

Dec. 29, 1970

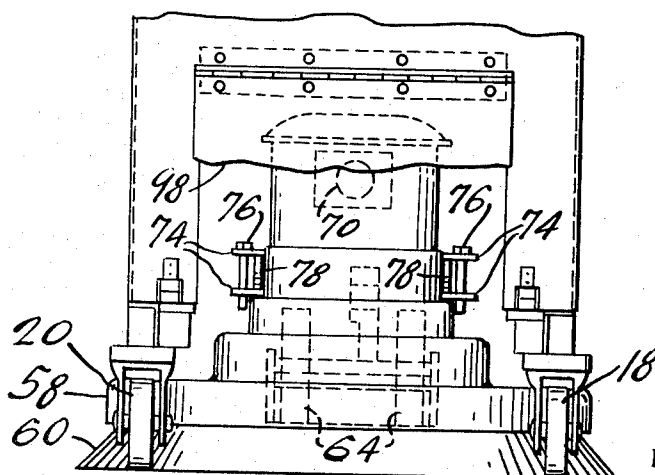
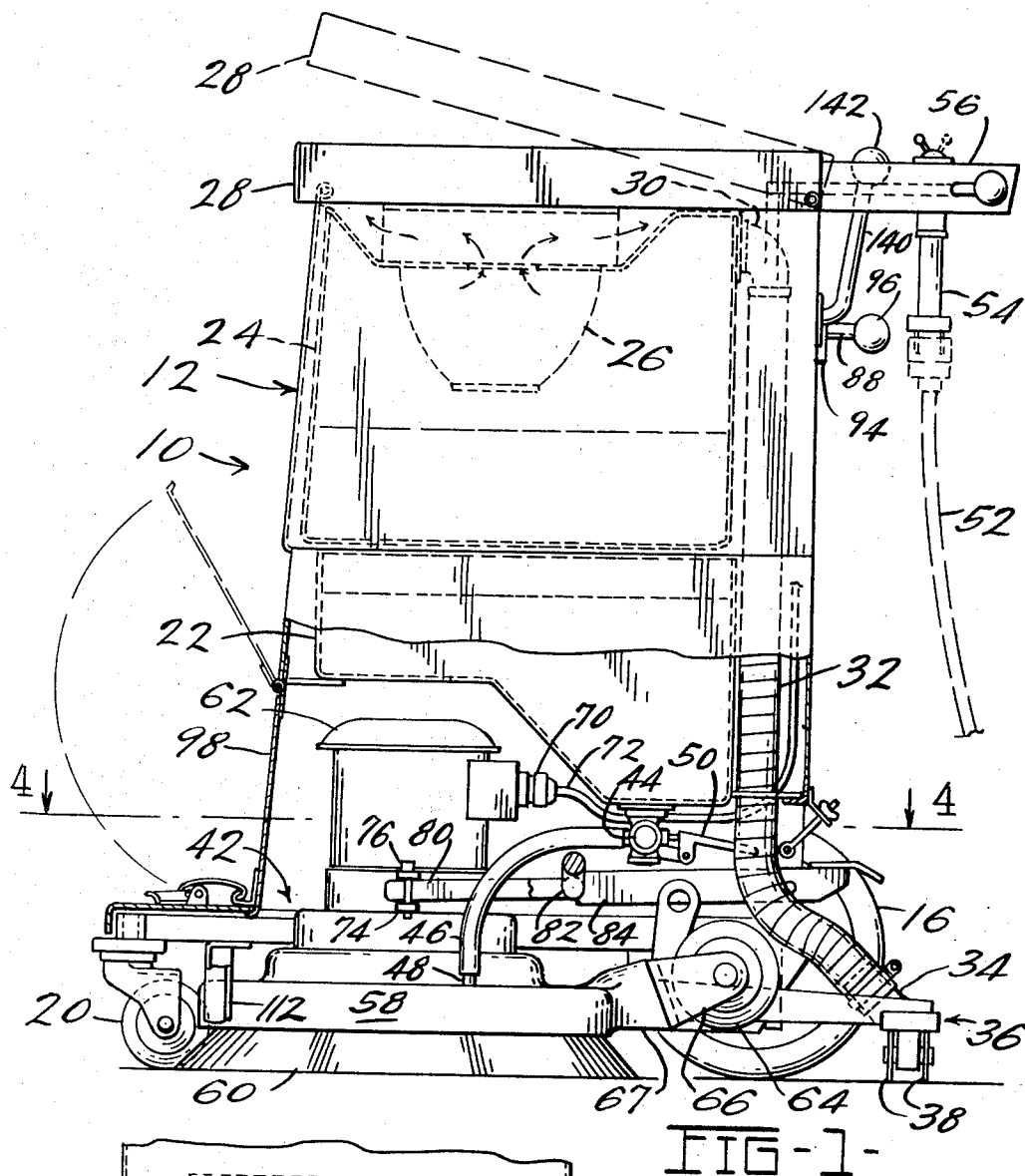
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3,550,181

APPARATUS FOR CLEANING FLOORS

Filed Jan. 24, 1968

4 Sheets-Sheet 1



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4 Sheets-Sheet 2

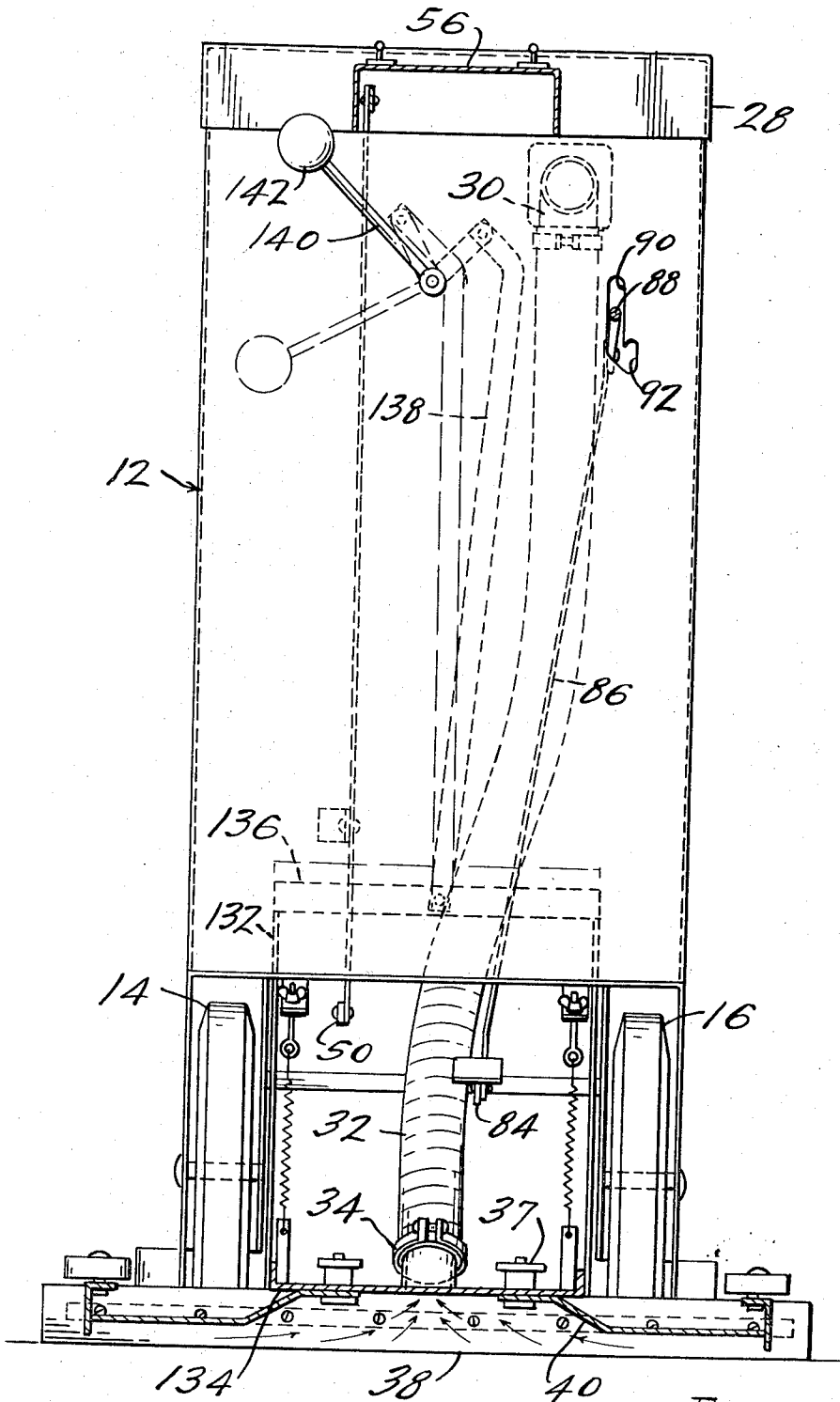


FIG-2-

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4 Sheets-Sheet 3

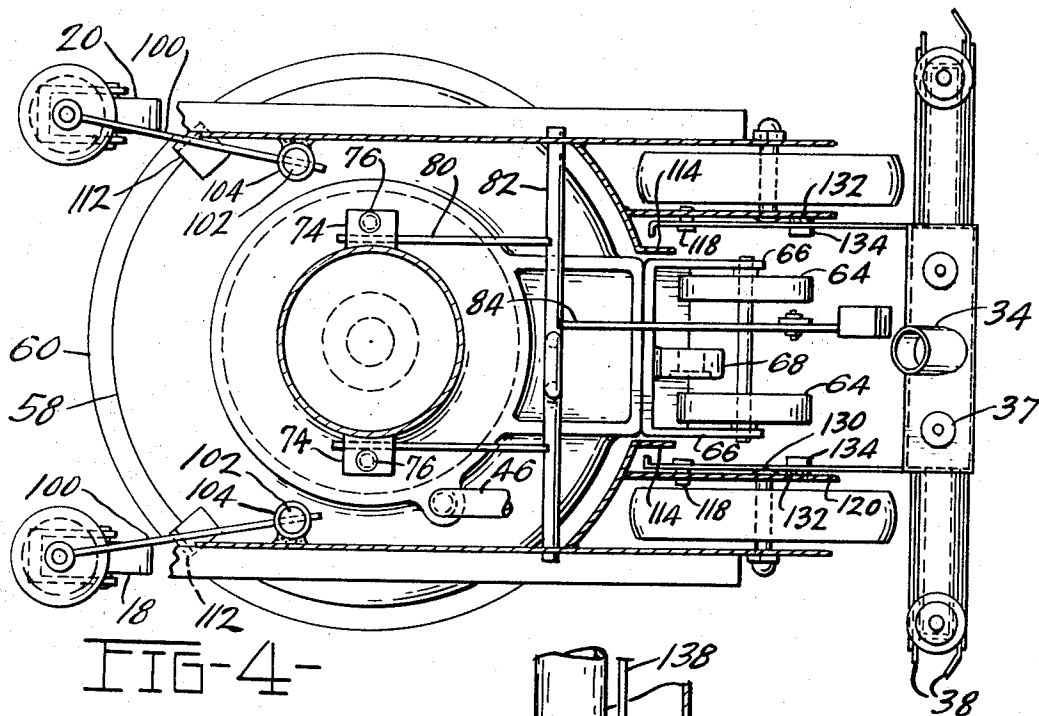


FIG-4-

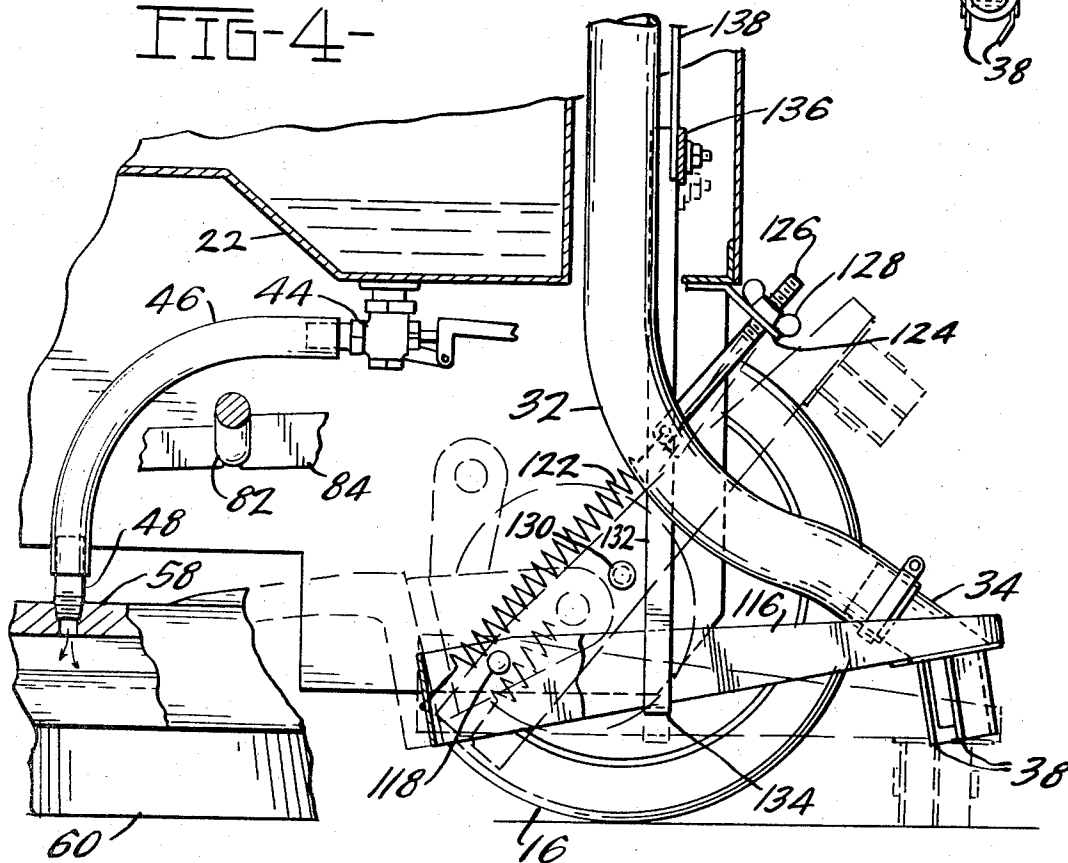


FIG-5-

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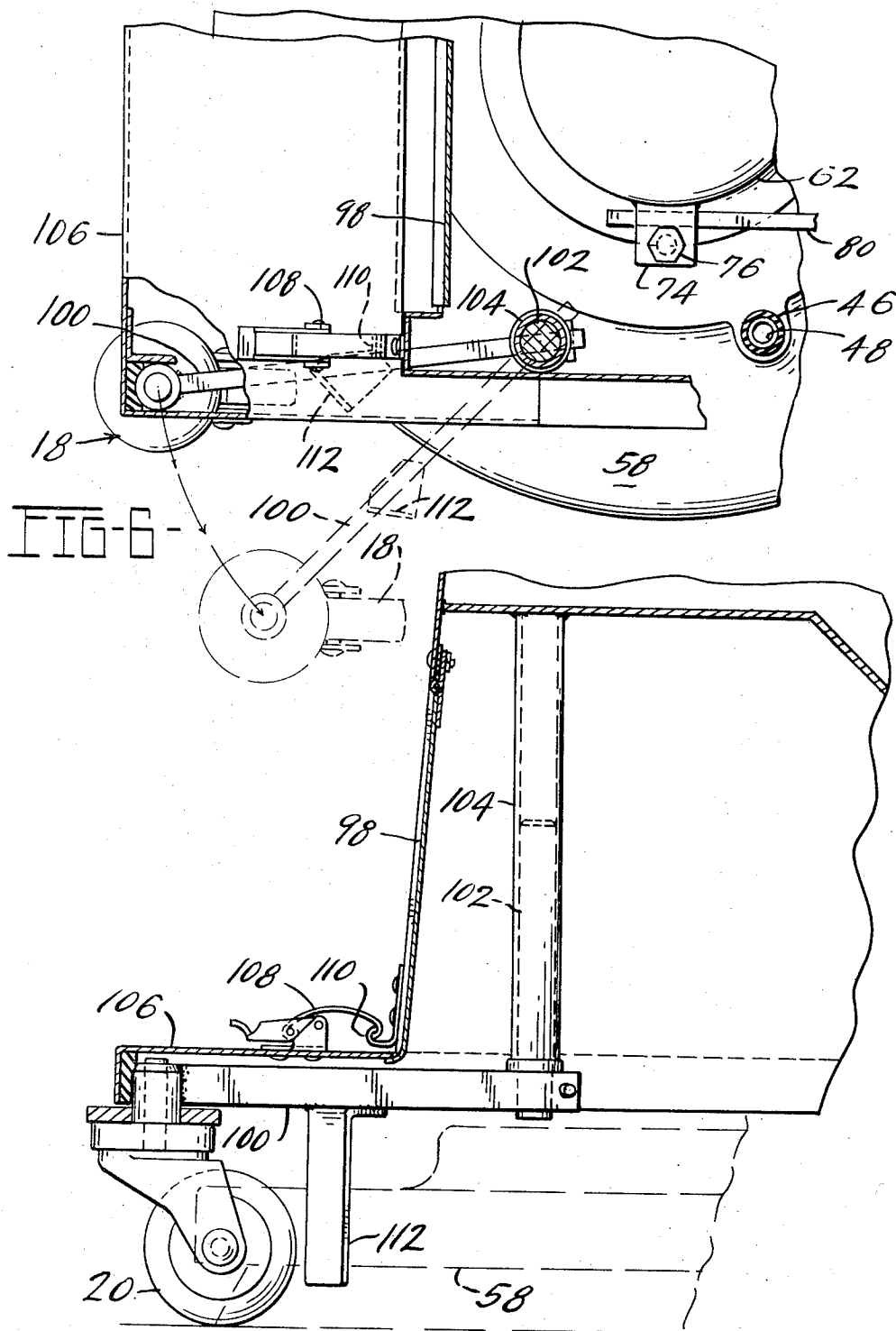


FIG-7 -

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3,550,181

APPARATUS FOR CLEANING FLOORS

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8 Claims

ABSTRACT OF THE DISCLOSURE

A floor scrubbing machine has improved portability, being lighter and easier to transport up or down stairs. The scrubbing machine is of the type having a rotating scrub brush and a rearwardly-mounted squeegee which, in combination with a vacuum system, removes the solution from the floor after scrubbing is completed by the brush. The rotating brush and its drive mechanism are a separate unit from the rest of the machine and can be separated when it is desired to take the machine up or down stairs to another floor, by way of example. The squeegee unit at the rear of the machine also can be retracted so that the rear wheels can be used to support the machine as it is moved up or down stairs. With this arrangement, a single operator can transport the machine as desired. The motor and drive unit also can be operated with a separate handle as a scrubber or waxer, for example, if desired.

This invention relates to an improved floor cleaning machine and particularly one which can be more easily transported.

Floor cleaning machines of various types are becoming more widely used. Whereas such machines previously were reserved primarily for large commercial buildings and factories, such are now tending to be used more and more in small buildings, including small schools, nursing homes, etc. Such buildings usually are multistoried and lack elevator facilities. Therefore, it has become a problem to employ the machine on all floors since it is normally quite heavy and difficult to carry, and the purchase of a machine for each floor is economically unfeasible. Consequently, the situation has deterred purchases of these machines for these types of buildings.

The present invention provides a floor cleaning machine of the type having a rotating brush which scrubs the floor, with a squeegee and a vacuum system located behind the brush to collect and pick up substantially all solution after the cleaning operation. Such machines generally weigh in the order of two hundred to three hundred pounds and are difficult for even two men to carry from one floor to another. In accordance with the invention, however, the machine is made with a separable scrubbing brush and drive unit which can be easily removed from the remainder of the machine and carried to another floor separately. Consequently, the drive mechanism and brush of the machine can be carried as one unit weighing in the order of one hundred pounds with the remainder of the machine moved up or down stairs with the aid of the rear wheels on which the machine is partly supported, this part of the overall machine weighing perhaps one hundred fifty pounds. The combination brush and drive unit also can be used separately as a hand-manipulated floor scrubber, waxer or buffer simply by assembling it with a conventional handle. Thus, the combination of the three components, the wheeled machine, the brush and drive unit, and the handle, can be used for a wide variety of applications.

Further in accordance with the invention, the squeegee and vacuum system located at the rear of the machine

can be retracted fully out of the way of the rear wheels so that the wheels can be free to aid in supporting the machine as it is moved up and down stairs, with the wheels resting on the steps and being relatively easily moved up or down over the risers.

It is, therefore a principal object of the invention to provide an improved floor cleaning machine having the advantages discussed above.

Many other objects and advantages of the invention will be apparent from the following detailed description of a preferred embodiment thereof, reference being made to the accompanying drawings, in which:

FIG. 1 is a side view in elevation, with parts broken away and with parts in cross section, of a floor cleaning machine embodying the invention;

FIG. 2 is a rear view in elevation of the floor cleaning machine shown in FIG. 1;

FIG. 3 is a fragmentary front view of the machine of FIG. 1 showing the brush unit in place;

FIG. 4 is a view in horizontal cross section taken through the floor cleaning machine along the line 4—4 of FIG. 1;

FIG. 5 is an enlarged, fragmentary view in longitudinal cross section of the lower rear portion of the floor cleaning machine with the squeegee unit shown in various positions in dotted lines;

FIG. 6 is a fragmentary view in horizontal section showing a pivotal arrangement for front wheels of the machine; and

FIG. 7 is a fragmentary view in vertical, longitudinal section showing the pivotal wheel arrangement of FIG. 6.

Referring particularly to FIGS. 1 and 2, a floor scrubbing machine 10 embodying the invention includes a main housing 12 supported on two large rear wheels 14 and 16 and two smaller front wheels or casters 18 and 20. The housing 12 includes a cleaning solution tank 22 for supplying solution to the floor for cleaning purposes and an upper recovery tank 24 which receives scrubbing solution from the floor after the scrubbing operation. A vacuum 26 is located in the tank 24 and is supported by a pivoted lid 28. The vacuum unit 26 includes a motor and an impeller which produce a vacuum in the tank 24 to enable the scrubbing solution to be pulled in through an inlet connection 30 connected to a long flexible bellows-type hose 32, the lower end of which is connected to a fitting 34 of a squeegee unit 36. The squeegee unit 36 preferably is connected to the fitting 34 with knob nuts 37 whereby the unit can be quickly disconnected and the hose 32 then used with a separate vacuum cleaning tool for vacuuming draperies, furniture, etc. For this purpose, the tool can have a suitable fitting which connects by means of the knob nuts 37 to the fitting 34. The squeegee unit 36 is of a conventional design and includes squeegee blades 38 which collect the solution and enable it to be picked up through a manifold chamber 40 (FIG. 2).

The cleaning solution for the floor being scrubbed is supplied to a scrubbing unit 42 by means of a remotely-controlled valve 44, a flexible tube 46, and an inlet connection 48 on the scrubbing unit. The valve 44 is controlled by a linkage 50 and an upper control handle (not shown), as is known in the art.

Power for the vacuum unit 26 and for the scrubbing unit 42 is supplied from an external line 52 to a connecting plug 54 associated with an upper control handle and panel assembly 56. By using an external power source, the need for batteries is eliminated and the machine thereby can be substantially lighter than battery-operated models, which contributes further to the relative lightweight and portability of the machine.

In accordance with the invention, the scrubbing unit 42 is of a single disc type commonly used with a handle

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extending therefrom upon which a tank of cleaning solution can be employed, if desired. An operator stands on the floor behind the scrubbing unit 42 and directs the unit through the handle. The unit 42 is suitable for certain scrubbing operations and particularly where buffing or waxing is desired. The unit 42 includes a supporting skirt or plate 58 below which is a large diameter scrubbing brush 60 and on which is mounted a drive motor 62. A splash skirt located around the brush is not shown for clarity of illustration. A pair of wheels 64 extend rearwardly from the skirt 58 and are rotatably carried by ears 66 affixed to a casting or projection 67. As shown, the wheels 64 are stationary and the operator can pivot the unit 42 back so as to rest on the wheels 64 when it is desired to transport the unit from one location to another. In some models, the wheels 64 are pivoted so that they can be swung downwardly when it is desired to transport the unit. A connecting ear 68 (FIGS. 1 and 4) extends upwardly from the skirt 58 between the wheels 64 to provide a pivotal connection for the handle when the unit 42 is to be used apart from the machine 10.

The inlet fitting 48 on the skirt 58 has a slip fit with the solution supply tube 46 so that the two can be easily connected and disconnected when the unit 42 is assembled with and removed from the machine 10. The motor 62 also has a plug connection 70 for making an electrical connection with a line 72 of the machine when the unit and machine are assembled.

In order for the unit 42 to be raised and lowered when in the machine 10, the unit 42 has a pair of ears 74 (FIG. 3) extending outwardly on each side of the motor housing 62 with pins 76 extending through the ears to form openings 78. The openings 78 receive tapered ends of lifting arms 80 (FIGS. 1 and 4) when the unit is assembled with the machine. The arms 80 extend forwardly of a pivot bar 82 rotatably supported by side walls of the housing 12. A foot-operated lever arm 84 extends rearwardly from the pivot rod 82 to a point where it can be moved downwardly by the foot of the operator, if desired. When so moved, the entire unit 42 is raised from the floor to enable the machine 10 to be moved about more easily.

As shown in FIG. 2, a long connecting bar 86 is pivotally connected to the lever arm 84 and terminates in a control rod 88 which extends through an elongate opening 90 in the rear wall of the housing 12. When the unit 42 is raised, the rod 88 is moved into a notch 92 to hold the unit in the raised position. The rod 88 is threaded and has a large nut 94 (FIG. 1) carried thereon which can be turned on the rod to bear against the rear wall of the housing 12, thereby frictionally engaging this wall and holding the rod 88 in any given position in the vertical portion of the opening 90. This enables the operator to set the rod 88 in a desired position by means of a knob 96 and then hold the rod in that position by the nut 94. The pressure on the brush 60 of the unit 42 can thereby be controlled to obtain any desired cleaning action.

When the unit 42 is assembled with the machine 10, a front door or panel 98 of the housing 12 is raised, as shown in dotted lines in FIG. 1, and the machine can then be tilted back to enable the front casters 18 and 20 to clear the skirt 58 of the unit 42, with the casters being in fixed positions relative to the housing. Alternately, the casters can be swung out to the side so that the machine need not be raised at all. In the latter instance, as shown in FIGS. 6 and 7, the casters are rotatably carried by pivotal arms or mounting means 100 which have pins 102 extending into the tubular sockets 104 located at corner portions of the housing 12. When the casters are in their forward or operating positions, they are maintained in position by a cover 106 supported by over-center clamps 108 which engage hooks 110. The clamps 108 are unhooked and the cover is removed when the arms 100 are to be swung outwardly. In this instance,

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the first bar 82 is humped in the middle to clear the connecting ear 68.

Locating flanges 112 are carried by the arms 100 and help maintain the skirt 58 in proper position when the casters are in their forward, operating position. With the flanges 112 in position, the wheels 64 and the ears 66 and the projection 67 of the unit extend into an opening defined by wall flanges 114 (FIG. 4) which also aid in positioning the unit 42 and help prevent the skirt 58 from rotating.

When it is desired to remove the unit 42 from the machine 10, as when the machine is to be moved from one floor of a building to another, the door panel 98 is opened, the cover 105 is removed, and the wheels 18 and 20 swung outwardly. The operator can then reach in and disconnect the electrical connection 70, 72 and remove the hose 46 from the fitting 48. The machine 10 can then be moved backward to separate the unit 42 or the unit can be pulled out. With this arrangement, the overall machine 10 is divided into two units, with the scrubbing unit 42 weighing in the order of one hundred pounds and the remainder of the machine 10 weighing in the order of one hundred fifty pounds. The unit 42 can then be carried up or down stairs by the operator and the remainder of the machine moved up or down with the aid of the large diameter rear wheels 14 and 16. The recovery tank 24 also can be removed to further decrease the weight of the machine.

In order for the wheels 14 and 16 to support the machine during its movement up and down stairs, the squeegee unit 36 must be moved upwardly out of the way of the wheels 14 and 16 and preferably above a horizontal line through the axis of the wheels so that the rear circumference of the wheels will be free to contact the risers of the stairs as the machine is moved up or down them by the operator, with the wheels always in contact with the steps or risers to aid in supporting the machine.

As shown particularly in FIGS. 1, 2, 4, and 5, the squeegee unit 36 is carried by a pair of arms 116 which are pivotally supported through pins 118 to inner wheel walls 120. When the squeegee unit 36 is in its lower position in contact with the floor, pressure is maintained by springs 122 which are connected to the inner ends of the arms 116 and are connected to upper ears 124 by rods 126 and wing nuts 128 which enable the pressure of the squeegee on the floor to be adjustable. When the squeegee is in its uppermost position, as shown in dotted lines in FIG. 5, the spring moves to an over-center position with respect to the pins 118 and thereby aids in holding the arms upwardly. The arms in their upper position also are held by the heads of axles 130 for the large rear wheels 14 and 16, the axle heads serving as detents.

The unit 36 can be raised to the retracted position by hand. It can be moved between a position off the floor and the operating position by the mechanism shown in FIG. 2. This includes a pair of side plates 132 having lower flanges 134 engaging the lower edges of the arms with the plates 132 connected by a cross bar 136. This is pivotally connected to a link 138 and to an L-shaped operating arm 140 having a knob 142 located at the top of the machine. The arm 140 can be swung downwardly to raise the squeegee slightly to the solid line position of FIG. 5 to clear the floor. The squeegee unit is moved by hand when it is to be retracted fully so as to enable the rear wheels to aid in supporting the machine when being moved up and down stairs. When the squeegee unit is moved to the retracted position, the bellows-type hose 32, which has been under tension, simply contracts and thereby withdraws behind the rear end wall of the housing 12.

Various modifications of the above described embodiment of the invention will be apparent to those skilled in the art, and it is to be understood that such modifications can be made without departing from the scope of the invention, if within the spirit and the tenor of accompanying claims.

We claim:

1. In combination, a floor scrubbing machine including two front and two rear wheels, arm means movably carried by said machine, a scrubbing unit comprising a supporting plate, a scrub brush below said plate, and a motor mounted above said plate and connected to said scrub brush to rotate said brush, said scrubbing unit further having arm-receiving means positioned to cooperate with end portions of said arm means, said arm means being located to engage said arm-receiving means when said brush is positioned at the same level as the wheels when all four wheels are on the ground and said machine is moved forwardly toward said scrubbing unit, to enable assembly of said machine and said scrubbing unit, means carried by said machine for moving said arm means to raise and lower said scrubbing unit, flanges, and means mounting said flanges on said machine for movement between a position in which the flanges fit over a forward portion of said supporting plate to prevent relative movement between said support plate and said machine to prevent said arm means from separating from said arm-receiving means, and a position in which the flanges are spaced from said scrubbing unit to enable said scrubbing unit to be separated from said machine by separation of said arm means and said arm-receiving means.

2. The combination according to claim 1 characterized by said scrubbing unit having a projection extending therefrom and spaced from said arm-receiving means, and said machine having means for receiving said projection when said arm means engages said arm-receiving means to help prevent rotation of said scrubbing unit relative to said machine.

3. The combination according to claim 1 characterized further by said scrubbing machine having a squeegee unit positioned behind the rear wheels, a pair of arms pivotally supporting said squeegee unit from said machine, whereby said squeegee unit can be moved upwardly to a retracted position above a horizontal line through the axes of said rear wheels to enable said scrubbing machine to be moved up and down stairs supported on the stairs only by said rear wheels, and means for aiding in holding said squeegee unit in the retracted position.

4. A floor scrubbing machine comprising a housing, wheel means supporting said housing, a cleaning solution tank supported by said housing, a supply valve associated with said cleaning solution tank for controlling the flow of solution therefrom, a recovery tank supported by said housing, a squeegee unit located at the rear of said machine, a vacuum system including a hose connecting said squeegee unit and said recovery tank to carry solution from said squeegee unit to said recovery tank, a separate scrubbing unit, means associated with said machine for positioning said scrubbing unit in a predetermined position substantially entirely under said machine, said scrubbing unit including a solution inlet, a flexible tube connected to said valve for supplying solution to said inlet, said scrubbing unit including an electrical motor having an electrical connection, and an electrical line carried by said machine for supplying power to said motor through said electrical connection, arm means pivotally supported by said machine and engageable with said scrubbing unit, means for raising said arm means to raise said scrubbing

unit, flanges, and means mounting said flanges on said machine for movement between a position in which the flanges cooperate with a forward portion of said scrubbing unit to prevent relative movement between said scrubbing unit and said machine to prevent said arm means from separating from said scrubbing unit, and a position spaced from said scrubbing unit to enable said scrubbing unit to be separated from said machine by separation of said arm means from said scrubbing unit.

5. A floor scrubbing machine according to claim 4 characterized by said means for raising said arm means constituting a foot-operated lever.

6. A floor scrubbing machine according to claim 4 characterized further by said wheel means including a pair of large diameter rear wheels, and means for raising said squeegee unit to a position above a horizontal line extending through the axes of the rear wheels.

7. A floor scrubbing machine according to claim 4 characterized by said wheel means including a pair of front wheels, and said flange-mounting means comprising additional arm means pivotally connected at end portions to each of said front wheels and pivotally supported at portions spaced from said end portions by said housing to enable said front wheels to be swung to the side to facilitate assembly of said scrubbing unit with said machine.

8. In combination, a floor scrubbing machine including two front and two rear wheels, arm means movably carried by said machine, a scrubbing unit comprising a supporting plate, a scrub brush below said plate, and a motor mounted above said plate and connected to said scrub brush to rotate said brush, said scrubbing unit further having arm-receiving means positioned to cooperate with end portions of said arm means, said arm means being located to engage said arm-receiving means when said brush is positioned at the same level as the wheels when all four wheels are on the ground and said machine is moved forwardly toward said scrubbing unit, to enable assembly of said machine and said scrubbing unit, means carried by said machine for moving said arm means to raise and lower said scrubbing unit, additional arm means pivotally connected to each of said front wheels and pivotally supported by said machine at a point spaced from the pivot connection with the front wheel to enable said front wheels to be swung to the side to facilitate assembly of said scrubbing unit with said machine.

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