Jan. 10, 1950 A. H. GERHARDT 2,494,436

COMBINED CLOTHES WASHER AND EXTRACTOR

Filed Aug. 6, 1943 4 Sheets-Sheet 1

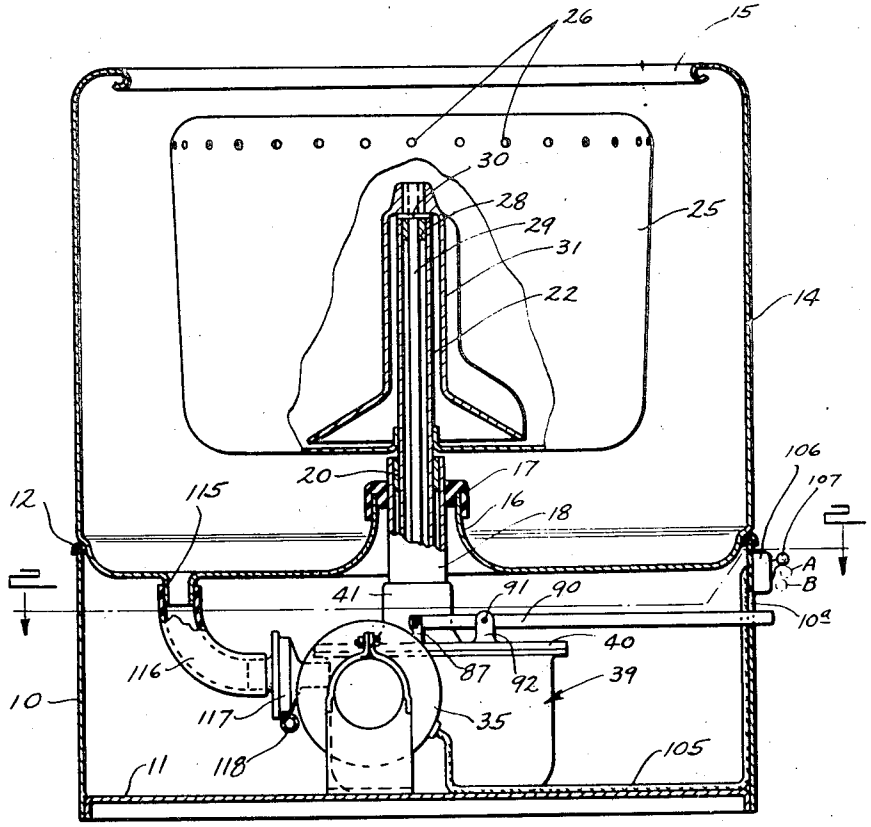


FIG. 1.

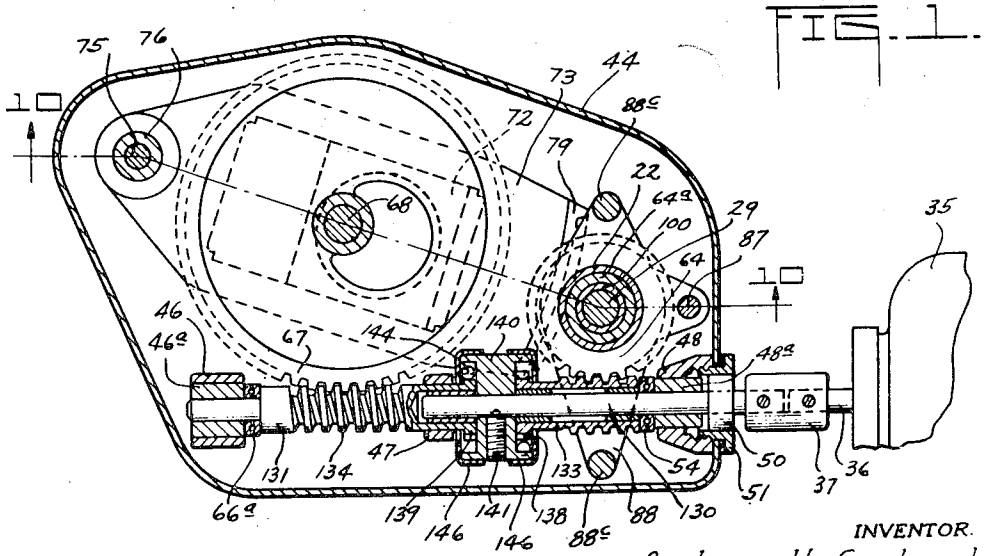


FIG. 2.

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COMBINED CLOTHES WASHER AND EXTRACTOR

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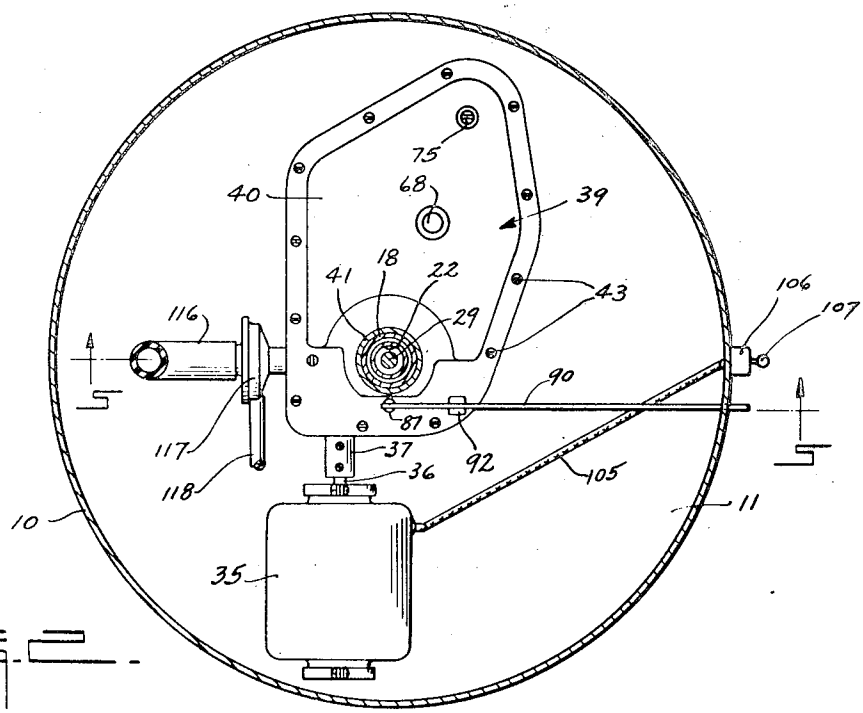


FIG. 2.

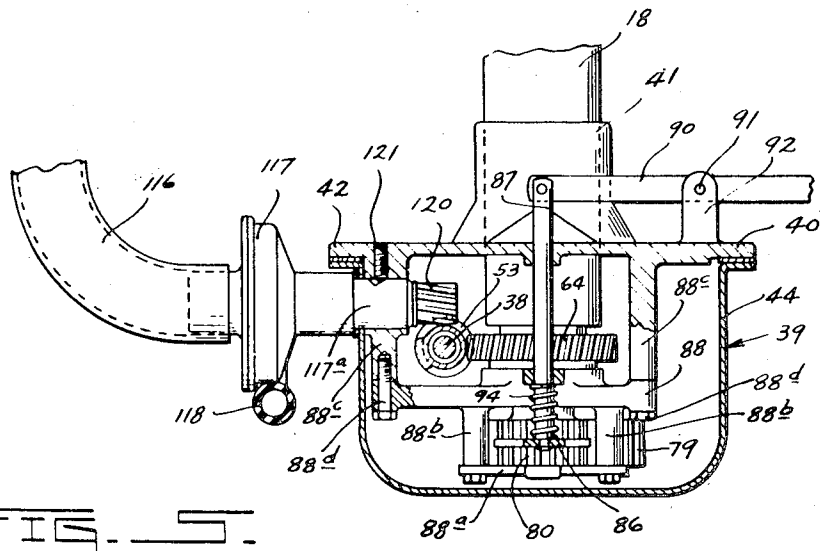


FIG. 5.

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COMBINED CLOTHES WASHER AND EXTRACTOR

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FIG. 3.

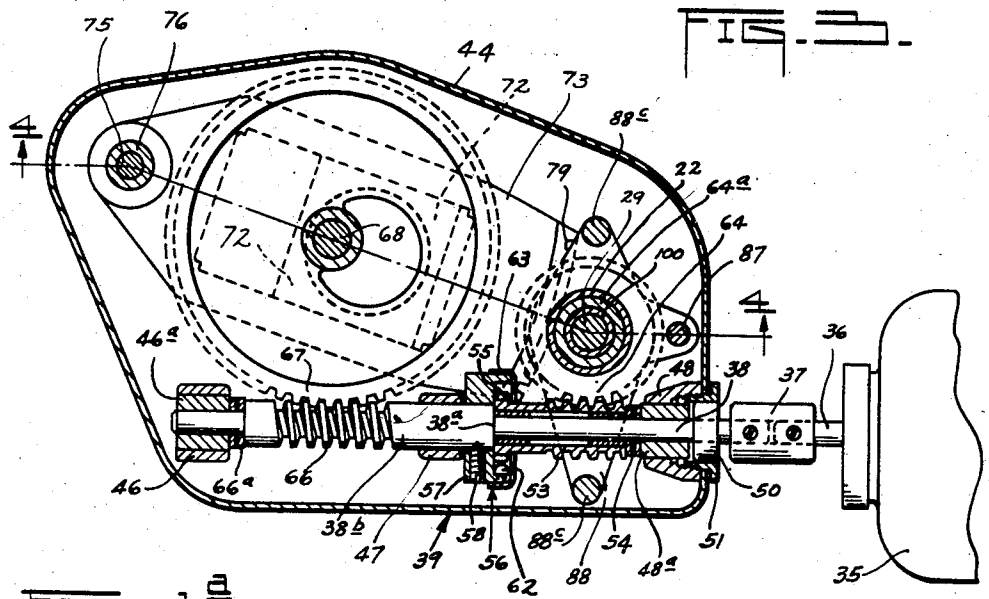


FIG. 1a.

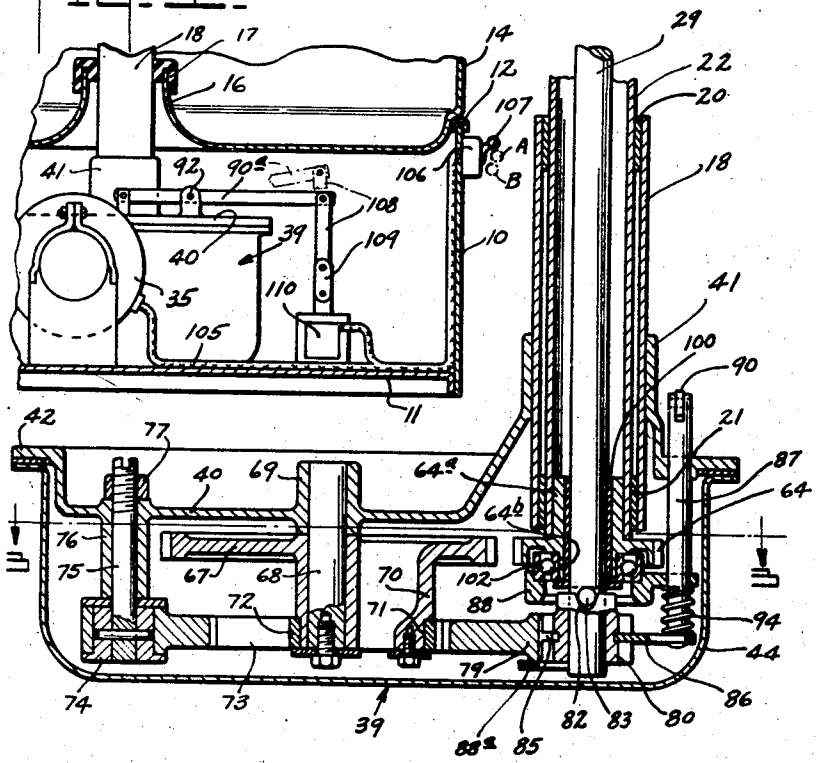


FIG. 4.

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COMBINED CLOTHES WASHER AND EXTRACTOR

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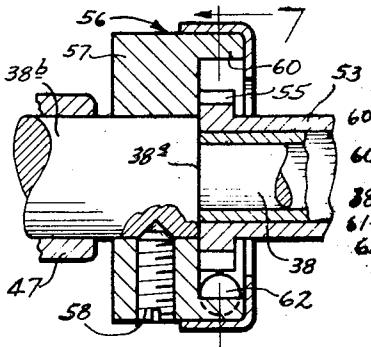


FIG. 6.

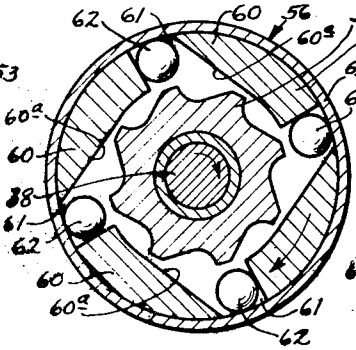


FIG. 7.

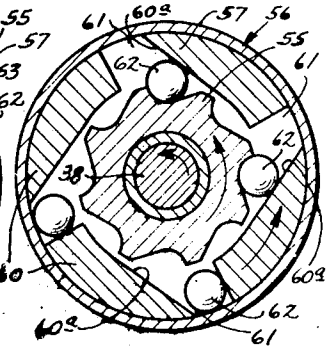


FIG. 8.

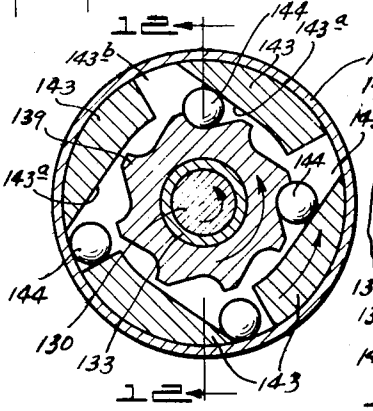


FIG. 11.

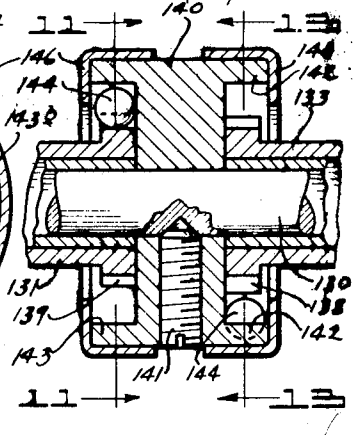


FIG. 12.

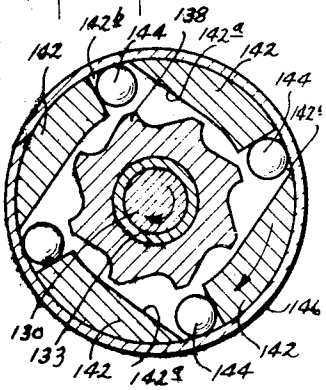


FIG. 13.

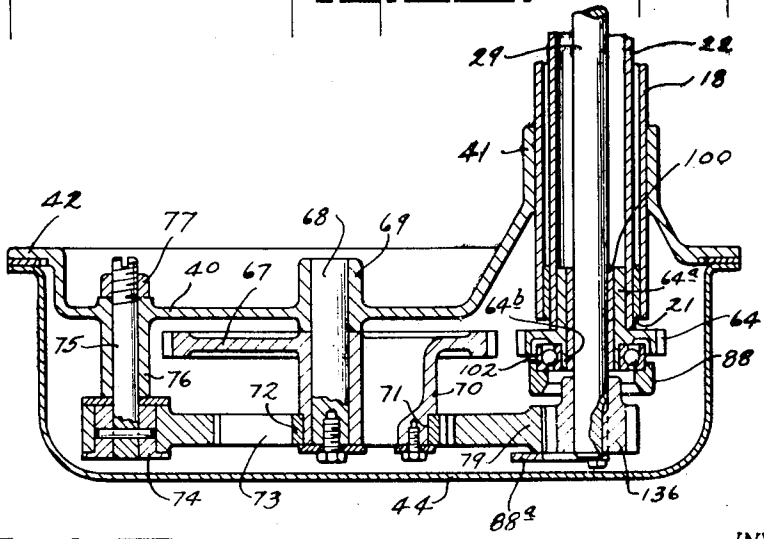


FIG. 10.

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Patented Jan. 10, 1950 2,494,436

UNITED STATES PATENT OFFICE

2,494,436

COMBINED CLOTHES WASHER AND EXTRACTOR

Andrew H. Gerhardt, Skokie, Ill., assignor to Thor Corporation, a corporation of Illinois

Application August 6, 1943, Serial No. 497,649

5 Claims. (Cl. 68—23)

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This invention relates to clothes washing machines of the combination washer and extractor type, wherein water is centrifugally extracted from the clothes in the same tub in which they are washed.

More particularly, this invention relates to machines of the general class wherein an oscillatable agitator is mounted within the basket for performing the washing operation upon the clothes, and wherein the basket in which the clothes are washed may be subsequently caused to rotate at a relatively high rate of speed, about an upright axis, for extracting the water from the clothes. Machines of this type may also be constructed and arranged so as to permit performing a rinsing operation upon the clothes as part of a series of sequential operations, which by way of example may be as follows: first washing the clothes, then performing an extracting operation upon the clothes, then performing a rinsing operation upon the clothes, and finally an extracting operation upon the clothes. Such machines may be constructed so as to perform the separate operations by manually operable controls, or wherein the operations are caused to be partially or completely performed automatically in a cyclic manner.

One of the objects of the present invention is to provide a novel driving mechanism for a machine of the character indicated which is relatively simple in construction, durable in operation, and which is capable of being economically manufactured.

Another object is to provide an improved drive mechanism for a machine of the character indicated, adapted to be driven by an electric motor, and where rotation of the motor in one direction causes oscillation of the agitator, and wherein rotation of the motor in the opposite direction causes rotation of the basket for performing an extracting operation upon the clothes.

A further object is to provide a novel drive mechanism for a basket and agitator of a machine of the character indicated, wherein said mechanism is constructed and arranged as to lend itself to convenient control by a suitable timing mechanism for performing certain of the operations in a cyclic manner.

A still further object is to provide an improved drive mechanism for a machine of the character indicated, wherein the mechanism proper is totally supported from the top of a housing.

A still further object is to provide an improved clutch for controlling the operation of the agitator.

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Other objects and advantages of this invention will be apparent from the following description taken in connection with the accompanying drawings, in which:

Fig. 1 is a vertical section through a combined washing and extracting machine, provided with a novel drive mechanism, embodying the present invention.

Fig. 1A is a fragmentary, sectional view through the machine, showing a modified form of control for the agitator clutch.

Fig. 2 is a transverse sectional view through the machine, looking down upon the mechanism housing, taken substantially as indicated at line 2—2 on Fig. 1.

Fig. 3 is a horizontal sectional view through the drive mechanism, taken substantially as indicated at line 3—3 on Fig. 4.

Fig. 4 is a vertical section through the drive mechanism, taken substantially as indicated at line 4—4 on Fig. 3.

Fig. 5 is a vertical sectional view through the drive mechanism, showing the driving connections for the pump, taken substantially as indicated at line 5—5 on Fig. 2.

Fig. 6 is an enlarged axial sectional view through the over-running clutch of the drive mechanism.

Fig. 7 is a trans-axial sectional view through the over-running clutch, taken substantially as indicated at line 7—7 on Fig. 6, and showing the position of the parts of the clutch when the drive mechanism is driven by the motor in a direction for effecting oscillation of the agitator.

Fig. 8 is a sectional view similar to Fig. 7, but showing the relative position of the parts of the clutch when the drive mechanism is operated by rotation of the motor in the opposite direction for effecting rotation of the basket.

Fig. 9 is a sectional view similar to Fig. 3, showing a modified form of drive mechanism utilizing a pair of over-running clutches.

Fig. 10 is a vertical sectional view through the modified mechanism, taken substantially as indicated at line 10—10 on Fig. 9.

Fig. 11 is a trans-axial sectional view through the double over-running clutch, taken as indicated at line 11—11 on Fig. 12, showing the position of the parts of one of the clutch devices when the motor is rotating in one direction for effecting oscillation of the agitator.

Fig. 12 is an axial section through the double over-running clutch.

Fig. 13 is a trans-axial sectional view through the other part of the double over-running clutch,

taken as indicated at line 13—13 on Fig. 12, showing the position of the clutch parts wherein the drive connections to the basket are inoperative during the time that the drive connections for oscillating the agitator are operative.

The machine illustrated in Figs. 1 and 2 of the drawings, is more or less diagrammatic and includes a supporting frame structure in the form of a base or skirt 10, having a bottom 11. The skirt is provided at its upper marginal edge with a resilient gasket 12, to provide a seat for an upwardly open receptacle 14. The receptacle may be detachably secured to the skirt 10, or base 11, by suitable bolts, not shown. The upper end of the receptacle is formed with a relatively large opening 15, which is adapted to be normally closed by a cover not shown. The bottom of the receptacle has the central area thereof formed with a flanged upwardly extending annulus as indicated at 16, the marginal upper edge of which has seated thereon a resilient member 17, such as rubber, which snugly embraces a tubular standard 18, associated with the drive mechanism, as will hereinafter be described.

Journaled in vertically spaced-apart bearings, 20 and 21, in said standard 18, is an upwardly extending tubular drive shaft 22, to which is rigidly secured, intermediate its length, as by welding, the bottom portion of a concentrically disposed basket or washing receptacle, 25. The basket, or what for convenience may sometimes be referred to as the tub, has its vertical wall inclined in an outward, upwardly direction, so that when the basket is rotated at a relatively high rate of speed, the water extracted from the clothes in the basket is caused to travel upwardly along the inner wall thereof, for discharge through a series of apertures 26, located adjacent the upper end of the tub. The water so discharged is accumulated in the receptacle 14, for disposal, as will hereinafter be described.

The upper end of the tubular drive shaft 22, is provided with a bearing 28 for the upper end of an agitator drive shaft 29, which is disposed centrally within the tube 22. The upper end of said shaft projects above the upper end of the tube, and is provided with a suitable driving member 30, having bearing support on the upper end of the tubular shaft 22, and operably connected to an agitator 31, mounted within the basket, as seen in Fig. 1 of the drawings.

Mounted within the skirt or base member 10, and supported directly upon the bottom 11, is a suitable drive mechanism, embodying the present invention, for causing selective oscillation of the agitator 31, and rotation of the basket 25.

While, as above stated, the representation of the machine in Fig. 1 of the drawings is more or less diagrammatic, it is to be understood that the mechanism to be presently described, together with the agitator and basket, and their respective drive shafts, may be properly supported by suitable apparatus not shown, so as to reduce or eliminate transmission of vibration of the operating parts of the machine to the receptacle 14, and the base 10, or to a cabinet structure which might be provided for the total machine. By way of illustration, the total drive mechanism, including a power motor, as well as the agitator and basket may be flexibly supported in a manner as disclosed in United States Letters Patent No. 2,334,858, issued to John P. Beattie, on November 23, 1943. While it is deemed essential to the production of a practical machine of the character indicated, that suitable vibration absorbing support

be employed, it is deemed unnecessary to disclose any specific form of such structure, since the present invention is directed to certain improvements in drive mechanisms for machines of the combined washing and extracting type. Therefore, for purpose of the present invention, it may be understood that the drive mechanism and power means may be supported in any desired and convenient manner.

The drive mechanism includes a reversible, electrically driven motor 35, having a drive shaft 36, connected by a coupling 37, to a main drive shaft 38, of the driving mechanism, indicated generally at 39. The mechanism includes a housing composed of a main cast top member 40, which includes an upstanding tubular member 41, press-fitted on the standard 18. The top housing member 40, as will be presently described, serves to provide total support for the drive mechanism for effecting oscillation of the agitator and rotation of the basket. The top member also includes an upwardly offset marginal flange 42, disposed a substantial distance above the main area of the top member, and secured to said flange by means of screws 43, is a sheet metal, upwardly open flanged receptacle 44, which serves to fully enclose the drive mechanism suspended from the top housing member 40. It will thus be seen that by disposing the flange connection of the two housing members 40 and 44, a substantial distance above the normal plane of the top member, the joint of the two housing members will always be located above the normal lubricant level within the housing, so that there will be no possibility of leakage of the lubricant at the flange joint. It is to be understood that suitable plugs may be provided in either of the housing members for the introduction and or removal of lubricant from the housing.

Depending from the top housing member 40, are three aligned bearing brackets, 46, 47, and 48, providing journal support for the drive shaft 38, and the bearing brackets 46 and 48, are provided with suitable bushings, 46a and 48a, respectively. An oil seal 50, is mounted on the shaft 38, within a threaded nut 51, having threaded connection with the interior of a recess in the bearing bracket 48. Loosely journaled on the shaft 38, intermediate the bearing brackets 47 and 48, is a worm 53, one end of which abuts against a thrust bearing 54, and the opposite end of said worm is formed as a ratchet 55, constituting a part of an over-running one way drive clutch, indicated generally at 56. The outer end of the ratchet member abuts against a shoulder 38a, formed by an enlarged portion 38b, of said main drive shaft 38. The clutch includes a cylindrical body member 57, rigidly secured on the enlarged portion 38b, of the shaft by means of a set screw 58. The right hand face of the body member 57, is provided with a plurality of (herein shown as four) circumferentially spaced apart jaws 60, disposed in transaxial alignment with the teeth of the ratchet member 55, formed on the end of the worm 53. The jaws are so formed as to provide clearance pockets 61, for accommodating steel balls 62, when the clutch member 57, rotates in the direction indicated by the arrow in Fig. 7 of the drawings, and the balls are confined in position by a cup-shaped member 63, press-fitted on the body 57. Certain of these balls are adapted to be seated in notches of the ratchet wheel and wedge against the inclined surfaces 60a, of the jaws 60, when the clutch member 57, rotates in the opposite di-

rection, as seen in Fig. 8 of the drawings, so as to constitute a positive drive between the clutch body member 57 and the ratchet wheel 55, for rotating the worm with the shaft 38. To state it differently, the clutch is a one-way drive clutch, and is operative for driving the worm 53 only when the shaft 38, rotates in one direction, and the clutch over-runs or is disengaged when the shaft 38, rotates in the opposite direction.

The worm 53 is continuously in mesh with a helical gear 64, having an upper hub portion 64^a, press-fitted into the lower end of the tubular drive shaft 22, which serves to rotate the basket 25.

The enlarged portion 38^b, of the shaft 38, is provided with an integral worm 66, abutting at its outer end against a thrust bearing 66^a. Meshed continuously with the worm 66, is a gear 67, journaled on a stud 68, which is rigidly secured by a drive fit in a boss 69, formed integral with the top housing member 40, as seen in Fig. 4 of the drawings. The underside of the gear is provided with an enlargement 70, the bottom portion of which constitutes an eccentric 71, journaled in a rectangular block 72, slidably guided in a yoke member 73, which is journaled at one end on a flanged bearing 74, which is pinned to the lower end of a vertical stud 75, supported in a depending bearing 76, projecting from the underside of the top housing member 40. The upper end of the stud is threaded and is provided with a nut 77, for supporting the yoke in proper relation to the other mechanism. The outer end of the yoke opposite the pivot connection, is formed with a segmental rack 79, which is continuously meshed with a pinion 80, journaled on the lower end of the agitator drive shaft 29, as clearly seen in Fig. 4 of the drawings.

The outer end of the segmental rack is guided and supported for movement on a curved member 88^a, connected to two depending legs 88^b, of a bracket 88, as seen in Fig. 5 of the drawings. The bracket 88, is connected by screws 88^d, to the lower ends of a plurality of spaced-apart depending legs 88^c, formed as an integral part of the top housing member 40, as seen in Fig. 5 of the drawings.

The upper side of the pinion 80, is formed with a hub provided with a notch 82, adapted to be moved into and out of cooperative engagement with a pin 83, on the lower end of the agitator drive shaft 29. The pinion is adapted to be moved axially along the shaft into and out of engagement with the pin 83, to constitute a clutch for controlling the operation of the agitator drive shaft. The pinion is provided substantially centrally of the face thereof, with a circumferential groove 85, extending into the teeth and into the body of the pinion, within the root diameter of the teeth thereof. Extending into the groove of the pinion is a yoke member 86, by means of which the pinion is axially shifted along the shaft to control engagement and disengagement of the notch thereof with the pin 83, on the agitator drive shaft. The yoke 86, is attached to an upwardly extending rod 87, which is guided in the bracket member 88, and in the top housing member 40, as seen in Fig. 4 of the drawings. The upper end of the rod 87, is pivotally connected to an operating lever 90, which is fulcrumed at 91, between a pair of upstanding lugs 92, formed on the upper side of the top housing member 40. As seen in Fig. 1 of the drawings, the outer end of the operating lever 90, extends

through an opening 10^a, in the skirt or base member of the machine, so as to be conveniently accessible for manual manipulation. A coil spring 94, surrounds the lower portion of the rod 87, and is interposed between the yoke member 86, and the bracket 88, so as to yieldingly urge the pinion 80, in a downward direction out of clutching engagement with the pin 83, of the agitator drive shaft. It is to be understood that the slot 10^a, in the base member, may be formed with a convenient shoulder so that when the lever 90, is depressed by pressure at the outer end thereof, it may be latched in such position against the reaction of the coil spring 94, so as to lock the pinion 80, in clutched relation to the agitator drive shaft.

The agitator drive shaft is journaled at its lower end in a bearing 100, press-fitted into the helical gear 64. Said gear is provided at its underside with a depending hub 64^b, and surrounding said depending hub portion, and seated in the upper end of the bracket 88, is a ball bearing 102, which serves to provide bearing support for the agitator drive shaft, as well as bearing support for the gear 64, and in addition, serves as an end thrust bearing for said gear, together with the tubular drive shaft 22, and basket 25.

The reversible motor 35, has its leads connected through conductor wires encased in a sheath 105, to a three-way switch, indicated at 106. The switch includes a manually operable member 107, which is adapted, when disposed in the dotted line position indicated at "A," to be in an off position with the circuits broken, and when disposed in the position seen in full lines, the circuit is completed for driving the motor 35, in clockwise direction, and similarly driving the main shaft 38, in clockwise direction when viewed from the right hand end of Fig. 3 of the drawings. Such direction of rotation of the shaft 38, causes the over-running clutch to travel in the direction as indicated in Fig. 7 of the drawings, wherein the balls 62, are out of driving relation to the ratchet wheel 55, and by virtue of which the worm 53 remains stationary. The worm 66, however, being an integral part of the shaft 38, drives the helical gear 67, which in turn, through the eccentric 71, and eccentric block 72, effects oscillation of the yoke carrying the segmental rack 79, which in turn oscillates the pinion 80, and through the medium of the agitator drive shaft 29, effects oscillation of the agitator 31, within the basket 25. As long as the pinion 80, is in the position seen in Fig. 4 of the drawings, in clutching engagement with the agitator drive shaft, oscillating motion is imparted to the agitator, the pinion, however, may be readily disengaged by operation of the manual lever 90, as above described. When the switch finger 107, is moved to the lower dotted position, indicated at "B," the motor is reversed in its direction of rotation, and causes its shaft, as well as the drive mechanism shaft 38, to rotate in counter-clockwise direction, thereby rendering operative the over-running clutch 56, as may be clearly seen in Fig. 8 of the drawings, so as to cause the balls 62, to move into wedging engagement between the jaws 60, and the teeth of the ratchet wheel, so as to positively drive the worm 53. The worm 53, being in constant mesh with the helical gear 64, thereby imparts rotation to the tubular drive shaft 22, for effecting relatively high speed rotation of the basket 25. When the basket is thus rotated, and assuming that the basket contains a quantity of washing fluid and

clothes which have been washed by the oscillation of the agitator, the water is discharged from the clothes and from the basket due to the centrifugal forces set up incident to such rotation of the basket in a manner well understood in the art. During such operation of the drive mechanism the hand lever 90, for controlling the clutch at the lower end of the agitator drive shaft is disposed in an inoperative position so that the agitator, together with its shaft 29, are free to move with the mass of water and clothes within the basket during the extracting operation.

In the modified construction shown in Fig. 1A of the drawings, the agitator clutch operating lever, designated at 90a, is of shorter length than the manually operating lever seen in Fig. 1, and the outer end of the lever is connected by links 108 and 109 to the core of a solenoid 110. The solenoid is connected in the branch of the electrical circuit for operating the motor when the motor rotates in clockwise direction, as aforesaid, with the switch finger 107, disposed in the full line position seen in Figs. 1 and 1A of the drawings. When the motor rotates in clockwise direction, the solenoid is energized, as seen in Fig. 1A of the drawings, to engage the clutch comprising the pinion 80, and the pin 83, at the lower end of the agitator drive shaft, for operating the agitator 31. When the switch finger 107, is disposed in the lower position, indicated by dotted lines at "B," the solenoid, not being connected in that portion of the motor circuit, remains deenergized, and the coil spring 94, maintains the pinion 80, out of clutching engagement with the agitator drive shaft. It is to be understood that if desired, the spring 94, and solenoid may be oppositely arranged, that is, the spring could be positioned to normally maintain the agitator drive pinion 80, in clutching engagement with the drive shaft and the solenoid, when energized, would effect disengagement of the drive pinion from the agitator drive shaft. Under these conditions, however, the solenoid would be connected in the other branch of the motor circuit so as to become energized when the switch finger is moved to the lower or dotted line position, indicated at "B" in the drawings.

The water discharged from the basket 25, is collected in the bottom of the receptacle 14, and is adapted to be discharged through an outlet 115, formed in the bottom wall of the receptacle. The outlet is in the form of a depending neck to which is connected a flexible hose 116, which in turn is connected to a pump 117, for discharging the water from the receptacle through a hose 118, to a drain, or other suitable place of discharge. The pump 117, is of conventional design and may be understood to include a rotatable impeller member not shown, operably connected to a helical pinion 120, meshed with the worm gear 53, as seen in Fig. 5. By virtue of this arrangement, the pump functions only when the basket 25, is rotated at high speed to perform the extracting operation. The housing of the pump 117, includes a reduced neck 117a, supported in the adjacent depending member 88c, and fixedly secured in position therein by a set screw 121.

If desired, the pump may be mounted with its pinion 120, meshed with the worm 66, so that the pump will function whenever the motor is operated. Such an arrangement may be especially desirable for certain conditions, such as during a thorough rinsing operation, in which case water may be permitted to overflow from the basket 25, into the receptacle 14, and the pump would promptly discharge the water from the receptacle through the conduit 118, to a suitable drain.

My novel drive mechanism for the agitator and basket, as above described, readily lends itself for embodiment in a machine wherein the operation of the agitator and basket may be individually and independently operated by manual manipulation of control members. The construction also lends itself for simple and convenient association with suitable timing mechanism by virtue of which operation of the agitator and the basket may be performed in a cyclic timed sequence. The timing mechanism may also be of such nature as to permit control of supply of washing fluid into the tub for performing the washing operation, as well as rinsing and bluing operations.

The structure shown in Figs. 9 to 13 of the drawings represents a modification of my novel drive mechanism. The essential differences between the mechanism above described, and this modified form of drive mechanism is in the provision of a double over-running clutch, and in the connection of the drive pinion to the agitator drive shaft 29. The main drive shaft of the modified mechanism is composed of two parts, including a shaft 130, connected to the motor shaft coupling 37, with the left hand end of the shaft journaled in a bearing in a socket formed in an axially aligned shaft 131. The right hand end of the shaft 130, is journaled in the bearing 48a, of the bearing bracket 48. The right hand end of the shaft 131, is journaled in the bearing bracket 47, while the left hand end of the shaft is journaled in the bearing 46a, of the bracket 46. Loosely journaled on the shaft 130, is a worm 133, disposed in continuous mesh with the basket driving gear 64, which is rigidly attached to the lower end of the tubular drive shaft 22. The shaft 131, is formed with an integral worm 134, in continuous mesh with the gear 67, which through the eccentric 71, and segmental gear 79, oscillates the agitator drive shaft pinion 136, which, as seen in Fig. 10 of the drawings, is keyed to the agitator drive shaft 29, for imparting oscillation to the agitator 31.

The left hand end of the worm 133, is formed with a ratchet 138, and the right hand end of the shaft 131, is formed with a ratchet 139. The two ratchets form parts of the double over-running clutch which also includes a main body member 140, rigidly secured on the shaft 130, by a set screw 141. The opposite faces of the body member 140, are respectively provided with a plurality of circumferentially spaced-apart jaws 142, and 143, disposed in transaxial alignment with the respective ratchets, 138 and 139, the jaws having inclined surfaces designated respectively at 142a and 143a, designed and related so as to form clearance pockets 142b and 143b, for accommodating steel balls 144, depending upon the relative direction of rotation of the respective ratchets with respect to the body member 140. The steel balls are confined in transaxial alignment with the respective ratchet wheels by cup shaped members 146, press-fitted on the respective ends of the body member 140, as seen in Fig. 12 of the drawings.

When the switch 106, has its operating member 107 disposed in the full line position as seen in Figs. 1 and 1A, the motor drives the shaft 130, in clockwise direction, and thereby rotates the double over-running clutch body member 140, so that the steel balls 144, of the right hand

over-running clutch, are disposed in the pockets 142b, as seen in Fig. 13 of the drawings, and the worm 133, remains in stationary relation. Such rotation of the body member 140, however, causes the balls 144, of the left hand over-running clutch to move into wedging engagement between pockets of the ratchet wheel 139, and the jaws 143, as seen in Fig. 11 of the drawings, and thereby positively drive the worm 134, which through the gear 67, and the segment gear 73, imparts oscillation to the pinion 136, and causes oscillation of the agitator drive shaft 29, together with the agitator 31.

When the switch member 107, is moved to the dotted position indicated at "B," in the drawings, the motor is operated in counter-clockwise direction, and similarly rotates the shaft 130 and the body 140, of the double over-running clutch. In such direction of rotation of the body member 140, the balls 144, of the right hand over-running clutch are moved into wedging engagement between the pockets of the ratchet wheel 138, and the jaws 142, so as to cause rotation of the ratchet wheel in counter-clockwise direction, and thereby rotating the worm 133, for driving the gear 64, which in turn, through the tubular drive shaft 22, rotates the basket 25, at a relatively high speed. Such direction of rotation of the motor and the double over-running clutch renders the left hand clutch inoperative and the balls 144, slip into the pockets 143b, out of engagement with the ratchet wheel 139, so that the worm 134 remains stationary and the drive to the agitator 31, is rendered inoperative.

While this construction is found to be reasonably satisfactory, it will be appreciated that the agitator remains relatively fixed or stationary during the time that the basket 25, rotates. Therefore, to avoid any possibility of damage to the clothes being operated upon when the basket is set into rotation, such as might occur by portions of the clothing snagging on portions of the agitator, it may be desired to render the agitator and its shaft free to rotate, and for this purpose, the pinion 136, may be constructed as a clutch similar to the construction shown in Fig. 4 of the drawings, and which may be either manually operated, or operated electrically incident to operation of the switch operating member 107, so that when the drive connections are completed for rotating the basket 25, the drive pinion 136, is out of driving engagement with the agitator drive shaft 29, and said pinion is caused to be clutched in driving engagement with the agitator drive shaft 29, only when the motor is rotated in clockwise direction, at which time the worm 134, drives the gear 67, and imparts driving motion to the pinion 136, for operating the shaft 29, to oscillate the agitator 31.

Although I have herein shown and described certain embodiments of my invention, manifestly it is capable of modification and re-arrangement of parts without departing from the spirit and scope thereof. I do not, therefore, wish to be understood as limiting this invention to the precise embodiments herein disclosed except as I may be so limited by the appended claims.

I claim:

1. In a combined washing and extracting machine including an upwardly open receptacle, an upwardly open basket mounted for rotation within the receptacle, and an oscillatable agitator mounted within the basket, the combination of mechanism for driving the basket; separate mechanism for driving the agitator; a reversibly driven electric motor; means, operable incident to rotation of the motor in one direction, for actuating the agitator driving mechanism; means, operable incident to rotation of the motor in the opposite direction, for actuating the basket driving mechanism, said two last mentioned means comprising two axially aligned worms and one-way drive clutch means for causing rotation of one of said worms only when said motor is driven in one of its two directions; clutch means interposed in the agitator drive mechanism and movable into and out of operative positions of adjustment; spring means for yieldingly urging said last mentioned clutch means to one position of adjustment; and means operable when the motor is driven in one of its two directions for moving said last mentioned clutch means to its other position of adjustment.

2. In a combined washing and extracting machine including an upwardly open receptacle, an upwardly open basket mounted for rotation within the receptacle, and an oscillatable agitator mounted within the basket, the combination of mechanism for driving the basket; separate mechanism for driving the agitator; a reversibly driven electric motor; means, operable incident to rotation of the motor in one direction, for actuating the agitator driving mechanism; means, operable incident to rotation of the motor in the opposite direction, for actuating the basket driving mechanism, said two last mentioned means comprising two axially aligned worms and one-way drive clutch means for causing rotation of one of said worms only when said motor is driven in one of its two directions; clutch means interposed in the agitator drive mechanism; spring means for yieldingly maintaining the clutch in operative position; and means rendered operable when the motor is driven in said opposite direction for disengaging said clutch means.

3. In a combined washing and extracting machine including an upwardly open receptacle, an upwardly open basket mounted for rotation within the receptacle, and an oscillatable agitator mounted within the basket, the combination of mechanism for driving the basket; separate mechanism for driving the agitator; a reversibly driven electric motor; means, operable incident to rotation of the motor in one direction, for actuating the agitator driving mechanism; means, operable incident to rotation of the motor in the opposite direction, for actuating the basket driving mechanism, said two last mentioned means comprising two axially aligned worms and one-way drive clutch means for causing rotation of one of said worms only when said motor is driven in one of its two directions; clutch means interposed in the agitator drive mechanism and movable into and out of operative position of adjustment; spring means for yieldingly urging said last mentioned clutch means to one position of adjustment; and a solenoid connected in the motor circuit and adapted to be energized when the motor is driven in one of its two directions for moving said last mentioned clutch means to its other position of adjustment.

4. In a combination washing and extracting machine of the type comprising an upwardly open receptacle, a basket mounted for rotation in the receptacle, an oscillatable agitator mounted in the basket, an upright drive tube connected to the basket, a shaft disposed within the tube and operably connected to the agitator, the combination of a machanism housing mounted below the receptacle and formed with an opening for re-

ceiving the lower ends of said tube and shaft, said housing including a rigid top member, mechanisms in said housing for selectively driving said tube and shaft, said mechanisms comprising a pinion mounted on the lower end of the tube and journaled on the shaft, a pinion on the lower end of the shaft, and motor driven mechanism totally supported from the underside of the top member and comprising a gear meshing with the pinion on the tube, and an oscillatable segmental rack meshing with the pinion on the shaft, a support bracket depending from the top member and surrounding the lower end of the shaft, and an anti-friction bearing seated on said bracket and surrounding a hub extension of the underside of the pinion on said tube for providing lateral bearing support for said shaft and tube and providing an end thrust bearing for said tube and basket.

5. In a combination washing and extracting machine of the type comprising an upwardly open receptacle, a basket mounted for rotation in the receptacle, an oscillatable agitator mounted in the basket, an upright drive tube connected to the basket, a shaft disposed within the tube and operably connected to the agitator, the combination of a mechanism housing mounted below the receptacle and formed with an opening for receiving the lower ends of said tube and shaft, said housing including a rigid top member, mechanisms in said housing for selectively driving said tube and shaft, said mechanisms comprising a pinion mounted on the lower end of the tube and

journaled on the shaft, a pinion on the lower end of the shaft, and motor driven mechanisms totally supported from the underside of the top member and comprising a gear meshing with the pinion on the tube, and an oscillatable rack meshing with the pinion on the shaft, a support bracket depending from the top member and surrounding the lower end of the shaft, an anti-friction bearing seated on said bracket and surrounding a hub extension of the underside of the pinion on said tube for providing lateral bearing support for said shaft and tube and providing an end thrust bearing for said tube and basket, and means depending from said bracket and providing bearing support for the outer toothed end of the segmental rack.

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