

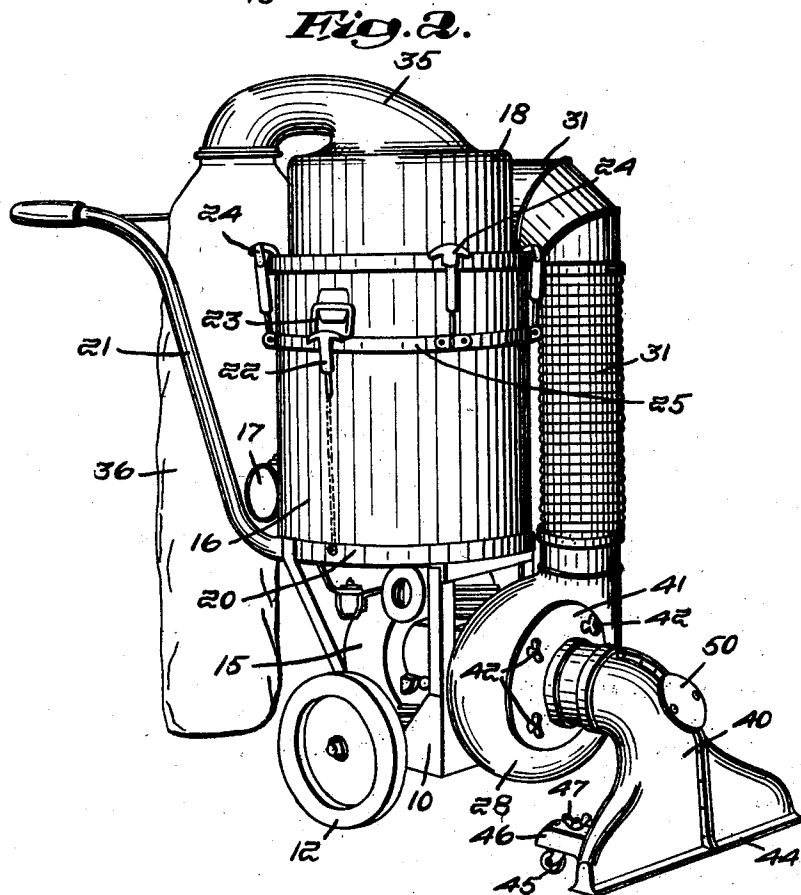
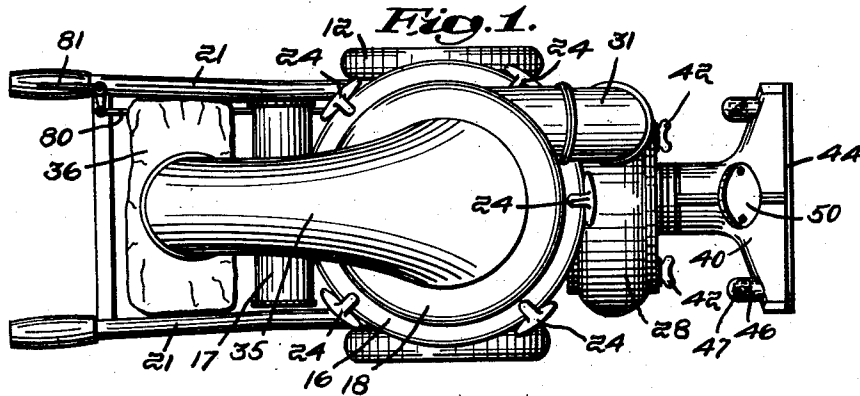
Feb. 25, 1958

A. W. MOFFAT
MOBILE SUCTION FLOOR CLEANER

2,824,335

Filed Feb. 17, 1955

4 Sheets-Sheet 1



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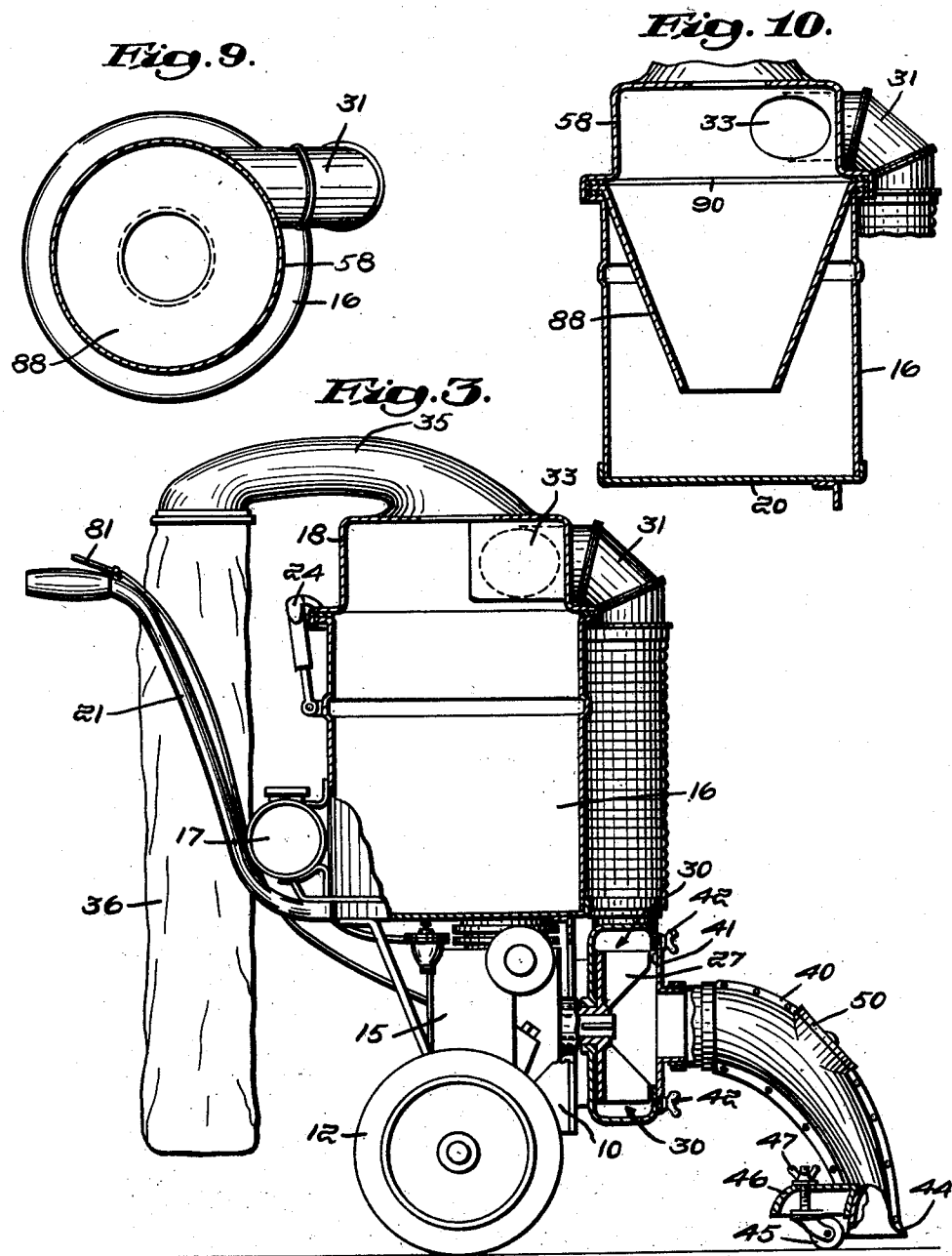
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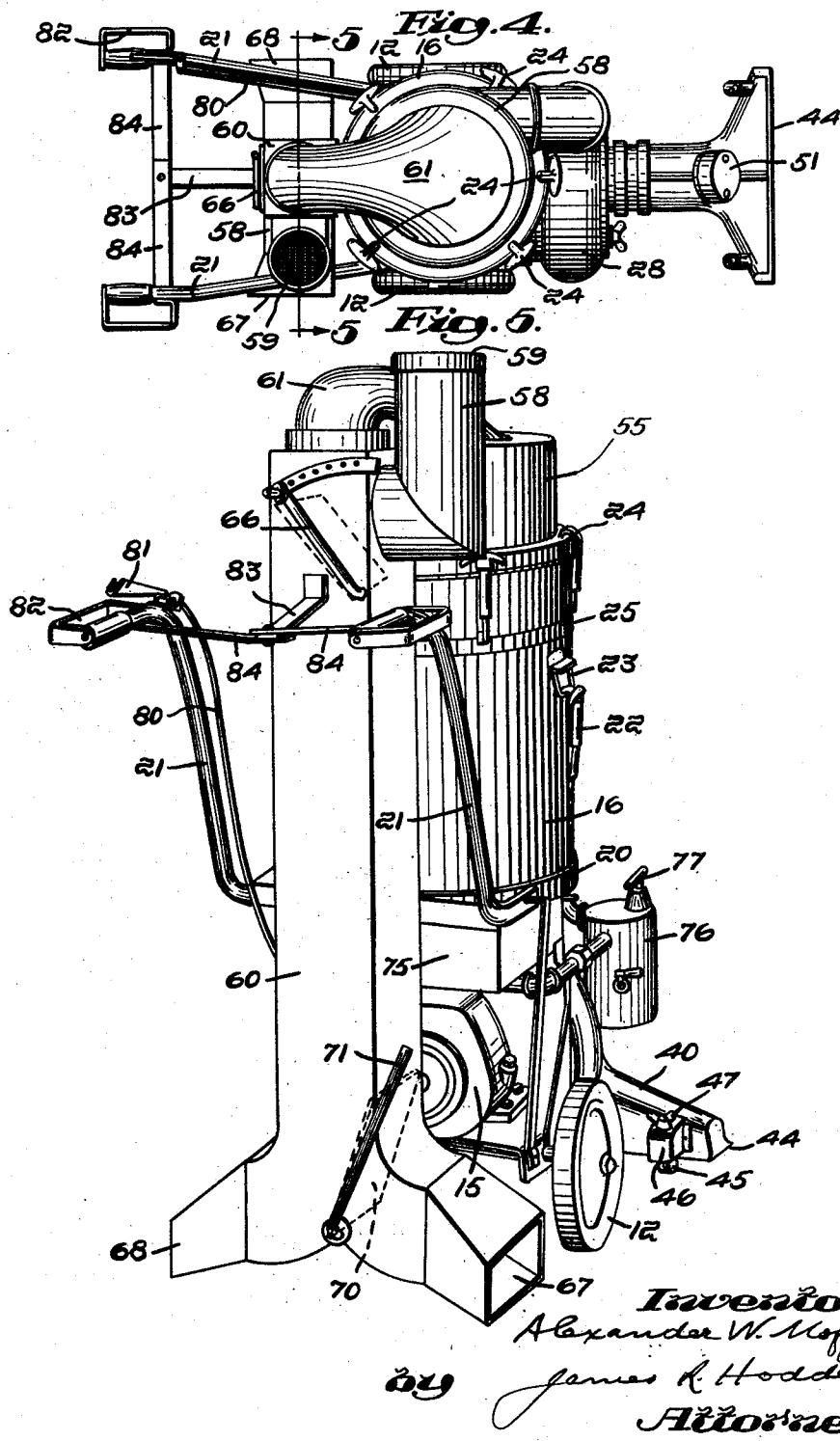
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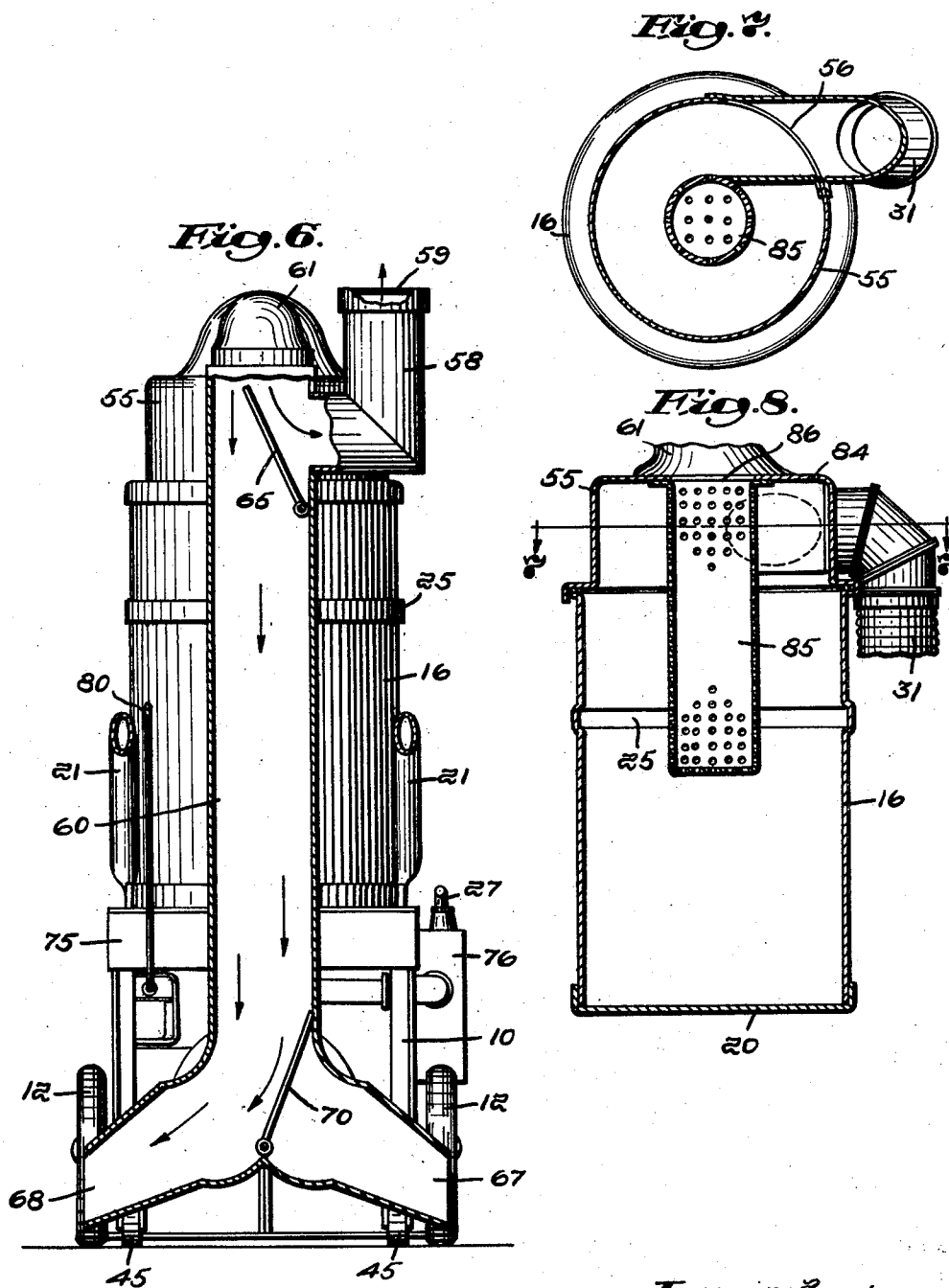
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4 Sheets-Sheet 4



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MOBILE SUCTION FLOOR CLEANER

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2 Claims. (Cl. 15—345)

My present invention relates to industrial mobile power-actuated floor-cleaning apparatus, particularly intended for use in such large establishments such as factories, mills, wood- and metal-working plants, machinery manufacturers, foundries, department stores, shoe manufacturers, upholsterers, and with special attachments for use in textile plants.

While, heretofore, various types of vacuum cleaning machines have been developed for household use, they were not suitable for employment in the larger type of industrial plants, with cement or wood floors, and wherein amounts of various sized particles, such as waste, mill ends, cuttings, wool and cotton droppings, and metal strips, grindings, or the like would accumulate; and the old style methods of manual sweeping were universally employed as a clean-up method.

My present invention provides a machine which will handle comparatively large and rough articles as well as taking up the dust and dirt on factory floors; and, furthermore, I provide a readily removable attachment which will enable the waste and particles underneath the machines to be blown out into the aisles, the removal of which presents a special problems in textile plants. My attachment thus first blows the waste from under machines into the adjacent alleyways and, thereupon, the blower attachment is removed and the dust bag attachment is replaced, both interchangeable top portions being provided with dust separators to permit dust and waste to drop into the cylindrical receptacle.

Preferably I may utilize a small gasoline motor so that the apparatus will be independent of electrical outlet and free to move throughout an entire plant area without restriction of the limitation of the length of electrical wire ordinarily necessary when an electric motor is used. However, an electric motor can be used if desired.

Important objects and features of the present apparatus consist in means providing a relatively wide nozzle and a cooperating blower unit which will pick up relatively large articles, including metal waste strips and the like, and by utilizing relatively slow speed and low vacuum.

I further provide means in the apparatus particularly intended for use in textile plants to include a blower arrangement with manually controllable means to conduct an air blast laterally in either direction underneath the textile machinery so as to thus remove dust and articles accumulating underneath such machines which heretofore were extremely difficult to pick up. Also, manually operated means are provided by my present invention to control the direction of the air blast under such textile or other machines from either side, or both sides, simultaneously as the machine is moved along, together with means to control the amount of air being delivered to the blower system so as not to blow the dust and articles under a machine, or machines, into the air or scattering it elsewhere.

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In the present embodiment of my invention I prefer to utilize a vertical tank construction mounted directly over the motor and in balanced relation over a pair of main carrying wheels which will greatly facilitate the manual handling of the apparatus, permitting ease in turning, pushing, pulling, and such manipulation as the operator finds advisable.

Also, I provide readily detachable means to shift the nozzle desired from one size or capacity to another, and also provide adjustable wheel supports for the nozzle to determine the spacing of the nozzle from the floor.

Furthermore, my present construction permits a ready interchange of different types of head thru which the air supply is conducted, particularly when the blower attachment is in use.

I have further provided a propeller or blower, which, in cooperation with its surrounding casing, will permit relatively large articles to be drawn in from the nozzle and forced outwardly and upwardly thru the current of air even at a slow speed of the motor and, hence, relatively slight vacuum.

Other features, novel combinations, and advantages will be hereinafter more fully pointed out and claimed.

Referring to the attached drawings illustrating preferred embodiments of my present invention:

Fig. 1 is a top plan view;

Fig. 2 is a vertical perspective view on a reduced scale;

Fig. 3 is a side view partly in cross-section;

Figs. 4 and 5 are, respectively, a top plan and vertical perspective view showing the blower attachment;

Fig. 6 is a vertical view partly in cross-section of the blower attachment and air-controlling means therein;

Fig. 7 is a cross-sectional view on the line 7—7 of Fig. 8;

Fig. 8 is a cross-sectional view illustrating one form of interchangeable head and air-distributing device, and

Figs. 9 and 10 are cross-sectional views, respectively, of a modified form of interchangeable head and air distributor.

Referring to the drawings, an open framework designated generally at 10 carries a pair of wheels 12—12 and supports a motor, either gasoline or electric, designated at 15, arranged centrally of the supporting frame, which frame carries a vertical waste-receiving cylinder 16 fitted with the removable top 18. The waste-receiving cylinder 16 fits into a flanged base 20 supported on the top of the frame and arranged to permit the lifting out of the cylinder to remove the contents. A pair of handles 21—21 extend from the frame rearwardly of the machine in convenient height for the operator. The cylinder 16 and base 20 are held in assembled position by clips 22, see Figs. 2 and 5, secured to the base 20 by a chain, and said clips fitting into handles 23 at two or more points around the cylinder. The removable top 18 is also secured by a set of similar links 24 attached to a circular rib 25 in a groove in the inside of the top part 18, as shown in Fig. 2.

The motor 15 turns a specially formed propeller or fan 27 enclosed in a circular casing 28 and with a substantial and uniform space between the outer ends of the propeller or fan blades and the interior of the casing. Said space is indicated at 30 and is important to permit bulky waste material to be sucked in by the propeller and then blown outwardly and upwardly thru a conduit 31 into the removable top 18, preferably thru an opening 33 on the side of the top, as best shown in Figs. 7, 9, and 10 to give a rotary swirling action to the air current and cause the dust, dirt, and bulky material to be thrown by centrifugal force against the outer walls of the waste receptacle 16, thus facilitating efficient precipitation of such material into the

receptacle. A gas tank 17 is arranged as shown in Fig. 3, or may be fitted as shown at 75 in Figs. 5 and 6.

The surplus air is then conducted thru a central dome-shaped fixture 35 leading from the central part of the removable top 18 and into a textile bag 36, where the air is dispersed into the pores and interstices in the bag and collecting any further fine dust created by the air current.

Removably secured to the front of the casing 28 is a nozzle 40 attached to the casing 28 by a plate 41, secured by a plurality of thumb screws 42—42 so that the nozzle can be readily removed and replaced and also to facilitate assembling. This nozzle consists of a tubular member which is flared outwardly to define an elongated rectangularly shaped aperture or mouth 44. This mouth 44 constitutes a passageway through which material may be drawn by suction of the propeller. Material thus raised by suction is drawn upwardly by the fan, propelled upwardly through the conduit 31 and thence passes through the opening 33 into the container 16.

In order to adjust the distance of the mouth of the nozzle 44 from the floor, I provide a pair of rollers 45—45 depending from lugs 46—46 thru which the threaded stem holding each roller passes and receives an adjusting thumb nut 47 to raise or lower the mouth 44 as desired.

It may be desirable to provide an opening 50 in the front of the nozzle 40 giving access into the same in case some large or bulky object is caught and also to observe the action of the suction operation of the apparatus and, if desired, at this point I may attach a counterweight 51, Fig. 4, to counterbalance the weight of the air chute and attachments when the latter are secured to the machine, see Figs. 4 and 5, to insure the holding of the nozzle mouth 44 in its downward position as the operator wheels the apparatus along the floor, the entire device, motor, receptacle and attachments being substantially balanced over the wheels for easy turning and manipulation, as above noted.

Referring to the modification shown in Figs. 4, 5, and 6, wherein I have illustrated the blower attachment particularly intended for use in textile mills or other plants, wherein it is desirable and important to clean out underneath machines, tables, stands, or the like which are inaccessible for cleaning purposes, I remove the top 18 with the dome-shaped fixture 35 and attached bag 36 and replace the same with a top member 55 and dome 61, connecting the top 55 to conduit 31 thru an opening 56, corresponding to 33 in the form shown in Figs. 1 and 2, said member 55 being attached to a downwardly extending air chute 60. The air chute 60 has an outlet 58 in which a screen 59 is fitted.

The chute 60 has an internal butterfly valve 65 to be adjusted by an outside length 66, see Fig. 5, to control the flow of air downwardly thru the chute 60 in the desired amount, the surplus air current being deflected by the outlet 58 thru the screen 59. Thus the operator provides just the right amount of air current supplied from the blower to blow out dust, dirt, and accumulated obstacles underneath the machine or other obstruction and not too much draft to cause the dust and dirt to permeate the atmosphere.

The chute 60 is formed with its bottom portion extending in diametrically opposite directions as at 67 and 68, opening laterally of the machine so that an air blast from the motor-driven blower may be directed underneath the machine in the area to be cleaned, and a butterfly valve 70 is provided to direct the current in either right or left direction, said valve being regulated by the outside handle 71.

It will thus be appreciated that the operator can readily direct the blast of air and the amount necessary or desirable for most efficient action as the machine is rolled during the floor-cleaning operation. As above noted, the motor can be either a gasoline-driven motor or an electric motor, preferably a gasoline motor with its supply tank 75 fitted above the motor and underneath the re-

ceptacle 16, all in balanced relation with the motor. A water supply tank 76 and filler cap 77 is supplied to connect with the engine exhaust and act as a flame arrester.

A remote throttle control 80 (or a switch control for electric power) extends upwardly to a hand-hold 81 adjacent the end of one of the handles 21, as best shown in Fig. 5. The hand-hold or grip 82 can be supplied at the end of each handle 21 and a brace 83 with links 84—84 extending from the brace to the handles reinforcing the same gives strength to the handles when tilting the machine for rolling along on the supporting wheels only. These wheels 12—12 may be rubber-tired, as indicated in Figs. 1 and 6, if desired.

The entire machine is, preferably, gasoline-driven and, hence, self-contained and its operation is not limited by the length of the electric cord which would be customary, if an electric motor is used. I find that a two H. P. gasoline engine is amply sufficient to create the air input suction and the upward and outgoing air blast, and that a one H. P. electric motor is similarly sufficient for ordinary work.

The advantage of having a removable top or cap enables me to substitute different types of head members to allow the articles carried by the upward blast to be deflected into the receptacle 16. One of such interchangeable head devices is shown in Figs. 7 and 8, wherein the head 84 is fitted with a centrally depending perforated tubular member 85 opening at the top, as indicated at 86, into this type of cap 61. Further time is thus given the articles carried by the air blast thru the pipe 31 to drop down into the receptacle 16 and the air is partially screened as it continues thru the perforated pipe 85 and onwardly into the bag 36, or alternately thru the blower conduit 60 when an interchangeable head with the conduit attached is employed. These interchangeable heads may have a different separator construction, as shown in Figs. 3, 7, 8, 9, or 10 as desired, but preferably I employ a construction which provides a slight back pressure as in Figs. 8 and 10.

Such a modification is shown in Figs. 9 and 10, wherein I provide an inverted truncated cone 88 which may be fitted between the top 58 and the receptacle 16 by a peripheral flange 90, which aids in deflecting some of the lighter materials into the receptacle 16, both the conical member 88 and the perforated pipe device 85 serving to slow down the air current passing thru the top portion before it escapes, thus increasing the speed of separation of the articles in the air current to cause such articles to drop more efficiently from the air carrying them.

In operating my improved suction floor cleaner, particularly in industrial plants, the motor is started and the operator will push the cleaner at ordinary walking speed along the floor thru the corridors, or between rows and batteries of machines, first adjusting the nozzle to desired height to insure that dust, dirt, and relatively bulky articles will be picked up. The speed of the motor is controlled at the handles, so that the operator can adjust the same for the particular work at hand. The air pump sucks in thru the nozzle and then blows upwardly the air blast carrying the articles thus picked up, whereupon the tangential direction of the air blast into the waste receptacle throws the heavy articles centrifugally against the inner walls of the waste receptacle, facilitating the precipitation of the dust, dirt, and other articles by gravity to the bottom of the receptacle.

The inclusion of a central baffle thru which the air escapes in the top of the machine also tends to give a slight back pressure to still further cause the dust and lighter particles to drop, while thus slowing up the exit of the air. Preferably, I also conduct the exit air blast thru the usual type of porous dust bag, which latter will collect in all the lighter particles carried by the air blast which have not been precipitated into the bottom of the waste receptacle.

An important feature of the present invention is the convertibility of the same by directing the air blast from

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the air pump thru a conduit downwardly adjacent the floor to blow laterally of the line of travel of the machine and thus force an air blast underneath tables, obstructions, sets of machines, or the like such as are used in textile plants or other industrial establishments. Thus, the air blast blows thru inaccessible places and the operator can control and adjust the air blast so that it will not stir up too much dust but simply blows out the waste material underneath these inaccessible spots out into the adjoining aisles or spaces where the machine can then pick up same during its line of travel.

The conversion of the machine from dust collection to a downward air blast is readily effected by interchangeable tops or domes, as herein explained and illustrated. This convertibility is believed to be a distinct novelty in this art, as well as the development of the cleaning apparatus suitable for industrial plants, and with specially designed air pump and blower elements to suck in and force out relatively bulky and large articles heretofore beyond the capacity of ordinary suction cleaning apparatus. The plate 50 can be removed to increase air supply thru the down-blast chute 60, if desired.

I claim:

1. In a mobile power actuated machine for cleaning floors, a frame, a pair of wheels mounted for rotation at the underside of said frame, a motor located on said frame and substantially centered above said wheels, a vertically extending waste receptacle removably supported on said frame directly above said motor and centered over said wheels, said waste receptacle having a waste inlet opening formed in the upper end thereof, a vertically extending waste conduit located immediately adjacent said waste receptacle and communicating with said waste inlet, said motor having a shaft projecting forwardly of said frame at a point immediately below said waste conduit, a blower fan below said waste conduit discharging into the same and operatively connected to said shaft, a suction nozzle connected to an inlet of said blower fan, said waste receptacle further having an outlet opening at the upper end thereof, and means connected to said outlet opening for conducting a blast of air downwardly and discharging it laterally across said floors, said means being in the form of a removable attachment including an elongated vertical tube positioned closely adjacent said waste receptacle, said tube having an upwardly directed branch discharge opening at its upper end and air discharge means at its lower end, and valve means between said vertical tube and said branch discharge opening for con-

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trolling the amount of air diverted through said branch discharge opening.

2. In a mobile power actuated machine for cleaning floors, a frame, a pair of wheels mounted for rotation at the underside of said frame, a motor located on said frame and substantially centered above said wheels, a vertically extending waste receptacle removably supported on said frame directly above said motor and centered over said wheels, said waste receptacle having a waste inlet opening formed in the upper end thereof, a vertically extending waste conduit located immediately adjacent said waste receptacle and communicating with said waste inlet, said motor having a shaft projecting forwardly of said frame at a point immediately below said waste conduit, a blower fan below said waste conduit discharging into the same and operatively connected to said shaft, a suction nozzle connected to an inlet of said blower fan, said waste receptacle further having an outlet opening at the upper end thereof, and means connected to said outlet opening for conducting a blast of air downwardly and discharging it laterally across said floors, said means being in the form of a removable attachment including an elongated vertical tube positioned closely adjacent said waste receptacle, said tube having an upwardly directed branch discharge opening at its upper end and oppositely directed air discharge nozzles at its lower end, valve means between said vertical tube and said branch discharge opening for controlling the amount of air diverted through said branch discharge opening, and valve means at the lower end of said tube for selectively directing the air discharge through one or the other of said nozzles.

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