April 16, 1940. J. MIKULASEK 2,197,559

OPERATING MECHANISM FOR WASHING MACHINES

Filed Sept. 17, 1936 3 Sheets-Sheet 1

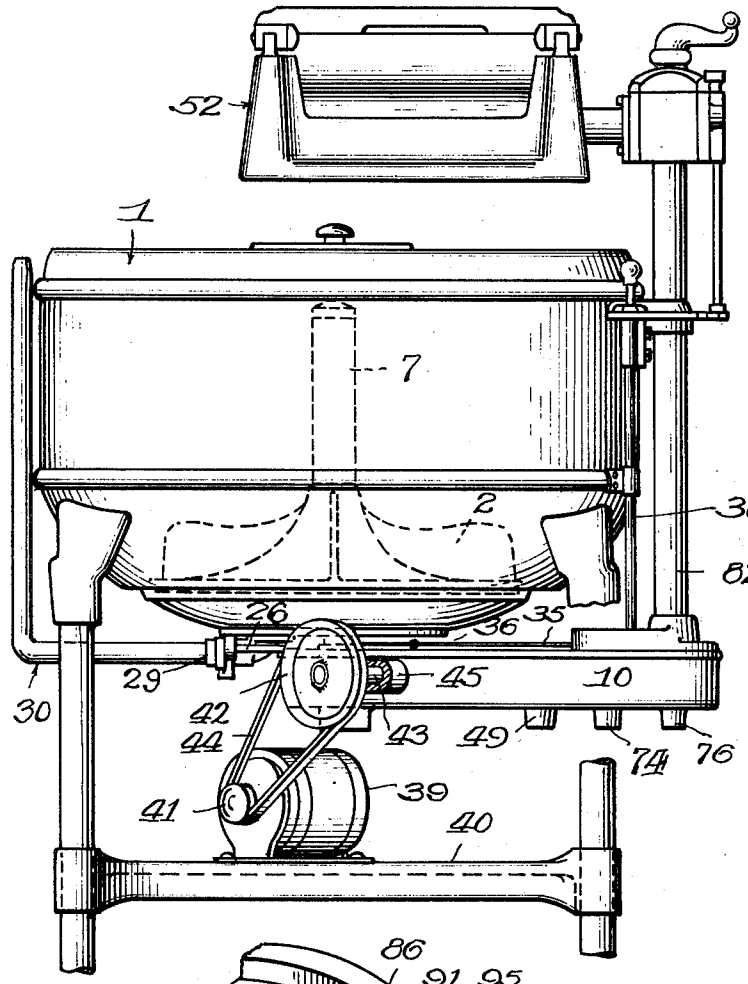


Fig. 1

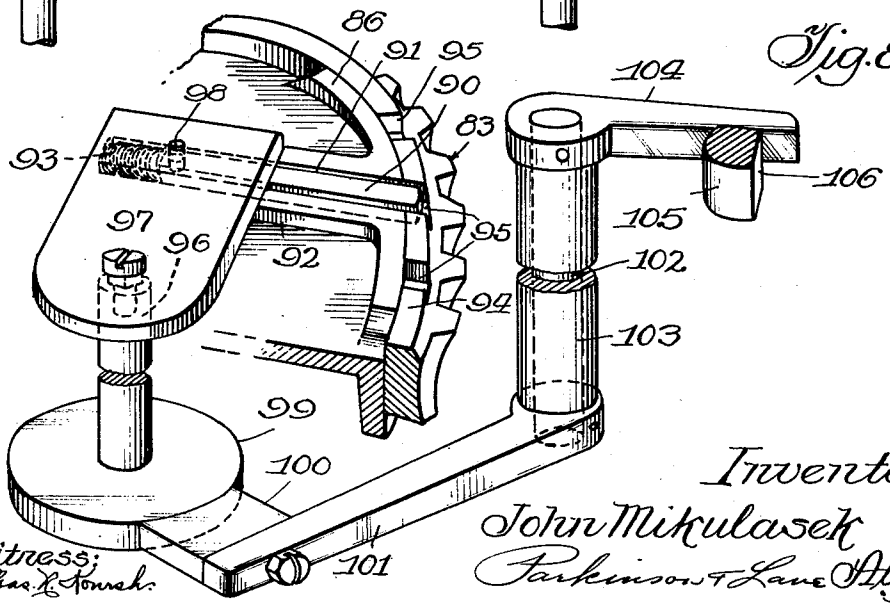


Fig. 8

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OPERATING MECHANISM FOR WASHING MACHINES

Filed Sept. 17, 1936 3 Sheets-Sheet 2

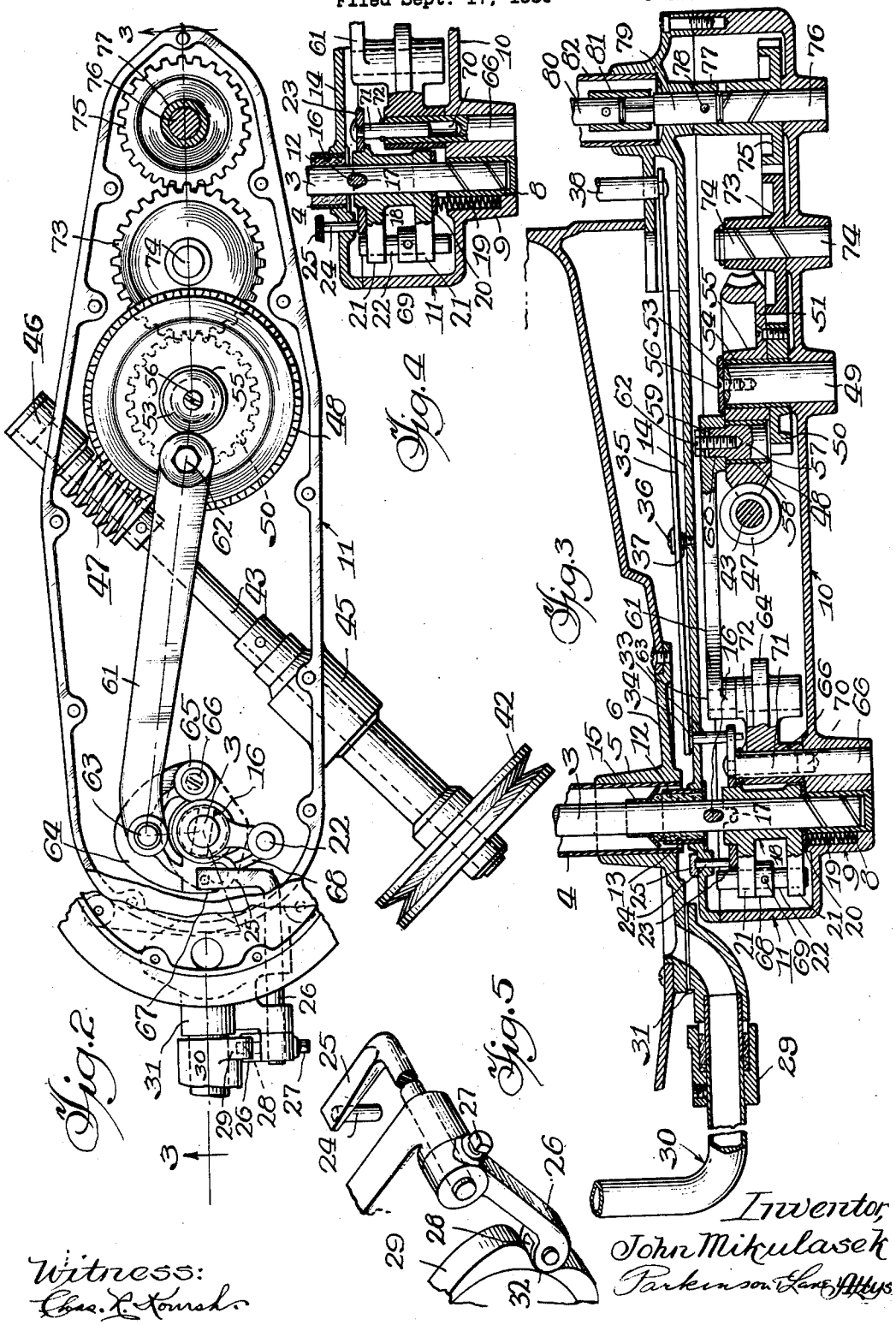


Fig. 2

Fig. 3

Fig. 4

Fig. 5

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OPERATING MECHANISM FOR WASHING MACHINES

Filed Sept. 17, 1936 3 Sheets-Sheet 3

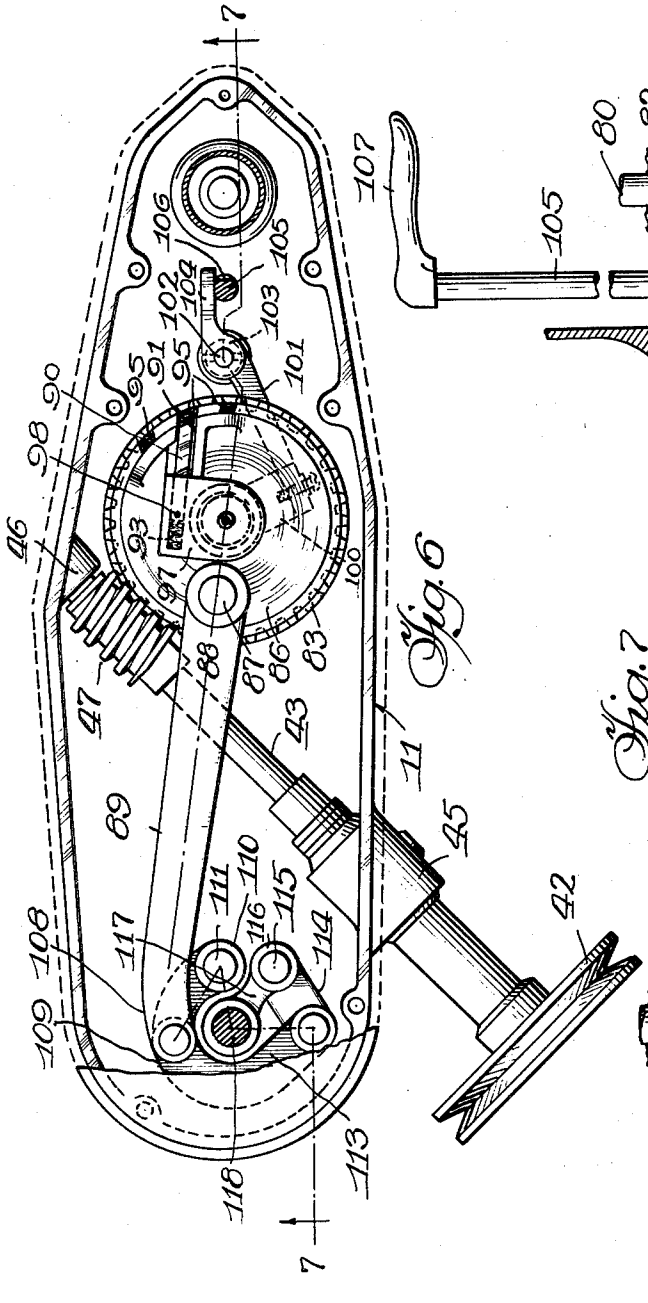


Fig. 6

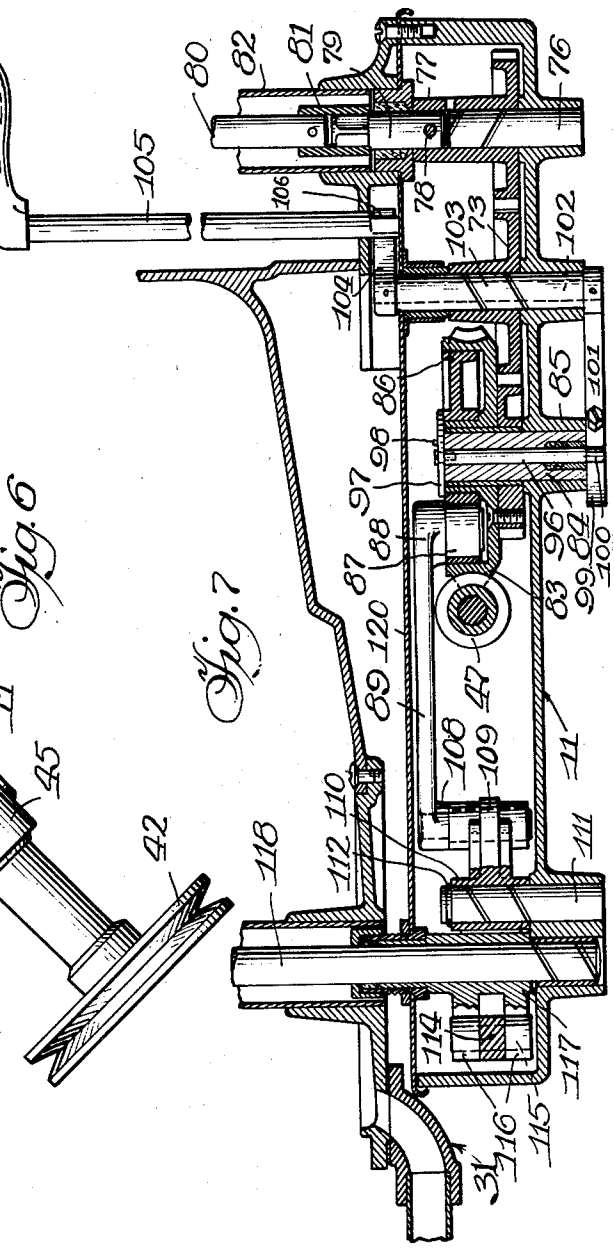


Fig. 7

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UNITED STATES PATENT OFFICE

2,197,559

OPERATING MECHANISM FOR WASHING MACHINES

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Application September 17, 1936, Serial No. 101,188

3 Claims. (Cl. 74—75)

The present invention relates to washing machines and more particularly to a novel operating mechanism, including a link drive for rapidly oscillating the agitator shaft and novel means for clutching and declutching the agitator shaft with the drive mechanism.

Among the objects of the present invention is to provide a novel drive mechanism for rapidly oscillating the agitator shaft. In the disclosed embodiment, the drive mechanism includes a series or system of links so related as to produce a whipping action which is transmitted to the agitator for violently throwing the water in opposed gyratory paths through and around the clothes while they are carried by and substantially suspended in the washing fluid.

A further object is to provide a novel power unit and drive mechanism for a washing machine, and novel means and mechanism for clutching and declutching the power unit with the agitator or impeller.

A still further object is to provide a novel clutch mechanism for readily connecting or disconnecting the agitator drive shaft with the power unit or drive mechanism.

Another object of the present invention is to provide a novel drain for discharging the washing fluid from the tub, this drain being preferably so constructed and arranged that a turning or shifting thereof actuates the mechanism for clutching and declutching the power unit with the washing mechanism, and when the drain is moved or turned to a position for discharging the washing liquid from the tub, the power unit is retained in declutched position.

A further object is to provide novel means and mechanism for shifting the operating parts of the drive unit into clutched and declutched position.

A still further object of the invention is to provide a novel combination of power unit or drive mechanism and drain in which the latter is adapted to not only drain or discharge the washing fluid from the tub, but also forms the means for actuating the clutch which in turn connects the power unit with the agitator or operating shaft.

Further objects, advantages, capabilities, features and constructions are comprehended by the invention as will later more fully appear and as are inherently possessed thereby.

In the drawings:

Fig. 1 is a view in side elevation of a washing machine equipped with the novel operating mechanism.

Fig. 2 is a top plan view of the operating mechanism.

Fig. 3 is a view in vertical cross section taken through the tub and on the line 3—3 of Fig. 2.

Fig. 4 is a view in vertical cross section of a portion of the drive mechanism shown in Fig. 3, but with the parts in clutching relation.

Fig. 5 is a fragmentary view in perspective of the clutch shifting or operating mechanism.

Fig. 6 is a view similar to Fig. 2, but of an alternate form of drive mechanism.

Fig. 7 is a view in vertical cross section taken on the irregular line 7—7 of Fig. 6.

Fig. 8 is a fragmentary view in perspective of an alternate construction of clutch operating mechanism.

Referring to the disclosure in the drawings, the embodiment of the invention is mounted on a washing machine having a tub 1 in which an agitator or impeller 2 is mounted for oscillation or reciprocation. The agitator or impeller is suitably driven by and connected to the upper end of a shaft 3 rotatable within a sleeve 4 secured in the boss 5 provided on the base plate 6 of the tub. It is to be understood that the center post 7 of the agitator encompasses and rotates or oscillates upon the sleeve 4 which is held stationary in the boss 5.

In the disclosure in Figs. 1 to 5 inclusive of the drawings, the lower end of the agitator drive shaft 3 is mounted in a step bearing 8 in the boss 9 of the lower section 10 of the casing 11 housing the drive mechanism. In order to seal the drive mechanism against the leakage of water, oil, etc., there is provided a cork oil seal 12 encased within a sleeve 13 pressed in the upper section 14 of the casing 11, and a water shedding or deflecting member 15 pressed onto the shaft and adapted to deflect any water, etc., which may get into the space between shaft 3 and sleeve 4.

Upon the agitator shaft is mounted a clutch-pin 16 adapted to engage in notches 17 formed in the upper face of the clutch member 18. This member is slidable upon the shaft and normally retained in clutching position by means of one or more springs 19 seating against the lower face plate 20 and exerting force thereagainst tending to move the clutch member into an engaged position.

In order to declutch the drive mechanism, the clutch member 18 is provided with widely spaced arms or bifurcations 21, 21, slidable upon a hinge pin 22. Upon the member 18 is mounted a shifter yoke 23 adapted when depressed, to lower the clutch member 18 and disconnect it from the agi-

tator shaft. A plunger 24 seats upon the plate or yoke 23 and is adapted to be depressed by means of a lever 25 fixed or keyed upon a lever arm 26 by means of a set screw or the like 27. The outer end of this lever arm carries a roller 28 adapted to ride upon a cam 29 keyed or locked upon a horizontal part of an L-shaped drain hose 30 communicating with the tub drain 31.

The cam is formed with a depression or well 32 and when the follow-up roller 28 seats therein, the plunger 24 is released and the springs 19 force the clutch member 18 into clutching position. The location of and contour of the cam is preferably such that when the drain is in a vertical position, the plunger 24 is released, and when the drain is rotated in either of the two swinging directions through a small angle required for shifting, the plunger will be depressed as shown in Fig. 3, and when the drain is rotated through an angle of 90° or more to drain the tub by gravity, the plunger is again released and the clutch is retained in clutching position to let the machine run and allow the sediment to be stirred up and flushed out.

If desired, suitable auxiliary shifting means may be provided, or such auxiliary means may replace the one combined with the drain. This comprises a plunger 33 having its lower end reduced and seating in the shifter yoke or plate 23, and its upper end 34 extending outside of the casing 11 and engaged by a lever arm 35 fulcrumed upon a shoulder screw 36. This is accomplished by providing the lever with an opening to receive the screw 36. A spring 37 pressing against the undersurface of the lever, helps to release it when the lever is moved to an inoperative position by pushing the rod 38 downwardly and thereby raising the opposite end of the lever arm 35 to release the plunger 33, and at which time the springs 19 move the clutch member 18 into clutching position.

In order to oscillate the hinge pin 22, clutch member 21 and agitator shaft 3, the invention comprehends a novel drive mechanism. The initial drive comprises a motor or other power plant 39 mounted upon a base 40, having a pulley 41 driving a pulley 42 upon a drive shaft 43 by means of a belt or the like 44. This drive shaft rotates in the bearings or bosses 45 and 46 disposed in the opposite sides of the housing or casing 11.

Mounted upon the shaft 43 is a worn 47 meshing with and continuously driving a worm wheel 48 rotatably mounted upon a stud pin 49. This worm wheel carries a gear 50 fixed to its lower face 51 for driving the wringer 52, as will be later more fully explained. A plate 53 which overlaps the upper end of the stud pin 49, bearing sleeve or bushing 54, and hub 55 of the worm wheel, is attached to the stud pin by a screw or the like 56 and retains these members against vertical displacement, but permits the worm wheel to freely rotate.

A crank pin 57 is mounted in a bushing or sleeve 58 carried by the worm wheel. The upper end of this pin is reduced at 59 and seats in an opening or socket 60 formed in one end of a crank or connecting arm 61, and is connected thereto by a bolt or the like 62. The opposite end of the crank or connecting arm is pivotally mounted at 63 to an arcuate link or arm 64. This mounting is intermediate the ends of the arcuate arm, one end being in the form of a sleeve 65 pivotally connected to a stationary stud pin 66 mounted in the boss 9. The other end 67 is pivotally connected to one end of a link 68, the other end of this link being pinned or connected at 69 to the hinge pin 22.

As disclosed in Fig. 3, the stud pin 66 is hollow at 70 to receive the sliding guide stem 71 of the plate or shifter yoke 23 while a snap spring ring 72 locks the sleeve 65 forming one end of the arcuate arm 64, against longitudinal movement on the stud pin.

The gear 50 meshes with and continuously rotates a gear 73 mounted upon a stud pin 74, and this latter gear in turn meshes with and rotates a gear 75 mounted upon a stud pin 76. The hub 77 of the gear 75 is connected at 78 to a stub shaft or drive extension 79 adapted to drive the wringer shaft 80 through a coupling 81. A sleeve 82 preferably encloses the wringer shaft.

In Figures 6, 7 and 8, there is disclosed an alternate form of drive mechanism in which the clutching means is located on the worm gear rather than on the agitator shaft. In this form, the worm 47 meshes with and drives the worm wheel 83 rotatably mounted on a stud pin 84 fixed in the boss 85 in the base of the casing 11. The worm wheel is hollowed out to receive an annular clutch member or crank disc 86 adapted to be clutched to and rotated by the worm wheel 83. This member carries a crank pin 87 to which is attached one end 88 of a crank or connecting rod 89.

In order to lock or clutch the crank disc or clutch member 86 to the worm wheel 83, the clutch member carries a latch-bar 90 slidable in a slot 91 provided in a web 92 of the disc. A spring 93 seats against the inner end of this latch-bar and tends to force the bar outwardly and into locking or clutching engagement with the worm gear. For this purpose, the rim 94 of the worm gear is preferably provided with one or more indexing notches 95 adapted to receive the latch-bar. This engagement only occurs when the agitator 2 is to be operated.

In order to retract the latch-bar or bolt 90, the stationary stud pin 84 is made hollow to receive a rotatable stud shaft 96 which carries at its upper end a plate 97 provided with a crank pin 98 that engages in an opening in the latch-bar and is adapted to retract the latch-bar when it is desired to stop the agitator.

This stub shaft carries at its lower end a friction wheel 99 adapted to be acted on by the friction brake shoe 100 carried by a rocker arm 101 mounted upon a rocker shaft 102 rotatably mounted in a stationary stud pin 103. An arm 104 is pinned to the upper end of the rocker shaft 102 and is adapted to be moved by means of a shifter rod 105 through contact of the cam-faced end 106 engaging this arm. Thus as the shifter rod is turned by the handle 107 from "off" to "on" positions, the cam-faced end acts on the arm 104 and moves it to release the brake shoe 100 from the friction wheel 99 on the stub shaft 96. At such time, the spring 93 moves the latch-bar or bolt 90 into locking or clutching engagement with the worm wheel 83, and this worm wheel then rotates the crank disc or clutch member 86.

In this form of the invention, the crank or connecting rod 89 has its other end 108 connected to an arcuate link or arm 109 intermediate its ends and which link or arm has one end in the form of a sleeve 110 rotatably mounted upon a stationary stud pin 111 and retained thereon by

a snap spring ring 112. The other end 113 is pivotally connected to a link 114 which is in turn pivotally carried by a hinge pin 115 mounted in the spaced bifurcations 116 of an arm 117 securely mounted upon the agitator shaft 118. A housing or casing 119 having a cover 120 is adapted to encase or enclose the operating mechanism.

Due to the arrangement of the link mechanism for changing the continuous rotation of the worm wheel into an oscillating motion and transmitting this motion to the agitator drive shaft, this shaft is moved through a cyclic movement or oscillation which is doubly accelerated and decelerated in its cycle of operation. At the beginning of the cycle, there is a substantially uniform but rapid acceleration while at the end of the stroke there is a substantially uniform but rapid deceleration. This produces a corresponding whipping of the agitator and fluid acted thereon to drive the washing fluid in violent, gyratory paths and thereby force the washing fluid through and around the clothes while they are in substantial suspension therein. Thus the clothes are thoroughly cleansed by the water action and without any substantial contact with or rubbing on, the agitator or interior of the tub.

Having thus disclosed the invention, I claim:

1. Operating mechanism for oscillating the agitator shaft of a washing machine, comprising a continuously rotated driving and driven member, a connecting rod eccentrically connected to the driven member, link mechanism joining the connecting rod and agitator shaft for changing the continuous rotation of the driving and driven members into an oscillatory movement for oscillating the agitator shaft at a rapid accelerated rate from the point of reversal to the mid point of the cycle and a rapid deceleration thereafter, said link mechanism comprising an arcuate link to which the other end of the connecting rod is pivotally mounted intermediate the ends of said arcuate link, one end of the arcuate link being secured against lateral movement but being permitted pivotal movement, an arm connected at one end to the free end of the link and a member having its one end pivotally connected to the other end of the arm and its free end slidably mounted on the agitator shaft, and clutching means on the agitator shaft and last mentioned member for clutching and declutching the link mechanism with the agitator shaft.

2. Operating mechanism for oscillating the agitator shaft of a washing machine, comprising a continuously rotated driving and driven member, a connecting rod eccentrically connected to the driven member, link members connected to the connecting rod and agitator shaft including a link member loose on the shaft and adapted to be moved vertically thereon, a pin projecting from the shaft, and indexing notches in the last mentioned link member adapted to receive the pin and thereby lock the link member directly to the shaft and oscillate the latter when the link member is raised into locked engagement.

3. Drive mechanism for oscillating the drive shaft of a washing machine, comprising a continuously rotating drive means, means for transforming the continuous rotation of the drive means into an oscillatory motion and including an oscillatory member slidable on the drive shaft, a pin projecting from the shaft, and a clutch face on the oscillatory member provided with a notch adapted to receive the pin when the oscillatory member is raised into clutching position for clutching the shaft and member so as to oscillate the shaft.

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