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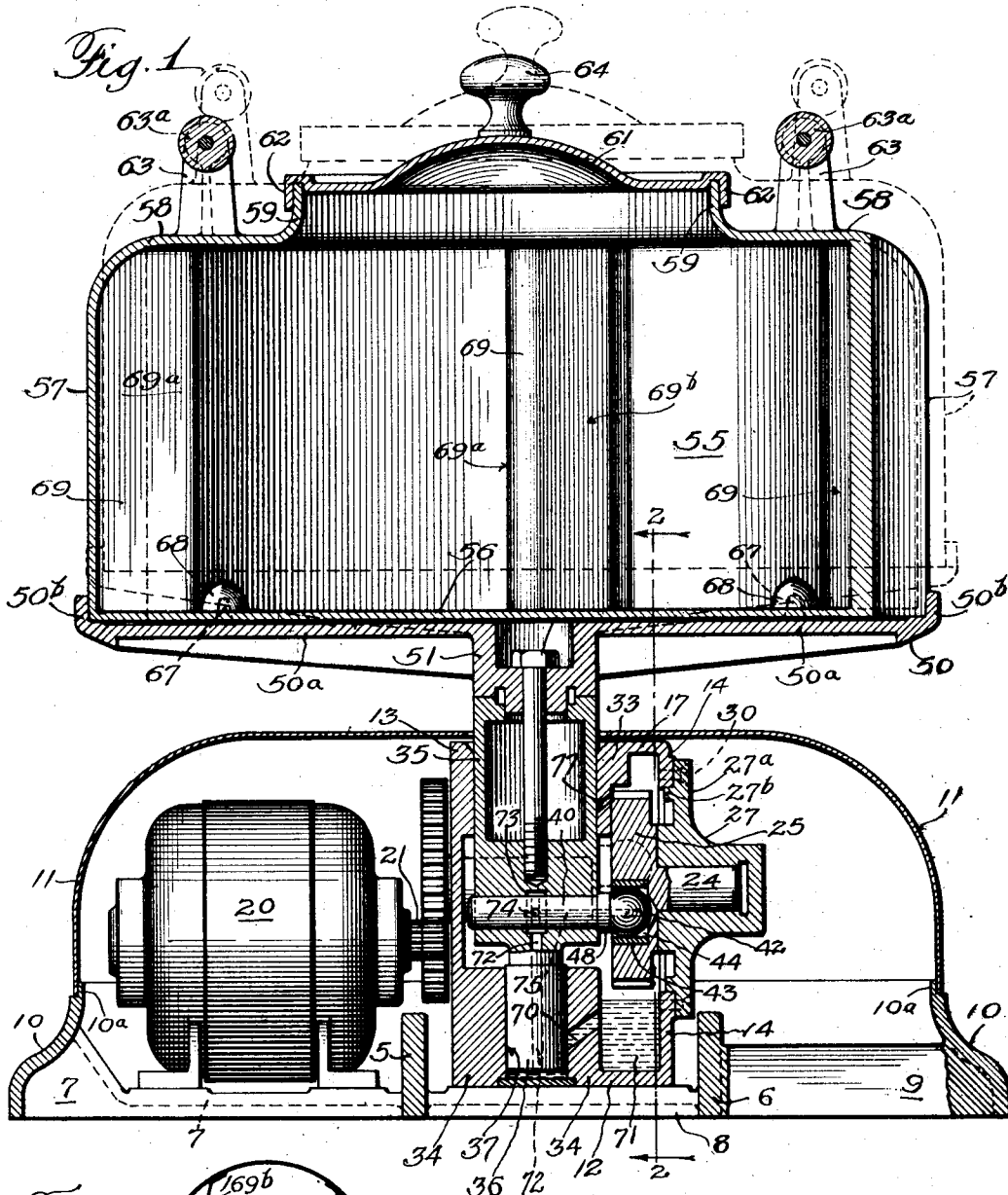
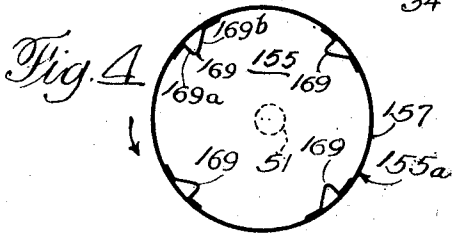
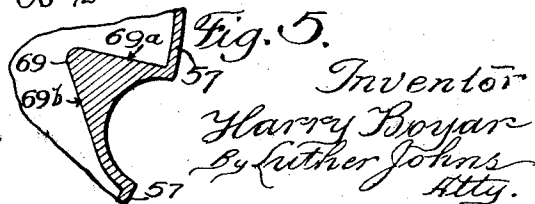
H. BOYAR

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WASHING MACHINE

Filed May 29, 1930

2 Sheets-Sheet 1



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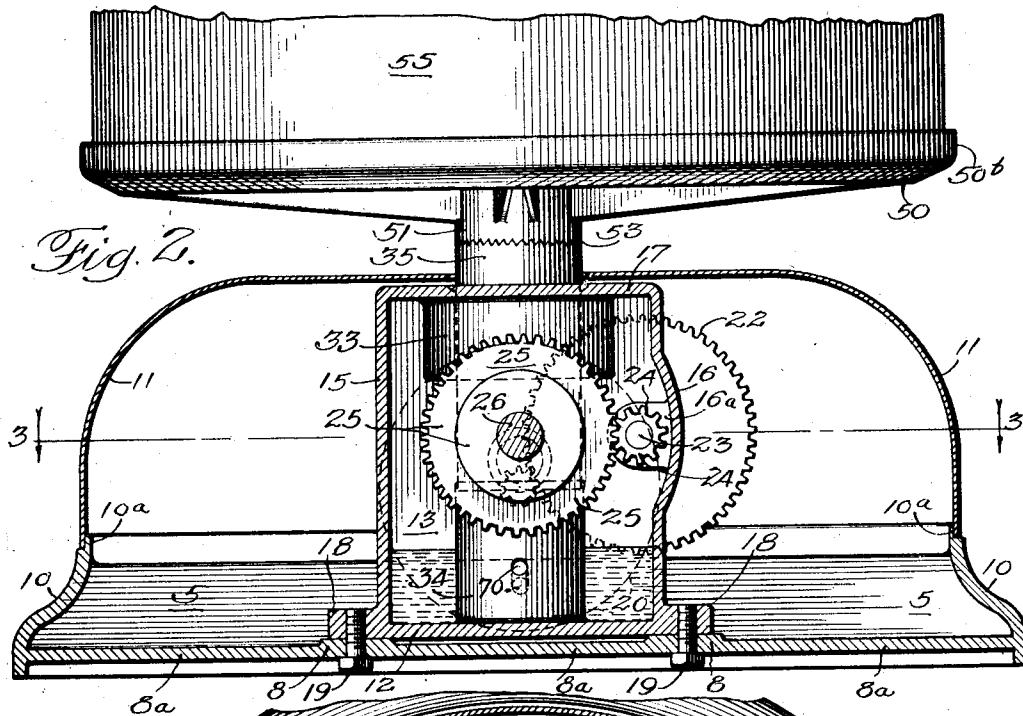
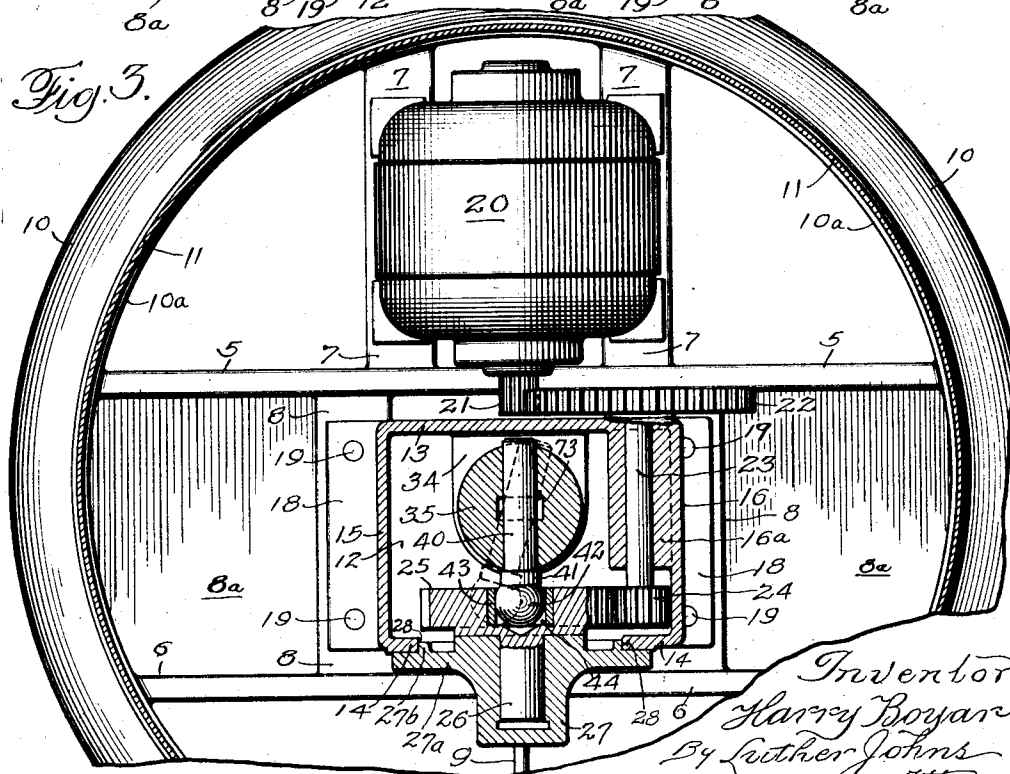
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UNITED STATES PATENT OFFICE

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WASHING MACHINE

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These improvements relate to clothes washing machines of a kind having a clothes receptacle adapted to contain a cleaning liquid and which reciprocates up and down while oscillating on the axis of reciprocation.

The objects include the provision of an efficient clothes washer which is notably compact and occupies but a small amount of space relative to the capacity of a given embodiment; and one also which is peculiarly appropriate for small-size constructions adapted for use in small apartments, kitchenettes, and like places where space considerations are important. Other objects have to do with simplicity and strength of the organized parts, convenience in use, quietness in operation, and the avoidance of certain conventional features of washing machines found disadvantageous. Other objects and advantages will be apparent from the specification, drawings and claims.

In the drawings Fig. 1 is a medial vertical section through a preferred embodiment of the machine complete, with the motor in full side view; Fig. 2 is a view showing a fragment of the clothes receptacle in side elevation and in section, as on the line 2—2 of Fig. 1 showing certain of the operating parts; Fig. 3 is a fragmental horizontal section on the line 3—3 of Fig. 2; Fig. 4 is a small diagrammatic horizontal section through a modified construction of the container showing the construction and arrangement of the clothes-pushing members in a container to be considered of sheet metal; and Fig. 5 is a fragmentary horizontal section of the container of Fig. 1 at one of the clothes-pushing elements.

The machine is supported on a base shown as a casting having a circumferential periphery on circular lines. This base has a skeleton bottom comprising a pair of upright vanes 5 and 6 extending from side to side, a pair of plate-like motor supports 7, a pair of flat and wide ribs 8 for supporting the operating mechanism, these ribs rising from plates or bottom walls 8a, and an upright vane 9, all of these base elements being integral with one another and with the

outer rim 10. This open and skeleton form of the base effects a notable saving in weight and cost. The base is preferably cast of aluminum.

The rim 10 has a flange at 10a defining a seat for the lower edge portion of the cup-shaped cover member 11, which may be considered to have been spun or pressed from flat sheet material, for example copper.

On the bottom ribs 8 is secured a mechanism frame having a bottom wall 12, upstanding side walls 13 and 14, end walls 15 and 16 and a top wall 17. Laterally-extending flanges 18 at the bottom provide means for securing this mechanism frame to the base ribs 8 by bolts 19.

The motor 20 is secured to the supports 7 of the base. It has a pinion 21 on its armature shaft meshing with a gear 22 fixed on a shaft 23 which extends through a bearing enlargement 16a of the end wall 16 of the frame.

On shaft 23 there is a pinion 24 meshing with a gear 25 shown as integral with a stud shaft 26 extending into a removable bearing member 27 having an annular flange 27a and an annular ridge-like projection 27b, the latter interfitting in an opening 28 in the side wall 14. Bolts 30, shown dotted in Fig. 1, hold this bearing member 27 in place.

The depending boss 33 is formed integrally with the top wall 17 while an upstanding boss 34 is integrally formed on the bottom 12 and side wall 13 of the mechanism frame, as shown in Figs. 1 and 2. The bosses 33 and 34 are bored on an axial line to accommodate a reciprocable shaft 35 and to provide a piston chamber 37 for a pump piston 36 respectively. The shaft 35 and piston 36 may be formed, as shown, from a single piece of metal. The shaft 35 is formed hollow chiefly to save weight.

The lower part of vertical shaft 35 is bored diametrically to accommodate, preferably with a working fit, the driving element or pin 40 which has an enlargement or collar-like formation 41 bearing against the side of the shaft 35, and a ball 42 at its outer end.

In the inner face of the gear 25, is a circular recess off-center with respect to the axis

of shaft 26 and accommodating a tubular steel bushing 43 tightly driven into position, the bushing forming a recess 44. (See Fig. 1.) The head 42 of the pin 40 fits snugly in this recess 44. The head can not move to the right as viewed in Fig. 1 because limited by the depth of recess 44, and the collar 41 bearing against the shaft 35 maintains the head 42 against displacement to the left as viewed in Fig. 1. The arrangement described constitutes a universal joint connection.

The motor being in operation, the driving member or gear 25 is rotated at a speed much reduced from the motor speed, and the head 42 and without the pin 40 is carried around in a circle. The shaft 35 must respond to the movements of head 42 and pin 40 because the pin or driving element 40 maintains a constant driving relation to shaft 35. This circular motion of head 42 becomes translated into upward and downward reciprocations of shaft 35 coupled with simultaneous oscillation on the axis of shaft 35.

If a cycle of these movements is initiated with the ball-and-socket universal joint 42, 43 at its lowermost position as shown in Fig. 1, the first quarter of the revolution of the gear 25 will raise shaft 35 upwardly the first half of its full stroke, and at the same time will rock shaft 35 one half of its oscillating movement in one direction. The next quarter of the revolution of gear 25 head 42 will carry shaft 35 upwardly the remaining half of its stroke and simultaneously turn shaft 35 the first half of its rocking movement in reverse direction. The ball 42 has now moved from its lowermost to its uppermost position as shown in dotted lines in Fig. 1. Continuing through the third quarter of the revolution of the gear 25, shaft 35 is carried downwardly one half its stroke while being turned through the second half of the reverse rocking movement. On the last quarter the shaft 35 descends to initial position at the lower end of its stroke while being turned through the first half of oscillating movement in said one direction. The rocking movements are reversed when shaft 35 is midway between the ends of its stroke. The beginning of a rocking movement lags ninety degrees in the rotation of gear 25 from the beginning of a reciprocating movement, and vice versa.

Mounted on the upper end of shaft 35 is a support 50 shown as circular in plan view and provided with a hub or shaft extension 51 which is off-center with respect to the circular periphery of the support 50 as shown in Figs. 1 and 4. Shaft extension 51 fits on shaft 35, and is held securely by a bolt 52 threaded into the lower part of shaft 35. Interlocking means shown as serrations 53 (Fig. 2) insures a positive driving connection between shaft 35 and the hub 51 and its supported parts.

The support or carrier 50 may be cen-

sidered to be in the form of a wheel or spider having spoke-like arms 50a (Fig. 1) connecting the hub 51 to the annular rim, the latter having an upstanding flange 50b.

The kettle, container or receptacle 55 is shown as a casting which is preferably of aluminum. Such a receptacle may be of sheet metal, and the one marked 155a of Fig. 4 may be considered such. The kettle 55 has a bottom 56, cylindrical side wall 57 and a top wall 58 terminating in an upstanding flange 59. The removable cover 61 has a flange 62 fitting over flange 59. Oppositely-arranged handle brackets 63 are integral with the top wall 58 and between the brackets of each pair is a wood or composition handle 63a. These handles enable the container to be lifted away bodily and carried about, while knob 64 enables the cover to be applied and removed.

The container 55 fits loosely within the flange 50b of the support 50 and may readily be lifted away from and re-applied to the support from time to time. This is a feature of importance as makes for greater convenience in the washing operations in general, and this container, with water, soap and the clothes to be cleaned therein may be placed on a stove and the water heated even to boiling if desired, or the water may be heated before the clothes are inserted. No heating device is therefore necessary in connection with the machine.

Several small upwardly-tapering projections or studs 67, Fig. 1, carried near the margin of support 50 interfit with similarly shaped recesses formed in integral enlargements 68 in the corner between the bottom wall 56 and side wall 57 of the kettle, and thus the kettle is moved positively by the carrier or support 50 when the latter is oscillated.

The kettle or container 55 moves with the same vertical reciprocations and the same oscillating movements as those given to vertical shaft 35. Fig. 1 shows in dotted lines, and somewhat exaggerated, the position of the container when it has reached its maximum throw to the right under oscillatory movement and as the container nears the upper end of the stroke of the piston. The throw of the container to the right and left is due to the eccentric arrangement of the container support 50 with respect to the axis of the shaft 35.

In this machine motion is supplied to the kettle contents by moving the container bodily. This, for one thing, dispenses with the use of the conventional reciprocating plungers within the body of the container and which occupy a very considerable amount of space and call for a container of materially great size for a given capacity, and, furthermore, the action of such beaters or pressers upon the clothes is not entirely satisfactory. The present container, being free of such de-

vices, will hold for effective washing an unusually large amount of material for a given size of machine.

I provide means for moving the material within the container in the form of a plurality of wedge shaped projections marked 69 in Fig. 1 and 169 in Fig. 4. In Fig. 4 projections 169 are formed of sheet metal and secured to the side wall 157 of the container 155. In Fig. 1 the projections 69 are integral with the side, bottom and top walls of the kettle.

These projections 69, 169 are in the nature of pushing devices and are severally formed with one side 69a which is approximately at right angles with the side wall and another wall 69b slanting off at a considerably greater angle. The side 69a is adapted to engage rather firmly with the clothing in the container when the container is rocking in the direction of the arrow in Fig. 4 so as to push the clothing around in the same direction, while on the reverse movement the more slanting sides 69b will permit those sides to slide against and away from the clothing rather than to force it back, and thus the material is being moved forward step by step much in the nature of a ratcheting operation. This movement is facilitated by the reciprocations of the container which keep the mass of material loosely compacted and in condition for easy movement. A further object of these vane-like extensions 69, 169 is to agitate the water and to force it around in the given direction whereby the clothing is carried in a floating manner by the water body. The vertical reciprocations cause the mass of material to rise and fall and spread apart and cause water to pass over and through the same, all as is readily to be appreciated when it is considered that the clothing is being partly floated and has inertia and momentum and is operated upon by pressures from the various walls of the container. In addition to the actions thus described there is, due to the eccentric motion of the kettle, a bodily throwing of the kettle contents around in the direction of intended movement. This eccentric movement produces a centrifugal action on the kettle contents which cooperates in the movement of the water and solid materials relatively to each other and to the kettle.

Returning to the power plant mounted on the base, the chamber 37 communicates by a duct 70 with an oil well 71. When the piston 36 rises oil flows into the bottom of the cylinder chamber, and on the return stroke the piston acts as a valve to close the duct 70 and then oil below the piston is forced upwardly through an axial bore 72 in the piston 36 into an annular space 73 around the pin 40 for lubricating it. The pin 40 has one or more holes 74 leading to a longitudinally-extending duct 75 which extends through the

ball 42. Oil is thus forced around the pin 41 and into the ball and socket recess 44. This recess 44 opens into the bearing surface for the stud shaft 26 and oil may therefore enter that bearing, and also at the bearing surface between the gear 25 and the bearing member 27. Oil emerging from the several outlets covers the inner face of gear 25 and flows through duct 77 into contact with reciprocating shaft 35. More oil is pumped than sufficient for actual oiling, and the excess flows back into well 71. Through this oiling system the parts which would be more difficult to reach are automatically kept well lubricated.

The eccentric movement of the kettle should not be excessive owing to the tendency thereby of the device as a whole to creep.

To gain access to the power plant it is necessary only to lift away the kettle, remove bolt 52 and then lift away the housing member 11.

It will be observed that the manufacturing operations call for only what is ordinary and well known, and that the various parts are easy of construction and are easily assembled.

I contemplate as being included in the present improvements all such variations, changes, departures and modifications from what is thus specifically illustrated and described as fall within the scope of the appended claims.

I claim:

1. In a clothes washing machine, the combination of a vertically disposed shaft mounted for simultaneous oscillatory and vertically reciprocating motions, means for simultaneously vertically reciprocating and oscillating said shaft, a horizontal support carried by said shaft at the upper end thereof, and an imperforate container for clothes and a cleaning liquid seated for ready removability on said support, and coacting means on said support and container for communicating the motion of said support to the container.

2. The combination of claim 1 hereof in which said support is substantially circular and is carried eccentrically by said shaft, and said container has a substantially cylindrical side wall, the construction providing that the container on the support will be eccentrically rocked when said shaft is rocked.

3. In a clothes washing machine, the combination of an imperforate container for the articles to be washed and a cleaning liquid, and means for vertically reciprocating the container while simultaneously oscillating it on the axis of reciprocation, said container being eccentrically mounted with respect to the axis of reciprocation, and means wedge shaped in plan within the container for moving the clothes therein in only one direction relatively to the container under the influ-

ence of said reciprocating and oscillating movements.

4. In a clothes washing machine, the combination of a container for the articles to be washed and a cleaning liquid, means for vertically reciprocating the container while simultaneously oscillating it on the axis of reciprocation, said container being eccentrically mounted with respect to the axis of reciprocation, and a plurality of pushing elements wedge shaped in plan within the container adapted to move the mass of clothes relatively to the container in only a given direction under the influence of said reciprocating and oscillating movements.

5. A washing machine including a shaft, means for vertically reciprocating said shaft and simultaneously oscillating said shaft about the axis of reciprocation, a container support on said shaft eccentrically mounted with respect to the axis of said shaft whereby one portion of said support will be given a greater throw than another part under oscillatory movement, and a clothes container on said support, said support and container having interfitting parts for moving said container with said support during oscillation of said support, the engagement of said container and support being maintained solely by the weight of the container and its contents.

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