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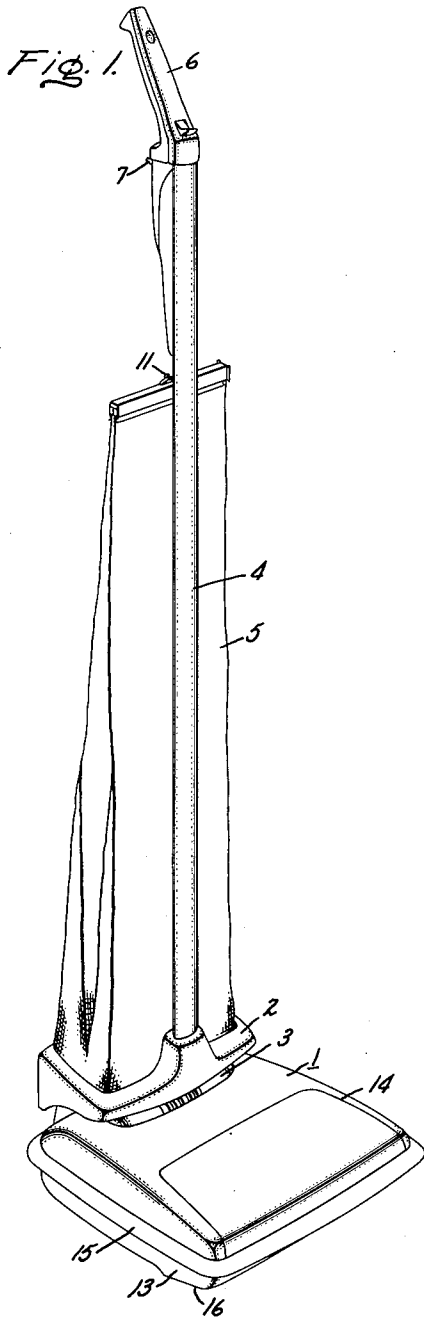
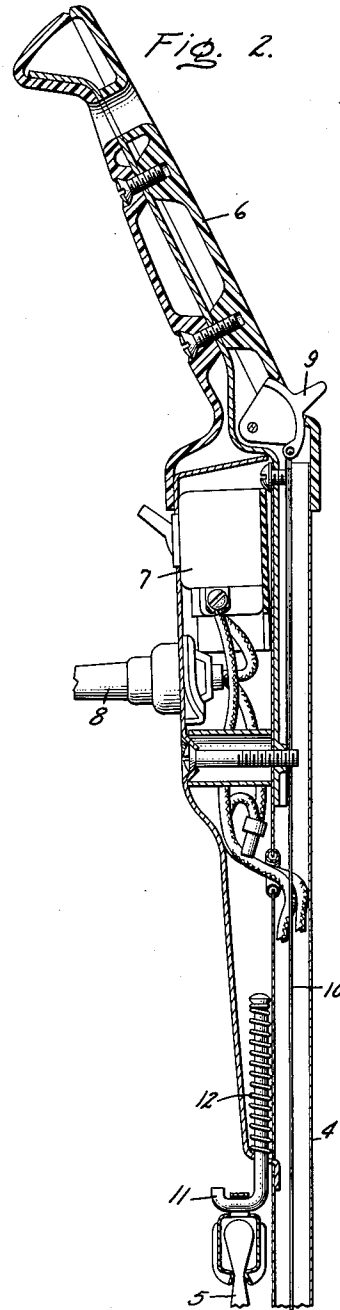
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3,032,799

VACUUM CLEANER WITH FLOATING FLOOR NOZZLE

Filed Dec. 8, 1959

4 Sheets-Sheet 1



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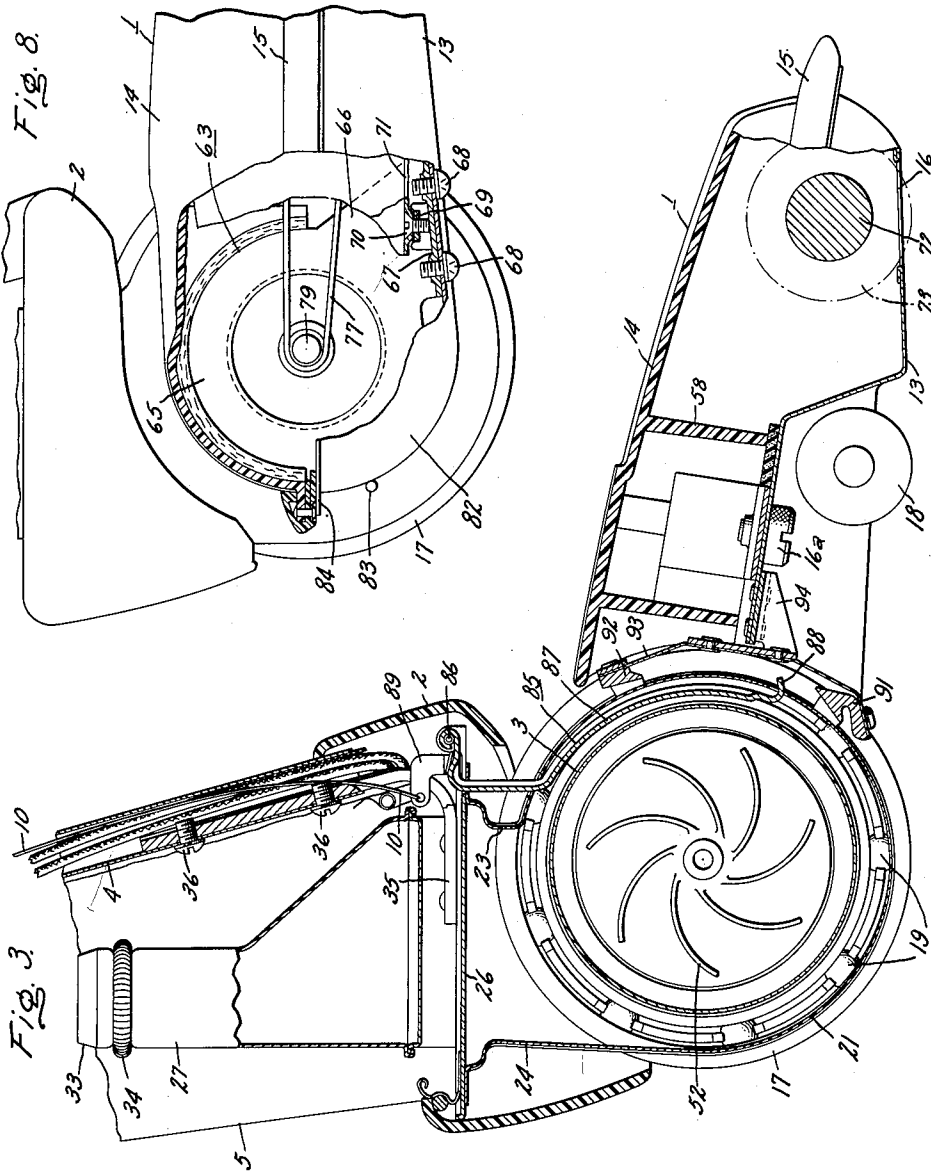
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4 Sheets-Sheet 2



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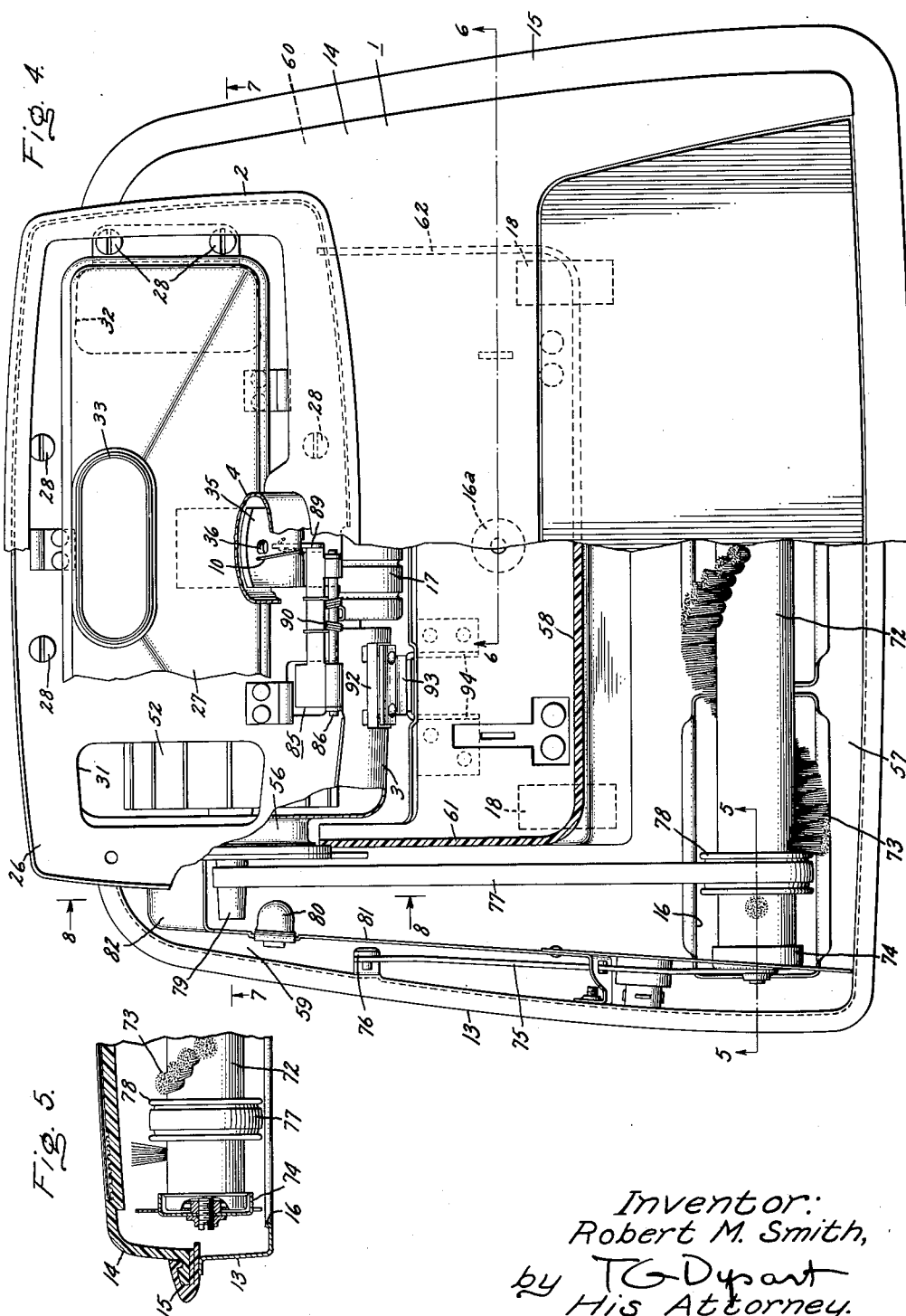
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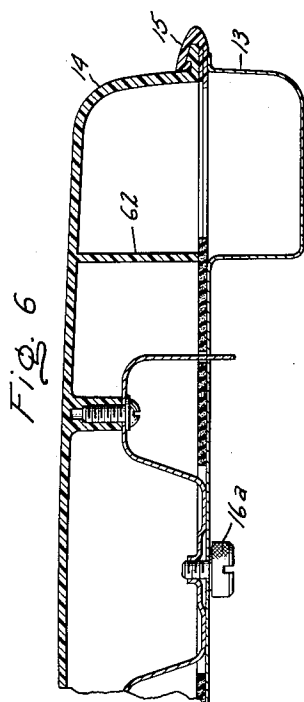
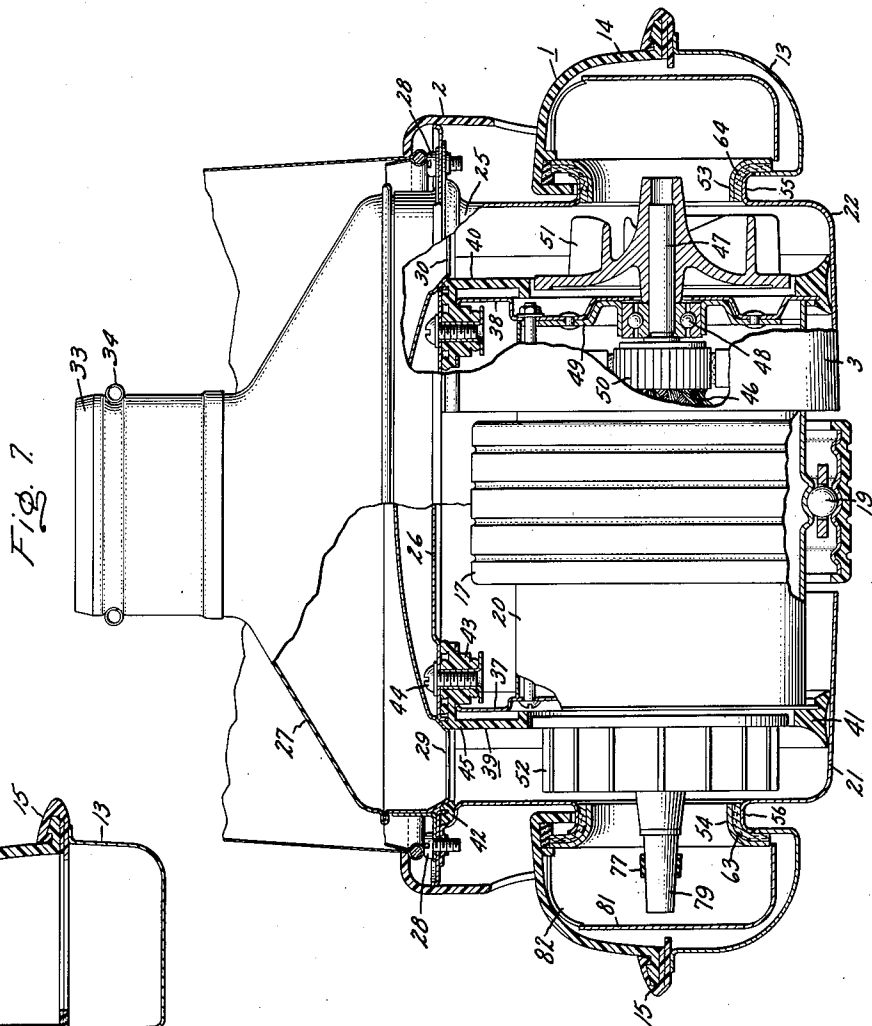
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VACUUM CLEANER WITH FLOATING FLOOR NOZZLE

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4 Sheets-Sheet 4



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3,032,799

VACUUM CLEANER WITH FLOATING FLOOR NOZZLE

Robert M. Smith, Lorain, Ohio, assignor to General Electric Company, a corporation of New York
Filed Dec. 8, 1959, Ser. No. 858,103
4 Claims. (Cl. 15—359)

This invention relates to vacuum cleaners, and more particularly to vacuum cleaners of the type having a motor-fan unit and a floor nozzle assembled in a unitary structure provided with wheels for movement on both bare floors and floor covering materials.

One of the objects of my invention is to provide an improved vacuum cleaner of the aforesaid type in which the floor nozzle is pivotally mounted with respect to the motor-fan unit and rests on the floor surface in floating relationship therewith.

Another object of the invention is to provide a vacuum cleaner of the type mentioned above in which the motor-fan unit is supported by a wheel encircling the housing thereof and the floor nozzle is separately supported in such a way that an optimum relationship between it and the floor nozzle is attained.

Further objects and advantages of the invention will become apparent as the following description proceeds, and the features of novelty which characterize the invention will be pointed out with particularity in the claims appended to and forming a part of this specification.

Briefly stated, in accordance with one aspect of my invention I provide a vacuum cleaner comprising a generally cylindrical motor-fan housing having an air inlet at each end defined by axially projecting trunnions, a generally horizontal floor nozzle provided with a pair of laterally spaced rearwardly extending arm portions pivotally connected to the trunnions on the motor-fan unit and arranged to provide suction passageways between the nozzle and the fan inlets, a wheel encircling the motor-fan housing and arranged to support it on a floor surface, and separate wheels for supporting the floor nozzle in floating relationship with respect to the floor.

For a better understanding of this invention, reference may be made to the following description and the accompanying drawings in which:

FIG. 1 is a perspective view of a vacuum cleaner embodying the present invention;

FIG. 2 is an enlarged fragmentary cross-sectional view of the upper portion of the handle shown in FIG. 1;

FIG. 3 is a fragmentary side elevation view of the cleaner shown in FIG. 1, some of the parts being broken away to show details of construction;

FIG. 4 is a top plan view of the portion of the cleaner shown in FIG. 3, some of the parts being broken away to show details of construction;

FIG. 5 is a fragmentary cross-sectional view taken along the line 5—5 in FIG. 4;

FIG. 6 is a cross-sectional view taken along the line 6—6 in FIG. 4;

FIG. 7 is a cross-sectional view taken generally along the line 7—7 in FIG. 4, and

FIG. 8 is a cross-sectional view taken along the line 8—8 in FIG. 4.

Referring to the drawings, the vacuum cleaner illustrated in FIG. 1 includes a nozzle casing 1 of generally rectangular configuration, a frame shroud 2, a motor housing 3 pivotally secured to the nozzle casing, a handle 4, and a dust bag enclosure 5. As shown in FIG. 2, handle 4 includes a handle grip portion 6, an electric motor switch 7, an electric power cord 8 and a thumb actuated lever 9 connected to a latch actuating cable 10 extending down through the interior portion of the handle. Dust bag enclosure 5 is supported in its upright

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position on the handle by a hook 11, and is preferably biased upwardly by a spring 12 associated with the hook member.

Floor nozzle casing 1 comprises a base shell 13 and a mating hood shell 14 joined at their edges with a combined sealing gasket and peripheral bumper 15 interposed therebetween so as to form a hollow nozzle having a suction mouth 16. Shells 13 and 14 are held together by a single screw 16a, and thus may be easily disassembled. The cleaner is supported on the surface to be cleaned by a relatively large wheel 17 encircling the central portion of motor housing 3 and a pair of smaller wheels 18 secured to the bottom surface of nozzle 1. Preferably wheel 17 is provided with roller bearings 19 so as to be freely rotatable on the motor housing. Thus the major portion of the weight of the cleaner is supported on a single large wheel, and as more fully described below, the smaller wheels on the nozzle support only the weight of the nozzle itself.

In accordance with my invention, floor nozzle 1 is not rigidly connected to motor-fan housing 3, but instead is connected thereto so that it is free to pivot about the horizontally disposed major axis of the motor-fan housing. Considering first the structural arrangement of motor-fan housing 3 and the parts such as handle 4 which are rigidly associated therewith, it will be seen that this housing includes a motor tube 20 and a pair of cup-shaped end members 21 and 22 spaced so as to accommodate wheel 17 therebetween. Each member 21 is generally cylindrical in vertical cross-section, but includes an upwardly extending scroll-like portion defined by a generally vertical front wall 23 and a generally vertical rear wall 24, as best shown in FIG. 3. The configuration of end member 22 is similar to that of end member 21, and it too is provided with an upwardly extending scroll shaped passageway defined in part by front wall member 25. The vertically extending walls of end members 21 and 22, including walls 23, 24 and 25, terminate in horizontally extending flanges to which is secured a horizontally disposed top plate 26 and a hollow duct assembly 27. As shown in FIG. 4, top plate 26 is of generally rectangular configuration and a plurality of peripherally spaced screws 28 are provided to secure it to the horizontal flange portions of end members 21 and 22. Duct assembly 27 includes a pair of spaced openings 29 and 30 in its lower portion positioned so as to overlie openings 31 and 32 in top plate 26, and an upper conduct portion 33 arranged to provide an air discharge opening. It will be understood that duct 27 forms the air discharge passageway through which dust laden air is discharged into a suitable dust bag enclosed within bag enclosure 5 and that the mouth of the dust bag is secured to member 33 by means such as a coil spring 34 adapted to clamp the mouth of the bag in airtight relation. Also secured to top plate 26 is a bracket 35 to which handle 4 is secured by means of screw fasteners 36, for example. Thus it will be seen that top plate 26 functions as a frame to which end members 21 and 22, duct assembly 27 and handle 4 are all rigidly connected.

Referring again to the details of construction of motor-fan unit 3, motor tube 20 (see FIG. 7) is rigidly secured to a pair of end plates 37 and 38 and these end plates are in turn resiliently supported within end members 21 and 22 of the motor-fan unit by means of a pair of resilient fan housing gaskets 39 and 40. While only gasket 39 will be described in detail, it will be understood that gasket 40 is its right-hand counterpart and that the latter is constructed in a similar manner. Gasket 39 is generally circular with a scroll-shaped upwardly projecting portion corresponding generally to the cross-sectional configuration of end member 21, as viewed in FIG. 3, and includes an annular portion 41 secured to end

plate 37 and in engagement on its outer surface with the inner surface of end member 21. Gasket 39 also includes an integral upper flange portion of generally rectangular configuration arranged to seal the connection between vent 27, top plate 26 and the flanged portions of end member 21 (surrounding opening 29), a mounting portion 43 secured to top plate 26 by means of screw 44, and a vertical web portion 45 which forms a part of the fan outlet passage. Thus, as shown in FIG. 7, motor tube 20 is secured in a resilient relationship to top plate 26 and is electrically insulated therefrom.

Mounted within motor tube 20 is an electric motor including a stator 46, a motor shaft 47 supported by bearings 48 carried by a bearing plate 49 which is secured to end plate 38, and a commutator 50. A rotary fan 51 is mounted on the righthand end of shaft 47 (as viewed in FIG. 7) and a similar fan 52 is mounted on the other end of the shaft. Fans 51 and 52 are arranged to draw air through inlets 53 and 54, respectively. Inlet 53 is defined by an axially projecting trunnion 55 formed on the end of end member 22 while inlet 54 is formed by an axially projecting trunnion 56 formed on the end of end member 21. Thus during operation of the motor, air is drawn through inlets 53 and 54, and discharged through outlet openings 29 and 30 into duct assembly 27.

Turning now to floor nozzle 1 and the manner in which it is associated with motor-fan housing 3, it will be seen (FIG. 4) that the floor nozzle casing includes a forward portion 57 in which suction mouth 16 is located, a rear wall 58 (FIG. 3) formed as an integral part of hood shell 14 and a pair of laterally spaced rearwardly extending arm portions 59 and 60 (FIG. 4) arranged to embrace motor-fan housing 3 and provide suction passages between suction mouth 16 and fan inlets 53 and 54. Rearwardly extending arm portions 59 and 60 are formed in part by walls 61 and 62 formed integrally with hood shell 14 and extending rearwardly from the ends of wall 58. Thus the side and front walls of nozzle casing 1 and walls 58, 61 and 62 form a generally U-shaped suction chamber, as viewed from above.

In accordance with an important feature of the present invention, nozzle casing 1 is supported on motor-fan unit 3 solely by means of a pair of bearings 63 and 64 secured to nozzle casing 1 and arranged in pivotal engagement with trunnions 55 and 56 on the motor-fan housing. Bearings 63 and 64 are connected to nozzle casing 1 in a similar manner; as shown in FIG. 8, bearing 63 includes an annular portion 65, a web portion 66 and a flange portion 67, the latter being secured to base shell 13 by means of a pair of screws 68. Bearing 63 also includes a tab 69 having a threaded hole therein adapted to receive a screw 70, and thereby secure a sheet metal dirt shield 71 to the bottom shell 13. Interposed between the outer annular surface of bearing 63 and the inner annular surface of trunnion 56 is a suitable annular sealing member made of felt, for example. Bearing 64 is similarly connected to trunnion 55, and hence nozzle casing 1 is free to pivot about the axis of motor shaft 47 and by the same means suction mouth 16 of the nozzle is connected to the fan inlets of fans 51 and 52 so that high suction without appreciable leakage is developed at the suction mouth. During operation of the cleaner, nozzle casing 1 is free to pivot with respect to motor-fan housing 3 and its wheels 18 support only its own weight. Hence suction mouth 16 is in floating relationship with respect to the floor surface being cleaned and the desired distance between the suction mouth and the floor surface may be easily maintained.

It is desirable that the surface to be cleaned be agitated during operation of the cleaner, and therefore a rotary brush 72 provided with bristles 73 is mounted in nozzle casing 1 adjacent suction mouth 16 for rotation about an axis parallel to the axis of motor shaft 47. Brush 72 may be pivotally mounted with respect to nozzle casing 1 by means of rearwardly extending pivot arms secured

to the ends of the brush shaft, such an arrangement being illustrated in FIG. 4 in which the left-hand end of brush 72 is mounted in a thread guard 74 which in turn is carried by a pivot arm 75 secured at its rear end to a pivot member 76 on casing 1. One suitable brush mounting and positioning arrangement of this nature is disclosed and claimed in application Serial No. 858,104 filed on December 8, 1959 by Warren N. Kemnitz and assigned to the assignee of the present application.

Brush 72 is of course arranged to be motor driven and accordingly a belt 77 connecting pulley 78 secured to the brush and pulley 79 secured to one end of motor shaft 47 is utilized for this purpose. In order to prevent lint, hairs and the like from interfering with proper operation of the belt, pulley 79 may be tapered and a belt stop 80 provided as more fully disclosed and claimed in application Serial No. 861,690 filed on December 23, 1959 by Franklin Wagner, now abandoned, and assigned to the assignee of the present application. As shown in FIG. 4, belt guide 80 is mounted on a sheet metal vertical wall portion 81 of dirt shield 71. Wall 81 extends from the forward portion of the nozzle casing rearwardly and terminates in a curved wall portion 82 which is shaped so as to direct dust laden air into the fan inlet 54. A similar dirt shield is of course provided on the opposite side of the nozzle casing. It will be seen that since the axis of pulley 70 coincides with the axis about which nozzle 1 pivots on trunnions 55 and 56, the belt and pulley system just described does not interfere with free pivotal movement of nozzle casing 1 with respect to the motor-fan housing.

While nozzle casing 1 is free to pivot with respect to motor-fan housing 3 during normal cleaning operations, it is desirable that certain stop positions be provided in which the nozzle casing is latched to the motor-fan housing. One such position which has been found to be desirable is that in which handle 4 is forwardly inclined approximately 15° from the vertical, and this forwardly inclined position may be located by providing a stop pin 83 projecting from the end of end member 21 of the motor-fan housing and arranged to engage a flanged portion 84 on the rear-most part of nozzle casing 1. In order to latch handle 4 to the nozzle casing when in this forward position a latch arm 85 is pivotally mounted on top plate 26 by means of a pivot pin 86. Latch arm 85 includes a curved intermediate portion 87 located within motor-fan housing 3 and a latch element 88 which projects through an aperture therein. Latch arm 85 also includes a lever portion 89 to which is fastened the lower end of cable 10, which, it will be recalled, is arranged to be actuated by lever 9 on the upper end of handle 4. Latch arm 85 is normally biased to the position shown in FIG. 3 by spring 90 (see FIG. 4) in which position it will engage latch member 91 when handle 4 is tilted forwardly to the stop position described above, or it will engage stop member 92 if handle 4 is tilted rearwardly to a position in which it is inclined approximately 30° above the horizontal. Latch members 91 and 92 are mounted on the opposite ends of a supporting arm 93 which in turn is fixedly secured by means of a bracket 94, to base shell 13 of nozzle casing 1. In the stop position first described, in which the handle is forwardly inclined approximately 15°, the nozzle is locked with respect to the remainder of the cleaner and the cleaner may be moved about from room to room with the nozzle in a lifted position so as to facilitate its movement over obstacles, such as door sills. In the second position just described, in which the handle 4 is rearwardly inclined approximately 30° above horizontal, the suction mouth 16 may be conveniently lifted during normal operation of the cleaner so as to clear small obstacles or whenever it is desired to lift the suction mouth somewhat above the surface being cleaned. However, it is sometimes desirable to unlatch nozzle 1 so that handle 4 may be placed in a completely horizontal position, as when it is desired to clean

under low chests and the like, and this may be done by actuating lever 9. Also, the cleaner may be conveniently stored when the nozzle is free to align itself with the axis of the handle, it being then possible to hang the cleaner on a hook so that the entire cleaner lies flat against the wall.

The latching mechanism for releasably latching motor-fan housing 3 and nozzle 1 together is the invention of Walter C. Huening, Jr., and is more fully disclosed and claimed in his application Serial No. 57,728 filed on September 22, 1960 and assigned to the assignee of the present application.

While I have shown and described a particular embodiment of my invention, I do not desire the invention to be limited to the particular construction disclosed, and I intend by the appended claims to cover all modifications within the true spirit and scope of my invention.

What I claim is:

1. A vacuum cleaner comprising a generally cylindrical motor-fan housing provided with openings at each end thereof forming air inlets; each of said air inlets being defined by a trunnion projecting from said motor-fan housing; an elongated handle secured to said motor-fan housing in perpendicular relation to the major axis thereof; a horizontally disposed floor nozzle casing including a pair of laterally spaced rearwardly extending arm portions adapted to embrace said motor-fan housing and provide suction passageways between said nozzle casing and said air inlets; each of said arm portions having a cylindrical bearing surface axially aligned with the trunnion on the adjacent end of said motor-fan housing and pivotally associated therewith; a wheel encircling said motor-fan housing and mounted for rotation about the major axis thereof so as to support it for movement on a floor surface; and means for independently supporting said nozzle casing on the floor surface; whereby said nozzle casing is pivotally supported on said motor-fan housing for free floating operation.

2. A vacuum cleaner comprising a generally cylindrical motor-fan housing provided with axial openings at each end thereof forming air inlets; each of said air inlets being defined by a trunnion projecting from and in co-axial relation with the major axis of said motor-fan housing; an elongated handle secured to said motor-fan housing in perpendicular relation to the major axis thereof; a horizontally disposed floor nozzle casing including a pair of laterally spaced rearwardly extending arm portions adapted to embrace said motor-fan housing and provide suction passageways between said nozzle casing and said air inlets; each of said arm portions having a cylindrical bearing surface axially aligned with respect to the major axis of said motor-fan housing and pivotally associated with one of said trunnions; a wheel encircling said motor-

fan housing and mounted for rotation about the major axis thereof so as to support it for movement on a floor surface; and means for supporting said nozzle casing on the floor surface; whereby said nozzle casing is pivotally supported on said motor-fan housing for free floating operation.

3. A vacuum cleaner comprising a generally cylindrical motor-fan housing; an elongated handle secured to said motor-fan housing in perpendicular relation to the major axis of said motor-fan housing; a floor nozzle casing pivotally secured to said motor-fan housing for pivotal movement about the major axis thereof; a wheel encircling said motor-fan housing and mounted for rotation about the major axis thereof so as to support it for movement on a floor surface; and means for independently supporting said nozzle casing.

4. A vacuum cleaner comprising a generally cylindrical motor-fan housing provided with axial openings at each end thereof forming air inlets; each of said air inlets being defined by a trunnion projecting from and in co-axial relation with the major axis of said motor-fan housing; a motor driven pulley extending axially from one end of said motor-fan housing; an elongated handle secured to said motor-fan housing in perpendicular relation to the major axis thereof; a horizontally disposed floor nozzle casing having a forward portion provided with a suction mouth, a rear wall parallel to the major axis of said motor-fan housing, and a pair of laterally spaced rearwardly extending arm portions adapted to embrace said motor-fan housing and provide suction passageways between said suction mouth and said air inlets; each of said arm portions having a cylindrical bearing surface axially aligned with respect to the major axis of said motor-fan housing and pivotally associated with one of said trunnions; a rotary brush mounted in said nozzle casing adjacent said suction mouth; a belt for driving said brush from said pulley; a wheel encircling said motor-fan housing and mounted for rotation about the major axis thereof so as to support it for movement on a floor surface; and wheel means for supporting said nozzle casing on the floor surface; whereby said nozzle casing is pivotally supported on said motor-fan housing for free floating operation.

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