

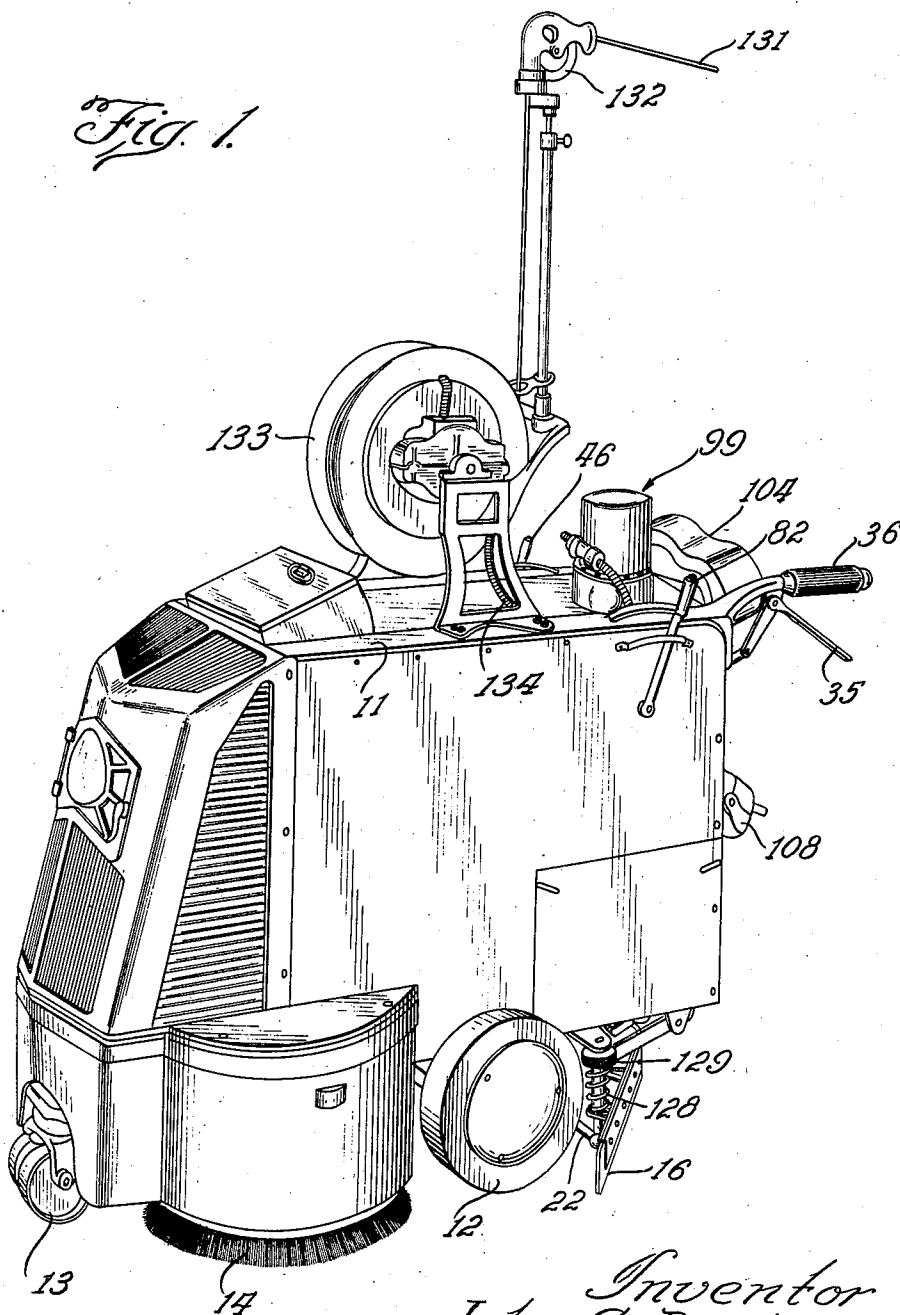
April 27, 1943.

J. A. BACKLUND
FLOOR-TREATING MACHINE

2,317,843

Filed June 11, 1938

7 Sheets-Sheet 1



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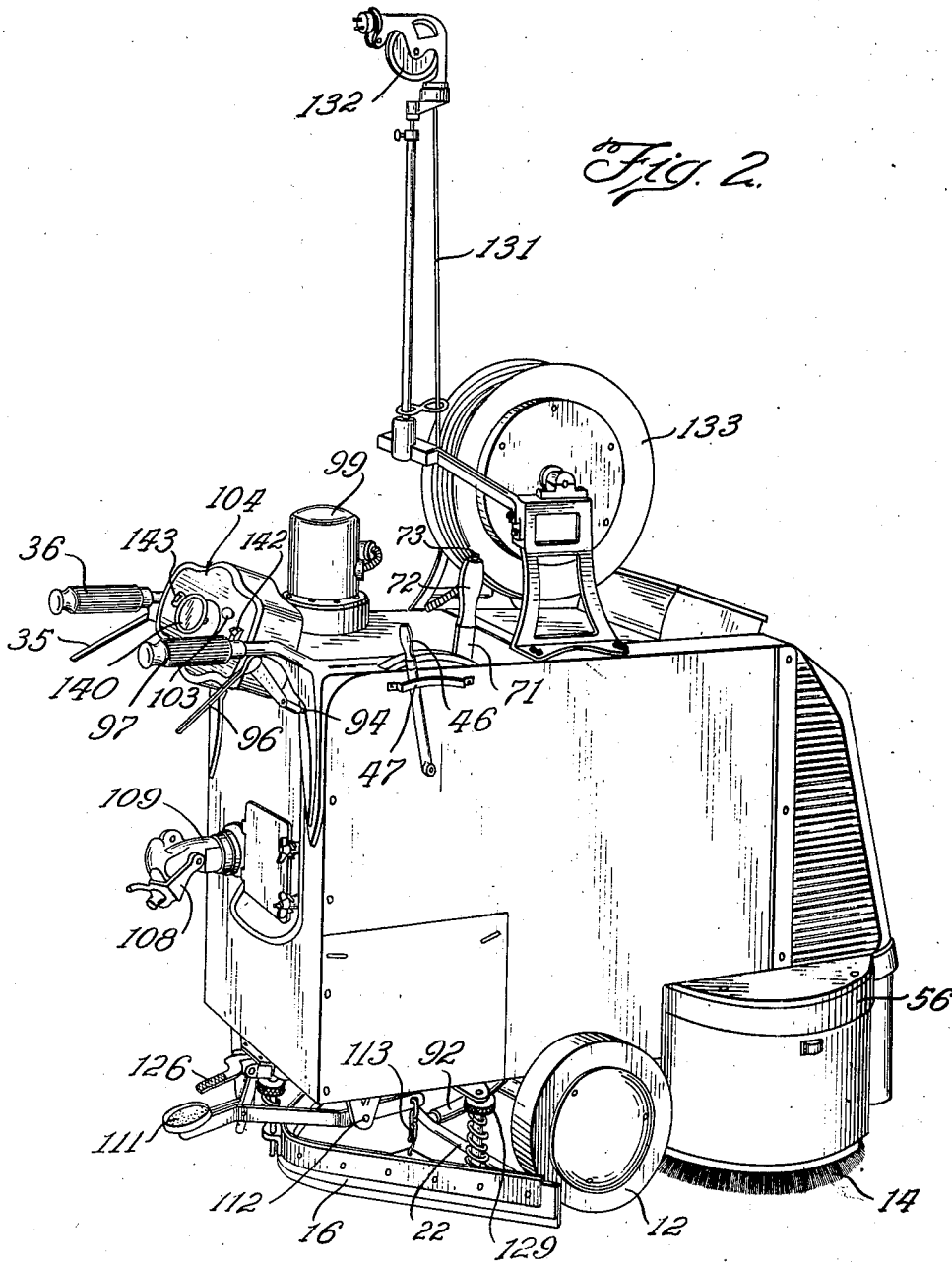
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7 Sheets-Sheet 2



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FLOOR-TREATING MACHINE

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7 Sheets-Sheet 3

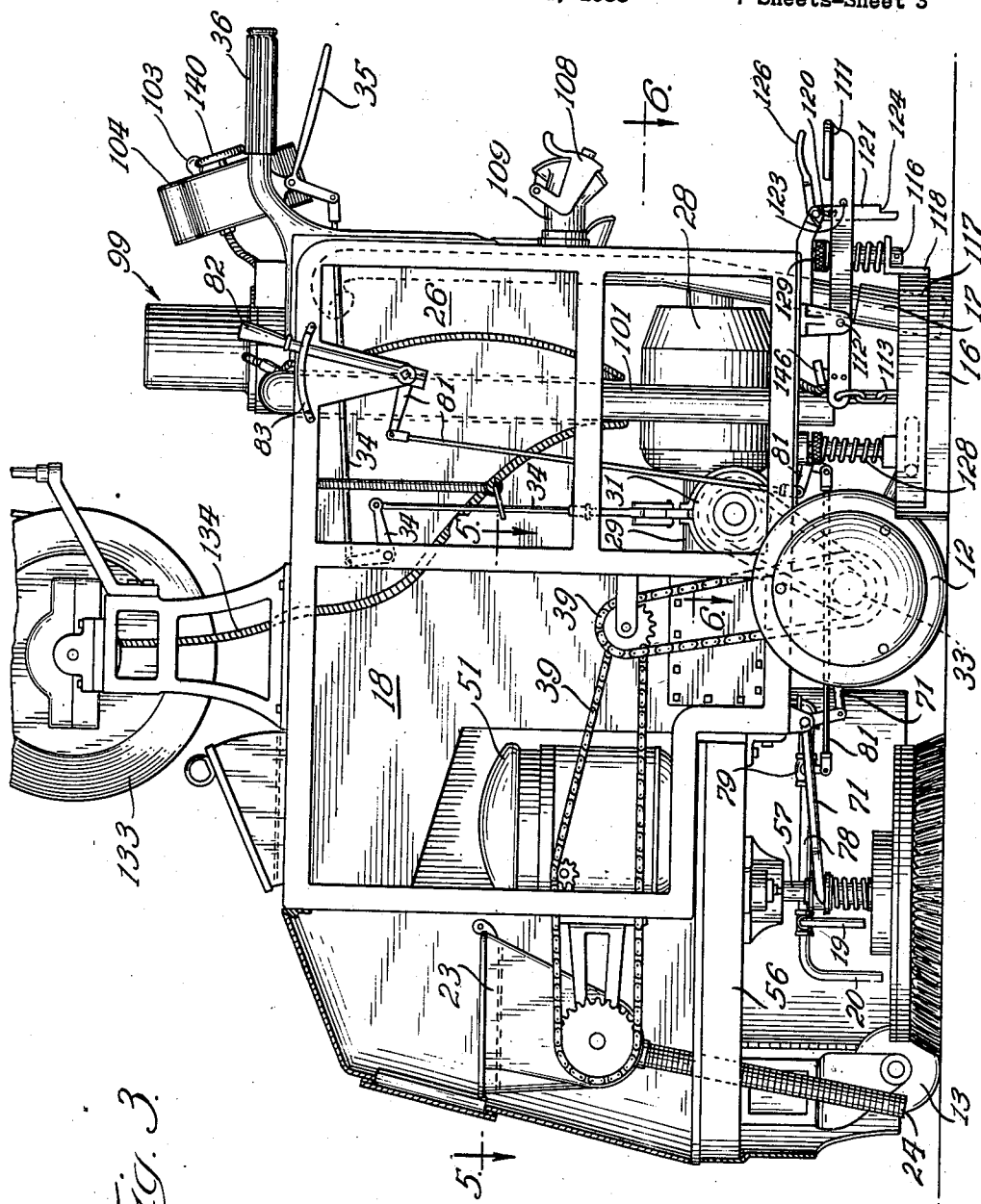


FIG. 3.

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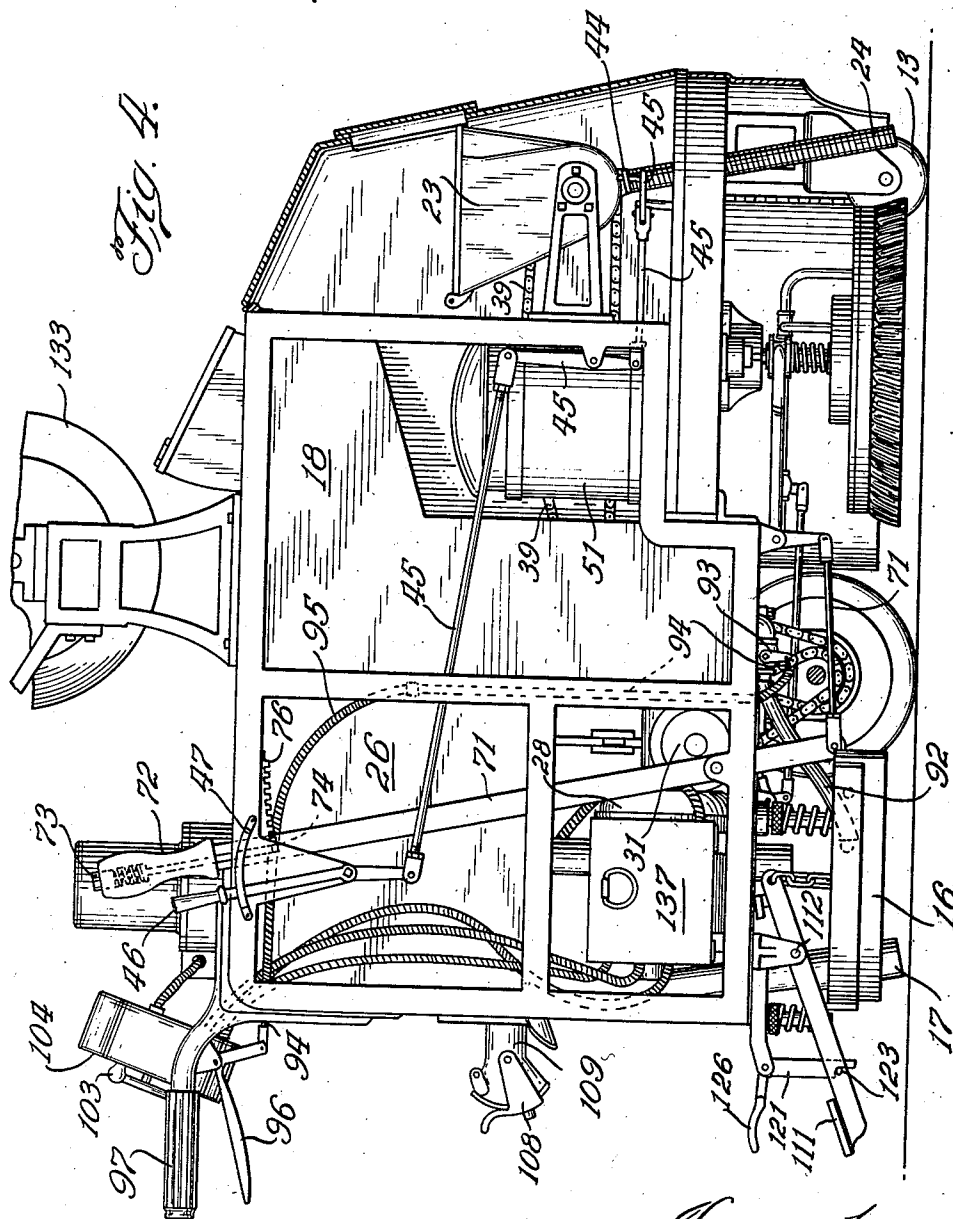
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7 Sheets-Sheet 4



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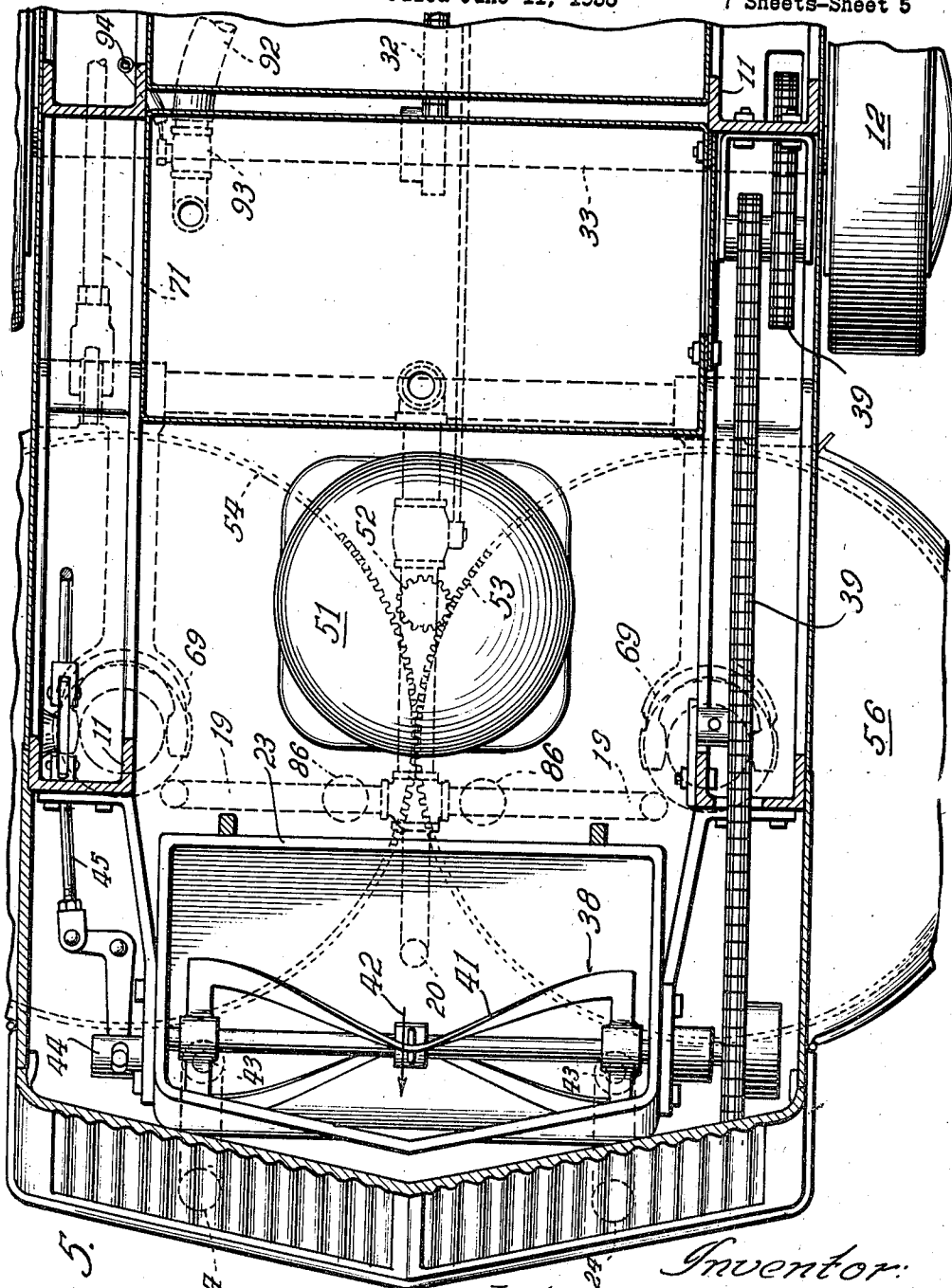


Fig. 5.

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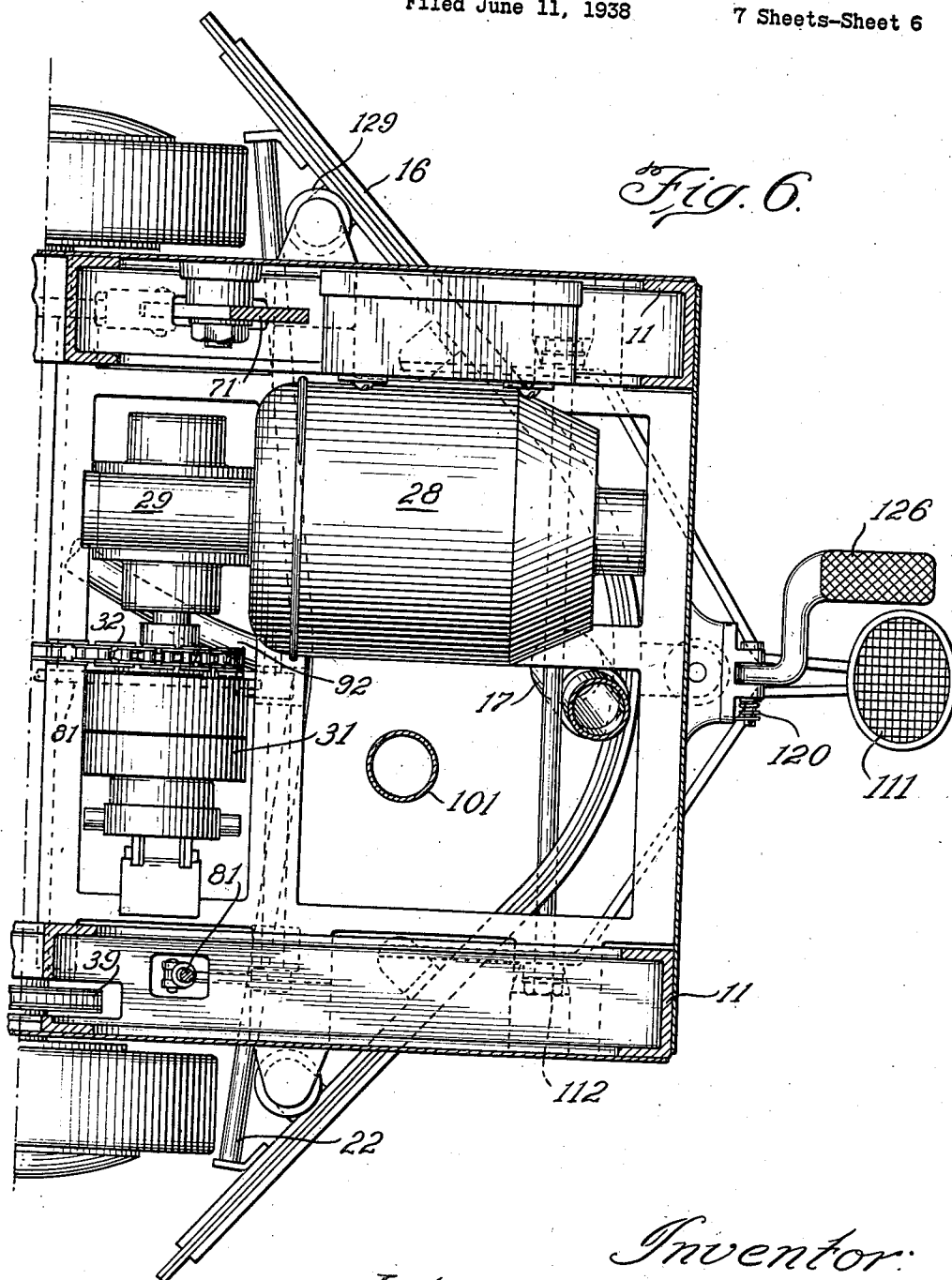
April 27, 1943.

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7 Sheets-Sheet 6



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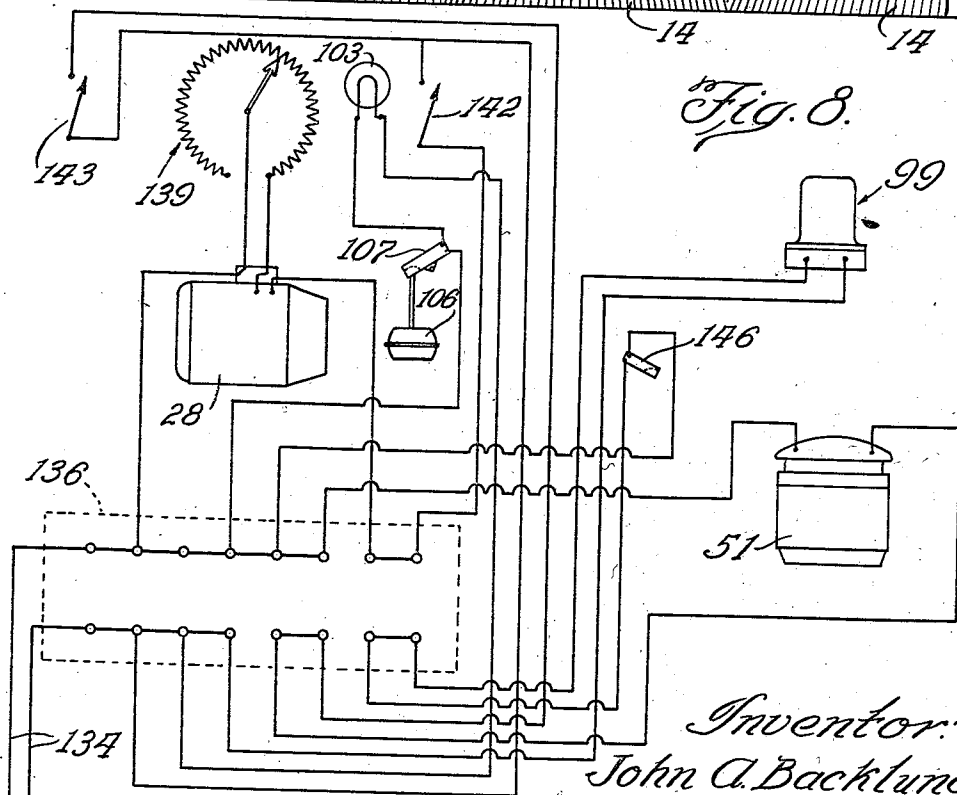
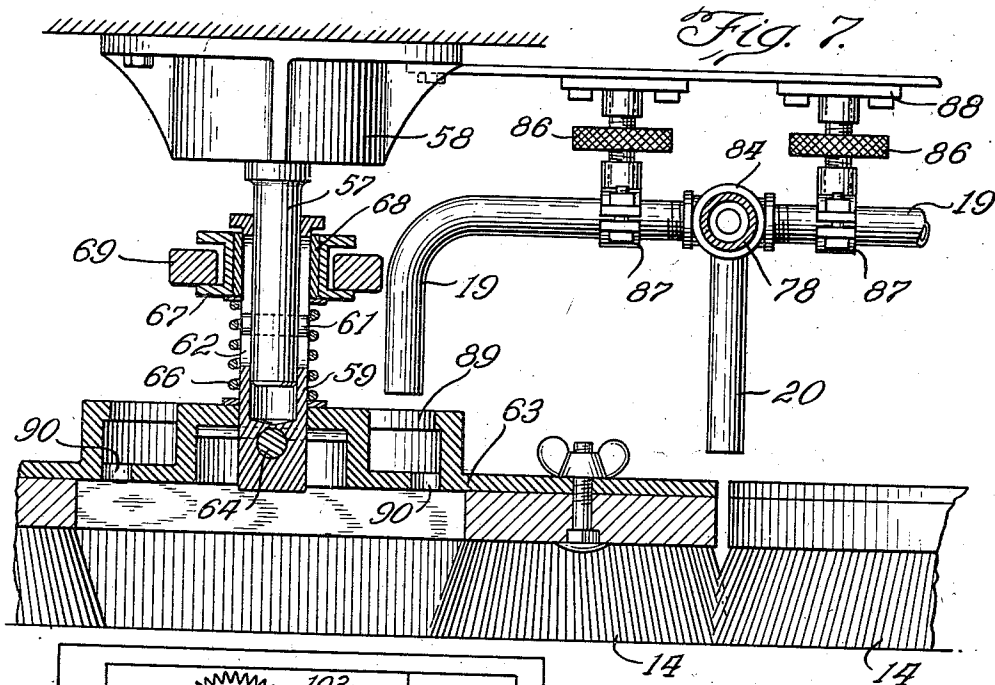
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FLOOR-TREATING MACHINE

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7 Sheets-Sheet 7



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UNITED STATES PATENT OFFICE

2,317,843

FLOOR-TREATING MACHINE

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2 Claims. (Cl. 15—50)

This invention relates to floor-treating machines and has been illustrated as embodied in a machine of the type commonly called a scrubbing and mopping machine in which motor-driven rotary brushes, to which water and soap powder are supplied, scrub the floor, and a squeegee with a vacuum pick-up pipe adjacent thereto mops or dries the scrubbed floor behind the rotary brushes. In some of its aspects the invention relates more broadly to machines which treat floors for other purposes.

Scrubbing and mopping machines have been known heretofore and in fact have been developed to the point where they perform their jobs fairly well. The objects of the present invention are therefore primarily to improve the machine from the standpoints of economy in manufacture, convenience and economy in use, length of life, and efficiency.

The manner in which these broad objects are attained as well as additional objects and advantages of the invention will be apparent from the following description and the accompanying drawings, in which:

Fig. 1 is a perspective view showing a commercial embodiment of the invention chosen for illustration.

Fig. 2 is a similar perspective view of the machine as seen from the opposite direction.

Fig. 3 is a longitudinal vertical sectional view taken through the machine, showing one side of the internal mechanism.

Fig. 4 is a similar view showing the other side of the internal mechanism.

Fig. 5 is a fragmentary horizontal sectional view taken approximately on the line 5—5 of Fig. 3.

Fig. 6 is a fragmentary horizontal sectional view taken approximately on the line 6—6 of Fig. 3.

Fig. 7 is a fragmentary sectional view showing features of the mounting of the brushes and the mounting of the pipes for supplying water thereto.

Fig. 8 is a diagrammatic drawing showing the circuits used in this invention and indicating the arrangement of the connection and control panels.

Although this invention may take various forms, only one has been chosen for the purpose of illustration. The general nature of this form of the invention is seen best in Fig. 1. The machine includes a chassis or frame 11 carried by driving wheels 12 and a front caster 13. The floor-treating elements comprise a pair of mo-

tor-driven rotary brushes 14 and a squeegee 16. The squeegee 16 is of generally V-shape as seen best in Fig. 2 so that the forward movement of the machine will cause the water supplied to the brushes 14 to be swept toward the vertex of the V where it is drawn into a pick-up suction pipe 17 as seen in Fig. 3. Water is supplied to the brushes 14 from a tank 18 through the pipes 19 and 20. It is also supplied for flushing purposes within the V of the squeegee 16 by means of a perforated pipe 22 which is also connected to the tank 18. Soap is supplied to the brushes 14 from container 23 through flexible conduits 24.

From the foregoing the general operation of the machine may be clearly understood. With soap supplied by the conduit 24 and water supplied by the pipes 19 and 20 the rotating brushes 14 thoroughly scrub the floor. The machine is moved forward continuously and the dirt and water together with a suitable quantity of flushing water from the pipe 22 are swept by the squeegee 16 to the vertex of the squeegee where the dirt and water are drawn by the pick-up pipe 17 into a tank 26.

The machine is driven by a motor 28 which through suitable gearing 29 drives a clutch 31 which, when it is engaged, drives a chain 32 (Fig. 6) which drives an axle 33 on which the drive wheels 12 are mounted. The drive wheels 12 are preferably both connected to the axle 33 through over-running clutches so that when the machine is turned the outside wheel may rotate faster than the other. The clutch 31 is controlled through a train of links and levers 34, by the handle or trigger 35 which is adjacent the handle 36 and is adapted to be operated by the fingers of the hand which grasps this handle 36. The handle 36 is one of the main handles for the machine, being secured directly to the chassis 11.

The detergent container 23 has a paddle wheel 38 therein which is driven by chains 39 from the axle 33 as seen clearly in Fig. 3. The paddle wheel 38 includes blades 41 which are preferably shaped to move very close to the wall of container 23 so as to have a grinding effect on the contents thereof, thus completely breaking up any lumps therein. Furthermore, the blades 41 are so shaped as to urge the contents of the container 23 from the center toward both ends. The shape which accomplishes this is seen clearly in Fig. 5, from which it is seen that the mid-point of the blade 41 leads in the direction of rotation indicated by the arrow 42, and the blade trails in the form of a helix toward each side from the mid-point of the blade. At each end

of the container 23 is an outlet 43 which communicates with one of the flexible conduits 24 to carry the detergent from the container 23 to a position approximately in front of each of the brushes 14. The flow of the detergent through the outlets 43 is accurately and conveniently controlled by means of a slide 44 which is movable between a fully opened position and a fully closed position to gradually diminish the effective size of the outlets 43. The slide 44 is controlled through the various links 45, seen best in Fig. 4, which in turn are operated by a handle 46. The handle 46 preferably moves adjacent a quadrant 47 which is calibrated to indicate the position of the slide 44 and hence the quantity of detergent which is fed to the brushes 14.

The brushes are driven by a motor 51 which drives a pinion 52 in mesh with a gear 53 which in turn is in mesh with a gear 54. The gears 52, 53 and 54 are all enclosed within a watertight and grease packed gear casing 56, seen best in Fig. 3. Each of the gears 53 and 54 drives a shaft 57 extending downwardly from the gear casing 56 and seen best in Fig. 7, which also shows more clearly a bearing housing 58 in which the shaft 57 is suitably journaled, preferably with roller bearings. A sleeve 59 is vertically slidable on the shaft 57 but is keyed to rotate with this shaft by a pin 61 which extends through a hole in shaft 57 and operates in a slot 62 in sleeve 59. A brush ring 63 is removably secured to the sleeve 59 in any suitable manner. One very desirable way of attachment is by providing the sleeve 59 with a pin 64 and providing the brush ring 63 with a slot and internal notches so that the sleeve with its pin 64 may be inserted into the ring 63 and then turned to permit the pin 64 to be drawn into a notch in which it is kept by the tension of a spring 66.

It is desired to control the vertical positioning of the brushes 14 in two respects. One is to raise the brushes from the floor when they are not being used, and the other is to not merely lower them onto the floor but to control their pressure against the floor. According to the present invention both of these desirable forms of control are provided in a very simple manner using the same control mechanism for both purposes. A flanged shift ring 67 is rotatably mounted on the sleeve 59, an anti-friction device such as a graphite ring 68 being provided between the sleeve 59 and the shift ring 67. The shift ring 67 is engaged by fingers 69 which in turn may be operated through the various links and levers 71, seen partly in Fig. 3 and partly in Fig. 4, by a handle 72. The handle 72 includes a button 73 which operates a spring-pressed detent 74 cooperating with a toothed sector 75 to lock the handle 72 and hence the levers 71 and the fingers 69 in a predetermined position. When the handle 72 is moved in one direction, the fingers 69 are raised and they raise the brushes 14 from the floor. When the handle 72 is moved in the other direction, it first lowers the fingers 69 to permit the brushes 14 to drop to the floor and subsequently lowers the fingers 69 still further to urge the brushes 14 against the floor with a pressure depending upon the exact positioning of the handle 72. This pressure is a resilient pressure transmitted through the spring 66 so that in the event of exceptional unevenness in the floor the brush 14 may yield thereto. This adjustable pressure on the brushes 14 is very desirable inasmuch as some floors such as those in lobbies need a very thorough and stiff

brushing while other floors which receive less wear and dirt may be thoroughly cleaned with a light brushing. It is especially important to have the brush-pressure control mechanism readily accessible to the operator and easily operated since otherwise the important factor of brush pressure is likely to be neglected. By having the same handle 72 control both the raising of the brushes from the floor and the brush pressure when it is lowered, the greatest simplicity is attained and, furthermore, the possibility of neglect of the regulation of the brush pressure is avoided. When the operator moves from one type of floor to another, he will naturally raise the brushes 14 during transportation of the machine and when he again lowers the brushes 14 it is instinctive with him, after a little experience, to move the handle 72 to such a position as will give the proper pressure on the brushes for the particular floor to be scrubbed.

The tank 18 is preferably of fairly large capacity, that in the commercial embodiment of the machine holding fifteen gallons. The delivery pipes 19 and 20 which feed the water to the brushes 14 are connected to the tank 18 through a pipe 78 and a valve 79. The valve 79 is controlled through links and levers 81 by a handle 82 which is mounted adjacent a quadrant 83 which is calibrated to indicate the position of the valve 79 so as to facilitate obtaining the proper flow of water through the delivery pipes 19 and 20 to the brushes 14.

It will be observed that according to this simplified form of the invention one valve 79 controls all three delivery pipes. Since the flow of water through the pipes is not ordinarily enough to fill the pipes so as to keep the pressure uniform on all three pipes, there is some likelihood that the water will not flow uniformly through the three pipes unless some special precautions are taken to make it do so. The construction shown in Fig. 7 is believed to be the simplest way of obtaining the uniform flow. According to this construction the supply pipe 78 is screwed into one side of a fitting 84 and the pipes 19 and 20 are screwed into the other sides thereof. It will be observed that no pipe is connected to the bottom of the fitting 84 since such pipe would inevitably receive most of the water. In order to distribute the water evenly between the various pipes the leveling hand screws 86 are provided, being provided for each of the pipes 19 and screwing into a clamp 87 thereon at one end and a bracket 88 thereabove. The threads of the leveling screws 86 are right and left hand threads on its two ends so that screwing either screw 86 in one direction raises the pipe to which it is connected while screwing it in the other direction lowers this pipe. When the screws 86 are turned in opposite directions so that one pipe 19 is raised as the other is lowered, this will of course cause more water to flow through the lowered pipe. When both screws 86 are turned in the same direction so as to raise or lower both of the pipes 19 uniformly, the angle of inclination of the fitting 84 as seen in Fig. 4 will be changed so that more or less water will flow through the fitting 84 to the pipe 20. In this way the flow of water through the three pipes can be equalized or, if preferred, a greater or less amount of water can be supplied through the pipe 20. The pipe 20 supplies water between the brushes at the front thereof, while the pipes 19 each supply water within a channel 89 above

the brush ring 63 so that the water runs through holes 90 into the brush.

The pipe 22 for supplying flushing water to the vicinity of the squeegee 16 is connected to the water tank 18 by a hose or other conduit 92 which, as seen best in Fig. 4, is connected to a valve 93. The valve 93 is a self-closing spring valve and, when desired, is opened by a wire 94 running within a choke cable 95 and connected to a trigger 96 positioned to be operated by the fingers of the hand grasping the right-hand main machine handle 97. When it is desired to flush the dirty water into the pick-up, it is simply necessary to squeeze the trigger 96 to open the valve 93 and supply as much water as may be desired to the pipe 22. This pipe is perforated with fine holes along its bottom so that the water will be supplied uniformly along its length.

As previously mentioned, the water is drawn up through pipe 17 into the dirty water tank 26. This tank need not be as large as the tank 18 since some of the water will be dissipated. Nevertheless, a fairly large capacity is desirable and in the commercial form of the invention the tank 26 has been a ten-gallon tank. A pick-up fan unit 99, including a motor and a centrifugal fan, is provided for creating a partial vacuum within the tank 26, there of course being suitable baffles for preventing the water delivered to the tank by pipe 17 from being drawn into the fan unit 99. The fan unit 99 exhausts through a muffler 101 which may be of any suitable form such as that known as the Burgess muffler. Such a muffler has been found very desirable from the standpoint of keeping the machine quiet inasmuch as without it the exhaust is by far the noisiest part of the machine.

It is of course desirable that the tank 26 should not be permitted to get too full since this would interfere with the functioning of the machine and, if carried to the extreme, would cause water to enter the fan unit 99. For this reason a pilot light 103 is provided at a suitable point preferably on a control panel 104 for indicating when the water in the tank 26 has reached a predetermined level. This pilot light is controlled by a float 106 within tank 26, the float operating a switch 107 which may desirably be of the mercury type. When the float 106 is raised to operate the mercury switch 107 and to illuminate the pilot light 103, the operator will know that it is time to empty the tank 26. This is done by raising a valve 108 on outlet 109. The tank 18 should be filled with clean water at the same time that the tank 26 is emptied. Because of its larger size, the tank 18 will then never run dry because the tank 26 will always fill up first and cause the signal light 103 to be illuminated.

When the machine is being moved from one place to another between operations, it is desirable to lift the squeegee 16 from the floor. This is accomplished by stepping on a treadle 111 which is pivoted at 112 and widely forked at its inner end. A chain 113 is connected to each branch of the fork and to the corresponding side of the squeegee 16. Movement of the squeegee 16 is guided by guide pins 116, the squeegee 16 being provided with a frame 117 having brackets 118 which engage the pins 116. The pins 116 may be provided with cotter pins near their ends to prevent the frame 117 from completely slipping off of the guide pins 116.

When the squeegee 16 has been raised by depressing the treadle 111, it will be held in this position by a latch 121 which is urged by spring

120 into engagement with a pin 123 on the treadle 111. The latch 121 is provided with a shoulder 124 which engages the pin 123 and holds the treadle 111 down, thus holding the squeegee 16 up off the floor. When it is desired to release the squeegee to cause it to again act on the floor, it is merely necessary to kick the latch 121 or step on the treadle 126 associated therewith. This removes the shoulder 124 from pin 123 so that treadle 111 is free to move upwardly and the squeegee 16 to move downwardly.

Pressure of the squeegee 16 on the floor is supplied by means of springs 128 which are mounted on guide pins 116. The pressure of the springs and hence the pressure of the squeegee 16 on the floor is controlled by thumb nuts 129 which are threaded on the upper ends of pins 116 and compress the springs 128 to the extent desired.

The electrical circuits of the machine have been designed to facilitate their connections and to place all of the switches and indicators at convenient locations. Thus, all of the electrical control apparatus is found on the one panel 104 which is positioned in the most convenient location, namely between the handles 36 and 97. The power is obtained by a wire 131 which is held overhead by a trolley 132 and wound on or unwound from a reel 133. From the reel 133 a single connection is taken through a suitable flexible cable 134 to a connecting block 136 (Fig. 3) within a box 137 (Fig. 4). Cables having five wires therein are run from the box 137 to the control panel 104, and two more wires are run in a cable from the motor 28 to the control panel 104, the latter being connected to a rheostat 139 which is operated by a handle 140.

This rheostat 139 is an important feature of the invention from the standpoint of economy, especially in combination with the feature of controlling the pressure of the brushes 14 on the floor. When the machine is used on floors which are easily cleaned, it is not only possible to release the pressure of the brushes 14 on the floor but it is also possible to speed up the movement of the machine. The latter is accomplished by means of the rheostat 139 which controls the speed of the motor 28. It has been found that with this combination of features, namely the adjustable pressure of the brushes 14 and the speeding up of movement of the machine, the machine will not only do more work in a given length of time but will wear out its brushes much more slowly. In fact, recent tests seem to indicate that with general work the brushes will last about twice as long when their pressure is properly controlled as when they are run at maximum pressure at all times.

In addition to the rheostat 139 and the signal or pilot light 103, the control panel 104 includes manually operated switches 142 and 143. As seen from the circuit diagram in Fig. 8, the switch 142 turns the motor 28 on and off, and the switch 143 turns the motor 51 on and off. The motor 99 is operated by a mercury switch 146 and may be automatically controlled so that it will under no conditions be on when the squeegee 16 is raised. This automatic control is obtained by means of the mercury switch 146 which, as seen in Fig. 3, may be mounted on the treadle lever 111. When the latter is swung to the squeegee raising position, the mercury will flow away from the contacts in the switch 146 and open the circuit.

From the foregoing it is seen that a floor scrubbing and mopping machine has been pro-

vided which includes numerous advantages, all of which contribute to make the machine more economical to manufacture, more easily operated, more economical in use, and more efficient. Although some of the features may have been used elsewhere before, it is believed that it has never been apparent that they could be used advantageously in a machine of this nature nor that the particular advantages pointed out would result from their use.

Although I have described my invention in its preferred embodiment, it is understood that the invention is not limited thereto, but changes and modifications may be made therein, all within the scope of the appended claims.

I claim:

1. A floor-treating machine including brush means, means for driving the brush means, liquid supply means including a single supply conduit, a plurality of delivery conduits connected thereto to deliver the liquid to different parts of the brush means, and means for equal-

izing the flow in said delivery conduits comprising screw means for adjusting the relative heights of the plurality of conduits.

2. In a floor treating machine having a movable floor-treating unit and motor operated liquid pick-up means including a motor, said means being operable to pick up material from the floor when said unit is acting on the floor, the means for raising said unit and simultaneously shutting off the motor operated liquid pick-up means including in combination a pivoted selectively operable member operatively connected with said unit and adapted to be pivoted to a predetermined position to retain said unit out of contact with the floor, means to hold said member in a predetermined position, and a mercury switch on said member electrically connected with said motor and movable in response to movement of said member to shut off the motor when the unit is raised.

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