Aug. 10, 1965 E. J. LOWES 3,199,319

WASHING MACHINES

Filed June 4, 1962 2 Sheets-Sheet 1

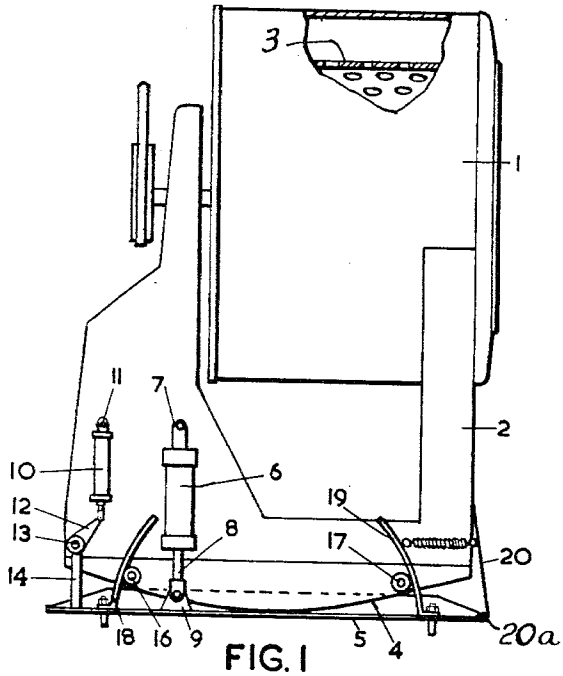


FIG. 1

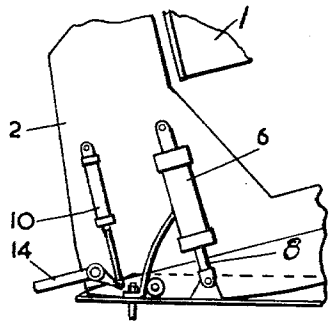


FIG. 2

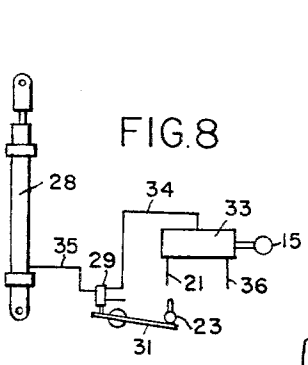


FIG. 8

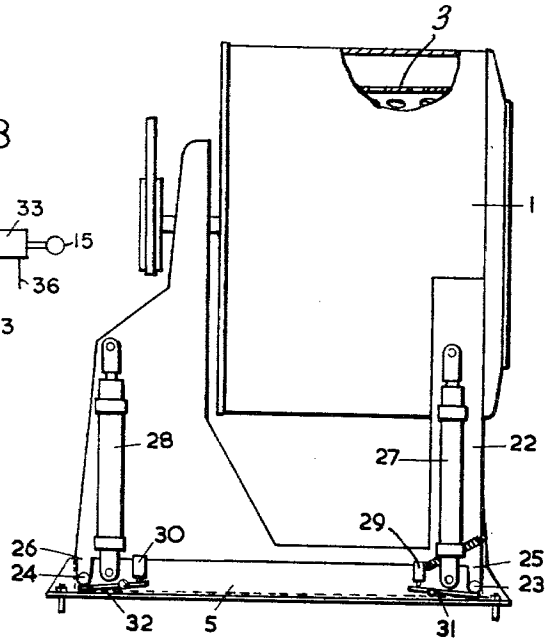


FIG. 3

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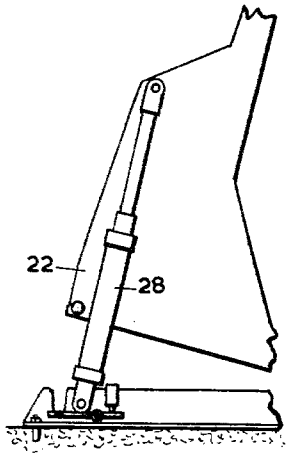


FIG.4

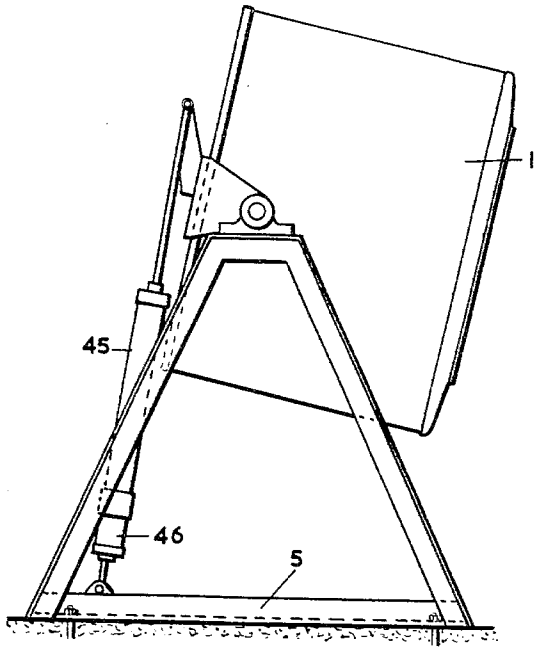


FIG.6

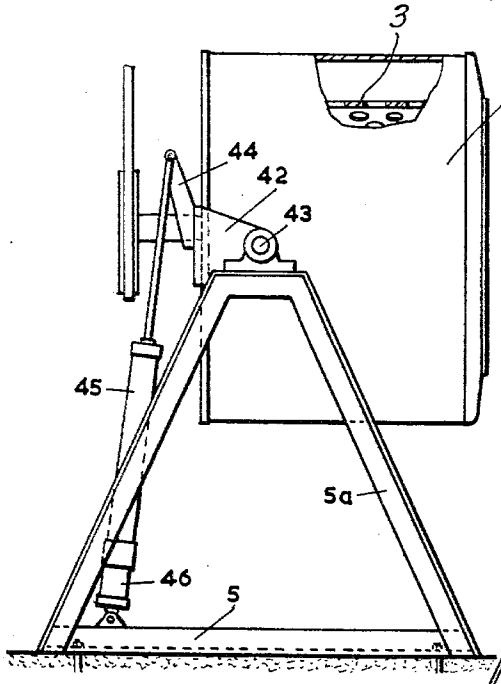


FIG.5

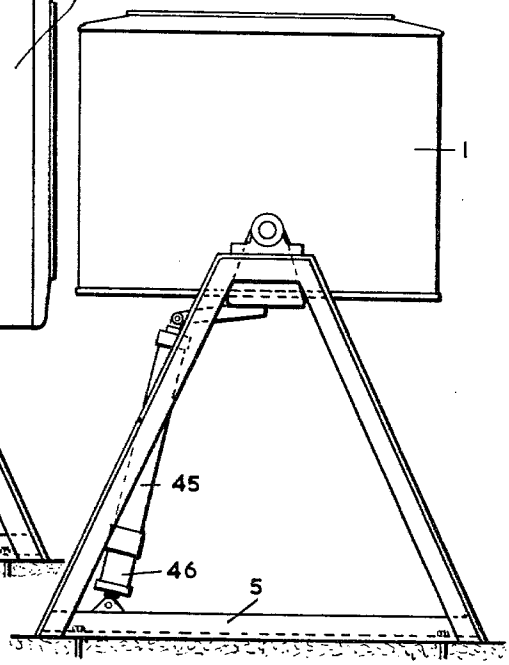


FIG.7

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3,199,319

WASHING MACHINES

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This invention relates to washing and like machines for laundering or otherwise processing textile articles, in which the articles are placed in a container which, during normal operation of the machine, is rotated about a horizontal axis, said container having an opening lying in a vertical plane at right angles to the axis of rotation at one end, say the forward end, for the entry and withdrawal respectively of articles to and from the container.

The invention provides improvements relating to the entry and withdrawal of such articles to and from the container, and in accordance with the invention a washing or like machine of the type described above comprises tilting means for selectively raising or lowering the forward (open) end of the container relative to the rear end to facilitate the entry and withdrawal, respectively, of articles.

Further features of the invention will become clear from the following description of some preferred embodiments thereof which are illustrated in the accompanying drawings, in which:

FIGURE 1 is a side elevation of a machine in accordance with the invention;

FIGURE 2 is a scrap view of the machine shown in FIGURE 1 with some parts in different relative positions;

FIGURE 3 is a side elevation of a machine in accordance with a second embodiment of the invention;

FIGURE 4 is a view of the machine shown in FIGURE 3 with some parts in different relative positions;

FIGURE 5 is a side elevation of a machine in accordance with a third embodiment of the invention;

FIGURES 6 and 7 are scrap views of the machine shown in FIGURE 5, with some parts shown in different relative positions; and

FIG. 8 is a diagrammatic showing of the relationship of the valves and jacks shown in FIG. 3.

The three machines illustrated in the drawings are of course provided with the usual components, such as motors, and service pipes for the delivery of fluids, water and the like, but in the drawings these parts are omitted for clarity, and in any event do not form part of the present invention.

In the drawings like reference numerals are used to denote like parts.

Each of the machines comprises a cylindrical fluid tight casing 1 whose geometrical axis is normally horizontal during operation of the machine. A cylindrical perforated container or cage 3 is rotatably mounted within the casing 1 with its geometrical axis coincident with that of the casing. The forward end of the cage, to the right of FIGURES 1, 3 and 5 has an opening lying in a vertical plane at right angles to the geometrical axis of the cage, and the casing has a door in its front end to expose the opening. The cage is coupled to a motor, not shown, by a motor shaft extending through the rear end wall of the casing and concentric therewith.

In the machine shown in FIGURE 1, the casing 1 is mounted rigidly in a generally U-shaped frame 2 having a convexo-cylindrical undersurface 4 which rests on a fixed base 5. The cylinder of a double-acting fluid operated jack 6 is connected to the frame 2 by a pivot 7, and the piston rod 8 of the jack is pivotally connected to an upstanding lug 9 forming part of the base 5.

The cylinder of a second double-acting jack 10 is connected to the frame 2 by a pivot 11 and the piston rod

of the jack is pivotally connected to one arm of a bell crank lever 12 connected to the frame by a pivot 13. The other arm 14 of the lever 12 is adapted to serve as a movable stop as will be explained below. Rollers 16, 17 are rotatably mounted on the frame 2 and co-operate with curved, upwardly extending guides 18, 19 respectively secured to the base.

FIGURE 1 illustrates the machine in its normal operating position, with the axis of the casing 1 horizontal. The casing is maintained in this attitude by the combined action of the jack 6, which is operated in a sense to cause it to retract, and the arm 14 of bell crank lever 12. When it is desired to remove articles from the cage, the door in the front end of the casing 1 is opened and jack 6 is extended, causing the assembly comprising the frame 2 and casing 1 to tilt about a horizontal axis at right angles to the axis of the casing in a sense to lower the front end of the casing (and thus of the cage) relative to the rear end. The contents of the cage are then the more readily removed. If desired the contents can be allowed to tumble out under their own weight, while the cage continues to rotate.

While the tiltable assembly is in this position the jack 10 is extended, causing the bell crank lever 12 to rotate about its pivot 13, so that the arm 14 of the lever is moved to a substantially horizontal position. The jack 6 is then fully retracted to tilt the assembly in the opposite direction (as shown in FIGURE 2) so that the axis of the casing is inclined forwardly and upwardly to facilitate loading of the cage. When loading is completed, jack 6 is extended sufficiently to allow rotation of the bell crank lever 12 under the action of jack 10, and the tiltable assembly is then returned to its horizontal position by once more reversing the operation of jack 6.

During the tilting operation, the interaction of rollers 16, 17 with guides 18, 19 ensures that no slipping occurs between the convex surface 4 and the base 5, i.e. a true rolling action is maintained.

Preferably the gap between the front end of the frame 2 and the base 5 is closed throughout the operation of the machine. This is achieved by means of a spring loaded guard 2 (extending the full width of the machine), pivotally connected along its lower edge by the hinge 20a to the base 5 and resting its upper edge against the frame 2.

The machine shown in FIGURE 3 comprises a generally U-shaped frame 22 which supports the casing 1. The frame has trunnions 23, 24 at its forward and rear ends, respectively, which trunnions rest in slots 25, 26 in the base 5. These trunnions constitute horizontal axes spaced fore and aft of the centre of gravity of the assembly comprising the frame and the container about which axes the said assembly can be tilted. The cylinders of each of two single acting jacks 27, 28 are pivotally connected to the base 5 and the piston rods of these jacks are similarly connected to the frame 22.

It will be apparent that as one or other of the jacks is extended, the frame is tilted about one of the trunnions. Thus, as shown in FIGURE 4, when jack 28 is extended the frame 22 is tilted about trunnion 23 so that the rear ends of the casing 1 and the cage are raised relative to the forward ends to facilitate removal of articles from the cage. Similarly, to tilt the assembly in the opposite direction about trunnion 24, for loading, jack 27 is extended.

Simultaneous operation of both jacks is prevented by means of a pair of spring loaded shuttle valves 29, 30 actuated by pivotting levers 31, 32 respectively. Thus valve 29, which is adapted to connect and disconnect jack 28 with a source of pressure fluid, is normally held open by lever 31, one arm of which bears against the operat-

ing member of the valve while trunnion **23** bears down on the other arm of the lever. If jack **27** is operated, trunnion **23** rises out of groove **25**, allowing rotation of the lever **31**. The valve therefore reverses to cut off the supply of fluid to jack **28**. Similarly, when jack **28** is operated, valve **30** and lever **32** are actuated to cut off the supply of fluid to jack **27**.

Since the connections of the jacks **27** and **28** with the valves **29** and **30** are identical only one such connection is illustrated in FIG. 8. As appears in FIG. 8, jack **28** is operated by moving the lever **15** which permits fluid under pressure to flow from a supply line **21**, through the valve **33**, the line **34**, the valve **29** and the line **35** to the jack **28**. Upon reverse movement of the lever **15** the fluid is discharged through the exhaust line **36**. As stated above when either valve **28** or **29** is used the other will be closed by the resulting movement of the corresponding lever **31** or **32**.

In the machine illustrated in FIGURE 5, the fluid tight casing **1** is rigidly mounted in a saddle **42** pivotally mounted by means of trunions **43**, on a rigid support frame *5a* forming an upward extension of base **5**. The saddle is formed with an arm **44** which is pivotally connected to the piston rod of a double-acting jack **45**. The cylinder of this jack is secured end to end to the cylinder of a second double-acting jack **46** of much smaller stroke than jack **45**. The piston rod of jack **46** is pivotally attached to the base **5**.

To maintain the casing **1** in the horizontal attitude shown in FIGURE 5, jack **45** is extended and jack **46** is retracted. To tilt the casing **1** forwardly and downwardly, for emptying the cage, both jacks are extended, as seen in FIGURE 6, while to tilt the casing **1** forwardly and upwardly both jacks are retracted, as seen in FIGURE 7.

Some known washing machines are intended automatically to eject the contents of the container, but cannot be relied upon to do so completely, and it is common practice for an attendant to be employed, his principal functions being to check the machines after each unloading operation and to remove by hand any remaining articles.

However, in the machines described above, the services of such an attendant can be dispensed with, for by continuing the rotation of the container after tilting it forwardly and downwardly (and opening the door in the front end of the casing), the ejection of all the articles from the container is assured.

Since the need for inspection of the containers and manual removal of articles therefrom is obviated, it follows that these machines can be operated automatically or by remote control. For example, if remote control facilities were provided, a single operator could control a battery of machines from a central operating station, and could thus easily supervise the supply of bundles of articles to the machines under his control, the starting and stopping of the machines and the discharge of the treated articles.

In each of the above described embodiments of the invention, the jacks may be pneumatically or hydraulically operated. Conveniently, the jacks are controlled by means of simple push pull selector valves, although other control means may of course be employed.

It will be appreciated that connections of hydraulic, electrical, and other services to the moving parts of the machine must be made flexible or otherwise arranged to accommodate the tilting of such parts.

Various forms of tilting means other than fluid operated jacks may be employed for the performance of the invention; in particular screw jacks either manually or power operated may be used. This and other variations are of course within the scope of the invention as defined in the appended claims.

I claim:

1. A washing or like machine comprising an assembly tiltably supported on a fixed base, said assembly including a rigid frame, a fluid tight outer casing rigidly supported in said frame and a perforated cylindrical container rotatably mounted within said casing, said container normally having its geometrical axis horizontal and having at its forward end an opening lying in a vertical plane at right angles to the said axis, said casing having an opening alined with said opening in said container, the container being rotatable about said axis relative to the outer casing, and tilting means for selectively raising or lowering the forward end of the container relative to the rear end to facilitate the entry and withdrawal, respectively, of articles to and from the container through said openings, said tilting means acting between said base and said frame to tilt the assembly in both directions relative to the base about a second axis extending horizontally and at right angles to the first said axis, said tilting means comprising a pair of double acting independently operable fluid jacks whose cylinders are secured together end to end and which act between said base and said assembly so that when one of the jacks is retracted and the other extended the axis of the container is held horizontal, and when both jacks are operated in a like sense the said assembly is tilted in one direction or the other about said second axis.

2. A machine as defined in claim **1**, wherein said tiltable assembly is mounted on trunnions for pivotal movement about said second axis.

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