April 9, 1968 C. BOYD 3,376,597

FLOOR SCRUBBING MACHINE

Filed Feb. 2, 1966 4 Sheets-Sheet 1

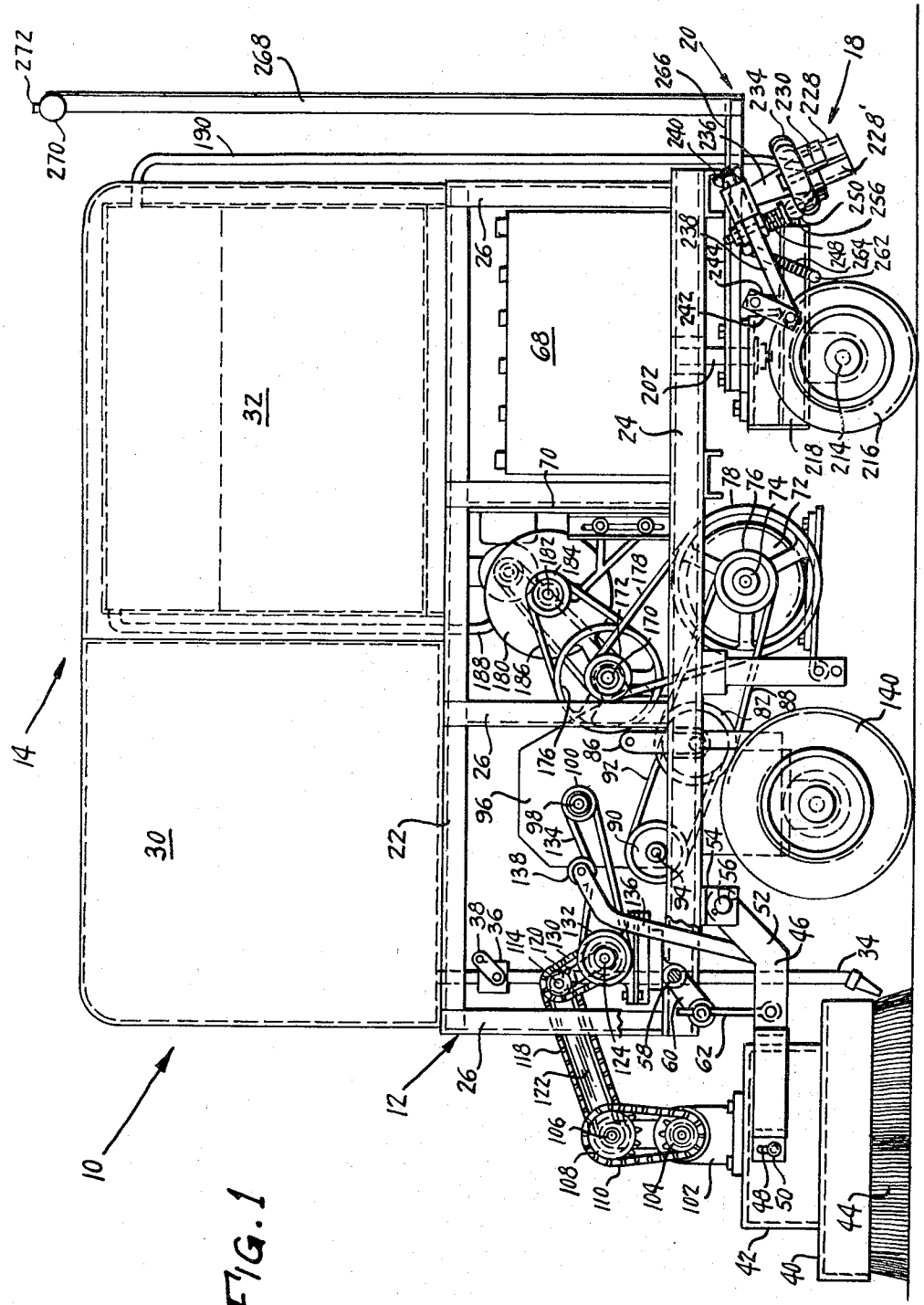

FIG. 1

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FLOOR SCRUBBING MACHINE

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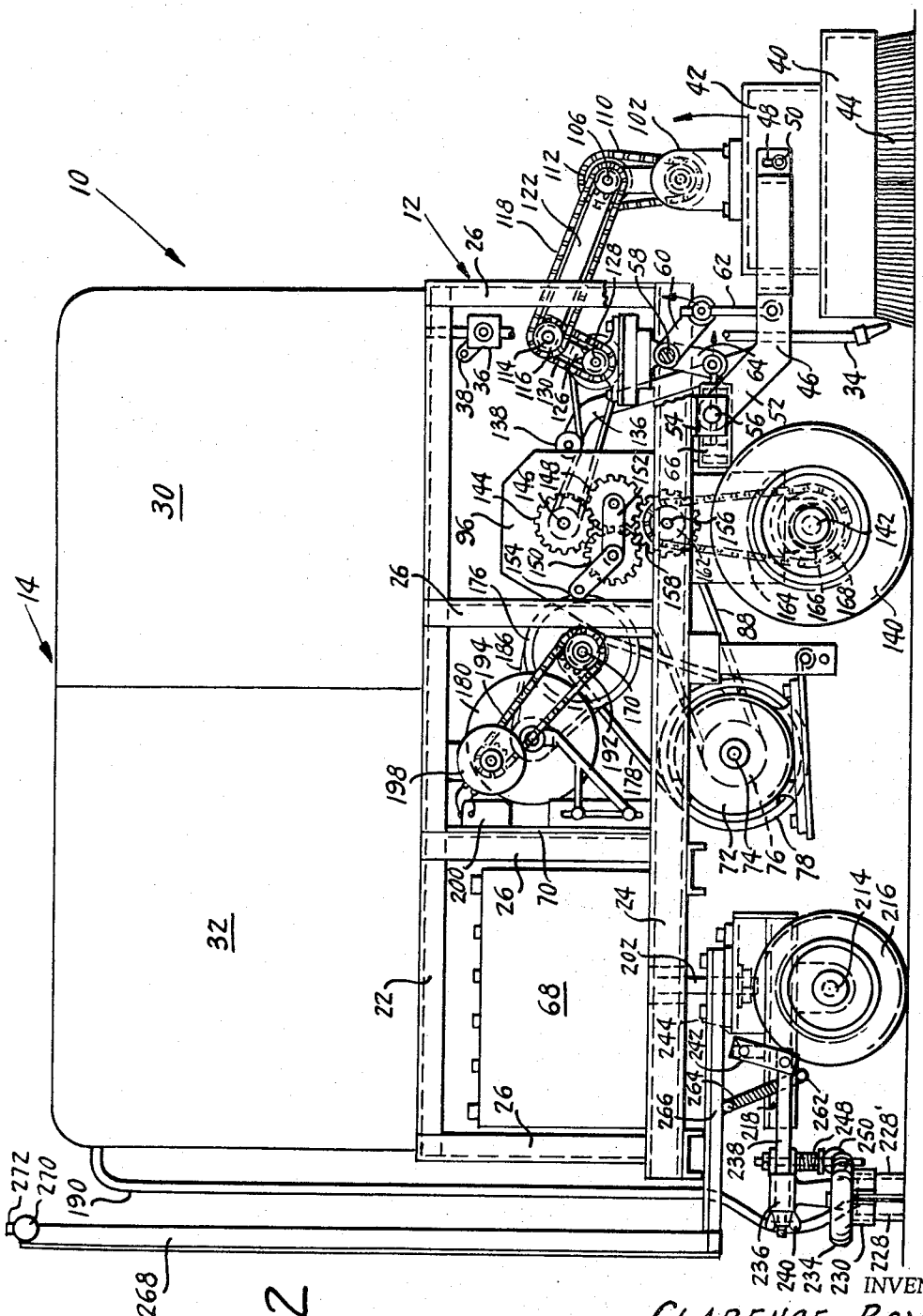

FIG. 2

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FLOOR SCRUBBING MACHINE

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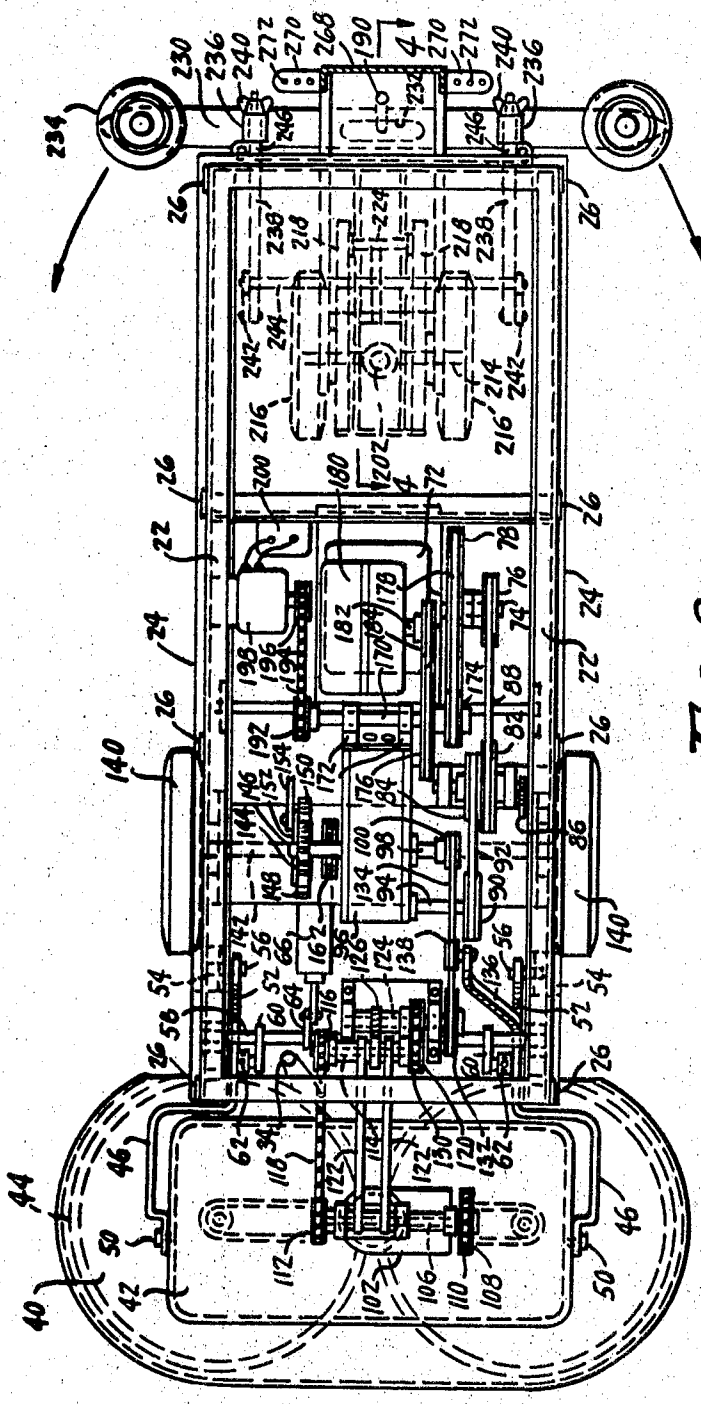

FIG. 3

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FLOOR SCRUBBING MACHINE

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FIG. 4

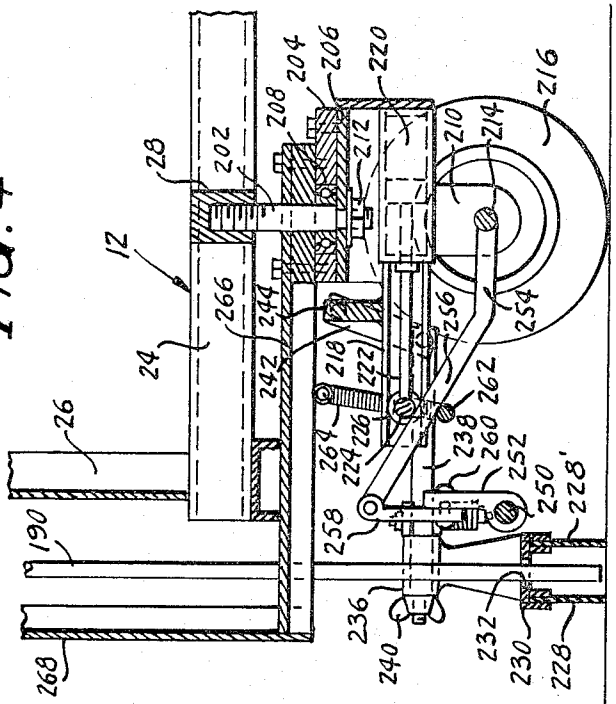
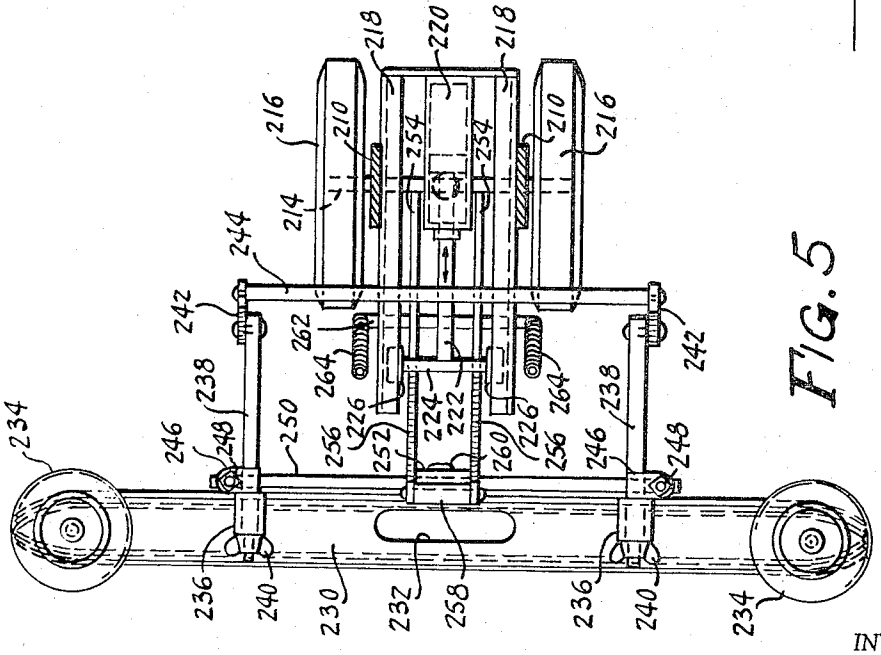


FIG. 5



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Patented Apr. 9, 1968

3,376,597

FLOOR SCRUBBING MACHINE

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Filed Feb. 2, 1966, Ser. No. 524,641
6 Claims. (Cl. 15—320)

ABSTRACT OF THE DISCLOSURE

A floor scrubbing machine having a carriage means pivotally attached at the rear end thereof. The carriage means includes ground engaging wheel means and squeegee means and the carriage means can be manually steered to enable the same to be selectively pivoted. As the carriage means is pivoted, the machine is steered and the squeegee means is moved to a position where it can collect the scrubbing liquid from the machine.

This invention relates to a floor scrubbing machine for cleaning and maintaining large areas of floor space on a suitable commercial basis, and more particularly this invention relates to an improved form of such floor scrubbing machine which is automatically power operated and which can be readily maneuvered and steered by the machine operator.

In order to properly clean and maintain the large floor areas which are present in office buildings, factories, warehouses and the like, it has become common practice to utilize machines of the general category of the present invention, that is power operated floor scrubbing machines. Such machines, in general, include at least two floor scrubbing brushes, means for automatically powering or rotating such brushes to cause the same to operate in a counter-rotating manner upon the floor, and a supply of wash water for delivery to these brushes to thus enable the same to properly wash or scrub the floor therebeneath. Also, such machines are generally provided with an automatic driving means for propelling the machine along the floor as the brushes perform the scrubbing operation, so that the operator need not manually push the machine.

While machines of this general category have been well known in the prior art and are familiar to those skilled in the art of floor maintenance, there have nevertheless been several drawbacks associated with these prior art forms of machines, such drawbacks being related to the machine construction, operation, maintenance and versatility. For example, such prior art machines were often difficult to steer or maneuver, thereby making it difficult for an operator to properly use the machine. Also, many of these prior art machines were only able to operate in a forward direction and at a single speed, thereby limiting the capabilities of the machine.

To refer more specifically to some of the problems encountered with prior art forms of floor scrubbing machines, one common problem which arose was the inefficiency of the vacuum squeegee mounted on the back of the machine. Such squeegees were customarily used and were formed by a pair of spaced apart rubber floor scraping blades with a vacuum being formed between the blades. Thus, the blades would not only scrape along the floor to collect the wash water from the brushes, but would trap such wash water therebetween to enable the same to be drawn up by the suction force therein. However, such squeegees were generally fixed in position on the rear of the floor scrubbing machine, and hence when the machine was turned during steering thereof, such squeegees tended to miss collecting certain portions of the wash water, thereby leaving puddles and streaks along the floor.

Another problem encountered in prior art forms of floor scrubbing machines resided in the inability to quickly and easily transport the same between washing locations. That is, in most instances, the brushes and the squeegee were fixed in position and could not be readily raised and lowered, at least not without completely shutting down the machine itself. As a result, it was difficult to transport the machines from one washing location to another without first shutting down the same. Also, in certain instances where the machine merely had to ride over a small bump such as a door jamb, the operator would have to shut down the machine to raise the brushes and squeegee if he were to properly pass over the bump. Because of the extreme inconvenience involved in manipulations of this type, most operators merely rode the machines over such bumps or jambs without shutting down the machines and without raising the brushes or squeegees and as a result, the brush heads and squeegee blades soon became damaged.

Still another drawback with the prior art forms of floor scrubbing machines resided in the need for continual recharging of their storage battery power supplies. It was found to be desirable and convenient to use storage batteries as a means for providing the power supply for operating these prior art floor scrubbing machines, but such batteries constantly were drained during operation of the machines, thereby requiring extended periods of recharging and, in fact, requiring replacement of the batteries themselves at frequent intervals. As a result, many large facilities found it necessary to have several scrubbing machines available for use, since at least some of the machines were constantly out of operating condition due to recharging or replacement of their batteries.

With the foregoing factors in mind, it is, therefore, an object of the present invention to overcome the difficulties, deficiencies and shortcomings associated with prior art forms of floor scrubbing machines and to provide in their stead, a new and improved floor scrubbing machine.

Another object of the present invention is to provide a floor scrubbing machine having an improved steering arrangement.

Another object of the present invention is to provide a floor scrubbing machine having an improved squeegee means for collecting the used wash water, such squeegee means being operative to efficiently collect all of the wash water even while the machine is being turned or otherwise steered.

Another object of the present invention is to provide a floor scrubbing machine which provides a minimum power drain on the rechargeable power source or storage batteries utilized therein.

Another object of the present invention is to provide a floor scrubbing machine wherein the brushes and squeegee can be selectively raised and lowered, even while the machine is in operation.

Other objects, advantages and salient features of the present invention will become apparent from the following detailed description, which, taken in conjunction with the annexed drawings, discloses a preferred embodiment hereof.

Referring to the drawings:

FIGURE 1 is a side elevational view of a floor scrubbing machine in accordance with the principles of the present invention;

FIGURE 2 is a fragmentary side elevational view, partly in section, taken from the opposite side of the machine of FIGURE 1;

FIGURE 3 is a top plan view of the floor scrubbing machine with the tanks removed therefrom;

FIGURE 4 is a fragmentary sectional view taken substantially along the line 4—4 of FIGURE 3; and,

FIGURE 5 is a top plan view of the apparatus shown in section in FIGURE 4.

Referring now to the drawings for a detailed description of the present invention, there is provided a new and improved floor scrubbing machine generally designated **10**, such machine including a body means formed principally of a main frame generally designated **12**, tank means generally designated **14** supported by the frame, brush means generally designated **16** coupled to the forward end of the frame, squeegee means generally designated **18** coupled to the rearward end of the frame, and steering means generally designated **20** for guiding the machine as the same is propelled across a floor being cleaned.

The main frame **12** is an open generally rectangular metal framework formed of a series of interconnected rods or bars. As such, it includes longitudinally extending upper bars **22** along each side of the machine, longitudinally extending lower bars **24** disposed therebeneath, vertically extending bars **26** interconnecting the upper and lower bars **22** and **24**, and transversely extending bars **28** interconnecting the upper bars on one side with those on the other and the lower bars on one side with those on the other.

The tank means **14** includes a pair of enlarged tanks, the forwardmost tank **30** containing a supply of fresh wash water and the rearwardmost tank **32** acting as a recovery tank for collecting the used wash water. A conduit **34** extends downwardly from the fresh water tank **30** to supply wash water to the brushes mounted at the front of the machine **10**. A valve **36** is mounted in the conduit **34** and is controlled by an operating link or handle **38** which is coupled to the controls for the machine. As such, the valve **36** can be selectively opened to supply water to the brushes or can be selectively closed to terminate the supply of water thereto.

The brush means **16** is juxtaposed to the lower forward front of the machine **10** and includes a brush head **40** having a gear box **42** disposed thereupon. At least two ground engaging washing brushes **44** are mounted in the brush head **40**, such brushes having vertically extending shafts extending into the gear box **42** to permit the same to rotate the brushes in counter-rotating direction. The brush means **16** is coupled to the main frame **12** by means of a pair of rearwardly extending arms **46** disposed on opposite sides of the gear box **42**. The forward end of each arm **46** is provided with an elongated slot **48** through which a mounting bolt **50** extends. This form of mounting thus permits the entire brush head and brushes to be mounted to the arms **46** in a more or less "free floating" manner. The rearward end of the arms **46** angles upwardly, as shown at **52**, and connects with an ear **54** depending from the main frame **12**, by means of a pivotal attachment **56**.

Means are provided for selectively raising and lowering the brush head **40** to thereby bring the brushes **44** into or out of engagement with the floor to be cleaned. To this end, and as can best be seen in FIGURE 2, a rod **58** extends across the frame means **12** at the lower front thereof. An ear **60** is provided at each end of the rod **58**, such ear in turn being coupled to the arms **46** by an adjustable coupling means in the form of a threaded arm **62**. By properly adjusting the setting of the threaded arm **62**, the height of the brush head above the floor can be varied. At some point along the rod **58** between the ears **60**, there is a further ear or link **64** fixed in position, with such ear extending generally rearwardly and downwardly. This ear **64** is coupled to an extensible actuating means **66** such as a hydraulic cylinder, a pneumatic cylinder, a solenoid, or the like. When this actuating means **66** is energized so that the plunger thereof extends forwardly, it pushes the link **64** forwardly thereby causing the rod **58** to rotate. This, in turn, causes the ears **60** to act as cams which raise the arms **46** and thus raise the attached brush head **40** and brushes **44**. Naturally, when the actuating means **66** is de-energized, the reverse operation is performed and the brush head and brushes are again lowered.

Before describing the manner in which the brushes **44** are rotated, a power system or driving means for the machine **10** will be described. Such power system initially receives power from a rechargeable power source formed by storage batteries **68** carried on the main frame at the rear thereof. An insulating wall **70** separates these batteries from the remainder of the driving mechanism which is disposed forwardly thereof. However, such batteries are electrically connected through the insulating wall **70** to a driving motor means **72**. The motor **72** has a drive shaft **74** extending outwardly therefrom, and such shaft has a small outboard pulley **76** fixed thereon and a larger inboard pulley **78** affixed thereon. A variable pitch pulley set is disposed forwardly from the motor **72**, such set including an outboard pulley **82**, an inboard pulley **84**, and a controlling handle **86** to be connected to the controls of the machine for varying the pitch of these variable pulleys. The outboard motor pulley **74** is connected to the outboard variable pitch pulley **82** by a continuous or endless driving belt **88**.

The other pulley **84** of the variable pulley set is aligned with a pulley **90** and is connected therewith by an endless driving belt **92**. The pulley **90** is mounted on a shaft **94** projecting outwardly from a main gear drive **96**. Another shaft **98** also projects outwardly from the same side of the main gear drive **96** and a pulley **100** is mounted thereupon. It is this shaft **98** and its attached pulley **100** which serve to provide the power for driving or rotating the brushes **44** in the brush head **40**. Thus, in the first instance, it is the rechargeable power supply or batteries **68** which provide the energy source for operating the machine **10**, such energy source being transmitted to the driving motor **72**, and then from that motor via endless drives **88** and **92** to create operation of the main gear drive **96**. This main gear drive serves to operate the brushes through rotation of the shaft **98**, in a manner to be now described, and also serves to provide motive power for propelling the machine, in a manner to be presently described.

To understand the manner in which the brushes are operated or rotated, attention is directed particularly to FIGURES 1 through 3 wherein it can be seen that an upstanding one-to-one ratio right angle drive mechanism **102** projects above the gear box **42** on the brush head **40**. A driving sprocket **104** extends from one end of the drive mechanism **102**, while a shaft or rod **106** is rotatably mounted above the right angle drive mechanism **102** and extending thereacross. On one end of the shaft **106**, a sprocket **108** is provided in spaced relation directly above the sprocket **104**, and a chain drive **110** thus interconnects the sprockets **104** and **108**. Another sprocket **112** is provided on the opposite end of the shaft **106**, as shown in FIGURE 2.

Another shaft **114** is provided in spaced relation behind the shaft **106** and within the main framework **12** of the machine. This shaft, as can best be seen in FIGURES 2 and 3, carries a sprocket **116** on one end thereof, such sprocket being generally aligned with the sprocket **112**. As such, an endless chain drive **118** extends between the sprockets **112** and **116** to interconnect the same together in a driving relationship. The opposite end of the shaft **114** is provided with another sprocket **120** which connects the same with the main drive shaft as will be described shortly hereinafter.

The shaft **114** is coupled to the shaft **106** by means of a pair of spaced apart links **122**, the length of which serves to adjust the amount of lift of the brush head. In other words, the length of the links **122** is so selected that the rods **106** and **114** will be spaced properly from one another to enable the brush head **40** to be lifted and lowered while the machine is in operation. In other words, lifting and lowering can be effected even while the chain drive **118** is operating. The main drive shaft for the

brushes is designated 124, is disposed within the main frame 12 beneath the shaft 114, and is suitably mounted by conventional journal bearings or the like, not shown. A link or ear 126 is fixed at one end to the main drive shaft 124 and has its other end pivotally connected to the shaft 114 between the ears or links 122, as can best be seen in FIGURE 3. The main drive shaft 124 also carries a sprocket 128 which is aligned beneath the sprocket 120 on the shaft 114, and an endless chain drive 130 interconnects these sprockets 120 and 128 together. The shaft 124 continues to extend beyond the sprocket 128, as can best be seen in FIGURE 3, and on this extended portion, a pulley 132 is mounted in generally coplanar relationship with the driving pulley 100 from the main gear drive 96. An endless driving belt 134 interconnects the pulleys 100 and 132 together in a driving relationship.

Finally, a tension applying means is provided for applying proper pressure or tension to the main drive belt 134. To this end an upstanding idler arm 136 is affixed to one of the arms 46 in an upwardly extending relationship. A rotatable roller 138 is provided at the end of the idler arm 136 for engagement with the belt drive 134. Thus, when the arms 46 are in their lower position, and thus the brush head 40 is likewise in its lowered position with the brushes engaging the floor, the rotary roller or head 138 provides a biasing force or tension upon the belt 134 to enable the same to drive the brushes in the following manner. As previously described, the main gear drive 96 is provided with power to thereby rotate the shaft 98. As the shaft 98 rotates, it likewise rotates the pulley 100, thereby serving to drive the belt 134. As long as the roller 138 is applying proper tension to the belt 134, the same serves to drive the pulley 132 and hence to drive the main drive shaft 124. As the main drive shaft 124 is rotated, its rotation is in turn imparted to the shaft 114 by means of the interconnecting chain drive 130. The rotation of the shaft 114 is, in turn, transmitted to the shaft 106 via the chain drive 118. Finally, the rotation of the shaft 106 is transmitted to the right angle drive mechanism 102 via the chain drive 110. As the right angle drive mechanism 102 operates, it causes the gear box 42 to operate and to thereby rotate the brushes 44 in a counter-rotating manner.

Now, let it be assumed that the operator wants to raise the brush head 42 to lift the brushes out of engagement with the floor, and he wishes to do so without shutting down the machine 10. To accomplish this, the operator need merely actuate the previously described energizing means 66, which, when extended, acts through the ears 60 and 64 to raise the arms 46 and to thereby raise the brush head. As the brush head starts to raise, the brushes 44 will nevertheless continue to rotate, since the links 122 assure that the spacing between the shafts 106 and 114 will remain constant, and that the chain drive 118 will therefore continue to operate. However, once the arms 46 are raised to a certain level, which can, if desired, be adjusted through adjustment of the upstanding angle of the idler arm or shaft 136, the rotary roller 138 will be lifted out of engagement with the driving belt 134. When this occurs, the tension will be released from the belt 134, and the same will be slack. Thus, even though the pulley 100 continues to rotate, such rotation will not be imparted through the driving belt 134 to the pulley 132, and hence, rotation of the main drive shaft 124 will cease. Of course, as this occurs, the brushes 44 will cease to rotate. Then, when the operator again desires to lower the brush head, he can do so merely by de-energizing the means 66, and as the brush head again lowers, the rotary roller 138 again moves into contact with the belt 134 to provide proper tension upon the same, and driving of the brushes 44 will again commence.

To understand the manner in which the machine itself is propelled, it will be first noted that such machine is provided with a pair of spaced apart front ground engaging wheels 140 attached together by an axle 142. The power for operating the ground engaging wheels is provided by a main driving gear 144 mounted on the outboard end of a shaft 146 which projects from the main gear drive 96. The shaft 146 can be driven in either a clockwise or counterclockwise direction to thus drive the wheels 140 either forwardly or in reverse, as will be described shortly hereinafter. Directly beneath the main driving gear 144, a pair of idler gears 148 and 150 are provided, such gears being interconnected by a link 152 so that they act as a pair. A control handle 154 is coupled to the link 152 to thus selectively move the idler gears to bring either one or the other into meshing engagement with the main driving gear 144. Beneath these idler gears, and spaced in parallel relationship above the axle 142, a shaft 156 is provided, such shaft extending between the main gear drive and one of the main frame lower channels 24. A gear 158 is mounted upon the shaft 156 for driving rotation by either one or the other of the idler gears, to thereby cause the shaft 156 to rotate. Another gear 162 is also provided on the shaft 156, spaced between the main gear drive 96 and the gear 158, as can best be seen in FIGURE 3. This gear or sprocket 162 serves to transmit driving power to the axle 142 via a chain drive 164. A differential 166 is mounted upon the axle 142 to thus enable the wheels 140 to properly maneuver around a corner or turn, and a sprocket 168 coupled to the differential is spaced beneath the gear 162 and in meshing engagement with the chain drive 164.

To now understand the manner in which the front wheels 140 are driven to propel the machine 10, let it be assumed that the machine is to be propelled in a forward direction. In such event, the main driving gear 144 is driven in a clockwise direction when viewed from the position of FIGURE 2. Also, the control handle 154 is moved to the position shown in FIGURE 2 so that the idler gear 148 meshes between the gears 144 and 158, and so that the idler gear 150 is completely out of engagement with both such gears. In such event, the clockwise rotation of the main driving gear 144 is thus transmitted through the idler gear 148 to cause a similar clockwise rotation of the gear 158 and hence of the shaft 156 connected thereto. As the shaft 156 rotates in a clockwise direction, it thus causes the sprocket 162 to rotate in a clockwise direction, such sprocket rotation in turn being transmitted via the chain drive 164 to cause a clockwise rotation of the axle 142. Such clockwise rotation, as will be seen, in FIGURE 2, causes a forward movement of the wheels 140.

On the other hand, let it be assumed that it is desired to propel the machine in a rearward or reverse direction. In such event, the main driving gear 144 is driven in a counterclockwise direction and the control handle 154 is moved to a position wherein the idler gear 150 meshes with the gears 144 and 158. Naturally, in such position, the other idler gear 148 is completely out of meshing relationship with either of these gears. In this position, the counterclockwise rotation of the main driving gear 144 is transmitted through the idler gear 150 to create a similar counterclockwise rotation of the gear 158 and hence of its attached shaft 156. This counterclockwise rotation is thus transmitted through the sprocket 162 and the chain drive 164 to cause a counterclockwise rotation of the axle 142. Again, as can be seen in FIGURE 2, a counterclockwise rotation of the axle 142 results in a rearward movement of the wheels 140.

For a further understanding of the manner in which the machine 10 and its various accessories and components operate, attention is again directed to FIGURES 1 through 3, wherein it can be seen that a jackshaft 170 extends across the rear of the main gear drive 96 and is mounted thereupon by suitable bearing mounts 172. On its right hand end, the jackshaft 170 is provided with a small inboard pulley 174 aligned with the large pulley 78 of the driving motor 72, and the jackshaft 170 is also provided with a large outboard pulley 176. A belt drive

178 extends in driving relation from the motor pulley 78 to the jackshaft pulley 174 and thus, as the motor 72 operates, the belt drive 178 causes a rotation of the jackshaft. A vacuum turbine 180 is provided in spaced relationship above the driving motor 72, such vacuum turbine having a projecting shaft 182 which mounts a pulley 184 in generally parallel relationship with the jackshaft outboard pulley 176. A belt drive 186 interconnects the pulleys 176 and 184, and thus, as the jackshaft 170 is rotated, the vacuum turbine 180 is operated. A hose or conduit 188 extends from the vacuum turbine 180 between the tank means 30 and 32 and connects near the top of the recovery tank 32. The recovery tank 32 is a closed or covered chamber and thus as the vacuum turbine draws a vacuum through the conduit 188, a reduced pressure or vacuum is created at the top of the recovery tank 32. Another conduit 190 likewise extends from the top of the recovery tank 32, and this conduit connects to the squeegee means 18. In this manner, when the vacuum turbine operates to create a suction or reduced pressure at the top of the recovery tank 32, such reduced pressure is likewise transmitted via the conduit 190 to the squeegee means, thereby serving to draw the water trapped within the squeegee means upwardly and into the recovery tank 32.

At the left hand end of the jackshaft 170, a sprocket 192 is provided, and this sprocket connects via a chain drive 194 with the driving sprocket 196 of an alternator 198. The alternator 198 is in turn electrically connected with a voltage regulator 200 mounted on the insulating wall 70 adjacent the batteries 68. The batteries or rechargeable power source 68, the alternator 198 and the voltage regulator 200 form a power system which is electrically connected in circuit with the driving motor 72. Thus, although there is a power drain from the batteries 68 to start operation of the driving motor 72, once such operation has been started, the major portion of the power comes from the alternator 198, and accordingly, the effective life of the batteries is greatly increased.

If attention is now directed to FIGURES 4 and 5, the steering means 20 will be described in greater detail. As can be seen in FIGURE 4, a stub shaft 202 depends downwardly from one of the cross supports 28 of the main frame 12. This stub shaft 202 serves to pivotally mount the steering means, which includes basically a set of rear wheels, a carriage means, and actuating mechanism for raising and lowering the squeegee means 18. The carriage means includes a pair of superposed flat plates 204 and 206, each having central apertures therethrough through which the end of the stub shaft 202 can project. The central aperture in the plate 204 contains a bearing 208, while the lower plate 206 includes a pair of spaced apart depending ears 210. The stub shaft 202 projects through each of the plates and is affixed thereto by a nut 212 which is threaded onto its end in the manner shown in FIGURE 4. The ears 210 serve to rotatably mount an axle 214 upon whose end a pair of rear wheels 216 are mounted. The rear wheels 216 are not only considerably smaller in diameter than are the front wheels 140, but moreover, such rear wheels are spaced considerably closer to one another than are the front wheels 140. As a practical matter, the front wheels 140 are generally mounted directly beneath the side channel frame pieces 24, and hence have a spacing equal to the width of the main frame 12. In contrast the rear wheels 216 are each spaced inwardly a considerable distance from the sides 24 of the main frame, and it is preferred that the spacing between such rear wheels be no more than one half the spacing between the front driving wheels 140.

A pair of rails 218 are attached to the exterior of the ear 210 and extend rearwardly therefrom in parallel relationship, the grooved or slotted portions of such rails being directed toward one another in facing relationship. An extensible cylinder means or hydraulic ram 220 is mounted beneath the plate 206 and extends rearwardly therefrom for the purpose of raising and lowering the squeegee means 18. The ram 220 includes an extensible cylinder or plunger 222 projecting therefrom, such plunger having a transverse cross bar 224 affixed to its outer end. The transverse bar 224 extends between the rails or tracks 218, and at each end thereof, a wheel 226 is rotatably mounted. These wheels 226 ride in the grooves within the rails or tracks 218 and thus traverse either forwardly or rearwardly, depending upon whether the hydraulic ram 220 is actuated or de-actuated.

Turning attention to the squeegee means 18 itself, it will be seen that the same is formed of a pair of spaced apart rubber blades 228, 228' each of which depends from an elongated cover 230. A slot or opening 232 is formed in the cover 230 to communicate with the space between the blades 22, 228' for collecting the water trapped therebetween. The recovery conduit 190 couples to this slot or opening 232 to thereby suck the water from the space between the squeegee blades upwardly into the recovery tank 32. Rubber bumpers 234 are mounted at the end of the squeegee cover 230 to assure that the same will not be damaged as it is turned during steering of the machine 10.

A pair of upstanding mounts or sockets 236 are provided on the top of the squeegee cover 230 with such mounts 236 being spaced apart by a distance greater than the spacing between the rear wheels 216. A rod 238 has one end thereof mounted within each of the mounts 236 and attaches therewithin by a wing nut 240 threaded on the end thereof, and such rod 238 extends from the squeegee means toward the wheels 216. The opposite end of each rod 238 is pivotally attached to the lower end of a small link 242. As can best be seen in FIGURE 5, the upper end of each link 242 is coupled to a transversely extending bar 244 which is affixed to the rails 218 as it extends thereacross. Just beyond the squeegee cover 230 on each of the rods 238, there is an outwardly projecting plate 246 from which an adjustable spring biased threaded means 248 depends. These adjustable means 248 serve to adjustably mount a transversely extending rod 248 which is linked to the hydraulic ram 220 in a manner to be now described, so that such ram can selectively raise and lower the squeegee means 18. An upstanding pad 252 is coupled to the rod 250 at the center thereof and projects thereabove in upstanding relationship.

Finally, a pair of spaced apart bars 254 are provided along opposite sides of the hydraulic ram 220 but spaced within the confines of the spaced rails 218. The forward end of each of these bars 254 is affixed to the axle 214 of the rear wheels. Then, as can best be seen in FIGURE 4, such bars 254 extend linearly rearwardly for a certain distance and then angle into an upwardly canted or radius portion 256. A pad or plate 258 is pivotally attached between the outer ends of these upwardly canted portions 256, and this plate 258 thus hangs freely downwardly in juxtaposition to the pad or plate 252 extending upwardly from the rod 250. A single pivot pin or member 260 interconnects the pads 252 and 258 together in a somewhat loose manner which permits a small amount of free play therebetween.

The squeegee means 18 is lowered by proper actuation or energization of the hydraulic ram 220. When this occurs, the plunger 222 thereof moves rearwardly and the transversely extending cross bar 224 on the end thereof pushes against the upwardly angled portions 256 to cam the same downwardly. This pushes the rod 250 downwardly, thereby moving the bars 232 and the interconnected squeegee downwardly until the blades 228, 228' are in engagement with the floor, The adjustable means 248 can be varied to assure that the squeegee will engage the floor with the proper amount of force or tension.

To assure that the squeegee means 18 will be raised off the floor when the hydraulic ram 220 is de-actuated, a shaft 262 is affixed transversely across the bottom of the bars 254, such shaft having an extent beyond the spacing

of the rails **218**, as can best be seen in FIGURE 5. A pair of powerful tension springs **264** connect from the ends of this shaft **262** to the underside of a plate **266** forming a part of the handlebar mechanism. Thus, when the hydraulic ram **220** is de-energized and the plunger **222** thereof is retracted, the springs **264** will lift the squeegee means **18** off the floor.

The plate **266** extends rearwardly beyond the end of the main frame **12**, and then projects perpendicularly upwardly at **268** to provide a mounting means for a pair of handlebars **270** which can be readily grasped and utilized by the machine operator. The controls for the various energizable portions of the machine can be provided in any suitable means on the handlebars **270**, as, for example, spring loaded buttons **272**. When the operator depresses a suitable button **272** or other actuatable means upon the handlebars **270**, the machine will go into operation, either in a forward or reverse direction, as selected by the operator. As the machine is traveling or being propelled along the floor, the operator steers the same via the handle bars **272**. As was previously described, the rear wheels **216**, the squeegee means **18** and the handlebars **270** are all coupled together by a form of carriage means which is pivotable about the centrally depending stub shaft **202**. Thus, when the operator steers the machine by merely turning the handlebars **270**, he likewise turns the rear wheels **216** and thereby simultaneously turns the attached squeegee means. As an example, when the parts are arranged as shown in solid lines in FIGURE 3, the machine will travel in a linear path, whereas when the parts are turned to the position shown in dotted lines, the machine will be steered into a turn. Since the squeegee means is necessarily always positioned behind the rear wheels **216**, since the same is attached thereto, such squeegee means will always be properly positioned, even during a turn, to collect all of the wash water from the brushes **44**. In other words, even while the machine is traveling around a corner, the squeegee means will collect all of the used water, thereby assuring that no puddles or streaks will remain on the floor.

After reading the foregoing detailed description, it will be apparent that the objects set forth at the outset of the specification have been successfully achieved by the present invention.

What is claimed is:

1. In a floor scrubbing machine, the combination comprising:

main frame means having a forward end and a rear end;

brush means coupled to said main frame means at its forward end for scrubbing a floor;

ground engaging front wheels coupled to said main frame means between its ends;

driving means coupled to said front wheels for rotating the same in a selected direction to thereby propel said machine;

carriage means pivotally attached to said main frame means adjacent its rear end;

said carriage means including at least one rotatably mounted ground engaging rear wheel for steering said machine and squeegee means for collecting the scrubbing liquid from said brush means; and

steering means coupled to said carriage means for selectively pivoting the same, thereby also pivoting of said rear wheels and said squeegee means.

2. The combination defined in claim **1** wherein two rear wheels are provided, said rear wheels being spaced apart by a distance smaller than the spacing between said front wheels.

3. The combination defined in claim **2** wherein said rear wheels are disposed beneath said main frame means at a location between said front wheels and said squeegee means.

4. The combination defined in claim **1** wherein said carriage means further includes means for selectively raising and lowering said squeegee means.

5. The combination defined in claim **1** further including:

a brush head juxtaposed to the forward end of said main frame means and having at least two rotatable ground engaging brushes supported thereupon;

said brush head having rearwardly extending arms;

said arms being pivotally attached to said main frame means thereby pivotally coupling said brush head to said main frame means;

brush driving means connected to said brush head to rotate said ground engaging brushes in a selected direction;

link means connected to at least one of said arms; and,

power means coupled to said link means and being selectively energizable to move said link means, thereby moving said arms to raise or lower said brush head.

6. The combination defined in claim **5** wherein said brush driving means includes an endless driving belt and wherein a tension applying means extends from one of said arms to maintain tension on said belt when said brush head is lowered, thereby assuring that said ground engaging brushes are driven, said tension applying means moving out of engagement with said belt when said brush head is raised thereby terminating driving of said ground engaging brushes.

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