

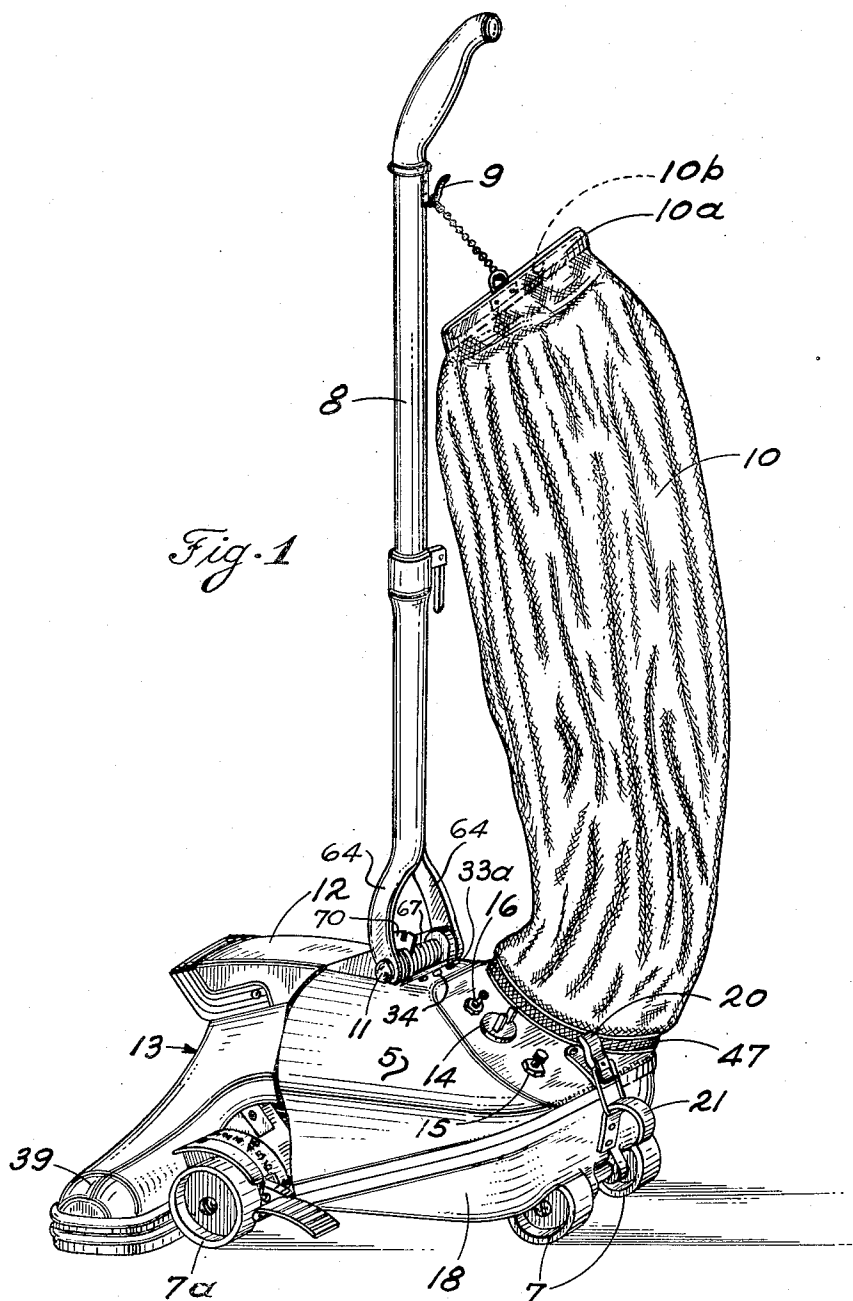
Feb. 18, 1958

J. B. KIRBY
VACUUM CLEANER

2,823,411

Filed June 22, 1953

5 Sheets-Sheet 1



INVENTOR.
JAMES B. KIRBY

BY
RICHEY, WATTS, EDGERSON & MCENENNY
H. F. McEnenny
ATTORNEYS

Feb. 18, 1958

J. B. KIRBY
VACUUM CLEANER

2,823,411

Filed June 22, 1953

5 Sheets-Sheet 2

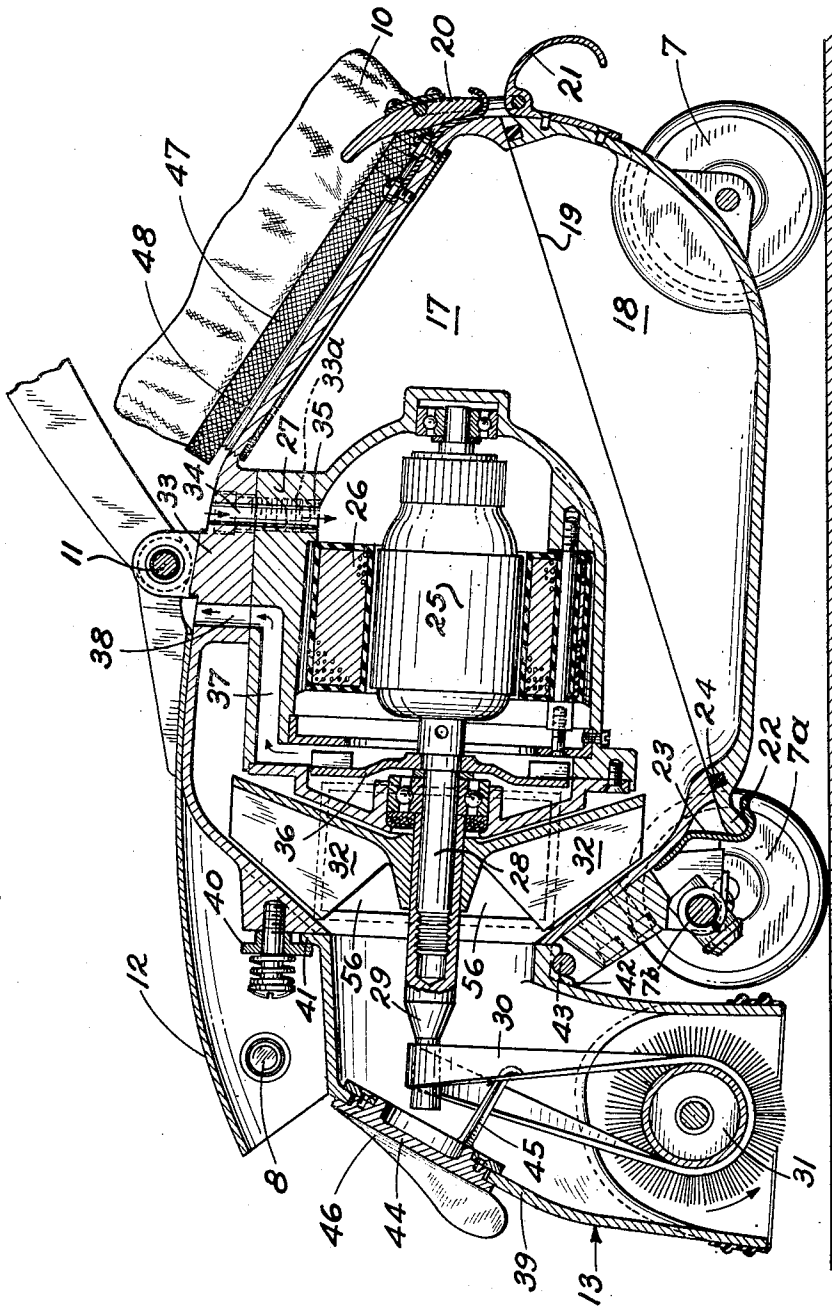


Fig. 2

INVENTOR.
JAMES B. KIRBY

BY
RICHEY, WATTS, EDGERTON & MCNENNY
H. F. McNenny
ATTORNEYS

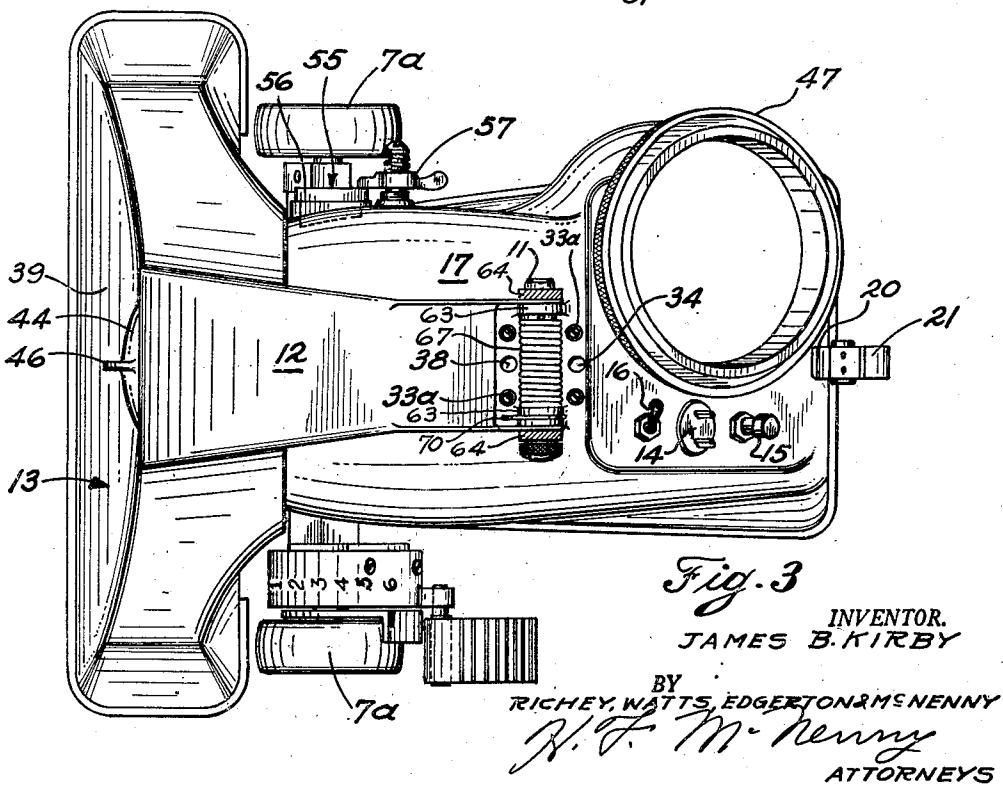
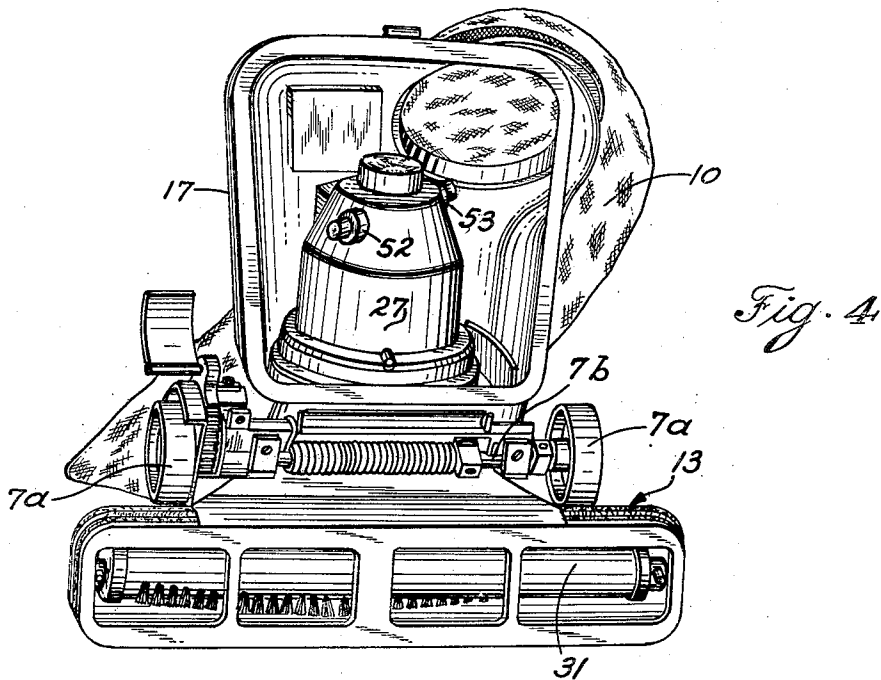
Feb. 18, 1958

J. B. KIRBY
VACUUM CLEANER.

2,823,411

Filed June 22, 1953

5 Sheets-Sheet 3



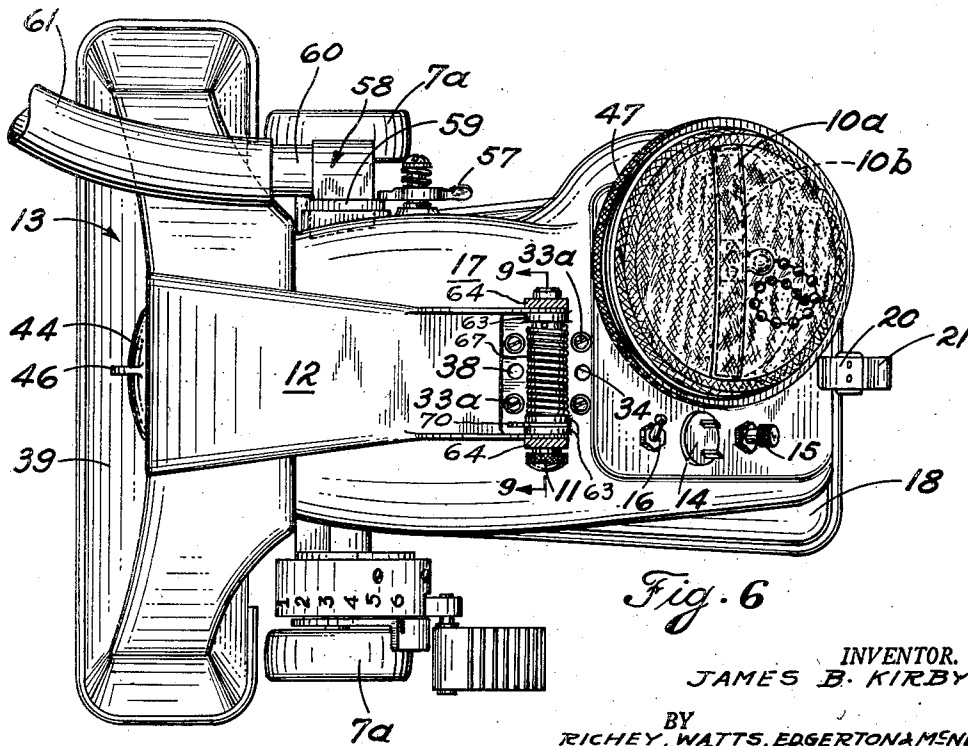
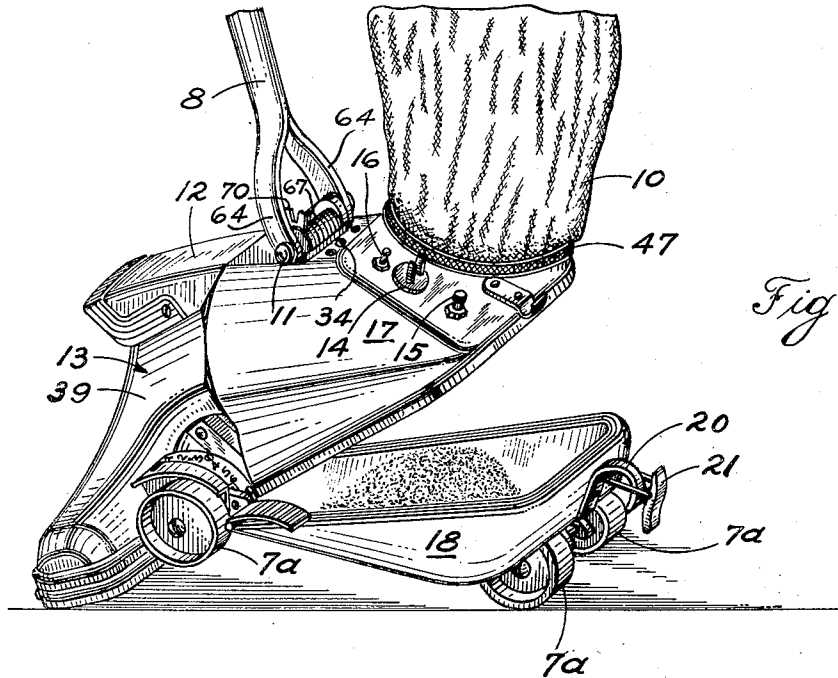
Feb. 18, 1958

J. B. KIRBY
VACUUM CLEANER.

2,823,411

Filed June 22, 1953

5 Sheets-Sheet 4



INVENTOR.
JAMES B. KIRBY

BY
RICHEY WATTS, EDGERTON A. MCNENNY
Attorneys

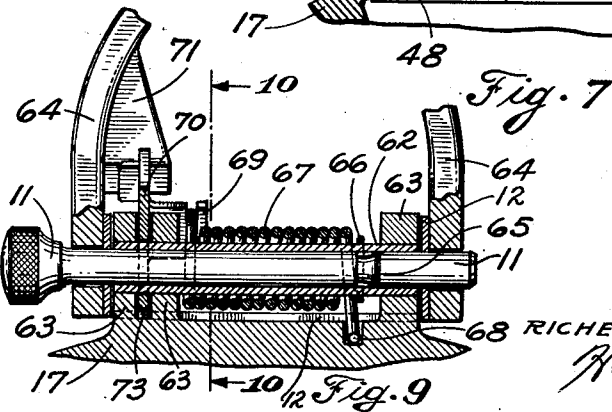
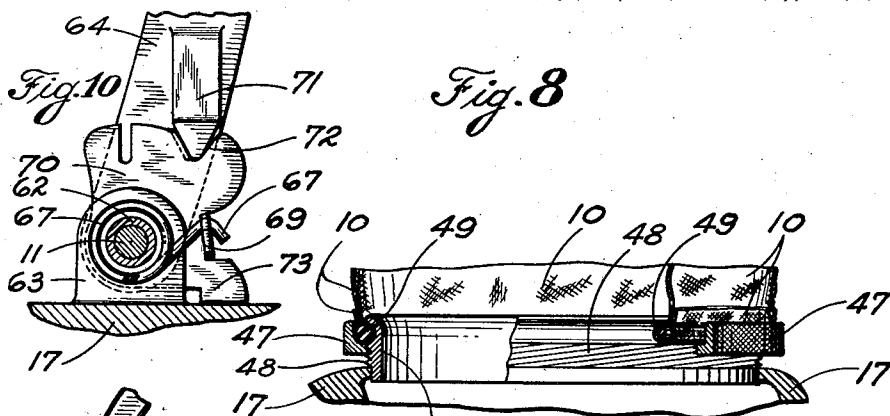
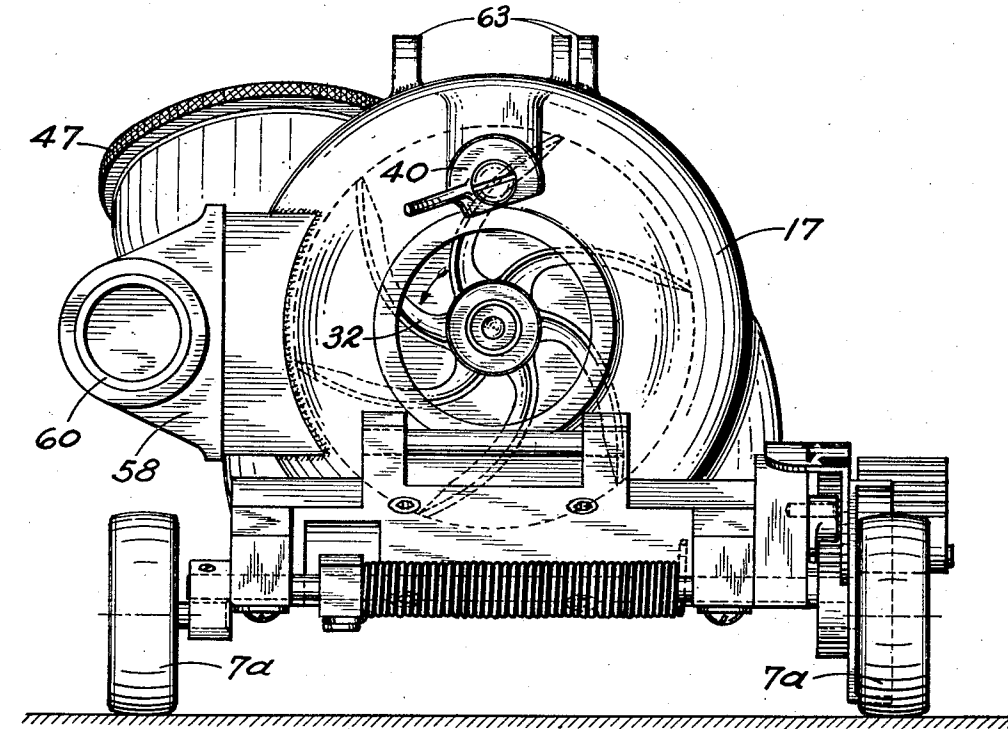
Feb. 18, 1958

J. B. KIRBY
VACUUM CLEANER

2,823,411

Filed June 22, 1953

5 Sheets-Sheet 5



INVENTOR.
JAMES B. KIRBY

BY
RICHEY, WATTS, EDGERTON & MCNENNY
H. F. McNenny
ATTORNEYS

1

2,823,411

VACUUM CLEANER

James B. Kirby, West Richfield, Ohio

Application June 22, 1953, Serial No. 363,311

2 Claims. (Cl. 15—352)

This invention relates to vacuum cleaners and more particularly to that type of vacuum cleaner referred to as a floor cleaner, in that it comprises a wheel supported body having a fan and motor unit and a transverse floor nozzle which is moved about over the floor that is to be cleaned.

It is among the objects of this invention to combine in a simple, practical cleaner the advantages and merits of both the so-called floor cleaner and the so-called tank cleaner while eliminating the undesirable features of each and retaining a full range of versatility.

Another object of the invention is to improve and facilitate the emptying of the cleaner making it unnecessary either to remove and empty the filter bag or to move the cleaner to a place at which the dirt can be emptied out.

Further objects are to simplify and reduce the cost of the cleaner and the assembly of the parts constituting the cleaner; to mount the motor and fan as a unit rigidly and securely within the cleaner without impeding the free outlet of air from the fan and without interfering with the formation of a settling chamber and dust box within the cleaner; to secure the motor and fan by single mounting of the motor housing so that the fan, without additional support, rotates very closely to the fan chamber so as to obtain maximum fan efficiency and so that the shaft of the motor can be used to drive a brush in the nozzle or for other accessories without permitting the heavy torques so applied to the motor shaft to impair the proper operation of the fan; to arrange the motor and fan and a dust bag or filter bag opening within the cleaner so as to provide a continuous opening from the fan, an unobstructed settling chamber and dust box and a dust bag opening positioned above the dust box with free access thereto so that the contents of the bag may fall freely into the dust box; to simplify the construction of the cleaner while maintaining maximum efficiency by forming a fan chamber surface on the inner walls of the cleaner casing or tank opening freely into the settling chamber and dust box through substantially its entire circumference; and to improve the emptying of the cleaner by forming the cleaner as a tank divided into two sections, the lower section constituting a scoop-shaped section so that the cleaner can be tilted forwardly by the handle to permit removal of the lower section with the entire contents of the cleaner for emptying.

Further objects and advantages relating to efficiency in operation and convenience in use will appear from the following description and the appended drawings, wherein:

Fig. 1 is an elevation of a vacuum cleaner made according to my invention;

Fig. 2 is a longitudinal sectional view through the vacuum cleaner;

Fig. 3 is a plan view of the vacuum cleaner;

Fig. 4 is a view of the cleaner with the dust receptacle removed and the cleaner body tilted forwardly about the forward edge of the floor nozzle;

2

Fig. 5 is a perspective view showing the vacuum cleaner tilted forward to facilitate removal of the detachable dust receptacle which forms a part of the cleaner body;

Fig. 6 is a plan view of the vacuum cleaner showing the arrangement of the dust bag within the cleaner body and the blower attachment in place;

Fig. 7 is a sectional view showing the means for securing the dust bag to the cleaner body;

Fig. 8 is a front end elevation of the cleaner with the floor nozzle removed and the blower attachment in position;

Fig. 9 is a detailed section taken on the line 9—9 of Fig. 6; and

Fig. 10 is a detailed section taken on the line 10—10 of Fig. 9.

The vacuum cleaner is illustrated in its entirety in Fig. 1 wherein the cleaner body indicated at 5 is supported on the floor by wheels 7 and 7a. The cleaner is moved about over the floor by handle 8 which supports at its upper end as at 9 the vacuum cleaner dust bag 10. The handle 8 is pivoted by the removable pin 11 to the cleaner body and the pin 11 may also function as the pivotal support for the light guard 12 which normally extends forwardly of the pivot to light the surface undergoing cleaning. A tube 62 extends through spaced ears 63 on the cleaner body, the handle 8 being formed with forks 64 which straddle the ears 63. The pin 11 extends through aligned openings in the forks 64 of the handle and through the tube 62. The pin is formed with a sloping recess 65 to receive a retaining spring 66 which surrounds the tube 62 and projects through an opening therein into the notch 65. A coil spring 67 surrounds the tube 62 and has one end resting upon the body of the cleaner as shown at 68 and the other end extending through a hook 69 projecting laterally from a plate 70 freely pivoted on the tube 62 within a slot in one of the ears 63. The adjacent fork 64 of the handle is formed with an integral lug 71 having a pointed end fitting into a notch 72 formed on the pivoted plate 70. Thus when the handle is assembled on the cleaner the plate 70 pivots with the handle and the spring 67 urges the handle upwardly and forwardly. The plate 70 is also formed with an abutment foot 73 positioned to engage the upper surface of the cleaner when the handle is pivoted into a substantially upright position so as to prevent further forward pivoting movement of the handle.

Transversely of the cleaner body 5 is arranged the floor nozzle 13. The cord for the electrical power for the cleaner motor is attached at 14 adjacent a foot operated start and stop switch 15 and a two-speed motor switch 16.

The cleaner body comprises a pair of complementary sections; the upper or main section being indicated as at 17 and the lower section as at 18 (Fig. 2). The lower section 18 is joined to the upper section along the inclined plane indicated at 19 in Fig. 2. This provides an arrangement whereby the lower section 18 is in the form of a scoop or dust receptacle which may be conveniently detached. The latch 20 secures the section 18 to the upper section 17 and when removed may be conveniently transported by the handle 21. The forward end of the lower section 18 is provided with a projecting lip 22 which is received by a spring clip 23 carried by the upper body section 17. Spaced wheels 7 on the section 18 support the rear end of the cleaner. A gasket 24 is provided in the lower section 18 at its juncture with the upper section 17 so as to form an air tight seal when the parts are assembled as shown in Fig. 2. The projecting lip 22 is curved downwardly and the clip 23 is curved upwardly so that when the two sections are swung away from each other in the position shown in Fig. 5 the lip 22 may pass easily into or out of the clip 23 and

3

when the two sections of the cleaner are closed the lip may not be withdrawn and the spring clip presses the lower section strongly toward the upper section to provide an effective air seal between the sections against the pressures within the body.

The motor and fan unit comprises an electric motor having armature 25 and field windings 26 carried within the motor housing 27. The armature shaft 28 is provided with a forward extension 29 to drive the belt 30 for the rotary brush 31 mounted in the floor nozzle. The fan 32 is secured to the armature shaft extension 29 and is arranged to draw dust laden air from the nozzle and discharge dust laden air around the periphery of the motor housing 27. A boss 33 is integrally formed on the upper interior wall of the body section 17 for supporting the motor and fan unit. With the lower section removed the motor and fan unit is easily assembled by insertion through the open bottom of the main section and then inserting the attaching screws 33a through boss 33 into the motor housing.

The boss 33 is provided with an inlet aperture as at 34 which is aligned with inlet aperture 35 in the motor housing to lead ventilating air into the interior of the motor housing. The ventilating air is moved through the housing by ventilating fan 36 secured to the armature shaft 28 and the discharge from the fan leads through passage 37 to outlet passage 38 in the boss 33. This arrangement provides that clean dust free air is circulated through the motor housing and thus the motor is sealed against the dust laden air which is within the cleaner body.

The floor nozzle 13 is detachably secured to the forward end of the cleaner body. The cleaner body section 17 is provided with a pivoted latch 40 which may be rotated so as to bring a cam portion of the latch 40 over a flange 41 on the upper edge of the floor nozzle 13. This latch is made accessible by swinging the light guard 12 upwardly about its pivot 11. The lower edge of the nozzle portion adjacent the body section 17 is provided with a grooved boss 42 adapted to embrace a transverse pin 43 carried by the body. After the boss 42 is placed over the pin 43 and the nozzle tilted into position against the cleaner body, the latch 40 may be turned to clamp the nozzle securely to the cleaner body.

An aperture in the forward wall 39 of the floor nozzle rotatably supports a belt lifter disc 44 on which is mounted an inwardly projecting belt lifter 45 normally disposed under the forward end of the shaft extension 29. When the disc 44 is rotated by means of the handle 46, the belt 45 swings in an arc so as to lift the belt free of the shaft extension 29. This latter position with the belt disconnected is preferred when the cleaner is used for a blower such as may be employed for spraying paint, for demoting and the like.

The vacuum cleaner bag 10 is secured to the cleaner body at the rear right hand portion as shown in Fig. 3 by means of a clamping ring 47 which is threaded on the flange 48 which surrounds the opening in the body 17 for the dust bag. The upper end of the flange 48 is turned outwardly as best shown in Fig. 7, and a bead or rubber ring 49 carried in the hem of the bag opening is clamped between the ring 47 and the flange 48. By manually rotating the ring 47 it will be lowered on its threaded connection so as to free the bead 49 when it is desired to remove the bag for replacement or for laundering.

The dust bag 10 is provided at its upper end with fold or hem 10a enclosing resilient flat steel strip 10b which maintains the desired support for the dust bag in its normal operating position. It also serves as a convenient grip for shaking the bag to dislodge dust and lint so that it may fall by gravity into the dust receptacle. When it is desired to convert the suction cleaner to a blower for applying demoting material or spraying, the dust bag is unhooked from its handle support and stuffed

4

into the dust bag opening. The steel strip 10b is proportioned with respect to the dust bag opening in the cleaner body so as to be slightly longer than the diameter of the dust bag opening. The steel strip 10b is manually flexed or bowed and thus will pass into the opening. When released it will resiliently secure the bag within the cleaner body. In this way the bag 10 and its strip 10b cooperates to form a closure for the dust bag opening when the blower is operated. An advantage of this arrangement is that there is some tendency for air impelled by the fan to leak through the dust bag. This is sufficient to insure that any free dust in the cleaner body around the motor housing or in the dust receptacle will not move towards the blower outlet in the fan chamber.

When it is desired to empty the vacuum cleaner, the handle is swung to the position shown in Fig. 1 so that the bag is disposed generally vertically and the abutment 73 engages the cleaner body. Manually shaking the bag by gripping the top hem will loosen dust and lint within the bag which will fall down into the body section 18. The latch 20 may be released and the cleaner tilted forwardly by pressing on the handle as shown in Fig. 5; thus leaving the dust receptacle section 18 on the floor and free for withdrawal from the clip 23 on the cleaner body. The receptacle 18 may be emptied and re-attached by means of latch 20 to the cleaner body. It will be noted from Figs. 3, 4 and 5 that the arrangement of the bag and bag opening in the cleaner body is at one side of the longitudinal center line through the body so that the motor housing 27 does not interfere with the free falling by gravity of the dust from the bag into the receptacle 18.

Preferably the mounting for the motor brushes 52 and 53 is as shown in Fig. 4 so that the brush mounting 53 is accessible through the bag opening and the brush mounting 52 is accessible through the underside of the cleaner body when the section 18 is removed. This facilitates servicing of the motor without the use of tools by removing the dust receptacle 18 and the dust bag 10. It will also be noted that when the dust receptacle section 18 is removed, the entire motor and fan unit may be removed through this opening on the underside of the cleaner body. This contributes to low cost assembly and convenience in manufacturing and servicing.

An opening into the fan chamber at the forward right hand side of the cleaner body is provided for the attachment of a blower. As shown in Fig. 3 a plug 55 is in position closing the blower opening. This plug 55 conforms to the inner contour of the fan chamber and is retained in place for normal vacuum cleaning operation. The plug 55 has a flange 56 arranged alongside a pivoted cam latch 57 which may be rotated to overhang the flange 56 on the blower plug 55. When the plug 55 is removed, the blower attachment 58 (see Fig. 6) may be inserted. The attachment 58 is also provided with a flange 59 cooperating with the pivoted latch 57 which is utilized to hold the blower attachment 58 in position. An outlet 60 is formed in the attachment 58 and a blower hose 61 is secured to this outlet. It will be understood that when the blower is used the belt lifter 44 is operated so as to eliminate the belt drive to the rotary brush and the dust bag 10 is stuffed into the cleaner body as above described. It is not essential that the belt be disengaged from the motor shaft and in some instances it may be satisfactory to merely raise the nozzle away from the floor.

The spacing between the mouth of the floor nozzle 13 and the surface to be cleaned is adjusted through the eccentric mounting of the forward pair of floor engaging wheels 7a. The wheels 7a are eccentrically carried by a rock shaft 7b transversely of the body of the floor cleaner adjacent the nozzle. The adjusting means illustrated forms no essential part of the present invention and is the subject matter of my co-pending application

Serial No. 377,481 filed August 31, 1953. During the operation of the cleaner, the user may adjust the nozzle to obtain maximum cleaning efficiency by manipulation of a foot pedal as illustrated in the instant application and as disclosed and claimed in detail in said co-pending application.

For normal floor cleaning operations the cleaner is connected to the household electric line as at 14 and the foot switch 15 operated. The nozzle is adjusted to desired cleaning position with respect to the surface to be cleaned by the foot pedal adjustment and the cleaner propelled over the surface by means of the handle 8. Dust laden air is drawn into the nozzle and discharged by the fan 32 in the chamber formed by the body sections 17 and 18. The dust and lint is filtered from the dirt laden air by the dust bag 10 and the dust accumulating in the bag 10 falls by gravity into the dust receptacle 18. Any lint or the like which may adhere to the bag 10 will fall by gravity when the bag is manually agitated. Thereafter the receptacle 18 may be removed by means of the latch 20 and the receptacle emptied. When it is desired to use the vacuum cleaner blowing attachment, the plug member 55 is removed and the attachment 58 inserted in the fan housing. The removability of the nozzle 13 facilitates the attachment to the exposed motor shaft of grinding or polishing accessories. The vacuum cleaner of my invention is thus readily adaptable to various household tasks. It is not necessary to remove the dust bag to empty the cleaner and it is not necessary to remove the dust bag when the blower attachment is applied.

Although I have disclosed and described my vacuum cleaner in considerable detail, it will appear that numerous changes may be made therein without departing from the scope of the invention as set forth in the following claims.

What is claimed is:

1. A vacuum cleaner comprising first, second and third body sections detachably secured to each other in the sequence named, said first section comprising a transverse nozzle having a brush mounted for rotation therein, the side walls of said first section merging above said brush in a circular outlet disposed substantially at right angles to said transverse nozzle, said second section having a forward portion in the form of a horizontally disposed truncated cone providing a circular inlet having a diameter substantially corresponding to the outlet of said first section, latch means carried by said second section adjacent said inlet to secure said first section to said second section, a horizontally disposed power unit supported within said second section consisting of a brush pulley, a fan and motor co-axially secured to each other in the sequence named, said second section having a top wall and side walls extending rearwardly from said conical portion, said power unit mounted within said second body section by means consisting of a boss depending from the top wall of said second section for attachment with a complementary boss on said motor whereby said fan is disposed within said conical portion co-axially thereof and the brush pulley in advance of the fan is projected through the outlet of the first section, the side walls of said second section terminating at their lower edges in a plane inclined with respect to the axis of said motor and fan unit, said third section having a bottom wall and side walls terminating in said inclined plane and co-operating latch means carried by said second and third sections to secure said sections to each other at said inclined plane whereby said power unit may be inserted

within and mounted in said second section through the opening provided at the bottom of said second section when the third section is removed, said second section having a downwardly inclined top wall rearwardly of said motor mounting boss, said inclined wall having a dust bag opening therein whereby the side walls of said third section have their greatest vertical extent beneath said dust bag opening.

2. A vacuum cleaner comprising first, second and third body sections detachably secured to each other in the sequence named, said first section comprising a transverse open bottom nozzle having a brush mounted for rotation therein, the side walls of said first section above the brush merging in a circular outlet disposed substantially at right angles to said transverse nozzle, said second section having a forward portion in the form of a horizontally disposed truncated cone providing a circular inlet having a diameter substantially corresponding to the outlet of said first section, latch means carried by said second section above and below said inlet to secure said first section to said second section, a power unit supported on a horizontal axis within said second section, said power unit comprising a brush drive pulley, a fan and motor co-axially secured to each other in the sequence named, said second section having a top wall and side walls extending rearwardly from said conical portion, said power unit supported within said second body section by means consisting of a boss depending from the interior of the top wall of said second section whereby said fan is disposed within said conical portion of the body and the brush drive pulley in advance of the fan is projected through the outlet of the first section, the side walls of said second section terminating rearwardly of said conical portion in a plane inclined with respect to the horizontal axis of said motor and fan unit, said third section having a bottom wall and side walls, said side walls terminating in said inclined plane and co-operating latch means carried by said second and third sections to secure said sections to each other at said inclined plane whereby said power unit may be inserted within and mounted in said second section through the opening provided at the bottom of said second section when the third section is removed, said second section having an inclined top wall rearwardly of said motor mounting boss, said inclined wall having a dust bag opening therein, said dust bag opening being rearwardly of the motor and located above the deepest portion of said third section.

References Cited in the file of this patent

UNITED STATES PATENTS

1,878,858	Kitto	Sept. 20, 1932
2,058,371	Van Roosen	Oct. 20, 1936
2,221,746	Kirby	Nov. 12, 1940
2,314,334	Frantz	Mar. 23, 1943
2,537,523	Frost	Jan. 9, 1951
2,538,464	MacFarland	Jan. 16, 1951
2,644,190	Brown et al.	July 7, 1953

FOREIGN PATENTS

261,780	Great Britain	Feb. 20, 1928
276,235	Great Britain	Aug. 25, 1927
364,334	Great Britain	Jan. 7, 1932
367,077	Great Britain	Feb. 18, 1932
497,495	Germany	May 9, 1930
535,643	Germany	Oct. 14, 1931
543,021	Germany	Feb. 2, 1932