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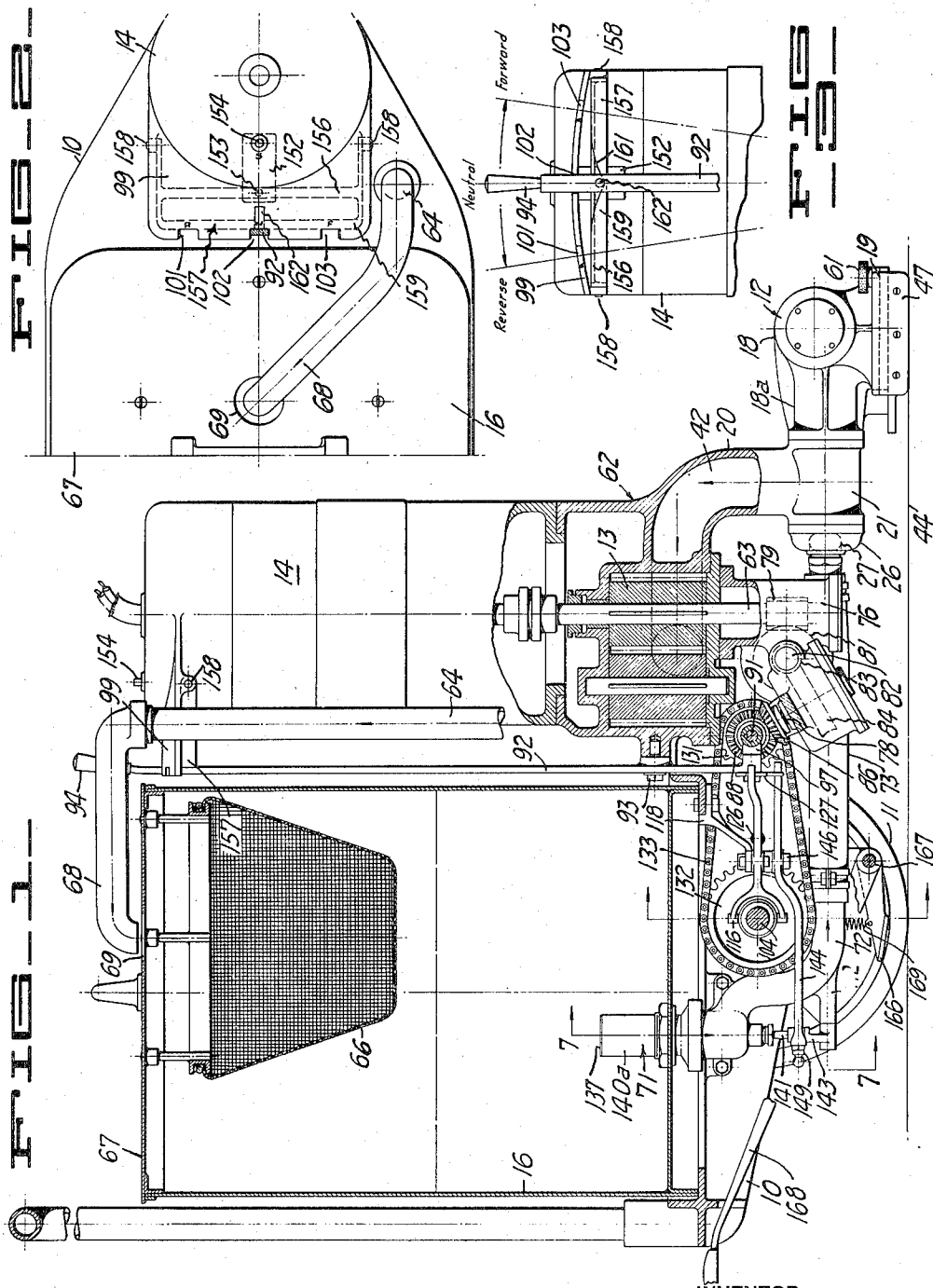
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2,129,797

CARPET WASHING MACHINE

Filed March 16, 1935

4 Sheets-Sheet 1



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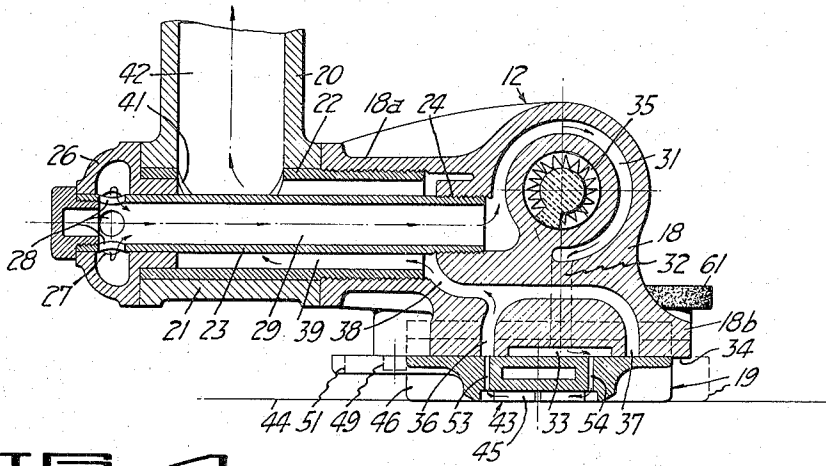


FIG. 4.

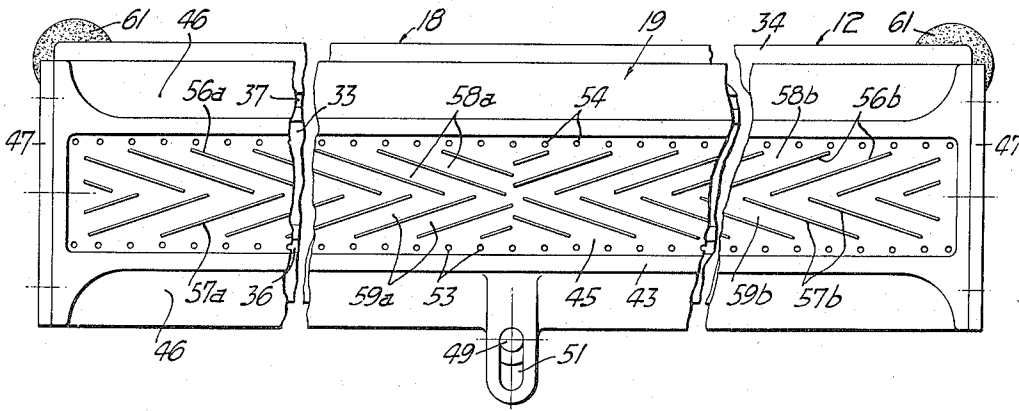


FIG. 5.

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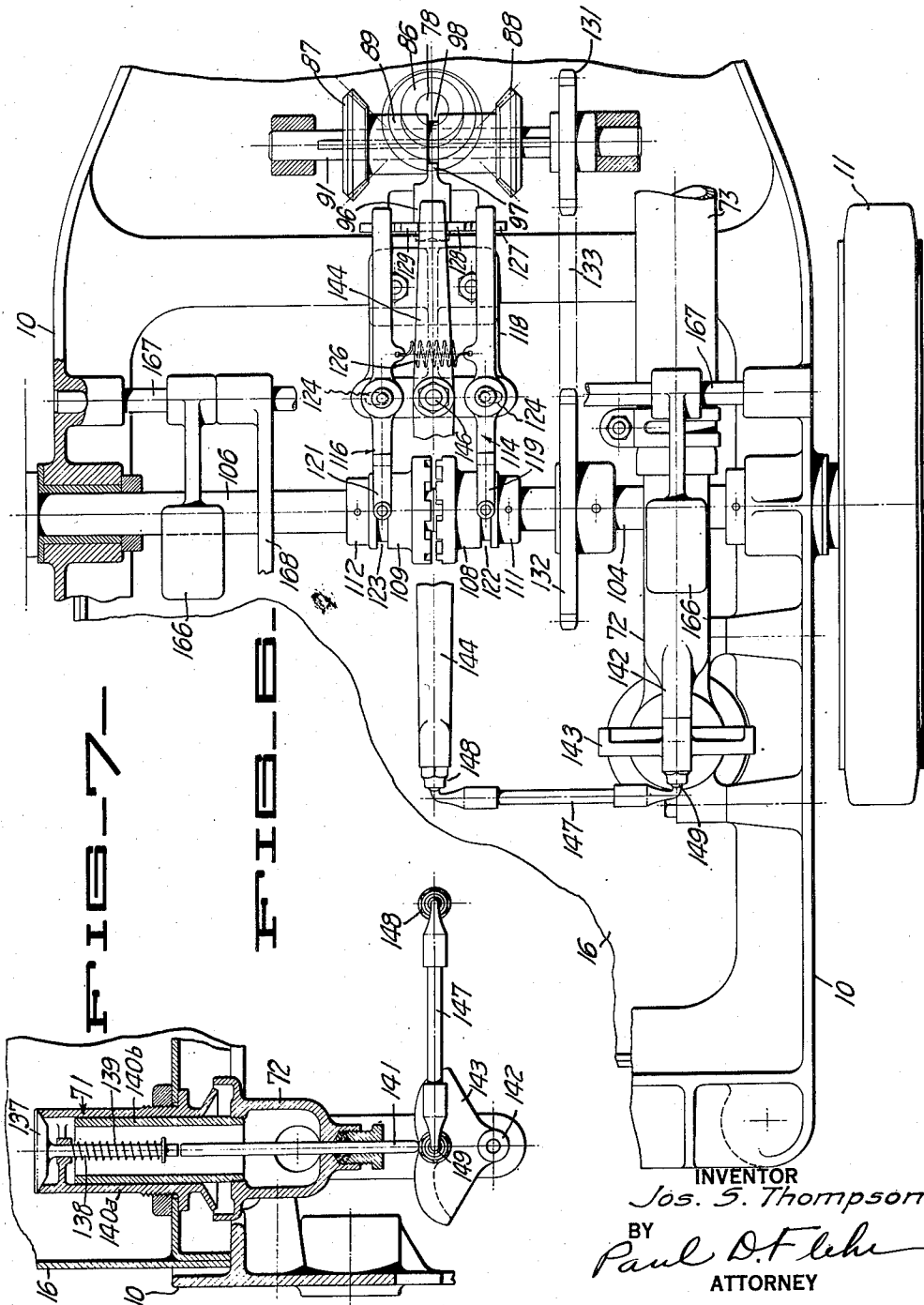
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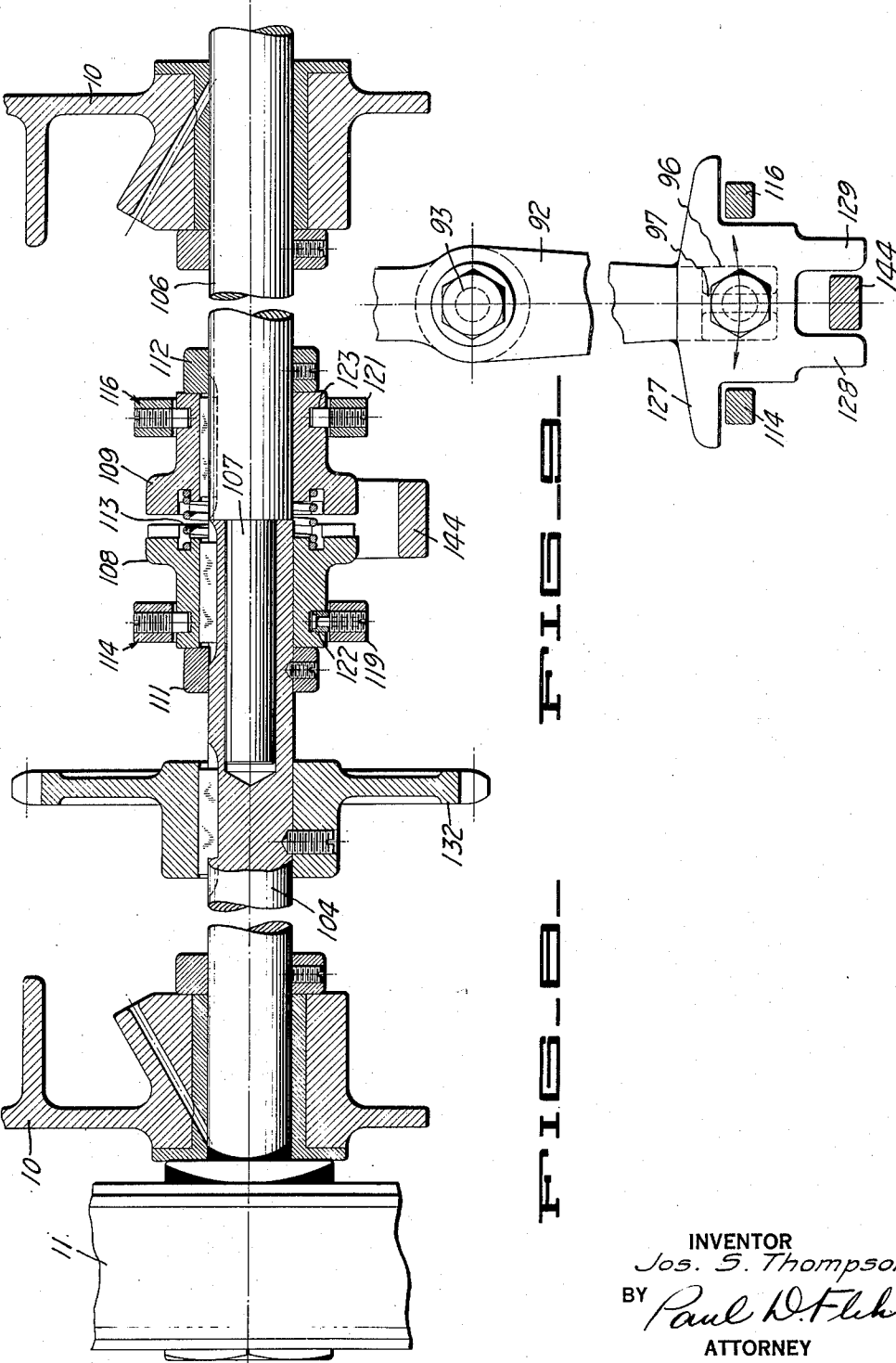


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CARPET WASHING MACHINE

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5 Claims. (Cl. 15—50)

This invention relates generally to devices or machines for the cleaning of various surfaces, where a washing or cleaning liquid is employed. It is of particular value where it is desired to wash carpets, rugs, or like floor-surfacing materials, without removing the carpet or rug from its normal position on the floor.

The embodiment of the invention disclosed herein is an improvement of the device disclosed and claimed in my Letters Patent No. 1,892,792, granted January 3, 1932, and of the machine disclosed in my co-pending application Serial No. 680,767, filed July 17, 1933, now issued Letters Patent No. 2,011,234, granted August 13, 1935, of which the present specification is a continuation in part.

Objects of the present invention can be briefly summarized as follows:—To afford more effective contact of washing liquid with the nap of a carpet or rug, thus promoting efficient cleaning and reconditioning; to make possible continued washing of a particular spot while the wheels of the supporting carriage are being driven; and to provide improved driving means and control features which will facilitate manipulation by an operator.

Further objects of the invention will appear from the following description in which a desirable embodiment of the invention has been set forth in detail in conjunction with the accompanying drawings.

Referring to the drawings:

Fig. 1 is a side elevational view, partly in transverse cross-section, illustrating one embodiment of the present invention.

Fig. 2 is a detail in plan, showing particularly the relationship of the control lever in conjunction with an electric motor switch.

Fig. 3 is a fragmentary detail showing a portion of the mechanism of Fig. 2 in elevation.

Fig. 4 is a side elevational detail, in cross-section, showing the washing head incorporated with the machine of Fig. 1.

Fig. 5 is a bottom plan view of the washing head.

Fig. 6 is a bottom plan view of a portion of the machine illustrated in Fig. 1, showing particularly the drive mechanism.

Fig. 7 is a cross-sectional detail taken along the line 7—7 of Fig. 1, showing a discharge valve and a control therefor.

Fig. 8 is a fragmentary detail, in cross-section, showing particularly the main axle of the machine.

Fig. 9 is a detail in side elevation showing the lower end of the main control lever.

In general, the machine as illustrated consists of a carriage frame 10, which is provided with wheels 11, and which serves to support a washing head 12. Associated with the washing head there is a liquid pump 13, adapted to be driven

by an electric motor 14. To afford a convenient supply of washing liquid, the carriage frame 10 also supports a suitable liquid tank 16. When the machine is in operation, liquid from tank 16 flows to the washing head 12, where it is brought into contact with the surface being cleaned. After such contact, the liquid is sucked back up through the head 12 by pump 13, and delivered back to the tank 16.

Since features of the washing head 12 form a material part of the present invention, this device will be first described in detail. It consists of a main body 18 formed of cast aluminum or like suitable material, in conjunction with a floor-operating plate 19. The rear side of the body is attached to a conduit 20 by means of a swivel coupling or journal 21. By virtue of the journal the entire head 12 may turn freely about a horizontal axis extending substantially in the general direction of movement of the machine, thus enabling the plate 19 to operate flat upon the floor, irrespective of minor floor variations.

To point out briefly the details of journal 21 as illustrated, the lower end of the conduit 20 is bored laterally and fitted with a tube or sleeve 22. One end of the sleeve 22 has a threaded connection with a rearwardly extending portion 18a of the body 18. Extending concentrically through sleeve 22 there is a tube 23 of substantially smaller diameter. One end of tube 23 has a threaded connection 24 with body 18, while the other end of the tube extends through a hollow closure cap 26. An inflow passage 27, for the admission of washing liquid, communicates with the interior of cap 26, and from thence the liquid may flow through ports 28, to the passage 29 formed within tube 23.

The head 18 is provided with ports or passages for delivering washing liquid from tube 23 to the floor-operating plate 19. Thus the upper portion of body 18 is shown provided with a curved passage 31, communicating between the interior of tube 23 and the downwardly extending passage 32. The lower end of passage 32 communicates with a recess 33 in the lower face 34 of the body 18. The lower body portion 18b, forming the face 34, may be substantially rectangular, or in any event is of substantial length in a direction lateral with respect to the path of movement of the machine. An electrical heating element 35 may be carried within the body of the head, to conduct heat to liquid flowing through the passages just described.

For the removal of washing liquid from the floor-operating plate 19, spaced ports or passages 36 and 37 are provided, which communicate with a common passage 38. Passages 36 and 37 extend to the bottom face 34, and are spaced to the rear and forwardly of the rear and forward extremities, respectively, of recess 33. From passage 38 liq-

uid flow occurs through the passage 39, between sleeve 22 and tube 23, and from thence through an opening 41 in sleeve 22, to the suction passage 42 formed by conduit 20.

5 The preferred construction for the floor-operating plate 19 can be best understood by reference to Figs. 4 and 5. The bottom face 43 of this plate is adapted to contact with the carpet or like floor surfacing 44 to be cleaned. Extending
10 intermediate the ends and longitudinal side edges of plate 19 there is a recess 45 formed in the lower surface 43 (Fig. 5). When in contact with the floor surfacing 44, as illustrated in Fig. 4, this recess is enclosed to form in effect a closed
15 chamber for flow of washing liquid. For the sake of lightness, and in order to avoid undue friction in moving over the floor surfacing, the longitudinal side portions of plate 19 may be cut away, as indicated at 46.

20 The mounting of plate 19 with respect to the body 18 preferably permits limited sliding movement between these parts, so that such movement occurs automatically as the head is moved back and forth over the floor surfacing. Thus,
25 upstanding flanges 47 are secured to the ends of plate 19, and these flanges slidably engage suitable tracks formed on the corresponding ends of the body portion 18b. The extent of sliding movement is limited, as by means of a depending pin 49, mounted upon one portion of the
30 body 18, and extending into a slot 51 formed in a lug on plate 19. One limiting position of plate 19, corresponding to the position which it occupies when the washing head is moved to the right as
35 viewed in Fig. 4, is illustrated in solid lines in this figure. The other limiting position, corresponding to the position occupied when the washing head is moving towards the left, is illustrated in dotted lines.

40 To produce for the circulation of washing liquid through recess 45, plate 19 is provided with two sets of ports 53 and 54. When the plate 19 occupies the relative position shown in solid lines (Fig. 4), ports 53 communicate with passage 36
45 for the removal of liquid, while ports 54 communicate with recess 33 for introducing washing liquid. For the dotted line position of plate 19, it is evident that ports 53 will be in communication with recess 33 to admit washing liquid to the
50 recess 45, while on the other hand ports 54 are brought into communication with passage 37 for the removal of washing liquid. Thus, for the two limiting positions of plate 19, the flow of liquid through recess 45 occurs in opposite
55 directions.

I have found that when the machine is operating over a carpet or rug having a considerable nap, the washing action may not be as effective as desired, unless provision is made for proper
60 flexing and agitation of the nap simultaneously with the washing action. As a desirable nap agitating means, I have shown two sets of vanes 56a-56b and 57a-57b, which can be conveniently formed as spaced ribs integral with the
65 main body of plate 19. While the shaping of these ribs may vary, they have been shown linear, whereby the spaces between the ribs form passages 58a-58b and 59a-59b for flow of washing liquid. Ribs 56a and 56b are inclined in opposite
70 directions with respect to the direction of travel, as are also ribs 57a and 57b, in order to secure effective agitation of the nap. Likewise, there is a staggering of the two sets of ribs, as shown in Fig. 5. With such an arrangement it is evident
75 that when plate 19 is moved over the surface of

a carpet, with a fair amount of downward pressure, the nap extending into recess 45 is flexed back and forth and the individual fibers are repeatedly separated, to enable the washing liquid to effectively contact all of the individual fibers
5 of the nap. Likewise, it is evident that the flow of washing liquid through recess 45 will occur mainly through the zig-zag paths defined by the interconnecting spaces between the ribs. It is desirable that the lower edges of the ribs terminate coincident with the plane of the lower
10 face 43. If they were extended below face 43, undue leakage of liquid might occur.

If desired, the machine may be provided with buffer means to avoid injury to baseboards or
15 furniture with which the head may come in contact. Thus, the forward corners of the head are shown provided with rollers 61, formed of suitable resilient material such as soft vulcanized rubber.

The pumping means for withdrawing washing
20 liquid through conduit 20, together with some air which may be admitted into recess 45, can be constructed as illustrated in Fig. 1. Thus, in this instance conduit 20 is formed as a part of housing 62, which is secured to the carriage frame 10.
25 The pump illustrated is of the gear type, having its main operating shaft 63 directly coupled to the shaft of an electric motor 14. The inflow side of the pump is connected to the passage 42 formed by conduit 20, while the outflow side
30 is connected to a pipe 64, which serves to deliver liquid back to the tank 16.

In order to prevent recirculation of foreign objects of considerable size which may be picked
35 up from the floor during a washing operation, it is desirable to pass the washing liquid through a screen before it is returned to the washing head. Thus, as shown in Fig. 1, a screen 66 is carried on the under side of the tank cover 67. An over-
40 hanging discharge spout 68 has a swivel connection with the upper end of pipe 64, and can be positioned to discharge liquid through the cover opening 69 upon the screen 66. The tank cover 67, together with the screen 66, can be
45 readily removed at any time, by first swinging pipe 68 to an out-of-the-way position.

Flow of washing liquid from the tank 16 to the washing head 12 is established as follows:
50 In the bottom wall of tank 16 there is an out-flow valve 71, a desirable construction for which will be presently explained. Flow pipe 72 leads from valve 71 and is coupled to the washing head through a hose connection 73, whereby gravity flow of washing liquid may occur into
55 the washing head through passage 27 (Fig. 4).

To provide means whereby the electric motor 14 may also drive the wheels 11 of the carriage
60 frame 10, the pump shaft 63 is shown extending downwardly into a gear housing 76. The gears carried by housing 76 serve to transmit motion at a reduced speed to shaft 78. As representative
65 of such gearing, a worm 79 on the lower end of shaft 63 engages a gear 81 carried by the intermediate shaft 82. Rotatable together with gear 81, there is a worm 83 which engages a gear 84 carried by shaft 78.

As best illustrated in Fig. 6, mounted upon the
70 outer end of shaft 78 there is a bevel gear 86 which is adapted to cooperate with either one of two bevel gears 87 and 88. These latter two gears are mounted upon a hub 89, which in turn is splined to an intermediate horizontal shaft 91.

To enable manual shifting of the hub 89, so that either one of the gears 87 and 88 may engage with the bevel gear 86, control means 75

is provided as follows: Conveniently mounted upon the machine, as for example between the motor 14 and the tank 16, there is a control lever 92. A pivotal mounting for the lever is indicated by stud 93, and the upper end of the lever is provided with a suitable handle 94. The lower end of the lever 92 is provided with an off-set portion 96, which carries a finger 97. Finger 97 extends into an annular groove 98, formed in the intermediate portion of hub 89. The upper portion of lever 92 co-operates with a suitable quadrant 99, having lever-positioning notches 101, 102 and 103. As will be presently made clear, when lever 92 is engaged in neutral notch 102, drive from the electric motor to the wheels 11 is interrupted; when the lever engages notch 101, the drive to the wheels moves the entire machine backwardly; and when the lever is engaged in notch 103 the machine is driven forwardly.

Instead of affording a direct drive between shaft 91 and the wheels 11, a drive through a suitable automatic clutch is provided. Thus the wheels 11 are mounted upon two separate aligned shafts 104 and 106, which are separately journaled in the sides of the carriage frame 10 (Fig. 8). The inner ends of shafts 104 and 106 may be journaled together, as by having the inner end of shaft 104 bored to receive an extension 107 of reduced diameter on the inner end of shaft 106. Splined upon the inner ends of these shafts, are the elements 108 and 109 of a jaw type clutch. These elements are normally urged apart, against the abutment collars 111 and 112, by the compression spring 113. When urged together, against the compression of spring 113, it is evident that shafts 104 and 106 are connected together to operate in unison.

To enable a selective shifting of clutch elements 108 and 109, responsive to operation of the control lever 92, two levers 114 and 116 are provided (Fig. 6). These levers are pivotally secured to a supporting bracket 118, and the ends of the levers adjacent the corresponding clutch elements 108 and 109 are provided with forks 119 and 121 for engaging the grooves 122 and 123 of the clutch elements. The pivotal connections between the levers 114 and 116 with bracket 118 preferably permit a certain amount of lost motion, as by having the pivot pins for the levers extending through slots 124 formed in the bracket. A tension spring 126 connects directly between the two levers.

Mounted upon the lower end of the manual control lever 92, and adjacent the off-set portion 96, there is a plate 127. This plate extends downwardly between the adjacent ends of levers 114 and 116 (Fig. 9), and at its lower extremity is provided with spaced lugs 128 and 129. Thus, when the control lever 92 is in the position represented by notch 102, plate 127 occupies the positions illustrated in Figs. 6 and 9, and the clutch elements 108 and 109 are disengaged. When lever 92 is shifted to the position represented by notch 103, bevel gear 87 is brought into engagement with gear 86, and at the same time shifting of plate 127 actuates lever 114 to slide clutch element 108 into engagement with element 109. Similarly, when the control lever 92 is shifted to a position corresponding to notch 101, gears 86 and 88 are brought into engagement, and lever 116 is shifted to bring clutch element 109 into engagement with element 108.

For transmitting motion to the wheels from shaft 91, positive drive means is provided to one of the shafts 104 or 106. Thus, mounted upon

the shafts 91 and 104 are the sprockets 131 and 132, connected by the drive chain 133.

With the arrangement described above, it is evident that for a position of lever 92 corresponding to notch 103, gears 86 and 88 will be brought into mesh and clutch elements 108 and 109 are engaged to drive the machine forwardly. Likewise, when the clutch lever is shifted to the position represented by notch 101, both of the wheels will be driven to propel the vehicle rearwardly. In the event the jaws of clutch elements 108 and 109 are so positioned that they can not immediately engage when clutch lever 92 is shifted, the give afforded by tension spring 126 and slots 124 permits immediate engagement of one of the bevel gears 87 and 88 with gear 86, following which the clutch elements 108 and 109 will snap to closed position when the jaws of the same assume a proper relative positioning.

Reference has previously been made to the valve 71 for controlling outflow of washing liquid from the tank 16. It is desirable that this valve be also controlled by movements of the lever 92, so that when this lever is in neutral position, represented by notch 102, the valve is closed, while in either reverse or forward position the valve is open for delivery of washing liquid. As representative of a suitable valve and operating mechanism of this character, the valve itself is shown provided with a vertically movable valve member 137 of the poppet type. The sliding stem 138 for the valve member 137 is urged towards closed position by spring 139. Extending upwardly through the external part of the valve body, and in alignment with the stem 138, there is an operating plunger 141. The body of the valve is formed of two interfitting and separable parts 140a and 140b, part 140a being carried by the tank 16, and part 140b being carried by the carriage frame.

To provide exterior operating means for the plunger 141, a bracket 142 serves to pivotally support a two-lobed cam 143. The exterior end of plunger 141 rests upon the surface of this cam, so that when the cam is in the neutral position illustrated in Fig. 7, valve member 137 is in closed position. However, when the cam is swung either to the left or to the right from the neutral position shown, plunger 141 is lifted, to open valve member 137.

As shown in Fig. 6, mounted beneath the levers 114 and 116, there is a lever 144. Intermediate the ends of this lever there is a pivotal connection 146 to bracket 118. One end of the lever extends between the lugs 128 and 129, while the other end is connected to the cam 143 by a link 147. Universal swivel connectors 148 and 149, to the ends of link 147, are desirable.

With the arrangement as described, when lever 92 is in a neutral position, cam 143 is likewise in a neutral position, so that valve 137 is closed. However, when lever 92 is moved to either forward or reverse position, cam 143 is moved to open the valve member 137 and effect flow of washing liquid to the washing head 12.

It is desirable to provide means whereby the energizing circuit to the motor 14 is automatically closed when the lever 92 is thrown to either forward or reverse position. Thus, as is evident from Figs. 2 and 3, a motor starting switch 152 is provided, which is controlled by the start and stop buttons 153 and 154, respectively. Button 153 underlies a bar 156, forming a part of a yoke 157. The side branches of this yoke are secured to the motor housing, by pivotal connections 158, to

enable swinging movement of the yoke in a vertical direction. The transverse bar 159 of the yoke, which underlies the notched quadrant 99, is provided with an upper cam face 161. A pin 162 mounted upon control lever 92 is arranged to engage the cam surface 161, and the character of this surface is such that when lever 92 is in neutral position, the switch 152 may be opened by compression of button 154, with the button 153 retaining the yoke in an elevated position. When the lever 92 is shifted from a neutral position to either forward or reverse position, the starting button 153 is automatically depressed by downward movement of yoke 157, to start the motor before engagement of the drive to the wheels. While the lever 92 is in either forward or reverse position, depression of button 153 makes it impossible for an operator to stop the motor by depressing button 154. Thus to stop the motor it is necessary to first move the control lever 92 to neutral position.

At times it is desirable to retain the machine stationary while continuing a washing operation upon a particular spot. To enable such operation, I provide means, operated manually as by means of a foot pedal, to elevate the wheels from the floor, thus permitting the wheels to revolve without movement of the machine. Thus, referring to Figs. 1 and 6, I provide a pair of floor contacting levers 166, which are secured at spaced points to a horizontal shaft 167. Likewise secured to shaft 167 there is a foot lever 168, the outer end of which projects beyond the rear end of the carriage frame, in position for convenient depression of the foot of the operator. A tension spring 169 serves to ordinarily urge the levers 166 towards a raised position out of contact with the floor. When the foot lever 168 is depressed by the foot of the operator, levers 166 are swung downwardly into contact with the floor, to elevate the carriage and to lift the wheels clear of the floor. While in this position the washing head 12 remains in contact with the floor, so that a washing operation on a particular spot may proceed while the machine remains stationary. Likewise, the driving mechanism is relieved to facilitate shifting or releasing of the gears.

It is evident that the machine described above has many desirable features. In addition to the fact that the washing head 12 will effect efficient washing of the carpet, with continued agitation of the nap while the machine is in movement, the manner in which the machine is controlled by movements of lever 92 makes the machine relatively fool-proof, as well as enabling use by relatively unskilled operators. If it is desired to secure prolonged washing of one particular spot of the carpet, traversing movement of the machine is arrested by depression of foot lever 168, without stopping the electric motor or the liquid pump. When the machine is not in operation, it can be readily wheeled about or maneuvered to any particular locality or position, due to the fact that the two wheels may revolve independently of each other.

I claim:

1. In a machine of the character described, a member having a substantially flat face interrupted by a recess, whereby when said face is contacted with a carpet or like surface to be cleaned a confined chamber is defined by the re-

cess and said surface, means for circulating a washing or cleaning liquid through the chamber thus formed, the member having spaced ports for the flow of liquid into and from said chamber, and combined liquid flow directing and nap agitating means disposed in said recess.

2. In a machine of the character described, a member having a substantially flat face interrupted by a recess, whereby when said face is contacted with a carpet or like surface to be cleaned a confined chamber is defined by the recess and said surface, means for circulating a washing or cleaning liquid through the chamber thus formed, the member having spaced ports for the flow of liquid into and from said chamber, and a plurality of liquid flow directing and nap agitating vanes disposed in said recess, the positioning of said vanes being between the points of communication of said ports with said recess.

3. In a machine of the character described, a member having a substantially flat lower face interrupted by a recess, whereby when said face is contacted with a carpet or like surface to be cleaned a confined chamber is defined by the recess and said surface, means for circulating a washing or cleaning liquid through the chamber thus formed, the member having spaced ports for the flow of liquid into and from said chamber, and a plurality of spaced liquid flow directing and nap agitating vanes disposed in said recess, said vanes being disposed in that portion of the recess which is between the points of communication with said ports, the lower edges of said vanes being substantially contiguous with the plane of said lower flat face.

4. In a machine of the character described, a member having a substantially flat lower face interrupted by a recess, whereby when said face is contacted with a carpet or like surface to be cleaned a confined chamber is defined by the recess and said surface, means for moving said member over said surface along a given path, means for circulating a washing or cleaning liquid through the chamber thus formed, the member having spaced ports for the flow of liquid into and from said chamber, and a plurality of spaced nap agitating ribs disposed in said recess, the spaces between said ribs defining passages for flow of liquid between said ports, said ribs extending at an angle with respect to said path of movement.

5. In a machine of the character described, a member having a substantially flat lower face interrupted by a recess, whereby when said face is contacted with a carpet or like surface to be cleaned a confined chamber is defined by the recess and said surface, means for circulating a washing or cleaning liquid through the chamber thus formed, the member having spaced ports for the flow of liquid into and from said chamber, means for moving said member along a given path over the surface to be washed, and two sets of spaced nap agitating ribs disposed in said recess, the ribs in the recess being inclined in opposite directions with respect to said path of movement, the spaces between said ribs defining passages for flow of liquid between said ports, and the lower edges of said ribs being substantially contiguous with the plane of said lower flat face.

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