

Oct. 12, 1943.

J. B. KIRBY

2,331,699

COMBINED CLOTHES WASHER AND EXTRACTOR

Filed Oct. 24, 1939

3 Sheets-Sheet 1

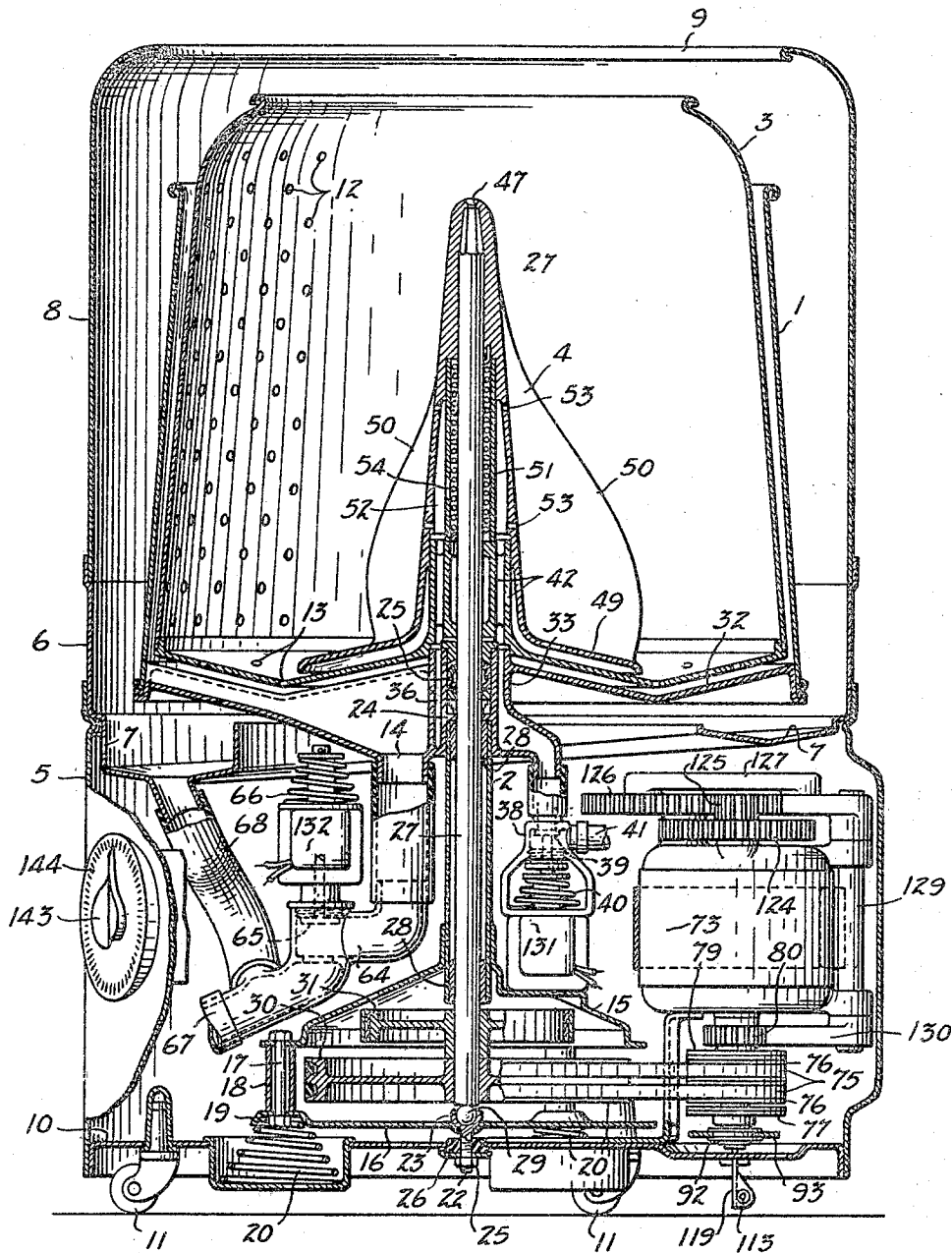


Fig. 1

INVENTOR
James B. Kirby
BY *Evans & McCoy*
ATTORNEYS

Oct. 12, 1943.

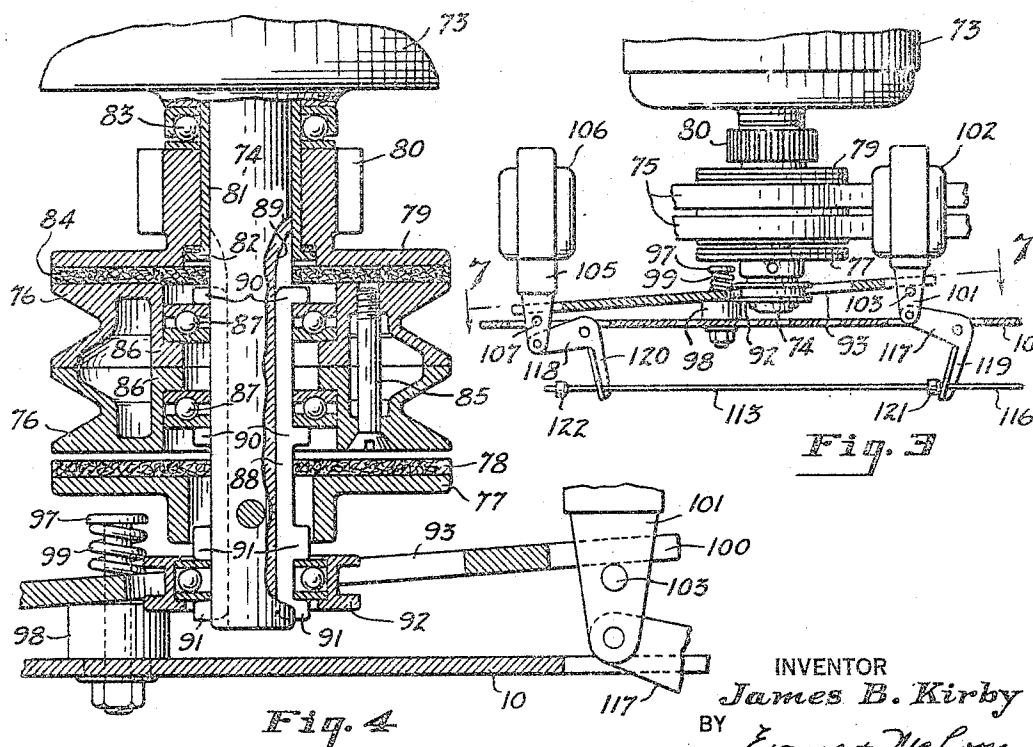
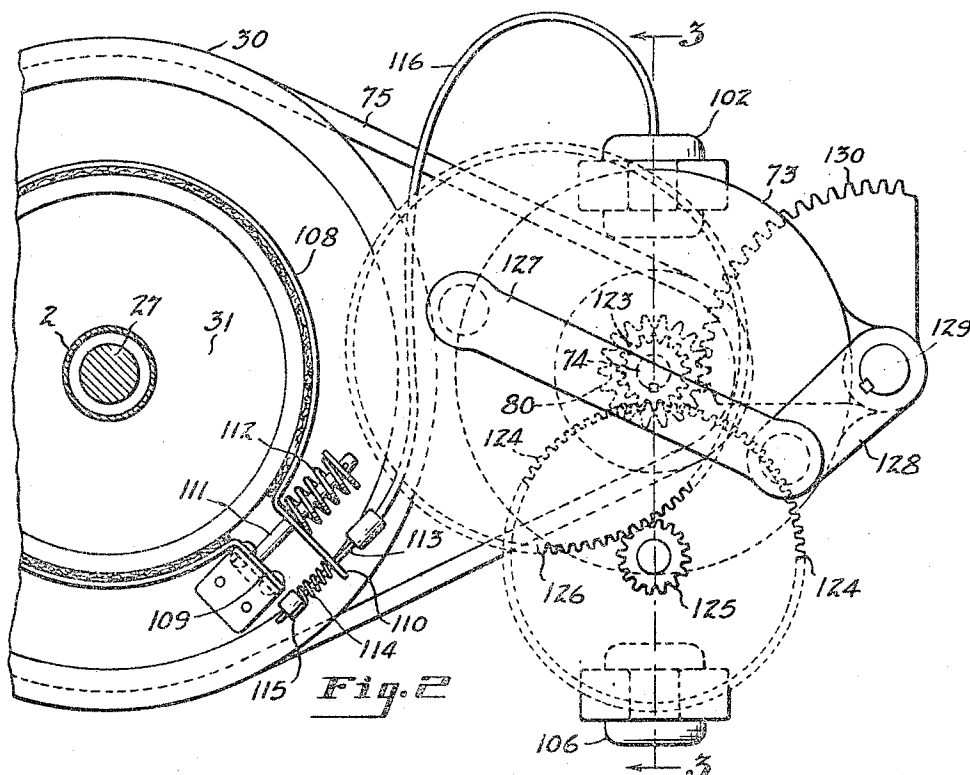
J. B. KIRBY

2,331,699

COMBINED CLOTHES WASHER AND EXTRACTOR

Filed Oct. 24, 1939

3 Sheets-Sheet 2



INVENTOR
James B. Kirby
BY *Evans & McCoy*
ATTORNEYS

Oct. 12, 1943.

J. B. KIRBY

2,331,699

COMBINED CLOTHES WASHER AND EXTRACTOR

Filed Oct. 24, 1939

3 Sheets-Sheet 3

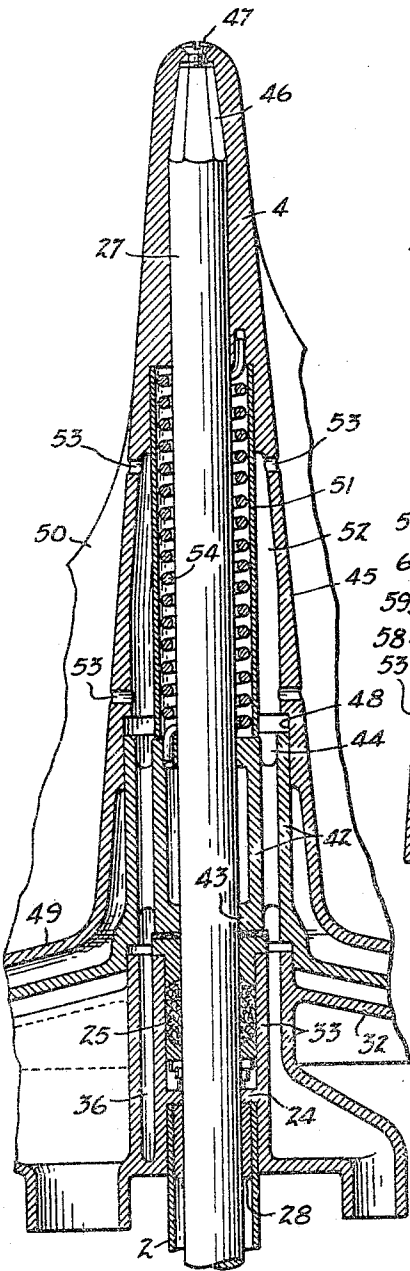


Fig. 5

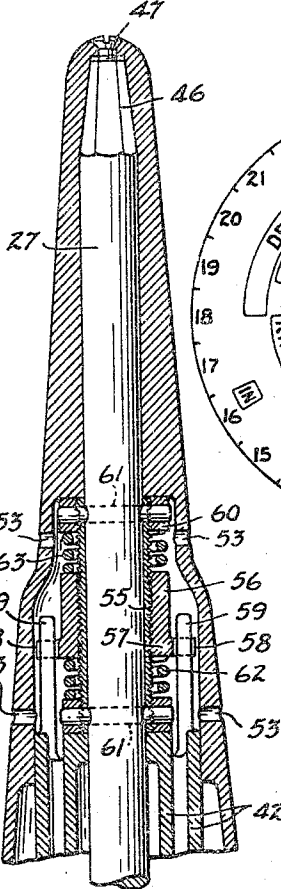


Fig. 6

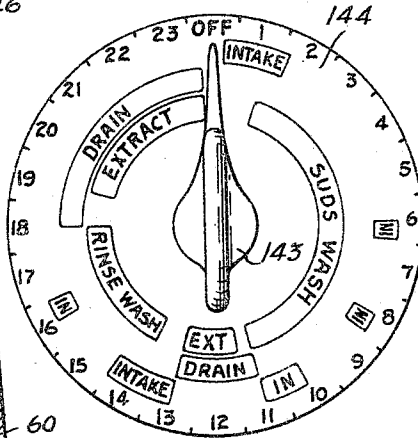


Fig. 9

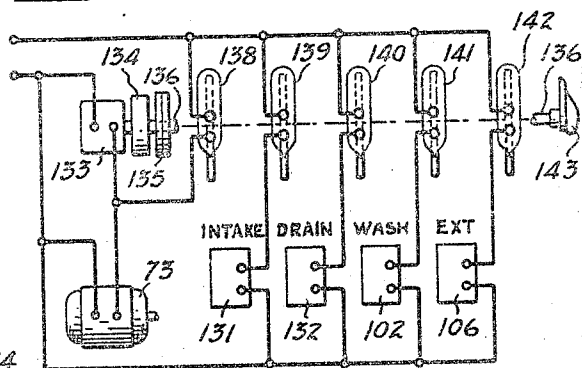


Fig. 8

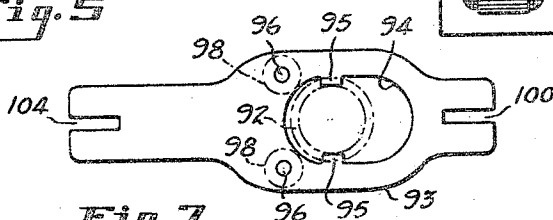


Fig. 7

INVENTOR
James B. Kirby
BY
Evans & Mc Coy
ATTORNEYS

UNITED STATES PATENT OFFICE

2,331,699

COMBINED CLOTHES WASHER AND
EXTRACTOR

James B. Kirby, West Richfield, Ohio, assignor
to The Apex Electrical Manufacturing Com-
pany, Cleveland, Ohio, a corporation of Ohio,
as trustee

Application October 24, 1939, Serial No. 300,965

1 Claim. (Cl. 68—23)

This invention relates to clothes washing machines, and more particularly, to a machine capable of washing, rinsing, and drying a batch of clothes in a single container without manual manipulation of the clothes during the washing and rinsing and drying operation, the machine preferably being provided with a timer control for automatically starting and stopping the various operations in proper sequence.

A further object is to provide a clothes receptacle which is rotatable to extract liquid from the clothes, an agitator which is adapted to oscillate within the clothes receptacle, and a single shaft operatively connected to both the agitator and the clothes receptacle through which the agitator may be oscillated within the receptacle or both the agitator and the clothes receptacle may be simultaneously rotated.

A further object is to provide a resilient torque absorbing driving connection between the shaft and clothes receptacle which permits sufficient relative angular motion between the shaft and extractor receptacle to allow the oscillation of the shaft and agitator within the clothes receptacle without substantial movement of the clothes receptacle.

With the above and other objects in view the invention may be said to comprise the machine as illustrated in the accompanying drawings hereinafter described and particularly set forth in the appended claim, together with such variations and modifications thereof as will be apparent to one skilled in the art to which the invention pertains.

Reference should be had with the accompanying drawings forming a part of this specification in which

Figure 1 is a vertical axial section through a combined clothes washer and dryer which embodies the invention.

Fig. 2 is a plan view of the washer actuating mechanism.

Fig. 3 is a fragmentary side elevation of the motor driving pulley and clutch, the bottom of the housing and the clutch actuator being shown in a section on the line indicated at 3—3 in Fig. 2.

Fig. 4 is a vertical axial section on an enlarged scale through the pulley and clutch mounted on the motor shaft.

Fig. 5 is a fragmentary axial section on an enlarged scale through the agitator, the hub portions of the tub and clothes receptacle, and the top portion of the supporting pedestal.

Fig. 6 is a section similar to Fig. 5 showing a modified form of the resilient driving connection

between the actuating shaft and clothes receptacle.

Fig. 7 is a detail view showing the clutch actuating lever in elevation.

Fig. 8 is a diagrammatic view showing the clock motor, the controlling switches, and the switch controlling cams.

Fig. 9 is a plan view of the indicating dial and manually operable control device.

The accompanying drawings show a machine in which clothes may be washed, rinsed, and dried in successive operations, the machine being provided with a tub 1 which is supported upon the upper end of a tubular pedestal 2, and in which the clothes remain during the washing, rinsing, and drying operations. The receptacle 3 is rotatably mounted within the tub so that it may be rotated to extract water from the clothes, and an agitator 4, mounted centrally within the clothes receptacle, is adapted to be oscillated to agitate the clothes and water within the clothes receptacle during the washing and rinsing operations.

The machine is provided with a housing which has a base portion 5 enclosing the lower portion of the supporting pedestal and the operating mechanism. The housing is provided above the base portion 5 with a drain portion 6 which is provided upon the interior thereof with an annular trough 7 which underlies the bottom of the tub 1 at its periphery so that it will catch any water overflowing the top of the tub. The upper portion of the housing consists of a tubular shell 8 which encloses the upper portion of the tub 1, the upper edge of the shell being bent inwardly to overhang the space between the shell and the top of the tub and providing an opening 9 through which access may be had to the clothes receptacle 3. The housing has a bottom plate 10 in which may be mounted supporting caster wheels 11.

The machine of the present invention is designed to effect removal of grit, lint, and oil dislodged from the clothes from the clothes receptacle during the washing and rinsing operations. During these operations the agitator 4 is oscillated within the clothes receptacle 3. During the drying operation the agitator 4 and clothes receptacle 3 are continuously rotated as a unit within the tub 1. The peripheral wall of the clothes receptacle is spaced inwardly from the peripheral wall of the tub and is provided with perforations 12. The bottom wall of the clothes receptacle is spaced from the tub and is provided with perforations 13. A drain outlet 14 is provided through which

water may be withdrawn from the bottom of the tub. During the washing operation the water and clothes within the clothes receptacle 3 are agitated by the oscillating agitator 4 and solid particles of dirt loosened from the clothes will be either thrown out through the perforations 12 in the peripheral wall of the receptacle or will fall by gravity to the bottom of the receptacle 3 and pass out through the perforations 13 into the bottom of the tub 1. The peripheral wall of the clothes receptacle 3 preferably extends above the top of the tub 1 so that the liquid level may rise to above the top of the tub without permitting any of the clothes to pass out of the receptacle. During the washing operation additional water is preferably delivered into the clothes receptacle 3 at intervals so as to cause an overflow over the top of the tub 1 into the drain trough 7 and this overflow will carry off any scum or floating impurities dislodged from the clothes while they are being washed.

In order to lessen the wear on the bearings, economize power, and avoid the creation of severe vibrations in the housing, the tub and its vertical supporting pedestal are preferably mounted for gyratory movement within the housing; and to permit this movement, the pedestal is pivotally mounted for movement in any direction about a pivot point disposed axially thereof and adjacent to the bottom of the housing. The pedestal has a base portion formed by a flaring conically shaped upper plate 15 fixed to the post 2 and a bottom plate 16 which is rigidly attached to the disc 15 by bolts 17 and which is spaced from the disc 15 by sleeves 18 which surround the bolts. The bottom plate 16 is provided on the underside adjacent its periphery with a suitable number of recesses 19 preferably located at the points where the bolts 17 are attached and these recesses provide seats for the upper small ends of conical coil springs 20 which are seated at their lower ends in wells 21 provided in the bottom plate 16 of the housing. The pedestal is held down upon the cushioning springs 20 by means of a central anchoring pivot bolt 22 which has a ball shaped head 23 fitting in a central recess in the plate 16. The bolt 22 extends through the bottom plate 16 of the housing and is provided with a nut 25 at its lower end which is screwed against a rubber washer 26 engaging the bottom of the plate 16. By tightening the bolt 22 the tension of the supporting coil springs 20 may be adjusted and by reason of the engagement of the ball head 23 in a correspondingly shaped recess in the plate any movement of the pedestal is constrained to pivotal movement about the center of the ball head 23. By tightening or loosening the bolt 22 the resistance offered by the springs 20 to lateral movements of the pedestal may be increased or decreased as desired.

The pedestal 2 provides a bearing for an actuating shaft 27 which extends upwardly into the tub and clothes receptacle and which is operatively connected to the agitator 4 and clothes receptacle 3 for imparting oscillating movements to the agitator and for rotating the receptacle within the hub. The pedestal 2 is provided with bearing sleeves 28 in which the shaft is journaled and the lower end of the shaft 27 rests upon a bearing ball 29 seated in the ball head 23 of the pedestal anchoring bolt 22 adjacent its lower end. The shaft 27 is driven through a pulley 30 fixed thereto at its lower end, and immediately above

the pulley there is a brake wheel 31 also fixed to the shaft.

Since the tub 1, clothes receptacle 3, and agitator 4 are mounted upon the pedestal post 2 and operating shaft 27 for relative turning movements, means is provided for preventing leakage of water through the supporting and bearing connections. For convenience and efficiency of operation means is also provided to introduce water into the clothes receptacle through the supporting members. The tub 1 has a bottom 32 which may be in the form of a casting which is provided with a central hub member 33 which has an axial opening which receives the upper end of the pedestal post 2, the hub opening being provided with an internal shoulder 24 which rests upon the upper edge of the tubular post 2. A packing gland 25 is provided which seals the space between the shaft and hub member 33 to prevent leakage of water through the space between the shaft and hub member. The hub member 33 is provided with an annular passage 36 which opens to the upper end thereof and with a lateral inlet portion at its lower end which is attached to a valve fitting 38 which is provided with a valve 39 which is normally held closed by a spring 40. The valve fitting 38 is attached to a flexible water supply conduit 41 through which water under pressure may be supplied from a suitable source. The clothes receptacle 3 has a hub member 42 which is bored to receive the shaft 27 and counterbored to receive the upper end of the hub member 33 of the tub and provided with an internal supporting shoulder 43 so that the clothes receptacle is rotatably supported within the tub with its bottom spaced above the bottom of the tub. The hub member 42 of the clothes receptacle is provided with an annular passage 44 which registers with the annular passage 36 in the hub member 33 of the tub so that water passing upwardly from the supply conduit will pass through the superposed hub members 33 and 42 of the tub and clothes receptacle. The agitator 4 is provided with an elongated conical body or hub portion 45 which is axially bored at its upper end to receive the upper end portion of the shaft 27, a suitable driving connection 46 being provided between the upper end of the shaft and the agitator. Any suitable connection may be provided between the shaft and the agitator to insure rotation of the agitator with the shaft. As herein shown, the shaft 27 has a tapered polygonal upper end which fits in a correspondingly shaped socket in the agitator. The agitator 4 is preferably so connected to the shaft 27 that it may be lifted off the upper end of the shaft and a screw 47 may be provided for securing the upper end of the agitator to the upper end of the shaft. The body portion 45 of the agitator 4 is hollow throughout a considerable portion of its length and has a bearing portion 48 which rotatably engages the upper end of the hub member 42 of the clothes receptacle. The agitator has a bell shaped base 49 and wings 50 extending radially from the hub portion and upwardly from the base portion. The upper end portion of the agitator is counterbored to receive a sleeve 51 which has an internal diameter somewhat greater than the diameter of the shaft 27. The sleeve 51 extends from the upper end of the receptacle hub member 42 through the hollow portion of the agitator hub member 45 and forms with the wall of the hollow body of the agitator an annular chamber 52 which communicates with the annu-

lar passage 44 through the hub portion 42 of the clothes receptacle. The wall of the agitator hub is provided with spaced apertures 53 through which water entering the chamber 52 from the water inlet is discharged radially outwardly into the clothes receptacle.

In the operation of the machine the shaft 27 is oscillated during washing and rinsing operations and is rotated continuously in one direction during the extracting or drying operation, the agitator 4 being fixed to the shaft 27 moves with the shaft when the shaft is oscillated and also when the shaft is rotated. The clothes receptacle, however, is preferably so connected to the shaft 27 that it will partake of the movement of the shaft only when the shaft is rotated so that during the washing and rinsing operations the agitator may oscillate within the receptacle while the receptacle is substantially stationary, the connection being such that the clothes receptacle is constrained to turn with the shaft whenever continuous rotation is imparted to the shaft. As shown in Fig. 1, a long coil spring 54 surrounds the shaft 27 within the sleeve 51, the upper end of the spring being attached to the agitator 4, and the lower end of the spring being attached to the hub member 42 of the clothes receptacle. A turning movement of the shaft within the hub member 42 and sleeve 51 causes the spring either to wind up and tighten against the shaft or to unwind and be expanded against the interior of the sleeve 51. In either case the effect is to permit a relative turning movement of the shaft which is initially quite free but which is resisted with gradually increasing intensity by the spring until the limit of movement of the spring is reached at which time the shaft becomes locked to the clothes receptacle. The relative freedom of movement of the shaft through a considerable angle within the sleeve 51 and the hub 42 permits the shaft to be oscillated through the angle desirable for operating the agitator 4, without imparting any substantial movement to the clothes receptacle 3. However, when continuous rotation is imparted to the shaft, the spring 54 provides a torque absorbing resilient connection between the shaft and clothes receptacle which gradually overcomes the inertia of the clothes receptacle and relieves the driving and braking mechanisms of sudden shock. The initial rotating movement of the clothes receptacle is, therefore, effected quietly and without imparting excessive stresses to the driving elements and the clothes receptacle is stopped with a gradual deceleration without excessive stress upon the braking mechanism.

In Fig. 6 of the drawings an alternative form of shock absorbing connection between the shaft and clothes receptacle is shown. In this modification the shaft 27 is provided with a sleeve 55 within the hollow hub of the agitator. The sleeve 55 is provided with multiple threads of relatively steep pitch and upon this sleeve is mounted a nut 56 which has an outwardly projecting flange 57 provided with spaced apertures 58 through which extend pins 59 which are fixed to the hub portion 42 of the clothes receptacle and project upwardly therefrom, the pins 59 serving to prevent rotation of the nut 56 with respect to the hub 42. At opposite ends of the sleeve 55 collars 60 are mounted on the sleeve and these collars are secured to the sleeve 55 and shaft 27 by pins 61 extending through the sleeve, shaft, and collars. A coil spring 62 is interposed between the lower end of nut 56 and the lower collar 60 and

a coil spring 63 is interposed between the upper end of the nut and the upper collar 60. A turning movement of the shaft 27 within the hub 42 causes the nut 56 to be moved upwardly or downwardly on the sleeve 55 due to the action of the pins 59 which restrain the nut against turning movement with respect to the hub 42. If the shaft be turned through a relatively small angle, the movement of the nut compressing the spring 62 or the spring 63 is not substantially impeded so that an oscillatory movement of the shaft 27 with respect to the clothes receptacle 3, such as required to oscillate the agitator, will not impart substantial movement to the clothes receptacle 3. However, if the shaft be given a continuous rotation, the upper or lower spring 63 or 62 will be gradually compressed until its resistance to further compression locks the shaft to the nut 56 and through the pins 59 to the hub 42 of the clothes receptacle 3. The springs 62 and 63 provide a resilient torque absorbing connection between the shaft and clothes receptacle serving the purpose of the coil spring 54 shown in Fig. 5. Relative rotation between the shaft and hub may occur either at the beginning of rotation or when the machine is stopped by application of a brake connected to the shaft. In the one case the inertia of the clothes receptacle impedes its movement and the shaft runs ahead of the clothes receptacle and in the other the inertia of the rotating clothes receptacle carries it ahead of the shaft. The starting torque acts in one direction upon the spring 54 or upon the springs 62 and 63 of Fig. 5, while the braking torque acts in the opposite direction. Either of the resilient connections herein shown serves to cushion the inertia of the clothes receptacle both at the start and at the end of the drying operation relieving the driving mechanism of shock in starting and relieving the braking mechanism of shock upon application of the brake.

In order to drain the tub during operation of the machine, the tub drain outlet 14 is connected to a fitting 64 provided with a valve 65 which is normally held in open position by a spring 66 but which is held closed by means, which will be hereinafter described, during washing and rinsing operations. A discharge pipe 67 which may be a flexible hose is attached to the fitting 64. The drain trough 7 is connected to the fitting 64 by means of a pipe 68 which is preferably flexible so that it does not interfere with the gyratory movement of the tub with respect to the housing.

The shaft 27 is actuated by means of an electric motor 73 mounted within the base portion 5 of the housing. The motor 73 has a vertically disposed shaft 74 which projects above and below the motor. The driving connection from the motor shaft 74 to the pulley 30 on the shaft 27 is through a pair of belts 75 extending over the pulley 30 and over the pulley 76 on the motor shaft. The pulley 76 is rotatably mounted on the motor shaft 74 and is slidable on the shaft for engagement with two clutch elements one of which has continuous rotation in one direction and the other of which rotates continuously back and forth. The lower clutch element is in the form of a clutch disc 77 fixed to the shaft 74 and provided with a friction facing 78 to resist slip between the pulley and disc. An upper clutch disc 79 is attached to a gear 80 which is rotatably mounted upon a sleeve 81 surrounding the shaft 74 and fixed to the motor casing. The sleeve 81 has a flange 82 at its lower end which restricts the downward movement of the gear and clutch

disc and is provided above the gear 80 with a ball thrust bearing 83. The disc 79 is provided with a friction facing 83 to resist slip between the clutch disc and the upper face of the pulley 76. The pulley 76 may be formed of two substantially identical parts joined together by bolts 85; at the interior thereof the pulley has webs 86 between upper and lower ball thrust bearings 87. The pulley 76 is shifted on the shaft 74 by means of keys 88 which slide in longitudinal slots 89 which are formed in the shaft 74. The keys 88 have lateral projections 90 which engage the outer races of the bearings 87 and projections 91 adjacent to their lower ends which engage opposite sides of a ball bearing within the shifter collar 92. The collar 92 may be shifted up and down on the shaft 74 by means of a lever in the form of a flat plate 93 provided with an elongated opening 94 to receive the collar 92 and with lugs 95 engaging in the groove of the collar. The lever 93 is provided with apertures 96 which receive bolts 97 attached to fulcrum blocks 98 secured to the bottom housing plate 10 beneath the lever 93. The apertures 96 being somewhat larger than the bolts 97 so as to permit the plate to rock about an axis transverse the bolts. A spring 99 is interposed between the head of each of the bolts 97 and the lever 93 and these springs normally hold the lever 93 in horizontal position against the flat top faces of the fulcrum blocks 98 in which position the clutch is held in neutral position with the pulley 76 out of contact with both clutch discs. The lever 93 at the side of the fulcrum blocks 98 upon which the clutch collar is located is provided with a slot 100 which receives the armature 101 of a solenoid 102, the armature 101 being provided with a pin 103 which underlies the lever 93, so that upon energization of the solenoid 102 the lever is lifted to shift the collar 92 upwardly and engage the pulley 76 with the upper clutch disc 79 to impart an oscillatory movement to the shaft 27. The opposite end of the shifter lever 93 is provided with a slot 104 which receives the armature 105 of solenoid 106 which has a pin 107 beneath the lever 93. The energization of the solenoid 106 causes the clutch collar 92 to be moved downwardly, the lever 93 rocking upon the fulcrum blocks 98 to force the clutch collar 92 downwardly and bring the pulley 76 into engagement with the lower disc 77 which is continuously driven in one direction. Energization of the solenoid 102 causes the shaft 27 to be oscillated and energization of the solenoid 106 causes continuous rotation of the shaft 27.

It is desirable that the shaft 27 be brought to a stop whenever it is disconnected from its driving mechanism, and a brake, therefore, is provided which is automatically applied when the shaft 27 is disconnected from its driving mechanism, and which is automatically released upon connection of the shaft to the actuating mechanism. The brake is in the form of a band 108 which surrounds the brake wheel 31 and which has a flange 109 at one end anchored to the pedestal base. The opposite end of the brake band has a flange 110, which is connected to the flange 109 by means of bolt 111, and which is engaged by a spring 112 which serves to normally press the flange 110 toward the flange 109 and engage the band with the brake wheel. For releasing the brake, a flexible pull cable 113 is provided which may be yieldingly connected to the flange 110 through a spring 114 interposed between the flange 110 and a knob 115 attached to the pull cable. The pull cable extends through a flexible

conduit 116 which leads through the bottom plate 10 of the housing. In order to actuate the pull cable to release the brake band 108 upon engagement of the pulley 76 with either the upper or lower clutch disc 79 or 77, the armatures 101 and 105 of the solenoids are attached to their lower ends to bell crank levers 117 and 118 which are pivoted to the bottom plate 10 and have depending arms 119 and 120 projecting beneath the bottom plate 10. The pull cable 113 is threaded through openings in the depending arms 119 and 120 of the bell cranks and is provided adjacent the arms with knobs 121 and 122 each knob being sufficiently close to an arm to be engaged by the arm when the arm is actuated by its solenoid so that a pull is exerted upon the cable 113 and the brake is released upon actuation of either of the clutch actuating solenoids 102 or 106.

The gear 30 is operated by the motor with periodic reversal of movement by means of gearing connecting the upper end of the motor shaft 74 to the gear 30. The shaft 74 has a pinion 123 at its upper end which meshes with a gear 124 carried on a shaft fixed to the motor casing. A pinion 125 rotates with the gear 124 and meshes with a gear 126 carried by a second shaft also fixed to the motor casing. A connecting rod 127 is connected at one end of the gear 126 and at its opposite end to a crank arm 128 fixed to the upper end of a vertical shaft 129. The shaft 129 is journaled at one side to the motor casing and extends to the lower end at the motor casing. A gear segment 130 is attached to the lower end of the shaft 129 and meshes with the gear 30. An oscillating motion is transmitted to the shaft 129 by the connecting rod 127 from the continuously driven gear 126 and the oscillating shaft 129 transmits turning movements first in one direction and then in the other to the gear 30 and this movement is transmitted through the clutch disc 79 and pulley 76 to the shaft 27.

The inlet valve 39 is opened against the action of the spring 40 by means of a solenoid 131 and the drain valve 65, closed against the action of its spring 66 by means of a solenoid 132. The solenoids 102, 106, 131, and 132 serve to control the operation of the agitator for washing and rinsing operations, the operation of the clothes receptacle for drying operations, the introduction of water into the clothes receptacle, and the draining of water therefrom. Energization of these solenoids may be effected by means of suitable switches. By closing the switches controlling the above mentioned solenoids at the proper times, the desired sequence of operations may be effected. By the use of a suitable timing mechanism, the sequence of the operations and also the duration of each operation may be automatically controlled. As shown in Fig. 8 of the drawings, the operation of the machine may be controlled by means of a clock motor 133 connected by reduction gearing 134 and through a clutch 135 to a shaft 136 which serves to operate the switches controlling the motors 73 and 133, the clutch solenoids 102 and 106, and the valve solenoids 131 and 132. The shaft 136 has five control cams which operate a switch 138 which controls the clock motor 133 and the power motor 73, a switch 139 which controls the solenoid 131, a switch 140 which controls the solenoid 132, a switch 141 which controls the solenoid 102, and a switch 142 which controls the solenoid 106. The outer end of the shaft 136 is provided with a handle 143 by which the shaft may be turned manually at any time to adjust

the position of the controlling discs and advance or retard the cycle of operations. The entire cycle of operations is completed in one revolution of the shaft 136 and the handle 143 is preferably in the form of a pointer which moves over the face of a dial 144 which has indicia in successive segments thereof which indicate the successive operations performed during the cycle.

As shown in Fig. 9, the dial 144 has indicated at the top thereof the off position of the controlling handle and pointer 139. When the combined handle and pointer 139 is turned slightly to the right from the off position, the solenoid 131 is actuated to open the inlet valve to admit water to the clothes receptacle and the switch 138 of the clock motor 133 is closed so that the shaft 136 continues to rotate slowly in the clockwise direction. The switch 139 controlling the inlet valve solenoid 131 is held closed while the pointer is moving over the portion of the dial indicated by the legend intake. As herein shown, the intake period is of a duration such that the tub will be filled with water at approximately 20 lbs. intake pressure in the time during which the intake valve is held open by its solenoid. If the inflow of water is too rapid, the handle 143 may be advanced to the washing position to cut off the flow of water whenever the tub is full; and if the flow of water into the tub is not sufficient, the handle 143 may be turned back counter-clockwise sufficiently to continue the flow of water until the tub is filled. The flexible inlet conduit 41 may be connected to the hot water faucet of a household water supply system to supply water at the proper temperature. When the tub is substantially full and the pointer has approached the end of the intake portion of its revolution, the switch 141 of the solenoid 102 is actuated to connect the shaft 27 to the gear 80 to impart oscillating movement to the agitator 4. The energizing and de-energizing of the solenoids 132 and 106 controlling the draining and drying operations occurs as the pointer 143 moves over the corresponding indicia on the dial. After the water inlet valve is closed, the washing operation continues for a suitable period of time, and dur-

ing that operation the solenoid 131 is actuated at pre-determined time intervals as indicated by the short blocks marked "In" on the dial to admit a pre-determined additional volume of water to the tub to cause overflow and clear away scum and other floating impurities. The draining of the tub and the suds extraction is effected by actuating of the solenoids 132 and 106 after the completion of the washing operation; and after the suds is extracted from the tub, the tub is refilled by actuation of the solenoid 131 and the agitator is oscillated by operation of the solenoid 102. Additional water may be introduced at intervals during the rinsing operation to clear away scum and other floating impurities, if desired. Following the rinse wash, the drain valve is opened and continuous rotation is imparted to shaft 27 and the clothes receptacle to extract water from the clothes in the receptacle. When the pointer reaches the off position, the operating motor and clock motor are disconnected to stop the machine.

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

What I claim is:

In a combination washer and extractor, a clothes receptacle having a rotatably supported hub portion, a shaft extending through said hub portion into said receptacle, an agitator within the receptacle having a hub portion attached to said shaft, means for oscillating said shaft about its axis, means for imparting continuous rotation to said shaft, a nut having threaded engagement with the shaft between the hub portions of the receptacle and agitator, means for holding said nut against rotation with respect to the receptacle, and means yieldably resisting movement of said nut in either direction on said shaft.

JAMES B. KIRBY.