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TUMBLING DRUM FOR LAUNDRY MACHINES

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My invention relates to laundry machines and, more particularly, to washing and drying machines of the rotatable or oscillatory type in which a perforated drum or cylinder containing the laundry to be washed is thoroughly agitated with the washing solution or fluid to thoroughly cleaning the articles being washed and the invention generally relates to a construction of shell for containing the washing fluid and for feeding soap to the hot water and steam contained therein and a drum rotatable in said shell and perforated in a novel manner to prevent injury to or tearing of the articles being washed while permitting free and unimpeded circulation of the washing fluid into and out of the drum, as well as causing violent agitation of the clothes and fluid therein to quickly cleanse the same without damage to the articles.

Another object of the invention is to so construct the machine that it may be readily disassembled to lift or remove the drum from within the stationary shell and to construct the shell in two parts which can be readily separated for such purpose and assembled to conveniently mount the drum for rotation or oscillation therein in a manner generally known as a tumbler action, or otherwise.

Another object of the invention is to provide a high class and efficient construction of washing machine, particularly with reference to the stationary shell and the rotatable perforated cylindrical drum so as to give maximum strength and reinforcement thereto to insure long life without catching in or tearing the clothes or articles being washed.

Another object of the invention is to provide walls for the shell and drum which eliminate weaknesses, breaking or falling apart as heretofore experienced in connection with such machines when constructed of woven wire or any other types, due to the enormous weight and pressures or stresses from the agitation of the washing fluid and laundry during the operation of the machine whereby the capacity thereof may be trebled, say from 200 to 600 pounds, or more, per machine.

A still further object of the invention is to provide novel sliding or hinged door constructions for either the shell or drum, whereby loosening and breaking down of the parts at the door openings is prevented and the same rendered capable of withstanding the stresses and pounding from the disengaged washing fluid and laundry therein, particularly with reference to the drum, and the shell rendered water tight so that the splashing of the washing fluid through the shell and especially at the door openings, is prevented.

Another object of the invention is to provide a novel brace structure for the drum and shell as well as novel perforations or perforated walls for the drum and the doors thereof together with novel latching or fastening means for the doors and joints between the doors and the coating walls of the shell and drum.

Further objects and advantages will appear and be brought out more fully in the following specification, reference being had to the accompanying drawings, in which:

Fig. 1 is a rear elevation of a washing machine in accordance with my invention;

Fig. 1A is a fragmentary exploded view of the rotary drum wall, partition and reinforcing rib structure;

Fig. 1B is an elevation of a portion of a partition wall;

Fig. 2 is an end elevation with the gear housing partly broken away;

Fig. 3 is a fragmentary sectional elevation of the brake mechanism taken on the line 2-2 of Fig. 1;

Fig. 4 is a fragmentary sectional elevation of the control lever and brake operating and locking means,

Fig. 4A is a section taken on the line 4A-4A of Fig. 4;

Fig. 5 is a front sectional elevation of the machine with the shell in section and the upper part of the drum, bearings and spiders in section;

Fig. 6 is an enlarged horizontal section taken on the line 6-6 of Fig. 5, and showing the hinged door latch construction;

Fig. 7 is an enlarged section of the latch taken on the line 7-7 of Fig. 5;

Fig. 8 is a fragmentary vertical longitudinal sectional elevation taken on the line 8-8 of Fig. 2;

Fig. 9 is a vertical cross-section taken on the line 9-9 of Fig. 8;

Fig. 10 is a sectional elevation taken on the line 10-10 of Fig. 5, showing the stationary shell in elevation and partly broken away;

Fig. 11 is an enlarged fragmentary section of the shell taken on the line 11-11 of Fig. 5, showing the soap box;

Fig. 12 is an enlarged fragmentary exploded sectional view of the shell, showing the connection between the separable sections thereof;

Fig. 13 is a section taken on the line 13-13 of Fig. 5;

Fig. 14 is a front elevation of the lower part of the rotating drum of Fig. 13 showing one of the
hinged doors, and partly broken away at a latch; Fig. 15 is a sectional elevation of one of the trunnions of the drum; Fig. 16 is an enlarged face view of Fig. 15; Fig. 17 is a view similar to Fig. 10, but showing a sliding door instead of a hinged door for the rotating drum; Fig. 17A is an enlarged fragmentary section of the perforated drum wall and doors; Fig. 18 is a front elevation similar to Fig. 14 of the drum, as shown in Fig. 17, and with a latch partly broken away; Fig. 19 is a longitudinal section taken on the line 18—19 of Fig. 18; Fig. 20 is an enlarged fragmentary section of the latch taken on the line 20—20 of Fig. 18; Fig. 21 is a cross-section taken on the line 21—21 of Fig. 20; Fig. 22 is a sectional elevation taken on the line 22—22 of Fig. 2; Fig. 23 is a face view of a portion of the perforated rib wall; and Fig. 24 is a section taken on the line 24—24 of Fig. 23.

Referring to the drawings, the improved laundry machine is illustrated particularly as a washing machine of the rotary or oscillatory type known as a "tumbler" and comprises a stationary cylindrical shell 24 which is imperforate and therefore forms a tank or housing for containing the washing fluid usually composed of hot water and soap solution in which steam is usually injected to assist in the cleansing action. This cylindrical shell is made up of a lower semi-cylindrical section or half 25 and a similar upper section 27 composed of a lateral wall made up of semi-cylindrical or arcuate plates bent on a common concentric arc or circle of the same radius throughout the circumference. The shell is mounted and rests on intermediate supports 30 in the form of legs or cradles and is usually positioned over a drain gutter or trough in a cement or other floor of the laundry building and stranded thereby. The ends of the shell are supported by end legs, bearing frames or standards 29 having inwardly extending supporting flanges 29a for the ends of the shell to rest on. The end walls or heads of the shell include a lower semi-circular section 30 and a similar upper section 31 which, like the other parts of the device, may preferably be of stainless or some non-rusting and non-corrosive metal of proper strength and gauge according to the capacity of the machine. An angular ring 32 is provided at the periphery of each end wall or head of the shell at the inside and is welded to the sections 28, 27, 30 and 31 at the joints or edges thereof, but may be additionally reinforced by rivets or other fastenings to rigidly connect said sections in a structure of maximum strength. A pair of U-shaped pieces or connecting bands 33 are provided at the inside of the lower section so that the upper edges thereof of project above or beyond the top edges of the lower section 26 of the lateral wall and the lower sections 30 of the end walls or heads. Spacing pieces or bands 34, also of U-shaped form, are provided outside of said sections with their top edges forming the top edges of the sections and immediately outwardly thereof are similar U-shaped bands or sections 35 all of which may be joined to the sections 28 and 30 of the shell as by means of rivets 36, thus forming grooves 37 in which the edges of the upper sections 27 and 31 may be received in connection with U-shaped pieces or bands 38 correspondingly riveted at the outside of the upper sections and in connection with which an interposed packing or wadding may be employed to effect a watertight joint. The bands would be of rectangular form except that they terminate at spaced distances from the center of each end of the shell, thereby providing legs at the ends of the U-shaped pieces. The projecting portions of the string or bands 32 are provided with tapped holes 40 which register with holes 41 in the bands or strips 35 and corresponding holes 42 in the sections 27 and 31 as well as the bands or strips 38 secured thereto to take bolts or screws 43 which serve to connect the sections or upper and lower halves of the shell and draw the parts together at the joint, as well as to render the same capable of being easily assembled or disassembled when it is desired to remove the upper half of the shell on a line extending diametrically in an inclined position toward the front, as more particularly shown in Fig. 10 of the drawings, so that the rotatable drum or cylindrical tumbler may be placed therein or removed therefrom for any purpose. The end members or heads of the shell are provided with semi-circular recesses 44 at their axial centers which engage in the conching edges of the sections 30 and 31 forming circular openings to take packing rings 45 made up of semi-circular sections or a split ring and secured by riveting or bolting the same to the sections of the end walls as seen more particularly in Figs. 5 and 10. At spaced intervals adjacent the peripheries of the end members of the shell, plates 46 are secured by means of rivets 47 and each is provided with a central tapped hole 48 registering with corresponding holes 49 in the end walls of the shell. These plates are provided with shoulders or notches 48 to receive the radiating or flanges of the rings 32 and may be made up of one or two sections, as desired, to form lugs or bosses for anchoring the drum in the frame. Spacing lugs 29b are provided on the end legs forming the bearing frames or standards 29 to form spacing collars between the said frames and the end walls or heads of the shell so as to prevent longitudinal shifting of the latter when connected, as will now be described. Bolts 51 are engaged through the tapped holes 45 and 50 of the plates or lugs 46 of the lower half section of the shell and through the spacing collars on the lugs 29b and into the frame members 28. While three of such bolts are shown, it is to be understood that a plurality of any number may be employed. Housings 52 are provided at the ends of the machine and are generally circular formed, flanged inwardly at the periphery with circular radial extensions at the top and back, the flanges abutting against the end frames 25. Bolts 53 are engaged through these housings at the lower section of the shell and with the frame members 28 which have threaded holes for this purpose as shown in Fig. 5 so as to fasten the housings to the bearings frame. Corresponding bolts 54 are provided in the upper section to fasten the latter to the end frames and housings at the corresponding top holes 46, these bolts extending entirely through said parts, including the end frames and the lugs 29b. Corresponding bolts 55 are provided to fasten the extensions of the housings to connect the same to the extensions of the frame members 28 adjacent thereto and serve to support the gears and shifting device to be later described and which, in the present instance, is shown as means for causing oscillation of a rotatable drum or tumbler 55.
preferably two and one-half revolutions in each direction alternately.

The rotating drum 56 is also cylindrical, but whereas the shell is imperforate, the drum is perforated or reticulated and is made up of a plurality of panels or sections 74, 74, 74, preferably two and the revolving drum 56 forming a lateral wall of slightly smaller diameter than the diameter of the shell 26 and alternating with a plurality of longitudinally extending reinforcing and agitating ribs to be later described. There are preferably five of the ribs and all will be noted from Figs. 10 and 12 of the drawings that the four panels or sheets 71 are of equal width and extend lengthwise of the drum, but the other panel space is wider and has a narrow upper strip 62 also running longitudinally and a similar lower strip 58, each door opening 64 at spaced points along the length of the drum. Outwardly turned flanges 65 are provided along the longitudinal edges of the ribs 66 which are substantially V-shaped in cross-section, being relatively arched and projecting radially inwardly. In cross-section, the flanges are radially convex along their sides 77 which are perforated as previously described, and an intermediate inner wall 68 which is imperforate. Where the ribs are applied to a drier, as distinguished from a washing machine, the ribs are imperforate at the sides as well as at the inner wall. The flanges 65 are riveted to the strips or sheets 57 in connection with outer end flanges 59 at the corners of angle brackets 70 which are shaped to conform to the ribs and serve to attach the ribs to the lateral wall as well as to the end walls of the drum and partitions thereof, to be later described. Thus, the flanges of the brackets or hangers 70 are riveted to the walls 67 and 68 of the ribs and also to the end disks or heads 71 of the drum with the ribs extending the entire length of the drum, the end disks being fastened in place at the outside between the spaced edges of the sheets or sections 57 and the strips 63 and 65 located in the widest panel of the drum. Flanges 72 are provided on the end disks 71 between the ribs 66 to reinforce and brace the same by abutting the flanges 65 thereof, as shown in Figs. 10 and 12 of the drawings and flanges 73 are provided on the end caps or heads 74, which are preferably castings. These end caps or heads are provided with spiders or fingers 78, preferably five in number, and in line with the ribs 66. The panel at the door opening 64, as previously stated, is wider than the other panels between the ribs, and in order to counterbalance the weight of the door at this longer panel, counterbalancing weights 80a are provided between the spiders 78 at the diametrically opposite side of the base 66. The drum will rotate in true balance. At the center, the casting forming the spider 78 produces a hub at the center which is circular and forms a depressed circular flanged disk portion 78a adapted to support trunnions or stub shafts 77 which are of step formation and turn with their respective ribs 78 to set in the recesses or depressed portions of the hubs or disks 76 and are bolted or otherwise removably secured thereto as at 78. The flanges are also provided with a pair of tapped holes 80 for attaching eyebolts or the like so that the flanges may be displaced from the recesses and the shafts pulled outwardly to disconnect or displace the same from the ends of the drum so that the latter will be free to be lifted out of the shell when the upper half section thereof is displaced by removing the bolts 43, as previously described. Each trunnion is provided with a bronze or similar bushing 81 adapted to take a roller bearing cage 82 or other similar anti-friction bearing and has a further reduced portion 83 provided with a key slot or spline 84 with a longitudinal key therein for a purpose to be hereinafter set forth. The trunnions have bearing in split bearings 85 carried by the frame members 29 and the upper caps or sections 66 thereof have sleeve extensions 87 inside of the packing rings 45 with an intermediate packing to prevent the escape of the washing fluid at these points. At the ends of the drum between the door openings 64 and the end disks or heads, strips 88 are provided, these strips being narrow and extending circumferentially between the ribs, the same as the sheets or sections 57 of the lateral wall, but need not be perforated. Corresponding strips 89 are secured between the door openings and the strips 88 and 89 are secured in position to the ribs, the same as the sections 57 by means of the brackets 70 and the out-turned flanges of the ribs 66. That is, the brackets have a flange contouring in shape to the shape of a rib and riveted thereto and also having a second flange disposed at right angles to the first flange and riveted to the adjacent end disks or drum heads, as seen more particularly in Fig. 13. Circular partitions in the form of disks 90 are provided equidistantly between the door openings 64 and opposite edges of the strips 93 and form compartments therebetween and between them and the drum heads. These partitions are secured in position by means of lateral peripheral flanges 91 similar to the flanges 72 and disposed between the ribs, as seen in Fig. 18. V-shaped cut-outs 82 are provided in the partitions 90 at the ribs 66 so that the outer portions of all of the ribs are freely open for the entire length of the drum. To render the structure more rigid, tie rods 83 connecting the drum heads or end members and are disposed intermediate of the open outer portions of the ribs, the threaded ends being suitably anchored as by means of nuts 94 on the threaded ends thereof at the outside side of the drum heads and for safety. The ends of the rods may be upturned or bent to nuts. Stiffening and reinforcing bands 95 may be provided around the drum to resist the great pressure and stresses imposed thereon and are shown ribbed or headed outwardly in the center for rigidity, particularly at the partitions 88.
In order to give additional strength to the lateral wall of the drum at the strips 58 and 59 and along the edges thereof at the top and bottom of the door openings, flanged ribs 68 running longitudinally are riveted thereto as also seen in Fig. 13, and the inner flanges thereof may be extended slightly into the door openings to form overlapping portions or seats 97 for the doors so as to resist inward movement of the latches or otherwise secured to the opposite edges of the door opening or to reinforcing strips provided at such points in connection with removable guide strips 124 which project inwardly beyond the spacing strips to form grooves 125 so as to slide in, in conformity with the periphery of the shell by reason of the parts all being produced on the same arc or radius. The top edge 127 of the door plate is bent inwardly and downwardly or forwardly in hook formation to interlock the hook 122 and form a lock joint which will absolutely prevent the door from dropping down further than a closed position and also the escape of the washing solution from splashing therethrough at such point. The bottom edge of the door is bent inwardly and downwardly or forwardly to overlap the bent portion 121 at the bottom edge of the door opening and positively prevent the escape or splashing of the washing solution at the bottom of the door. It is to be understood that water is supplied to the shell or tank in the usual or any preferred manner and the water is injected into the shell by reason of the partitions providing a solid wall in the shell. The partitions 131 are provided for the box and is hinged at the top of the opening 129, preferably with a pintle having removable cap nuts on the ends thereof for facility and cleaning.

Where sliding doors are provided in lieu of the hinged doors 102 for the drum, the strips 62a and 63a, as shown in Fig. 17 corresponding to the strips 62 and 63, may be correspondingly bent. However, the strip 62a is preferably bent outwardly and upwardly or backwardly and the top edge of the door 133 is bent inwardly and downwardly or forwardly, but preferably offset or bent slightly outwardly to pass the offset portions 61 at the perforations in the wall of the drum. The shell doors may be of the same or any preferred material and are turned inwardly and upwardly or backwardly to the sides and bottom of the door openings 64 and riveted to the strips 62a and 63a at the lateral wall 61, including the bottom edge. Spacers 136 are riveted to the strips 135 and removable strips 137 are provided on the outside to form guide grooves 138 at the sides and overlapping joints at the bottom for the bottom edges of the doors so that when the latter seat is in the grooves, extreme rigidity is provided at this point.

The strips 135 are provided with recesses or cutouts 138 to take keepers 140, these keepers being in the form of rectangular sockets, and like the aforesaid keepers 100, being reversible in position. They are provided with top and bottom flanges 141 bolted, riveted or otherwise fastened to the adjacent ends of the strip 135 as otherwise needed to the latches or forming with each keeper at the opposite sides of the door 126 includes a flanged latch casing or housing 142 bolted or riveted to the wall of the door adjacent the sides and bottom edge and having a pintle or pivot means at the outside with a slot or recess 144 at the inner end thereof for seating or shoulders at the inside of the pocket on opposite sides of the recess. The inner end is also provided with a V-shaped flange 145...
adapted to take the ends of V-shaped ribs 148 corresponding to the ribs 111 and flanged for riveting the same to the door on the inside. The latch bolt body is designated portion 148 to enter the keeper 149, the reduced engaging portion of the latch bolt being recessed at 149 for this purpose so that the outer face of the bolt will lie flush with the outer face of the keeper. The latch bolt body is also recessed at the outer side or undercut to provide a handle 150 in the form of a hook accessible through a larger opening 152 in the door 133 for releasing the bolt. A pocket 151 is provided on the inside of the latch bolt at the back cooperating with the opposed pocket of the latching housing which has an outwardly projecting lug 152 between which and the outer end of the pocket 151 or the latch bolt, a compression spring 153 is mounted to project the bolt. Shoulders 154 are provided to limit the projection of the bolt through a slot 155 in the casing and the strips 135 are provided with notches 156 at opposite sides to hold the door up, that is, in open position at the opening 64 by engagement of the latch bolts at opposite sides of the door therewith.

The door is withdrawn from the fingers behind the hook or handle 150 and compressing the spring so that the door may be moved, and, in each instance, the engagement of the bolt with the keeper is automatic and assisted by the weight of the door, but may be entirely manually operated.

As before stated, the drum or turntable 56 is adapted to be rotated within the cylindrical shell or tank 25, and, in order to oscillate the drum, that is, to periodically reverse the direction of rotation thereof after two and one-half revolutions in each direction, or otherwise, the drum is provided at opposite ends with driving gears 157 which are mounted on the reduced portions 83 of the trunnions or stud shafts 77 and fixed by the keys 84, but it is obvious that, by disengaging the base flanges 78 from the end members or heads of the drum by removing the bolts 75, the trunnions may be replaced or the gears removed by removing the bolts 84 of the housings 53. The upper extensions of the housing 52 house idle gears 159 which are in mesh with the gears 157, these idle gears being fixed to stud shafts 159 journaled in bearings 160 of a frame extension 161 at the upper back portion of the machine corresponding to the position of the extension housing for the gears 158 and including upper and lower longitudinal channel members 162 and 163. A smaller pinion 164 meshes with each gear 158 and completes the gear train in the housing from a drive shaft 165 to which the pinions are fixed. This drive or counterbalance is journaled in bearings 166 on the frames 29 and 161 and carries a pair of loose pulleys 167 and 168, the former being adapted to take a straight belt 169 and the other a twisted or crossed belt 170 for driving the shaft in a reverse direction from that in which it is driven by the belts being alternately shifted in opposition directions on a fixed pulley 171 keyed to the shaft 165 between the pulleys 167 and 168. Of course, the machine may be driven in any other suitable way as by an individual motor, but, as illustrated, a worm gear 172 is fixed to the shaft 165 in mesh with a worm gear 173 rotatably mounted on a stud shaft 174 in a frame 175 on the housings 29, which forms a housing for the worm and gear. A roller 176 is mounted on a stub shaft 177 eccentrically on the gear 173 near its periphery and lugs 178 on the frame 175 support a roller 180 slides horizontally. This cam plate has an irregular surface substantially X-shaped on the inside, that is, with opposed oppositely sloping surfaces 181 and a segment 182 concentric to the pivot center of the gear 173 at the bottom. This segment has a central notch 183 engaged by a pivoted latch arm 184, the other arm 185 of which is longer or heavier and adapted to overbalance the arm 184 tending to normally hold the latter in the notch 183 so that the latch arm 184 and a bar 185 is pivoted, will reciprocate with the plate 180 which is prevented from sliding independently of the latch arm and bar. The bar 186 reciprocates or slides in bearing lugs 187 on, and depending from the frame 175 and has belt shifter arms 188 with belt engaging segments extending in opposite directions to receive the respective belts 169 and 170. A roller 189 is journaled on the free end of a semi-circular curved trip arm 190 to engage the arm 185 of the pivoted latch arm so that when it is raised the arm will be disengaged downwardly from the notch 183. This trip arm 190 is fixed to a stub shaft 191 mounted to turn in bearings 192. A depending arm 193 is fixed to the shaft 191 and is forked at its lower end to engage a sleeve 194 which is adjustable on a shifter rod 195 by means of nuts 195 threaded on the rod on opposite sides of the arm 193 so as to adjust the degree of throw thereof. A hollow or tubular shaft 197 is mounted to turn or oscillate in the frame 25, that is, an extension thereof, and has a control lever 198 pivoted at 199 to a segment casing 200 fixed to the tubular shaft 197 by means of a set screw 201 disposed through a sleeve extension of the segment casing. A link 196a has a fork connected to the arms 188 and is pivotally connected to a rocker arm 199b keyed to the shaft 197 for the purpose of shifting the belts by hand by rocking said shaft through the medium of the lever 199b which is thereby caused to oscillate during the automatic shifting of the belts. A spring latch 202 is provided between the lever 198 to engage notches 203 of the ratchet segment so that by depressing the latch, it may be disengaged from the ratchet teeth or notches to permit the lever to be shifted forwardly and back- wardly, but the lever end 204 is held in the notch 205 of the hollow shaft 197 which is rigidly connected to the segment 200. An arm 204 is fixed on the stub shaft 191 and has its free end pivotally connected by an adjustable link 205 with a rocker arm 206 fixed to a rocker shaft 207 mounted in the upper channel guide bearing 208. A rocker arm 209 is also fixed to the shaft 207 and is connected to one end of the brake band or strip 210 which operates on a brake drum 211 suitably supported on the shaft 165 and fixed thereto. A post 212 is connected to the other end of the band or strip and is usually stationarily mounted on the bearing 208 so that by rocking the shaft 207 from the lever 199, the band may be retracted to frictionally grip the drum or to release the same whereby the machine may be brought to a stop with the doors and openings of the shell in perfect alignment with the doors and openings of the shell. In this position, the parts are held by a spring actuated plunger 213 mounted in a housing on and engaging an opening in the segment 200 at lever 199. A locking plate or dog 214 is also piv-
oted to the extension of the frame 29, as shown in Figs. 4 and 4A of the drawings, to press against the lever 188 and additionally lock the latter against movement in an intermediate position where it is also held by the spring actuated plunger 212.

Should the door openings not be in perfect registration, means is provided to rotate the drum manually to bring the door openings of the drum in alignment with the door openings of the shell in the different compartments which, in the present instance, are designed to accommodate two hundred pounds of articles or laundry or more, so that the entire capacity is trebled (six hundred pounds) over the ordinary machines, although I do not wish to be limited to this particular capacity. However, it is pointed out that this is possible by reason of the improved and rigid construction and the fact that the longitudinal ribs project inwardly a suitable distance further than any machine constructed and in fact, produce oppositely facing paddles in converging relation to each other from the periphery of the drum substantially in a plane with the axis of rotation for violently stirring and agitating the washing fluid. The resistance offered to such movement in a washing machine is decreased by the perforations which, due to their peculiar construction, or formation, are prevented from catching in articles of clothing. The ribs upon the interior of the drum also carry the articles around in such a manner that the greatest benefit from the fluid agitation is received and the result is that the articles are thoroughly cleansed, assisted by the periodical reversing of the rotation of the drum by means of the oscillating reversing mechanism, all of which contributes to the thorough cleansing of the laundered articles in the shortest possible time with the least possible consumption of power. The manual means for turning the drum is normally out of gear when the machine is in operation and is shown, more particularly, in Figs. 2 and 22 of the drawings. This hand turned unit is designated generally at 215 and consists of a frame member 216 and a yoke 217 which in turn carries a pivot 218 for a yoke arm 219 which carries a worm 220 keyed to a shaft 222 adapted to be turned by a hand wheel 224 which may be operated from the front of the machine at one end. An arm 222 is provided at the inner end of shaft 222 and is pivoted eccentrically to a disk 223 fixed to one end of a shaft 224 mounted to turn in the frame of the unit 216. The forward end of the shaft 224 carries a depending arm 225 adapted to rest against the shaft 223 of the worm and is provided with a handle whereby it may be turned. The housing 32 is provided with an opening 229 so that the worm 215 may mesh with the adjacent gear 231 so that by turning the hand wheel 224, rotation may be imparted to the drum when the power drive mechanism is out of gear. However, by swinging the parts upwardly on the shaft 224 as a pivot, the hand turning unit will be rendered operable by disengaging the worm 218 from the gear 231. A handle 229 is provided at the center as shown in Figs. 1 and 10 and is in the form of a valve having a seat 229 with which a valve head or plate 229 coop- erates, this valve head being preferably spring held and adjustable with respect to the seat. A lever 231 is pivoted at 232 to an auxiliary frame forming part of the valve beneath the bottom of the shell and has a foot plate 233 at its free end, the top portion of which is pivoted to a link 234 in turn connected at its inner end to a locking arm 235 with a roller 236 adapted to engage beneath the casing or auxiliary frame of the valve to lock the valve in a closed position but permit the same to be readily released by depressing the lower portion of the foot plate and withdrawing the roller from its locked position so that the valve may be readily opened by the weight of the water or washing solution in the shell and discharged into the usual drain trough or gutter usually supplied in floors of laundries equipped with such machines. On the other hand, in driers, where the walls of the shell and drum need not be perforated, the ribs are also made imperforate and the parts merely supplied with the necessary heat to take up the moisture in the laundered articles so as to partially or completely dry the same.

The positioning of the door openings of the drum adjacent the door openings of the shell is assisted and facilitated by the counterbalance weights 252 in connection with the bracing mechanism whereby by pulling the lever 189 forwardly to rock the shaft 181 in a clockwise direction as seen in Figs. 3 and 9 through the medium of the arms 202 and 204 to swing the arm 205 forwardly and tighten the brake band 210 on the drum 211. This also releases the latch arm 184 from the notch 130 in the segment 182 before applying the brake. Thus, in the operation of the machine, while the latch arm 184 is so held, the drum is oscillated or alternately rotated in reverse directions by the automatic shifting of the reversing belts 169 and 170 alternately on and off of the fixed drive pulley 171 from the loose pulleys 167 and 169, respectively. This is accomplished by the rotation of the shaft 165 from the pulley 171 causing rotation of the worm 172 in mesh with the worm gear 173 whereby the latch arm 184 is in the notch 130 and while the roller 180 of the top arm 180 is disengaged from the arm 185. The latch arm 184 being pivoted to the sliding or reciprocating bar 190 serves to connect the sliding plate 190 to the bar 188, and, as the worm gear 178 is slowly turned by the worm 12, the eccentric roller 176 engages and rides on the opposed oppositely inclined camming surfaces of the cam 181 at the recessed inside or back face of the plate 185, whereby reciprocating the plate as well as the shifter arm 180 to shift the belts 169 and 170 alternately onto the drive pulley 171 to automatically oscillate or periodical reverse the direction of rotation of the drum with consequent increased washing efficiency due to the resulting displacement and agitation of the washing solution and the articles being washed or, in the case of a drier, the tumbler of the clothes under the action of heat. During this oscillation or periodic reversing of the direction of rotation of the drum, the hand shifter 178 will also be oscillated, including the lever 188 and the roller 180 of the shaft or parts connected thereto. Thus, the shaft 165 being driven while the frame 215 is swung upwardly as indicated by the arrows in Fig. 22 and supported in a raised position to disengage the worm 218 from the gear 187 at one end, the drum 90 is uniformly driven at both
ends. The worm 172 being in mesh with the gear 173, rotates the latter in the plane of the shaft 165, and as the roller 176 turns with the arm 165, it engages the opposed cam surfaces 161 which, being oppositely inclined, cause the plate 180 to be reciprocated or slide back and forth on the rod 170. With the lever 125 in a forward position, the arm 190 will be swung up to engage the roller 169 with the arm 165 and disengage the arm 186 from the notch 182 of the segment 181 of the plate 180 so that the latter will merely slide without shifting the bar 166. The belts 168 and 170 may be on their loose pullies 167 and 168 respectively, in which event the shaft 165 is not driven or either belt may be on the intermediate fixed pully 171 to drive the shaft 165 and thus the drum 68 through the gear trains heretofore described. However, when the lever 125 is in a rearward position, the arm 190 is swung down and the heavy arm 195 will drop of its weight to move the other arm 194 into the notch 182 and connect the plate 180 to the bar 166 and the belt shifter whereby the drum will be oscillated or periodically and alternately driven in opposite or reverse directions, the rod 195 and lever 125 being free to oscillate. By omitting this unit, the drum may be driven continuously.

After the deposit of articles to be laundered into the respective compartments of the drum 68 through the aligned door openings of the shell and drum, the desired quantity of water is run or supplied within the shell or tank 29 and passed into the drum and articles to be washed submerged therein. Soap in powder or liquid form is supplied to the hot water through the soap boxes in the shell and the solution passes through the perforations or holes in the walls of the drum and these may be augmented by injections of steam, if desired, to form the required washing solution or fluid. The machine is then operated as above described. The improved construction permits the free circulation of the washing fluid and thoroughly permeates the articles in a particular formation of the ribs with inwardly converging or outwardly diverging flat sides, instead of being arched or curved, causes more violent agitation of the articles and washing solution by deflecting the same laterally at a lesser angle and besides being rigid to give maximum strength to resist strains, strains and pounding, increases the flow of the fluid into and out of the drum through the perforate walls thereof and at the freely open outer portions throughout the length of the ribs as well as the surface area, especially as the ribs extend inwardly a greater distance radially, i. e., approximately one-third of the radius of the drum and are balanced to ounces, together with the drum, so that the operation is smooth and uniform. This is also facilitated by locating the tie rods 33 at or near the outer open portions of the ribs and substantially centrally between the perforated sides thereof and by having the biot or intermediate inner transverse members or walls 66 imperforate so that streams of the washing fluid are alternately forced through one side and then the other as the drum is oscillated or reversely rotated for definite periods of time. However, by having the holes or perforations punched or stamped out and formed as described with the inner depressions, the outward pressure of the fluid is facilitated while preventing the catching and tearing of the cloth articles.

While I have illustrated and described the preferred form of construction for carrying my invention into effect, this is capable of variation and modifications without departing from the spirit of the invention. I, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claims.

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

1. A cylindrical drum for washing or drying machines comprising end discs, a plurality of spaced trough-shaped inwardly projecting ribs extending longitudinally between said discs and having outwardly turned flanges on their longitudinal edges, brackets on said end discs to receive and fit the end portions of said ribs and said discs having inturned segmental flanges fitting between and abutting the adjacent edges of the rib flanges, side walls consisting of arcuate plates having their longitudinal edges overlapping and secured to the rib flanges and their ends overlying and secured to the segmental flanges of the end discs, end caps fitting against the outer faces of the end discs and having inturned flanges fitting over the ends of arcuate plates and securing said ends between the same and said segmental flanges and tie rods connecting said end caps and extending through said ribs.

2. A cylindrical drum for a washing or drying machine comprising end discs, a plurality of spaced trough shaped inwardly projecting ribs extending longitudinally between said discs and having outwardly turned flanges on their longitudinal edges, brackets on said end discs to receive and fit the end portions of said ribs and said discs having inturned segmental flanges fitting between and abutting the edges of the rib flanges, side walls consisting of arcuate panels having their longitudinal edges resting on and secured to said rib flanges and their ends secured on the segmental flanges of the end discs, said panels having a door opening and the other panels being perforated, a door for said door opening, brackets fitting and secured to the ends of said ribs and having flanges connected to said end discs, end caps fitting against the outer faces of the end discs and having inturned flanges fitting over the ends of said panels and securing said end between the same and the segmental flanges on the end discs, and tie rods connecting said caps and extending through the ribs.

3. A drum of the class described comprising end discs, a plurality of spaced trough shaped ribs extending longitudinally between said discs and having outwardly turned flanges on their longitudinal edges, brackets on said end discs to receive and fit the end portions of said ribs and said discs having inturned segmental flanges fitting between and abutting the adjacent edges of the rib flanges, a partition for said drum dividing the same into separate chambers, said partition being peripherally notched to receive said ribs and having segmental flanges abutting the rib flanges, side walls consisting of arcuate plates or panels having their longitudinal edges secured to the rib flanges and their ends secured to the segmental flanges on the end discs, said panels also secured to the segmental flanges on the partition.

4. A cylindrical drum for washing or drying machines comprising end discs, a plurality of
spaced trough shaped inwardly projecting ribs extending longitudinally between said discs and having outwardly turned flanges on their longitudinal edges, brackets on said end discs to receive and fit the ends portions of said ribs and said discs having inturned segmental flanges fitting between and abutting the adjacent edges of said ribs, side walls consisting of arcuate panels having their longitudinal edges secured to the outer faces of the ribs flanges of adjacent pairs of ribs and their ends secured to the outer faces of the segmental flanges, a transverse partition in said drum dividing the same into compartments, said partition being peripherally notched to receive said ribs and having segmental flanges end-abutting the flanges on the ribs and secured to said panels, one of said panels having door openings providing access to said compartments respectively and the other panels being perforated, reinforcing strips secured to the respective panel adjacent the upper and lower edges of the door openings and having flanges projecting beyond said edges, arcuate strips secured to the inner faces of the panel on each side of the door openings and projecting beyond the edges of said openings, forming with the projecting edges of the reinforcing strips a continuous door stop around the door opening, a door for closing each of said openings, end caps fitting against the outer faces of the end discs and having inturned flanges fitting over the ends of the panels and securing said ends between the same and the segmental flanges on the discs, and tie rods connecting said end caps and extending through said ribs.

5. A drum of the class described comprising end discs, a plurality of spaced trough shaped ribs extending longitudinally between said discs and having outwardly turned flanges on their longitudinal edges, brackets on said discs to receive and fit the end portions of said ribs and said discs having inturned segmental flanges fitting between the adjacent edges of the rib flanges, a partition for said drum dividing the same into separate chambers, said partition being peripherally notched to receive said ribs and having segmental flanges, side walls consisting of arcuate plates or panels having their longitudinal edges secured to the rib flanges and their ends secured to the segmental flanges on the end discs, said panels also secured to the segmental flanges on the partition, and a reinforcing band extending around the drum directly exteriorly to the flanges on the partition.

6. In a drum for washing or drying machines, end discs, a plurality of trough-shaped inwardly projecting ribs extending longitudinally between said discs and having outwardly turned flanges on their longitudinal edges, said discs having inturned segmental flanges fitting between and abutting the adjacent edges of the rib flanges, and side walls consisting of plates having their longitudinal edges overlapping and secured to the rib flanges and their ends overlying and secured to said segmental flanges of the end discs.

CHARLES C. BATINA.

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