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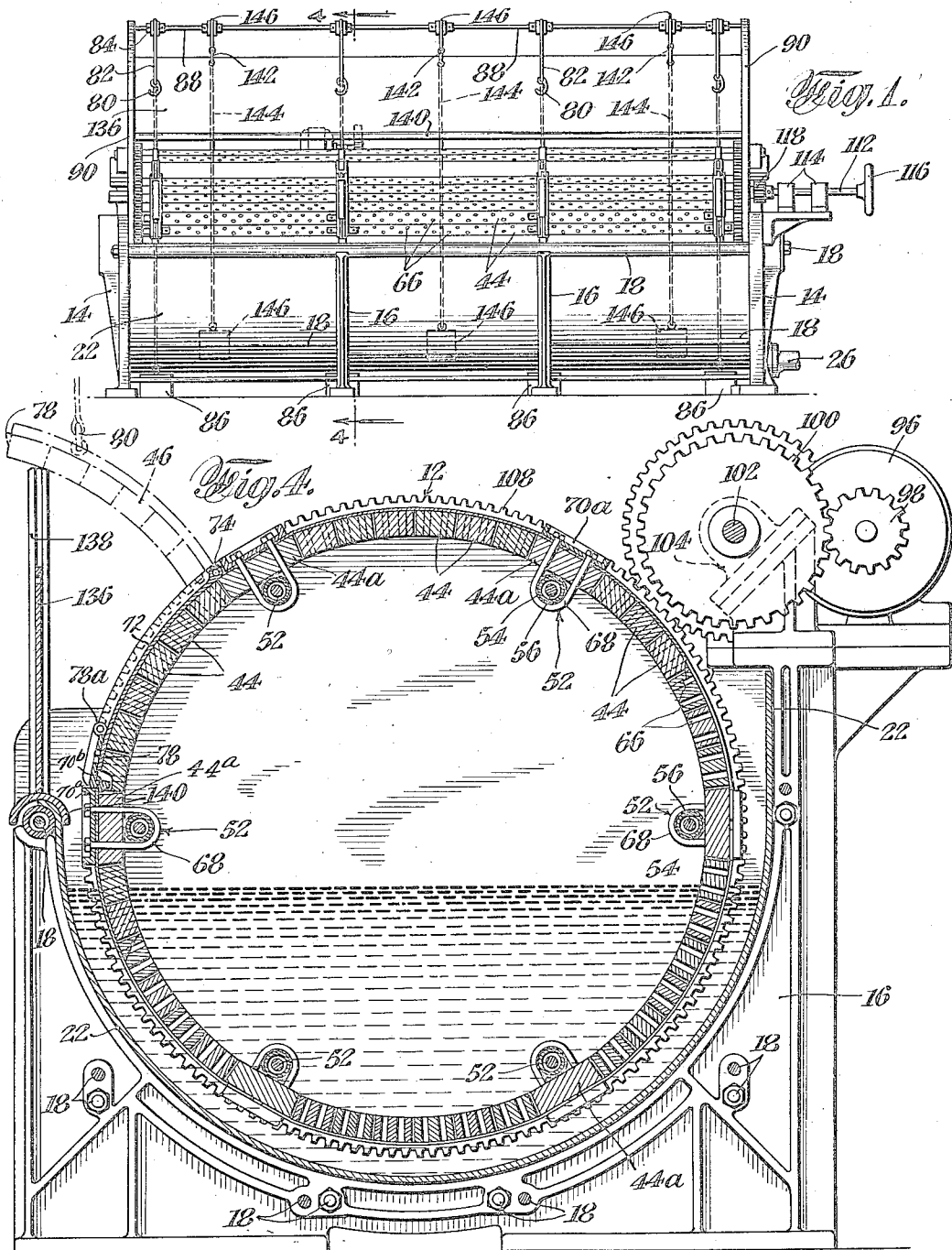
J. A. ISKYAN ET AL

2,039,249

WASHING MACHINE

Filed Dec. 29, 1933

3 Sheets-Sheet 1



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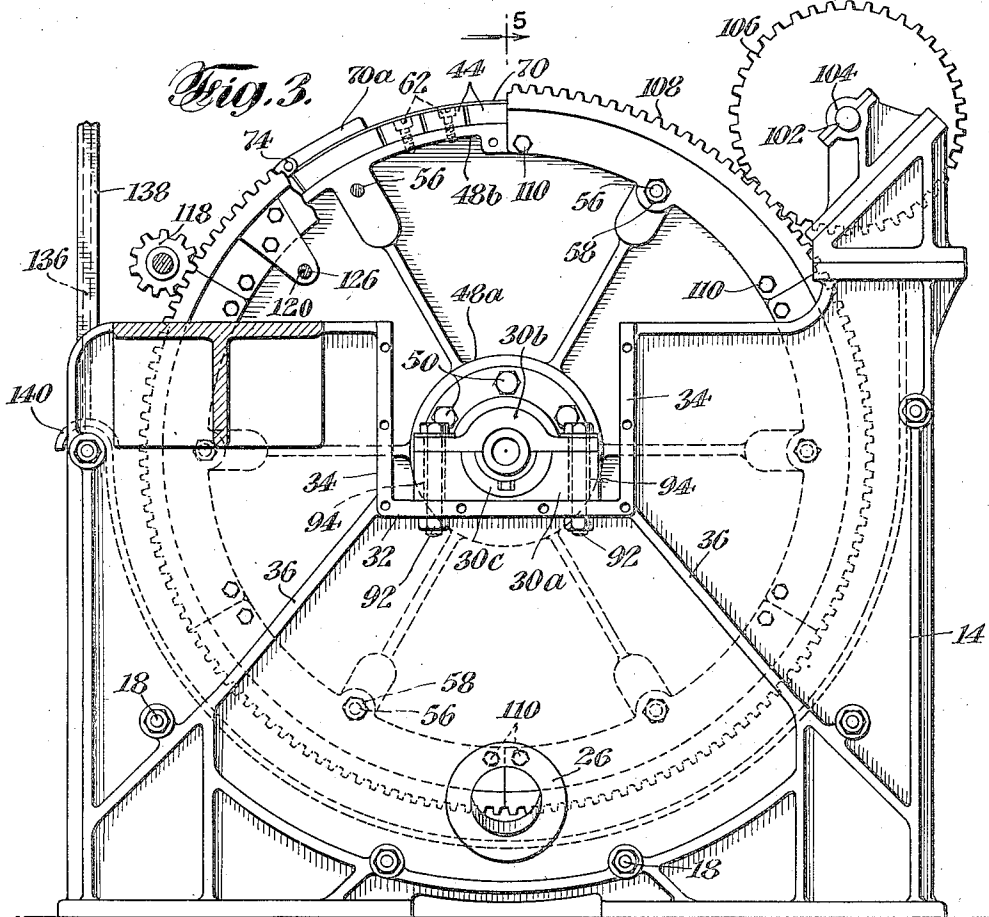
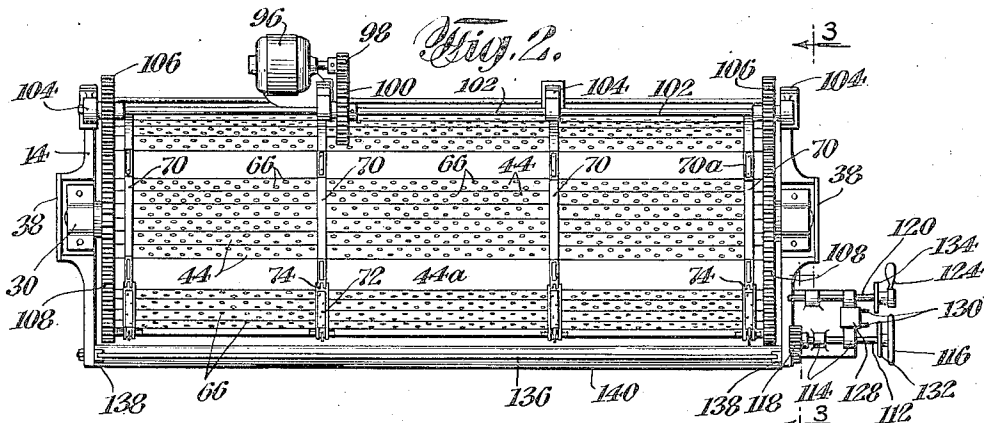
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3 Sheets-Sheet 2



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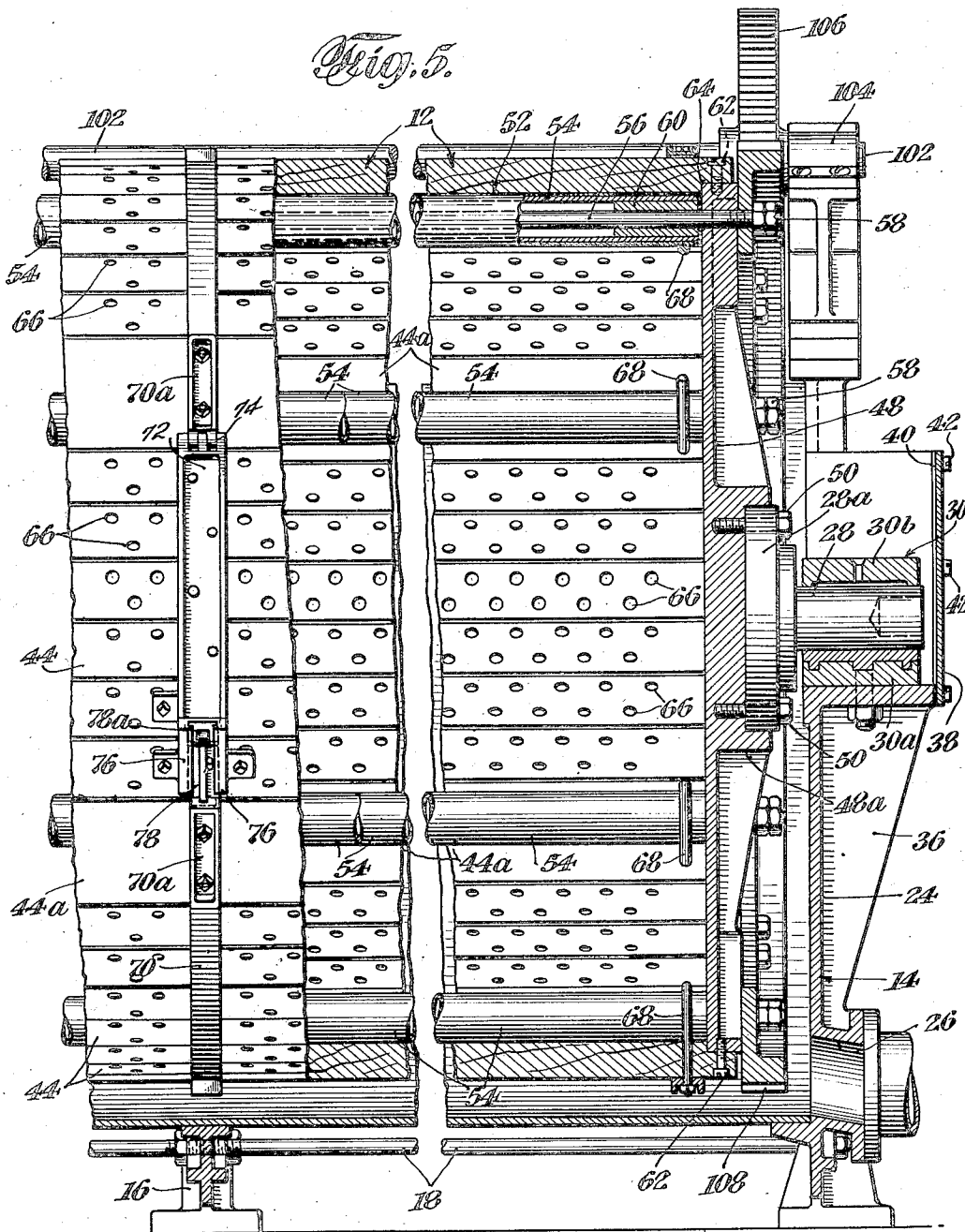
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WASHING MACHINE

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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WASHING MACHINE

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5 Claims. (Cl. 68—18)

Our present invention relates to improvements in washing machines for washing and chemically treating rugs and other articles; and is a machine of the general type which comprises a barrel for receiving the articles mounted for rotation or oscillation in a tank.

Another object of our invention is to effect improvements in machines of this type whereby loss of water or solution by leaking and spilling from the machine is substantially prevented, this having been a serious fault with previous machines.

Another object is to improve the constructional make-up of the barrel of the machine to accomplish advantages in various respects including the advantages of rigidity, strength, ease of renewal of parts and efficient operation.

Another object is to provide improved door means including improved door operating and latching means.

Another object is to provide means for releasably locking the barrel in its charging and discharging position, which is interconnected with the drive means for rotating or oscillating the barrel whereby the drive means cannot be set into operation until the locking means has been released.

These and other objects and advantages of our invention will appear from the following description in connection with the accompanying drawings. These show a preferred embodiment of the invention, it being understood of course that the illustrated embodiment is intended to be simply illustrative and not to limit the invention to the details of said preferred embodiment as herein specifically shown and described. On the contrary it will be understood that changes can be made in details, parts may be modified or omitted and other parts added, etc. without departing from the scope and spirit of the invention or from the definitions thereof in the appended claims.

In the drawings:

Fig. 1 is a front elevation of a washing machine within my invention;

Fig. 2 is a plan view of same;

Fig. 3 is a combined end elevation and transverse section on the line 3—3 in Fig. 2 on a larger scale;

Fig. 4 is a combined end elevation and transverse section on line 4—4 in Fig. 1, on a larger scale, the open position of the door being indicated by dotted lines and;

Fig. 5 is a fragmentary longitudinal section partly in elevation through the machine, this section being taken on the line 5—5 in Fig. 3.

Referring to the drawings, the tank is indicated as an entirety by the numeral 10, and the rotary barrel as an entirety by the numeral 12.

Describing first the tank, this comprises metal frames or castings adapted to rest on and to be secured to the floor or other suitable foundation, and further comprises sheet metal plates supported by and secured to said frames. The frames include two end-frames 14 at the ends of the tank and an intermediate frame or frames 16. These end and intermediate frames are secured together in spaced apart relation by horizontally extending screw-threaded rods, nut and bolt means, etc. 18. All of the frames are formed with concave sills upon which rest the curved sheet metal plates 22 forming the bottom and sides of the tank. It will be understood that only the marginal portions of the plates 22 rest on the sills and that these marginal portions are welded to the sills so that the plates form a water-tight bottom and sides for the tank.

The end frames 14 differ from the intermediate frames 16 in having integral vertical webs 24 which form the ends of the tank and thereby complete it to hold water or other solution.

Thus the tank has a semi-cylindrical body formed by the curved plates 22 with its ends closed and completed by the webs 24 of the end frames. It will be noted from Fig. 4, etc. that the curved plates 22 and the sills extend high up at the back of the tank whereas at the front they stop short at about midway of the barrel to enable the rugs or other articles to be handed into and out of the barrel conveniently.

Each end frame 14 towards its bottom is formed with a neck 26 communicating with the interior of the tank and connecting with a pipe line at one end of the tank for filling it and for discharging or emptying the tank at the other end. Suitable control valves not shown are provided at both ends of the tank operative to control the flow through the inlet neck 26 into the tank and through the other neck 26 out of the tank.

The barrel 12 has trunnions 28 journaled in bearings 30 supported by the vertical webs 24 of the end frames 14. For this purpose the vertical web of each end frame is formed at the upper center portion thereof (as best shown in Figs. 3 and 5), with an opening having a bottom integral with the vertical web and further having two sides 34 integral with both said bottom and said vertical web. In other words, the construction provides in effect, an open-ended and open-topped metal box 32—34 (Fig. 3) on

the outside face of the vertical web **24** of each end frame located centrally of the upper portion thereof, said box being integral with the rest of the casting and being further strongly supported by the bracing ribs **36** which also form an integral part of the casting. The inner end of each of these boxes **32—34** is open to the tank; and the bottom portion of the boxes is below the level of the liquid in the tank so that I provide a closure for the outer end of each box consisting of a plate **38** (Fig. 5), an interposed gasket **40** and screws **42** for removably fastening the plate water-tight in place.

The previously referred to bearings **30** for the trunnions of the barrel are supported in these boxes **32—34** bolted to the bottom **32** thereof. In other words, the trunnions and the bearings are located wholly within the tank which latter includes the aforesaid box-like extensions **32—34**, and therefore, it is impossible for any liquid to leak past said bearings to the outside of the tank.

The barrel **12** is cylindrical in shape with closed ends; and has its cylindrical portion formed by wooden staves **44** and a hinged door **46**; and has its ends formed by circular metal heads or castings **48**. The previously referred to trunnions **28** have enlarged circular bases **28a** let into circular recesses in the outer faces of the thickened hubs **48a** of the barrel heads **48**. Bolts **50** serve to bolt the trunnions by means of their bases to the heads and at the same time permit a worn or broken trunnion to be replaced readily.

The two barrel heads **48** are connected by a plurality of elements having a combined tying together and spacing apart function as to the barrel heads, these elements being designated generally by the numeral **52**. In the illustrative machine there are six of these elements **52** extending lengthwise of the barrel located on a circumference just inside the staves **44**, and said elements **52** are equi-distantly spaced from one another circumferentially of the barrel (Fig. 4).

Each element **52** consists of a cylindrical metal tube or pipe **54** located between the barrel heads **48**; and further consists of a rod **56** passed through the barrel heads and through the pipe. The ends of the rod projecting beyond the barrel heads are screw-threaded and engaged by nuts **58**. Centering sleeves **60** surround the rod **56** at intervals within the pipe **54**. The result of the construction is that the rods **56** of the elements **52** strongly tie together the barrel heads **48** while the metal pipes **54** which are all of the same length keep the heads rigidly spaced apart.

Each barrel head **48** is formed with a rim-flange **48b**. The ends of the staves are secured to these flanges by the screws **62** (Fig. 5). The staves at both ends have their corners notched as shown at **64**, Fig. 5, so as to engage and fit the peripheral corner of the barrel heads. All of the staves are or may be perforated with holes **66** to give free access for the solution from the tank into the barrel and back again. Preferably, however, the staves **44a** located next the pipes **54** of the tying and spacing elements **52** are not weakened by perforating them because these staves **44a**, called hereinafter anchor staves, are made wider than the others for increased strength and are not only screwed to the rim-flanges **48b** of the barrel heads but are also clamped to the spacing pipes **54** by means of U-bolts **68**, Fig. 5. These U-bolts surround the pipes with their legs projecting through holes in the anchor staves and are secured by nuts

on the outer faces of said staves as shown. By this means, the anchor staves **44a** are firmly anchored to the elements **52**; and said anchor staves in turn serve as anchorages for the ends of flexible metal bands **70** which extend circumferentially of the barrel between adjacent anchor staves **44a**, and overlie the intermediate staves **44** to prevent them from being displaced downwardly due to the weight of the contents of the rotating and oscillating barrel. The metal anchoring fixtures for the ends of the bands are designated **70a**.

In the illustrative machine, there are shown four circumferential sets of these bands **70**, Fig. 2, appropriately spaced apart lengthwise of the barrel. Since each circumferential set of these bands **70** is made up of short lengths or segments arranged end to end, a worn, weak or broken stave is readily replaceable by removing the related tie band segment without disturbing the others.

The previously referred to hinged door **46** consists of staves **44** bolted to and held together by stiff transverse metal ribs **72**. The door is or may be nearly as long as the barrel and vertically is arcuate in form and fills the space between two of the anchor staves **44a**. The upper ends of the metal ribs **72** of the door are hinged at **74** (as best shown in Fig. 5 etc.) to the anchoring fixtures **70a** on one of said anchor staves; and the lower ends of said ribs **72** are formed with guides **76** in which slide latch-bolts **78** have engagement at **70b** (Fig. 4) with the fixtures **70a** on the anchor stave **44a** at the lower or free edge of the door. The latch bolts **78** are formed with eyes **78a** engageable when it is desired to open the door by hooks **80** (compare Figs. 2 and 4) on cords or wire ropes **82** passing over grooved pulleys **84** and having counterweights **86** on their other ends at the back of the machine. These pulleys turn on a rod or axle **88** which latter is supported in any suitable way as by stationary standards **90**. The act of hooking the weighted cords to the latch-bolt **78** results in unlatching them. The operator then gives a downward pull and an upward shove on the door assisted by the counterweights **86** thereby making it easy to hinge the door upwardly into its open position shown by the dotted lines in Fig. 4. The bearings **30** for the trunnions **28** have already been referred to. More in detail each bearing shown in Figs. 3 and 5 consists of two vertically separable parts, namely a base block **30a** and a cap **30b**. In the base block is fitted a semi-cylindrical part **30c** made of a suitable composition of bearing-metal having integral lugs or projections **30d** received into correspondingly shaped sockets in the base block preventing the bearing part **30c** from getting out of position. Bolts **92** secure the bearings **30** adjustably to the bottoms **32** of the boxes **32—34** by passing through round holes in said bottom and through elongated holes or slots **94**, Fig. 3, in the blocks **30a**, and covers **30b**. Since these slots run lengthwise of said blocks and covers they permit adjustment of the bearings transversely of the machine relatively to each other and at the same time permit centering the barrel in the tank.

We will now describe the barrel operating means. An electric motor **96** (compare plan view 2) supported on a standard at the back of the machine has a pinion **98** on its armature shaft in mesh with the gear **100** on a shaft **102** suitably journaled and supported by bearings **104** at the back of the machine. This shaft **102**

carries at its ends gears 106 which are in mesh with and drive the large gears 108 bolted to the exposed or outer faces of the barrel heads 48 by bolts 110. The rods 56 and the nuts 58 of the tying and spacing elements 52 also serve as shown in Fig. 5, etc. to bolt the gears 108 to the barrel heads:

It will be noted that these large gears 108 are segmental as distinguished from being unitary. Each is shown as built up out of six segments in the illustrative machine. If the gears were unitary, a broken tooth would require the entire barrel to be lifted vertically clear of the tank to replace the gear. I have made the gear segmental to avoid this. To make a repair, the segment with the broken tooth is brought around by rotation of the barrel until fully exposed by the end frame 14, the segment is then readily unbolted from the barrel head and replaced by a new segment. In the same way if anything goes wrong with the bearings 30 or the trunnions 28 or if it be desired to reline the bearings, this is readily accomplished by removing the plates 38, previously described (Figs. 2 and 5). The bolts 92 (Fig. 3) may then be removed and the barrel lifted at one or both ends for a few inches necessary to get inside the bearings. The free end of each trunnion is formed with a hole in which a lifting bar or rod can be socketed in order to raise and lower the barrel.

A combined rotary and oscillating movement of the barrel 12 on its trunnions, first in one direction and then in the opposite direction is the mode of operation which is preferred. More specifically, I prefer that the barrel shall make several rotations in one direction followed by the same number of rotations in the opposite direction and so on alternately. Of course this mode of operation is subject to change and might be made to consist in rotating the barrel continuously in only one direction. Means not shown is provided which may be of any suitable sort or description for effecting the alternate rotations in opposite directions, such as an automatically operated switch for appropriately reversing the electrical connections to the motor to effect reversals in its direction of rotation.

Hand operated means is also provided for turning over the barrel 12 for any purpose as for example, to locate the door 46 at the front of the machine in the barrel loading and unloading position shown in Fig. 4. This hand means (shown in Figs. 1 and 2, etc.) consists of a short piece of shaft 112 rotatable and also slidable endwise in the bearings 114 supported on a bracket on the end-frame. This shaft has a hand wheel 116 at its outer end and a pinion 118 at its inner end. Thus, by this hand means its pinion 118 can be slid into (and out of) engagement with the segmental gear 106 and then rotated by hand to rotate the barrel into the desired position.

Locking means is shown in Fig. 2 for releasably locking the barrel in its aforesaid charging and discharging position shown in Fig. 4. This locking means consists of a rod 120 slidable endwise as well as rotatable in suitably supported bearings 122. A handle 124 on the outer end of this rod enables its inner end to be engaged with a perforated lug 126, Fig. 3, attached to the barrel head, whereby the rod 120 releasably locks the barrel against rotation out of its Fig. 4 position.

Within the casing 128, Fig. 2, is a pair of electrical snap switches, the respective plungers of which are shown projecting at 130. These

switches are in the power line to the electromagnet 96 so that when either of them is open the motor is open circuited and cannot be operated. Springs not shown in connection with the plungers of these switches cause them normally to project from the casing 128 as shown in Fig. 2, at which time the switches are closed and they do not open circuit the motor. On the other hand, when the pinion 118 is in mesh with the segmental gear, a collar 132 on the shaft 112 presses against the plunger 130 of one of the switches and opens said switch thereby open circuiting the motor and making it impossible to start up the machine as long as the hand operating means 116 is in mesh. The same is true of the locking pin 120 which has a collar 134 which engages the plunger 130 of the other switch when the pin is in locking engagement with the barrel and thereby opens said switch and prevents energizing the motor 96 and the operation of the machine even although the main operating switch (not shown) of the motor be thoughtlessly closed by the operator.

To prevent the solution from being slopped out of the tank at the front of the machine when in operation, I provide an apron or plate 136 extending across the entire front of the tank and slidable up and down into and out of operative position in vertical guides 138. Fig. 1 shows the apron in its up, non-operating position; and Fig. 4 shows it in its down, operating position. The apron is formed or provided at its bottom with a downwardly directed concave edge or bead 140 adapted to embrace or fit down over the rail 18, Fig. 4, crossing the front of the tank and about which the front edge of the grooved plate or plates 22 is wrapped and preferably welded. The purpose of the concave bead 140 is to make a substantially water-tight joint between the apron and the front edge of the tank.

To lift the apron out of the way when charging the tank with rugs or discharging it, cord and pulley means, etc. is provided similar to that already described in connection with lifting the door 146. Thus hooks 142 are engageable into holes in the upper margin of the apron, these hooks being on the ends of cords 144. Supported over grooved pulleys 146 turning on the rod 88, the other ends of said cords have counterweights 146 attached to them. To place the apron into its operative position the hooks are disconnected and it is pulled down.

Supplementing now the description already given of the parts of the machine, it will be assumed that the tank and barrel are filled with water or other solution up to about the level shown in Fig. 4. If the barrel is not already in the charging and discharging position shown in that figure, it will be rotated into that position by the hand wheel 116, Figs. 1 and 2 and then locked against rotation by the locking means 124, Fig. 2. The apron 136 will then be raised out of the way by putting into operation the cord and pulley means 144—146 as already described. The door 46, Fig. 4 will then be unlatched and hinged into its up and open position by putting into operation the cord and pulley means 82—84.

The rugs or other articles will then be charged or put into the barrel through the door opening. The door will then be closed and unhooked from the cord and pulley means, whereupon the latch bolts 78 will spring or can be shot by hand into latching position. The apron will then be lowered and unhooked from its cord and

pulley means as shown in Fig. 4. The hand means 116 and the locking means 124, Fig. 2 will then be disengaged from the barrel. The electric circuit, not necessary to be shown, is now complete for the motor 96 to be energized except for throwing the main switch (not shown). Upon throwing said main switch, the electric motor means will rotate the barrel alternately in opposite directions. The rugs in the bottom of the barrel will be carried along with it as soon as they bear against the structural elements 52, Fig. 4, that happen to be at the low side of the barrel. These will carry the rugs before them until the rugs are partially or nearly out of the solution whereupon the rugs will slip off the structural elements 52 and fall towards the bottom of the barrel until engaged by another element 52, whereupon the same operation will be repeated.

The tendency of the solution to splash out of the machine occurs mostly at the reversals of the rotation of the barrel. The apron 136 prevents the solution from splashing out of the tank at the front of the machine from whatever cause; and the same is prevented at the back of the machine by the high part of the plates 22, Fig. 4 forming the bottom and sides of the tank. The rugs having been treated for the desired time, the electric motor is shut down, and the barrel is again rotated by hand and locked in its Fig. 4 position. The apron and door are then raised out of the way and the rugs removed from the barrel and replaced by others for similar treatment as just described.

What we claim is:

1. In a washing machine, the combination of a tank; a barrel comprising heads peripherally connected by staves; members extending longitudinally within the barrel adjacent the staves tying together and at the same time spacing apart the heads, there being comparatively few of said members compared to the number of the staves and these being spaced apart circumferentially of the barrel; means for laterally binding together each longitudinally extending member and an anchor stave to which it is adjacent; and tie bands of segmental length as compared to the entire circumference of the barrel, said bands having their ends releasably anchored to separated anchor staves, said bands serving to support externally the intermediate staves.

2. In a washing machine, the combination of a tank, a cylindrical barrel mounted in the tank and rotatable about its longitudinal axis which is substantially horizontal; a door forming part of the cylindrical body of the barrel, said door

being hinged to swing about an upper substantially horizontal edge; latch means on the lower edge of said door and the adjacent body portion of the barrel; means for locking the barrel non-rotatably in position for the door to be operated; weighted cord and pulley means releasably attachable to the latch means on the door for automatically unlatching the latch means and lifting the door.

3. In a washing machine, the combination of a tank, a barrel comprising a cylindrical body with heads at the ends thereof, trunnion and bearing means within said tank at the ends of the barrel for supporting the barrel rotatably in the tank; gears also within the tank mounted on the ends of the barrel; and motor driven gears in mesh with the first-named gears; the gears on the ends of the barrel being made up of separable segments which are individually replaceable, the ends of the tank adjacent the gears on the ends of the barrel being cut out to expose the face of the aforesaid separable segments, one at a time when in uppermost position, thereby permitting access to the face of any segment for its removal and replacement.

4. In a washing machine, the combination of an open-topped, open-mouthed tank, a barrel formed internally with longitudinal ribs and rotatably supported partially submerged in said tank; means for operating the barrel; said tank having high back and end walls to take the splash and having a low front wall as compared with the back to give access to the barrel for inserting and removing the articles to be washed through an openable side portion of the barrel; and an upright apron supported for up and down movement into and out of a position wherein it forms an upward continuation of the aforesaid low front side of the tank whereby the splash from the machine is returned by said apron back into the tank.

5. In a non-portable washing machine, the combination of a stationary tank and a rotary barrel for receiving the articles to be washed, trunnions on said barrel projecting axially from its ends, troughs projecting outwardly from the ends of the tank at the level of the trunnions and receiving said trunnions through the inner ends of the troughs which are open so that they receive also the liquid contents of the tank, said troughs also having open outer ends, bearings for said barrel-trunnions located in said troughs, and removable water-tight closures for the aforesaid open outer ends of the troughs.

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