Aug. 11, 1942. A. MATTHEWS 2,292,789

WASHING MACHINE

Filed June 21, 1940 4 Sheets-Sheet 1

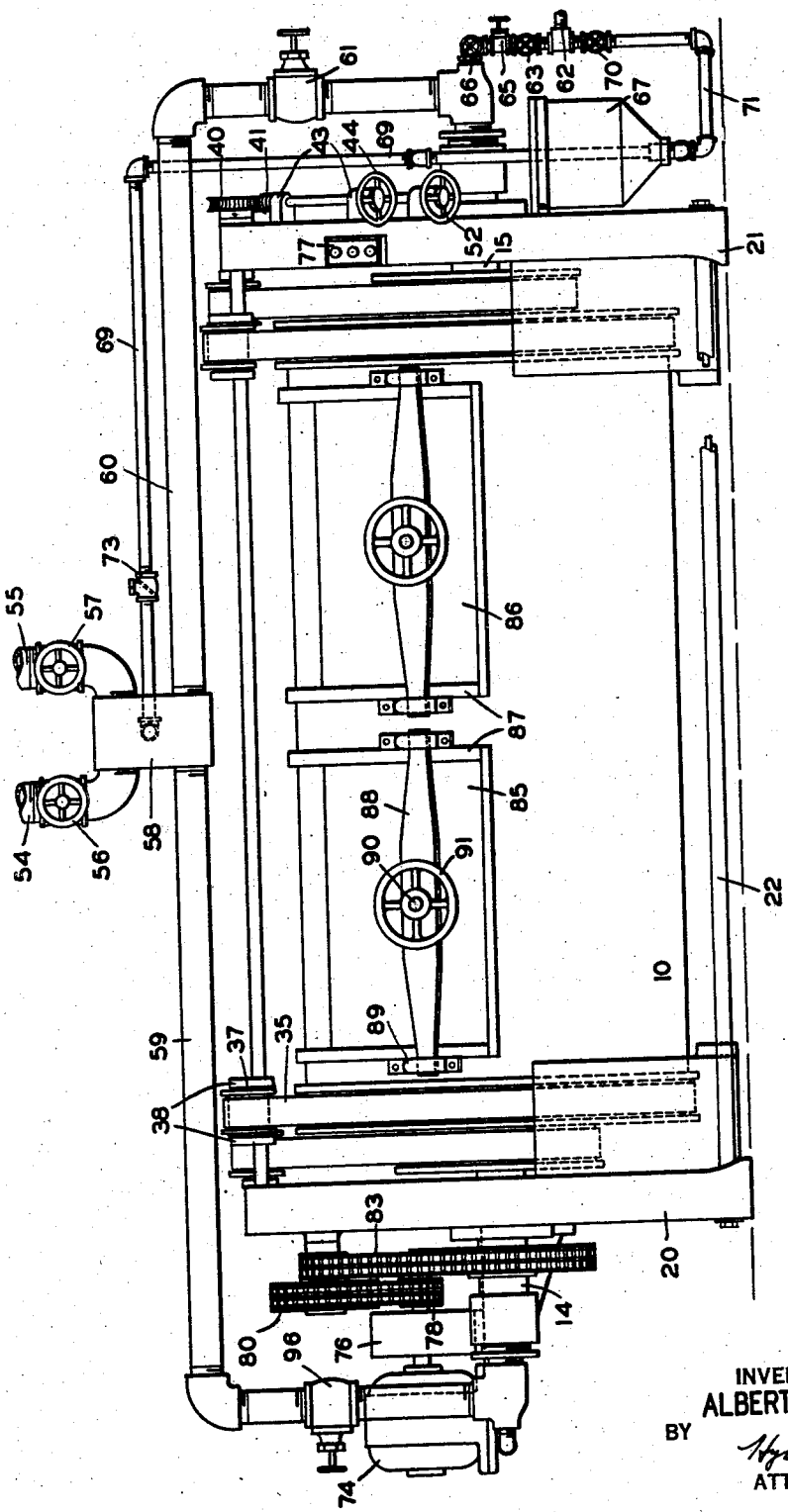

FIG-1

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Aug. 11, 1942. A. MATTHEWS 2,292,789

WASHING MACHINE

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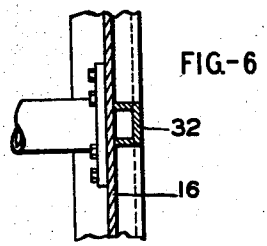

FIG.-6

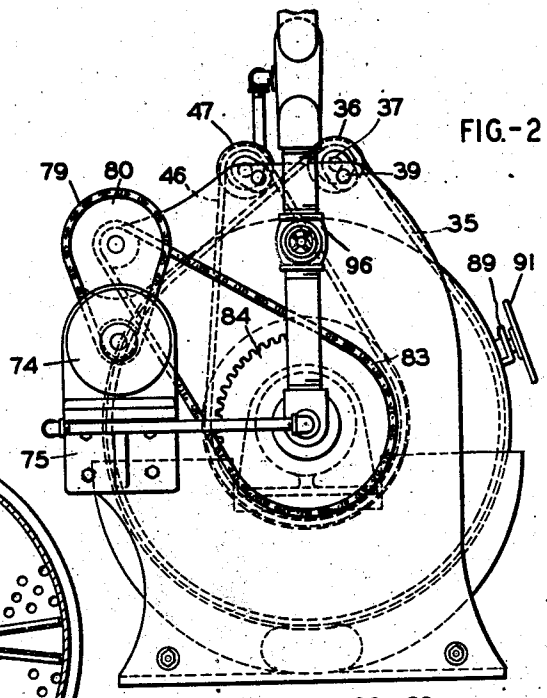

FIG.-2

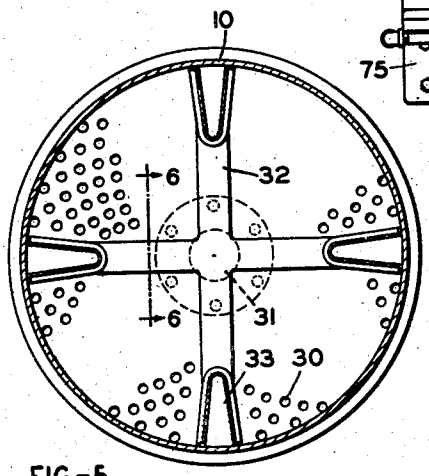

FIG.-5

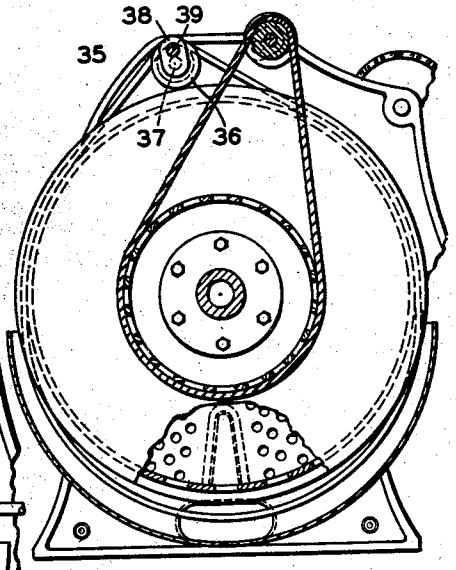

FIG.-4

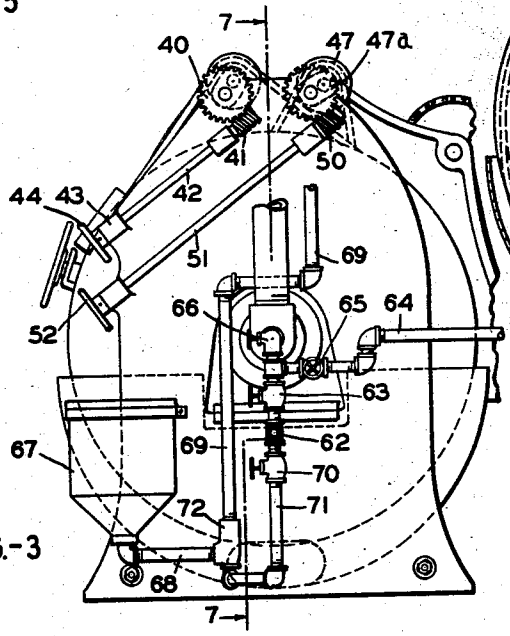

FIG.-3

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Aug. 11, 1942. A. MATTHEWS 2,292,789

WASHING MACHINE

Filed June 21, 1940 4 Sheets-Sheet 3

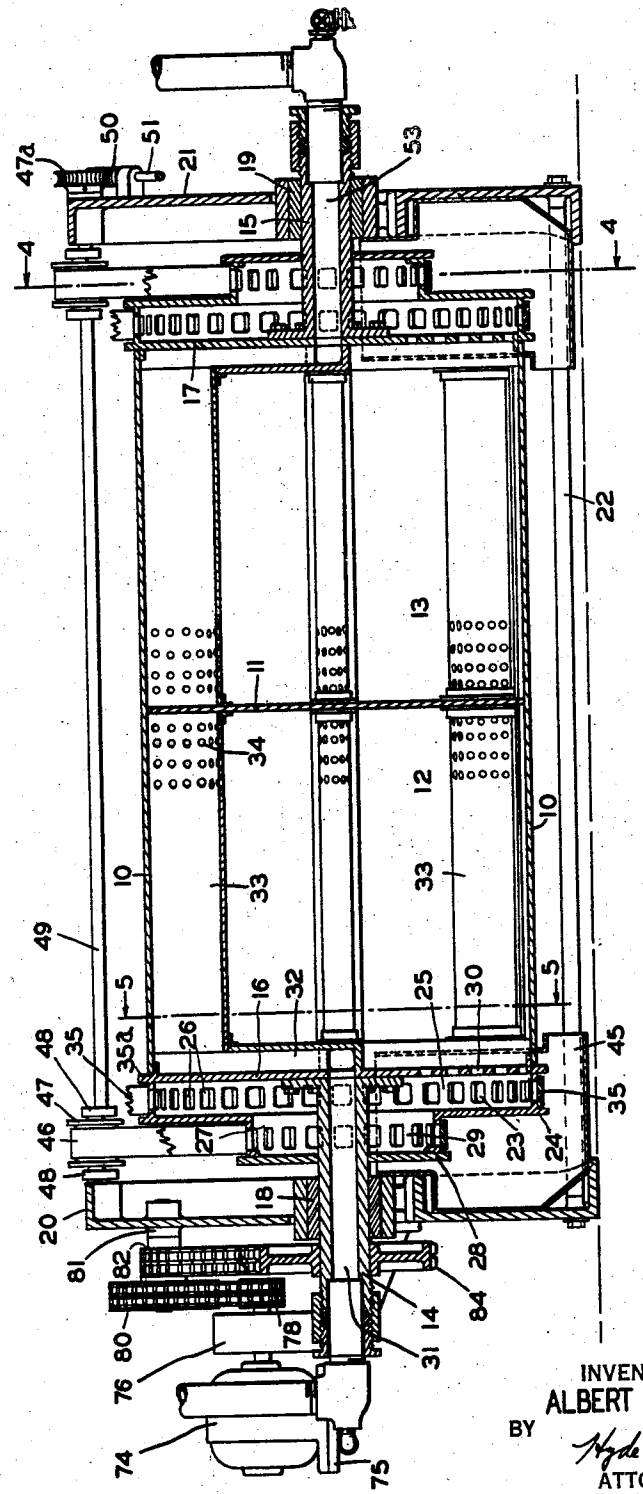

FIG.-7

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Aug. 11, 1942. A. MATTHEWS 2,292,789

WASHING MACHINE

Filed June 21, 1940 4 Sheets-Sheet 4

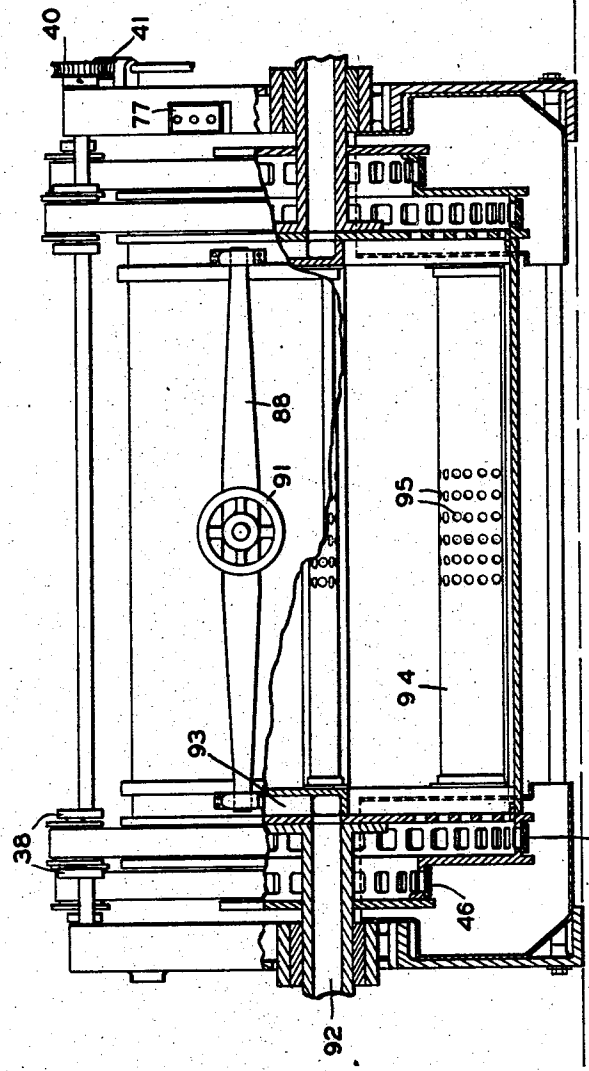

FIG-8

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Patented Aug. 11, 1942 2,292,789

UNITED STATES PATENT OFFICE

2,292,789

WASHING MACHINE

Albert Matthews, Cincinnati, Ohio, assignor to The American Laundry Machinery Company, Norwood, Ohio, a corporation of Ohio

Application June 21, 1940, Serial No. 341,685

6 Claims. (Cl. 68—58)

The invention relates to washing machines of the type known as tubless or shell-less washers. In a machine thus designated a single container, usually cylindrical, performs both the functions of the rotatable, inner, goods-containing cylinder, and the outer stationary water-containing shell of the conventional type of washer. In the older, tub type machine which was provided with a rotating container within a stationary member, the rotating container was necessarily perforate to allow ready access of detergent to the goods.

In the newer, or tubless, type the usual practice has been to effect the entry and discharge of detergent through passages centered in trunnions in the axis of rotation of the washer.

With this type of tubless washer, in which the detergent entered at one end and discharged through the other end, the design was limited for obvious reasons to a single chamber. Since the driving mechanism, supporting frame, and supply conduits, etc., occupy a substantial floor space, it becomes desirable that an apparatus be devised for achieving the advantages of the tubless type washer and at the same time securing a plurality of distinct washing chambers in a unitary assembly.

The present invention permits the use of two totally separated chambers, simultaneously operated by the same driving mechanism, and each being individually served by a source of detergent supply. Each chamber has mechanism for effecting a total discharge of detergent while the machine is in operation. Further, each chamber has facilities for maintaining the detergent level at any desired depth, within convenient limits, and each chamber may be operated under a continuous flow with discharge of excess fluid while the machine is continuously operated.

I have discovered that improved results may be achieved by introducing the detergent through a passageway centered in a trunnion at the end of the chamber while discharging it through an opening or series of openings in the cylindrical periphery of the chamber. I use flexible belt means embracing the said cylinder in the zone of said openings as a sealing means for a substantial extent of the lower portion of said outlets. In a preferred embodiment of my invention I use a washer comprising two wholly separated washing chambers, although the invention may be applied to a single chamber washer. An elongated cylinder is divided by an imperforate partition perpendicular to its cylindrical axis so as to form the two chambers, and each chamber has its respective entry and discharge passages in the ends remote from the dividing partition. This permits two separate loads to be simultaneously washed while securing the advantages of entry and discharge of detergent without stopping the machine, as will hereinafter appear.

One object of my invention, therefore, is to provide a tubless type washer wherein two separate loads may be simultaneously washed, and the detergent continuously introduced and discharged during operation.

A further object of my invention is to provide a tubless type washer comprising two totally separated chambers, simultaneously operated by the same driving mechanism, yet each being separately serviced by a source of detergent supply, and each having a separate total discharge and overflow control.

A further object of my invention involves the application of my novel idea of axial entry and peripheral discharge of detergent to a single chamber, tubless type machine.

Further objects and advantages will be apparent from the following description, and from the accompanying drawings illustrating several embodiments of my invention, in which

Fig. 1 is a front elevation of one form of the machine;

Fig. 2 is an end elevation looking from the left of Fig. 1;

Fig. 3 is an end elevation looking from the right of Fig. 1;

Fig. 4 is a section of the machine taken on the line 4—4 of Fig. 7, showing one of the discharge belts in the discharging position, parts being broken away to show a partial section on the line 4—4 of Fig. 7;

Fig. 5 is a section of the cylinder taken on the line 5—5 of Fig. 7;

Fig. 6 is a detail section taken on the line 6—6 of Fig. 5;

Fig. 7 is a sectional view taken on the line 7—7 of Fig. 3;

Fig. 8 is a partial section and front elevation of a modified form.

In a machine of the dual chamber type, first to be described, and shown in detail in Figs. 1 to 7, I prefer to introduce the detergent through a passage in a trunnion coaxial with the axis of rotation. It passes thence through radially disposed conduits into longitudinal ribs spaced along the interior of the cylindrical outer wall. The ribs are inwardly perforated near the end of the chamber remote from the entry point and the detergent enters the washing chamber and reverses, generally, its direction flowing back

through the washing chamber, and outwardly through an opening or openings peripherally spaced around the cylinder, as now to be described.

Referring first to Figs. 1 and 7, the washer comprises a cylindrical container 10 divided by means of an imperforate bulkhead 11 into two separated washing chambers 12 and 13. The cylinder is carried by gudgeons 14 and 15 attached to end walls 16 and 17 and journalled in bearings 18 and 19 supported in frame members 20 and 21. The frame members are securely spaced by tie rods 22.

Since, in the present embodiment, each of the washing chambers 12 and 13 operates as a distinct unit, except where otherwise noted, the description will be continued with special reference to chamber 12.

A discharge head 23 is partially contained between end wall 16 and an outer wall 24, shown as substantially parallel to wall 16 and spaced therefrom by a circumferential wall 25 equipped with perforations 26. Superimposed upon said head 23 and forming a concentric extension thereof is a smaller chamber 27 which is a step-down continuation of the discharge head, bounded on its outer end by wall 28, and on its periphery by a perforate circumferential wall 29. The chamber 23 and its continuation 27 are in communication with washing chamber 12 through a series of perforations 30 in end wall 16.

Detergent fluid from an external source is conveyed into the washing chamber through the passage 31 in trunnion 14 and as it passes through end wall 16 it diverges through a plurality of radially disposed passages 32 into hollow ribs 33 extending longitudinally along the interior of the inner surface of cylinder 10. Ribs 33 are preferably perforated as at 34 to permit the detergent fluid to pass into the washing chamber, from whence it flows, either continuously or intermittently, outwardly to a drain in a manner now to be described.

A flexible belt 35 retained in its seat by suitable flanges 35a embraces a substantial portion of the lower periphery of the discharge head 23, its upper portion passing over a pulley 36 mounted eccentrically by means of shaft 37 and crank arms 38 on main shaft 39. When held in operative position by the adjustment of its idler pulley, the flexible belt provides a liquid seal for the discharge head to the extent of that portion of its peripheral seat embraced by the belt.

Tension on the belt 35 is relieved, and the extent of its sealing engagement is progressively varied by swinging pulley 36 toward or away from the axis of rotation of the cylinder in the following manner. As seen to best advantage in Figs. 3 and 7, a coaxial extension of shaft 39 has mounted on its end a gear 40 which engages a worm 41 on the end of rod 42 which is rotatable in bearing brackets 43 integral with the frame 21. Rod 42 has affixed to its end a hand wheel 44 conveniently disposed to rotate the shaft 39 through the medium of the worm and gear. Rotation of the shaft 39 swings the pulley 36, because of the crank throw, towards or away from the rotating cylinder 10 and the crank throw is designed to allow the belt to be completely disengaged from its peripheral seat if so desired. This may be accomplished while the cylinder is rotating at any speed. Since the detergent may freely pass into the discharge head through apertures 30 in the wall 16 and thence into a drain chamber 45, it is apparent that a complete washing cycle, including any desired number of rinses, may be achieved without stopping the machine. It is further apparent that the circumferential perforations 26 need not be confined to the end of the chamber since they may be located anywhere around a section taken perpendicular to the axis of rotation, and the pulley 36 can be positioned along shaft 39 to maintain the belt in sealing position on the perforations.

A certain amount of control over the level of liquid in the machine is secured by adjustment of the belt 36 through variation of the position of its idler pulley as hereinbefore described. An auxiliary level control is obtainable by a further application of my peripheral discharge method in the following manner. A smaller coaxial extension 29 which is stepped down from discharge head 25 has a sealing belt 46 passing over an idler pulley 47 which is disposed by means of crank arms 48 eccentric to shaft 49 as best seen in Figs. 3 and 7. The position of pulley 47 is adjustable towards and away from the axis of rotation of cylinder 10 in a manner identical with that described for the adjustment of pulley 36. This is accomplished by causing gear 47a to rotate by means of its meshed worm 50, rod 51 and hand wheel 52. By suitable adjustment of the position of idler pulley 47 the belt 46 may be caused to embrace either a substantial portion of its peripheral seat around the auxiliary discharge chamber 29, or may be gradually unseated to a complete discharge position at which point all liquid in the washer above the level of the lowest free aperture in the auxiliary discharge chamber will flow outwardly into drain 45. Continuous operation with or without overflow of excess liquid is facilitated by this last described arrangement which augments the control permissible by means of the position of belt 35 as hereinabove fully described.

As clearly illustrated in Fig. 7, this particular embodiment of my invention is designed for simultaneously processing two loads at the same time, since the chamber 13 in the right half of the drawing is a duplicate of its counterpart 12 previously described. The hand wheels, by means of shafts 39 and 49, control the sealing belts at both ends of the machine. If individual control of liquid level for each half is desired, shafts 39 and 49 could readily be adapted, by additional center pulleys and termination of the shafts thereat, to be separately operated by adding another set of hand wheels for the left end of the machine. Also, if desired, the partition 11 between the two chambers may be perforated to permit the use of a common washing solution while keeping the two batches of goods separated.

Referring now to Figs. 1, 3 and 7, water, steam and other washing supplies enter through the hollow gudgeons 14 and 53. The water, from hot and cold supply pipes 54 and 55 under the control of valves 56 and 57 respectively, enters a mixing chamber 58 and thence through pipes 59 and 60 to the gudgeon passageways. Since, in the embodiment shown in Figs. 1 and 7, both ends are substantial duplicates, the description proceeds with the detergent control means for chamber 13.

Valve 61 is provided to control the detergent supply to chamber 13. Steam, from supply line 62, under the control of valve 63 is admitted to the gudgeon 53 and to the gudgeon 31 through

pipe 64 under the control of valve 65. The steam to chamber 13 may be separately controlled by means of valve 66.

Supplies are delivered by steam injection. This system comprises a supply bowl 67 connected by pipe lines 68 and 69 to the mixing chamber 58. Steam under the control of valve 70 is supplied through line 71 to an injection nozzle 72. When it is desired to deliver supplies such as soap, soda, bluing, etc., to the mixing chamber the valve 70 is turned on and the suction induced by the injection nozzle draws the supplies into the pipe 69 and thence into the mixing chamber. A check valve 73 prevents water from backing up into line 69.

The driving mechanism is best seen in Figs. 1, 2 and 7. A motor 74 is mounted on a bracket 75 attached to the frame 20. The motor is provided with a brake 76 and with conventional speed control, reversing mechanism, etc., (not shown), controlled from switch box 77 (Fig. 1). A sprocket pinion 78 is mounted on the motor shaft which drives, by means of a chain belt 79, a sprocket 80 on a shaft 81 mounted on the frame. This shaft 81 carries another sprocket 82 connected by a chain 83 with a sprocket 84 attached to gudgeon 14.

The two chamber machine shown in Fig. 1 is provided with sliding doors 85 and 86 movable in guides. A cross beam 88, fitted at its ends under brackets 89 has a threaded aperture in its center portion which carries a threaded shaft 90 operated by a hand wheel 91. The inner end of the shaft engages the door 85 and clamps it in position.

A somewhat modified embodiment of my invention is shown in Fig. 8. This is a single chamber machine in which duplicate entry and discharge passages for detergent are provided at both ends of the chamber. The detergent, entering through hollow gudgeon 92 and radial passages 93 as hereinbefore described, passes into hollow ribs 94, enters the washing chamber at about its center portion through apertures 95 and is subsequently discharged through openings in the periphery of the cylinder as hereinbefore described. The advantage of this type of machine is that the detergent traverses only approximately one-half of the load, and the accumulation of soil near the outlets is only about one-half the accumulation encountered in a single chamber machine having the same total load capacity and having its liquid entry at one end of the chamber and the discharge at the other end.

In operating the machine the load is placed in the washer and the doors are closed and clamped. Supplies from the chamber 67 are delivered to the mixing chamber as hereinbefore described. Water from lines 54 and 55 is delivered in volume to provide a suitable temperature and is furnished to one or both chambers depending on whether it is desired to operate a single pocket or both pockets. A suitable liquid level is maintained by manual adjustment of the two sealing belts. Overflow operation may be maintained by keeping either or both of the valves 56 and 57 in partially open position, or individual control on either side separately may be had by valves 61 or 96. The cylinder is rotated by starting the motor 74 from switch 77 in the conventional manner. At the end of the washing operation the detergent is completely discharged by releasing the tension on belt 35 for instance to the point where it breaks contact with the lowest portion of its peripheral seat.

While it is apparent from a study of the present disclosure that I have provided means for simultaneously processing two distinct loads in a tubless type washer simultaneously under conditions permitting the continuous entry and discharge of detergent, it is further apparent that certain advantages incident to the axial entry and peripheral discharge of detergent may be achieved in a single chamber machine, and it is my intention that both embodiments of the invention as well as equivalents thereof, may be included within the scope of the appended claims.

What I claim is:

1. A tubless type washer comprising a rotatable cylinder provided with an inlet passage for detergent fluid in the end thereof and positioned substantially at the axis of rotation, a main discharge chamber comprising substantially a cylindrical continuation of the rotatable cylinder, an auxiliary discharge chamber comprising a step down coaxial continuation of said main discharge chamber, said main discharge chamber and said auxiliary discharge chamber having upon the periphery of each a perforated portion, and flexible belt means embracing said respective perforated peripheries and forming a liquid seal for the lower portion thereof.

2. A tubless type washer comprising a rotatable cylinder having an inlet passage for detergent fluid in the end thereof and positioned substantially at the axis of rotation, a main discharge chamber comprising substantially a cylindrical continuation of the rotatable cylinder, an auxiliary discharge chamber comprising a stepdown coaxial continuation of said main discharge chamber, said main discharge chamber and said auxiliary discharge chamber having upon the periphery of each a perforated portion, flexible belt means embracing said respective perforated peripheries and forming a liquid seal for the lower portion thereof, and adjustable means for moving said belt means into and out of contact with said perforated peripheries.

3. A tubless type washer comprising a chambered work holding cylinder rotatable about a horizontal axis and having a generally imperforate cylindrical body provided with portions perforated to form outlets located at different distances from the axis, and means operative while the cylinder is rotating for selectively closing or opening either outlet independently of the other, in such manner as to permit drainage discharge to different predetermined levels.

4. A tubless type washer comprising a rotatable work containing cylinder having at one end thereof a discharge head, said discharge head having a portion provided with a discharge opening, means for sealing and unsealing said opening during rotation of said cylinder, said discharge head having a further portion spaced inwardly from said first mentioned discharge opening and towards the axis of rotation, said further portion being provided with a second discharge opening, and means for sealing and unsealing said second opening during rotation of said cylinder.

5. A tubless type washer comprising a rotatable work containing cylinder having at one end thereof a discharge head, said discharge head having a portion provided with a discharge opening, means for sealing and unsealing said opening during rotation of said cylinder, said discharge head having a further portion spaced inwardly from said first mentioned discharge opening and towards the axis of rotation, said further portion

being provided with a second discharge opening, means for sealing and unsealing said second opening during rotation of said cylinder, and means for introducing detergent fluid into said rotatable cylinder at a location spaced between said discharge head and the other end of said cylinder whereby detergent is caused to circulate in diverging directions through the work.

6. A tubless type washer comprising a rotatable cylinder provided with an inlet passage for detergent fluid in the end thereof, and positioned substantially at the axis of rotation, said washer having its cylindrical body generally imperforate but provided with portions perforated to form outlets located at different distances from the axis, and means operative while the cylinder is rotating for selectively opening or closing either outlet independently of the other in such manner as to permit drainage discharge to different predetermined levels.

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