Jan. 14, 1947. J. H. LEEF 2,414,154

ROTARY DRUM CLOTHES WASHING MACHINE

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Fig. 1

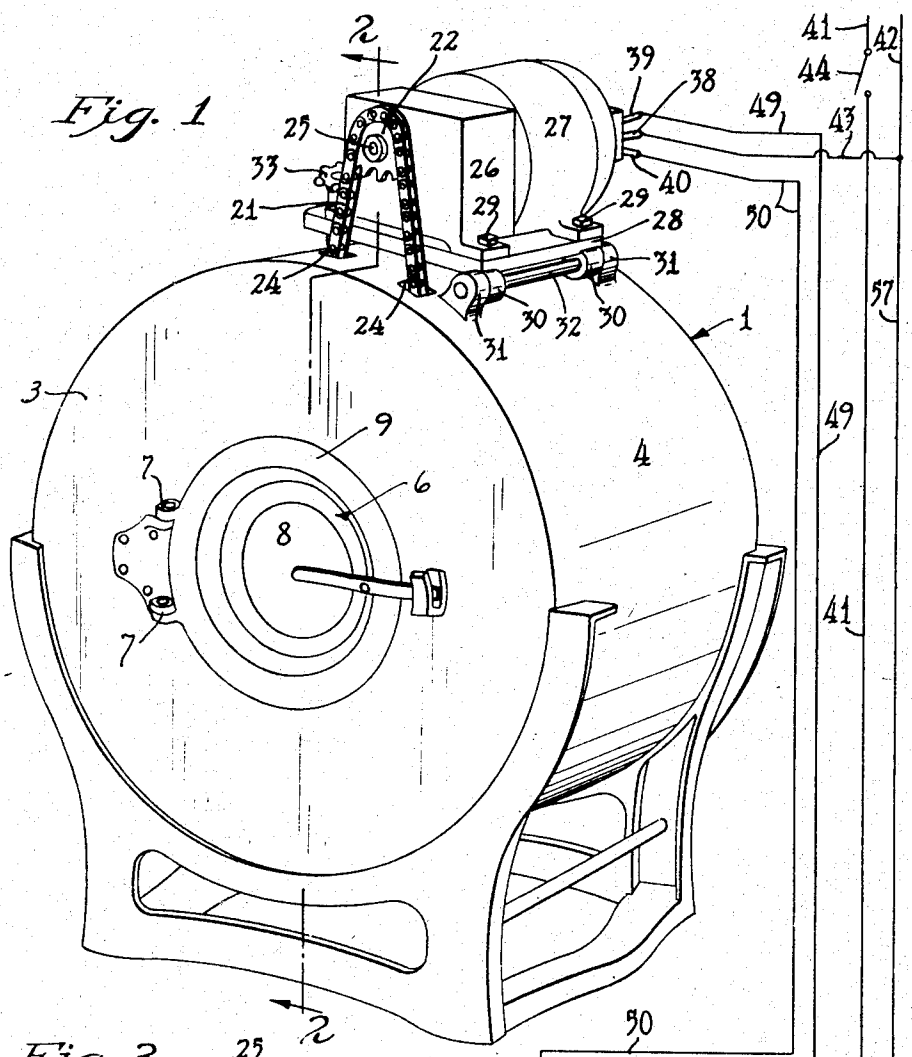
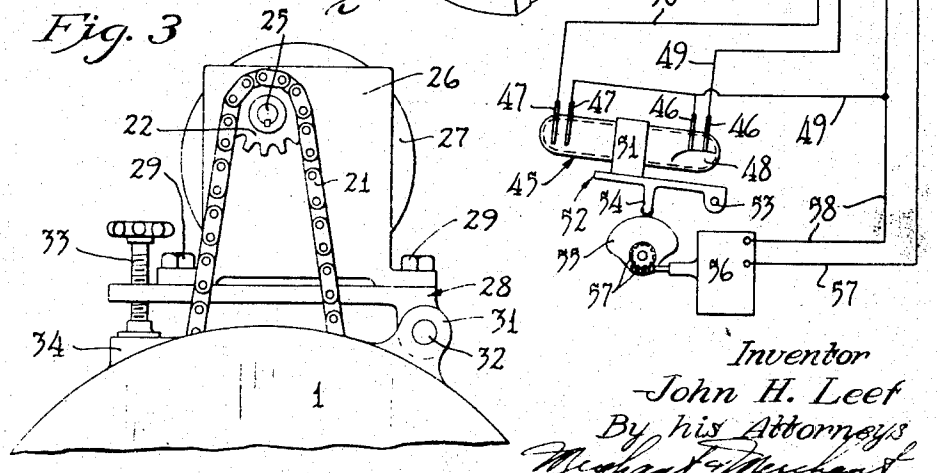


Fig. 3



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Fig. 2

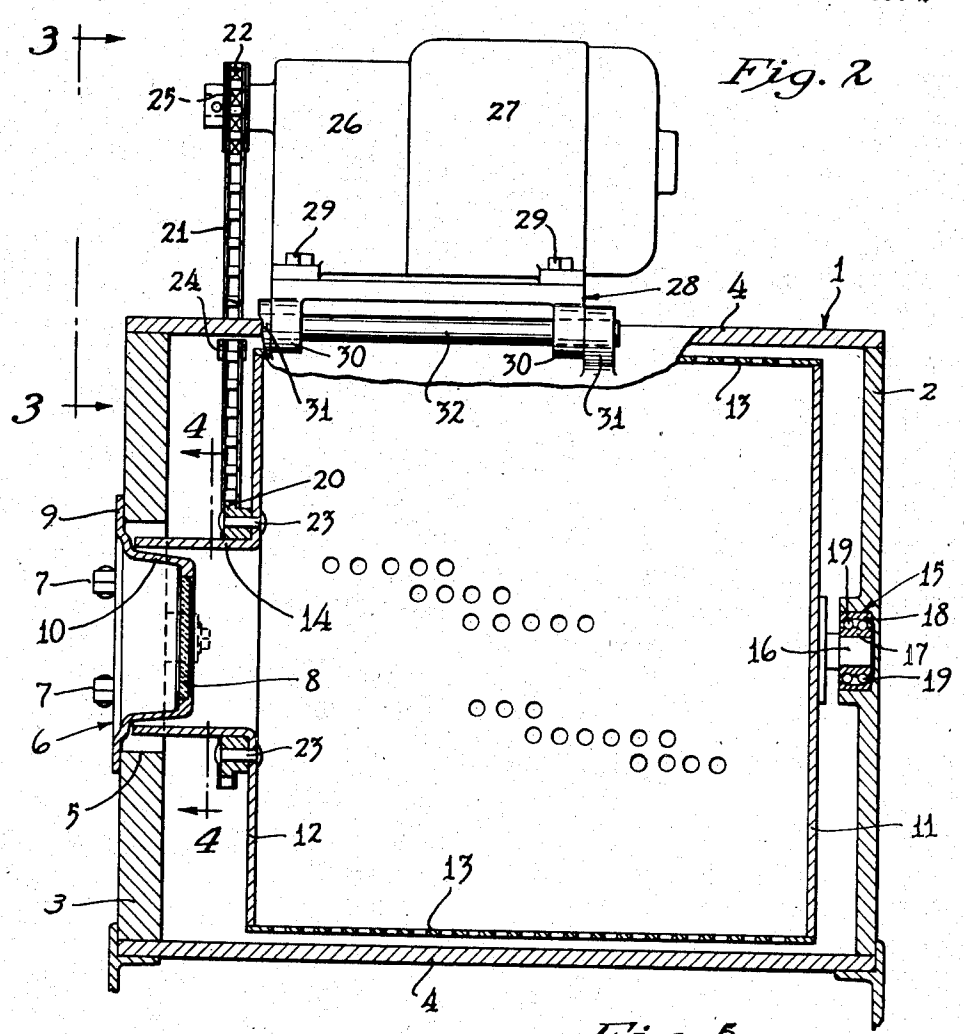


Fig. 4

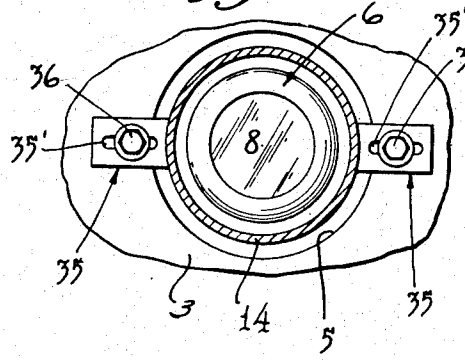
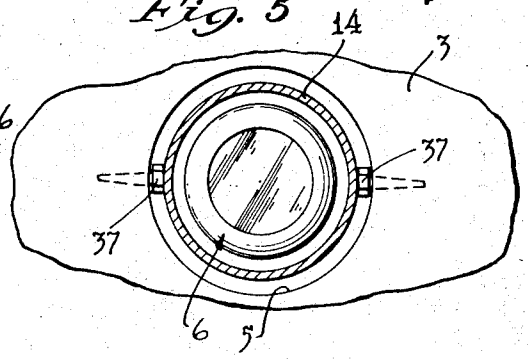


Fig. 5



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ROTARY DRUM CLOTHES WASHING MACHINE

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5 Claims. (Cl. 68—140)

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My present invention relates to improvements in the so-called "rotary drum" type of washing machine, wherein a perforate rotary inner drum is mounted within a stationary outer shell or casing and in which it is customary practice to intermittently reverse the direction of rotation of the said perforate inner drum.

Generally stated, the invention consists in novel devices, combinations of devices, and arrangement of parts hereinafter described and defined.

While the invention is adapted for use in connection with rotary drum washing machines generally, it has been particularly designed and developed for use in connection with, and has particular advantages when used in connection with, that variety of rotary drum washing machine wherein loading and unloading of the inner drum is accomplished through aligned axial openings in the inner drum and outer casing.

Among the important objects of the present invention is the provision of improved mounting and driving mechanism for the rotary inner drum which may be produced and maintained at a minimum of cost, and wherein the driving connections for the inner drum will be automatically maintained tight and free of backlash.

Another important object of the present invention is the provision of an inner drum supporting and driving mechanism which, when applied to rotary drum machines of the end loading type, may be readily adjusted to obtain or maintain axial alignment of the loading and unloading openings of the inner drum and outer casing.

Still another important object of the invention is the provision of simple and inexpensive bearing devices for preventing lateral wobbling of the chain-supported end of the rotary drums of the above described type of washing machine, and which may be hereinafter referred to as "anti-wobble bearings."

The above and other important objects and advantages of the invention will be made apparent from the following specification, claims, and appended drawings.

In the accompanying drawings, like characters indicate like parts throughout the several views.

Referring to the drawings:

Fig. 1 is a composite drawing comprising a perspective view of a machine embodying a preferred embodiment of the invention and a wiring diagram illustrating the electrical hook-up of the reversible motor;

Fig. 2 is an axial sectional view taken on the line 2—2 of Fig. 1;

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Fig. 3 is an enlarged fragmentary end view taken approximately on the line 3—3 of Fig. 2 and looking from left toward the right;

Fig. 4 is a fragmentary detail sectional view taken on the line 4—4 of Fig. 2; and

Fig. 5 is a fragmentary detail sectional view similar to Fig. 4 but showing a somewhat modified form of adjustable anti-wobble bearings for the inner drum.

In the drawings, the stationary outer casing of the machine, indicated as an entirety by 1, is shown as being of cylindrical form comprising a rear end wall 2, a front end wall 3, and a cylindrical wall 4. This drum-like outer casing 1 is provided in its front wall 3 with an axial loading and unloading aperture 5 that is normally closed by a door 6 hinged to the outer surface thereof at 7, and which is provided with a transparent window 8. Preferably, and as shown, this door comprises a radial annular flange 9 that normally rests against the outer face of the front wall 3, a sleeve-like flange 10 that extends inwardly through the outer wall opening 5, and an end wall in which the said window 8 is located. For reasons that will hereinafter be made apparent, it will be seen that the inwardly extended sleeve-like flange 10 of the door 6 is abruptly contracted intermediate its ends and is thereafter inwardly tapered.

The inner drum of the machine is shown as being cylindrical in form and comprises an imperforate rear end wall 11, a front end wall 12, and a perforate cylindrical wall 13. The said front end wall 12 of the inner drum is provided with an axial loading and unloading opening defined by an axially projecting cylindrical flange 14 that projects into and works with clearance between the wall of the axial opening 5 of the outer casing and the inwardly tapered portion of the sleeve-like flange 10 of the door 6. This much of the machine is known to be old, but I will now proceed to describe in detail the inner drum supporting, driving, and guiding mechanism or mechanisms forming the subject matter of the present invention, and which I believe to be new in the art.

The rear end of the rotary inner drum is journalled and supported through the medium of a suitable self-aligning bearing. In the preferred embodiment of the invention herein illustrated, the rear end of the inner drum is journalled to the rear wall 2 of the outer shell or casing 1 through the medium of a conventional self-aligning bearing 15 and a stub shaft 16 carried by and projecting axially from the rear end wall

of the inner drum. While one well-known type of self-aligning bearing has been shown, it should be understood that any bearing permitting a reasonable degree of axial misalignment without binding may be sucessfully employed and that the term "self-aligning bearing" is herein used in a broad and liberal sense to include any kind of bearing permitting a sufficient degree of axial misalignment without undue binding or damage to the parts. The particular bearing illustrated comprises an inner race 17 receiving the stub shaft 16, an outer race 18 mounted fast in a suitable recess in the end wall 2, and bearing balls 19.

The inner drum is driven by, and the front end of the drum is supported by, driving and transmission parts and connections comprising a ring sprocket 20, a drive chain 21, and a pinion sprocket 22. The ring sprocket 20 surrounds the loading sleeve 14 of the inner drum and is suitably anchored to the front wall of the inner drum by rivets or the like 23. The chain 21 engages the sprockets 20 and 22 and works through suitable openings 24 in the top of the outer shell or casing 1. The pinion or driving sprocket 22 is mounted fast on a drive shaft 25 of a suitable speed-reducing transmission mechanism contained within a transmission casing 26. This shaft 25 is driven from a suitable motor 27 through the medium of said speed-reducing transmission mechanism. The power unit comprising the speed-reducing transmission mechanism and motor 27 is supported from the top of the outer casing 1 through the medium of a mounting base 28. The said power unit comprising the rotary and transmission mechanism is bolted directly to the base 28 at 29, and said base at one side is pivotally or hingedly connected to the top of the cylindrical outer casing 1 by cooperating hinge lugs 30 and 31 and a hinge pin or pintle 32. The hinge pin or pintle 32 extends parallel to the axis of the sprocket 22. At its other side, the power unit mounting base 28 is supported from the arcuate top of the outer casing 1 by adjusting screws 33 that work through internally-threaded apertures in the mounting base and bear against suitable load-carrying projections 34 on the upper portion of the outer casing.

With the above described arrangement, it will be clear that the chain 21 will be maintained tight and slack free at all times, since the entire weight of the loading end of the rotary drum and its contents are carried directly by the driving connections comprising the chain 21 and sprockets 20 and 22. This feature is highly important, particularly in machines wherein the direction of rotation of the rotary drum is intermittently reversed as in the present instance. Of course, it is also important that the loading or unloading openings of the outer casing and rotary drum be maintained in true axial alignment, so that the extended sleeve 14 of the inner drum will work with clearance between the walls of the outer casing opening 5 and the inwardly tapered portion 10 of the door 6. Initial and subsequent vertical adjustments of the front or loading end of the rotary inner drum with respect to the outer casing are, of course, quickly and easily accomplished by hand manipulation of the adjusting screws 33 resulting in a slight pivotal tilting action of the entire power unit and a resultant raising or lowering of the upper drive sprocket 22. After initial vertical adjustment of the loading end of the drum by manipulation of

the hand screws 33 to bring the sleeve 14 into vertically centered relation with the walls of the casing passage 5, further adjustments will be necessary only at widely-spaced intervals occasioned by wear and consequent stretching of the link chain or belt 21, assuming, of course, that the chain and weight-carrying bearings are of sufficient size to carry the load without undue strain.

In the preferred embodiment of the invention illustrated in Figs. 1–4 inclusive, lateral wobbling movements of the loading end of the rotary inner drum are prevented by anti-wobble bearings in the nature of oil-soaked bearing blocks 35. These bearing blocks 35 are located at and engage diametrically opposite sides of the loading sleeve 14 of the inner drum and are adjustably anchored directly to the inner face of the end wall 3 of the outer casing. By reference particularly to Fig. 4, it will be seen that the bearing blocks 35 are longitudinally slotted and are secured to the end wall 3 by head and washer equipped bolts 36 screw-threaded into the end wall 3 and working in the slots 35' of the blocks 35.

In the modification shown in Fig. 5, the anti-wobble bearings comprise headed lag screws 37 screwed directly into the casing end 3 and having their heads disposed against diametrically opposite points on the periphery of the sleeve 14.

In the above description, it has been assumed that the machine is of the particular variety wherein the direction of rotation of the inner drum is intermittently reversed. While this intermittent reversing of the drum may be accomplished in various different ways, I prefer to accomplish this action by use of a reversible electric motor controlled by suitable automatic reversing switch mechanism. Hence, it may be assumed that the motor 27 is of the reversible type having three leads extending therefrom. In Fig. 1, these leads are indicated by 38, 39, and 40. Referring now particularly to the diagrammatical portion of Fig. 1, a pair of power line leads are indicated by 41 and 42 respectively. The power line lead 42 is connected directly to the motor lead 38 through a lead 43. The lead 41 has interposed therein a manual off-on switch 44 and is adapted to be alternately connected to motor leads 39 and 40 through opposite end contacts of a conventional mercury switch 45. This mercury switch has a pair of contacts 45 at one end thereof and a pair of contacts 47 at the other end thereof; the contacts 46 being closed by a globule of mercury 48 when the tube is tipped to the right and the contacts 47 being closed by the mercury 48 when the tube is tipped to the left. The mercury tube contacts 46 are interposed in a lead 49 extending from lead 41 to motor contact 39 and the mercury tube contacts 47 are interposed in a lead 50 connecting motor lead 40 to lead 41 through part of lead 49. The mercury tube 45 is mounted through the usual spring clip 51 on a rocking arm 52 that is pivoted to a fast support at 53 and is provided with a depending cam-engaging lug 54. The lug 54 rides on the periphery of a cam 55 that is driven by an electric motor 56 through speed-reducing worm gears 57. The motor 56 may be assumed to be of the small clock type variety and has one side connected directly to lead 43 through a lead 57 and its other side connected to lead 41 through a lead 58. The contour of the cam 55 is such that the switch 45 will be tilted in one direction to close contacts 56 throughout approximately 180° of cam movement and will permit the switch 45 to tilt in the other direction and close

contacts 47 through the other approximately 180° of cam movement. The speed of rotation of the cam 55 should be such that the rotary inner drum will be permitted to revolve several times consecutively in each direction.

It will, of course, be understood that the outer casing is fluid tight at least below the loading opening 5 thereof and is adapted to contain in its lower portion a body of suitable cleaning fluid, such as soap and water, to a level considerably above the bottom of the perforate inner drum, so that clothing or the like within the inner drum will be saturated with the cleaning fluid.

While the invention has been illustrated and described in connection with washing machines, it will be obvious that the invention is also applicable to clothes drying machines of the so-called rotary drum or "tumbler" type.

What I claim is:

1. In a machine of the kind described, a fixed outer casing, a perforate rotary inner drum disposed within said outer casing on a horizontal axis, axially aligned loading and unloading openings in one end of the rotary inner drum and an adjacent wall of the outer casing, the other end of said inner drum being journalled to the outer casing through the medium of a self-aligning bearing, a ring chain sprocket mounted on the loading and unloading end of the rotary inner drum concentrically with and surrounding the loading and unloading opening therein, whereby loading and unloading of said inner drum will be through the axial opening in said ring sprocket, a power unit mounted on the upper portion of said outer casing and having a chain sprocket located above the outer casing and said ring sprocket, and a link chain running over said sprockets, said chain operating through apertures in the upper portion of said outer casing.

2. The structure defined in claim 1 in which the said power unit is mounted on the upper portion of the outer casing through the medium of a

pivotal connection the axis of which is parallel to but spaced from the axis of the upper sprocket, and an adjusting device controlling the angulation of the power unit with respect to the outer casing whereby to effectively raise and lower the upper sprocket.

3. In a machine of the kind described, a fixed outer casing, a perforate rotary inner drum disposed within the outer casing on a horizontal axis, an axial loading and unloading opening in one end of the inner drum, a cooperating axially aligned loading and unloading opening in an adjacent wall of the casing, said inner drum being provided with an axially projecting loading and unloading sleeve extending from the marginal portion of said inner drum opening into the cooperating opening of the outer casing, a self-aligning bearing operatively supporting the other end of the inner drum, a ring chain sprocket mounted on the loading and unloading end of the inner drum in radially spaced concentric relation to said ring sprocket, a driving sprocket rotatively supported on the upper portion of the outer casing above the ring sprocket, a chain running over said sprockets and supporting and driving said ring sprocket and drum from the upper sprocket, and horizontally spaced anti-wobble bearings mounted on the outer casing and engaging diametrically opposite portions of the loading and unloading sleeve.

4. The structure defined in claim 3 in which the said anti-wobble bearings comprise horizontally slotted bearing blocks anchored to the outer casing by bolts passed through said slots.

5. The structure defined in claim 3 in which the said anti-wobble bearings comprise headed lagscrews screwed directly into the outer casing through the wall of the said aperture therein and having their heads in frictional engagement with the outer periphery of the sleeve of the inner drum.

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