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J. H. LONGSHORE ET AL

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VACUUM SCRUBBER

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2 Sheets-Sheet 1

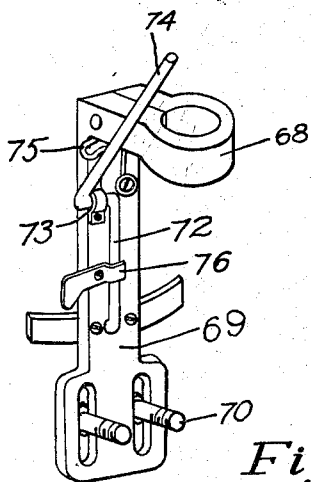
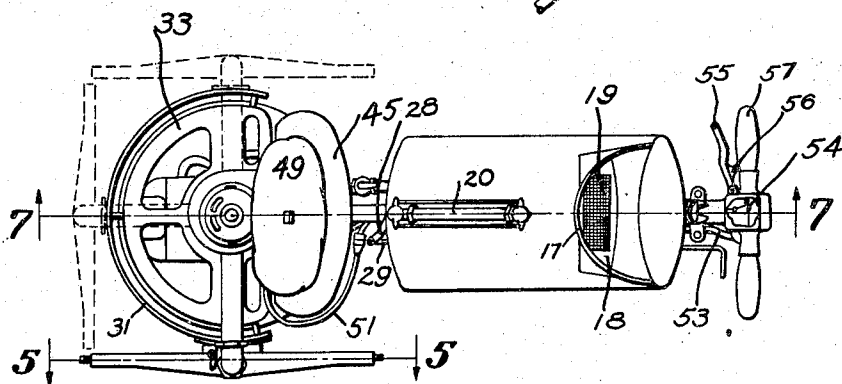
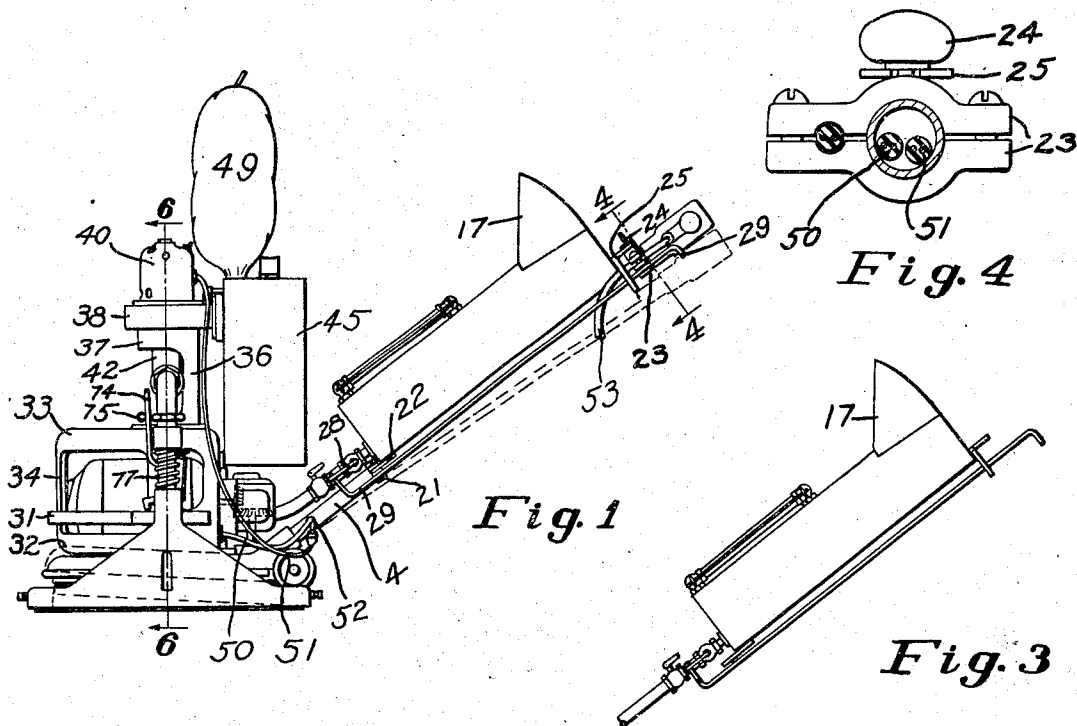


Fig. 2

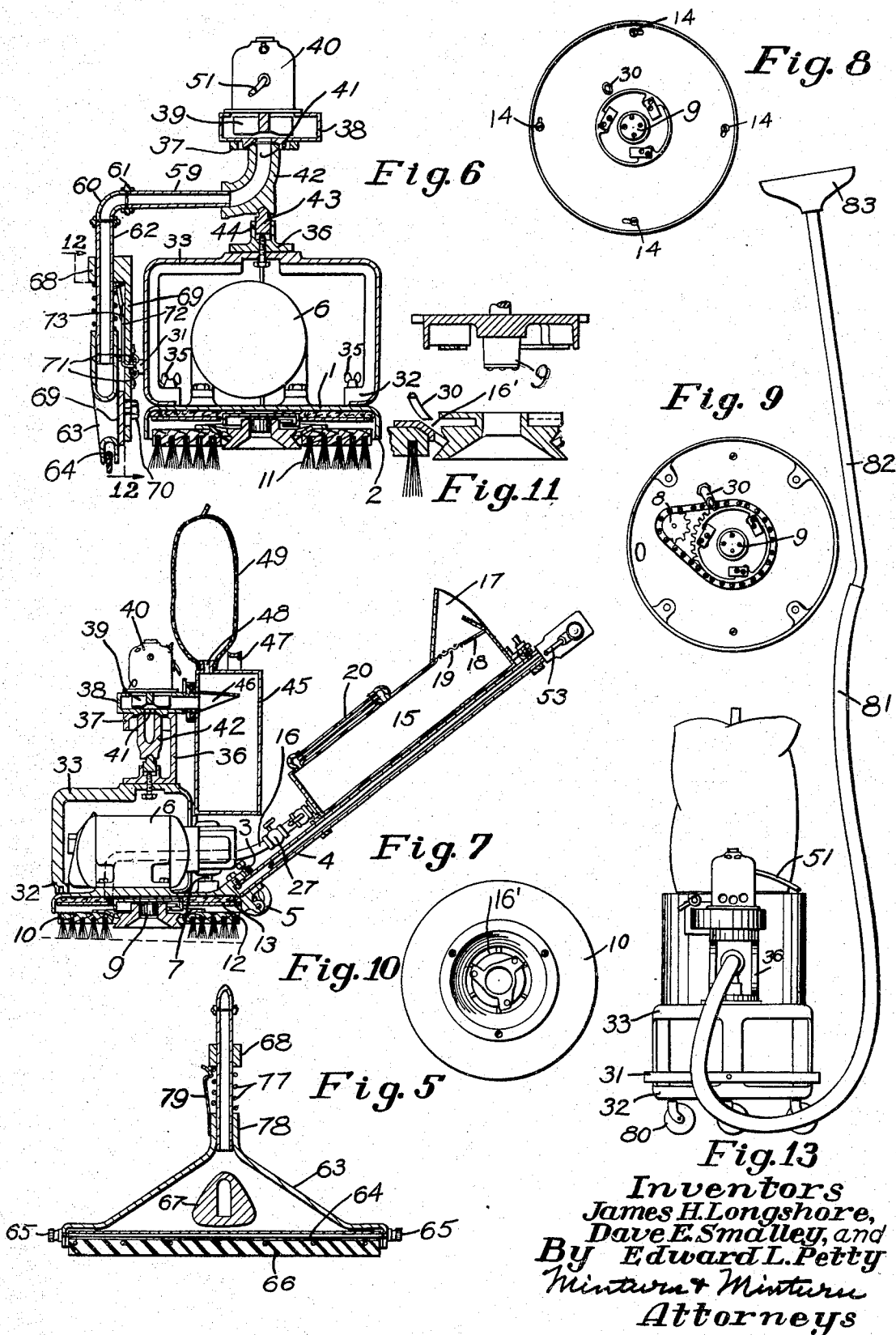
Fig. 12

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UNITED STATES PATENT OFFICE

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VACUUM SCRUBBER

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15 Claims. (Cl. 15—50)

This invention relates to improvements in machines for cleaning floors and floor coverings and to pneumatic means for progressively depositing the refuse material, dry, wet or liquid, as the case

5 may be, in a receptacle carried by the machine.

Greater efficiency is obtained with a machine operating laterally and the concentrated weight type is more efficient than when the weight is divided by being partially supported on wheels.

10 A particular object of the invention is to provide a machine which may be operated with all of the weight on the brush, backwards and forwards and also laterally, in any of those directions at the will of the operator.

15 In cleaning rugs and fabric floor coverings it is very desirable to remove dust, lint and loose particles before scrubbing with suds, and it is equally desirable to remove the dirty suds as quickly as possible, to prevent soaking the rug and to prevent the dirty solution from drying in the rug. An important object of this invention is to provide a machine which will operate as a dry dust vacuum cleaner when moved laterally in one direction, then as a scrubber when moved laterally

20 in the opposite direction, supplying its own suds, and again by reversing its direction of travel to immediately pick up the dirty lather and suds and deposit them in a tank carried by the machine. Another object is to provide a scrubbing machine with an adjustable vacuum nozzle that can be easily and quickly adjusted to a position in front of, or on either side of the machine, to suit the convenience of the operator or varying conditions of use.

30 A further object is to provide a vacuum device for a scrubbing machine which can be raised free from the floor and held there making the machine quickly available for polishing without the removal of the vacuum mechanism.

40 The object also is to provide means for easily and quickly removing the whole vacuum mechanism from the rest of the machine, for use in cleaning draperies, upholstered furniture and the like, leaving the polishing machine intact for separate use.

50 Another object is to provide a nozzle for the vacuum device which will adjust itself automatically to an uneven floor surface and to the gradually wearing off of the brush bristles; also to provide a squeegee in the nozzle which is automatically adjustable to hold dust, liquid, or other matter to be picked up, where the full suction of the vacuum can act to remove it; also to provide a squeegee which can be easily renewed at small cost.

We accomplish the above, and other objects which will hereinafter appear, by the mechanism illustrated in the accompanying drawings, in which—

Fig. 1 is a view in side elevation of a scrubbing machine embodying one form of our complete invention;

Fig. 2 is a top plan view of same, showing other positions of the vacuum nozzle in dotted lines;

Fig. 3 shows the suds tank removed from the handle and the rest of the machine;

Fig. 4 is a cross section on the line 4—4 of Fig. 1;

Fig. 5 is a longitudinal section of the vacuum nozzle on the line 5—5 of Fig. 2;

Fig. 6 is a section on the line 6—6 of Fig. 1;

Fig. 7 is a section on the line 7—7 of Fig. 2;

Fig. 8 is a plan view of the under side of the body of the machine with the brush removed showing its clutch half;

Fig. 9 is a view of the same with the cam plate removed to show the sprocket reducing gear;

Fig. 10 is a plan view of the top of the brush body showing its clutch half;

Fig. 11 is a vertical section of the two clutch bearing members ready for cooperative assembly;

Fig. 12 is a perspective view of the nozzle-supporting hanger, and

Fig. 13 shows the vacuum device removed from the rest of the machine and mounted on casters and equipped for use in cleaning draperies and the like.

Figures 4 to 7 inclusive are on a larger scale than the other figures of the drawings.

Referring to the drawings, the machine body comprises a plate 1, here shown as circular although it may be oval, rectangular, or otherwise, and a depending marginal flange 2. An integral lug 3 at one side has a socket in which a push bar handle 4 is removably secured. Under the lug 3 a cranked axle is journaled and a pair of wheels 5 mounted on the ends of the axle may be lowered to support that side of the body, or elevated out of floor contact.

Mounted upon the plate 1 is an electric motor 6, the armature shaft of which bears a bevel wheel which meshes with a similar wheel on the upper end of a shaft 7 vertically mounted in bearing support by the plate. A sprocket wheel 8 on the lower end of shaft 7 is drivingly connected by a link belt with a larger sprocket wheel fixed on a hub 9 concentrically journaled below the plate 1. The lower end of the hub 9 terminates with a clutch half.

Mounted concentrically of plate 1, and sur-

rounded by the flange 2, is a scrubbing and/or polishing brush, comprising a circular wooden body 10 supporting annular rows of depending bristles 11 and as here used, of a type illustrated and described in Patent No. 2,021,608, issued Nov. 19, 1935, but other brush structures may be used. The brush is preferably removable and to that end the body 10 is provided with a clutch half which mates with that on the hub 9, whereby the brush is rotated from the hub, but is readily separable from its mounting and driving posts. The sprocket gears are protected by a lower metal plate 12 and felt gasket 13 which are removably secured by screws 14 as shown in Fig. 8.

The brush may be tilted to throw the weight of the machine on the front or rear of the brush by raising or lowering the handle bar 4. Thus, by raising the outer end of the handle bar the weight will be greatest upon the far side of the brush, which, if the brush is being driven counterclockwise, will cause the machine to travel to the left of the operator; but by lowering the handle bar the weight will be on the near side of the brush or side closest to the operator and the machine will travel to his right, and will continue to scrub or polish during both travels.

For use as a scrubber liquid soap suds is supplied from a tank 15, through a rubber hose 16 connected with the bottom of the tank and connects with a tube 30 discharging through the plates 1 and 12 into a channel 16' in the body 10 of the brush, from which the suds is distributed to the bristles. The tank is closed at both ends and has a spout 17 near its upper end through which it is filled. It has a partition 18 with a strainer 19, and is provided with a glass gauge 20 to show the contents of the tank. A two-part band 21 is clipped to the lower part of the handle bar 4 and that end of the tank has a tongue 22 which is slipped between the two parts of the band to retain that end of the tank. A like band 23 is clipped to the upper end of the bar 4 and carries a wing bolt 24, which is straddled by a bifurcated tongue 25 from the tank. By slipping the hose 16 off of the tube 30 at the brush end and turning wing bolt 24, the tank may be removed from the machine as shown in Fig. 3. This is done when dry-cleaning is in progress.

The pipe 16 has a valve 27 by which the liquid from the tank may be cut off. It also has a second valve controlled by a handle 28 which is connected with the cranked end of a rod 29 that extends up to within reach of the operator's hand and terminates with a cranked end for his manipulation of the valve. The vacuum mechanism is assembled on a body, here shown as comprising a base ring 32, which rests upon the plate 1, a horizontal member 33 located above the motor 6 and supported from the ring 32 by vertical posts 34. 31 is a guard rail and support for the nozzle hereinafter to be described. The body as a whole is removably secured to the plate 1 by bolts having wing nuts 35, for convenient manipulation in removing the vacuum mechanism from the scrubber.

A standard 36 is secured to the top of the horizontal member 33 and supports an integral ring 37, upon which a fan housing 38 is mounted. The fan 39 (see Figs. 6 and 7) is operated by an electric motor 40, mounted upon the fan housing. The eye of the fan is opposite an opening 41 in the bottom of the housing and this opening is surrounded by an inwardly beveled flange, as best shown in Fig. 6, which forms a seat for a correspondingly tapered end of an elbow 42, which is

rotatably adjustable on a center-bearing plug 43, against the lower portion of the elbow. This bearing 43 is seated in a socket 44. A set screw, threaded through the member 33 and bottom of the socket, contacts the lower end of the bearing plug 43 and provides means for pressing the elbow 42 into its seat 41.

Secured by tongues similar to those described for the suds tank to the fan housing above and to the base of the vacuum mechanism below, is a tank 45, into which the fan housing discharges, as shown in Fig. 7, under a hood 46, the function of which is to direct the incoming refuse matter downwardly. The tank has a hand hold 47 by which the tank may be raised to slip its holding tongues out of engagement, thereby leaving the tank free for emptying when full.

Mounted upon the top of the tank 45, on a sleeve 48 is a fabric bag 49 into which dry dust laden air from the tank 45 is discharged during dry-cleaning and the dust retained in the bag while the air escapes through the meshes of the bag, in the familiar manner of pneumatic cleaners.

Electric current is supplied to both motors through conductors 50 and 51, respectively, both of which enter the handle bar 4 through a hole 52 (see Fig. 1), and connect at the top of the bar with a cable 53 that runs to a floor plug (not shown) or other electric source of current. A switch 54, in the handle head (see Fig. 2) is controlled by a lever 55, normally held by a spring 56 away from handle 57, and in position to open the switch and cut off current to the motors except when the lever 55 is pressed against the handle by the hand of the operator. In other words, the motors stop when the operator releases the lever 55 and only run while he presses the lever against handle 57.

The fan 39 creates a suction through the elbow 42. A pipe 59 is fixed to the elbow so it can be used as a leverage in turning the elbow. The pipe extends horizontally far enough to clear the body 32—33 and is connected with an elbow 60 by an easily manipulated coupling 61. The other end of the elbow is connected with a vertical pipe 62 that terminates with a laterally extended nozzle 63. The mouth of the nozzle is an elongated slot with parallel sides, midway between which is a hinge bar 64, which is supported by the nozzle at the two ends of the slot, where it is retained by milled nuts 65, 65. Wrapped around the bar 64 is a metal split-sleeve U-shape in cross section, forming a hinge connection and attaching means for a flexible strap 66, here shown as made of rubber, which extends for an appreciable distance below the mouth of the nozzle to contact the floor or floor covering and act as a squeegee and also as a valve to control the flow of air into the nozzle from one side to the other of the rubber strap, depending upon the direction of travel of the machine.

In order to equalize the inflow of air to the nozzle, we form the hollow interior in two diagonal channels by means of the barrier 67 which acts as a spreader.

Fixed to the pipe 62, near the upper end of the pipe, is a collar 68, and depending from the collar is a hanger 69 which is slotted vertically at its lower end to guide a retaining bolt 70 passing through the slot into a thickening of the nozzle wall 63. The hanger 69 has a pair of clips 71, 71 with adjacent ends formed in hooks that receive the bar 31 between them. The bar 31 has holes at the front of the machine and on two op-

posite sides for the engagement therein of the end of lever 72 to lock the nozzle at those positions. The lever 72 is fulcrumed at 73 (Figs. 6 and 12) and is continued thence upwardly into a handle 74 (Figs. 1 and 12). A spring 75 holds the lever normally in locked position where it may be retained by a wedge 76 to guard against accidental release.

A spring 77 between the fixed collar 68 and the tubular stem 78 of the nozzle yieldingly presses the nozzle against the floor. A spring bar 79 has a hook with sloping end causing the bar to spring out and pass the collar 68. The hook then engages the top of collar 68 by the spring action of the bar and locks the nozzle in raised position out of contact with the floor, until released by pushing the hook off of the collar, thereby bringing spring 77 into action.

With the assembly of parts and their positions shown in Figs. 1, 2, 6 and 7, the weight of the machine will be on the front of the brush and upon the brush being driven clockwise by the motor the machine will move to the operator's left or in the direction of the nozzle 63. The squeegee in the nozzle will tip toward the brush closing the passageway on that side and opening it on the opposite side. The fan will create a suction causing the nozzle to dry clean the surface over which it passes and the brush will follow with a scrubbing action. Then by lowering the handle bar to the position shown by dotted lines in Fig. 1 the weight will be on the rear of the brush, causing it to move the machine laterally to the right of the operator. The nozzle follows and tilts in the opposite direction causing the rubber strap 66 to swing over and to act as a squeegee, scooping up the dirty suds into the suction which is now on the side toward the brush. The dirty suds is deposited in the tank 45, from which the dust collected by the preceding dry-cleaning travel has escaped into the bag 49.

When it is desired to operate the machine in a straight, forward and backward direction, the nozzle 63 is changed to a front position as indicated by dotted lines in Fig. 2. The wheels 5 may be turned down into use if it is not desired to have the entire weight of the machine on the brush.

In some situations the cleaning can be more easily or effectively accomplished with the nozzle 63 on the right side of the machine as shown by dotted lines in Fig. 2, in which adjustment the machine operates similarly to the manner first described.

The entire suction mechanism may be easily removed by disengaging the two wing bolts thereby leaving the brush to be used as a scrubber or polisher.

The suction mechanism as above removed may be mounted on caster wheels, holes for which are provided in the ring 32, the nozzle uncoupled at 61 and a hose 81 attached to the tube 59, as shown in Fig. 13. The other end of the hose has a tubular handle 82 terminating with a suction nozzle 83, and the device can be used for cleaning curtains, upholstered articles, and the like fabrics.

By the removal of the brush and with the pneumatic device on the machine as shown in Fig. 1, and the nozzle adjusted to the front, the machine may be run forward and back as a pneumatic sweeper. In this use the suds tank is taken off as unnecessary.

While we have described our invention in language more or less specific as to structural features it is to be understood that the invention is not limited to the specific details shown, but that

the means and construction herein disclosed comprise the preferred mode of several forms of putting the invention into effect and the invention, therefore, is claimed in any of its forms or modifications within the legitimate and valid scope of the appended claims.

Having thus described our invention, what we claim is:

1. In a floor and floor cover cleaning machine, a rotating brush mounted beneath the machine, a rigid member pivoted to the machine, a nozzle carried by the rigid pivoted member and adjustable to a position in front or at either side of the brush, and means carried by the machine for creating air suction through the nozzle at all of its adjustments.

2. In a floor and floor cover cleaning machine, a rotating brush located under the machine, a member pivoted at one end to the machine above and in the axis of the rotating brush, a nozzle carried by the pivoted member and adjustable to a position in front and at either side of the brush, a tube in upper and lower telescoping parts supporting the nozzle for vertical adjustment of the nozzle, means carried by the machine for creating a suction through the tube and nozzle at all of its adjustments, and a handle for causing the machine to travel selectively toward or from the nozzle by varying the elevation of the outer end of the handle, said nozzle having a squeegee member opening the nozzle on the side toward which the machine is moving and closing it on the other side.

3. In a floor and floor cover cleaning machine, a machine body, a horizontally rotating brush mounted beneath the body, a handle bar attached to the machine for machine manipulation, a suds tank discharging suds to the middle of the rotating brush, and a suction nozzle removing suds deposited by the brush, said nozzle being carried by the machine body angularly adjustable around the brush.

4. In a floor and floor cover cleaning machine, a machine body, a horizontally rotating brush mounted beneath the body, a handle bar attached to the machine for machine manipulation, a suds tank supported by the handle and discharging suds to the rotating brush, a discharge nozzle above the middle of the brush, a tube through which the suds from the tank are conveyed to the discharge nozzle, a valve between the tank and nozzle, a suction nozzle carried by the machine body and adjustable horizontally around the brush for removing suds deposited by the brush.

5. In a floor and floor cover cleaning machine, a machine body, a rotating brush mounted beneath the body, a handle bar attached to the machine body for machine manipulation, a suds tank supported by the handle bar and a tubular connection from the tank for discharging suds to the horizontally rotating brush and a suction nozzle adjustable horizontally around the horizontally rotating brush removing suds from the floor and floor cover, said nozzle being connected with the machine body.

6. In a floor and floor cover cleaning machine, having a machine body, a rotating brush mounted beneath the body, a handle bar attached to the machine body for machine manipulation, and a suds tank supported by the handle bar; means for removably securing the tank to the handle bar comprising bands around the bar and tongues fixed to the tank, one of which is slipped under a strap and the other of which is bolted to a strap.

7. In a machine for cleaning floors and floor covers, a machine body, a fan housing supported above and spaced from the body, a rotating fan in the housing, said housing having an eye inlet, a pipe elbow swingingly mounted to discharge through the eye inlet, a nozzle, and pipe connections between the elbow and the nozzle, said nozzle being adjustable around the machine body.

8. In a machine for cleaning floors and floor covers, a machine body, a fan housing supported above and spaced from the body, a rotating fan in the housing, said housing having an eye inlet, a pipe elbow swingingly mounted to discharge through the eye inlet, a nozzle, and pipe connections between the elbow and the nozzle, said nozzle being adjustable around the machine body, and means for retaining a given lateral adjustment of the nozzle relative to the body.

9. In a machine for cleaning floors and floor covers, a machine body, a fan housing supported above and spaced from the body, a rotating fan in the housing, said housing having an eye inlet, a pipe elbow swingingly mounted to discharge through the eye inlet, a nozzle, and pipe connections between the elbow and the nozzle, said nozzle being adjustable around the machine body, and means for retaining a given lateral adjustment of the nozzle relative to the body comprising a curved track fixed relative to the body and having indents, a lever carried with the nozzle having an end entering an indent of the track and a spring normally seating said end.

10. A removable pneumatic cleaner for floor scrubbers and polishers having a body, comprising a vacuum nozzle, a base member carried by the body, means carried by the base member supporting the nozzle in a plurality of positions, a fan housing carried by the base member and having an air inlet, a fan in the housing, a tank supported by said base member, said housing discharging into said tank, a bag air-strainer attached to the tank for dust filtering and air discharge, a pipe fitting swivelly secured by an outlet end over said housing inlet, pipe means interconnecting with said fitting and said nozzle to travel with the nozzle, a motor mounted on said housing connected to drive said fan, and means removably securing said base member to said body.

11. In a machine for the purpose specified, a body, an annular band secured to the body and having a plurality of spaced apart holes, a pneumatic nozzle having a tubular discharge, a suction pipe on which the tubular member of the nozzle is telescopically mounted, a hanger suspended from the suction pipe, a lever pivoted to the hanger and terminating with a bent end engaging one of the holes of the annular band,

and manually controlled means for holding the end of the lever in the hole.

12. In a machine for the purpose specified, a body, an annular band secured to the body and having a plurality of spaced apart holes, a pneumatic nozzle having a tubular discharge, a suction pipe on which the tubular member of the nozzle is telescopically mounted, a hanger suspended from the suction pipe, a lever pivoted to the hanger and terminating with a bent end engaging one of the holes of the annular band, manually controlled means for holding the end of the lever in the hole, a spring normally lowering the nozzle on the suction pipe and a latch hook attached to the nozzle and adapted to engage the top of the hanger to resist the action of the spring.

13. In a floor machine, a body, a hollow handle bar attached to the body, a horizontal rotatable brush removably secured to and under the body, an electric motor mounted on the body and driving the brush, a second electric motor supported from and above the body, an exhaust fan driven by the second motor, a nozzle connected by a conduit with the eye of the fan and adjustable to different sides of the horizontal brush, a handle at the outer end of the handle bar, an electric conductor entering the handle bar through the handle and supplying current to the two motors, and a switch in the conductor at the handle.

14. In a pneumatic cleaner, a suction pipe, a nozzle having a tubular neck telescoping on the pipe, a fixed collar surrounding the pipe, a hanger depending from the collar having one or more longitudinal slots opposite the nozzle, a bolt through each slot seated in the wall of the nozzle and allowing for adjustment of the nozzle longitudinally of the hanger.

15. In a cleaning and scrubbing machine, a circular machine body, a brush rotating under the body, a fan housing supported above the body, a rotating fan in the housing, said housing having an underside inlet opposite the eye of the fan with a depending flange having a tapering opening, a pipe elbow with a tapering end seated in the tapering opening, a pipe extending from the other end of the elbow, the pipe being extended downwardly beyond the circle of the machine body, a nozzle supported by the downward pipe extension, a pivot pin seated in a socket in the bottom of the elbow, and a set screw contacting the bottom of the pivot pin to regulate the pressure of the elbow in its seat in the fan housing, the nozzle being swingingly adjustable about the machine body by the swinging adjustment of the elbow.

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