Aug. 25, 1936. W. A. FRANTZ ET AL 2,052,392

LAUNDRY MACHINE

Filed May 27, 1932 5 Sheets-Sheet 1

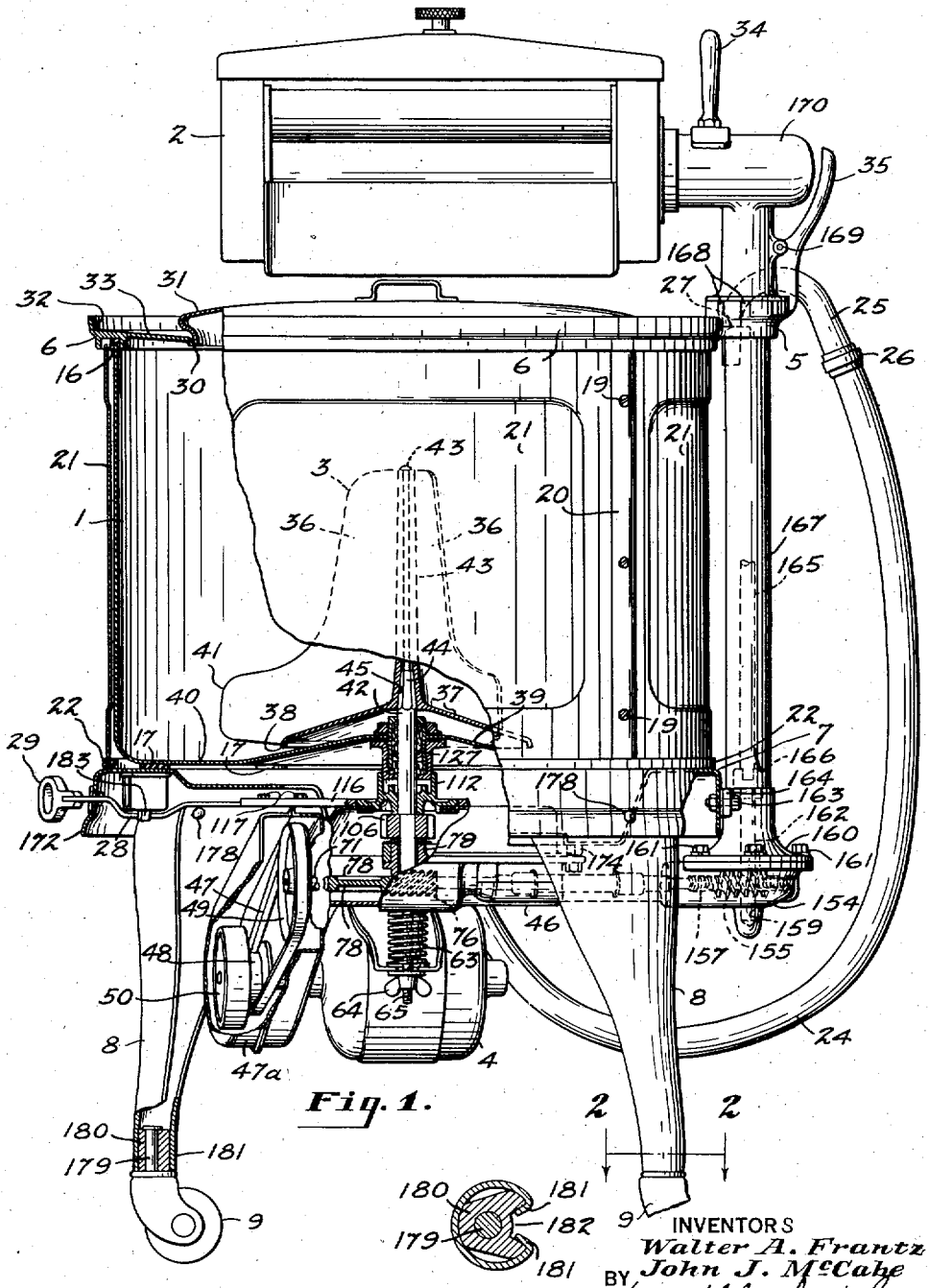


Fig. 1.

Fig. 2.

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LAUNDRY MACHINE

Filed May 27, 1932 5 Sheets-Sheet 2

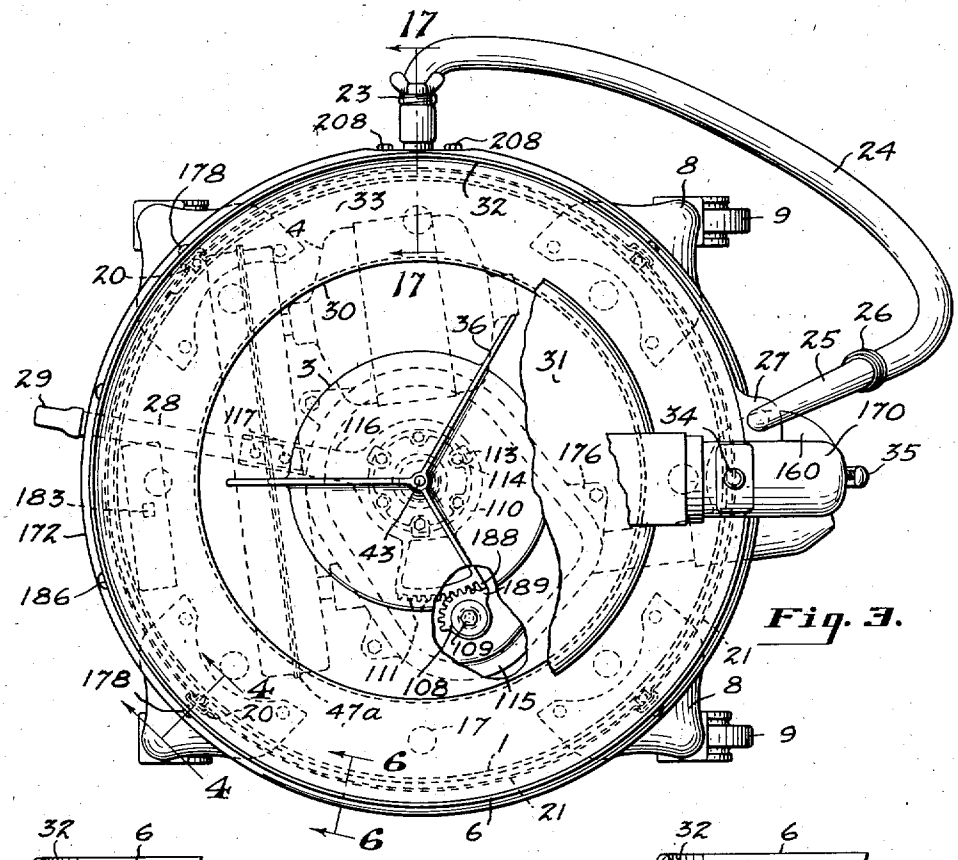


Fig. 3.

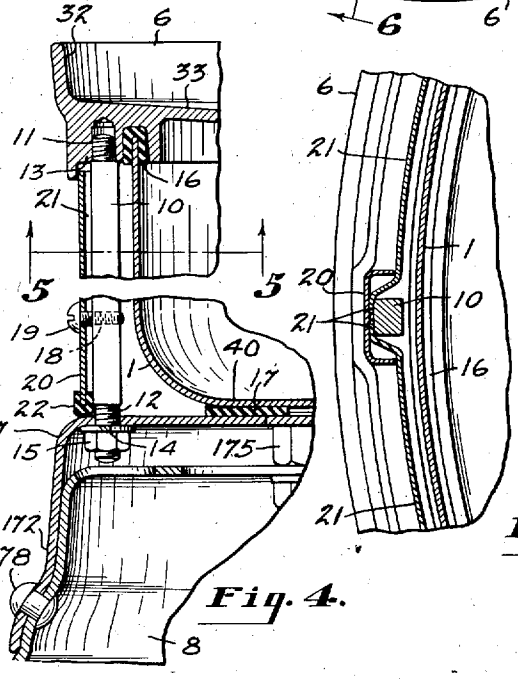


Fig. 4.

Fig. 5.

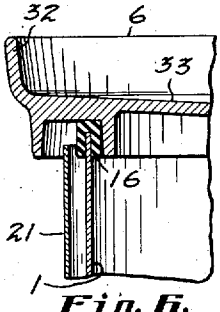


Fig. 6.

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LAUNDRY MACHINE

Filed May 27, 1932 5 Sheets-Sheet 3

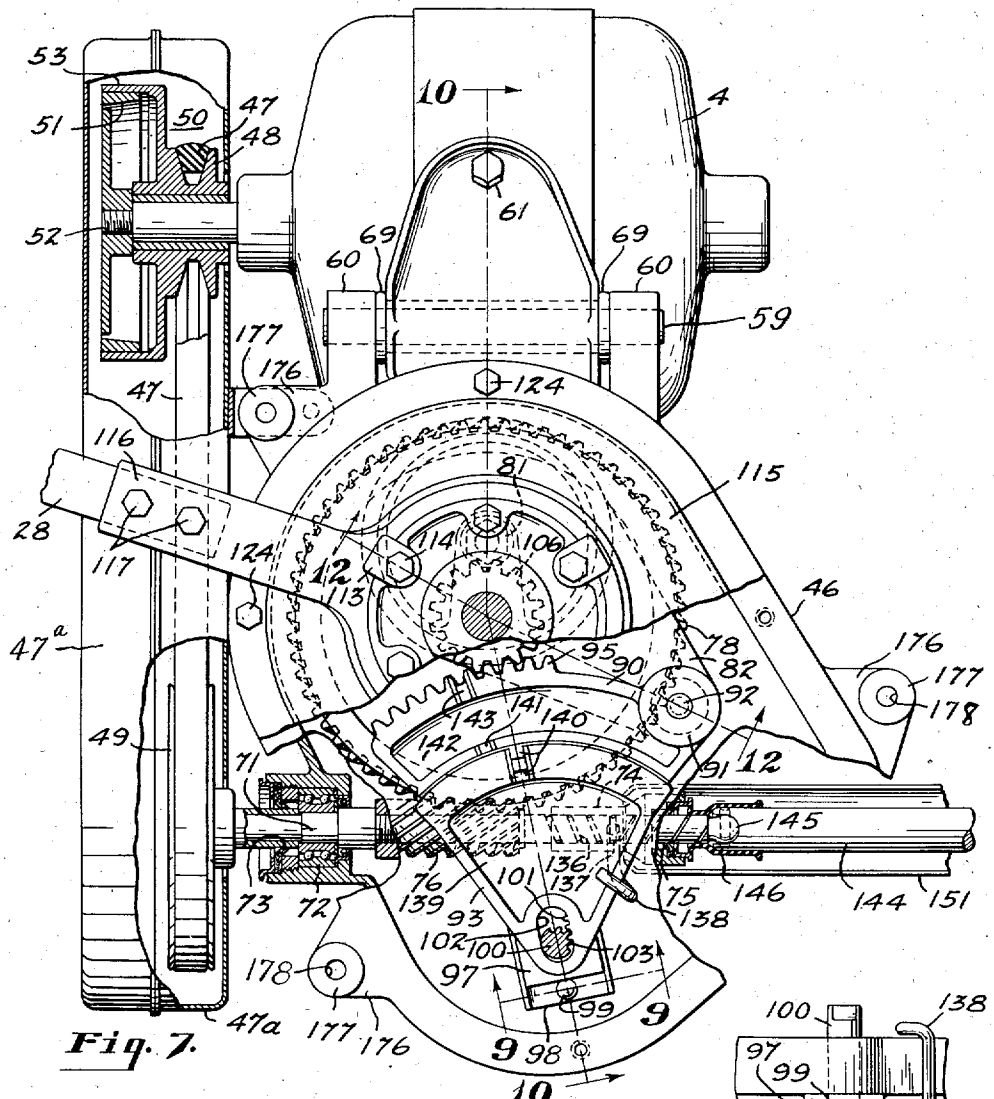


Fig. 7.

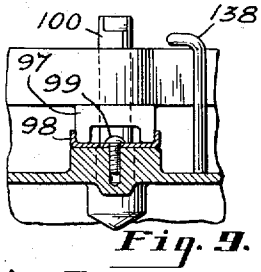


Fig. 9.

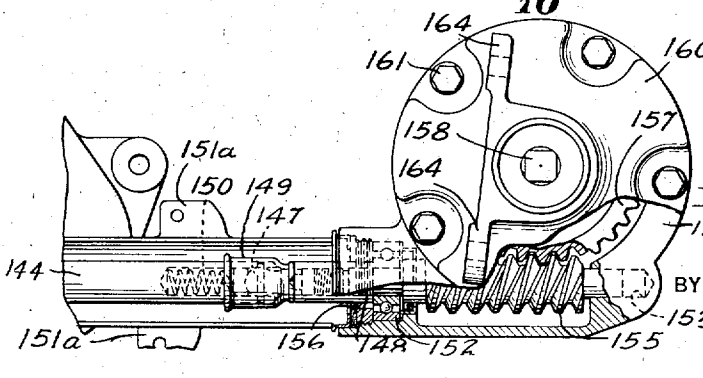


Fig. 8.

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LAUNDRY MACHINE

Filed May 27, 1932 5 Sheets-Sheet 4

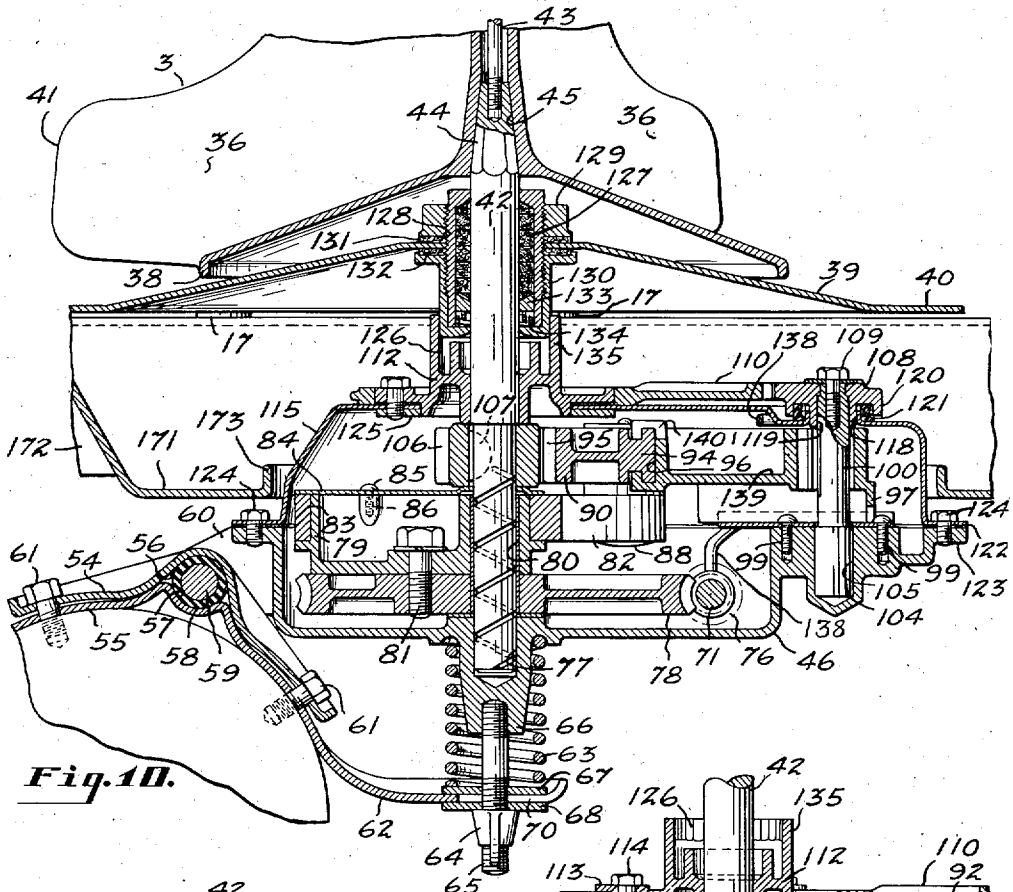


Fig. 10.

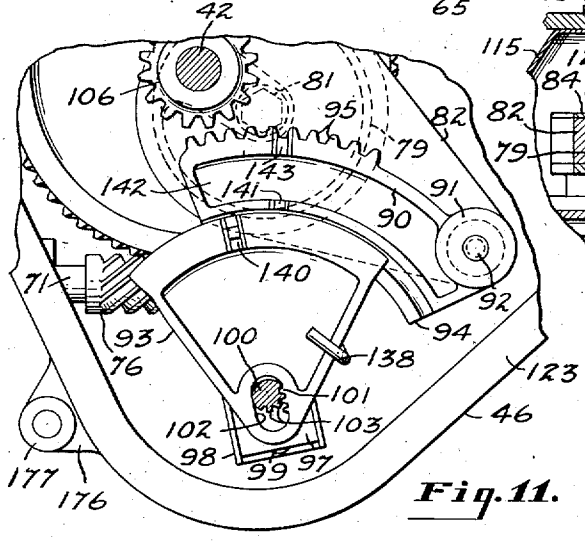


Fig. 11.

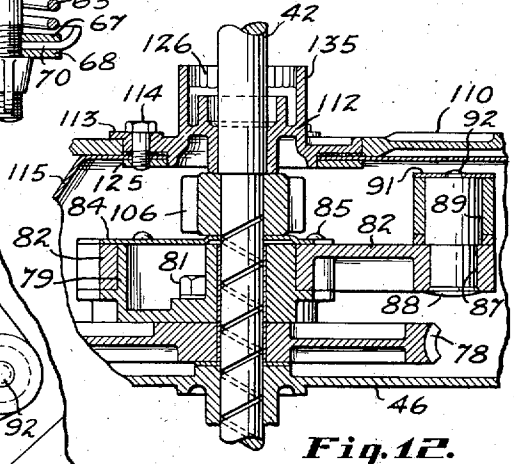


Fig. 12.

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LAUNDRY MACHINE

Filed May 27, 1932 5 Sheets-Sheet 5

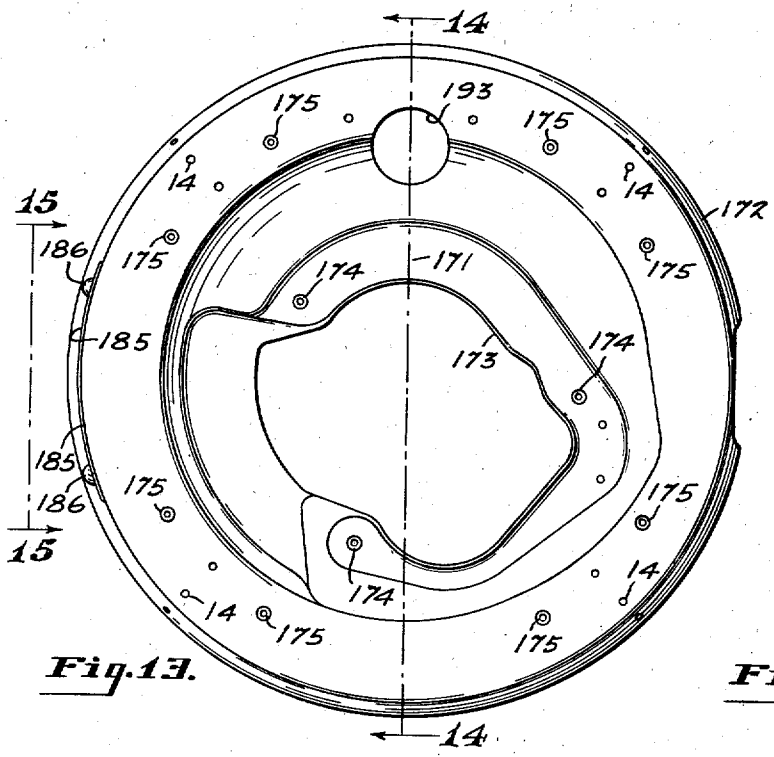


Fig. 13.

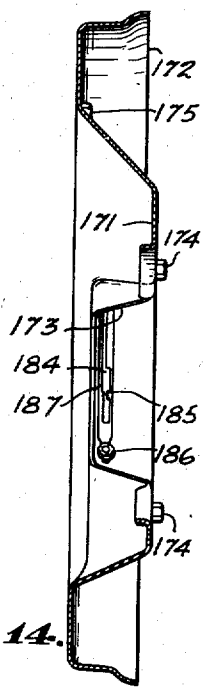


Fig. 14.

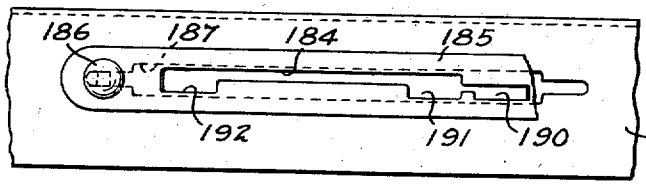


Fig. 15.

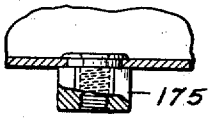


Fig. 16.

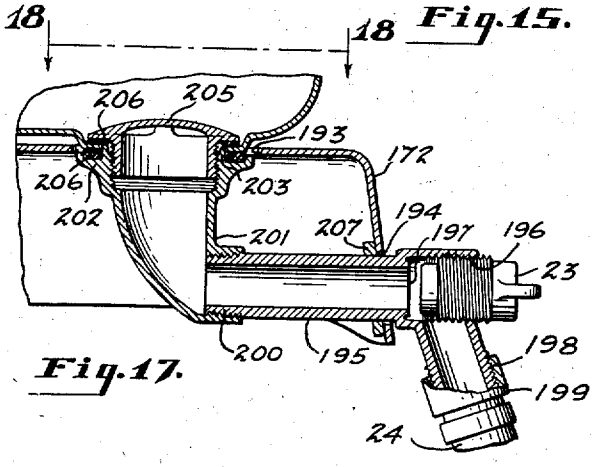


Fig. 17.

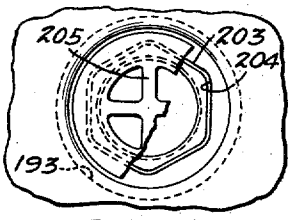


Fig. 18.

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Patented Aug. 25, 1936 2,052,392

UNITED STATES PATENT OFFICE

2,052,392

LAUNDRY MACHINE

Walter A. Frantz, Shaker Heights, and John J. McCabe, Cleveland, Ohio, assignors to The Apex Electrical Manufacturing Company, Cleveland, Ohio, a corporation of Ohio

Application May 27, 1932, Serial No. 614,000

20 Claims. (Cl. 259—101)

This invention relates to combined clothes washing and wringing machines, and in particular, washing machines which employ an oscillating agitator for performing the washing operation.

One of the objects of this invention is to provide in a machine of the type disclosed, novel supporting and securing means for the tub in which the washing operation is performed.

Another object of this invention is to provide in a machine of the type disclosed, a shield formed from a plurality of removable panels for protecting and thermally insulating the washer tub.

Another object of this invention is to provide in a machine of the type described, a form of agitator and tub bottom construction which is arranged to prevent the clothes from working underneath the base of the agitator.

Another object of this invention is to provide a washing machine operating mechanism of unitary construction, in which the motor and other operating elements of the mechanism can be assembled and tested as a unit separate from the machine.

Another object of this invention is to provide in a machine of the type disclosed, a simple and compact washer drive mechanism, in which the majority of the operating elements are grouped for movement about a common axis.

Another object of this invention is to provide in a machine of the type disclosed, an improved means for starting and stopping the operation of the dasher or agitator.

Another object of this invention is to provide in a machine of the type disclosed, an improved frame construction.

Another object of this invention is to provide in a machine of the type disclosed, an improved supporting structure for the tub and the operating elements of the machine.

Another object of this invention is to provide in a machine of the type disclosed, an improved means for handling the liquid used in effecting the washing operation.

Another object of this invention is to provide in a machine of the type disclosed, an improved means for securing the caster bearings in position in the supporting legs of the machine.

Another object of this invention is to provide in a machine of the type disclosed, an improved form of gearing for driving the wringer and the washer mechanisms.

A further object of this invention is to provide in a machine of the type disclosed, a generally improved and simplified mechanism embodying a minimum number of parts, which are designed and assembled so as to permit the manufacture of such a machine by modern high speed factory production methods.

With these and other objects in view, the invention consists in the novel construction, arrangement and combination of parts, hereinafter described and illustrated and some of its embodiments in the accompanying drawings, and particularly pointed out in the appended claims.

In the drawings:

Figure 1 is a side elevational view, partly in section, of our improved washing machine.

Figure 2 is an enlarged sectional view taken on line 2—2, Figure 1.

Figure 3 is a plan view of our improved washing machine.

Figure 4 is an enlarged sectional view taken on line 4—4, Figure 3.

Figure 5 is a sectional view taken on line 5—5, Figure 4.

Figure 6 is an enlarged sectional view taken on line 6—6, Figure 3.

Figure 7 is an enlarged plan view, partly in section, of the washer or agitator driving mechanism.

Figure 8 is an enlarged plan view, partly in section, of the reduction gearing of the wringer driving mechanism.

Figure 9 is a sectional view taken on line 9—9, Figure 7.

Figure 10 is a sectional view taken on line 10—10, Figure 7.

Figure 11 is a fragmentary view corresponding to Figure 7, showing the agitator driving gears in their disengaged position.

Figure 12 is a sectional view taken on line 12—12, Figure 7.

Figure 13 is a plan view of the stamped metal base of the machine.

Figure 14 is a sectional view taken on line 14—14, Figure 13.

Figure 15 is an enlarged side elevational view of that portion of the tub supporting base which receives the mechanism control lever.

Figure 16 is an enlarged sectional view taken through one of the nuts which are riveted to the base for receiving the bolts by means of which certain of the elements of the machine are secured to the base.

Figure 17 is an enlarged sectional view of the drain valve, taken on line 17—17, Figure 3.

Figure 18 is a plan view of the tub drain opening and strainer shown in section in Figure 17.

Referring to the complete washing machine illustrated in Figure 1, the numeral 1 indicates a washer tub which is provided for the purpose of effecting therein the washing of clothes and other articles. Above the washer tub, there is positioned a wringer 2, by means of which adherent liquid is squeezed from the clothes after they have been washed or rinsed. The tub 1 is preferably formed from a steel stamping to which a coating of vitreous enamel has been applied.

The washing operation is effected by means of an oscillatable dasher or agitator 3, which extends upwardly from the bottom of the washer tub 1, and which is mounted to turn about a vertical axis. The agitator 3, is driven by a motor 4, which is supported beneath the washing compartment 1, and it is connected in driving relation to the agitator 3, through suitable gearing which will be described in detail presently.

The agitator or dasher 3, operates with a reversely rotary movement about a vertical axis and swings through an arc of substantially one hundred and eighty degrees during its operation. The wringer 2 is mounted for swinging movement in the collar 5, of the top plate 6, and it is driven by the motor 4, through suitable speed reducing gearing which is housed and supported on a level below the bottom of the washer tub.

The washer tub 1, is secured in place between a stamped metal base member 7, and the die-cast metal top plate 6. Four supporting legs 8, are secured directly to the base member. The supporting legs are provided with casters 9, to facilitate moving the machine about from place to place.

The washer tub is clamped in place on the machine between the top plate 6, and the base 7, by means of the tie rods 10. These rods are rectangular in cross section and are finished with upper and lower threaded ends 11 and 12, respectively. The upper threaded ends of the rods are received in drilled and threaded bosses 13, which are formed integrally with the top plate at spaced intervals on its underside.

The lower threaded ends of the rods project through suitable holes 14, pierced in the base member 7, and they are fitted with nuts 15, by means of which the top plate is brought into engagement with the channeled rubber ring 16 which is fitted over the top edges of the washer tub. A number of rubber pads 17, are interposed between the base 6 and the bottom of the washer tub.

In this manner a strong and resilient mounting is provided for the tub. The stated tub holding means does not require the piercing of the tubs for bolt holes and the like, thus eliminating the possibility of leakage at such points.

Chipping, cracking and crazing of the porcelain enamel of the tub during the assembling of the machine or in its subsequent use, is practically eliminated through the expedient of gripping the tubs between a yielding material such as rubber which is in contact with a relatively large area of the tub. This mounting arrangement avoids the setting up of localized strains in the tub and thus eliminates the most common cause of failure of the enamel of the tub.

The tie rods 10, are drilled and tapped at 18, for the reception of the screws 19, which serve to hold the finishing strips 20, in contact with the vertical edges of the removable panels 21. The lower edges of the panels are fitted with channeled strips of rubber 22, for the sake of appearance and to insure sealing contact with the base 7, of the machine at these points.

The removable panels 21 enhance the appearance of the machine and at the same time, serve to thermally insulate the washer tub and to protect it against damage. The panels are of sufficient strength to withstand a relatively heavy blow and even though they are damaged by such a blow, the enameled tub, in most cases, will be found to be unharmed and the machine can be easily reconditioned by simply replacing the damaged panel with a new one. This operation is easily performed by first, removing the two strips 20, which hold the panel in question, whereupon the panel can be removed and a new one inserted in its place.

The emptying of the contents of the tub is under control of a plug valve, the operating member of which is indicated by the numeral 23. A drain hose 24 is attached at one end to the valve and at its opposite end the hose is provided with a goose-neck 25, which is secured to the hose by means of a swivel connection 26. An apertured ear 27 is formed in the top plate 6 for receiving the goose-neck of the hose.

The operation of the agitator 3, is controlled by means of a control lever 28, to which is secured a grip or handle 29. The control lever 28, is capable of occupying three fixed positions: in the first position, the motor 4 is inoperative; in the second position the motor is connected to an electric circuit thus placed in operation; and in the third position, the washing machine agitator 3 is connected in operated relation with the washing machine gearing and the driving motor.

The top plate 6, is provided with an opening 30, which registers with the washer tub. A removable cover 31 is provided for the tub opening 30. The top plate 7, is provided with an upstanding edge or rim 32 and a downwardly slanting ledge 33, which extends from the rim to the margin of the opening 30. By this arrangement the water which gets onto the top plate automatically drains back into the tub.

The operation of the wringer rolls is controlled by means of the lever 34. This lever may be shifted towards and from the operator to drive the wringer rolls in one direction or the other. In the vertical position of the wringer control lever 34, the wringer rolls are inoperative and disconnected from their driving mechanism.

The lever 35 is provided to lock the wringer in the various adjusted positions to which it may be swung. The mechanical and structural features of the wringer and its gearing are shown in detail in our copending application Serial Number 613,999.

The water and clothes contained in the washer tub are given a vortex movement by the to and fro rotation of the agitator 3, and in this manner the clothes are quickly and effectively washed.

The agitator 3, is provided with three vertical vanes 36, which extend upwardly from a frusto-conical base plate 37. The vanes of the agitator are extended beyond the margin of the base plate 37 for the purpose of preventing the clothes from getting underneath the downwardly turned edge 38 of the base plate.

As a further means for preventing the clothes from getting underneath the edge 38 of the base plate, the tub is provided with a conical raised portion 39, which extends upwardly into the conical base of the agitator. The downwardly turned edge 38 of the agitator base closely approaches the conical upraised portion 39 of the

tub bottom, at a point some distance above the point where this part of the tub merges into the horizontally disposed portion 40, of the tub bottom.

As previously stated, the operation of the agitator induces a vortex movement of the contents of the tub. The relative movement of the water and clothes with reference to the central portion of the tub bottom, is outwardly and upwardly and then inwardly and downwardly.

The contour of the agitator base and the exposed area of the upraised portion of the tub bottom conforms at this point, approximately to the flow lines of the moving contents of the tub when the machine is in operation. This arrangement permits better circulation of the tub contents with a smaller power consumption than would be possible with the use of an agitator base, the shape of which tended to oppose the flow of the tub contents or which varied greatly from the flow lines of the moving contents of the tub.

The natural counter-flow induced at the outermost edges 41, of the trailing face of vanes 36, is not sufficient to throw the clothes against the marginal edge of the agitator base on account of the relatively great distance between these points, and in the normal operation of the machine, the movement of the clothes is always in a direction away from such point.

Under abnormal conditions, such as when the machine is loaded with an excessive amount of clothes, the extended portions 41 of the vanes operate to sweep the clothes clear of the line where the agitator base approaches the tub bottom.

The agitator 3, is removably secured to its operating shaft 42, by means of an elongated bolt 43. The end 44, of the agitator shaft, is prismatic in shape and has a plurality of flat sides which taper towards the axis of the shaft. The agitator base is provided with a central socket 45 of complementary form to the prismatic end 44 of the shaft, for receiving this end of the agitator shaft. This arrangement provides a detachable driving connection between the shaft 42 and the agitator 3. The end of the shaft 42 is internally threaded for receiving the bolt 43, by means of which the agitator is securely held in place on its shaft.

The washer mechanism gearing of the machine is confined within a two-part gear case, the base 46 of which is used to support the motor 4. The mechanism in the gear case is driven by the motor 4, by means of a V belt 47, which engages the motor pulley 48, and the mechanism pulley 49. A cover 47a is provided for the belts and pulleys.

A centrifugal clutch 50, which is formed in part by the motor pulley 48, is provided to permit the motor to come up to speed before the load of driving the washing machine mechanism is imposed upon it. The clutch 50 is of similar construction to the clutch illustrated in copending U. S. patent application Serial Number 497,678 which was filed by W. A. Frantz and A. W. Seyfried, November 24, 1930.

In the form of clutch just referred to, a centrifugally operated clutch member 51 is fixedly connected to the motor shaft 52. A clutch drum 53, is integrally formed with the pulley 48. The drum and pulley are rotatably journaled on the motor shaft and when the motor comes up to speed, the centrifugally operated part 51 of the clutch, frictionally engages the drum 53 and drives the pulley at the same speed as that of the motor shaft. If an overload is imposed upon the motor, the clutch immediately begins to slip and thus prevents any damage to the motor.

The motor 4 is secured to the gear case 46, by means of a pair of stamped metal plates 54 and 55. These plates are formed with complementary channels 56 and 57, respectively, between which there is received a rubber sleeve 58 and a supporting shaft 59 which it incloses. The motor 4 is pivotally suspended from the projecting ears 60 of the gear case, which are apertured for receiving the uncovered ends of the shaft 59. The stamped metal motor supporting members 54 and 55 are secured to the motor and each other by means of a pair of bolts 61.

The lower supporting plate 55 is provided with an extending arm 62, which is engaged between the spring 63 and a wing nut 64. The spring 63 is compressed between the arm 62 and the gear case base 46 and it serves to resiliently hold the arm in contact with the wing nut 64. The wing nut is threaded onto a rod 65, the upper end of which is screwed into a boss 66, formed on the base 46 of the gear case. The boss 66 also serves to position and guide the spring 63, which surrounds it.

A pair of dielectric washers 67 and 68 are provided to insulate the arm 62 from the spring 63 and the nut 64. The upper washer 67 is engaged by the spring 63 and the lower washer 68 is engaged by the wing nut. The provision of the washers just mentioned, and the rubber sleeve 58, which forms a sheath for the shaft 59, serves to electrically insulate the motor 4 from the rest of the machine. The sleeve 58 has flanged ends 69, for preventing contact between the plates 54 and 55 and the ears 60. The arm 62 is slotted or forked at 70, for receiving the rod 65.

The spring 63 is arranged to resiliently oppose the pull of the belt 47 and it co-operates with the rubber sleeve 58 to provide a resilient and flexible mounting for the motor 4. By this arrangement the motor noises are not transmitted to and amplified by the rest of the machine and an extreme degree of quietness in operation is attained by reason of such construction.

The lower half or base 46 of the gear case, may be constructed in the form of a metal casting. The mechanism belt pulley 49 is fixedly connected to a worm shaft 71, which is journaled at one end in an anti-friction bearing 72. An oil seal 73 is provided between the shaft 71 and the gear case to prevent the escape of oil at this point. The opposite end of the worm shaft is journaled in a plain bearing 74, formed in the gear case base. An oil seal 75 is also provided in the end of this bearing to prevent the escape of oil from the gear case. A worm 76 is threadably secured to the shaft 71.

The lower end of the agitator shaft 42 is journaled in a bearing 77, which is formed in the boss 66 of the gear case base. The shaft 42 provides a bearing for the worm gear 78, which meshes with the worm 76. An eccentric 79 having a hole 80, adjacent to its marginal edge for the receiving of the agitator shaft 42, is fixedly secured to the top of the worm gear 78 by means of the bolt 81, which is screwed into the gear 78.

A connecting rod or pitman 82, receives the eccentric 79 in a suitable bearing 83, formed in one of its ends. The rod 82 is held in place on the eccentric by means of a plate 84 which is fitted over the top of the eccentric and which

extends beyond the edge of the eccentric to cover the bearing portion 83 of the connecting rod. The plate 84 is held in position by means of a plurality of drive screws 85, which are driven in the drilled holes 86 of the eccentric.

The opposite end of the connecting rod 82 is provided with a hole 87, in which a bearing pin 88 is riveted. The pin 88 is journaled in a bearing 89, which is formed in the curved rack bar 90. The pin 88 is held in place in the rack bar 90, by means of a plate 91, which is secured to the pin 88 by the drive screw 92. The rack bar 90 is slideably fitted in a laterally moveable bearing member 93. The side 94 of the curved rack bar, which is opposite to the side upon which its gear teeth 95 are cut, is H shaped in cross section. This part of the bar is smoothly finished and is received in a channel 96 of the bearing member 93, which is C shaped in cross section. The rectangular base 97 of the bearing member 93 is received in a channel member 98, which is fixedly secured to the gear case base by means of the drive screws 99.

The lateral movement of the bearing member 93 is effected by means of a pinion 100, which meshes with the rack teeth 101, formed in the opening 102, which is provided through the bearing member 93. The pinion 100 is in the form of an elongated mutilated gear having a sufficient number of teeth 103 formed thereon, to shift the bearing member a slight distance back and forth in its guideway 98.

The pinion 100 is provided with an enlarged cylindrical lower end 104, which is journaled in a suitable bearing 105 formed in the base of the gear case. The gear teeth 95 of the rack bar engage with the gear teeth of the pinion 106, which is fixedly secured to the agitator shaft 42, by means of a key 107.

From the foregoing it is apparent that during the time of operation of the motor 4, the worm 76, the worm gear 78 and the eccentric 79 are continuously driven, the latter two elements being rotated about the agitator shaft 42, as a bearing pin. At the same time the connecting rod 82 reciprocates the curved rack bar 90 back and forth in its slideway 96, and this movement of the rack bar is transmitted through the pinion 106 to the agitator shaft 42, giving it a reversely rotary angular movement of substantially one hundred and eighty degrees in each direction. It is understood, of course, that such movement of the agitator shaft takes place only when the rack bar 90 is in mesh with the agitator shaft pinion.

The bearing hole 89 of the rack bar, is placed at a considerable distance from the agitator shaft pinion 106, so that the direction of the force transmitted by the pitman 82 to the rack bar 90 closely approaches a direction tangent to the curvature of the rack bar. This arrangement insures a free running mechanism with low frictional power losses.

The driving of the agitator shaft may be controlled at will by simply rotating in one direction or the other, the pinion 100, which controls the position of the rack bar bearing member 93. The agitator shaft 42 provides a bearing member for the worm gear 78 and its associated eccentric 79, thus permitting a very compact arrangement of the elements of such a mechanism while, at the same time, eliminating several parts, such as the worm gear supporting shaft and its associated bearings which are customarily employed in such mechanisms.

The upper end of the rack bar shifting pinion 100, is received in a central opening of complementary form, provided by the segmental pinion 108. The segmental pinion 108, is securely held in place on the pinion 100 by means of the bolt 109, which screws into the pinion 100. The segmental pinion 108, is operatively geared to a shifting quadrant 110. This quadrant has gear teeth 111, which mesh with the gear teeth of the pinion 108.

The quadrant 110, is rotatably supported about the agitator shaft bearing member 112, and is held in position thereat by means of the plates or clips 113, integrally formed on the bearing member 112. A plurality of bolts 114 serve to hold the bearing member in place on the gear case cover 115. The shifting quadrant has an integrally formed arm 116, to which the shifting lever 28 is secured by means of the bolts 117.

The gear case cover 115 may be formed from a metal stamping with suitable openings for the agitator shaft bearing 112, and the segment shifting pinion 100. An annular bearing 118, is pressed out of the gear case cover for receiving and providing a bearing for the depending sleeve 119 of the segmental pinion 108. This pinion is also provided with a downwardly turned outer edge 120, which is provided for the purpose of retaining the packing ring 121 in place. The packing ring 121 is provided to prevent the escape of oil from the gear case at the bearing 118.

The gear case cover is formed with an outwardly turned edge 122, for engaging the correspondingly formed top edge 123 of the cast metal base of the gear case. A plurality of bolts 124, are used to secure the upper and lower portions of the gear case to each other. An annular ring 125, is welded to the under side of the gear case cover about an opening which is provided to receive the bearing member 112. The ring 125 is provided to strengthen and thicken the gear case cover at this point so that it may be drilled and tapped for receiving the bolts 114, provided to hold the bearing member 112 in place on the gear case cover.

The bearing member 112 is provided with an upstanding sleeve 135 which forms an annular cup for catching and retaining the small amount of oil or grease which may escape from either the packing material 127 provided to seal the shaft 42, or from the gear case itself, by way of the agitator shaft bearing.

Should an unusual amount of oil collect in the cup, the capillary attraction of the packing 127 will tend to take up some of it, while gravity also acts to return such oil to the gear case. If desired, the cup may be packed with hard grease to better insure the lubrication of the shaft packing and the shaft bearing over an extended period of time and thus assist in preventing the escape of water from the tub and oil from the gear case.

The packing material 127 is retained in an exteriorly threaded cup-like die cast member 128, which is arranged to extend through a central opening provided in the bottom of the tub 1. The member 128 is held in position by means of an upper die-cast lock nut 129 and a lower die-cast internally threaded flanged cup 130, which engage with threads formed on the member 128 and they serve to clamp the tub between their opposite faces. Suitable gaskets 131 and 132 are used between tub and the nut 129 and the flange of the cup 130 to effect a liquid-tight seal at this point.

The packing material 127 is automatically maintained in the fluid-tight adjustment about the shaft 42, by means of a slidably fitted packing gland 133 and a flat spiral spring 134, which is interposed between the cup 130 and the gland 133.

The cup 130 and the inner face of the upwardly extending sleeve or collar 135 of the bearing member 112 are formed with a plurality of complementary flat sides or faces. The flat faces of the sleeve are indicated by the numeral 126. The cup 130 is loosely fitted in the sleeve 135 of the bearing member 112. The complementary flat sides of the cup 130 and the sleeve 135 cooperate with each other to prevent the nut from unthreading itself from the inner cup 128 and also serve to hold the cup from turning, thus facilitating the application or removal of the upper nut 129. The packing means just described, is supported entirely by the tub bottom and is free to move on the shaft which it seals to take care of irregularities in the fitting of the parts of the machine and to permit relative movement between the tub and the operating mechanism.

Should it ever be necessary to renew the packing material, the cup 128 can be readily removed through the tub bottom for this purpose without disturbing the rest of the machine.

The gear shifting pinion 108 and quadrant 110 and the agitator shaft bearing 112 may be constructed of die castings to eliminate a large number of machining and other finishing operations on such parts. The bearing member 93, for the rack bar 90 also may be constructed of a die casting.

A spiral groove 136 is formed on a portion of that part of the worm shaft 71, which is received in the bearing 74. One end of the spiral groove 136 is in contact with the oil in the gear case and during the rotation of the shaft, the spiral groove causes oil to be forced into the annular groove 137 which is cut in the shaft at the opposite end of the spiral groove. The bearing 74 is drilled at a point opposite to the annular groove 137 for the reception of the oil pipe 138. This pipe communicates with the annular groove 137 and conducts oil therefrom to the top surface of the member 93.

The web 139 of the member 93 is located on a lower level than the marginal edges of this member and thus provides a shallow open container which is capable of holding considerable amount of lubricant. A channel 140, is cut in the top of the C shaped guideway 96 for its lubrication. The rack bar is notched at 141 for the escape of oil from the guideway to the depression 142, provided in the rack bar. Oil from the depressed part of the rack bar flows over the agitator pinion 106 by way of the notch 143.

In this manner a combined gravity and force-feed lubrication system is provided for the working parts of the machine and a very small amount of oil in the gear case will effectively lubricate all of the mechanism in the gear case.

The worm shaft 71 extends through the gear case at the bearing 74 and is there connected to a horizontal drive shaft 144, by means of a universal joint 145. The universal joint is provided with a cover 146 for retaining a supply of grease about the joint. The opposite end of the drive shaft 144 is connected by means of a similar universal joint 147 to the wringer worm shaft 148. This joint is also provided with a dirt excluding and grease retaining cover 149.

A spring 150 is carried in one end of the connecting shaft 144 to take up the end play and prevent the vibration of the shaft when it operates. A channel or trough-shaped guard 151 is supported beneath the shaft 144. This guard extends a distance beyond the ends of the shaft and serves to catch the oil that might escape from the bearings beneath which it is positioned, as well as providing a guard for the shaft 144.

The worm shaft 148 is journaled in a ball bearing 152 and a plain bearing 153, which is formed in the wringer drive gear case 154. The shaft 148 is provided with a worm 155, which is rigidly fixed thereon at a point intermediate the ends of the shaft. An oil seal 156 prevents the escape of oil from about the bearing 152. The worm 155 engages a worm gear 157, which is mounted on the shaft 158, for rotation about a vertical axis.

The worm gear shaft 158 is journaled at its lower end in a bearing 159 which is formed in the gear case 154. A cover 160 is secured to the top of the gear case by means of the bolts 161. The cover is formed with a bearing 162 for the upper part of the worm gear shaft 158. The cover is secured to the machine base 6 by the bolts 163, which pass through holes formed in the laterally projecting ears 164 of the cover.

The worm gear 157 is pinned to its shaft 158. The upper end of the shaft 158 is coupled to the wringer drive shaft 165, by means of a detachable coupling 166. The wringer column 167 is received at its lower end in the cover 160 and at its upper end in the wringer supporting collar 5. The collar 5 is notched at 168 to receive the locking lever 35, which is pivotally mounted at 169 on the wringer gear case 170.

The base 7 of the machine is formed from a steel stamping and it is provided with a depressed portion 171, for the purpose of strengthening and stiffening it. The base 7 is provided at its outer edge with a downwardly extending skirted portion 172. The central part of the base is formed with an upstanding wall 173, which defines an opening through which the gear case cover 115 projects. By reason of this construction, a very rigid, yet light weight base is provided.

A plurality of threaded nuts 174 and 175 are riveted to the base for the purpose of receiving the bolts which are used to secure the washer gear case and the legs of the machine to the base. The ends of the nuts 174 are ground down to the proper height after they have been riveted to the base to insure the accurate fitting of the gear case.

The lower half of the base 46, of the agitator driving mechanism gear case, is provided with three ears 176, upon which are formed the pads 177. These pads are ground level with the top of the gear case and are drilled at 178 for the reception of the bolts by means of which the gear case is secured to three nuts 174, which are carried by the stamped metal base 7.

The skirt 172 of the base is pierced for receiving the leg securing rivets 176, one of which is provided for each of the legs. The legs are of stamped metal construction.

The top of the legs rest against the underside of the riveted nuts 175, and they are secured to the base at these points by suitable bolts which are received by the nuts 175. The leg rivets and leg bolts serve principally to hold the legs in position and do not carry any substantial part of the weight of the machine; and for this reason they are not apt to become loosened in the use of the machine.

The vertical pin 179, of the caster 9, is carried in a bearing member 180, which is received in the lower end of the legs. The bearing member 180 is held in position by crimping the edge portions 181 of the legs into a depression 182, formed in the bearing member 180, thus providing a strong and inexpensive form of securement for the caster bearing.

The motor 4 is controlled by a toggle switch 183, actuated by the operating lever 28. The switch 183 is operated by a spring (not shown) in one direction and by the lever 28 in the opposite direction; thus, when the lever 28 is shifted upwardly, as viewed in Figure 2, the switch closes and starts the motor, and when the lever is shifted downwardly, the lever 28 engages the switch to break the circuit.

The operating lever 28 works in a slot 184, provided by the plate 185, which is secured by the bolts 186 in position over the slot 187, and which is formed in the skirt 172 of the base. The plate 185 is laterally adjustable for adjusting the position of the lever 28, when the stops 188 and 189 of the quadrant 110 and segmental pinion 108 have been adjusted or filed down, to compensate for wear between the agitator shaft pinion 106 and its driving rack bar 90. The plate 185 is provided with three notches 190 and 191 and 192, formed in one side of the slot 184 for locking the operating lever 28 in its off position, motor operating position and washing position respectively.

The switch 183 and its control means are shown in detail and claimed in copending application for U. S. Letters Patent Serial No. 619,505 filed by Paul E. Frantz on June 27, 1932.

The base member 1, has a circular hole punched out at 193, and another hole in its skirt at 194, for receiving the tub drain valve. This valve is in the form of an L shaped fitting 195, which has an internally threaded side opening 196, for receiving the threaded valve plug 23. The valve plug co-operates with a valve seat 197, integrally formed with the fitting.

The outer end of the fitting is threaded at 198, for receiving the coupling 199 of the hose 24. The other end of the fitting 195 is threaded at 200, to permit its connection to the elbow 201. The upper end of the elbow is formed with a flange 202, and has an internally threaded hexagonal end portion 203, which is received in a hexagonal hole 204 provided in the tub bottom.

A threaded strainer 205 is screwed into the elbow 201 to hold it in place on the tub. Gaskets 206, are positioned between the tub and the strainer and the flange of the elbow, to provide a leak-tight joint at this point. The valve is braced by means of a plate 207, which closely fits the L fitting 195 and which is secured to the skirt 172 by the bolts 208.

Furthermore it is to be understood that the particular forms of apparatus shown and described, and the particular procedure set forth are presented for the purposes of explanation and that various modifications of said apparatus and procedure can be made without departing from our invention as described in the appended claims.

Having thus described our invention, what we claim is:

1. In a laundry machine, a casing for holding liquid and articles to be washed, washing means in said casing, power operated gearing for driving said washing means, a supporting structure for said casing and gearing having an annular marginal portion, and control mechanism for connecting and disconnecting said gearing to said washing means comprising, a rotatable member operatively associated with said gearing, a gear on one end of said member, a second gear meshing therewith and rotatable about a vertical axis located centrally of said supporting structure, and lever means for rotating said second gear having an operating handle projecting beyond the marginal portion of said supporting structure.

2. In a laundry machine, a liquid container, laundering instrumentalities in said container, a support for said container, operating mechanism carried by said support including a rotatable shaft operably associated with said laundering instrumentalities and traversing a wall of said container, said shaft being held against movement in an axial direction, and sealing means for said shaft at the place where it traverses the wall of said container comprising shaft-engaging packing material, a packing gland therefor and securement means for said gland accessible from the interior of said tub whereby said gland and the packing material therein may be removed from the machine by way of the interior of said tub, said sealing means being supported solely by the wall of said container so that the container wall is free to move axially of said shaft and relatively thereto.

3. In a laundry machine, a liquid container, laundering instrumentalities in said container, a support for said container, operating mechanism, a case for said mechanism fixedly secured to said support, said mechanism having a rotatable shaft operably associated with said laundering instrumentalities and traversing a wall of said container, said shaft being held against movement in an axial direction, and sealing means for said shaft at the place where it traverses the wall of said container comprising shaft-engaging packing material, a packing gland therefor and securement means for said gland accessible from the interior of said tub whereby said gland and the packing material therein may be removed from the machine by way of the interior of said tub, said sealing means being supported solely by the wall of said container so that the container wall is free to move axially of said shaft and relatively thereto.

4. In a washing machine, a washing tub for containing both clothes and a detergent liquid, agitating means in said tub for effecting the washing operation, a driving shaft for operating said means extending through a wall of said tub, operating means for said shaft, a supporting base for said operating means and said tub, a seal for said shaft carried by the wall of said tub, means for securing said seal to the wall of said tub comprising a threaded member inside of said tub and a threaded member outside of said tub, and means rigid with said supporting base for securing said last named member against rotation, said last named means loosely engaging said outer threaded member whereby it is free to move axially of said shaft.

5. In a washing machine, a washing tub for containing both clothes and a detergent liquid, agitating means in said tub for effecting the washing operation, a driving shaft for operating said means extending through a wall of said tub, operating means for said shaft, a supporting base for said operating means and said tub, a seal for said shaft carried by the wall of said tub, means for securing said seal to the wall of said

tub comprising a member inside said tub threadably connected to a member outside said tub, and means rigid with said supporting base for securing said last named member against rotation, said last named means loosely engaging said outer threaded member whereby it is free to move axially of said shaft.

6. In a washing machine, a washing tub for containing both clothes and a detergent liquid, agitating means in said tub for effecting the washing operation, a driving shaft for operating said means extending through a wall of said tub, operating means for said shaft, a supporting base for said operating means and said tub, a seal for said shaft carried solely by the wall of said tub, means for securing said seal to the wall of said tub comprising a member inside said tub threadably connected to a member extending outside said tub, said members having wrench engaging flat sides, and a socket member for receiving the wrench engaging portion of the member rigid with said base which is outside the tub for holding the same against rotation.

7. In a washing machine, a washing tub for containing both clothes and a detergent liquid, agitating means in said tub for effecting the washing operation, a driving shaft for operating said means extending through a wall of said tub, operating means for said shaft, a supporting base for said operating means and said tub, a seal for said shaft carried solely by the wall of said tub, means for securing said seal to the wall of said tub comprising a member inside said tub threadably connected to a member extending outside said tub, said members having wrench engaging flat sides, and a socket member rigid with said base and being of complementary form to the wrench engaging portion of the member which is outside the tub for receiving and holding the same against rotation.

8. In a washing machine, a washing tub for containing both clothes and a detergent liquid, agitating means in said tub for effecting the washing operation, a driving shaft for operating said means extending through a wall of said tub, operating means for said shaft, a supporting base for said operating means and said tub, a seal for said shaft carried solely by the wall of said tub, means for securing said seal to the wall of said tub comprising a member inside said tub threadably connected to a member extending outside said tub, said members having wrench engaging flat sides, and a socket member rigid with said base loosely receiving the wrench engaging portion of the member which is outside the tub for holding the same against rotation.

9. In a laundry machine, a liquid container, a support for said container, laundering instrumentalities in said container, operating mechanism, a gear case for said mechanism carried by said support beneath said container, said operating mechanism including a shaft projecting from the gear case and extending through the bottom of said container, said gear case having a cup surrounding said shaft at the point where it emerges from said gear case, and a seal for said shaft sealed to the bottom of said tub and projecting loosely into said cup said seal being held against rotation by said cup.

10. In a laundry machine, a support, a liquid container carried by said support, laundering instrumentalities in said container, and operating mechanism for said laundering instrumentalities carried by said support, said operating mechanism including a gear case and a projecting shaft traversing the bottom of said container and operably connected to said laundering instrumentalities and also a cup carried by the top of said gear case and surrounding said shaft to provide a receptacle for oil escaping from the gear case by way of said shaft and a seal for said shaft extending into said cup where it is in position to be lubricated by oil carried in the cup.

11. In a laundry machine in combination, a liquid container, a support for said container, laundering instrumentalities in said container, operating mechanism for said laundering instrumentalities comprising a gear case and a shaft extending from said gear case and connected to said laundering instrumentalities, said shaft traversing the bottom of said container, sealing means for said shaft at the point where it traverses the bottom of said container, and a cup surrounding the said shaft and carried at the top of said gear case, said sealing means having a part with prismatic sides extending into said cup where it is engaged by complementary sides formed in said cup.

12. In a laundry machine, in combination, a support, a liquid container carried by said support, laundering instrumentalities in said liquid container, operating mechanism for said laundering instrumentalities carried by the underside of said support, said operating mechanism including a gear case and a projecting shaft traversing the bottom of said container and connected to said laundering instrumentalities, sealing means for said shaft at the place where it enters said container, and a bearing member for said shaft carried by the top of said gear case, said bearing member being surrounded by a cup in which the bottom of said sealing means is received whereby liquids escaping from the gear case at the shaft bearing or liquids escaping from the container at the shaft seal will be caught and collected in said cup.

13. In a laundry machine, in combination, a support, a liquid container carried by said support, laundering instrumentalities in said container, operating mechanism for said laundering instrumentalities including an operating shaft traversing the bottom of said casing, shaft sealing means sealed to the bottom of said container, supported solely thereby and having an aperture for the reception of said shaft, said sealing means having soft packing in engagement with said shaft and also having means accessible from the interior of the tub for adjusting the packing means, and means rigid with said support loosely engaging a part of said sealing means for preventing its rotation.

14. In a laundry machine, a liquid container, laundering instrumentalities in said container, an operating shaft for said laundering instrumentalities traversing the wall of said container, and means for sealing said shaft at the point where it traverses the container wall carried solely by such wall, said sealing means comprising a pair of oppositely disposed nested cups the bottoms of which are located inside and outside said tub, packing means carried inside of said cups and means accessible from the interior of the container for adjusting one of said cups with respect to the other and for securing said cups to the container wall.

15. In a laundry machine, in combination, a support, a liquid container carried by said support, laundering instrumentalities in said container, an operating shaft for said laundering instrumentalities traversing an aperture in the wall of said container, shaft sealing means carried solely by the wall of said container for preventing

the escape of liquid from the container at the point where the shaft traverses the wall of said container comprising packing means in engagement with the shaft and retaining means for said packing means arranged to permit removal of the packing from inside said container without removing said shaft, and means rigid with said support loosely engaging a part of said sealing means for preventing its rotation.

16. In a washing machine, a washing tub for containing both clothes and a detergent liquid, agitating means in said tub for effecting the washing operation, a driving shaft for operating said means extending through a wall of said tub, operating means for said shaft, a supporting base for said operating means and said tub, a seal for said shaft carried by the wall of said tub, means for securing said seal to the wall of said tub comprising a threaded member inside of said tub and a threaded member outside of said tub, and means for securing said last named member against rotation, said last named means loosely engaging said outer threaded member whereby it is free to move axially of said shaft.

17. In a laundry machine, a supporting structure having an annular marginal portion, a casing having a compartment for containing liquid and articles to be washed carried by said supporting structure, agitating means in the compartment of said casing, operating mechanism carried by said structure and arranged to be connected and disconnected in driving relation with said agitating means, a control lever for effecting such connection and disconnection, said control lever being pivoted for movement about a vertical axis located substantially centrally of the compartment of the casing, and an operating handle for said lever extending beyond the annular marginal portion of said supporting structure.

18. In a laundry machine, a casing having an annular side wall portion for holding liquid and articles to be washed, said side wall portion defining a surface of revolution about a vertical axis, washing means in said casing, power-operated gearing for driving said washing means, a supporting structure for said casing and gearing, and control mechanism for connecting and disconnecting said gearing to said washing means comprising a member journaled for movement in a horizontal plane about the axis of the annular side wall portion of said casing, movement compounding means connecting said member to said gearing and an operating handle for said member projecting radially beyond the annular side wall of said casing.

19. In a laundry machine, a casing having an annular side wall portion for holding liquid and articles to be washed, said side wall portion defining a surface of revolution about a vertical axis, washing means in said casing, power-operated gearing for driving said washing means, said gearing having an exteriorly located bearing member, a supporting structure for said casing and gearing, and control mechanism for connecting and disconnecting said gearing to said washing means comprising a member journaled on said exteriorly located bearing for movement in a horizontal plane about the axis of the annular side wall portion of said casing, movement compounding means connecting said member to said gearing and an operating handle for said member projecting beyond the annular side wall portion of said casing.

20. In a laundry machine, a casing for holding liquid and articles to be washed, said casing having an annular side wall formed as a surface of revolution about a vertical axis, washing means in said casing, power-operated gearing for driving said washing means including a driving shaft traversing the bottom of said casing and coaxial with the vertical axis thereof, a supporting structure for said casing and gearing, and control mechanism for connecting and disconnecting said gearing to said washing means comprising, a lever journaled for movement about the axis of said shaft and an operating handle therefor extending radially beyond the lower portion of the side wall of said casing.

WALTER A. FRANTZ.
JOHN J. McCABE.

CERTIFICATE OF CORRECTION.

Patent No. 2,052,392. August 25, 1936.

WALTER A. FRANTZ, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 7, first column, lines 21 and 22, claim 6, strike out the words "rigid with said base and insert the same after "member" in line 20, same claim; line 67, claim 9 after "cup" insert a comma; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 15th day of December, A. D. 1936.

Henry Van Arsdale

(Seal) Acting Commissioner of Patents.

the escape of liquid from the container at the point where the shaft traverses the wall of said container comprising packing means in engagement with the shaft and retaining means for said packing means arranged to permit removal of the packing from inside said container without removing said shaft, and means rigid with said support loosely engaging a part of said sealing means for preventing its rotation.

16. In a washing machine, a washing tub for containing both clothes and a detergent liquid, agitating means in said tub for effecting the washing operation, a driving shaft for operating said means extending through a wall of said tub, operating means for said shaft, a supporting base for said operating means and said tub, a seal for said shaft carried by the wall of said tub, means for securing said seal to the wall of said tub comprising a threaded member inside of said tub and a threaded member outside of said tub, and means for securing said last named member against rotation, said last named means loosely engaging said outer threaded member whereby it is free to move axially of said shaft.

17. In a laundry machine, a supporting structure having an annular marginal portion, a casing having a compartment for containing liquid and articles to be washed carried by said supporting structure, agitating means in the compartment of said casing, operating mechanism carried by said structure and arranged to be connected and disconnected in driving relation with said agitating means, a control lever for effecting such connection and disconnection, said control lever being pivoted for movement about a vertical axis located substantially centrally of the compartment of the casing, and an operating handle for said lever extending beyond the annular marginal portion of said supporting structure.

18. In a laundry machine, a casing having an annular side wall portion for holding liquid and articles to be washed, said side wall portion defining a surface of revolution about a vertical axis, washing means in said casing, power-operated gearing for driving said washing means, a supporting structure for said casing and gearing, and control mechanism for connecting and disconnecting said gearing to said washing means comprising a member journaled for movement in a horizontal plane about the axis of the annular side wall portion of said casing, movement compounding means connecting said member to said gearing and an operating handle for said member projecting radially beyond the annular side wall of said casing.

19. In a laundry machine, a casing having an annular side wall portion for holding liquid and articles to be washed, said side wall portion defining a surface of revolution about a vertical axis, washing means in said casing, power-operated gearing for driving said washing means, said gearing having an exteriorly located bearing member, a supporting structure for said casing and gearing, and control mechanism for connecting and disconnecting said gearing to said washing means comprising a member journaled on said exteriorly located bearing for movement in a horizontal plane about the axis of the annular side wall portion of said casing, movement compounding means connecting said member to said gearing and an operating handle for said member projecting beyond the annular side wall portion of said casing.

20. In a laundry machine, a casing for holding liquid and articles to be washed, said casing having an annular side wall formed as a surface of revolution about a vertical axis, washing means in said casing, power-operated gearing for driving said washing means including a driving shaft traversing the bottom of said casing and coaxial with the vertical axis thereof, a supporting structure for said casing and gearing, and control mechanism for connecting and disconnecting said gearing to said washing means comprising, a lever journaled for movement about the axis of said shaft and an operating handle therefor extending radially beyond the lower portion of the side wall of said casing.

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