

April 25, 1933.

J. B. KIRBY

1,905,912

WASHING MACHINE

Original Filed March 21, 1927

Fig. 1

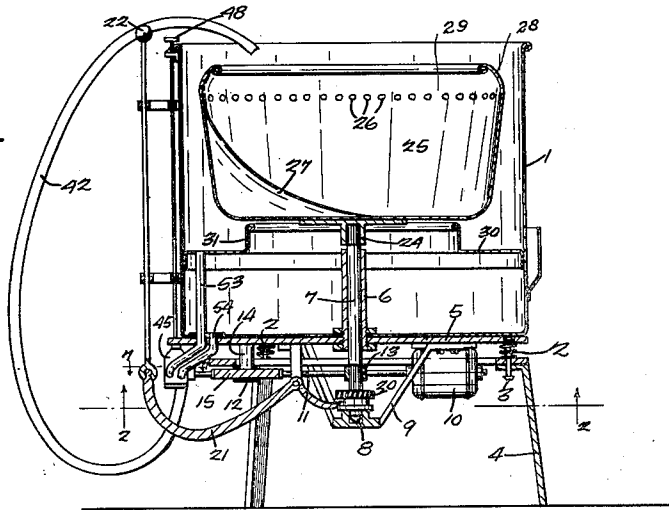


Fig. 2

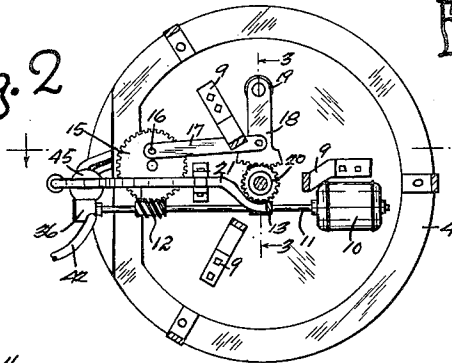


Fig. 3

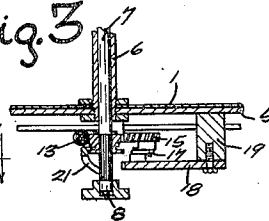


Fig. 4

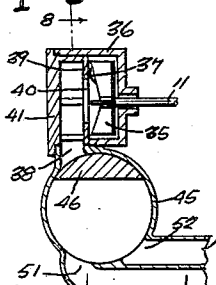


Fig. 5

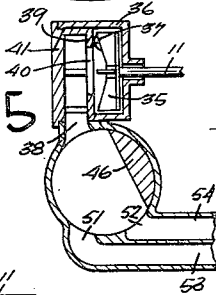


Fig. 8

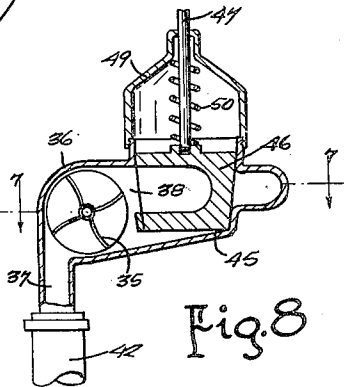


Fig. 6

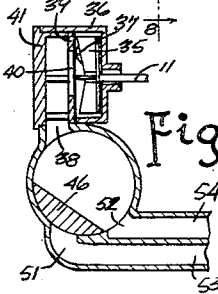
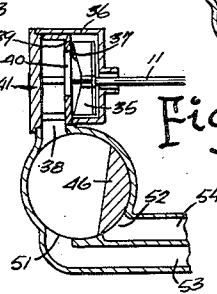


Fig. 7



James B. Kirby
Inventor
by Smith and Freeman
Attorneys

UNITED STATES PATENT OFFICE

JAMES B. KIRBY, OF WEST RICHFIELD, OHIO

WASHING MACHINE

Application filed March 21, 1927, Serial No. 176,909. Renewed July 3, 1930.

This invention relates to combined washing and extracting machines for the laundering or dry cleaning of clothing and fabrics and has for its objects the provision of an improved and simplified mechanism whereby such articles can be washed and extracted with minimum of handling either of the clothes or of the mechanical equipment; the provision of new and improved mechanism for effecting the various mechanical movements required with a minimum number of parts; the provision of new and improved means for accommodating the vibration due to any unbalanced condition of the clothing during the extracting operation; while further objects and advantages of the invention will become apparent as the description proceeds.

In the drawing I have illustrated a specimen embodiment of my invention although it will be understood that this drawing is intended to be merely illustrative of the principles of my invention and is not intended to limit me to any features of design, proportion, or arrangements of parts. Fig. 1 is a vertical sectional view through a combined washing and extracting machine containing my invention corresponding to the line 1—1 of Fig. 2, the parts being shown in washing position; Fig. 2 is a bottom plan view corresponding to the line 2—2 of Fig. 1; Fig. 3 is a sectional view on the line 3—3 of Fig. 2 showing the parts in extracting position; Figs. 4, 5, 6, and 7 are sectional views of the pump corresponding to the line 7—7 of Figs. 1 and 8, showing the valve in different positions; and Fig. 8 is a vertical sectional view corresponding to the line 8—8 of Fig. 4.

My improved machine comprises an upright casing 1 adapted to hold the washing liquid and here shown as yieldingly supported by springs 2—2 (preferably supplemented by very loose bolts 3) on top of a rigid stand 4. The bottom of the casing is here shown as reinforced by a stiff, circular plate 5 in which is tightly mounted the rigid, upright, axial sleeve 6. Journaled in this sleeve is a vertical operating shaft 7 whose lower end is stepped in a thrust

bearing 8 carried by the branched spider 9 whose legs are secured to the bottom of the plate 5.

Tightly secured to the bottom of the plate 5 is a driving motor 10 having a horizontal shaft 11 to which are attached two spiral gears 12 and 13. Pivoted to a rigid post 14 carried by the plate 5 is a pinion 15 meshing with the gear 12 and having an eccentric pin 16 articulated by means of the connecting rod 17 to an oscillating element, here consisting of a segmental rack 18 pivoted to a second post 19 carried by the plate 5. The spiral gear 13 located adjacent to the shaft 7 constitutes one form of a constantly rotating element. Slidably splined on the lower end of the shaft 7 is a power transmitting element 20 here consisting of a spiral gear adapted to engage either with said rotating element (the gear 13) or said oscillating element (the rack 18) depending upon whether said power transmitting element (the gear 20) is in raised or lowered position. In the present specific embodiment the gear 20 is formed with teeth of proper slant to mesh with the gear 13, and the rack 18 is likewise formed with teeth with this same slant. The gear 20 is shifted along the shaft 7 by means of a suitable lever 21 which in turn may be manipulated by a suitable handle 22 located in any convenient position. When the gear 20 is in an intermediate position it is out of engagement with the gear 13 and the rack 18.

The upper end of the shaft 7 is fluted or otherwise suitably formed for the reception of the socket 24 carried by the bottom of a container 25 in which the washing is effected. This container is made in the form of a liquid containing tub having its bottom and the lower part of its sides imperforate so as to hold detergent liquid without leaking, but having its sides slanted upwardly so as to permit the discharge of such liquid upon rapid rotation. I have shown a horizontal row of apertures 26 at the point of maximum diameter of the container for the discharge of the liquid. Suitable liquid and clothes agitating provision is made, here consisting of a single radial vane 27 rigid with the con-

tainer. This vane may be made by bending the container wall inwardly or by a separate member or members affixed to said container. Above the level of the apertures 26 the wall of the container is preferably tapered or inclined inwardly as shown at 28, and terminates in a roll rim 29 or other stiffened edge.

The height of the sleeve 6, and consequently the height of the container above the bottom of the casing, is such as to enable the entire liquid contents of the casing to be received and stored in the casing beneath the container during the extracting operation if the user shall so desire; and for the purpose of preventing splashing of that liquid due to the vibration of the mechanism and the rapid rotation of the container immediately above the same, as well as for the purpose of effecting a separation between the washing liquid and other substances such as rinsing and bluing water, I provide the wall of the casing with an annular shelf 30 a short distance below the container, and having at its inner margin an upright lip 31 defining an annular trough with the adjacent side wall of the casing 1. The top of the rim 31 preferably projects to within a short distance of the bottom of the container, since the latter is always supported at the same elevation. The circular opening through this trough combined with the removable mounting of the container enables ready access to all parts of the casing interior for purposes of cleaning and inspection.

Secured below the plate 5 is a pump 36 operatively connected to the motor and associated with a hose 42 and valve 45 in such wise that the liquid contents of the trough or casing can either be elevated back into the container or discharged to a waste or other receptacle. In its preferred form this pump comprises a rotor 35 carried by the end of the shaft 11 inside a suitable casing 36 having a peripheral outlet 37 in the same plane with the rotor, and having an inlet port 38 at a point beyond said rotor. Located inside the pump chamber between the rotor and inlet port 38 is a partition 39 having a central aperture 40 which constitutes a pump inlet, this casing being conveniently carried by the cover plate 41. Secured to the outlet 37 is a flexible hose 42 of sufficient length either to deliver into the container 25 or elsewhere as desired.

Located at one side of the pump chamber is a valve casing 45 having therein a tapered chamber in which is mounted the valve member 46 of the turning plug type to which is attached the stem 47 provided with a handle 48 at the top of the casing. The valve casing is here shown as provided with a hollow cap 49 in which is a spring 50 by which the valve member is held seated. Formed in the wall of this chamber at a distance from the port 38 are two ports 51 and 52 connecting re-

spectively with conduits 53 and 54 which lead, one to the trough 30 and the other to the bottom of the casing. When the valve is turned to the position shown in Fig. 4, any liquid flowing into the trough 30 can pass to the casing by way of the valve chamber, the pump being entirely cut off, although it rotates continuously. When moved to the position shown in Fig. 5 all liquid both from the trough and casing is discharged from the pump; when moved to the position shown in Fig. 6 the passage 33 is closed, and liquid from the passage 54 passes to the pump; while in the position shown in Fig. 7 the passage 54 is closed and only that liquid in trough 30 can flow into the pump.

Owing to the many capabilities of the mechanism the procedure followed by different users is not uniform wherefore the following description is only illustrative of one mode of operation:

A batch of clothing and a washing liquid is introduced into the container 25, and the motor started, the gear 20 being engaged with the rack 18 and the valve being set in the position shown in Figure 6. The action of the mechanism oscillates said container smartly, dashing the clothes and liquid about and bringing all parts into clothes-cleansing relation. By operating the machine with the hose in the position shown in Fig. 1 and with the valve in the position shown in Fig. 6, a continuous circulation of detergent liquid is produced during the washing operation if sufficient liquid was used initially, whereby scum and other floating waste is continuously washed out of the container and trapped in the casing. When this has progressed sufficiently the lever 21 is shifted to cause the gear 20 to mesh with the gear 13 and thereby produce a steady rotation of the container at high speed thus throwing the liquid contents thereof outwardly through the apertures 26 where they are caught in the trough 30. During this procedure the valve should be in the position shown in Fig. 4 so that the washing liquid is collected in the bottom of the casing 1, after which the valve is rotated to the position shown in Fig. 7 so as to prevent loss of said liquid. The motor is now stopped or the gear 20 moved to neutral position, a quantity of rinse water is added to the container, the apparatus operated for a short time in washing position, after which the gear 20 is again caused to mesh with the gear 13, leaving the valve in the position shown in Fig. 7. All the liquid ejected from the container is caught in the trough 30 and discharged through the pump and hose to any suitable place of disposal. A quantity of bluing water can now be added to the container and mixed with the clothes either mechanically or by hand as desired, and this in turn centrifuged out

of the same, and ejected through the pump and hose. These rinsing and bluing operations have not contaminated the liquid in the bottom of the casing in any way. This last centrifuge operation is continued until the clothes are sufficiently free from water for hanging on the line, then they are removed and a new batch of clothing introduced into the container. The valve is now rotated to the position shown in Fig. 5 or 6 (it makes no difference which), the hose being also moved to the position shown in Fig. 1 so that all the liquid contents in the bottom of the casing are now returned to the container 25 by the hose 42 after which the original washing operation is repeated. The yielding mounting of the casing reduces the strain on the bearings due to any unbalanced condition of the clothing in the container during the extracting operation without causing any such movement of the legs relative to the floor as to mar or deface the same, while splashing of the liquid against the bottom of the rapidly rotating container is restrained by the shelf 30 despite the vibration of the casing.

The clothing can be completely washed, rinsed, blued, and wrung out without being touched by hand, and at the end of the operation the liquid contents of the casing are ejected by the pump into a sink or other place of disposal even though it be above the level of the machine, thus dispensing with the need of carrying water or of furnishing a low level drain. In order to discharge the last drops of liquid so as to prevent freezing or souring of the undischarged liquid the valve 46 is lifted from its seat against the force of the spring for the purpose of simultaneously connecting all of the valve ports and passageways with the outlet 37.

Certain features of the gear mechanism herein shown are reserved because of their being already included in my prior application Serial No. 694,899, filed February 25, 1924.

It will be understood that a great many changes can be made within the scope of my invention and I do not limit myself in any wise except as set forth in the annexed claims which I desire may be construed each independently of limitations contained in other claims.

Having thus described my invention what I claim is:

1. In a combined washing machine and extractor, a casing, a vertical shaft therein, a container carried by said shaft and having an imperforate bottom and a side wall also imperforate below a given level, said container being supported at a substantially fixed elevation sufficiently above the bottom of the casing to accommodate the entire liquid contents of said container therebeneath,

a fixed annular shelf carried by the casing and projecting part way beneath the bottom of said container, and means for selectively washing clothing inside said container and for rotating said container at high speed.

2. In a combined washing machine and extractor, a casing having an annular trough about its wall intermediate the top and bottom thereof, an upright container journaled in said casing upon a vertical axis and located at a substantially fixed elevation above said trough, the elevation of said container being sufficient to enable its entire liquid contents to be received in said casing beneath the same, and means for washing clothing in said container and for rotating said container about its axis to eject the liquid contents into said trough, in combination with a pump having an inlet and an outlet port, a discharge conduit connected to said outlet port, a valve connected to said inlet port, and connections from said valve to said trough and casing respectively.

3. In a combined washing and extracting machine, in combination, an upright casing, a vertical shaft therein, a container carried by said shaft and having an imperforate bottom and a side wall having perforations above a given level, an annular trough carried by said casing and extending from the side wall thereof to beneath the bottom of said container so as to receive all liquid overflowing from said container either when rotating or at rest, independent discharge conduits from said casing and trough, and stop means for said conduits.

4. In a laundry machine, a liquid holding casing, a container journaled thereon on a substantially vertical axis and spaced above the bottom thereof, means for washing laundry articles in said container, a supporting frame comprising a rigid annular member and floor-engaging legs carried thereby, yielding means interposed between said member and casing for permitting gyration of said casing, means for rotating said container at high speed, and means carried by the casing interiorly thereof for preventing splashing of its liquid contents, said means being arranged to enable ready access to said casing for cleaning purposes.

5. In a laundry machine, a combined clothes washer and extractor comprising, in combination, an upright liquid holding casing, a vertical bearing sleeve carried by the bottom thereof, a rotatable shaft journaled in said sleeve, a combined washing tub and extractor-container carried by the upper end of said shaft upon a vertical axis and spaced above the casing bottom, means for agitating the contents of said container for washing purposes, a supporting frame for said casing, yielding means interposed between said

frame and casing for permitting gyration of said casing, and driving mechanism for said shaft.

6. In a laundry machine, a combined clothes washer and extractor comprising in combination, an upright casing, a vertical bearing sleeve carried by the bottom thereof, a combined washing-container and extractor-container located on a vertical axis above said sleeve, means journaled in said sleeve for agitating the container contents for washing purposes and rotating said container for extracting purposes, a supporting frame for said casing, yielding means interposed between said frame and casing for permitting gyration of said casing, a driving element, and gearing operatively associated with said driving element and the means journaled in said sleeve, whereby said means is given one kind of movement for washing purposes and a movement of rapid rotation for extracting purposes.

7. In a combined clothes washer and extractor, a single tub mounted on a vertical axis, said tub having a slanting wall and its lower part being imperforate, driving mechanism for selectively oscillating said tub to agitate its contents or to spin the same about its axis, and a vane mounted inside said tub to oscillate and rotate therewith, the tub-interior being unimpeded except by said vane.

8. In a combined clothes washer and extractor, a tub mounted on a vertical axis, said tub having a bottom and a perforated side wall, a vane affixed to the tub adjacent to the tub bottom, and driving mechanism for selectively oscillating said tub to agitate its contents or to spin the same about its axis, the tub-interior being unimpeded except by said vane.

9. In a combined washing and extracting machine, in combination, an upright casing, a vertical shaft therein, a container removably carried by said shaft and having an imperforate bottom and a side wall also imperforate below a given level, an annular trough carried by said casing and extending from the side wall thereof to beneath the bottom of said container so as to catch all liquid overflowing therefrom either when rotating or at rest, independent discharge conduits from said casing and trough, and stop means for said conduits, said means including provisions whereby the liquid contents of said trough may be discharged either from said casing or into another portion of said casing.

10. In a washing machine, a container for clothes and liquid formed as a surface of revolution about a vertical axis and having overflow provisions for the centrifugal discharge of the liquid contents located at a level considerably above the container bottom, a vane fixed in said container to oscil-

late and rotate therewith, a conduit discharging into said container, means for selectively oscillating or rotating said container about its axis, an annular trough for the reception of the liquid discharged from said overflow provisions and pumping devices for returning the liquid through said conduit to said container.

In testimony whereof I hereunto affix my signature.

JAMES B. KIRBY.