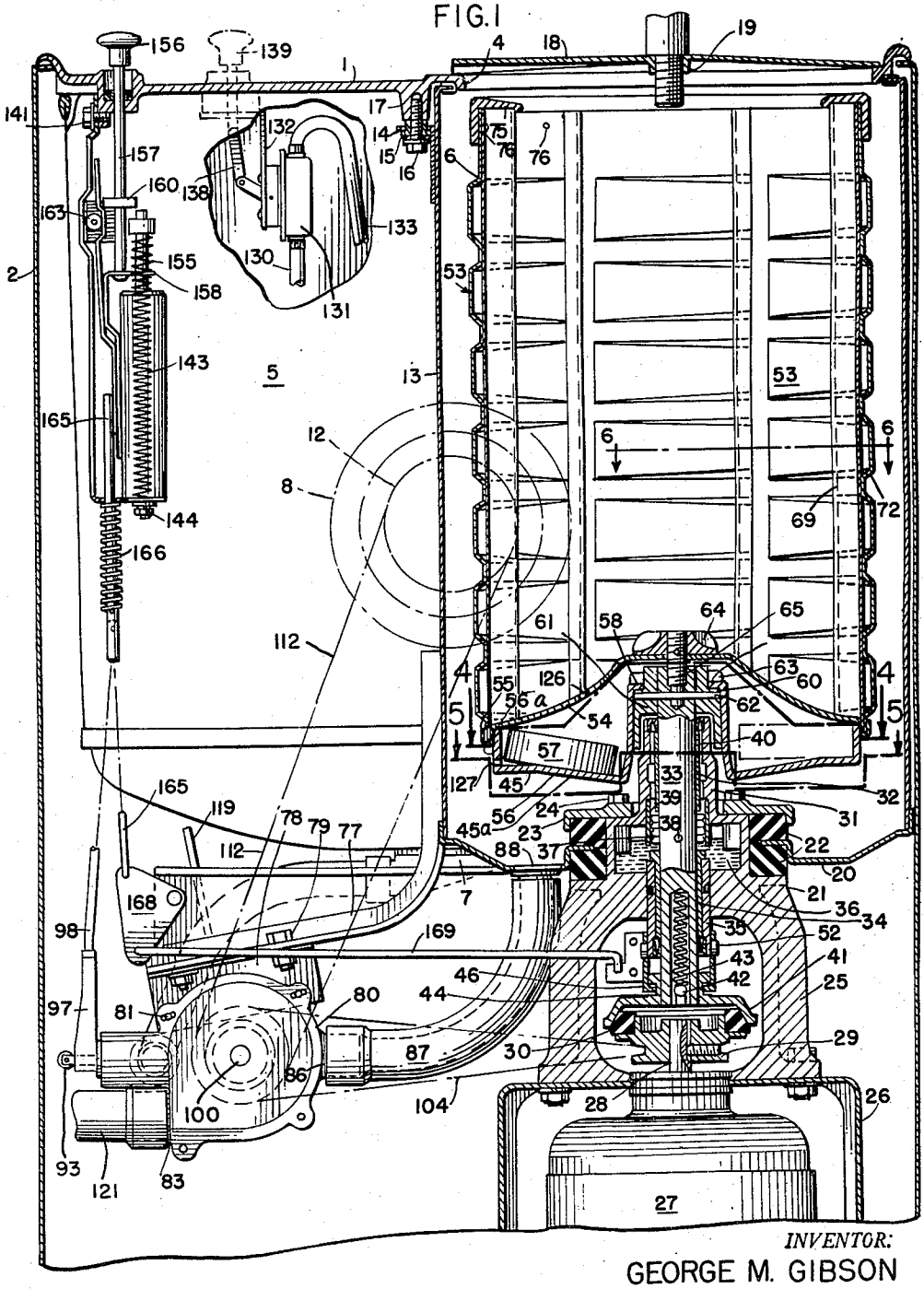
Sept. 15, 1959 G. M. GIBSON 2,904,185

LAUNDERING MACHINES

Filed Feb. 3, 1953 4 Sheets-Sheet 1

FIG. 1



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LAUNDERING MACHINES

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FIG. 2

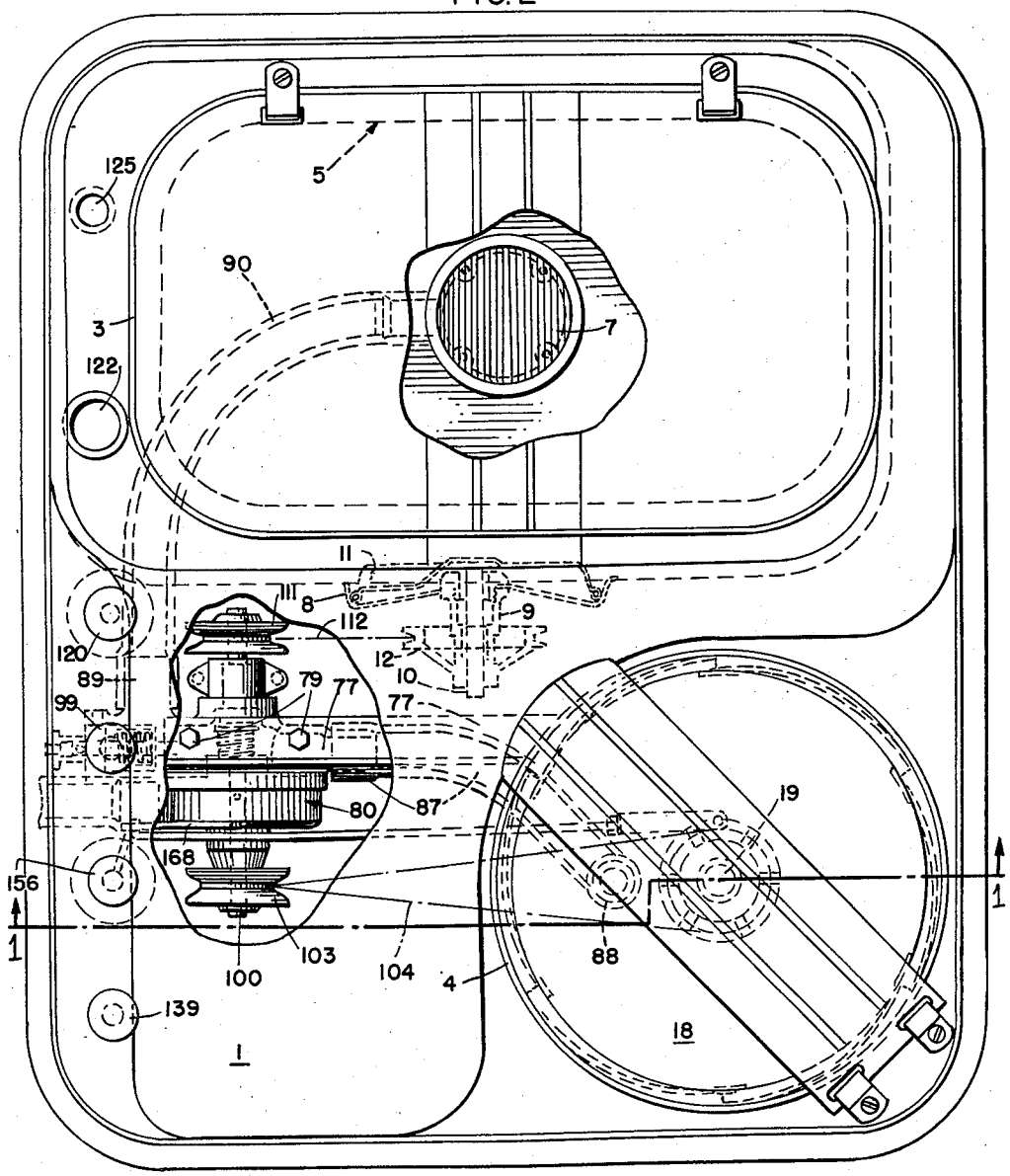
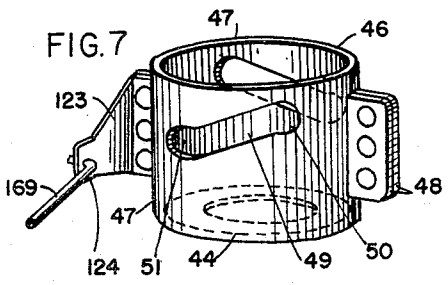


FIG. 7



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LAUNDERING MACHINES

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FIG. 3

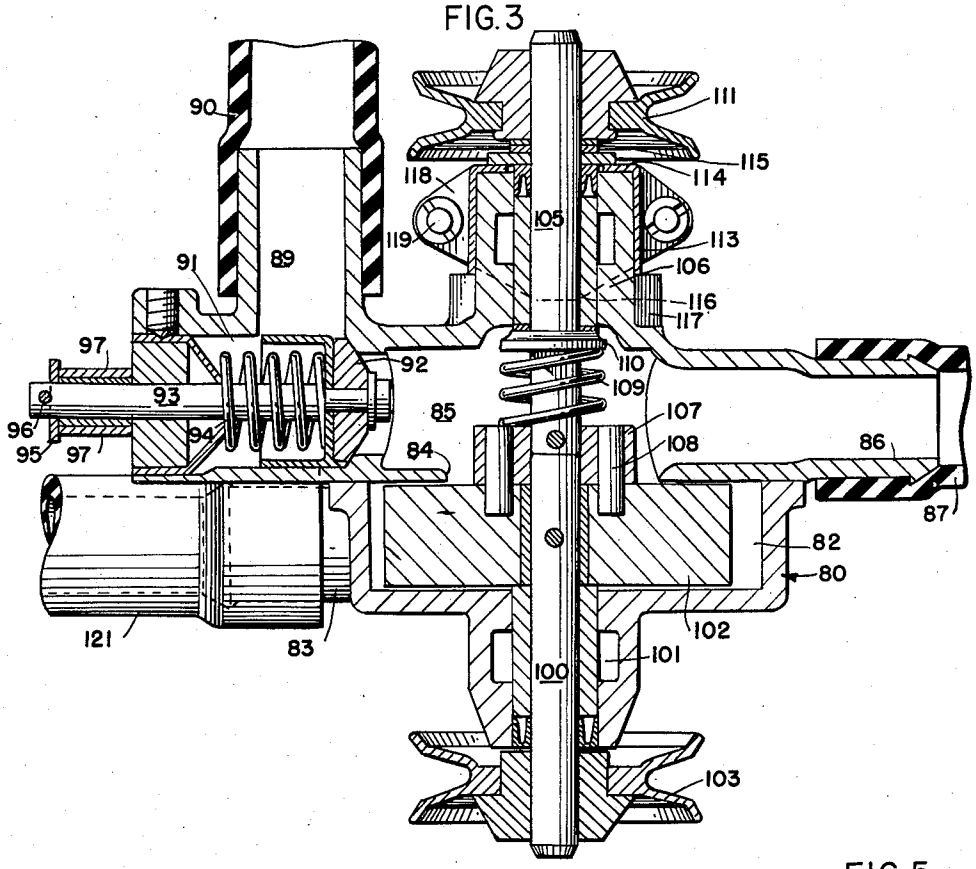


FIG. 4

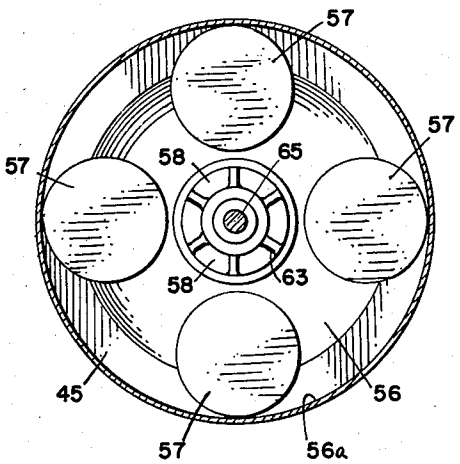
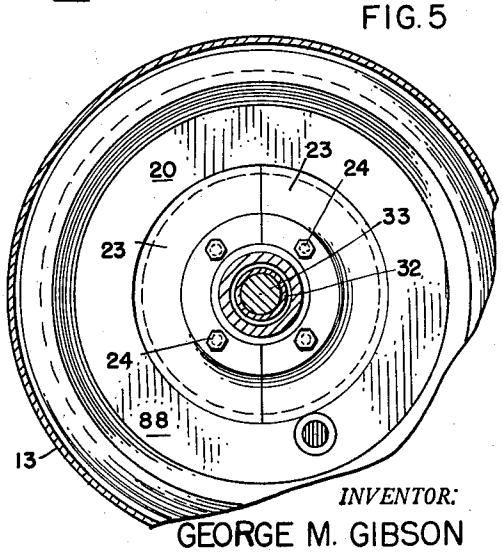


FIG. 5



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LAUNDERING MACHINES

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FIG. 9

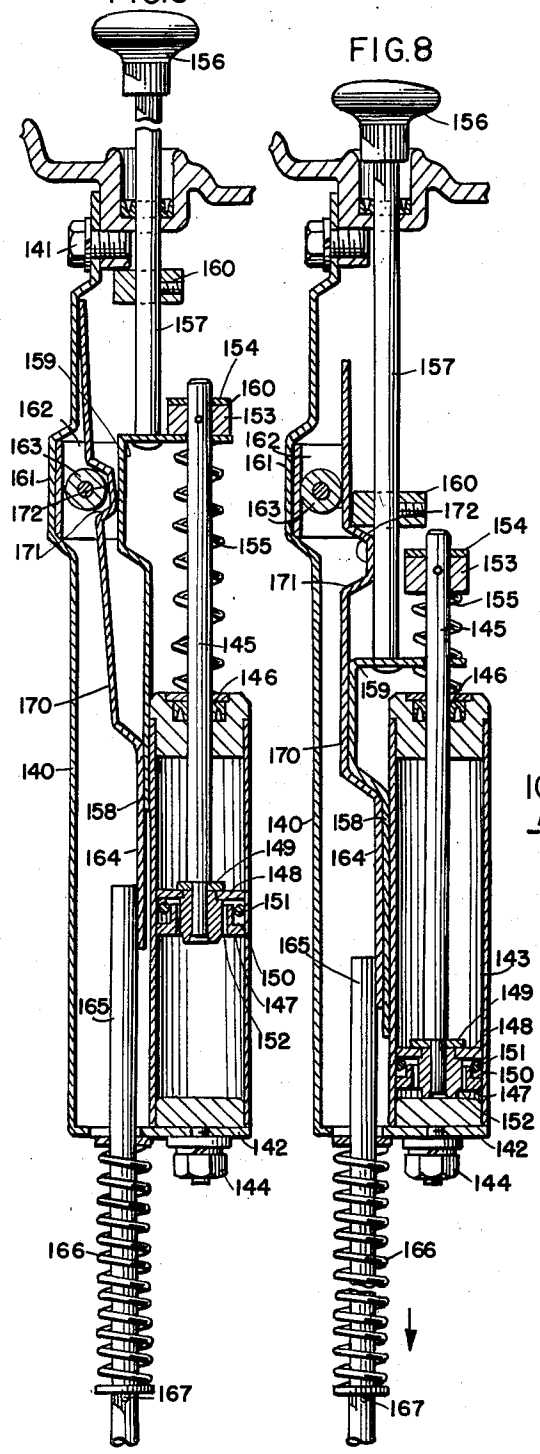
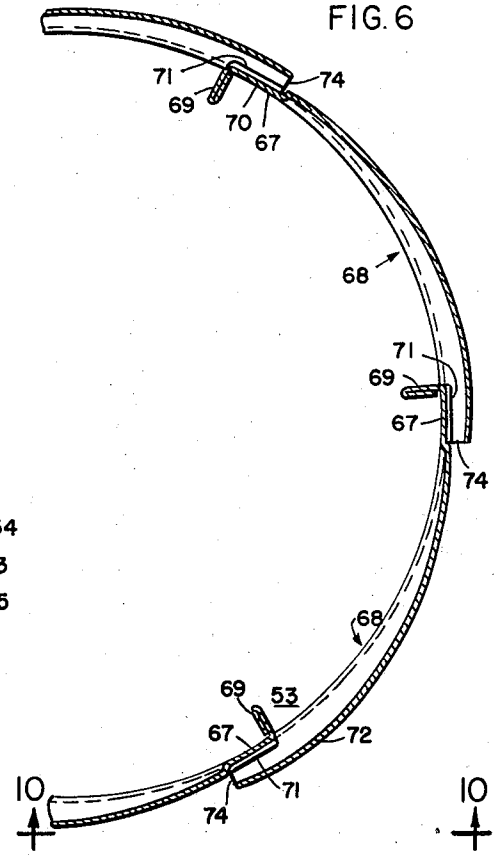


FIG. 8

FIG. 6



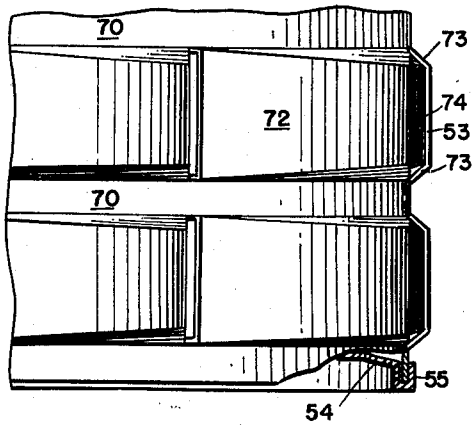


FIG. 10

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United States Patent Office 2,904,185 Patented Sept. 15, 1959

2,904,185

LAUNDERING MACHINES

George M. Gibson, Bellevue, Iowa

Application February 3, 1953, Serial No. 334,879

13 Claims. (Cl. 210—363)

My invention relates to the art of laundering and in particular to a novel, economical apparatus in which clothing and the like may be washed, rinsed, freed of water and partially dried.

It is a particular object of my invention to provide a laundering machine embodying a centrifugal extractor in which clothing is freed of moisture to a degree of dryness suitable for ironing.

It is another object of my invention to provide a laundering machine embodying an extractor of the centrifugal type in which moisture is extracted in liquid phase by centrifugal force and in vapor phase by air induced to flow through the clothing during the extracting process.

It is a more particular object of my invention to provide a centrifugal extractor having a high angular velocity embodying a novel counterbalancing structure which automatically compensates for unequal distribution of the weight of the clothing in the extracting basket and changes in the weight distribution as the extracting process progresses.

It is another object of my invention to provide a laundering machine embodying a washing machine and a centrifugal extracting mechanism and drive motor therefor, mounted resiliently to move independently of the washing machine and embodying a controllable drive from the motor to the washing machine which is not adversely affected by movement of the drive motor relative to the washing mechanism.

Still another object of my invention is to provide a centrifugal extracting mechanism having a timing control governed by the movement of a spring urged porous piston through a body of liquid and incorporating a release mechanism providing a manually operated means for stopping the extractor independently of the timing mechanism without stopping the drive motor.

It is a further object of my invention to provide a centrifugal extractor balancing mechanism having a plurality of movable weights so mounted that the weights are subjected to a high frictional resistance as long as the angular velocity of the extractor is below a predetermined value and are freed of the frictional resistance when the angular velocity exceeds such value to counteract unbalance in the extractor.

Other objects and advantages of the invention will become apparent as the description proceeds when taken with the accompanying drawing in which:

Figure 1 is a sectional elevation taken substantially along line 1—1 in Fig. 2 and through a laundering machine embodying my invention and particularly illustrating my novel extracting mechanism.

Figure 2 is a top plan view of my apparatus with certain parts broken away to reveal underlying structures.

Figure 3 is a sectional view drawn to an enlarged scale of a pump and drive control for a washing machine.

Figure 4 is a sectional view taken on the line 4—4 of Figure 1 looking in the direction of the arrows.

Figure 5 is a sectional view taken on the line 5—5 of Figure 1 looking in the direction of the arrows.

Figure 6 is a sectional view taken on the line 6—6 of Figure 1 looking in the direction of the arrows.

Figure 7 is a perspective view on an enlarged scale of a clutch actuator.

Figure 8 is a sectional view on an enlarged scale of a timing control for the extracting apparatus shown in inactive condition.

Figure 9 is a view similar to Figure 10 showing the timer control in active condition, and

Figure 10 is a view taken on the line 10—10 of Figure 6 looking in the direction of the arrows.

Referring now to the drawing in detail and first to Figure 1 thereof my apparatus generally comprises a frame structure composed of a rigid, preferably cast, top plate 1 which supports all functional parts of my apparatus and is in turn supported by a peripheral skirt 2 which will be mounted on any suitable type of floor support. The plate 1 is formed with openings 3 and 4 providing access to a washing tub 5 and an extracting mechanism 6, respectively. My apparatus also includes a drive motor, pump and control mechanisms to be described hereinafter.

The washing machine per se is the type described and claimed in my Patent #2,478,188 issued August 9, 1949, for "Method of and Apparatus for Washing Fabrics." The tub 5 is suspended by brackets, not shown, or any other suitable means from the underside of the plate 1. The bottom central portion of tub 5 is provided with a drain fitting 7. One side wall of the tub is indented at 8 and carries a bearing structure 9 which rotatably supports a shaft 10. An impeller agitator 11 is carried by the shaft 10 in the indentation 8 and a drive pulley 12 is mounted on the shaft 10 exteriorly of the tub 5. In operation, the impeller 11 is preferably submerged below the washing liquid and is rotated in a unidirectional manner by a means to be described.

The extractor 6 comprises a cylindrical outer casing 13 which is resiliently supported from the underside of the plate 1 around the opening 4 by circumferentially spaced brackets 14, four are shown, welded to the casing 13. The brackets 14 are supported on resilient grommets 15 which are carried by studs 16 threaded into depending bosses 17 on the plate 1. A dished annular plate 20 has a peripheral flange welded to the lower end of casing 13 to form the bottom wall thereof. A cover 18 for the extractor is suitably mounted on the plate 1 and is provided with a central opening 19 adapted to receive a hose for example for supplying rinse water to the extracting chamber.

The upper part of a motor and drive support casting 21 extends through the central opening in the plate 20. The marginal portions of the plate 20 around the central opening therein are engaged by upper and lower resilient rubber rings 22. The lower ring 22 rests upon a peripheral shoulder on the casting 21 and the upper ring 22 underlies a pair of arcuate clamping plates 23, see Figure 5, which are secured to the casting 21 by studs 24 threaded into casting 21. The studs 24 are drawn up to compress the rings 22 on the plate 20 to form a water tight joint therewith and to provide a resilient mount for the casting 21 on the extractor casing.

The lower part of the casting 21 comprises a plurality of depending legs 25, forming a spider construction, which are bolted at their lower ends to a rectangular frame 26 supporting a drive motor 27. The motor shaft 28 projects into the space within the legs 25 and carries a drive pulley 29 having a truncated conical rubber ring 30 at its upper end forming a driving clutch member. The upper portion of casting 21 is provided with an upstanding hub 31 projecting above the plate 23 and

housing a sleeve bearing 32 for a drive shaft 33. The shaft 33 is aligned with the motor shaft 28 and is mounted at its lower portion in a guide and thrust bearing 34 carried in a support sleeve 35 fixed to the casting 21 and projecting into the space between the spider legs 25. The casting 21 is hollowed out between the hub 31 and mounting for sleeve 35 to form an oil reservoir 36 within which a thrust collar 37 is pinned to the shaft 33. Collar 37 bears directly on the upper end of the sleeve bearing 34, or free thrust washers may be interposed between these elements if desired. The outer surface of the collar 37 is spirally grooved as shown and rides in a sleeve 39 depending into the oil reservoir 36 from the hub 31 to form an oil feeder for the upper bearing sleeve 32 which depends below the upper end of the sleeve 39 in order to dip into oil circulated by the grooved thrust collar. A vertical groove 40 in the casting 21 along the sides of the sleeves 34 and 39 provides for the return of excess oil to the reservoir 36. The lower bearing sleeve 34 has its upper end submerged in the oil in reservoir 36 and may be formed with conventional oil feeding grooves.

The lower end of shaft 38 slidably supports a clutch member 41 adapted to engage the clutch ring 30 to form a driving connection therebetween. Relative rotation between the clutch members 41 and shaft 38 is prevented by a pin 42 fixed to member 41 and riding in a slot in shaft 38. A spring 43 housed in an axial bore in shaft 38 bears on pin 42 and biases the clutch member 41 into driving engagement with the ring 30. The upper portion of the clutch member 41 is provided with a peripheral groove which receives an inturned base flange 44 on a clutch shifting collar 46, see Figure 7. The collar 46 is composed of two identical half round sections 47 each terminating in out-turned diametrical flanges 48. Corresponding flanges 48 are bolted or otherwise suitably joined. One pair of flanges 48 is provided with angularly bent portions 123 having a flange 124 adapted to receive an actuating rod as will be described later. Each section 47 is formed with a diagonal slot 49 terminating in upper and lower horizontal stop sections 50 and 51, respectively. When assembled as shown in Figure 1, the slots 49 receive diametrically projecting pins 52 on the lower end of the stationary sleeve 35. Rotary motion applied to the collar 46 in a direction to ride the pins 52 into the stop portions 51 of slots 49 raises the collar 46 and clutch member 41 against the bias of spring 43 to disengage the clutch members 41 and 30. Similarly, opposite rotation of the collar 46 will engage the clutch and drivingly connect the shaft 33 to the motor shaft 28.

A centrifugal extracting mechanism is housed in the casing 13 and is driven by the shaft 33. The extracting mechanism comprises a cylindrical basket 53, to be described more fully hereinafter, having an open top and is closed at its bottom by an upwardly dished plate 54. The basket 53 and plate 54 are joined by a reversely bent annular flange 55, see Figure 10, on the plate 54 embracing the lower edge of the basket and forming a rigid depending cylindrical anchoring member beneath the lower face of the plate 54. The flange 55 telescopes over the upper end of the outer wall 56*a* of an annular channel member 56. The wall 56*a* is cylindrical and parallel to shaft 33 and joins an annular base wall section 45 lying in a plane normal to the axis of shaft 33. The wall 45 joins a base wall 45*a* sloping downwardly and inwardly to the inner wall of the channel member 56. The upper edge of the inner wall of the channel 56 is provided with an inturned flange 58 bearing on a shoulder 60 of a supporting sleeve 61 which snugly telescopes into the inner wall of the channel member 56 and is secured to shaft 33 by a taper pin 62. The flange 58 is notched to receive radial lugs 63 on sleeve 61 above shoulder 60 to form a driving connection to the channel member 56. The sleeve 61 fits snugly in the channel member 56 for an appreciable axial distance to prevent tilting movement of the channel member relative to shaft 33.

A flat nut 64 is secured to a stud 65 which is threaded into an axial bore in the shaft 33 and bears on the central portion of the plate 54 to seat the flanges 55 firmly on the wall 56*a* and to seat member 56 firmly on shoulder 60. When the nut 64 and stud 65 are drawn down tightly, the basket 53 and guideway 56 are firmly attached to each other and to the shaft 33.

The channel member 56 forms a guideway for a plurality of balancing weights 57 of disc-like configuration. The discs 57, four are shown, roll on wall 56*a* to position themselves to counter dynamic unbalance in the rotating part of the extractor rotating system. When the parts are at rest, and as determined by the slope of the wall 45*a*, the weights 57 may normally be disposed radially inwardly on surface 45*a* and in edge contact with the walls of the hollow hub or inner wall portion of the chamber or channel member 56 or if the extractor parts are in motion and the angular velocity of the guide way 56 is below a predetermined value, the weights 57 assume the full line position of Figure 1 with the surface 45*a* still engaging in supporting contact with the lower surfaces of the weights to impart a large frictional drag to the weights which prevents undesirable racing of the weights as the guideway accelerates or decelerates during starting and stopping operations. As shown in Figure 1, the cylindrical peripheral surfaces of the disc weights in rest or relaxed position are angularly related to the wall 56*a* and the weights are adapted to engage that wall at points below a line drawn through the centers of gravity of the weights normal to the axis of shaft 33. When the angular velocity of the member 56 exceeds a predetermined value, the centrifugal force acting on the weights pivots them from their points of engagement with wall 45*a* to engage the peripheral surfaces of the weights in rolling engagement with the wall 56*a* with the aforesaid lines through the centers of gravity of each weight intersecting the wall 56*a* between points on the periphery of the weight engaging the wall 56*a*. Such pivotal movement of the weights disengages them from the wall 45*a* to relieve the weights of the large frictional drag imposed thereby. In the above described running position of the weights, shown in dashed lines in Figure 1, the bottom surfaces thereof engage the narrow ring surface 45 which imposes a light frictional drag on the weights to prevent hunting and racing in the guideway as the unbalance of the rotating system changes during the extracting operation or the rotating system undergoes a change in angular velocity as during starting or stopping operations. If desired the weights 57 may have a rubber or plastic coating to minimize noise or to change the coefficient of friction of the weights in relation to the walls 45*a* and 45. The wall 45 may be omitted in systems not subject to sudden changes in speed or unbalance. Changing the thickness of the weights and the mass thereof may further be desirable under certain conditions of use and for variance in wall slope.

The plate 54 is preferably formed with a few small openings 126 to permit a small quantity of water to seep into the channel 56 to act as an initial lubricant for the weights 57. Any liquid except a lubricating film is quickly removed from the channel 56 through holes 127 when the extractor basket is rotated as free liquid in the channel 56 interferes with the balancing action of the weights.

The weights 57 become fully effective after the extractor system has accelerated above the critical speed. It is desirable to design this extractor system with a low critical speed to secure maximum effectiveness from the balancing system and to utilize the heavy depending motor to dampen the momentary unbalance which may occur as the extractor basket is accelerated to the critical speed. The resilient mount of the entire rotating system and depending motor has been found to reduce the initial unbalance to a momentary quiver after which the rotating system automatically balances itself.

Referring now to Figures 1, 6 and 10 the extracting

basket comprises a plurality, six are illustrated, of identical vertically extending arcuate sections **68**. To facilitate description the basket **53** will be considered as rotating in a counter-clockwise direction as viewed in Figure 6. Each section **68** comprises an inwardly directed radial vane **69** on the leading edge formed by bending the leading edge of the strip section to lie in a radial plane and then bending approximately one-half the bent portion through an angle of 180 degrees to lie against the trailing face of the other portion of the vane. Each section **68** is also formed with a plurality of narrow circumferentitlly extending axially spaced bands **70** lying in a surface of revolution except for the trailing portions **71** thereof which are offset radially to overlie the leading portion of the following section **68** which is formed by a vertical strip **67** immediately following the vane **69** and lying in the same surface of revolution as the major portions of the bands **70**. The portion **72** of each section **68** between the bands **70** and trailing strip **67** is offset radially outwardly of the bands **70** on a spiral path. The spiral portion **72** joins the bands **70** by angular side walls **73** which decrease from a maximum radial displacement at their trailing edges to merge into the leading edge of the strip **67**. The sections **68** are preferably stamped or pressed from sheet metal.

The sections **68** are assembled with each strip **67** telescopically received in the radially offset portion **71** of the preceding section and the overlapping and engaging portions **67** and **71** are welded together to form a rigid unitary basket structure with the trailing portions of the spirals spaced radially of the strips **67** to form outlets **74** lying in radial planes and facing rearwardly of the direction of rotation. The top portion of basket **53** engages the underside of an annular ring casting **75** having a depending cylindrical section, telescopically receiving top portion of the basket. The ring **75** overlies the top ends of the vanes **69** and is secured to the basket by studs **76** threaded through the basket into the cylindrical portion of the ring casting. When the basket is rapidly rotated, clothing therein piles up ahead of each vane **69** and is subjected to pressure thereby. The spiral sections **72** produce low pressure areas at the outlet ports **74** which facilitate removal of liquid and draws air through the basket and clothing contained therein.

An angularly bent strut **77** is secured, as by welding, to the casing **13** and carries a downwardly extending bracket **78** at its end which is secured by bolts **79**. The bracket **78** is adjustably bolted or riveted to a pump and clutch housing structure **80** as indicated at **81**. The housing structure **80**, see Figure 3, comprises a pump chamber **82** having a liquid outlet nipple **83** and a liquid inlet **84** opening to an inlet manifold and pump chamber **85**. An inlet nipple **86** communicates with the manifold **85** and is connected by a hose **87** to a drain fitting **88** opening into the lowest point in the plate **20** to drain extracted liquid from the extracting casing **13** and **20**. The casing **80** also includes an inlet nipple **89** connected by a hose **90** to the drain fitting **7** of the washer tub **5** and opens into a chamber **91** which communicates with the manifold **85** under the control of a poppet valve **92** mounted on a rod **93** in the chamber **91**. The rod **93** is surrounded by a spring **94** in chamber **91** biasing the valve **92** to closed position. The rod **93** projects outwardly of casing **80** and carries a thrust plate **95** engaging a pin **96** extending through the end portion of shaft **93**. A bifurcated slider **97** straddles the projecting portion of shaft **93** between the casing **80** and plate **95**. As shown in Figure 1 the legs of slider **97** are wedge-shaped and are raised to bring the wide end of the wedges into engagement with plate **95** to open valve **92** against spring **94**. The slider **97** connects to a rod **98** terminating in control knob **99** just above the top plate **1**, see Figure 2. When knob **99** is lifted, the slider **97** is in the Figure 1 position and the tub **2** drains through the poppet valve assembly into manifold **85**. When the knob **99** is depressed, the valve closes as shown in Figure 3.

A shaft **100** is journaled in a bearing **101** in housing **80** and carries a blade type centrifugal pump impeller **102** in chamber **82** and a pulley **103** exteriorly of housing **80**. As indicated in Figure 1, the pulley **103** is driven by a resilient rubber belt **104** from the motor drive pulley **29**.

A second shaft **105** is rotatably and slidably mounted in axial alignment with shaft **100** in a bearing structure **106** carried by housing **80**. A plate **107** fixed to shaft **105** in manifold **85** carries projecting pins **108** adapted to extend into the spaces between adjacent blades of the impeller **102** and be engaged by the impeller blades to form a driving connection for shaft **105**. The impeller, plate **107** and pins **108** thus form a clutch. A spring **109** surrounds shaft **105** in manifold **85** and bears between the plate **107** and a thrust washer **110** bearing on housing **80** to bias the clutch to the engaged position of Figure 3. The outer end of shaft **105** carries a pulley **111** connected by a resilient rubber belt **112**, see Figure 1, to the drive pulley **12** of the washing machine impeller.

The bearing structure **106** journals a collar **113** having an inturned flange **114** engaging a thrust washer assembly **115** on shaft **105** and bearing on pulley **111**. The collar **113** has a pair of diametrically positioned axially extending cam surfaces **116**, one of which is shown by a dashed line in Figure 3, adapted to seat upon cam protuberances **117** on housing **80**. The cam **117** is shaped complementally to the cam **116** whereby rotation of the collar **113** from the Figure 3 position rides the high portions of cam **116** onto the high portions of cam **117** to shift shaft **105** against spring **109** sufficiently to declutch the pins **108** from the pump **102** which de-energizes the washing impeller. The collar **113** has a projecting flange **118** on one side thereof which is connected to a rod **119** extending through the plate **1** and terminating in a knob **120** which is raised and lowered to rotate collar **113** to control the washing impeller.

The outlet nipple **83** is connected to a conventional exhaust hose **121** having a goose neck on its end whereby it may hang over the side of a laundry tub to run the pumped liquid to waste or may engage in an opening **122** in the top plate **1** to return extracted liquid to the washing tub as desired.

As explained briefly above, the spiral exhaust conduits on the extractor basket **53** act as exhaust ejectors and form low pressure areas at the exhaust ports **74**, which induces a flow of air through the clothing for removing moisture therefrom in vapor phase. The foregoing action is supplemental to the removal of liquid from the clothing by centrifugal action which liquid discharges from the ports **74** and is removed from casing **13** through the drain **88**. After the clothing is partially freed of entrained liquid by centrifugal action, the flow of air through the clothing materially aids further extraction by promoting liquid flow and by removing vapor which condenses on the relatively cool surface of casing **13** and runs to the drain. The air flows in a circular path through the ports **74**, upwardly along basket **53** and thence over the rim **75** into the basket. The foregoing air circulation also promotes uniform drying of the clothing in the basket.

Electrical energy is supplied to the machine by a service cord **130** which connects to a toggle switch **131**. In Figure 1 the toggle switch and its operating mechanism is shown displaced to the right to facilitate illustration. The switch **131** is supported by a bracket **132** depending from the top plate **1**. Service conductor **133** energizes the motor **27** from the switch **131**. The switch **131** is connected by a link **138** to a push rod and actuating knob **139** slidably mounted in the top plate **1**. As shown in Figure 2 the knob **139** is aligned with control knobs **99** and **120** and is out of the plane of the section line **2—2**. The

knob 139 exercises sole control over the energization of the motor 27.

The actuating mechanism for the clutch 30—41 controlling the extracting mechanism is a timing control. The timing control is shown in Figures 1, 8 and 9 and is supported by a rigid bracket 140 secured to the top plate 1 by a bolt 141. The lower end of bracket 140 has a horizontal foot portion 142 to which the bottom portion of an oil filled cylinder 143 is secured by a bolt 144. A rod 145 is slidable through a seal 146 in the top of the cylinder 143 and has its lower end threaded into a piston 147 having a slide fit with the inner wall of cylinder 143. The piston 146 secures a porous metal plate 148 of smaller diameter than the cylinder, against a thrust washer 149 on rod 145. The piston 146 is reduced in diameter below the plate 148 to form a channel 150 housing a flexible sealing ring 151. The piston 147 is drilled to form right angle passageways 152 between the channel 150 and the space beneath the piston. When the piston is raised from the position of Figure 8 the ring 151 rolls to the bottom of the channel 150 and the oil above the piston flows freely around the outer edge of the plate 148 into the channel 150 and through the passageways 152 to the zone beneath the piston. When the piston moves downwardly from the position of Figure 9, the ring 151 rolls upwardly into engagement with the porous plate 148 and seals the passageway between the cylinder 140 and outer edge of plate 148 whereby oil flowing upwardly through the passageways 152 and channel 150 must seep through the plate 148 to reach the zone above the piston. The seepage of oil through the plate 148 is slow and downward movement of the piston is utilized to time the operation of the extractor. The upper end of the rod 145 has a collar 153 secured thereto upon which rests a plate 154 extending on opposite sides of the rod 145 beyond the cylinder 143. Tension springs 155 are connected between the ends of the plate 154 and the foot 142 to bias the piston structure downwardly to the Figure 8 position.

The piston 147 is raised against the springs 155 by a knob 156 on the upper end of a rod 157 extending through the top plate 1 and carrying a slider 158 bearing on the side wall of cylinder 143 and having right angularly bent portion 159 one leg of which is vertical and offset from the cylinder 143 and the other leg of which surrounds rod 145 beneath the collar 153. An adjustable collar 160 is mounted on the rod 157 to limit upward movement of the piston 147. The position of the collar 160 determines the distance to which the piston 147 can be raised by knob 156 and hence the time required for the piston to return to the Figure 8 position.

The bracket 140 has an indented portion 161 mounting a U-shaped holder 162 which supports a roller 163 between rod 157 and bracket 140. The roller 163 engages a slider 164 which is attached at its lower end to a rod 165 biased downwardly by a spring 166 bearing between the foot 142 and a pin 167 secured in rod 165. The lower end of rod 165 is engaged in an opening in a rock plate 168 pivotally mounted on bracket 77. A rod 169 is connected between the rock plate 168 and the flange 124 on the clutch actuating collar 46. When the rod 165 is in the low position shown in Figure 8 the collar 46 is rotated to disengage the clutch 41 and the basket 13 is stationary. The slider 164 is provided with a first offset section 170 engaging the offset portion of slider 158 and joined by a shoulder 171 to a second reversely facing offset 172. When the knob 156 is raised, the piston 147 raises in cylinder 143 against the bias of the springs 155, simultaneously the slider 164 is raised against the bias of spring 166 due to the engagement between the shoulder 171 and the horizontal portion 159 of the slider 158. The slider 164 is preferably made of spring metal biased to bear on roller 163 which engages the upper portion of the slider and prevents the shoulder 171 from disengaging from the slider 158. When the slider 164 is raised sufficiently to engage clutch 41 by operating through the rod 165, rock plate 168, rod 169 and collar 46, the offset 172 is raised to the Figure 9 position and receives the roller 163 to hold the parts in clutch engaging position. As the slider 164 flexes to receive the roller 163 in offset 172, the shoulder 171 disengages from slider 158 and further upward movement locks the offset 172 in engagement with the roller as shown in Figure 9 by engagement between the offset 172 and the offset portion of slider 158. The distance the piston 147 is raised after engagement between the roller 163 and offset 172 is a measure of the time the basket 53 will be driven by the drive motor through the clutch 41. The stop 160 will be adjusted at the factory to determine the maximum time of operation of each extracting operation. After the stop 160 engages the underside of the top 1, the operator releases the knob 156 and the piston 147 slowly descends as oil seeps through the porous plate 148 under the pressure applied by springs 155 and 166. When the slider 158 is lowered by the oil piston until the top thereof is below shoulder 171, the upper portion of slider 164 flexes to the right, as viewed in Figure 9, due to the force of spring 166 and which then snaps the sliders 158 and 164 and rod 165 to the Figure 8 position to declutch the basket 53. The piston 147 will not be in its lowest position when the basket is declutched but will shortly return to the Figure 8 position due to the force of springs 155. The slider 158 is held in its upper position only by frictional engagement with slider 164, hence the extracting operation can be stopped at any time by depressing knob 156 independently of the oil cylinder which will return to its rest position according to its time characteristic. Preferably the stop 160 will be adjusted to provide operation of the basket 53 for some maximum time period, 10 binutes for example, but lesser time periods of extractor operation may be achieved by raising knob 156 a distance less than the maximum according to suitable markings applied to rod 157 which become progressively visible as the knob 156 is raised.

In operation the washer impeller may be driven or stopped at will by raising and lowering the control knob 120 to clutch and declutch the constantly rotating pump and shaft 105. Water may be supplied to the washing tub 5 by inserting a filling hose in the opening 125 in the plate 1. Water and detergent removed by the extracting mechanism may be returned to the washing chamber by placing the end of the emptying hose 121 in the opening 122 in plate 1. The tub 5 is emptied by raising the control knob 99 which opens the washing tub drain control valve 92 and drains the tub to the emptying pump.

Extracting and rinsing operations may be carried out concurrently or independently of washing operations. Wet clothing is loaded into the basket 53 and the lid 18 closed after which the motor is energized, if not running, and the knob 156 is raised to set the timing cylinder in operation and to engage the clutch 41 to rotate the extractor basket 53. As the basket 53 is accelerated to running speed, the load therein distributes itself by centrifugal force on the cylindrical wall of the basket ahead of the vanes 69. The high rotational speed of the basket extracts the liquid in the clothing centrifugally which action is aided by the air circulation induced by the low pressure areas at the outlets 74. The extracted liquid drains to the pump and is run to waste or returned to the washing tub through hose 121 as the operator may desire. The weights 57 have been found to compensate fully for unequal weight distribution in the basket 53 so that the extractor operates smoothly and without vibration after a momentary quiver at starting. The resilient mount of the drive motor and extractor drive mechanism is effective to absorb momentary vibrations in

the extracting system and the belt drives between the motor and pump and the agitator and pump isolate these elements from such vibrations and also permit the extractor drive to move relative to the pump and the pump to move relative to the agitator without disturbing the driving connections between these elements. The elongated pin connected rods which exercise control of the clutches, valves and timer also allow relative movements between parts of the apparatus without binding or altering control settings and do not form effective vibration transmitters whereby the extractor is effectively isolated from the other parts of the system and may shift relative thereto in achieving a condition of stable balance.

While the invention has been illustrated and described in detail herein, it is not to be limited thereto but various changes may be made in the construction, design and arrangement of parts without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. Extracting apparatus comprising a support frame, an extractor casing carried by said frame, a drive shaft rotatably supported by said casing, an extracting basket carried by said shaft in said casing, and a counterbalancing mechanism carried by said shaft comprising an annular channel member having a base wall sloping inwardly and downwardly from the outer to the inner peripheral walls defining the radial limits of said channel member, and a plurality of disc weights individually spaced about said channel member and carried upon and frictionally restrained in radially inward positions by said sloping base wall as said basket is accelerated until centrifugal force lifts said weights within said chamber and out of frictional engagement with said sloping base wall.

2. A centrifugal fluid extracting apparatus for various articles carrying fluid comprising a support having an aperture therethrough, a rotatable article carrying basket, drive means connected to spin said basket, a mounting structure comprising resilient members flanking opposite outward sides of said support adjacent the aperture therein, orientation means for said basket and said drive means connected with opposite outward portions of said resilient members to provide a flexible carrier on both sides of said support for said basket and drive means on said support, said basket being arranged to one side of said mounting structure and said drive means at the other side thereof with the latter communicating with said basket through said support aperture, and kinetic balancing means at one side of the support and arranged to dampen vibration by counteracting off center loads in said basket, said drive means being freely and solely suspended from said resilient mounting structure in pendulum fashion at the other side of the support to provide a freely swinging weighted static balancing means for said basket to act in cooperation with said kinetic balancing means to further counteract basket vibration, the axial tilting of the entire assembly fulcruming about a point substantially coincident with level of the support and in the aperture portion thereof.

3. In the centrifugal fluid extracting apparatus of the character set forth and defined in claim 2, but wherein said support comprises a casing to house said basket therein, a framework is provided to carry said casing, and resilient means is interposed between said casing and framework to prevent the transmission of operational vibration from said casing into said framework.

4. In a centrifugal fluid extracting apparatus of the character set forth and defined in claim 2, but wherein said kinetic balancing means comprises a confining chamber connected with said basket, a plurality of free and axially displaced weights bodily operable annularly about the basket axis in said confining chamber, and said static balancing means being symmetrically located coincident with the basket axis of rotation.

5. In a centrifugal water extracting apparatus for removal of moisture from clothing, in combination, a spinning basket unit to carry the articles of clothing, a support, a resilient mounting on said support, structural means flanking both upper and lower faces of said mounting adapted to rotatably orient said basket unit, a power unit and further structural means to freely suspend said power unit below said resilient mounting for unrestrained motion in pendulum fashion relative to said support, a drive from said power unit to said basket unit, and a counterbalancing mechanism connected with one of said units and in vertical spaced relation to one side of said resilient mounting to dampen developed off center load variations that are created in said spinning basket unit, said assembly being adapted to tilt about a fulcrum point disposed substantially in line with said support and within the resilient mounting thereof.

6. A centrifugal extracting mechanism comprising a frame, an extractor casing supported upon said frame, a bearing structure resiliently supported upon said casing, a shaft rotatably mounted in said bearing structure, an extracting basket and a counterbalancing mechanism mounted upon said shaft, said counterbalancing mechanism comprising means forming a chamber including an annular wall member arranged concentric with said shaft and joined with a wall member sloping inwardly and downwardly toward said shaft, a plurality of cylindrical disc weights in said chamber, said weights occupying positions on said sloping wall member to dispose the peripheral portions of the weights in angular relations with respect to the annular concentric wall member of said chamber when said weights rest upon said sloping wall member, said weights being adapted to recline upon said sloping wall member at points below the levels of lines extending through their centers of gravity and normal to the axis of said shaft when the rotational velocity of said mechanism is below a predetermined value, and said weights being adapted to disengage from said sloping wall member for peripheral rolling engagement with said annular wall member when the rotational velocity of said mechanism exceeds said value.

7. A centrifugal extracting mechanism comprising a frame, an extractor casing supported upon said frame, a bearing structure resiliently supported upon said casing, a shaft rotatably mounted in said bearing structure, an extracting basket and a counterbalancing mechanism mounted upon said shaft, said counterbalancing mechanism comprising means forming a chamber including an annular wall member arranged concentric with said shaft and joined with a wall member sloping inwardly and downwardly toward said shaft, a plurality of cylindrical disc weights in said chamber, said weights occupying positions on said sloping wall member to dispose the peripheral portions of the weights in angular relations with respect to the annular concentric wall member of said chamber when said weights rest upon said sloping wall member, said weights being adapted to recline upon said sloping wall member at points below the levels of lines extending through their centers of gravity and normal to the axis of said shaft when the rotational velocity of said mechanism is below a predetermined value, and said weights being adapted to disengage from said sloping wall member for peripheral rolling engagement with said annular wall member when the rotational velocity of said mechanism exceeds said value, said annular wall member and said sloping wall member being connected by means of an annular wall section disposed in a plane situated normal to said shaft, said annular wall section being of limited radial extent to prevent the outward displacement of the centers of gravity of said weights beyond the outer peripheral limits of said sloping wall member.

8. Extracting apparatus comprising a support frame, an extractor casing carried by said frame, a drive shaft rotatably supported by said casing, an extracting basket carried by said shaft in said casing, and a rotary counter-

balancing mechanism carried by said shaft comprising means forming a shaft rotated chamber having an outer upright wall and an annular base wall extending normally from adjacent said annular upright wall toward said shaft, a plurality of circular weights disposed within said chamber each having a peripheral wall adapted to engage on said outer upright wall for rolling movement of the weights thereon, said weights each having an extended base surface thereon, and a weight supporting wall angularly connected with said annular base wall and arranged to provide frictional driving engagement between said chamber and the extended base surfaces of said weights, the angular relation of said annular base wall and said weight supporting wall being such that said weights rock upon their extended base surfaces in response to the action of centrifugal force when said chamber rotates at a predetermined velocity to dispose said weights in rolling engagement against said outer annular wall of said chamber and to disengage the weights from contact with said weight supporting wall.

9. A centrifugal extractor comprising a basket, a shaft supporting said basket, a bearing structure rotatably supporting said shaft, means resiliently mounting said bearing structure, means for rotating said shaft, and a rotary counterbalancing structure comprising a revolving guideway carried by said shaft and having a vertical annular outer wall connected with a bottom wall that is inclined radially inwardly and downwardly toward said shaft, a plurality of weights in said guideway each having a cylindrical peripheral wall and a flat bottom surface, said weights having the bottom surfaces thereof frictionally engaging the inclined bottom wall of said guideway when said weights are disposed in radially inward positions and partially beneath the upper limits of said inclined bottom wall of the guideway when the rotational velocity of said guideway is below a predetermined value, said weights being centrifugally disengaged from said bottom guideway wall for rolling contact with said annular outer guideway wall when the rotational velocity of said guideway exceeds said predetermined value.

10. A centrifugal extractor comprising a basket, a shaft supporting said basket, a bearing structure rotatably supporting said shaft, means resiliently mounting said bearing structure, means for rotating said shaft, and a rotary counterbalancing structure comprising means forming an annular counterbalance weight retaining unit having an outer peripheral wall and a radially arranged supporting wall extending about said bearing structure, a plurality of individual weights adapted for bodily actuation about said bearing structure within said retaining unit, said weights each having a peripheral exterior wall portion thereon adapted to engage and to roll upon said outer peripheral retaining unit wall to position said weights in operative locations under higher rotational speeds of said retaining unit to compensate for dynamic unbalances that develop in said basket by unbalanced basket contents, and said weights each being further provided with a bottom coplanar base surface area thereon to engage said supporting wall to impose a frictional drag to react directly between said supporting wall and said weights during slower rotational speeds of said retaining unit.

11. A centrifugal extractor comprising a basket, a shaft supporting said basket, a bearing structure rotatably supporting said shaft, means resiliently mounting said bearing structure, means for rotating said shaft, and a rotary counterbalancing structure comprising mechanism forming an annular chamber secured to said shaft, said annular chamber providing at least one circular upright perimeter wall and at least one radially arranged bottom wall disposed between said perimeter wall and the shaft, and a plurality of free disc-shaped weights arranged in said chamber for bodily obital motion along circular paths encircling said chamber carrying shaft, each of said weights having angularly arranged wall portions thereon, one of said wall portions being adapted to roll upon said upright perimeter wall of said chamber under certain rotational speeds of operation and said other of the wall portions being adapted to frictionally slide along said radially arranged wall portion of said chamber under certain other rotational speeds of operation.

12. A centrifugal extractor comprising a basket, a shaft supporting said basket, a bearing structure rotatably supporting said shaft, means resiliently mounting said bearing structure, means for rotating said shaft, and a rotary counterbalancing structure comprising means forming an annular chamber encircling said shaft in a position between said basket and said resilient supporting means, said chamber having a first wall arranged generally radially with respect to said shaft and a second paripheral wall surrounding said shaft and connected with said first wall, said walls being arranged in angular relation with respect to each other, and a plurality of counterbalance weights in said annular chamber, said weights each having a bottom supporting face and a radially outer peripheral rolling face, said faces being arranged at an internal angle to each other that is less than the internal angle between said radial and peripheral walls of said chamber, and said radial and peripheral walls of said chamber and said angularly arranged faces of said weights being so related that said peripheral faces of said weights engage said peripheral chamber wall at points disposed below the lines taken through the center of gravity of said weights and normal to said shaft when said weights are supported at rest with their bottom supporting faces upon said radial chamber wall.

13. A centrifugal extractor comprising a basket, a shaft supporting said basket, a bearing structure rotatably supporting said shaft, means to resiliently mount said bearing structure and means to rotate said shaft, and a rotating counterbalancing structure driven by said shaft and comprising means forming a chamber having a dished wall surrounding said shaft and sloping upwardly and away from said shaft, an annular wall positioned radially of said shaft and connected about the terminal edge portion of said dished wall to form a step elevated above the lower portion of said dished wall, and an upright rim wall angularly connected with said annular radial wall in outwardly spaced relation from the terminal edge portion of said dished wall, and a plurality of weights confined within said chamber for bodily orbital motion about said shaft, said weights each being provided with a bottom coplanar face for support upon said dished wall of said chamber and having an outer circular wall angularly positioned in relation to said bottom face, said weights having their bottom coplanar faces disposed in frictional sliding contact with said dished wall during certain operative rotational shaft speeds, and said weights having their outer circular walls disposed for face to face rolling contact with said rim wall during certain other operative rotational shaft speeds, the angular relation between said circular wall and coplanar face of each of said weights being such in relation to the angle between said rim and annular walls of the chamber so as to dispose said weights out of contact with said dished chamber wall and in sliding contact with said radial annular chamber wall when said weights function in rolling contact with the rim wall of said chamber.

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