Nov. 15, 1955 K. M. HAMMELL ET AL 2,723,737

CLUTCH AND FLUID DRIVE UNITS FOR CLOTHES WASHING MACHINES AND THE LIKE

Filed Nov. 21, 1950 4 Sheets-Sheet 1

FIG. 1

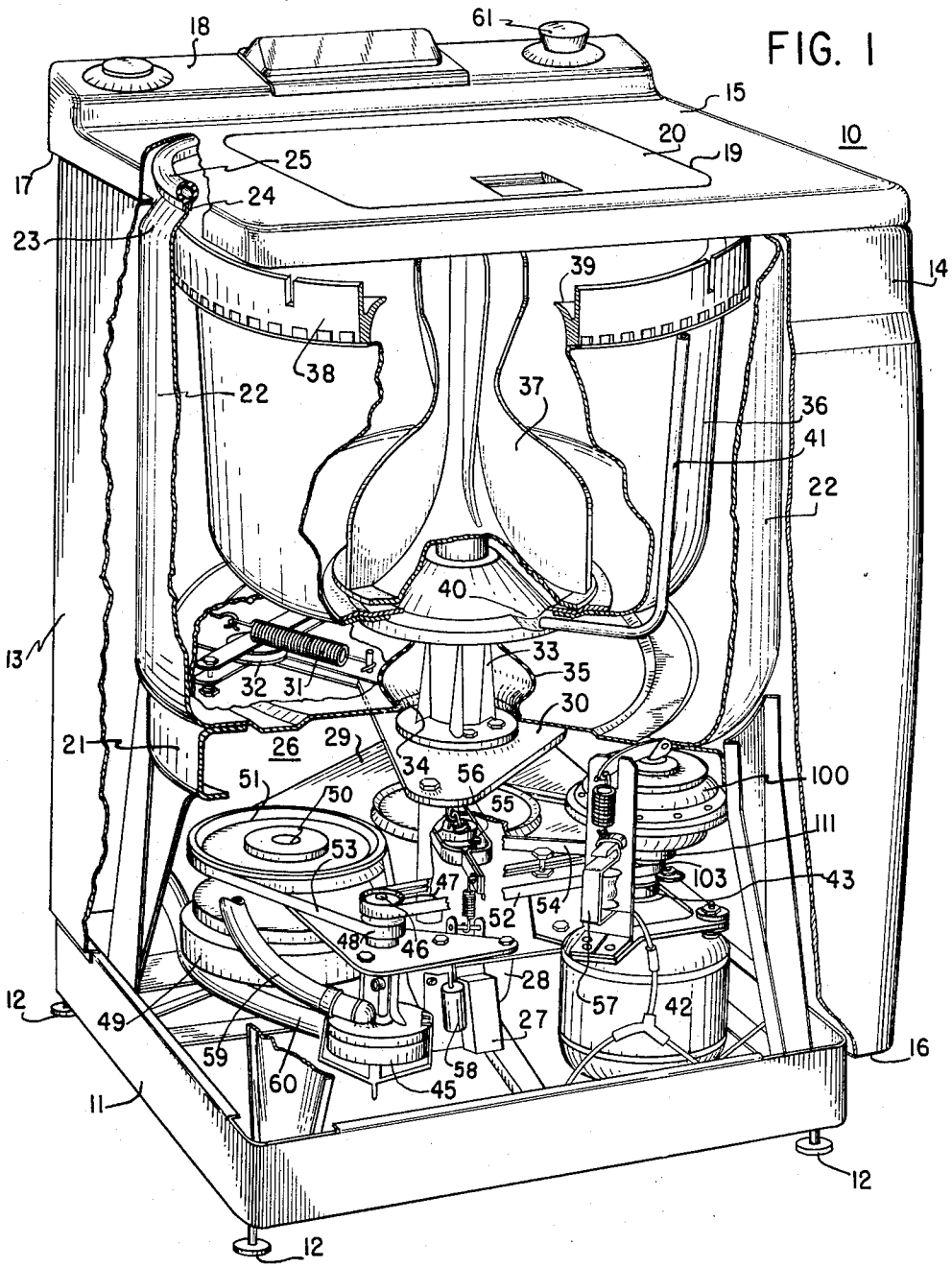

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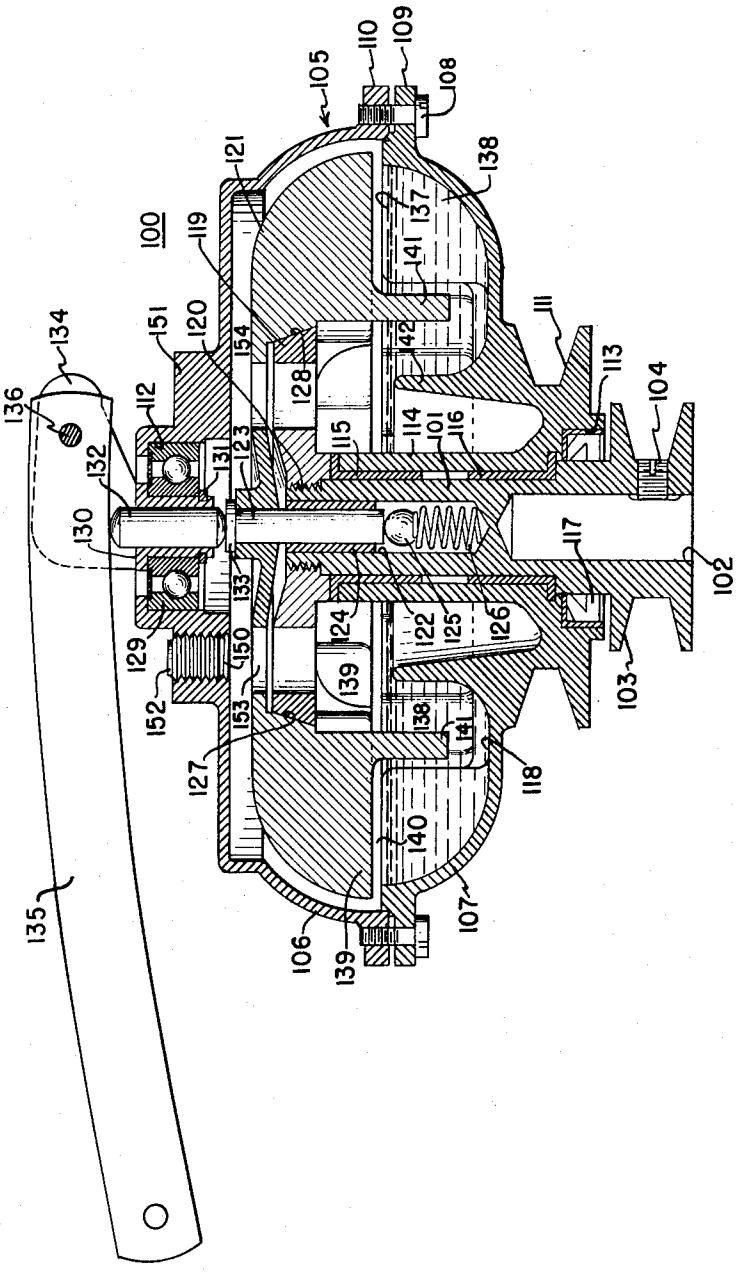
FIG. 2



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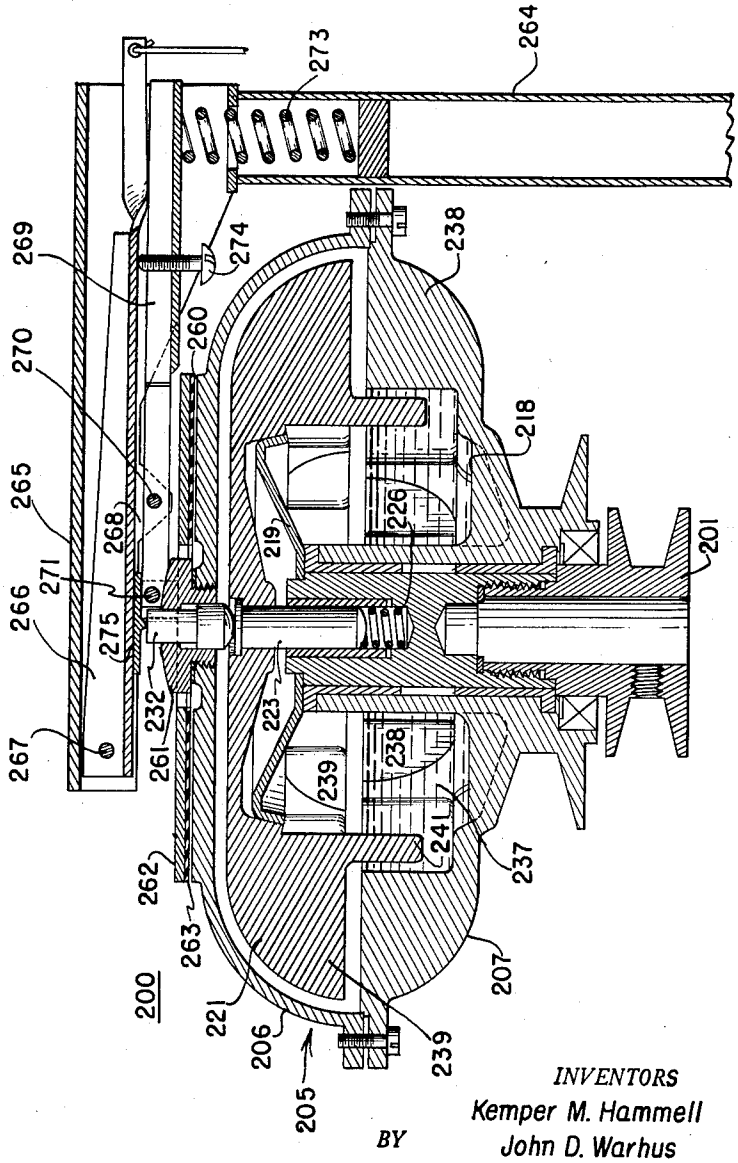
Filed Nov. 21, 1950 4 Sheets-Sheet 3

FIG. 3



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Filed Nov. 21, 1950 4 Sheets-Sheet 4

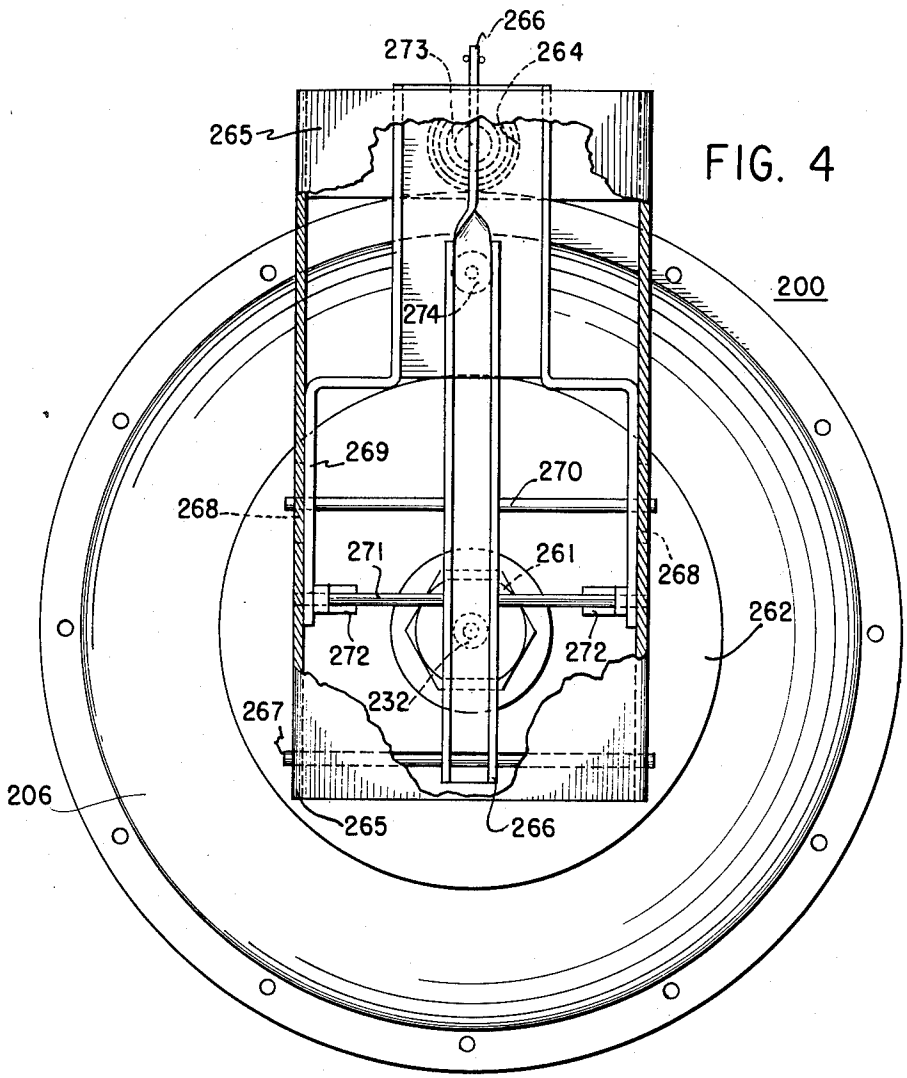

FIG. 4

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CLUTCH AND FLUID DRIVE UNITS FOR CLOTHES WASHING MACHINES AND THE LIKE

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Application November 21, 1950, Serial No. 196,917

9 Claims. (Cl. 192—12)

The present invention relates to clutch and fluid drive units for clothes washing machines of the type in which the clothes are washed, rinsed and centrifugally dried in a receptacle or tub, and more particularly to such a unit that is adapted to be arranged between the tub and the associated electric drive motor in the clothes washing machine.

In a clothes washing machine of the type noted, the tub is arranged in an upstanding position and mounted for rotation, and an upstanding agitator is arranged in the tub and mounted for oscillation. The agitator is selectively oscillated to effect washing and rinsing of the clothes, and the tub is rotated or spun to effect the centrifugal discharge therefrom of the wash water and the rinse water. Rotation or spinning of the tub following the final rinsing of the clothes not only effects the centrifugal discharge of the rinse water from the tub, but it also effects the centrifugal discharge from the clothes of a great proportion of the absorbed rinse water, whereby the clothes are partially dried by this final spinning operation of the tub.

Since this final spinning operation of the tub is carried out at a fairly high speed, considerable mechanical difficulties have been experienced in clothes washing machines of this type, due primarily to excessive vibration of the tub as a consequence of uneven distribution of the load of clothes in the tub.

In order to minimize the vibration of the tub during the final spinning operation thereof, a clothes washing machine has been proposed that incorporates a fluid drive unit arranged between the tub and the associated electric drive motor so that the slippage in the fluid drive unit may automatically compensate for the unbalance of the tub and its load of clothes. Specifically, the fluid drive unit effects a very gradual acceleration of the tub and the load of clothes when operation f the associated electric drive motor is initiated and establishes a variable spinning speed of the tub that is dependent upon the amount of unbalance of the tub and its load of clothes. As the rinse water is centrifugally discharged from the clothes, the amount of unbalance of the tub and its load of clothes is inherently reduced so that the fluid drive unit automatically increases the spinning speed of the tub, whereby the desired final spinning speed of the tub may be ultimately obtained, notwithstanding the initial excessive amount of unbalance of the tub and its load of clothes, and without excessive vibration of the tub. In this proposed washing machine, the agitator in the tub is selectively oscillated by a first electric drive motor through an associated motion-translating mechanism and a clutch, and the tub is selectively rotated by a second electric drive motor through the associated fluid drive unit.

While the proposed clothes washing machine is satisfactory in operation, it is considerably more expensive to manufacture than is desirable, due primarily to the provision of the two separate electric drive motors and the independent transmission arrangements respectively extending therefrom to the agitator and to the tub.

Accordingly, it is a general object of the present invention to provide an improved clutch and fluid drive unit that is adapted to be incorporated in a clothes washing machine of the type described so that a single electric drive motor may be employed selectively to operate both the agitator and the tub of the machine.

A further object of the invention is to provide a clutch and fluid drive unit of improved construction and arrangement.

A further object of the invention is to provide a clutch and brake and fluid drive unit.

A still further object of the invention is to provide a fluid drive unit that incorporates an improved fluid baffle arrangement which insures a positive initial pick-up between the relatively rotatable bladed elements of the unit.

Further features of the invention pertain to the particular arrangement of the elements of the clutch and fluid drive unit, whereby the above-outlined and additional operating features thereof are attained.

The invention, both as to its organization and method of operation, together with further objects and advantages thereof, will best be understood by reference to the following specification taken in connection with the accompanying drawings, in which Figure 1 is a front perspective view, partly broken away, of a clothes washing machine incorporating a clutch and fluid drive unit embodying the present invention; Fig. 2 is an enlarged vertical sectional view of the clutch and fluid drive unit incorporated in the clothes washing machine shown in Fig. 1; Fig. 3 is an enlarged vertical sectional view, of a clutch and brake and fluid drive unit embodying the present invention that may be incorporated in the clothes washing machine shown in Fig. 1; and Fig. 4 is a plan view, partly broken away, of the clutch and brake and fluid drive unit shown in Fig. 3.

Referring now to Fig. 1 of the drawings, there is generally illustrated a clothes washing machine **10** of the oscillating agitator and rotating tub type embodying a cabinet and drain tub arrangement of the character of that disclosed in the copending application of John C. Sharp and Walter P. McCarty, Serial No. 190,144, filed October 14, 1950, now Patent No. 2,687,633, issued August 31, 1954. Specifically the machine **10** comprises a substantially rectangular base **11** that is supported upon independently adjustable feet **12** arranged to engage the floor or other supporting surface. A casing **13** is removably carried by the base **11** and includes rear and side walls defining both a front opening and a top opening. A front wall **14** is removably carried by the front of the casing **13** in order to close the front opening mentioned, and a top wall **15** is removably carried by the top of the casing **13** in order to close the top opening mentioned. The lower portions or rear and side walls of the casing **13** join the upper portions of the rear and sides of the base **11**; while the lower portion of the front wall **14** joins the upper portion of the front of the base **11** so as to provide a toe receiving recess **16** disposed below and rearwardly of the front wall **14** and forwardly of the front of the base **11**. The sides of the front wall **14** are disposed substantially flush with the side walls of the casing **13**. The sides of the top wall **15** are disposed substantially flush with the side walls of the casing **13**, and the front of the top wall **15** is disposed substantially flush with the upper portion of the front wall **14**. The top wall **15** projects rearwardly from the rear wall of the casing **13** in order to provide an upstanding space **17** disposed below the rear of the top wall **15** and behind the rear wall of the casing **13**, which upstanding space **17** is adapted to receive plumbing connections, not shown. More specifically, the rear of the top wall **15** terminates in an upwardly directed backsplash **18** that projects over the top of the upstanding space **17**, and a substantially centrally disposed top opening **19**

is provided in the top wall 15 in order to render the interior of the casing 13 accessible from the exterior. A door 20 is provided for the purpose of selectively closing the top opening 19, the rear edge of the door 20 being hinged to the top wall 15 and movable toward and away from the backsplash 18 into respective open and closed positions with respect to the top opening 19.

Upstanding supporting structure 21 is arranged in the lower portion of casing 13 and carried by the base 11; which supporting structure 21 carries an upstanding substantially cylindrical drain tub 22 arranged in the upper portion of the casing 13. The drain tub 22 is provided with an inwardly directed annular marginal throat 23 that terminates in a top opening 24 disposed below the top wall 15; and the top edge of the throat 23 carries a substantially annular sealing gasket 25 surrounding the top opening 24 and engaging the lower surface of the top wall 15 for the purpose of sealing the top opening 24 in the drain tub 22 to the top wall 15, the bottom wall of the drain tub 22 being spaced above the base 11 to define machinery compartment 26 arranged in the lower portion of the casing 13. The base 11 carries additional supporting structure 27 upon which the principal machinery disposed in the machinery compartment 26 is mounted. Specifically an upstanding support 28 is pivotally mounted at the lower end thereof to the structure 27, which upstanding support 28 comprises, among other structure, two vertically spaced-apart plates 29 and 30 arranged substantially centrally in the machinery compartment 26. The plate 30 is operatively connected to the upstanding structure 21 by a plurality of resilient springs 31 and associated snubber devices 32, whereby the upstanding support 28 is normally centered along a substantially vertical axis, but is capable of gyratory movement about its pivotal mounting upon the structure 27. The plate 30 carries an upstanding bearing bracket 33 that projects through a substantially centrally disposed opening 34 provided in the bottom wall of the drain tub 22, which bracket 33 is sealed to the portion of the bottom wall of the drain tub 22 surrounding the opening 34 by an arrangement including an upstanding flexible boot 35 formed of rubber, or the like.

An upstanding spin tub 36 is arranged within the drain tub 22 and supported by a tub sleeve, not shown, that is mounted in the bearing bracket 33 for rotation about a substantially vertical axis; and an upstanding agitator 37 is arranged within the spin tub 36 and supported by an agitator shaft, not shown, that is mounted in the tub sleeve for oscillation about the substantially vertical axis mentioned. The spin tub 36 is provided with an upwardly and outwardly flared side wall that terminates in an open top disposed below the top wall 15 and arranged in substantial alignment with the top openings 19 and 24, whereby the interior of the spin tub 36 is readily accessible from the exterior through the top openings 19 and 24 when the associated door 20 occupies its open position. The top rim of the spin tub 36 carries an annular balance ring 38 that is provided with an inwardly directed annular clothes retaining flange 39. Also the bottom wall of the spin tub 36 is provided with an annular sediment trap 40 disposed below the base of the agitator 37, the sediment trap 40 communicating with the interior of the drain tub 22 by an arrangement including two upstanding drain conduits 41 disposed substantially diametrically opposite each other and carried by the spin tub 36.

An electric drive motor 42 is mounted upon the plate 29 and provided with an upwardly directed operating shaft 43, upon the upper end of which there is mounted a clutch and fluid drive unit 100 embodying the features of the present invention and including two independently rotatable pulleys 103 and 111. Also a drain pump 45 is mounted upon the plate 29 and provided with an upwardly directed operating shaft 46, upon the upper end of which are mounted two pulleys 47 and 48. Further a motion-translating mechanism 49 is mounted upon the plate 29 and provided with an upwardly directed drive shaft 50,

upon the upper end of which there is mounted a pulley 51.

The pulley 103 of the unit 100 is directly belted by a flexible V-belt 52 to the pulley 47 that is carried by the operating shaft 46 of the drain pump 45; and the pulley 48 that is carried by the operating shaft 46 of the drain pump 45 is directly belted by a flexible V-belt 53 to the pulley 51 that is carried by the drive shaft 50 of the motion-translating mechanism 49. As explained more fully hereinafter, the clutch and fluid drive unit 100 comprises a housing 105 that carries the pulley 111 that is directly belted by a flexible V-belt 54 to a pulley 55 that is carried by the tub sleeve, not shown, that is supported within the bearing bracket 33 and directly connected to the spin tub 36. Moreover the motion-translating mechanism 49 includes a driven shaft, not shown, that is selectively connectable by a clutch mechanism 56 to the agitator shaft, not shown, that is arranged in the tub sleeve mentioned and directly connected to the agitator 37. Also as explained more fully hereinafter, the clutch and fluid drive unit 100 comprises an operating member that is adapted to be selectively operated for clutch control purposes by an associated electromagnet 57. Further the clutch mechanism 56 is adapted to be selectively operated for clutch control purposes by an associated electromagnet 58.

The drain pump 45 is provided with an inlet conduit 59 that communicates with the lower portion of the drain tub 22, and a discharge conduit 60 that projects through the rear wall of the casing 13 and communicates with drain plumbing, not shown. Also an electric timer and control switch, not shown, is arranged within the casing 13 below the backsplash 18 and adjacent to the junction between the rear wall and the right-hand side wall of the casing 13 and provided with an upstanding control shaft that projects through an opening, not shown, provided in the backsplash 18, the upper end of the control shaft mentioned carrying a rotary control knob 61. Also inlet valve mechanism, not shown, is arranged within the casing 13 below the backsplash 18 and adjacent to the junction between the rear wall and the left-hand side wall of the casing 13 and provided with a hot water inlet valve connection, a cold water inlet valve connection, and a discharge connection communicating with the open top of the spin tub 36, whereby hot water or cold water or warm water may be selectively admitted into the spin tub 36. In view of the foregoing general description of the construction and arrangement of the machine 10, it will be understood that clothes may be placed within and removed from the spin tub 36 through the opening 19 provided in the top wall 15 when the door 20 occupies its open position. Moreover the complete cycle of operation of the machine 10 may be readily established by the control knob 61 under the control of the associated electric timer, not shown. Specifically washing and rinsing and centrifugal drying steps may be readily carried out upon the clothes in the spin tub 36 in a well-known manner. More particularly, when operation of the electric drive motor 42 is initiated, the operating shaft 43 thereof rotates the operating shaft 46 of the drain pump 45 through the drive connection including the belt 52 and the pulleys 103 and 47, whereby the operating shaft 46 of the drain pump 45 rotates the drive shaft 50 of the motion-translating mechanism 49 through the drive connection including the belt 53 and the pulleys 48 and 51. The operating drain pump 45 pumps to the exterior through the inlet conduit 59 and the discharge conduit 60, any liquid that may accumulate in the lower portion of the drain tub 22. When the drive shaft 50 of the motion-translating mechanism 49 is thus rotated, the driven shaft thereof, not shown, extending to the clutch mechanism 56 is oscillated; however, the agitator 37 is not oscillated at this time since the clutch mechanism 56 normally occupies its declutched position.

Also rotation of the operating shaft 43 of the electric drive motor 42 conditions the clutch and fluid drive unit

100 for selective operation; however the housing 105 of the unit 100 and the pulley 111 carried thereby are not rotated at this time as the unit 100 normally occupies its declutched position.

In order to operate the agitator 37, the electromagnet 58 is energized, whereby the clutch mechanism 56 is operated into its clutched position so that the driven shaft, not shown, of the motion-translating mechanism 49 is clutched to the agitator shaft, not shown, that is connected to the agitator 37. In order to rotate the spin tub 36, the electromagnet 57 is energized, whereby the clutch and fluid drive unit 100 is operated into its clutched position so that the housing 105 thereof is gradually accelerated to a given speed of rotation determined by the normal slippage between the bladed elements of the unit 100 in a manner more fully explained hereinafter. The rotating housing 105 of the clutch and fluid drive unit 100 effects rotation of the tub sleeve, not shown, that is connected to the spin tub 36 through the drive connection including the pulley 111 carried by the housing 105 of the unit 100, the belt 54 and the pulley 55. In passing, it is noted that prior to initiating a spinning operation of the spin tub 36, the electromagnet 58 is de-energized in order to bring about the return of the clutch mechanism 56 into its declutched position as it is undesirable to effect a spinning operation of the spin tub 36 while the agitator 37 is being oscillated.

When the spin tub 36 is thus rotated, the principal portion of the wash water contained therein is centrifugally discharged adjacent to the upper portion of the spin tub 36 through a plurality of holes arranged between the upper edge of the spin tub 36 and the associated balance ring 38; while the wash water contained in the sediment trap 40, along with any sediment contained therein, is discharged through the upstanding conduits 41 by the centrifugal forces produced incident to the rotation of the spin tub 36. Accordingly the wash water is centrifugally discharged from the spin tub 36, while the flange 39 provided on the balance ring 38 prevents the discharge of the clothes from the spin tub 36. The wash water that is centrifugally discharged from the spin tub 36 is caught in the drain tub 22 and pumped by the drain pump 45 to the exterior. Following the final rinsing operation of the machine 10, the spin tub 36 is rotated during a substantial time interval in order that a considerable portion of the rinse water absorbed by the clothes contained in the spin tub 36 may be centrifugally discharged therefrom so as to obtain centrifugal drying, at least to this extent, of the clothes contained in the spin tub 36.

It will be understood that the cycle of operation of the machine 10 is automatically established by the timer, not shown, and that the initial filling of the spin tub 36 with hot water or cold water or warm water may be selectively controlled by the combination timer and control switch under the manual control of the control knob 61. After the spin tub 36 has been appropriately filled with wash water by manipulation of the control knob 61, the control knob 61 is further manipulated to initiate the automatic cycle mentioned. As previously noted, the timer, not shown, effects the operation of the machine 10 through the timed cycle, including a washing step and two rinsing steps, followed by the final centrifugal drying step; whereupon the timer arrests further operation of the machine 10 so that the clothes contained in the spin tub 36 may be removed through the top opening 19 provided in the top wall 15 after the door 20 has been moved into its open position. A suitable electric control circuit of the character described that may be incorporated in the machine 10 is disclosed in the copending application of Walter P. McCarty, Serial No. 122,321, filed October 19, 1949, now Patent No. 2,646,673 issued July 28, 1953.

Referring now to Fig. 2, the clutch and fluid drive unit 100 there illustrated, and embodying the features of the present invention, that is incorporated in the machine 10 described above, comprises an upstanding operating element or shaft 101 that is directly carried by the upper end of the operating shaft 43 of the electric drive motor 42, as previously explained. More particularly, the lower end of the operating element 101 has a substantially centrally disposed cylindrical bore 102 formed therein that is adapted directly to receive the upper end of the operating shaft 43; whereby the operating element 101 is mounted for rotation about a substantially vertical axis. Also the lower end of the operating element 101 carries a pulley 103 that is preferably formed integrally therewith and is adapted to receive the V-belt 52 in order to provide the direct drive connection between the operating shaft 43 of the electric drive motor 42 and the operating shaft 46 of the drain pump 45, as previously explained. A threaded opening is provided between the upper and lower flanges of the pulley 103 that receives a set screw 104 that is employed for the purpose of holding the operating element 101 securely in place upon the upper end of the operating shaft 43 of the electric drive motor 42.

Also the unit 100 comprises an upstanding housing 105 including complementary upper and lower sections 106 and 107 that are detachably secured together by an annular series of screws 108, the screws 108 extending through openings provided in an annular flange 109 carried by the lower section 107 and being threaded into openings provided in an annular flange 110 carried by the upper section 106. Also a packing ring, or the like, not shown, may be provided between the adjacent flanges 109 and 110 or between the engaging annular portions of the upper and lower sections 106 and 107 so as to render the interior of the housing 105 fluid tight. The lower section 107 carries a pulley 111 that is preferably formed integrally therewith and is adapted to receive the V-belt 54 in order to provide the direct drive connection between the housing 105 and the tub sleeve that is connected to the spin tub 36, as previously explained.

The upper and lower sections 106 and 107 have substantially centrally disposed upper and lower openings 112 and 113 respectively formed therein that are arranged in alignment along the vertical axis of the operating element 101 and the housing 105. Also the lower section 107 is provided with an upstanding sleeve 114 disposed concentric with the lower opening 113 and projecting upwardly into the lower portion of the upper section 106. The upper portion of the operating element 101 extends into the lower opening 113 and into the sleeve 114 and mounts the housing 105 for rotation about the centrally disposed vertical axis. More specifically upper and lower bearing elements 115 and 116 are arranged between the adjacent walls of the operating element 101 and the sleeve 114 so that the operating element 101 and the housing 105 may be rotated independently of each other about the centrally disposed vertical axis. Further a suitable packing ring or gland 117 is arranged in the lower opening 113 in order to provide a fluid seal between the operating element 101 and the lower section 107.

The upper and lower sections 106 and 107 are hollow; and a substantially annular reservoir 118 is provided in the lower section 107 in surrounding relation with respect to the upstanding sleeve 114, whereby the upper end of the upstanding sleeve 114, as well as the upper end of the operating element 101, project above the reservoir 118 and into the lower portion of the upper section 106. The upper end of the operating element 101 carries an annular plate 119 disposed above the reservoir 118 and arranged within the upper section 106. More specifically, the upper end of the operating element 101 and the plate 119 are secured together by a threaded connection therebetween, indicated generally at 120, whereby the plate 119 is rigidly secured to the upper end of the operating element 101 and is rotatable therewith about the centrally disposed vertical axis.

A substantially annular member 121 is arranged within the upper section 106 and mounted for rotation inde-

pendent of both the operating element **101** and the housing **105**. Also the member **121** is mounted for longitudinal sliding movement along the centrally disposed vertical axis toward and away from the plate **119** into respective clutched and declutched positions. More specifically a substantially centrally disposed cylindrical bore **122** is formed in the upper end of the operating element **101**; and an upstanding downwardly projecting shaft **123** is rigidly secured within a substantially centrally disposed hole formed in the member **121**. The downwardly projecting shaft **123** extends into the bore **122** and is retained in place by a bearing sleeve **124** arranged between the wall of the bore **122** and the wall of the shaft **123**. Moreover the lower end of the shaft **123** is supported by a ball **125** arranged in the lower portion of the bore **122**, which ball **125** is supported upon a compression coil spring **126** arranged in the lower end of the bore **122**. Thus it will be understood that the member **121** is rigidly secured to the shaft **123** and that the shaft **123** is mounted for rotation and sliding movement longitudinally of the centrally disposed vertical axis within the bearing sleeve **124**. The ball **125** and the associated compression spring **126** not only support the lower end of the shaft **123**, but also urge it upwardly, whereby the member **121** is normally biased away from the cooperating plate **119**. More particularly, a substantially annular tapered bore or clutch surface **127** is provided in the lower portion of the member **121**; and a cooperating substantially annular tapered clutch surface **128** is provided upon the periphery of the annular plate **119**. The cooperating clutch surfaces **127** and **128** respectively provided in the member **121** and on the plate **119** are tapered upwardly so that when the member **121** is moved upwardly the clutch surfaces **127** and **128** are disengaged and so that when the member **121** is moved downwardly the clutch surfaces **127** and **128** are engaged.

A ball bearing structure **129** is arranged in the upper opening **112** formed in the upper section **106** and receives and supports an upstanding substantially cylindrical barrel **130** that is disposed in alignment with the centrally disposed vertical axis of the operating element **101** and the housing **105**. More specifically, the outer race of the ball bearing structure **129** is suitably secured to the wall of the upper section **106** surrounding the upper opening **112**; and the inner race of the ball bearing structure **129** receives and supports the cylindrical barrel **130**. Thus is will be understood that the housing **105** may be rotated about the centrally disposed vertical axis independent of the cylindrical barrel **130** upon the ball bearing structure **129**. Preferably the ball bearing structure **129** is of the sealed variety in order to provide a fluid seal about the upper opening **112** around the cylindrical barrel **130**. More particularly the cylindrical barrel **130** may be suitably secured in place by a split ring **131** disposed in an annular groove provided in the lower end of the cylindrical barrel **130** and engaging the lower surface of the inner race of the ball bearing structure **129**. The cylindrical barrel **130** receives a cylindrical plunger **132** that is mounted for sliding movement longitudinally of the centrally disposed vertical axis. The upper end of the plunger **132** projects out of the upper end of the upper opening **112**, and the lower end of the plunger **132** engages a head **133** provided on the upper end of the shaft **123**. The extreme upper end of the cylindrical barrel **130** is bifurcated to provide two laterally spaced-apart ears **134** having a slot therebetween that receives the inner end of an operating member **135**, the inner end of the operating member **135** being pivotally mounted to the ears **134** upon a laterally extending pin **136** extending therebetween. The outer end of the operating member **135** is operatively connected through a suitable coil spring, or the like, to the armature of the electromagnet **57**, as previously explained, and the lower intermediate portion of the operating member **135** engages the upper end of the plunger **132**. Accordingly, it will be understood that when the electromagnet **57** is energized, the outer end of the operating member **135** is pulled downwardly, whereby the operating member **135** pivoting about the pin **136** forces the plunger **132** downwardly in the cylindrical barrel **130**. As the plunger **132** is thus moved downwardly in the cylindrical barrel **130**, the lower end of the plunger **132** engaging the head **133** of the shaft **123** forces the shaft **123** and the member **121** downwardly against the bias of the compression spring **126**, whereby the clutch surfaces **127** and **128** are engaged. On the other hand, when the electromagnet **57** is de-energized, the outer end of the operating member **135** is released, whereby the compression spring **126** may return the shaft **123** and the member **121** upwardly returning the plunger **132** upwardly and pivoting the operating member **135** upwardly about the pin **136**, whereby the clutch surfaces **127** and **128** are disengaged.

The reservoir **118** contains a body of fluid **137**, such, for example, as a quantity of oil or other hydraulic medium. The upper level of the body of fluid **137** is disposed slightly below the junction between the upper and lower sections **106** and **107** so that the member **121** is disposed above and normally entirely out-of-contact with the body of fluid **137** arranged in the reservoir **118**. The lower section **107** carries a plurality of circumferentially spaced-apart main driven blades **138** disposed interiorly of the reservoir **118** and substantially completely submerged in the body of fluid **137** contained therein; and likewise the member **121** carries a plurality of circumferentially spaced-apart main drive blades **139** disposed above and exteriorly of the reservoir **118** and cooperating with the main driven blades **138**. Thus the drive blades **139** carried by the member **121** are disposed above and out-of-contact with the driven blades **138** carried by the lower section **107**, an annular space **140** being provided between the sets of blades **138** and **139**. The arrangement described above permits free rotation of the member **121** and the drive blades **139** carried thereby with respect to the lower section **107** and the driven blades **138** carried thereby.

A pair of diametrically opposed start blades or projections **141** are carried by the member **121** and extend downwardly into the reservoir **118**, whereby the lower ends of the start blades **141** are submerged in the body of fluid **137** arranged in the reservoir **118**. Further an upstanding substantially cylindrical baffle **142** is provided in the reservoir **118** in surrounding relation with respect to the sleeve **114** and disposed intermediate the sleeve **114** and the driven blades **138** carried by the lower section **107**. The start blades **141** bring about the deflection of the fluid **137** from the reservoir **118** into the space **140** between the drive blades **139** and the driven blades **138** when the member **121** is operated into its clutched position with respect to the plate **119** as explained more fully below.

Considering now the operation of the clutch and fluid drive unit **100**, it will be understood that the member **121** normally occupies its declutched position with respect to the plate **119**, the clutched position of the member **121** with respect to the plate **119** being illustrated in Fig. 2. At this time, the operating electric drive motor **42** effects rotation of its operating shaft **43** and the consequent rotation of the operating element **101** that is rigidly secured thereto, whereby the pulley **103** is directly rotated with the operating element **101** in an obvious manner. However, at this time, the member **121** occupies its declutched position with respect to the plate **119**, whereby the plate **119** rotating with the operating element **101** does not effect rotation of the member **121** or of the housing **105** so that the member **121** and the housing **105** remain stationary at this time. Now when it is desired to rotate the housing **105**, the electromagnet **57** is energized so that the operating member **135** is moved downwardly pivoting about the pin **136** and forcing the plunger **132** downwardly so that the shaft **123** and the member **121**

are moved downwardly against the bias of the compression spring **126**. As the member **121** is thus moved downwardly, the clutch surfaces **127** and **128** are engaged, whereby the member **121** is rotated with the plate **119**. As the member **121** is thus rotated, the start blades **141** deflect the fluid **137** contained in the reservoir **118** outwardly into the annular space **140** disposed between the drive blades **139** and the driven blade **138**, whereby the drive blades **139** exert a torque through the fluid **137** upon the driven blades **138** causing rotation of the housing **105** to be initiated. Also any of the fluid **137** in the reservoir **118** that is deflected inwardly toward the cylindrical baffle **142** is deflected thereby upwardly and outwardly toward the drive blades **139** and thence into the annular space **140** in order further to improve the drive through the fluid **137** between the blades **139** and **138**. In passing, it is pointed out that the normal level of the fluid **137** is slightly above the upper end of the cylindrical baffle **142** and slightly below the junction between the upper and lower sections **106** and **107**, as previously noted. Thus the arrangement of the cylindrical baffle **142** further insures that the drive blades **139** exert torque through the fluid **137** upon the driven blade **138**.

When rotation of the housing **105** is thus initiated, the fluid **137** contained in the reservoir **118** is flung outwardly by centrifugal force into the annular space **140** thereby further to insure the drive relationship between the blades **139** and **138**. Accordingly the housing **105** is gradually accelerated and ultimately rotates at a speed somewhat below that of the member **121** and the operating shaft **43** of the electric drive motor **42**, in view of the fact that there is always some slippage between the drive blades **139** and the driven blades **138**. Moreover, the rotating housing **105** effects rotation of the pulley **111** carried thereby and the consequent rotation of the spin tub **36**.

Further it will be understood that the arrangement of the clutch and fluid drive unit **100** between the operating shaft **43** of the electric drive motor **42** and the spin tub **36** not only provides for very gradual acceleration of the spin tub **36** when the member **121** is moved into clutched relation with respect to the plate **119**, but the unit **100** also compensates for any unbalance of the spin tube **36** and the contained load of clothes since the slippage between the drive blades **139** and the driven blades **138** is dependent upon the load that is imposed upon the pulley **111** carried by the housing **105**. Thus in the event of an uneven distribution of the clothes in the spin tub **36**, the resultant unbalanced load imposed upon the housing **105** will be greater than normal, whereby the amount of slippage between the drive blades **139** and the driven blades **138** will be greater than normal so that the electric drive motor **42** will spin the spin tub **36** at a lower than normal speed. However, as the rinse water is centrifugally discharged from the load of clothes contained in the spinning spin tub **36**, the unbalance of the spin tub **36** and the load of clothes contained therein is reduced effecting a corresponding reduction in the load imposed upon the housing **105**, whereby the amount of slippage between the drive blades **139** and driven blades **138** is decreased so that the electric drive motor **42** spins the spin tub **36** at a greater speed. This automatic compensation for unbalance of the spin tub **36** and the load of contained clothes that is brought about by the unit **100** is very advantageous as it prevents excessive vibration of the spin tub **36**, notwithstanding an initial abnormal unbalance of the spin tub **36** and the contained load of clothes.

Subsequently when it is desired to arrest a spinning operation of the spin tub **36**, the electromagnet **57** is deenergized, whereby the compression spring **126** returns the shaft **123** and the member **121** upwardly so that the member **121** is moved into its normal declutched position disengaging the clutch surfaces **127** and **128**. When the member **121** is thus declutched from the plate **119**, continued rotation of the operating element **101** by the operating shaft **43** of the electric drive motor **42** is not effective to transmit any torque to the member **121**, whereby no torque is transmitted to the housing **105** so that the member **121** and the housing **105** consequently assume a rest position along with the spin tub **36**. In fact, the frictional forces that are normally exerted upon the spin tub **36** arrest rotation thereof shortly after the member **121** is declutched from the plate **119** and the spin tub **36** in its rest position arrests rotation of the housing **105** by virtue of the drive connection therebetween including the flexible belt **54**.

Finally it is noted that the clutch and fluid drive unit **100** may be readily filled with the fluid **137** after the parts have been assembled by virtue of the arrangement of a threaded filling opening **150** that is provided in a centrally disposed boss **151** carried upon the upper portion of the upper section **106**, the threaded opening **150** normally receiving a cooperating threaded plug **152**. Also an annular series of holes **153** are formed in the central portion of the member **121**, and an annular series of holes **154** are formed in the plate **119**, so as to permit the direct and ready return of the fluid **137** from the upper portion of the housing **105** back into the reservoir **118** when rotation of the housing **105** is arrested. In the construction of the unit **100**, the upper and lower housing sections **106** and **107** may be formed of die-cast aluminum, or the like; while the plate **119**, the operating element **101**, the shaft **123** and the plunger **132** are preferably formed of steel.

Referring now to Figs. 3 and 4, the clutch and brake and fluid drive unit **200** there illustrated, and embodying the features of the present invention, may be substituted in the machine **10** for the clutch and fluid drive unit **100**. The unit **200** embodies fundamentally the same construction as the unit **100** with the addition of the associated brake structure. In the interest of brevity, only the basic outline of the unit **200** will be described since the principal elements thereof perform the essential functions of the corresponding elements in the unit **100**. Thus the unit **200** comprises the operating element **201**, the plate **219**, the member **221**, the housing **205** including the upper and lower sections **206** and **207**, the shaft **223**, the plunger **232**, the compression spring **226**, the reservoir **218** containing the body of fluid **237**, the drive blades **239**, the driven blades **238**, and the start blades **241**.

Also in the unit **200**, the upper portion of the upper section **206** is provided with an annular brake surface **260** that surrounds a centrally disposed thimble or collar **261** that supports the plunger **232**. Operatively associated with the brake surface **260** provided on the upper portion of the upper section **206** is a brake shoe **262** that is provided with a lower brake lining **263**.

In this case, the upstanding structure **21** provided in the machine **10** also comprises an upstanding standard **264** that may be in the form of a tube, which standard **264** carries a bracket **265** that projects over the housing **205**. Preferably the bracket **265** is hollow, and arranged therein is an operating member **266**, the inner end of the operating member **266** being pivotally mounted upon the bracket **265** by a pivot pin **267**, and the outer end of the operating member **266** being connected by an associated coil spring, or the like, to the armature of the electromagnet **57**. Also the lower portion of the bracket **265** carries a pair of depending tabs **268**, upon which an operating lever **269** is pivotally mounted intermediate its ends upon a pivot pin **270**. The inner end of the operating lever **269** is pivotally connected by a pivot pin **271** to a pair of upstanding lugs **272** that are secured to the upper portion of the brake shoe **262**, whereby the brake shoe **262** is supported by the operating lever **269**. The outer end of the operating lever **269** cooperates with the upper end of a compression coil spring **273** that is arranged in the upper end of the standard **264**; and an adjustable screw **274** is carried by the operating lever **269** and arranged in abutting relation with respect to the operating member **266**. Finally the operating member **266** carries

a pivot plate 275 that engages the upper end of the plunger 232 that is slidably supported in the collar 261.

In view of the foregoing description of the unit 200, it will be understood that the member 221 normally occupies its declutched position with respect to the plate 219 and the brake shoe 262 normally occupies its engaged position with respect to the brake surface 260 provided on the upper section 206 of the housing 205, the member 221 being illustrated in its clutched position with respect to the plate 219 and the brake shoe 262 being illustrated in its disengaged position with respect to the brake surface 260 in Fig. 3. When it is desired to rotate the spin tub 36, the electromagnet 57 is energized, whereby the outer end of the operating member 266 is moved downwardly, the operating member 266 pivoting about the pin 267, whereby the pivot plate 275 engaging the upper end of the plunger 232 moves the plunger 232 downwardly in order to effect movement of the shaft 223 and the member 221 downwardly so as to clutch the member 221 to the plate 219. Also when the outer end of the operating member 266 is moved downwardly, the intermediate portion thereof engages the upper end of the screw 274 in order to rotate the operating lever 269 in the clockwise direction about the pin 270, as viewed in Fig. 3, against the bias of the compression spring 273. When the operating lever 269 is thus pivoted in the clockwise direction about the pin 270, the inner end thereof is moved upwardly, whereby the pin 271 lifts the brake shoe 262 through the lugs 272 into disengaged relation with respect to the brake surface 260. Accordingly at this time, the member 221 rotating with the operating element 201 effects rotation of the housing 205 through the fluid 237 coupling the drive blades 239 and the driven blades 238, the housing 205 being free to rotate at this time since the brake shoe 262 occupies its disengaged position with respect to the brake surface 260. Hence the electric drive motor 42 rotates the spin tub 36 through the unit 200.

When it is desired to arrest spinning of the spin tub 36, the electromagnet 57 is de-energized, whereby the compression spring 273 returns the operating lever 269 in the counterclockwise direction about the pin 270, as viewed in Fig. 3, so that the inner end of the operating lever 269 is moved downwardly causing the brake shoe 262 to engage the associated brake surface 260 provided on the upper portion of the upper section 206 of the housing 205. Also as the operating lever 269 is rotated in the counterclockwise direction about the pin 270, the screw 274 engages and forces the operating member 266 upwardly so that the operating member 266 is pivoted about the pin 267 in order to cause the pivot plate 275 to disengage the upper end of the plunger 232 so that the compression spring 226 may return the shaft 223 and the member 221 upwardly causing the member 221 to be moved into declutched position with respect to the plate 219. At this time, the member 221 is not only declutched with respect to the plate 219 so that no torque is exerted between the operating element 201 and the housing 205, but the brake shoe 262 occupies its engaged position with respect to the brake surface 260. Thus the kinetic energy of the spin tub 36 is dissipated in the brake lining 263 of the brake shoe 263 in direct engagement with the brake surface 260 provided on the upper section 206 of the housing 205 by virtue of the drive connection between the housing 205 and the tub sleeve that is attached to the spin tub 36. This arrangement positively insures that spinning of the spin tub 36 is arrested in an extremely short interval of time following the de-energization of the electromagnet 57.

In view of the foregoing, it is apparent that there had been provided in a clothes washing machine of the type in which the clothes are washed, rinsed and centrifugally dried in a receptacle or tub, an improved clutch and fluid drive unit or alternatively an improved clutch and brake and fluid drive unit, each of the units being of improved and simplified construction and arrangement.

While there has been described what is at present considered to be the preferred embodiment of the invention, it will be understood that various modifications may be made therein, and it is intended to cover in the appended claims all such modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. A clutch and fluid drive unit comprising an upstanding enclosing housing including a bottom wall having a first substantially centrally disposed opening formed therein and a top wall having a second substantially centrally disposed opening formed therein and mounted for rotation about a substantially vertical axis extending through said openings, an upstanding drive element having an upper end extending through said first opening into said housing and mounted for rotation about said vertical axis independently of said housing, upstanding bearing structure arranged between said housing and said drive element, structure defining a substantially annular and horizontally disposed reservoir in the lower portion of said housing surrounding and out of contact with said drive element, a substantially annular and horizontally disposed member arranged in said housing above said reservoir and mounted for rotation about said vertical axis independently of said housing and said drive element, upstanding bearing structure aranged between said drive element and said member, an upstanding operating element having a lower end extending through said second opening into said housing and mounted for movement along said vertical axis, upstanding bearing structure arranged between said housing and said operating element, means responsive to movement of said operating element into a first position for clutching said member to said drive element and responsive to movement of said operating element into a second position for declutching said member from said drive element, said member rotating with drive element when it is clutched thereto, a plurality of annularly disposed upstanding drive blades carried by said member above said reservoir, a plurality of annularly disposed upstanding driven blades carried by said housing within said reservoir, said drive blades being disposed in cooperating relation with said driven blades and spaced thereabove a short distance, a fixed charge of fluid confined in said housing and arranged in said reservoir in contact with said driven blades and normally out of contact with said drive blades to permit free rotation of said drive blades with respect to said driven blades, and means including start blades carried by said member and depending into said reservoir and responsive to rotation of said member with said drive element for deflecting the fluid from said reservoir into the space between said drive blades and said driven blades in order to cause said drive blades to exert a torque through the fluid upon said driven blades so as to effect rotation of said housing.

2. A clutch and fluid drive unit comprising an upstanding enclosing housing including a bottom wall having a first substantially centrally disposed opening formed therein and a top wall having a second substantially centrally disposed opening formed therein and mounted for rotation above a substantially vertical axis extending through said openings, an upstanding drive element having an upper end extending through said first opening into said housing and mounted for rotation about said vertical axis independently of said housing, upstanding bearing structure arranged between said housing and said drive element, structure defining a substantially annular and horizontally disposed reservoir in the lower portion of said housing surrounding and out of contact with said drive element, a substantially annular and horizontally disposed member arranged in said housing above said reservoir and mounted for rotation about said vertical axis independently of said housing and said drive element, upstanding bearing structure arranged between said drive element and said member, an upstanding operating element having a lower end extending through said second opening into

said housing and mounted for movement along said vertical axis, upstanding bearing structure arranged between said housing and said operating element, means responsive to movement of said operating element into a first position for clutching said member to said drive element and responsive to movement of said operating element into a second position for declutching said member from said drive element, said member rotating with drive element when it is clutched thereto, a spring normally biasing said operating element into its second position, means including an operating member for moving said operating element against the bias of said spring from its second position into its first position, a plurality of annularly disposed upstanding drive blades carried by said member above said reservoir, a plurality of annularly disposed upstanding driven blades carried by said housing within said reservoir, said drive blades being disposed in cooperating relation with said driven blades and spaced thereabove a short distance, a fixed charge of fluid confined in said housing and arranged in said reservoir in contact with said driven blades and normally out of contact with said drive blades to permit free rotation of said drive blades with respect to said driven blades, and means including start blades carried by said member and depending into said reservoir and responsive to rotation of said member with said drive element for deflecting the fluid from said reservoir into the space between said drive blades and said driven blades in order to cause said drive blades to exert a torque through the fluid upon said driven blades so as to effect rotation of said housing.

3. A clutch and fluid drive unit comprising an upstanding enclosing housing including a bottom wall having a first substantially centrally disposed opening formed therein and a top wall having a second substantially centrally disposed opening formed therein and mounted for rotation about a substantially vertical axis extending through said openings, an upstanding drive element having an upper end extending through said first opening into said housing and mounted for rotation about said vertical axis independently of said housing, upstanding bearing structure arranged between said housing and said drive element, structure defining a substantially annular and horizontally disposed reservoir in the lower portion of said housing surrounding and out of contact with said drive element, a substantially annular and horizontally disposed member arranged in said housing above said reservoir and mounted for rotation about said vertical axis independently of said housing and said drive element, upstanding bearing structure arranged between said drive element and said member, an upstanding bearing sleeve arranged in said second opening, an upstanding operating element arranged in said bearing sleeve and mounted for movement along said vertical axis, the lower end of said operating element projecting into said housing and the upper end of said operating element projecting out of said housing, means including an operating member cooperating with the upper end of said operating element for moving said operating member, means responsive to movement of said operating element into a first position for clutching said member to said drive element and responsive to movement of said operating element into a second position for declutching said member from said drive element, said member rotating with drive element when it is clutched thereto, a plurality of annularly disposed upstanding drive blades carried by said member above said reservoir, a plurality of annularly disposed upstanding driven blades carried by said housing within said reservoir, said drive blades being disposed in cooperating relation with said driven blades and spaced thereabove a short distance, a fixed charge of fluid confined in said housing and arranged in said reservoir in contact with said driven blades and normally out of contact with said drive blades to permit free rotation of said drive blades with respect to said driven blades, and means including start blades carried by said member and depending into said reservoir and responsive to rotation of said member with said drive element for deflecting the fluid from said reservoir into the space between said drive blades and said driven blades in order to cause said drive blades to exert a torque through the fluid upon said driven blades so as to effect rotation of said housing.

4. A clutch and fluid drive unit comprising an upstanding enclosing housing including a bottom wall having a first substantially centrally disposed opening formed therein and a top wall having a second substantially centrally disposed opening formed therein and mounted for rotation about a substantially vertical axis extending through said openings, an upstanding drive element having an upper end extending through said first opening into said housing and mounted for rotation about said vertical axis independently of said housing, upstanding bearing structure arranged between said housing and said drive element, structure defining a substantially annular and horizontally disposed reservoir in the lower portion of said housing surrounding and out of contact with said drive element, a substantially annular and horizontally disposed member arranged in said housing above said reservoir and mounted for rotation about said vertical axis independently of said housing and said drive element, upstanding bearing structure arranged between said drive element and said member, an upstanding bearing sleeve arranged in said second opening, upstanding bearing structure arranged between said housing and said bearing sleeve, an upstanding operating element arranged in said bearing sleeve and mounted for movement along said vertical axis, the lower end of said operating element projecting into said housing and the upper end of said operating element projecting out of said housing, an upstanding bracket carried by said bearing sleeve, means including an operating member pivoted to said bracket and cooperating with the upper end of said operating element for moving said operating element, means responsive to movement of said operating element into a first position for clutching said member to said drive element and responsive to movement of said operating element into a second position for declutching said member from said drive element, said member rotating with drive element when it is clutched thereto, a plurality of annularly disposed upstanding drive blades carried by said member above said reservoir, a plurality of annularly disposed upstanding driven blades carried by said housing within said reservoir, said drive blades being disposed in cooperating relation with said driven blades and spaced thereabove a short distance, a fixed charge of fluid confined in said housing and arranged in said reservoir in contact with said driven blades and normally out of contact with said drive blades to permit free rotation of said drive blades with respect to said driven blades, and means including start blades carried by said member and depending into said reservoir and responsive to rotation of said member with said drive element for deflecting the fluid from said reservoir into the space between said drive blades and said driven blades in order to cause said drive blades to exert a torque through the fluid upon said driven blades so as to effect rotation of said housing.

5. A clutch and fluid drive unit comprising an upstanding enclosing housing including a bottom wall having a first substantially centrally disposed opening formed therein and a top wall having a second substantially centrally disposed opening formed therein and mounted for rotation about a substantially vertical axis extending through said openings, an upstanding drive element having an upper end extending through said first opening into said housing and mounted for rotation about said vertical axis independently of said housing, upstanding bearing structure arranged between said housing and said drive element, structure defining a substantially annular and horizontally disposed reservoir in the lower portion of said housing surrounding and out of contact with said drive element, a substantially annular and horizontally disposed member arranged in said housing above said reservoir and

mounted for rotation about said vertical axis independently of said housing and said drive element, upstanding bearing structure arranged between said drive element and said member, said member also being mounted for movement along said vertical axis into clutched and declutched positions with respect to said drive element, said member being rotated with said drive element when it is moved into its clutched position with respect thereto, an upstanding bearing sleeve arranged in said second opening, an upstanding operating element arranged in said bearing sleeve and mounted for movement along said vertical axis, the lower end of said operating element projecting into said housing and the upper end of said operating element projecting out of said housing, means including an operating member cooperating with the upper end of said operating element for moving said operating member, the lower end of said operating element cooperating with said member and moving it between its declutched and clutched positions with respect to said drive element, a plurality of annularly disposed upstanding drive blades carried by said member above said reservoir, a plurality of annular disposed upstanding driven blades carried by said housing within said reservoir, said drive blades being disposed in cooperating relation with said driven blades and spaced thereabove a short distance, a fixed charge of fluid confined in said housing and arranged in said reservoir in contact with said driven blades and normally out of contact with said drive blades to permit free rotation of said drive blades with respect to said driven blades, and means including start blades carried by said member and depending into said reservoir and responsive to rotation of said member with said drive element for deflecting the fluid from said reservoir into the space between said drive blades and said driven blades in order to cause said drive blades to exert a torque through the fluid upon said driven blades so as to effect rotation of said housing.

6. A clutch and fluid drive unit comprising an upstanding enclosing housing including a bottom wall having a first substantially centrally disposed opening formed therein and a top wall having a second substantially centrally disposed opening formed therein and mounted for rotation about a substantially vertical axis extending through said openings, an upstanding drive element having an upper end extending through said first opening into said housing and mounted for rotation about said vertical axis independently of said housing, upstanding bearing structure arranged between said housing and said drive element, structure defining a substantially annular and horizontally disposed reservoir in the lower portion of said housing surrounding and out of contact with said drive element, the upper end of said drive element having a substantially centrally disposed longitudinally extending bore formed therein, a substantially annular and horizontally disposed member arranged in said housing above the upper end of said drive element and said reservoir, an upstanding bearing shaft rigidly secured to said member and projecting downwardly into said bore, upstanding bearing structure arranged in said bore between said drive element and said bearing shaft mounting said member for rotation about said vertical axis independently of said housing and said drive element and mounting said member for movement along said vertical axis into clutched and declutched positions with respect to said drive element, said member being rotated with said drive element when it is moved into its clutched position with respect thereto, an upstanding bearing sleeve arranged in said second opening, an upstanding operating element arranged in said bearing sleeve and mounted for movement along said vertical axis, the lower end of said operating element projecting into said housing and the upper end of said operating element projecting out of said housing, means including an operating member cooperating with the upper end of said operating element for moving said operating element, the lower end of said operating element cooperating with said bearing shaft and moving said member between its declutched and clutched positions with respect to said drive element, a plurality of annularly disposed upstanding drive blades carried by said member above said reservoir, a plurality of annularly disposed upstanding driven blades carried by said housing within said reservoir, said drive blades being disposed in cooperating relation with said driven blades and spaced thereabove a short distance, a fixed charge of fluid confined in said housing and arranged in said reservoir in contact with said driven blades and normally out of contact with said drive blades to permit free rotation of said drive blades with respect to said driven blades, and means including start blades carried by said member and depending into said reservoir and responsive to rotation of said member with said drive element for deflecting the fluid from said reservoir into the space between said drive blades and said driven blades in order to cause said drive blades to exert a torque through the fluid upon said driven blades so as to effect rotation of said housing.

7. A clutch and fluid drive unit comprising a housing having a first substantially centrally disposed opening formed in the bottom thereof and a second substantially centrally disposed opening formed in the top thereof and mounted for rotation about a substantially vertical axis extending through said openings, a drive element having an upper end extending through said first opening into said housing and mounted for rotation about said vertical axis independently of said housing, bearing structure arranged between said housing and said drive element, structure defining a substantially annular reservoir in the lower portion of said housing surrounding and out of contact with said drive element, the upper end of said drive element having a substantially centrally disposed longitudinally extending bore formed therein, a member arranged in said housing above the upper end of said drive element and said reservoir, a bearing shaft rigidly secured to said member and projecting downwardly into said bore, bearing structure arranged in said bore between said drive element and said bearing shaft mounting said member for rotation about said vertical axis independently of said housing and said drive element, a ball and a supporting spring arranged in said bore between the lower end of said bearing shaft and said drive element mounting said member for movement along said vertical axis into clutched and declutched positions with respect to said drive element, said supporting spring normally biasing said member into its declutched position with respect to said drive element, said member being rotated with said drive element when it is moved into its clutched position with respect thereto, a bearing sleeve arranged in said second opening, an operating element arranged in said bearing sleeve and mounted for movement along said vertical axis, the lower end of said operating element projecting into said housing and the upper end of said operating element projecting out of said housing, means including an operating member cooperating with the upper end of said operating element for moving said operating element, the lower end of said operating element cooperating with said bearing shaft and moving said member against the bias of said spring from its declutched position into its clutched position with respect to said drive element, a plurality of annularly disposed drive blades carried by said member interiorly of said reservoir, a plurality of annularly disposed driven blades carried by said housing exteriorly of said reservoir, said drive blades being disposed in cooperating relation with said driven blades and spaced thereabove a short distance, a body of fluid arranged in said reservoir and normally out of contact with said drive blades to permit free rotation of said drive blades with respect to said driven blades, and means responsive to rotation of said member with said drive element for deflecting the fluid from said reservoir into the space between said drive blades and said driven blades in order to cause said drive blades to exert a torque

through the fluid upon said driven blades so as to effect rotation of said housing.

8. A clutch and brake and fluid drive unit comprising a housing having a substantially centrally disposed opening formed therein and mounted for rotation about a substantially vertical axis, a drive element extending through said opening into said housing and mounted for rotation about said vertical axis independently of said housing, structure defining a substantially annular reservoir in the lower portion of said housing surrounding and out of contact with said drive element, a member arranged in said housing above said reservoir and mounted for rotation about said vertical axis independently of said housing and said drive element, said housing having a brake surface formed thereon, a brake shoe cooperating with said brake surface, mechanism operative to a first position to clutch said member to said drive element and to disengage said brake shoe from said brake surface and operative to a second position to declutch said member from said drive element and to engage said brake shoe with said brake surface, said member being rotated with said drive element when it is clutched thereto, means for selectively operating said mechanism into its first and second positions, a plurality of annularly disposed drive blades carried by said member exteriorly of said reservoir, a plurality of annularly disposed driven blades carried by said housing interiorly of said reservoir, said drive blades being disposed in cooperating relation with said driven blades and spaced thereabove a short distance, a body of fluid arranged in said reservoir and normally out of contact with said drive blades to permit free rotation of said drive blades with respect to said driven blades, and means responsive to rotation of said member with said drive element for deflecting the fluid from said reservoir into the space between said drive blades and said driven blades in order to cause said drive blades to exert a torque through the fluid upon said driven blades so as to effect rotation of said housing.

9. A clutch and brake and fluid drive unit comprising a housing having a first substantially centrally disposed opening formed in the bottom thereof and a second substantially centrally disposed opening formed in the top thereof and mounted for rotation about a substantially vertical axis extending through said openings, a drive element having an upper end extending through said first opening into said housing and mounted for rotation about said vertical axis independently of said housing, bearing structure arranged between said housing and said drive element, structure defining a substantially annular reservoir in the lower portion of said housing surrounding and out of contact with said drive element, a member arranged in said housing above the upper end of said drive element and said reservoir and mounted for rotation about

said vertical axis independently of said housing and said drive element, bearing structure arranged between said drive element and said member, an operating element having a lower end extending through said second opening into said housing and mounted for movement along said vertical axis, bearing structure arranged between said housing and said operating element, means responsive to movement of said operating element into a first position for clutching said member to said drive element and responsive to movement of said operating element into a second position for declutching said member from said drive element, said member rotating with drive element when it is clutched thereto, said housing having a brake surface formed thereon, a brake shoe cooperating with said brake surface, an operating member having a first position disengaging said brake shoe from said brake surface and a second position engaging said brake shoe with said brake surface, mechanism operative to a first position to operate both said operating element and said operating member into their first positions and operative to a second position to operate both said operating element and said operating member into their second positions, means for selectively operating said mechanism into its first and second positions, a plurality of annularly disposed drive blades carried by said member exteriorly of said reservoir, a plurality of annularly disposed driven blades carried by said housing interiorly of said reservoir, said drive blades being disposed in cooperating relation with said driven blades and spaced thereabove a short distance, a body of fluid arranged in said reservoir and normally out of contact with said drive blades to permit free rotation of said drive blades with respect to said driven blades, and means responsive to rotation of said member with said drive element for deflecting the fluid from said reservoir into the space between said drive blades and said driven blades in order to cause said drive blades to exert a torque through the fluid upon said driven blades so as to effect rotation of said housing.

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