

Feb. 3, 1959

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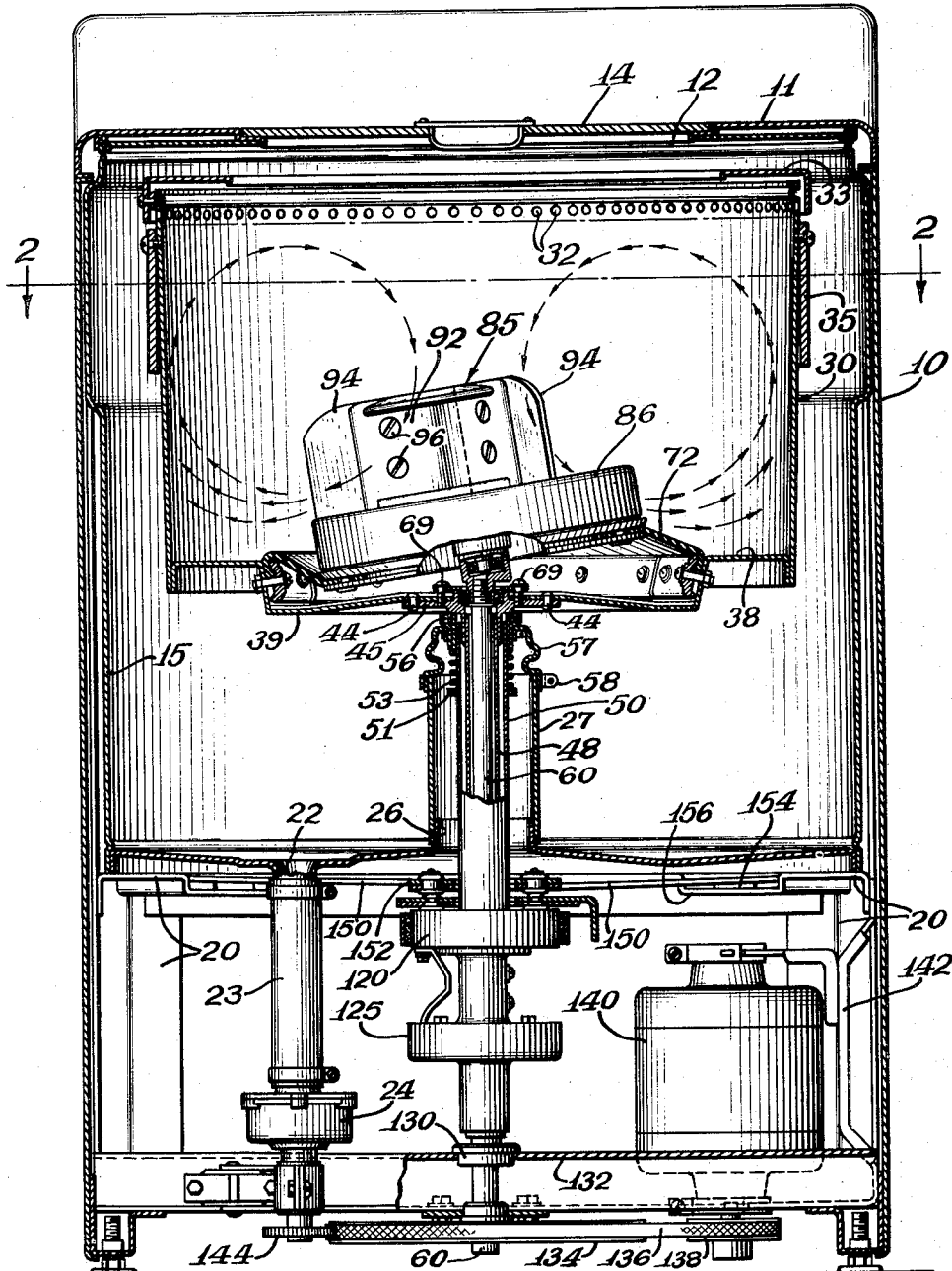
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CLOTHES WASHING MACHINE

Filed July 30, 1953

4 Sheets-Sheet 1

FIG. 1.



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FIG. 2.

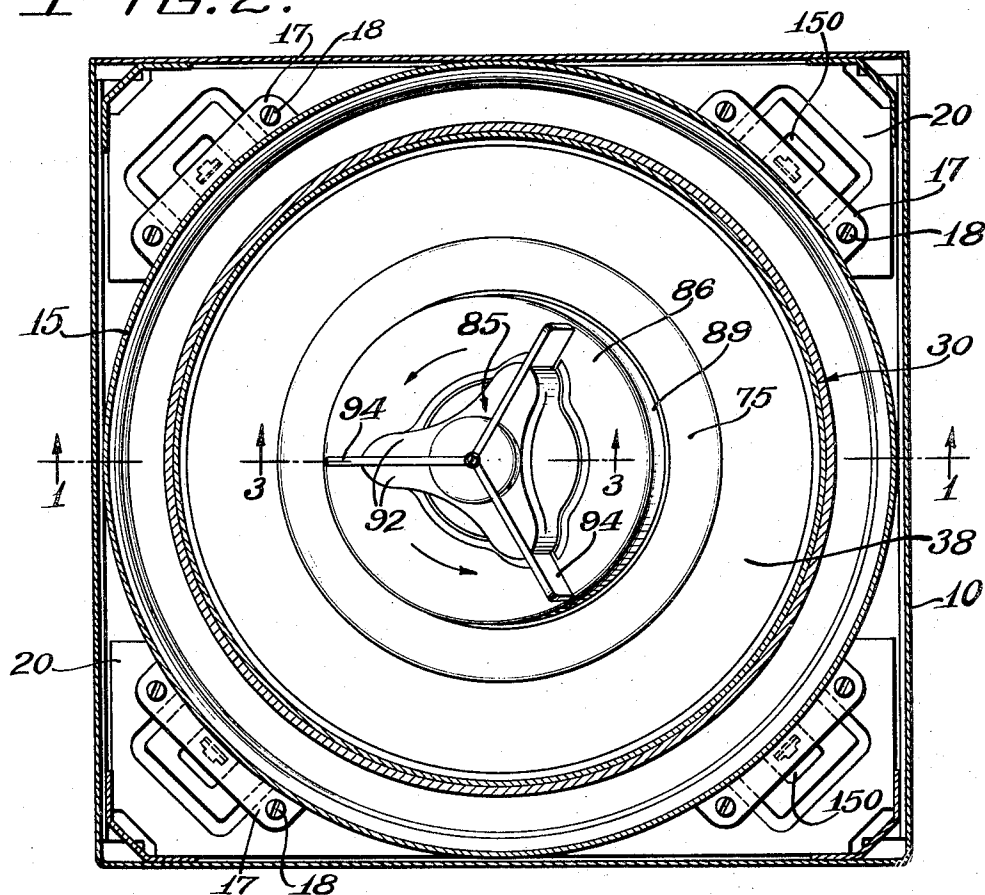
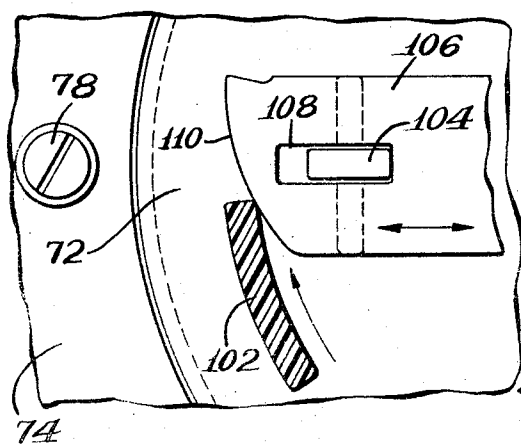


FIG. 5.



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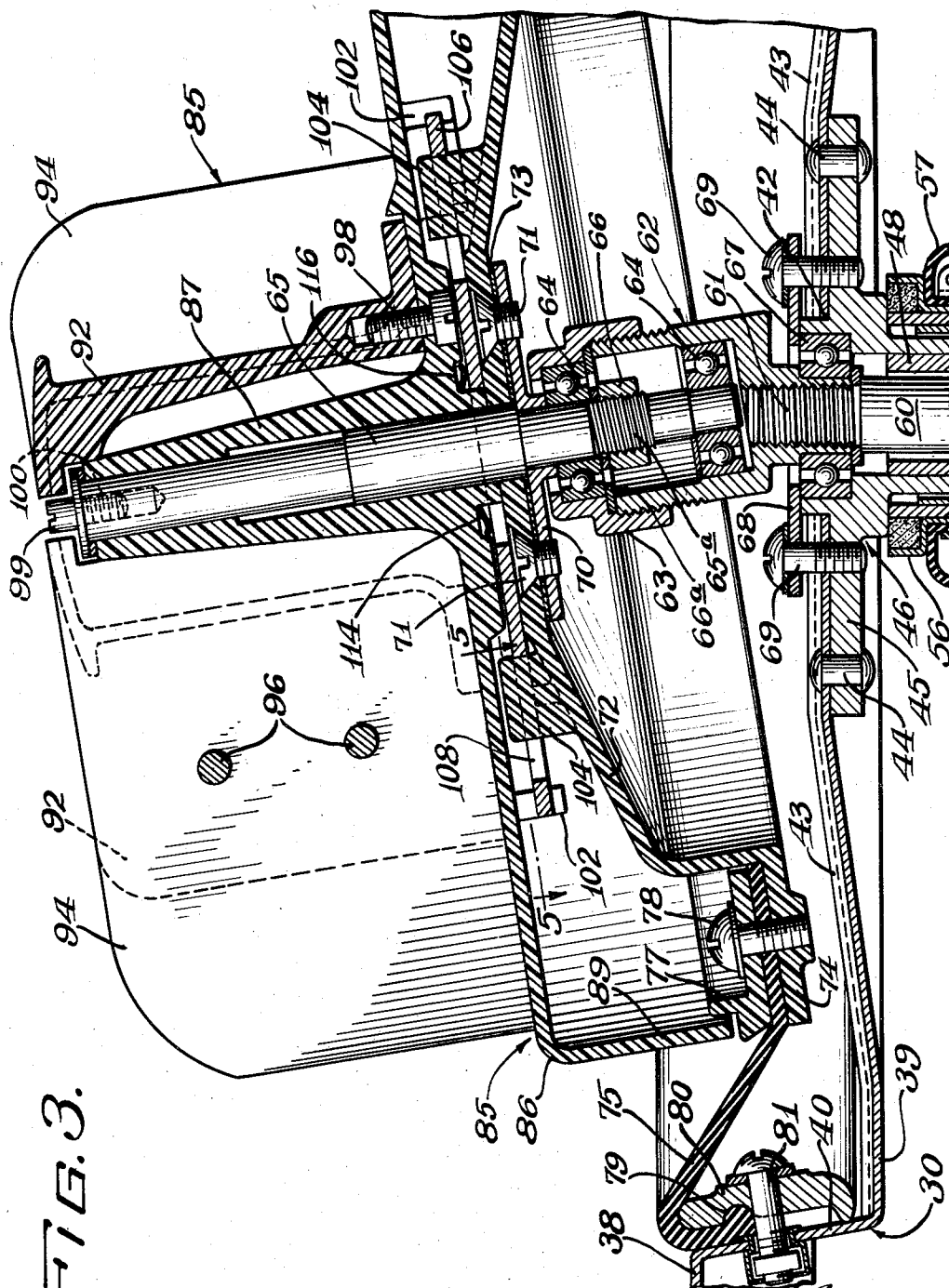
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2,871,689

CLOTHES WASHING MACHINE

Filed July 30, 1953

4 Sheets-Sheet 3



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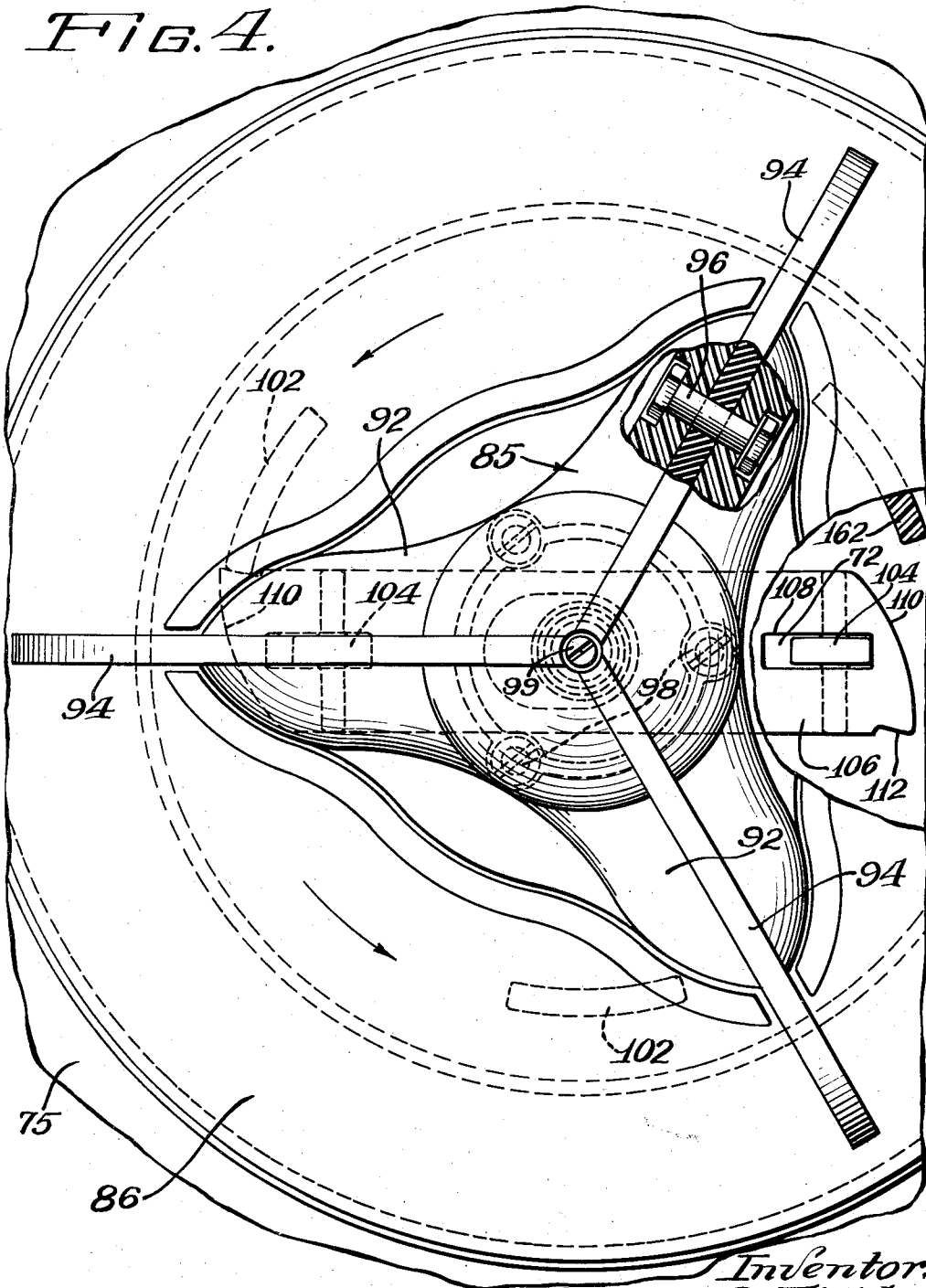
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CLOTHES WASHING MACHINE

Filed July 30, 1953

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FIG. 4.



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2,871,689

CLOTHES WASHING MACHINE

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Application July 30, 1953, Serial No. 371,382

3 Claims. (Cl. 68—131)

This invention relates to a domestic type clothes washing machine, and more particularly to an agitator type of machine wherein the agitator proper is caused to move orbitally about an inclined upright axis and by virtue of which the agitator is caused to tilt or wobble so that successive outer marginal portions of the agitator move in an upward direction and then move in a downward direction. Machines having an agitator movable in the manner above referred to are broadly disclosed in Jensen Patent No. 2,186,786, dated January 9, 1940, and Sekavec Patent No. 2,075,628, dated March 30, 1937, both of which patents have been assigned to the same assignee as the present invention.

Machines of the type embodying the present invention lend themselves for embodiment in a machine provided with a relatively simple and inexpensive drive mechanism, wherein the main drive shaft for actuating the agitator may be driven at a desired rate of speed. Such agitator mechanisms are such that they may be embodied in a machine wherein the tub or basket, in which clothes are to be washed, may be selectively driven at the same rate of speed as employed for driving the agitator mechanism, for centrifugally extracting the washing liquid from the clothes.

One of the primary objects of this invention is to provide an improved clothes washing machine of the character indicated wherein orbital wobbling motion is imparted to a mounting member, which is sealed in relation to an opening in the bottom of the tub, and wherein the agitator proper is removably mounted on the mounting member.

Another object is to provide an improved machine of the character indicated wherein the agitator is capable of being positioned in relatively close relation to the bottom of the tub.

A further object is to provide an improved machine of the character indicated wherein the agitator is free to rotate in at least one direction, on an axis inclined to vertical.

Still another object is to provide an improved clothes washing machine of the character indicated wherein the agitator is free to rotate in one direction, about an axis inclined to vertical and is restricted against rotation in the opposite direction.

A still further object is to provide an improved clothes washing machine of the character indicated wherein an agitator mounting member is connected by a flexible sealing member, to provide a sealed relationship between the bottom of the tub and the agitator drive mechanism, and wherein the fastening means for connecting the flexible member to the tub and mounting member are totally shielded, so as to preclude possible contact with clothes being washed in the machine.

A still further object is to provide an improved clothes washing machine of the character indicated wherein the agitator mechanism is connected by a flexible sealing member to the bottom of the tub and wherein the agitator mechanism and the bottom of the tub, together with

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the sealing member, are so dimensioned and correlated to each other as to preclude undue wear on the clothes and to substantially eliminate breakage or damage to buttons and/or buckles or the like on clothes being washed.

A still further object is to provide an improved clothes washing machine of the character indicated wherein the agitator mechanism and tub, together with the flexible sealing member, are so correlated as to preclude damage or injury to clothing incident to pinching of clothing by contact with the flexible sealing member, as a result of the vertical and orbital movement of the agitator mechanism within the tub.

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

Figure 1 is a vertical sectional view through a clothes washing machine embodying the present invention, taken substantially as indicated at line 1—1 on Figure 2.

Figure 2 is a horizontal sectional view through the machine, taken substantially at line 2—2 on Figure 1.

Figure 3 is an enlarged vertical section through the agitator mechanism and its mounting in the tub, taken substantially as indicated at line 3—3 on Figure 2.

Figure 4 is an enlarged fragmentary plan view looking down on the agitator mechanism, with portions broken away to show details of construction.

Figure 5 is an enlarged fragmentary view, looking down showing constructional features, by virtue of which the agitator per se is permitted to rotate freely in one direction about an inclined upright axis but is restricted against rotation in the opposite direction, taken at line 5—5 on Figure 3.

It is to be understood that the novel agitator mechanism embodying the present invention is adapted for use in conventional washing machines of the type employing a stationary tub, or in a machine wherein the basket or tub is adapted to be rotated for centrifugally extracting water from the clothes. As illustrated, my novel agitator mechanism is shown embodied in a machine wherein the basket or tub is rotatable, and wherein clothes may be both washed and centrifugally extracted.

Referring now to the drawings, the machine comprises an outer sheet metal cabinet 10, having a top 11 formed with a main central opening 12 through which clothes may be introduced into and removed from the tub or basket of the machine. The opening 12 may normally be closed by a cover element indicated at 14. Mounted within the cabinet is an outer tub or receptacle 15 into which the washing fluid is discharged after certain phases of the washing operation are completed. The tub 15 is supported at its lower edges by means of a plurality of laterally extending lugs or tabs 17, secured by screws 18 to mounting brackets 20, secured to the interior of the cabinet 10. The bottom of the tub 15 is provided with a drain opening 22 connected by a hose 23, to a pump 24, for discharging the washing fluid to a suitable drain. The central portion of the bottom of the tub is provided with an upturned annular flange 26, on which is seated, in sealing engagement, an upright sleeve or tube 27, for accommodating drive shafts as hereinafter described.

Mounted within the upper portion of the outer stationary tub 15 is a rotatable tub or basket 30, in which clothes are adapted to be washed and centrifuged. The tub 30 is provided with a side wall which is tapered in an upwardly and outwardly direction and is provided adjacent its upper marginal edges with a plurality of apertures 32, through which washing liquid is discharged from the tub or basket 30, into the outer tub 15, incident to the centrifuging operation. Secured to the upper portion of the side wall of the washing tub or basket 30,

is an annular ring 33, which extends over the marginal edge of the basket, as seen in Figure 1 of the drawings, and serves to confine the clothes within the tub during the centrifuging operation. Rigidly secured to the exterior of the upper portion of the side wall of the basket or tub 30, is a weight ring 35, to counter-balance off-center loads within the machine, during the centrifuging operation, as is well understood in the art. The washing tub or basket 30 is provided with a bottom 33, having a relatively large central portion thereof depressed, as indicated at 39, which is connected by a circular, upwardly extending side wall 40 to the main portion of the bottom 38. The central area of the depressed portion 39, is provided with an opening 42, for accommodating agitator drive mechanism, which extends therethrough as will be presently described. The depressed bottom area 39 is formed with a multiplicity of radially extending ribs 43, for purposes of reenforcement of the basket bottom. The washing tub or basket 30 is secured by rivets 44 to a flange 45, of a mounting member 46, which supports the basket or tub 30. Said member 46, is rigidly attached, such as by welding, to an upright tubular drive shaft 48, which extends downwardly through a tubular friction transmitting member 50, through the sleeve 27, and extends below the bottom of the outer tub 15, as seen in Figure 1 of the drawings. Rigidly mounted on the upper end of the tubular member 50, is a collar or flange 51, constituting a seat for a coil spring 53, the upper end of which reacts against the lower end of the tub mounting member 46, through a liquid seal 56, which seats against the underside of a transverse shoulder on the mounting member 46, and thereby maintains a wiping sealing surface against water coming in contact with the driving mechanism. A flexible boot 57, is mounted below the lower end of said seal and engaged by spring 53, and its lower end is attached to the upper end of the sleeve 27, by a clamping band 58, so as to provide a fluid seal with respect to the drive mechanism, so that water within the outer tub cannot, under any conditions, be splashed or caused to flow over the upper end of sleeve 27. The tubular drive shaft 48, by reason of its manner of connection to the washing tub or basket 30, is adapted to impart rotary motion to said basket for centrifugally extracting washing fluid from the clothes in the basket, as hereinafter described.

Extending upwardly and substantially concentric within the tubular drive shaft 48, is an agitator drive shaft 60, the upper end of which is threaded, as indicated at 61, for connection to a crank head 62, having a cap 63, threaded thereon and the axis of said crank head extends at a slightly oblique angle to the axis of the shaft 61. Mounted within the crank head 62, is a pair of axially spaced bearings 64, in which is journaled a stub shaft 65, projecting at an acute angle to vertical, as seen in Figure 3 of the drawings. The lower portion of the stub shaft 65 is threaded at 65a on which is mounted a clamping nut 66, seating against a plate 66a, clamped between the two parts of the crank head, for firmly securing the stub shaft against axial movement relatively to the crank head. The lower end of the crank head is seated in a bearing 67, mounted in a recess in the basket support member 46. Said bearing 67, is held in seated position by a plate 68, fastened by screws 69, threaded in flange 45 of the support member 46.

Rigidly secured to the stub shaft 65, as by welding, is a transversely extending flange 70, to which is rigidly attached as by screws 71, a substantially circular, dome-like, agitator mounting member 72. Interposed between the central area of the underside of the mounting member and the flange 70, is a sealing gasket 73. The outer marginal edge of the mounting member 72, is formed to provide an annular flange 74, extending in a plane substantially perpendicular to the axis of stub shaft 65.

In order to seal the drive mechanism, including the crank head, its bearings, as well as the agitator drive

shaft 60, and the basket drive shaft 48, from contact by washing fluid within the tub 30, I employ an annular, flexible sealing member 75, formed of any suitable material, such as rubber. The inner marginal edge of the annular sealing member is rigidly attached to the marginal flange 74 of the mounting member by a clamping ring 77, and screws 78. The outer marginal portion of the flexible sealing member 75 is secured to the upright wall portion 40, surrounding the depressed area 39, of the bottom of the washing tub. For this purpose, the flexible sealing member is formed at its outer edge with a rib or bead 79, which is adapted to be engaged in a correspondingly formed groove, in the outer face of a plurality of curved clamping segments 80, which rigidly secure the outer marginal edge of the flexible member 75 to the upright wall 40 by means of bolts 81.

Rotatably mounted on the stub shaft 65, is an agitator 85, which comprises an inverted, dish-shaped base 86, having a central hub portion 87, seated, in bearing relation, on top of the central area of the mounting member 72. The agitator base includes a depending marginal flange 83, the lower edge of which terminates in close relation to the outer marginal edge of the clamping ring 77, as seen in Figure 3 of the drawings, and serves to provide a covering for the screws 78, which secure the flexible sealing member to the mounting member 72. Thus, by reason of the flexible sealing member being trained upwardly around the upper marginal edge of the clamping segments 80, the bolts 81 are shielded with respect to the interior of the tub 30, and by reason of the screws 78 being shielded by the skirt 89 of the agitator base, there is no possibility of said fastening means ever being contacted by clothes being washed within the tub or basket, and thereby eliminates possible damage or injury to the clothes by such obstructions.

Due to the shape or configuration of the mounting member 72, and its location with respect to the bottom of the tub 30, the inner marginal portions of the flexible sealing member 75 are caused to freely move vertically, by movement imparted to the mounting member 72, incident to rotation of the drive shaft 60, and the crank head 62, and the vertical limits of movement of said inner marginal portion of the flexible member, at its point of connection to the mounting member, lie both above and below respectively, the main portion 38 of the bottom of the tub 30, which surrounds the depressed area 39, and by virtue thereof it is possible to position the agitator 85, in relatively close relation to the bottom of the tub 30.

By virtue of the construction described, it is possible to employ a flexible sealing member 75 of such dimensions that when its inner and outer marginal edges are connected in proper sealing relation, as above described, said member is at all times under partial compression, and hence does not impose any restriction on the freedom of movement of the mounting member 72, and the agitator 85. Further, by virtue of employing a sealing member, which is normally under slight compression, and due to the manner of connection to the tub 30, and to the mounting member 72, there is no possibility of pinching or squeezing of clothes in the process of washing, and hence the possibility of damage to the clothes, or buttons and other articles attached to articles of clothing, is substantially eliminated. Moreover, by virtue of this construction, wherein the sealing member need ever to be under tension, the sealing member is free to follow the movement of the mounting member 72, and hence avoids a tendency to crack or rupture, as normally occurs in the use of corrugated types of sealing members, and which latter type of sealing members also have an inherent tendency to return to their initial corrugated form. Hence, by reason of the mounting member 72 being free to move in an orbital path without restriction by the sealing member 75, less power is required in imparting such orbital movement to the mounting member 72, and the agitator

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85, carried thereon, in performing the washing operation. Furthermore, by removal of the agitator 85, from the mounting member 72, as will hereinafter be described, it is possible to have free access, from within the basket or tub 30, to the screw 78 and to the bolts 81, for removal or replacing the flexible member 75.

The agitator 85, including the base 86, as shown, is made up of a plurality of parts, which may, if desired, be formed as a single unitary structure. As shown, there is mounted on the agitator base 86, a vaned structure, comprising three (3) segments 92, which are preferably formed of non-ferrous metal or suitable plastic material, adapted when assembled in cooperating relation, as seen in Figures 3 and 4, in circumferentially spaced apart relation, to embrace between adjacent segments, resilient vane members 94, preferably formed of rubber. Each of the rubber vanes is rigidly attached to two (2) adjacent segments 92, by a pair of bolts 96, and the assembly of the segments 92 and vanes 94 is rigidly secured in surrounding relation to the hub 87, of the agitator base member 86, by screws 98. In the process of assembling segments 92, together with vanes 94, in attached relation to the base 86 of the agitator, there is positioned in the space between the upper end of the hub 87, and the central head portion formed at the upper ends of the segments 92, as clearly seen in Figure 3 of the drawings, a flanged head screw 99, and which screw is adapted to be threaded into a threaded bore 100, in the upper end of the stub shaft 65, and by virtue of which the agitator may be quickly connected to or disconnected from said stub shaft.

The agitator 85, is free to rotate about the stub shaft 65. It has been ascertained that if the agitator 85 is mounted so that it is incapable of rotation about the axis of the stub shaft 65, in the same direction of orbital rotation of the mounting member 72, but permitting free rotation of the agitator in the opposite direction, improved washing results are obtained. Accordingly, I provide suitable means by virtue of which the agitator 85, is precluded from rotating in the same general direction of orbital movement as the mounting member 72, which movement is represented by arrows in Figures 2 and 4 of the drawings. Formed integrally with and extending downwardly from the under surface of the agitator base member 86, are three (3) circumferentially spaced apart lugs or stops 102, and formed integrally with and extending upwardly from the central dome portion of the mounting member 72, is a pair of lugs 104. Seated over said lugs 104, is a reciprocally movable dog or latch member 106, in the form of a flat bar, having apertures 108 for accommodating said lugs 104. The opposite ends of the latch member 106 are curved, as indicated at 110, so as to function cam-wise with respect to the lugs or stops 102 on the agitator, so that when the agitator tends to rotate in a direction opposite to the path of orbital movement of the mounting member 72, in other words in clockwise direction, as seen in Figure 4, the respective ends of said latch member or dog 106 will engage one of the stops 102 in cam-wise fashion and thereby cause reciprocal movement of the latch member 106, permitting the agitator 85 to rotate in clockwise direction. However, any tendency of the agitator to precess with respect to the mounting member 72, that is, rotate in counterclockwise direction, is immediately opposed, because one of the abutment faces 112, on the outer ends of the latch member 106, will be in a position for direct endwise engagement with one of the lugs or stops 102, on the agitator, as clearly seen in Figure 4 of the drawings. To substantially eliminate noise which may result, by reciprocal movement of the latch member 106, in the event the agitator turns in counterclockwise direction, I provide an annular spring member 114, which seats against the upper surface of the latch member 106, and against the bottom of a recess 116, formed in the lower end of the hub 87 of the agitator base.

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Mounted in surrounding relation to the tubular drive shaft 48, below the tubular support 50, is a brake device indicated generally at 120, and a clutch device indicated generally at 125. The entire assembly, comprising the washing basket 30, the agitator mounting member 72, and agitator 85, and all other auxiliary structures, together with the drive shaft 60, are totally supported at the lower end of the drive shaft 60 through the medium of a ball bearing 130, carried on a frame member 132, supported in the lower end of the cabinet 10. The drive shaft 60 extends below the bearing 130 and has mounted on the lower end thereof, a pulley 134, which is driven by a belt 136, from a pulley 138, which in turn is mounted on the drive shaft of an electric motor 140, supported on a bracket 142, which in turn is connected to the cabinet 10. By virtue of this single reduction transmission, the motor 140 normally drives the drive shaft 60, which in turn through the crank head 62 imparts a relatively high speed orbital movement to the mounting member 72, and on which is mounted the agitator 85. In this condition of operation, the brake 120, which is mounted to engage and secure the tubular drive shaft 48 against rotation, is operative, and the clutch 125 is disengaged. After completion of the washing operation, the brake 120 is disengaged, and the clutch 125 is engaged, so as to couple or connect the tubular drive shaft 48 to the drive shaft 60, and by virtue of which the shafts 48 and 60 are rotated in unison, and thereby the basket 30 is caused to rotate at the same high rate of speed for centrifugally extracting washing liquid from the clothes. Said liquid, as above indicated, is discharged through the apertures 32, in the basket 30, and is collected in the outer tub 15, and is discharged through the hose 27 by the pump 24, to a suitable drain. The pump 24 includes a drive pulley 144, which is in constant engagement with the outer surface of the belt 136, and therefore the pump is functioning at all times when the motor 140 is operating.

The particular details of construction and operation of the brake 120 and clutch 125, and the manner of control thereof, does not constitute a part of the present invention; therefore further detailed description thereof is believed unnecessary.

As is well known in connection with centrifugal extracting type washing machines, there is a tendency, in the event of uneven distribution of clothes in the basket 30, for the basket and associated parts to gyrate. By virtue of the present construction, such gyration occurs about an axis extending through the main mounting bearing 130. To assist in eliminating such gyratory movement, I provide one or more flat bar type snubber members 150, herein shown as comprising two (2) sets or pairs, extending diagonally within the cabinet 10, the central portion of bars being connected to a ring 152, surrounding the tubular standard 50, and the outer ends of each of said bars being provided on their underside with a friction pad 154, adapted to ride upon the upper surface of a recessed portion 156, of the brackets 20, and function in a manner well understood in the art to snub and dampen gyratory motion of the basket 30 and associated parts, which is transmitted by the tubular friction member 50 to said snubber bars.

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

I claim:

1. In a laundering machine, a tub adapted to contain clothes to be washed, said tub having an opening in the bottom thereof; agitator drive connections extending upwardly through said opening in the bottom of the tub, said drive connections comprising an upright rotatable shaft having its upper end in registration with said open-

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ing and a crank head mounted on the upper end of said shaft; an upwardly extending stub shaft disposed at an acute angle to vertical and having its lower portion mounted in said crank head; an agitator mounting member surrounding and fixedly secured to said stub shaft, above said crank head; an annular flexible sealing member connected at its inner edge in sealing engagement with the marginal portion of said mounting member and its outer edge being connected to the bottom of the tub to form a liquid seal between said tub and the agitator drive connections; an agitator mounted for free rotation on the stub shaft and seated upon said mounting member, and means for preventing rotation of said agitator in one direction, by which combination of parts rotation of the upright shaft imparts an orbital wobbling movement to said mounting member and said agitator and permits monodirectional rotation of the agitator.

2. In a laundering machine, a tub adapted to contain clothes to be washed, said tub having an opening in the bottom thereof; agitator drive connections extending upwardly through said opening in the bottom of the tub, said drive connections comprising an upright rotatable shaft having its upper end in registration with said opening and a crank head mounted on the upper end of said shaft; an upwardly extending stub shaft disposed at an acute angle to vertical and having its lower portion mounted in said crank head; an agitator mounting member surrounding and fixedly secured to said stub shaft, above said crank head; an annular flexible sealing member connected at its inner edge in sealing engagement with the marginal portion of said mounting member and its outer edge being connected to the bottom of the tub to form a liquid seal between said tub and the agitator drive connections; an agitator mounted for free rotation on said stub shaft and seated upon said mounting member; and means for restricting rotation of said agitator in one direction, by which combination of parts rotation

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of the upright shaft imparts orbital wobbling movement to said mounting member and said agitator and permits monodirectional rotation of the agitator.

3. In a laundering machine, a tub adapted to contain clothes to be washed, said tub having an opening in the bottom thereof; agitator drive connections extending upwardly through said opening in the bottom of the tub, said drive connections comprising an upright rotatable shaft having its upper end in registration with said opening and a crank head mounted on the upper end of said shaft; an upwardly extending stub shaft disposed at an acute angle to vertical and having its lower portion mounted in said crank head; an agitator mounting member surrounding and fixedly secured to said stub shaft, above said crank head; an annular flexible sealing member connected at its inner edge in sealing engagement with the marginal portion of said mounting member and its outer edge being connected to the bottom of the tub to form a liquid seal between said tub and the agitator drive connections; an agitator mounted for rotative movement on said stub shaft and seated upon said mounting member by which combination of parts rotation of the upright shaft imparts orbital wobbling movement to said mounting member and said agitator; and means for restricting rotative movement of the agitator in the same direction as said orbital movement of the mounting member and agitator.

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