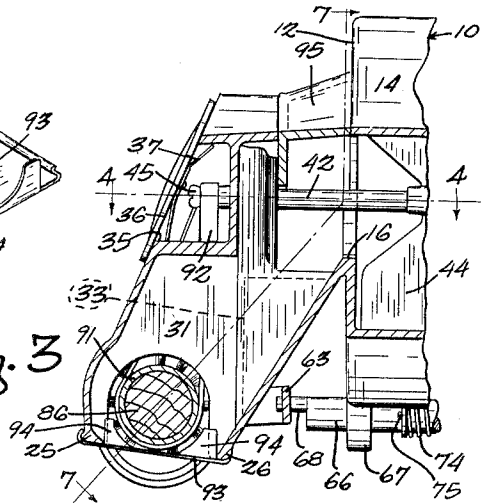


Fig. 11

Fig. 4

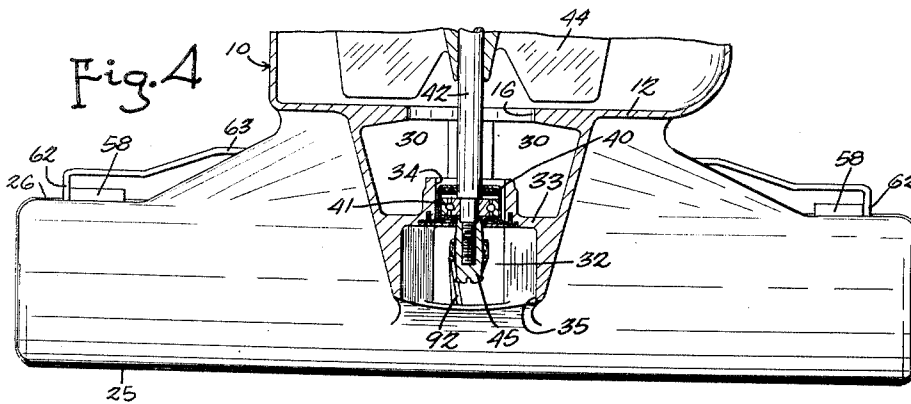
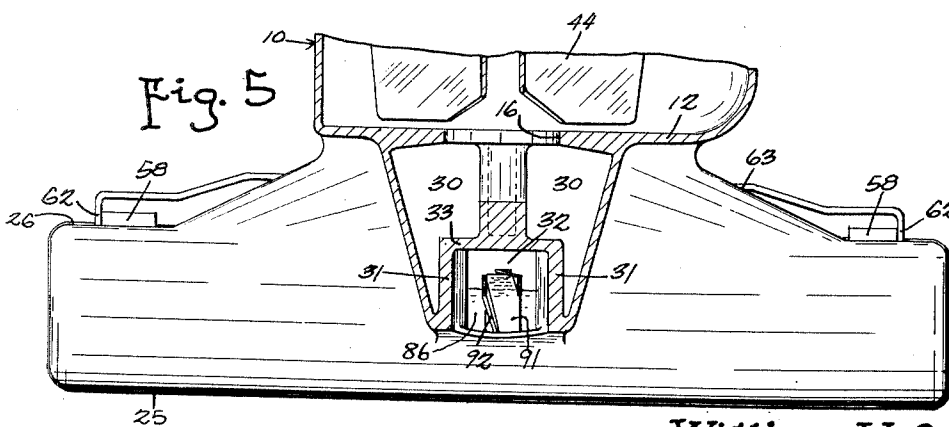


Fig. 5



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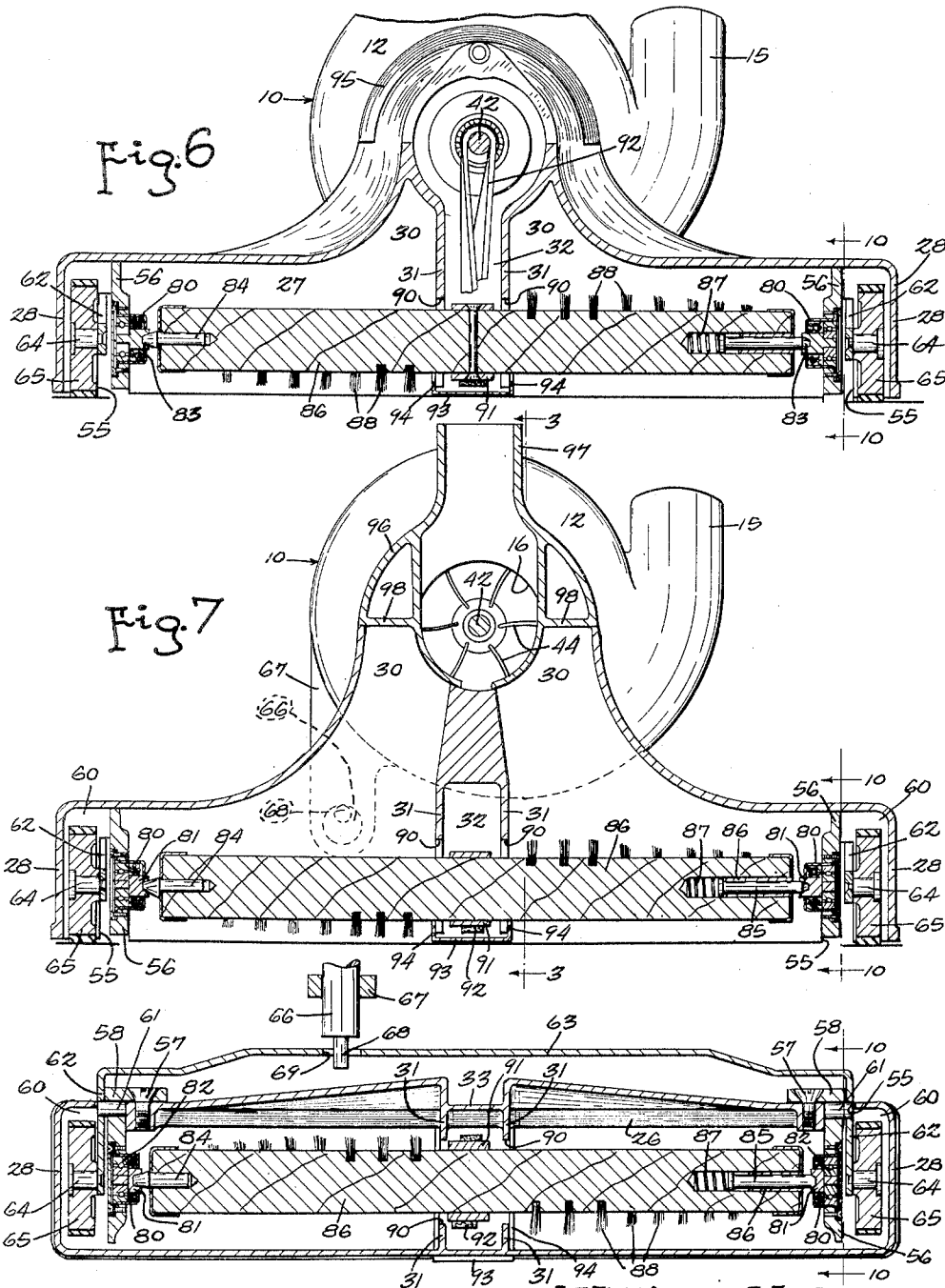


Fig. 8

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UNITED STATES PATENT OFFICE

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SUCTION CLEANER

Application filed November 12, 1927. Serial No. 232,767

This invention relates to electric vacuum cleaners of the portable type and has for its main objects: the provision of a new and improved brush drive; the provision of new and improved expedients for mounting the fan and brush-driving pulley; the provision of new and improved expedients for securing a direct-drive from the fan shaft to the brush and for protecting the brush-drive from becoming obstructed by litter; the provision of a new and improved hose connection; the provision of a new and improved nozzle construction; the provision of a new and improved brush-mounting; the provision of a new and improved elevation adjustment; while further objects and advantages of the invention will become apparent as the description proceeds.

In the drawings accompanying and forming a part of this application I have illustrated one physical form in which my inventive ideas may be embodied, although it will be understood that the same is intended to be merely illustrative and not limiting upon me. Fig. 1 is a perspective view of the cleaner casing; Fig. 2 is a longitudinal, axial, sectional view of the same showing the hose coupling in place; Fig. 3 is a longitudinal sectional view taken on the line 3—3 of Fig. 7 showing the filler plate in place; Figs. 4, 5, 6, 7, and 8 are sectional views corresponding to the similarly numbered lines in Fig. 2; Fig. 9 is a perspective view of the hose connection; Fig. 10 is a sectional view corresponding to the line 10—10 of Figs. 6, 7, 8; Fig. 11 is a detail view of the elevation knob; and Fig. 12 is a perspective view of the shield-plate for the brush-drive.

The casing of the cleaner consists of a rigid hollow metal body having at the middle part thereof a fan housing 10 interposed between a motor-housing 11 at the rear and a nozzle part in front. The fan-housing defines a chamber having a substantially circular front-wall 12 and rear-wall 13 connected by a curved side-wall 14, the latter being swelled outwardly at one point to produce the rearwardly-turned outlet-neck 15. The front-wall 12 is formed near its center with a circular inlet-opening 16 and the rear-

wall is formed opposite thereto with a circular opening 17 surrounded exteriorly by a seating surface 18 and flange 19. The motor-housing consists of a hollow metal body having at its forward end a circular flange 20 adapted to enter the flange 19 and where it is held by suitable bolts not shown. In the opposite end of the housing 11 is an axial opening 21 in which is mounted the bearing for the rear end of the shaft. Secured to the bottom part of the housing 11 near the rear is the bracket 22 of a floor wheel 23, here shown as pivoted after the manner of a caster. The arms 24 of a suitable handle (not shown) are also secured to the exterior of this housing for manipulating the cleaner.

Carried by the front-wall 12, and preferably integral therewith, is a collecting nozzle which projects obliquely forwardly and downwardly, increasing in width as it departs from the fan housing and formed at its extremity with a pair of spaced parallel lips 25, 26, defining an elongated inlet-mouth whose plane is approximately parallel to the common axis of the fan housing 12 and motor housing 11, although it is preferable to have the forward lip 25 elevated slightly above the rearward lip as shown in Figs. 2 and 3. Immediately above and adjacent to these lips the interior of the nozzle is formed with two aligned chambers 27 located one adjacent to each end of the nozzle and terminating in end webs 28. 28, also preferably integral with the rest of the casing. Extending upwardly and rearwardly from the chambers 27 are two passageways 30—30, one at each side of the center line of the cleaner. Between the two brush-chambers, the forward and rearward walls of the nozzle are connected by two vertical, parallel, longitudinally-spaced webs 31—31 which define between them a brush-drive housing 32. This housing is of elongated shape and projects perpendicularly from the chambers 27, one side being formed by the wall 33 which projects beyond the passageways 30—30, and is spaced from the wall 12 of the fan casing; these passageways are inclined rearwardly, one at each side of the belt- and pulley-housing so as to emerge into

the space between that and the fan casing as shown in Figs. 1, 3, 4, and 5, while the wall 33 is formed in front of the opening 16 with an opening 34 for the bearing for the forward end of the fan shaft. The nozzle accordingly exhibits two brush chambers separated by a central brush-drive chamber, the former communicating with rearwardly inclined passageways which converge toward the fan chamber inlet, and the latter rising vertically in front of and spaced from said inlet. The forward face of the chamber 32 is formed in line with the opening 34 with an aperture 35 adapted to be closed with the removable plate 36, preferably held in place by a spring clip 37.

Mounted in the openings 21 and 34 are the hollow, sheet metal cups 40—40 in which are located ball-bearings 41—41 which support the horizontal shaft 42, which is provided with a motor armature 43 inside the housing 11, a centrifugal fan 44 in the fan chamber, and a belt pulley 45 in the brush-drive chamber. Interposed between the flange 20 and the seat 18 is the margin of a circular metal partition 46 having a central aperture through which said shaft passes, the center of said partition having a suitable packing-ring 47 embracing the shaft sufficiently closely to prevent flow of air therealong, but without any substantial bearing-effect, the forward face of said partition having a circumferential rib 48 closely surrounding the disk-base of the fan so as to inhibit the entrance of dust therearound. Preferably the bearings are slidable in their respective cups 40—40, a spring 50 being interposed at the rearmost bearing and forcing the same together with the shaft forwardly against the front-bearing, thus preventing looseness and diminishing noise.

Formed in the rear wall of the nozzle adjacent to each end of said nozzle is a vertical slot 55 through which projects a supporting plate 56 which is held in place by screws 57 entering a right-angular flange 58 which overlaps the exterior of the nozzle at one side of each slot. Each of these plates extends substantially the full width and height of the brush-chamber and serves in effect to define at each end thereof an independent wheel-chamber 60. Carried by each of the plates is a horizontal pin 61 on which is pivoted one arm 62 of a yoke which extends from one end of the nozzle to the other. The width of the slots 55 is sufficient to accommodate both the plate and yoke-end, as shown in Figs. 7 and 8, but too small to enable the latter to become disconnected from its pivot pin. Carried by each extremity of this yoke inside the nozzle is a horizontal stud 64 upon which is journaled a floor-wheel 65.

This yoke is adjusted and held in the desired position, in the present embodiment by means of a horizontal rotatable bolt 66, slid-

ably and rotatably mounted in two spaced ears 67—67 carried by the fan casing. The forward end of this bolt carries an eccentric finger 68 which enters a narrow elongated slot 69 formed in the yoke 63; the rearward end of said bolt carries a suitable knob, knurled as shown at 70 to facilitate its rotation, and formed adjacent to one face with a prismatic portion 71 (see Fig. 11) provided with markings indicating the degree of elevation corresponding to the different positions of said bolt. The bottom face of said knob is formed with a plurality of recesses 72 adapted to receive a fixed projection 73 carried by the adjacent ear 67 as said knob is turned, and a coil spring 74 surrounding said bolt on the opposite side of said ear and pressing against a pin 75 holds said knob and bolt in adjusted position.

Each of the plates 56 is apertured for the reception of a sheet metal cup 80 in which is located a central rotatable spindle 81 carried by a ball-bearing 82. Each of these cups is preferably eccentric to said spindle (see Fig. 10) so as to enable the vertical height of the latter above the floor to be changed merely by rotating the cup in its aperture. The end of each spindle is formed with a tapered socket 83 adapted for the reception of one of the studs 84 or 85 carried by the brush-body 86. This brush-body is usually made of wood as being the cheapest material for the purpose, one of the studs, as 84, being preferably fixed and the other being slidable in a hollow sleeve 86 and pressed yieldingly forward by a spring 87 to permit easy attachment and removal of the brush. The exterior of the brush-body is provided with tufts of bristles 88 arranged in suitable rows and projecting into suitable proximity to the inlet mouth.

The webs 31—31 are formed at their lower ends with vertical slots 90—90 for the passage of the brush body, which latter is provided between these webs with a driving pulley 91 receiving a quarter-twisted belt 92 which connects it to the pulley 45. The dimensions of the slot 90 are sufficient to permit the necessary adjusting movements of the brush, but without undue facility for the entrance of litter, and the brush-drive is further protected by means of a removable sheet-metal, guard-plate 93 secured to the bottom of the nozzle and having upturned side portions 94 projecting into the brush chamber adjacent the webs 31—31 and suitably notched for the accommodation of the brush 86.

The casing recess between the wall 12 of the fan chamber and the wall 33 of the brush chamber, which during the use of the cleaner with its own suction nozzle, is closed by a horse-shoe shaped filler member 95, shown in Figs. 1 and 3, whose outer wall constitutes substantially a continuation of the nozzle-wall and prevents ingress of air to the inlet

opening 16 excepting such as enters by way of the passages 30—30. When it is desired to employ a flexible extension-hose, this filler-member is replaced by a hose-connection 96 having approximately the same external shape as the filler-member but formed above with a nipple 97 for the reception of the hose (not shown), and formed below at each side with a shoulder 98 and wing 99 whereby the passages 30—30 are closed as shown in Fig. 7. The faces of the members 95 and 96 are notched, as shown at 100, for the reception of the shaft 42, and with a recess 101 for the reception of the rounded nose of a spring-button 102, whereby they are held against accidental displacement.

As a result of the improvements herein described the fan-shaft is supported near its extremities and near the brush-belt so that wear on the bearings is decreased and free running is assured; the brush-drive is housed against entanglement with lint or litter; the relation of the nozzle passageways to the fan-shaft is such that very little tendency is exhibited for rags and litter becoming wound thereon, while if such does occur the width of the recess occupied by the filler 95 is such as to enable ready clearing: the hose connection can be attached and detached without interfering with the brush-drive or necessitating any shifting of the belt, it being merely necessary to elevate the nozzle so as to prevent the brush from rubbing on the floor so as to absorb unnecessary power or do injury to itself or the floor covering, which is easily accomplished by rotating the elevation adjusting bolt. Furthermore where the passageways 30—30 are cut off the floor-covering is no longer lifted into contact with the brush.

The arrangement of the bearings permits the use of ball-bearings without drawing air therethrough so as either to remove oil or deposit dust; the design and arrangement of the brush-drive, bearings, carrying wheels, and yoke enables the latter elements to be made and completely assembled together as a unit prior to attachment to the casing, thus cheapening production; this handling of the brush and wheel-mounting also enables the casing to be considerably simplified and its machining reduced. The peculiar construction of the brush mounting also permits ready removal of the brush without disturbing the ball-bearings therefor, and also permits the use of brush of the cheapest kind and simplest construction which can be replaced with little expense when worn. Furthermore this design enables the use of larger ball-bearings than can conveniently be located inside a brush.

While I have described with considerable care the particular machine chosen as the illustrative embodiment of my invention, it will be understood that a great many changes in different details thereof can be made with-

out departing from my inventive idea or sacrificing the advantages thereof, wherefore I do not limit myself in any wise except as recited in my several claims which I desire may be construed each independently of limitations contained in other claims.

Having thus described my invention what I claim is:

1. In a suction cleaner, a nozzle having two brush-chambers and a central belt-chamber interposed between said brush-chambers, a centrifugal fan having its axis substantially horizontal, a substantially horizontal shaft carrying said fan and projecting into said belt-chamber, brushing devices in said brush-chambers, means including a belt in said belt-chamber operatively connecting said shaft to said brushing devices, and inclined passageways connecting said brush-chambers to the fan inlet, one passageway located on each side of said belt-chamber.

2. In a suction cleaner, a fan-housing having an inlet, a nozzle having two brush chambers arranged end to end and separated from each other, a vertical brush-drive housing having its lower end located between said brush chambers and its upper end located in front of and spaced from said inlet, and passageways leading from said brush-chambers to said inlet and located one at each side of said brush-drive housing and inclined relatively to said brush-drive housing.

3. In a suction cleaner, a fan housing having an inlet opening and a substantially horizontal axis, a collecting nozzle having an inlet mouth located below the axis of said opening and a vertical brush drive housing having its upper end projecting in front of and spaced from the plane of said opening, the other end of said brush-drive housing extending to the middle of said inlet mouth, two passageways leading from said brush chambers to said opening, located one at each side of said brush-drive housing and inclined relative thereto, a substantially horizontal shaft traversing said fan housing and projecting into said brush-drive-housing, and a bearing for said shaft carried by said housing.

4. In a suction cleaner, a nozzle having two brush chambers arranged end to end and separated from each other and a belt-housing interposed between said brush chambers and projecting vertically therefrom, a substantially horizontal fan-shaft journaled in one wall of said belt-drive housing, a brush body projecting into said brush-chambers and traversing said brush-drive housing, power transmitting means inside said housing operatively connecting said shaft to said brush, and passageways connecting said brush-chambers to the fan inlet, one passageway located on each side of said brush-drive chamber.

5. In a suction cleaner, a fan-chamber having its axis substantially horizontal, a nozzle

having two brush chambers arranged end to end and separated from each other, a vertical belt chamber located between said brush-chambers and rising to a point in line with
 5 said fan-chamber axis, brushing devices in said brush chambers, means in said belt chamber for transmitting power to said brushing devices, said means including a belt, and a
 10 passageway independent of said belt-chamber leading from each brush chamber to said fan chamber.

6. In a suction cleaner, a casing having a motor housing, a fan housing, and a brush-drive housing all arranged in line and ar-
 15 ranged in the order named from rear to front, a substantially horizontal shaft journaled in said first and last-housings and passing freely through said fan housing, a collecting nozzle integral with said brush drive hous-
 20 ing and having a brush chamber therein, a brush in said brush chamber, power transmitting means in said brush drive housing connecting said shaft and brush, and a pas-
 25 sageway leading from said brush chamber to said fan housing located at one side of said brush-drive-housing and inclined relative thereto.

7. In a suction cleaner, a casing having a fan chamber and a nozzle, and means sup-
 30 porting said casing with the fan chamber axis substantially horizontal, said nozzle having two brush chambers arranged end to end transversely of the fan-chamber axis and at one side thereof and also having a brush
 35 drive chamber located between said brush chambers and rising perpendicularly therefrom in front of and at a distance from the wall of said fan-chamber, said nozzle having at each side of said brush-drive chamber an
 40 inclined passageway leading from one of said brush chambers to said fan chamber.

8. In a suction cleaner, in combination, a motor-housing, a fan-housing and a brush-drive-housing arranged successively in the
 45 order named, the fan housing being spaced from said brush-drive-housing and having an inlet opening in the wall nearest thereto, bearings in said motor-housing and brush-
 50 drive-housing, a single continuous shaft journaled in said bearings and traversing said fan-housing, an armature carried by said shaft in said motor-housing, a fan carried by said shaft in said fan-housing, a partition located between said fan-housing and brush-
 55 drive housing and having an aperture therein through which said shaft projects freely, and a brush-drive element carried by said shaft in said brush-drive-housing.

9. In a suction cleaner, a collecting nozzle
 60 having an outlet passageway near its middle and chambers extending horizontally therefrom, a vertically adjustable supporting plate detachably secured inside said chamber near each end and defining a wheel-cham-
 65 ber, a carrying wheel located in said chamber,

and a brush detachably pivoted to said plates.

10. In a suction cleaner, a casing having a collecting-nozzle, a fan-housing and a motor-housing arranged in the order named, a single continuous shaft traversing said fan-
 70 housing and projecting into said nozzle and into said motor-housing, bearings adjacent to the ends of said shaft, and a fan and an armature carried by said shaft between said bearings, said shaft being devoid of bearings
 75 elsewhere than at its ends.

11. In a suction cleaner, a casing having a collecting-nozzle, a fan-housing, and a motor-housing arranged in the order named, a pair of bearings carried by the casing, one
 80 in said nozzle and the other in said motor-housing, a shaft journaled in said bearings and traversing said fan-housing without additional bearings, a fan and an armature carried by said shaft between said bearings, said
 85 fan being located in said fan-housing and said armature in said motor-housing, a brush in said nozzle, and brush-drive mechanism operatively connected to said shaft immediately outside one of said bearings.

12. In a suction cleaner, a casing having a collecting-nozzle, a fan-housing and a motor-housing arranged in the order named, bearings carried by said nozzle and motor-housing respectively, a shaft journaled in
 95 said bearings and traversing said fan housing, a fan and an armature carried by said shaft between adjacent bearings, said fan being located in said fan-housing and said armature being located in said motor-housing,
 100 a brush in said nozzle, and brush-drive-means connecting said brush and shaft and engaging said shaft closely adjacent to the first named bearing.

In testimony whereof I hereunto affix my
 signature.

WILLIAM V. ORR.

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