June 24, 1924.

1,498,623

H. G. GROSSE

WASHING MACHINE

Filed July 26, 1918

4 Sheets-Sheet 1

Fig. 8.

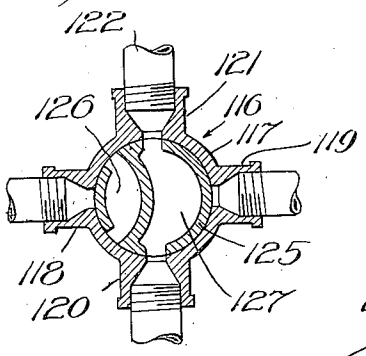

Fig. 1.

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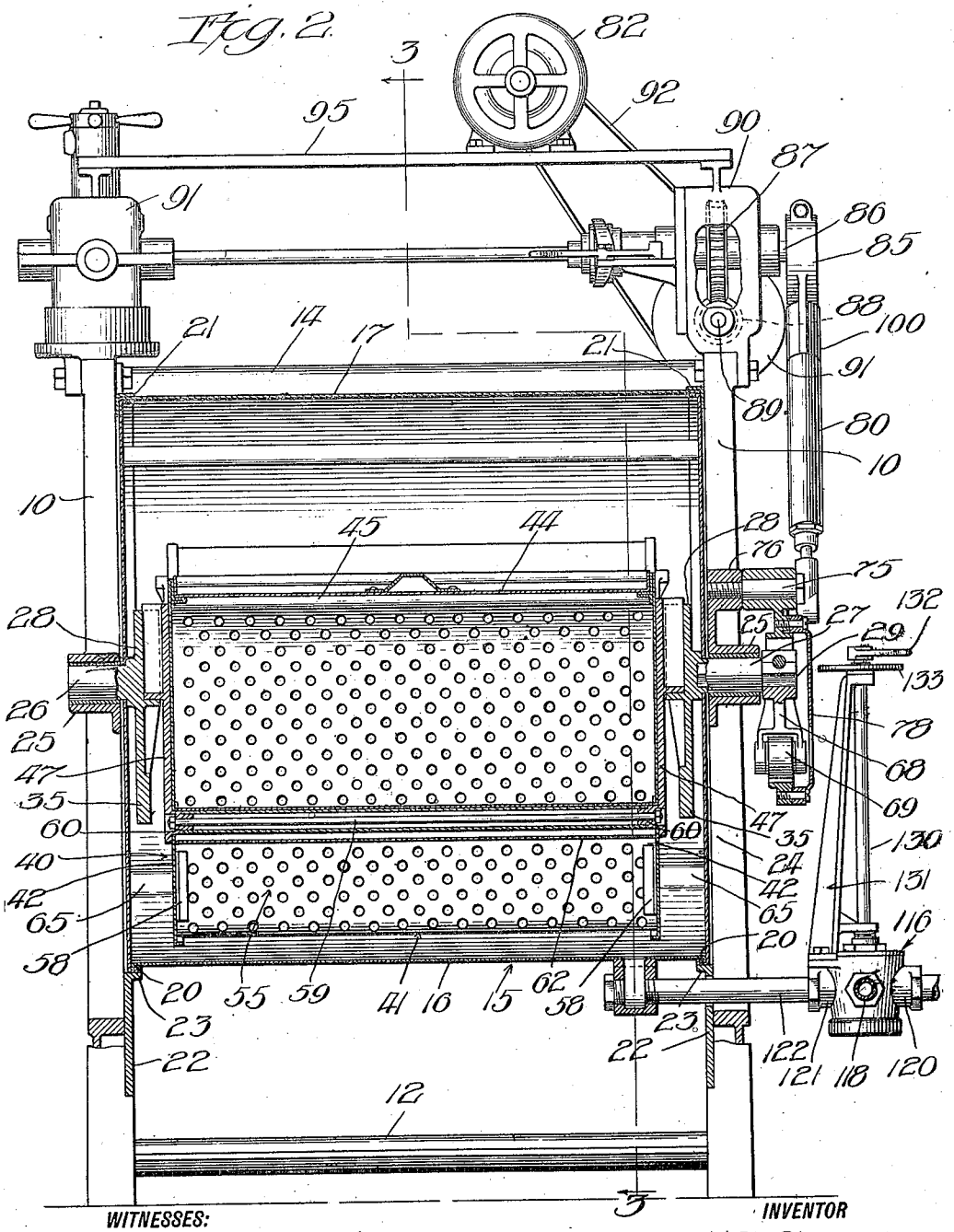
Fig. 2.



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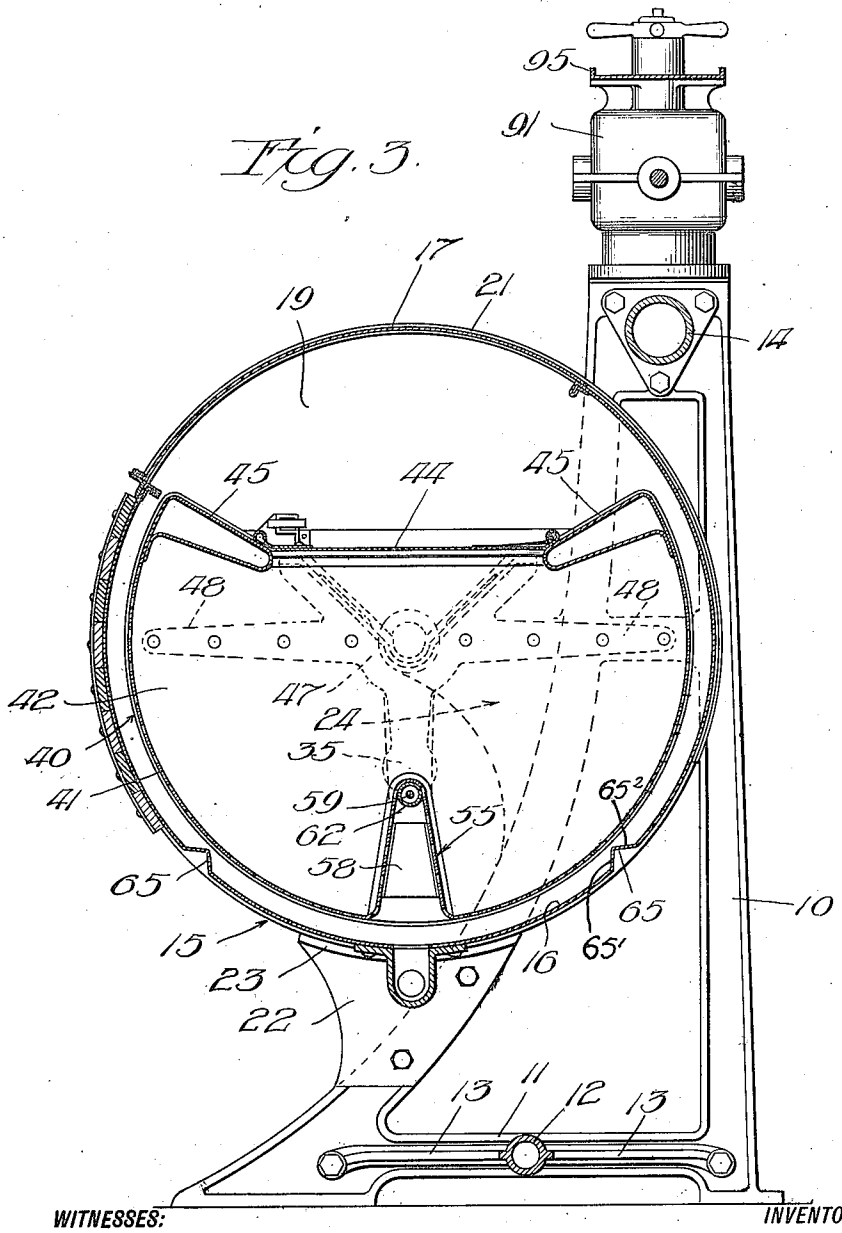
Filed July 26, 1918 4 Sheets-Sheet 3

Fig. 3.



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WASHING MACHINE

Filed July 26, 1918 4 Sheets-Sheet 4

Fig. 7

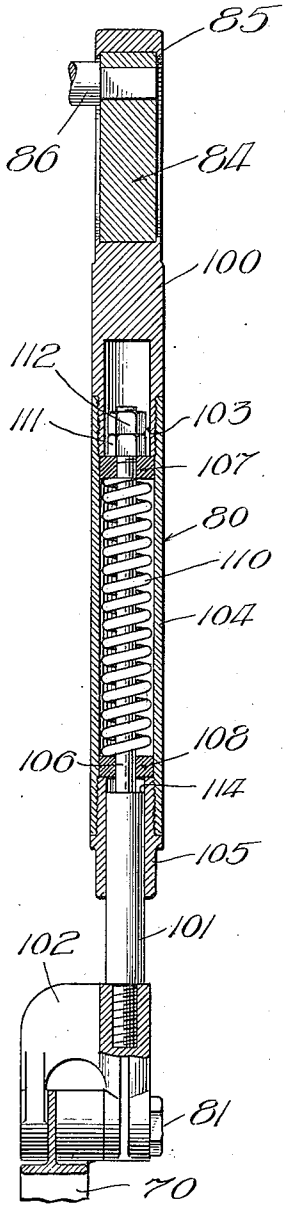


Fig. 4

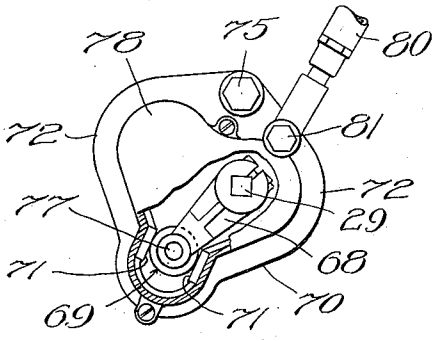


Fig. 5

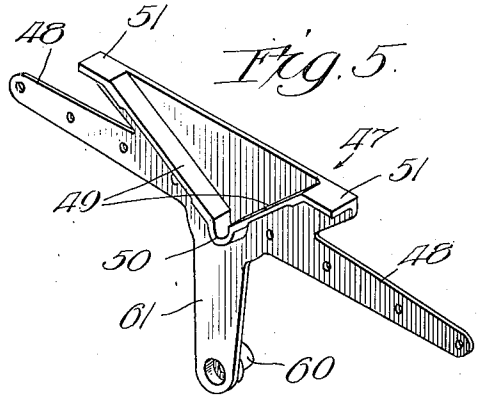
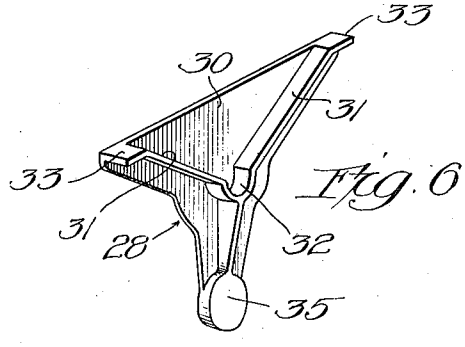


Fig. 6



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UNITED STATES PATENT OFFICE.

HERMAN G. GROSSE, OF CHICAGO, ILLINOIS.

WASHING MACHINE.

Application filed July 26, 1918. Serial No. 246,842.

To all whom it may concern:

Be it known that I, HERMAN G. GROSSE, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Washing Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in washing machines of that general type having an oscillating drum or cylinder to receive the clothes to be washed and which is contained in a shell or tub that is adapted to receive the wash water in which the cylinder, with the clothes therein, is partially submerged. The said inner cylinder and the outer surrounding shell or tub are provided at their upper sides with movable or removable doors through which the clothes are inserted into and removed from the washing cylinder.

Among the objects of the invention is to provide means for separating the clothes in the oscillating washing cylinder and for keeping them separated during the washing operation so as to prevent the clothes from being unequally distributed in the washing cylinder, and thereby avoiding throwing unequal loads on the operating mechanism of the cylinder in the to and fro movements of the latter and avoid wadding of the clothes in a manner to prevent free passage of the wash water therethrough.

Another object of the invention is to provide means on the outer shell or tub which intercepts the wash water as the cylinder is oscillated from side to side in such manner as to cause the wash water to be diverted and forced through the perforated cylinder in the part thereof which contains the clothes and which is submerged in the wash water in the outer casing or tub.

A further object of the invention is to provide novel means for interlocking the clothes cylinder to a part within the tub that is connected to the operating mechanism to support the clothes cylinder in the tub, the interlocking means being constructed and arranged to permit the clothes cylinder to be quickly set in place in the tub and removed therefrom and to accurately center the clothes cylinder relatively to the driving mechanism.

The invention consists in the combination and arrangement of the parts shown in the drawings and described in the specification, and is pointed out in the appended claims.

In the drawings,

Figure 1 is an end view of the washing machine embodying my invention, with parts broken away.

Figure 2 is a vertical section on the indirect line 2—2 of Figure 1.

Figure 3 is a vertical section on the indirect line 3—3 of Figure 2.

Figure 4 is a fragmentary detail illustrating the actuating member of the power transmission mechanism hereinafter to be described.

Figures 5 and 6 are perspective views illustrating the castings on the washing cylinder and tub, respectively, through the medium of which the washing cylinder is supported in the tub and is centered relatively to the driving mechanism.

Figure 7 is a detail of the pitman for imparting motion from a motor driven train to the operating member shown in Figure 4.

Figure 8 is a horizontal section on the line 8—8 of Figure 1.

The frame of the machine comprises two like shaped frame members 10, one at each end of the machine having broad supporting bases 11. Said frame members are tied together at their bases by a tubular tie bar 12 provided at its ends with cross arms 13 that are bolted to the bases, as best shown in Figure 3. The upper ends of said frame members are tied together by a tubular tie bar 14 which is bolted or otherwise rigidly secured to the inner faces of the frame members.

15 designates the outer casing or tub, herein shown as made cylindric. It comprises an imperforate shell 16 which is provided at its upper side with an opening closed by a sliding door 17. The tub is completed by end walls or heads 19 which, as herein shown, are inwardly flanged and are connected to the ends of the shell by double seam joints 20 (Figure 2). The shell is provided at its upper side, and for a distance at its rear side, with curved guides 21 to guide the door in its opening and closing movements. The said tub is supported on vertical plates 22 that are

bolted or otherwise secured to the end frame members 10, which plates are provided at their upper margins with curved, inwardly turned flanges 23, on which the ends of the tub thus constructed are supported. The tub is further supported on the end frame members by other plates 24 attached to or made integral with the frame members, said plates being formed with bosses 25 that receive short bearing trunnions 26, 27, which extend through the end walls or heads 19 of the tub and are mounted to rock in bushings in said bosses. The trunnions are formed integral with carriers, designated as a whole by 28. The trunnion 27 at one end of the machine is interlocked to a short stub shaft 29, through which power is transmitted from a driving mechanism to oscillate the cylinder. The said shaft 29 is shown as square in cross section and may be either fitted in a squared opening in the trunnion 27 or may be cast therein when the associated carrier 28 is cast. The said carriers 28 are alike in contour, with the exception of the manner of attaching the stub shaft 29 to one of the trunnions. Each carrier comprises a generally triangular plate 30 that is formed with converging ribs 31, 31, and at the lower proximate ends of said ribs with a semi-circular socket 32. Said ribs terminate at their upper ends in flat seats 33. The carriers extend below said semi-circular sockets 32 to form weighted arms 35 for the purpose to be hereinafter described.

40 designates as a whole the oscillating cylinder contained within the tub. It comprises a perforate parti-cylindric shell 41 and end members or heads 42, 42 which, as herein shown, are solid or imperforate. The said end members or heads are inwardly flanged to surround, and are interlocked to, the shell either by double seaming or other suitable fastening means. The said cylinder is open at its top and is closed by a door 44 that may be mounted either to swing on hinges or to be otherwise removed to afford access to the interior of the cylinder. The said door spans a space between, and is supported on ledges 45, 45 which, as shown in Figure 3, are formed by turning the metal of the shell inwardly and thence turning it back and attaching its terminal margins to the body of the shell.

Attached to each end or head of the oscillating cylinder is a cast metal bracket, designated as a whole by 47 and shown in detail in Figure 5. Said brackets are provided with oppositely extending arms 48 which lie against and are riveted or otherwise secured to the heads 42. The brackets are further provided between said arms with converging flanges 49 which, at their lower proximate ends, terminate in semi-cylindric projections 50 to enter the sockets 32 of the carrier plates 29. The upper ends of said flanges 49 terminate in overhanging members 51 which bear upon the seats 35 of the carriers 28.

The construction of said carriers 28 and brackets 47, arranged with their interfitting, converging flanges 31 and 49, respectively, constitutes means for interlocking the cylinder to the carriers 28. Said carriers, by reason of their connection to the rocking trunnions 26, 27 have an oscillating movement which is transmitted through the brackets 47 to the cylinder 40.

The cylinder 40 is provided at its lower side and in the plane of its axis of oscillation with an upstanding partition 55 which divides the clothes space of the cylinder into two like segmental compartments. As herein shown, said partition is formed as an integral part of the shell 41 of the cylinder, the metal of the shell of the cylinder being formed upwardly to constitute, as shown, a hollow V-shaped projection or partition. Preferably also the walls of the hollow partition thus formed are perforated so as to permit the passage of water therethrough. As herein shown and preferably, the walls of said hollow partition are stiffened by bracing plates or diaphragms 58 arranged one at each end thereof, as shown, and flanged at their side edges to be riveted or otherwise secured to the partition walls.

A tie bolt 59 extends between the heads of the washing cylinder and through bosses 60 formed on the lower ends of arms 61, which depend from the brackets 47, said tie rod being threaded at its ends to receive clamping nuts. A spacing tube 62 surrounds said tie rod and fits at its ends over the bosses 60 and against shoulders formed by reducing the diameter of the inner ends of the bosses to space the cylinder heads. Said spacing tube lies within the upper side of the hollow partition 55, which latter is shown as curved at its upper side to conform to the spacing tube. The said tie bolt and spacing tube, in connection with the partition 55, has the effect to greatly strengthen the cylinder structure, especially at the bottom portion which principally sustains the dead and operating loads.

The shell of the tub is provided at each side of the plane of its axis and near the bottom thereof with deflecting or retarding ledges 65 which extend inwardly from the tub towards, but terminate short of, the shell of the clothes cylinder. As herein shown, they are formed as integral parts of the shell, the shell being swaged or bent inwardly to produce exterior V-shaped recesses in the shell and corresponding shaped ledges within the tub.

In the operation of the machine thus far described, the clothes cylinder is oscillated about the axis of the trunnions or lugs 26,

27 through a short arc of a circle. The clothes in said cylinder are, by such oscillatory movement, carried backwardly and forwardly through the wash water which passes through the perforations of the cylinder shell and through the meshes of the clothes being washed. The motion of the cylinder in contact with the water tends to carry the water upwardly along the inner sides of the tub, and the momentum of the moving body of water tends to carry the water much further than that due to the movement of the oscillating cylinder alone. The said ledges 65, located as shown in Figure 3, serve, not only to retard the upward flow of the wash water, but also, by reason of the location thereof and also by reason of their shape, serve to deflect the wash water inwardly towards the perforate shell of the cylinder, and thereby force an increased volume of water through the clothes. That is to say, the angle of the lower sections or sides $65'$ of said ledges is upwardly and inwardly, and the planes of said lower sides at the opposite sides of the machine converge. Therefore, in each oscillation of the cylinder the lower sides of the ledges serve to throw the water into the cylinder through the perforations thereof and thereby retain the water in the active cleaning zone of the cylinder. Furthermore, the water that is thrown against the tub wall above the ledges is deflected by the oblique upper sides 65^2 of said ledges downwardly and inwardly through the perforated tub wall into and through the clothes. Said deflecting ledges also serve to prevent water splashing from the tub even though the tub should not be made the full circle and were not provided with a cover. The weighted arms 35 act to equalize the weight of the carrier brackets 28 about their axis of rotation.

The partition 55 serves to prevent the clothes bunching or matting at one side of the plane of oscillation of the cylinder so that, with the proper amount of clothes in the cylinder, they are prevented from wadding so that water may pass freely therethrough and thus enhance the cleansing operation. By reason of the fact that the partition 55 is perforated, said partition affords comparatively small retardation of the passage of water from one segmental chamber of the cylinder to the other. Thus a very free flow of water through the clothes, due to the oscillation of the cylinder, is insured which enables the clothes to be washed in a minimum time.

The operating mechanism herein shown for oscillating the cylinder is made as follows:

Fixed to the outer end of the stub shaft 29 beyond the trunnion 27 is a crank arm 68 which carries at its end a bearing roller 69. 70 designates an actuating member that is formed with internal parallel tracks 71, 71, along which the roller 68 travels. Said actuating member, as herein shown, consists of a closed yoke-shaped casting that is enlarged at its sides 72 to permit free movement of the crank arm 68 that lies between the arms of the yoke-shaped member. The casting is pivoted at its upper end by means of a pivot bolt 75 to a lug 76 on the adjacent end frame member 10 of the machine. As shown, the crank arm 68 is forked with its arms extending on opposite sides of the roller 69, and the roller is mounted in the fork of the crank arm by means of a short shaft or stud 77. Preferably and as herein shown, the outer side of the open yoke-shaped actuating member is covered by a plate 78 which prevents clothing of an operator being caught in the cooperating actuating member and crank arm.

The said actuating member is swung from side to side by means of a pitman 80 which is loosely connected at one end by a pin 81 with the actuating member adjacent to the pivot 75 thereof: and said pitman is operatively connected at its other end to a gear train which is driven by a motor 82. The means for connecting said pitman with the motor is made as follows:

84 designates an eccentric that lies within a strap 85 fixed to the upper end of the pitman 80. 86 designates a short shaft to which is fixed the eccentric 84. On said shaft is mounted worm wheel 87 that meshes with a worm 88, shown in dotted lines in Figure 2, and said worm 88 is fixed to a shaft 89 that is mounted in suitable bearings in a gear housing 90 supported at the top of one of the frame members 10. Said shaft 89 is provided with a grooved pulley 91 which is connected by a belt 92 with similar grooved pulley 93 on the shaft of the motor 82. Said motor is supported on a cross beam or plate 95 that extends between and is supported at one end on the crank casing 90 and is supported at its other end on a gearing casing 91 for a reversible wringer gear mechanism.

The actuating member 70 is shown in the central or mid position of its throw in Figure 1, at which time the crank arm 68 is vertical and the clothes cylinder is disposed in the tub with its opening uppermost, as seen in Figure 3. Figure 4 illustrates the position of said actuating member 70 when at one limit of its throw and the corresponding position of the crank arm 68, and said Figure 4 illustrates the angular movement of the clothes cylinder from its central position to its extreme throw as the operating mechanism herein shown is designed. The throw of the cylinder from side to side is accomplished with a comparatively small endwise movement of the pitman 80 owing to the fact that the pitman is pivoted to the ac-

tuating member at a point closely adjacent to the pivot 75 of the actuating member. As the actuating member swings from side to side on its pivot the bearing roller 69 for the crank arm 68 rides on the tracks 71 which may be hardened to avoid wear between the parts.

In order to prevent sudden shocks or jars being thrown upon the actuating mechanism at the reversal of oscillation of the cylinder and also to assist the cylinder to smoothly reverse at the extremity of each throw, cushioning means may be employed which may be associated with the pitman that transmits power from the motor driven gear drive to the actuating member 70 or may otherwise be applied to said actuating member.

As herein shown, the cushioning means are associated with and embodied in the pitman construction, and are made as follows:

The said pitman 80 comprises two end members 100, 101, the former constituting part of or attached rigidly to the strap 85, and the latter constituting a shaft, being fixed rigidly to a yoke 102 which is connected to the actuating member 70 through the pivot pin 81.

The pitman member 100 terminates in a tubular portion that is reduced at 103 and is exteriorly screw threaded to enter and be threaded to one end of a sleeve 104. The other end of the sleeve is interiorly screw threaded to engage external screw threads of a collar 105 that is mounted on the pitman member 101 to slide lengthwise of the latter. Said pitman member 101 is provided with an extension 106, shown as reduced in diameter beyond the main body of the pitman member 101. Said extension extends throughout the principal length of the sleeve 104. 107, 108 designate perforated discs, through which the extension extends. The disc 107 fits closely within the sleeve 104 and against the lower end of the reduced screw threaded portion 103 of the pitman member 100. The disc 108 likewise fits closely in the sleeve 104 and against the upper end of the collar 105. Interposed between said discs 107 and 108 is a spiral expansion spring 110. The upper end of the extension 106 of the pitman member 101 is threaded to receive adjusting and locking nuts 111 and 112.

The eccentric 84 rotates in the direction indicated by the arrow in Figure 1 and, as therein shown, the said eccentric is just beginning to exert power on the pitman to oscillate the clothes cylinder in one direction. The corresponding position of the pitman parts are shown in Figure 7. Endwise thrust of the pitman is primarily exerted through the upper pitman member 100 and the sleeve 104 to cause said sleeve, the spring 110, and the collar 105 to move downwardly relatively to the pitman member 101 (the collar sliding on the pitman member 101) until the lower disc 108 is brought up against the shoulder 114 between the reduced and larger part of the pitman member 101, whereupon the driving thrust of the pitman is exerted through the spring 110 so as to yieldingly transmit said thrust. Thereby sudden shock on the gear train and motor and on the pivot 81 is avoided. During this movement the upper end of the reduced portion 106 of the pitman member 101 has been projected through the upper disc 107, so that when the eccentric is reversed to exert a pulling stress on the pitman to swing the cylinder in the other direction, the shoulder afforded by the member 111 on the pitman extension 106 is separated from the upper disc 107. The pulling stress exerted by the eccentric in oscilating the cylinder in the other direction has the effect to first cause the upper pitman member, the sleeve 104, the spring 110, and the collar 105 to shift endwise relatively to the pitman member 101, and when the upper disc 107 is brought up against the nut 111, pulling stress of the pitman is exerted yieldingly through the spring 110, with the result of avoiding shocks on the gear train and motor and the pivot 81.

116 designates a valve through which hot and cold water is supplied to the tub and dirty water is drained therefrom. Said valve is shown in detail in Figure 8. It is a four-way valve, and comprises a casing 117 that is provided with ported hot and cold water branches 118, 119, respectively, adapted to be connected by pipes with sources of hot and cold water, a ported drain branch 120 connected to a drain pipe and a ported delivery branch 121 that is connected to a pipe 122 through which water is delivered to the bottom of the tub and is drained therefrom to the valve. 125 designates a plug rotatively mounted in the casing. Said plug is provided with two through passages 126, 127 that terminate in ports at the periphery of the plug and are adapted to register with the ports of the various branches. The ports of the passage 126 are angularly spaced ninety degrees, while the ports of the passage 127 are angularly spaced one hundred and eighty degrees. Said plug passage 126 is adapted to bridge between either the hot or cold water branch to the delivery water branch 120 to furnish either hot or cold water to the tub. The plug passage 127 is adapted to bridge between the delivery branch 121 and the drain branch, as shown in Figure 8, to permit wash water to be drained from the tub to the drain pipe connected to the branch 120. So also, if desired, either of the hot or cold water branches may be connected

by the passage 126 to the drain branch to clear said branch and its connected pipe of sediment.

The valve plug 125 is provided with an upstanding stem 130 which is rotatively mounted in bearings in a bracket which is attached to and rises from the valve casing. Said stem is provided with an operating handle 132, and said handle may cooperate with a dial 133 bearing suitable legends to guide the operator in adjusting the valve to supply water to or drain it from the tub.

I claim as my invention,

1. A washing machine comprising a tub for wash water, an oscillatory clothes cylinder therein, adapted to be partially submerged in the wash water, with means to oscillate it, and a narrow, upstanding, hollow, perforated partition opening outwardly to the space between the cylinder and tub throughout the length thereof and at its normal lower part, and terminating below the axis of oscillation of the cylinder to divide the cylinder into segmental clothes receiving compartments, said cylinder being unobstructed above said partition.

2. A washing machine comprising a fixed tub for wash water, a perforated clothes cylinder oscillatory therein through a range of a part of a circle and adapted to be partially submerged in the wash water, with means to oscillate it, and a perforated, upstanding, longitudinal partition within the normal lower part of the cylinder and terminating below the axis of oscillation of the cylinder, said tub being provided at the sides, and below the top of said partition, with rigid internal water deflectors out of contact with but closely adjacent to the cylinder periphery and formed with fixed, inclined faces to deflect into the cylinder water raised towards them by the cylinder.

3. A washing machine comprising a fixed tub for wash water, a clothes cylinder oscillatory therein through a range of a part of a circle having a perforated shell and adapted to be partially submerged in the wash water, a central, perforated partition rising from the bottom of said cylinder to form segmental clothes receiving compartments, and internal water deflecting ledges on the tub below the water level therein, and one at each side of the normal position of said partition and terminating short of the cylinder wall for deflecting water from the tub into the cylinder toward opposite sides of said partition during the oscillations of the cylinder.

4. A washing machine comprising a tub for wash water having end walls, an oscillatory cylinder therein, and V-shaped brackets and carriers on the cylinder and tub ends, respectively, having elongated bearing faces to support the cylinder from the tub ends and to center the cylinder in the tub, with the brackets adapted to be lifted directly from the carriers to remove the cylinder, said carriers being rockingly mounted on the tub ends.

5. A washing machine comprising a tub for wash water having end walls, an oscillatory cylinder therein, carriers provided with trunnions which are mounted to rock in bearings in said end walls and provided also with upwardly diverging elongated flanges, a clothes cylinder within the tub, brackets on the end walls of the cylinder having diverging flanges to rest on said carrier flanges and to thereby center the cylinder in the tub, and separable from the carrier flanges by direct lift, and means to transmit rocking motion to the trunnion of one of said carriers.

6. A washing machine comprising a tub for wash water having end walls, an oscillatory cylinder therein, carriers provided with trunnions which are mounted to rock in bearings in said end walls and provided also with upwardly diverging flanges, and at the converging ends of said flanges with sockets, a clothes cylinder within the tub, brackets fixed to the end walls of said cylinder and provided with diverging flanges to seat on the flanges of the carrier and with projections to seat in said sockets, and means to transmit rocking motion to the trunnion of one of said carriers.

In testimony whereof, I have hereunto set my hand at Chicago, Illinois, this 22nd day of July, 1918.

HERMAN G. GROSSE.