My invention relates to an improvement in floor treating machines having rotating disc members such as brushes, steel wool pads, grinding blocks, etc., generally used in the maintenance of floors in the manner of scrubbing, polishing, surfacing, etc., and more particularly to the means for propelling the machine over the floor.

Present day floor treating machines generally referred to as "automatic" are propelled over the floor surface by means of a clutch, reduction gears, transmission, differential, or other drive means connected to one or more of the wheels supporting the machine with additional drive means for rotating the floor treating members. In addition to the cost of the mechanism in the foregoing type of machines a further expense is incurred where a reverse mechanism and/or two speed or variable speed mechanism is used.

It is an object of my invention to provide a floor treating machine having new and novel means for propelling the machine across a floor including mechanism for manipulating the floor treating members whereby the same not only treat the floor but also provide the propelling force which moves the machine either forward or in reverse over the floor at a selectable rate of speed. It is also an object to provide means for raising and lowering the brushes and adjusting the pressure of the brushes upon the floor. It is a further object to provide means for propelling a floor treating machine without the need of the conventional transmission, clutch, or other wheel drive hook-up.

I shall not here attempt to set forth and indicate all of the various objects and advantages incident to my invention, but other objects and advantages will be referred to in or else will become apparent from that which follows.

The invention will appear more clearly from the following detailed description when taken in connection with the accompanying drawings, showing by way of example a preferred embodiment of the inventive idea wherein like numerals refer to like parts throughout.

In the drawings forming part of this application:

Figure 1 is a longitudinal side view of my machine with the outer casing removed and with the brushes in a lowered position, the brush manipulating mechanism not shown but appearing in other figures.

Figure 2 is a front view thereof, the water tank not shown.

Figure 3 is a view substantially on the line 3--3 of Figure 4 showing principally the brush raising mechanism which is in a lowered position.

Figure 4 is a view substantially on the line 4--4 of Figure 3.

Figure 5 is a view substantially on the line 5--5 of Figure 4.

Figure 6 is a side view of substantially the brush manipulating pressure differential mechanism longitudinally of the machine with the brushes in a lowered non-driving position.

Figure 7 is an enlarged plan view of the forward part of the brush manipulating mechanism shown in Figure 6.

Figure 8 is a front view of the brushes and the manipulating mechanism therefor on the line 8--8 of Figure 7 with the tilted positions of the brushes shown in broken lines.

Figure 9 is a perspective view of the forward portion of the brush manipulating mechanism and a portion of the brushes.

Figure 10 is a rear view of the machine with certain portions not shown.

Figure 11 is a longitudinal side view opposite to that shown in Figure 1 and showing the brush manipulating mechanism but not the brush raising and lowering mechanism shown in other figures.

Figure 12 is a detailed sectional view of a portion of the brush manipulating mechanism on the line 12--12 of Figure 7.

Figure 13 is a sectional view on the line 13--13 of Figure 5.

Referring to the drawings in detail, my machine A includes the lower substantially rectangular frame 10 which is formed of the front upright transverse member 11, the longitudinal side members 12 and 13 and the forward portions 14 and 15 of the frame, the rear end transverse member 16. The lower frame 10 also includes the forward frame piece 17 connected to the extended portions of the side frame members 12 and 13. The front caster wheel 17 is mounted on the under edge of the frame members 11 and 17 and secured at each of the corners of the frame 10 are the uprights 18, 19, 20 and 21. The numeral 22 designates a top longitudinal side frame member connected to the front upright 19 and the rear upright 18, and the numeral 23 designates a top longitudinal side frame. Secured to the front uprights 19 and 20 are the transverse brace members 23 and 24, and mounted on the brace 23 is the reel 23 on which the supply of electrical cord 24 is wound. The reel 23 includes the automatic cord return member 25.

Further included are the secondary longitudinal frame members 26 and 27 which are secured to the uprights 18 and 19 and 20 and 21 respectively. The vacuum tank 28 is slidable mounted on transverse cross members 29 connected to the frame members 26 and 27 by means of the wheels 30 mounted on the bottom of the tank 28. Secured to the offset portions 14 and 15 of the frame 10 are the upright bracket members 31 and 32 respectively on the upper end of which are pivotally mounted the rear ends of the upper arm members 33 and 34 by means of the pins 33 and 34 respectively. The forward ends of the upper arm members 33 and 34 are pivotally mounted on and adjacent the upper ends of the upright members 35 and 36 by means of the pins 35 and 36 respectively. Pivoted mounted on the lower ends of the upright members 35 and 36 by means of the transverse cross shaft hereinafter mentioned are the forward ends of the lower arm members 37 and 38 respectively. The rear ends of the lower arms 37 and 38 are pivotally secured to the lower ends of the upright brackets 31 and 32 together with the upright members 35 and 36 form a pair of parallelogram formations.

The upright members 35 and 36 are secured to the horizontal support frame platform 37 on which the motor 38, brushes, and brush-drive means hereinafter mentioned are mounted. I further provide the upright members 39 and 40 which are secured to the uprights of the lower longitudinal frame members 12 and 13 respectively. Notably secured to the upper ends of the uprights 39 and 40 is the transverse cross shaft 41, and rigid-
ly secured centrally of the shaft 41 is the stub arm 42. The forward end of the stub arm 42 is pivotally secured to the upper end piece 43 of the shaft 44, and the shaft 44 has secured to the lower end thereof the piston portion 45 which is slidably mounted in the cylinder 46 and is urged downwardly by means of the coil spring 46" secured within the cylinder 46. The lower end of the cylinder 46 is bifurcated and pivotally connected to the shaft 47 which also pivotally mounts the lower arms 37 and 38. Further provided is the lift arm 48 the forward end of which is rigidly secured to the shaft 41 with the other end pivotally secured by the pin 51 to the substantially vertical lift arm 50. The upper end of the arm 50 is pivotally connected by the pin 51 to the substantially horizontal lift arm 52 which at its forward end is pivotally connected to the front upright member 19 by means of the pin 19'. The rear end of the lift arm 53 is formed with the handle piece 53 and the upright member 18 is formed with a series of spaced holes 54 which receive a bolt 55 which also extends through a hole formed in the arm 52 whereby the arm may be placed in various positions. The arm 52 may be moved anywhere from the full line position of Figure 1 to the broken line position thereof for horizontal adjustment of the platform frame 37 as will be set out more fully hereinafter. Mounted on the platform frame 37 is the shaft 56 on which is mounted the pulley 57 driven by the belt 58 positioned on the shaft of the motor 38. The shaft 56 drives the reduction gear box 59 mounted on the frame 37 by conventional means, and the shaft 56 is coupled to the shaft 60 by means of the coupling 61. The shaft 60 drives the reduction gear box 62 also mounted on the platform frame 37 by conventional means. The gear boxes 59 and 62 have extending from the underside thereof the stub shafts 63 and 64 respectively which are turn connected to the universal flexible couplings 65 and 66 respectively. The couplings 65 and 66 are connected to the bearing blocks 67 and 68 by means of the short shafts 67' and 68' respectively to which the brush mountings 69 and 70 respectively are secured and on which the circulating brushes 71 and 72 are removably mounted. The rotatable brush mountings 69 and 70 may also mount floor treating members such as steel wool discs and buffing pad discs depending upon the floor treatment desired. The bearing blocks 67 and 68 do not rotate but mount bearings which in turn mount the shafts 67' and 68', and the shafts 67' and 68' transmit pressure from a lever, hereinafter described, to the shafts 67' and 68'. I further provide a brush manipulating mechanism which creates a pressure differential on the inner or outer portions of the brushes and which includes the upright handle lever 73 formed with offset handle portion 74. The lower end of the lever 73 is pivotally mounted on the transverse rod 75 connecting the rear ends of the longitudinal lower frame members 12 and 13. A horizontal arm 76 is pivotally connected at the rear end thereof to the lever 75 at a point spaced from the lower end of the lever 75. The forward end of the arm 76 is pivotally connected to a short vertical arm 77 pivotally mounted at its lower end to the axle shaft 78, Figures 6 and 7. The upper end of the vertical arm 77 is pivotally connected to the rear end of the horizontal arm 79, and the forward end of the arm 79 is pivotally connected by means of the pin 79' to the upper end of the substantially vertical leg portion 80 of the one-piece substantially L-shaped lever 81. The L-shaped lever 81 is pivoted at 82 on the shaft 47 to which is pivotally connected the front ends of the lower arms 37 and 38 of the parallelogram formation hereinafter described. The substantially horizontal leg portion 83 of the L-shaped lever 81 is loosely connected to the stub shaft 84, Figures 7 and 9. The stub shaft 84 has formed on the inner end thereof the universal spherical mounting 85 which is mounted substantially centrally of the one-piece shaft 86, Figure 12, and maintained centrally thereof by means of the spacer sleeves 87 and 88 positioned on the shaft 86 on either side of the mounting 85. Mounted on the shaft 86 adjacent the ends thereof are the universal spherical mountings 89 and 90 having the stub portions 91 and 92 respectively. The universal spherical mounting 85 is identical to the mountings 89 and 90 and includes a ball portion 93, Figure 12, with the flattened side portions 94 and the hole 95 therethrough and through which the shaft 86 extends. The mounting 85 also includes the socket portion 96 in which the ball portion 93 is mounted. The mountings 85, 89, and 90 and sleeves 87 and 88 are secured in position by means of the nuts 88' secured to each end of the shaft 86. Connected to and extending outwardly from the stub portions 91 and 92 are the short shafts 97 and 98 respectively which are rigidly connected to the bearing blocks 67 and 68 respectively. Further provided are the wheels 99 and 100 mounted on the ends of the axle-shaft 78 and substantially within the frame recesses formed by the offset portions 14 and 15 respectively. In addition I provide the tubular conduit member 101 which connects with the vacuum tank 28 and the conduit member 101 is mounted centrally thereof for horizontal adjustment of the platform frame 37 as will be set out more fully hereinafter. Mounted on the upper ends of the rear upright frame members 18 and 21 is the transverse cross bar 103 for use by the operator in guiding and controlling the machine in its movement. The electrical cord 24 is run from the reel 23 upwardly over the pulley 104 mounted on top of the standard 105, and the cord is attached to the motor 38 for the operation thereof by means of a conventional switch not shown. The cord 24 is plugged into a source of power, and as the machine is moved from the source of power the cord is played off the reel 23. The return member 25 keeps the cord reasonably taut. Further provided is the fresh water or soap water tank 106 slidably mounted on the transverse frame members 22 and 22' by means of the brackets 107 and 108. The tank 106 is used to supply water to the brushes 71 and 72 when the same are used for scrubbing a floor, and the means for getting the water from the tank to the brushes includes the outlet valve 109 mounted on the bottom of the tank 106 which is actuated by the rod 110 in turn actuated by the handle 111 through the short rod 112. Connected to the valve 109 is the supply line 109' and leading therefrom are the two water supply tubes 113 and 114 the lower ends of which terminate at the openings 115 and 116 of the brush mounts 69 and 70 whereby water may be directed to the floor adjacent the brushes 71 and 72. Water picked up by the squeegee pick-up 102 is deposited in the conventional vacuum tank 28 through the tube 101. The tank 28 is emptied by rolling it on the tracks 29 slightly outwardly from the frame member 27 and emptying into a separate container by means of the drain cock 28' mounted on the bottom of the tank 28. Operation of the machine In using my machine A for scrubbing or polishing a floor the brushes 71 and 72 must rest upon the floor C in contact therewith as shown in Figure 1, and with the full or partial weight of the brushes and the frame and motor unit to which they are connected, the lift arm 52 is in the full line position of Figure 1. The amount of pressure of the brushes upon the floor may be regulated as hereinafter described. To propel the machine forwardly and at the same time scrub or polish the floor, the motor 38 is turned on causing the brushes 71 and 72 to rotate. It will be noted that the brushes are caused to rotate in opposition to the positioning of the gear boxes 59 and 62, and there is a slight overlap of the inner portions of the brushes whereby a continuous path is covered. With the brushes ro-
tating and in parallel contact with the floor, the machine stays in one position. To cause the machine to go forward the handle 74 is eased forward gradually and by means of the horizontal arm 76, the short vertical arm 77, the arm 79, the leg portion 83 of the L-shaped lever 81 is caused to move downwardly whereby the stub shafts 84 is moved downwardly thereby moving the shaft 86 downwardly. As the shaft 86 is moved downwardly it lifts the short shafts 97 and 98 downwardly at and by means of the universal mountings 89 and 90. As the shafts 97 and 98 are tilted downwardly, at the inward ends thereof, pressure is applied to the bearing blocks 67 and 68, and the brushes 80, 45, 65, and 66 thereby placing a greater amount of pressure on the inner portion of each brush 71 and 72 for greater frictional contact with the floor. In this condition there is still pressure contact with the floor of the outer portion of each brush whereby the entire brush surface of the floor, and due to the greater pressure on the inner portion of the brushes indicated by x on brush 71 and y on brush 72 than on the outer portions indicated as "z" and "w," the machine is drawn forward due to the direction of movement and pressure on the inner half of each brush. With an increased pressure differential on the sides of the brushes on the floor as compared with the outer portions, the machine will travel at a greater forward speed. If the lever 73 is returned to the full line position of Figure 6, the pressure differential on the brushes is relieved, and the brushes merely rotate in contact with the floor and the machine remains stationary. It will be noted that with my brush tilting mechanism both brushes are tilted simultaneously, and due to the universal action of both the couplings 65 and 66 and the spherical bearings 89, 90, 85 and 88, both brushes contact the floor exactly the same regardless of low or high spots in the floor. Without this full universal action the machine could turn left or right as either of the brushes hit high or low spots.

While I have spoken of the brushes as "tilt" all that is done is that there is greater pressure created on the inside of each brush (forward movement) or outside of each brush (reverse movement of the machine). The entire surfaces of both brushes contact the floor at all times when the brushes are tilted either way and the machine is moved.

If it is desired to reverse the machine, the lever 73 is moved backwardly or to the right, as in Figure 6, and through the mechanism just described, the brushes are tilted whereby a greater degree of pressure is created on the outer portion of each brush indicated by z on brush 71 and w on brush 72. In this condition the pressure on the brushes is still pressure contact of the inner portion of each brush upon the floor, but due to the greater pressure on the outer portions of each brush at the portion z of brush 71 and w of brush 72, the machine is moved rearwardly due to the direction of movement and pressure of the outer half of each brush 71 and 72. The speed of rearward travel is regulated by the amount of pressure differential placed upon the outer portions of the brushes by operating the handle-lever 73. The travel of the machine is stopped by returning the lever 73 to the full line neutral position of Figure 6.

As the machine is caused to go forward by moving the shaft 86 downwardly, the shaft 86 also pivots slightly and substantially horizontally at the joint 85 as indicated in Figure 9 by means of the arrows which are necessary as the brush mountings are forced slightly further apart in the slight tilting process which produces the pressure differential on the areas of the brushes. As the shaft 86 pivots, it also moves down when the pressure is increased on the inner portions of the brushes 71 and 72 whereby the machine is caused to move forward.

When the machine is caused to move backwardly, the shaft 86 moves upwardly as it pivots in the opposite direction to that when the pressure differential created on the brushes is opposite as set forth above. It will also be noted that the short shafts 97 and 98 pivot up and down from the point of connection of the couplings 65 and 66 respectively. It is the couplings which allow the brush mountings 69 and 70 and the brushes thereon to be tilted slightly to further allow the pressure differential in the brushes heretofore mentioned.

To raise the brushes 71 and 72 fully from the floor C, the handle 53 is lowered from the full line position of Figure 1 to the broken line position, and in so doing the arm 50 is forced downwardly thereby moving the arm 48 downwardly which rotates the shaft 41 and as a result the arm 42 is raised. As the arm 42 is raised, the shaft 43 is raised through the stub arm 43. As the shaft 44 is raised, the piston portion 45 is drawn up against the spring 46, and when the spring 46 is compressed to a predetermined point the shaft 47 is lifted which thereby raises the frame-platform 37 through the upright members 35 and 36 and the pivoted arm members 33 and 34, and 37 and 38 which allow the frame 37 to rise substantially vertically. As a result of the above lifting mechanism the degree of pressure of the brushes on the floor may be adjusted and controlled, for with a slight draw-up on the coil spring 46 the full brush pressure weight is relieved only slightly, and as a further result the entire frame 37 and motor and brush driving unit float, as it were. Such floating action allows easy travel over uneven floor surfaces which is also aided by the universal couplings 65 and 66.

The full weight and contact of the brushes 71 and 72 may be returned to the floor, that is, full lowered position of the brushes, by returning the handle 53 to its full line position of Figure 1.

The invention is not to be understood as restricted to the details set forth since these may be modified within the scope of the appended claims without departing from the spirit and scope of the invention.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent is:

1. In a mobile floor treating machine, frame means having wheel means connected thereto, a pair of disc members mounted on said frame means for contact with a surface, means for rotating said disc members in opposite directions, means for manipulating each of said disc members independently of said frame means whereby portions of each of said disc members travel in contact with a surface with greater pressure than other portions to cause the machine to move upon the surface on which the machine rests and simultaneously treat the surface.

2. The device of claim 1 including means for raising and lowering said disc members independent of said frame means.

3. In a mobile floor treating machine, frame means having wheel means connected thereto, a pair of floor treating disc members mounted on said frame means, for contact with a surface, means for rotating said disc members in opposite directions, means for raising and lowering said disc members, and means for manipulating said disc members whereby the inner portions thereof with respect to said frame means are caused to exert a greater pressure than the outer portions upon a surface on which the disc members rest to thereby drive the machine in one direction upon the surface including means for manipulating said disc members whereby the outer portions thereof with respect to said frame means are caused to exert a greater pressure than the inner portions upon a surface on which the disc members rest to thereby drive the machine in the opposite direction.

4. In a mobile floor treating machine, frame means having wheel means connected thereto, disc means mounted on said frame means for contact with a surface, means for rotating said disc means, and means for causing portions of said disc means to contact a surface with greater pressure than other portions independent of said frame
means to cause the machine to move upon the surface on which it rests.

5. In a mobile unit, frame means having wheel means connected thereto, a pair of disc members flexibly connected to said frame means for contact with a surface, means for rotating said disc members, means independent of said frame means for causing portions of said disc members to exert greater pressure upon a surface than other portions thereof to thereby move the unit over the surface and simultaneously treat the surface.

6. The device of claim 5 including lever means acting independent of said frame means for raising and lowering said disc members.

7. In a mobile floor treating unit, frame means having wheel means connected thereto, a pair of disc members flexibly connected to said frame means for contact with a surface, means for rotating said disc members, means for raising and lowering said disc members, lever means operatively connected to said frame means and said disc members for manipulating said disc members independently of said frame means whereby portions thereof are caused to exert greater pressure upon a surface than other portions thereof to thereby move the unit over the surface and treat the surface simultaneously.

8. In a mobile floor treating unit, frame means having wheel means connected thereto, a support frame pivotally connected to said frame means, a motor mounted on said support frame, gear means connected to said support frame, disc supporting means flexibly coupled to said gear means and having disc members connected thereto, means for rotating said disc members, lever means connected to said support frame for raising and lowering the same to thereby raise and lower said disc members and means operatively connected to said frame means and said disc supporting means independent of said frame means for tilting said disc supporting means to thereby tilt said disc members to contact a surface and move the unit over the surface.

9. In a mobile floor treating machine, frame means having wheel means connected thereto, a support frame pivotally connected to said frame means, lever means connected to said support frame for raising and lowering the same, a pair of disc members flexibly coupled to said support frame, means connected to said support frame for rotating said disc members in opposite directions, said disc members being positioned in substantially side-by-side relationship with one disc member slightly overlapping the other with respect to movement over a surface, second lever means for simultaneously tilting said disc members independently of said frame means to move the machine upon a surface and treat the same when said disc members are lowered into contact with a surface.

10. In a mobile surface treating machine, frame means, wheel means for supporting said frame means, surface treating means connected to said frame means, means for rotating said surface treating means, means for causing portions of said surface treating means to contact a surface with greater pressure than other portions thereof to thereby cause the machine to move on the surface upon which the same rests.

11. In a mobile surface treating machine, frame means, wheel means for supporting said frame means, surface treating means connected to said frame means, means for rotating said surface treating means, and means independent of said frame means for manipulating said surface treating means with respect to the surface upon which the machine rests to cause portions of said surface treating means to contact the surface with greater pressure than other portions thereof to thereby cause the machine to move on the surface.

12. In a mobile surface treating machine, frame means, a pair of disc-like surface treating members, means for rotatably supporting said surface treating members on said frame means, means for rotating said disc-like surface treating members, means for moving said surface treating members into contact with a surface independent of said frame means, and means for varying the location of each surface treating member relative to said frame and independent thereof.

13. In a mobile surface treating machine, frame means, a pair of disc-like surface treating members, means for rotatably supporting said surface treating members on said frame means, means for rotating said disc-like surface treating members, and means for varying each axis of rotation of said members in opposite directions to either side of respective parallel lines extending perpendicularly to the surface.

14. In a mobile surface treating machine, frame means, a pair of disc-like surface treating members, means for rotatably supporting said surface treating members on said frame means, means for rotating said disc-like surface treating members, and means for varying each axis of rotation of said members in parallel planes extending perpendicularly to the surface.

15. In a mobile surface treating machine, frame means, a pair of surface treating members, means for rotatably supporting said surface treating members on said frame means, means for rotating said surface treating members, and means for varying each axis of rotation of said members in parallel planes extending perpendicularly to the surface.

16. In a mobile surface treating machine, frame means having wheel means connected thereto for operable contact with a surface upon which the machine is used, floor treating disc means connected to said frame means, means for rotating said disc means, lever means pivotally connected to said frame means and said disc means for raising and lowering said disc means, means for causing portions of said disc means to contact a surface on which it rests with greater pressure than other portions thereof to thereby cause the machine to move upon the surface.

17. In a mobile surface treating machine, frame means having wheel means connected thereto for operable contact with a surface upon which the machine is used, floor treating disc means, shaft means connected to said disc means, flexible couplings connected to said shaft means, means for rotating said flexible couplings to thereby rotate said disc means, lever means connected to said shaft means for varying the axis of rotation of said disc means independent of said frame means to cause portions of said disc means to contact the surface with greater pressure than other portions thereof to thereby move the machine on a surface.

18. In a mobile floor treating machine, frame means having wheel means connected thereto, a support frame pivotally connected to said frame means, a motor mounted on said support frame, floor treating means flexibly connected to said support frame, drive means connecting said motor with said flexible floor treating means, lever means connected to said support frame and said frame means for raising and lowering said support frame independent of said frame means to thereby move said floor treating means in and out of contact with a floor, second lever means connected to said floor treating means for causing portions thereof to contact a floor with greater pressure than other portions independent of said frame means to thereby move the machine over a surface and simultaneously treat the
19. In a mobile floor treating machine, frame means having wheel means connected thereto, disc means, means for mounting said disc means on said frame means, means for rotating said disc means, means for raising and lowering said disc means, and means for manipulating said disc means whereby the inner portions thereof with respect to said frame means are caused to exert a greater pressure than the inner portions upon a surface on which the disc means rests to thereby drive the machine in the opposite direction.

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