

June 29, 1943.

L. ZIMARIK

2,322,909

FLEXIBLE CONDUIT COUPLING FOR SHELL-LESS WASHERS AND THE LIKE

Filed Dec. 11, 1940

2 Sheets-Sheet 1

FIG. 2

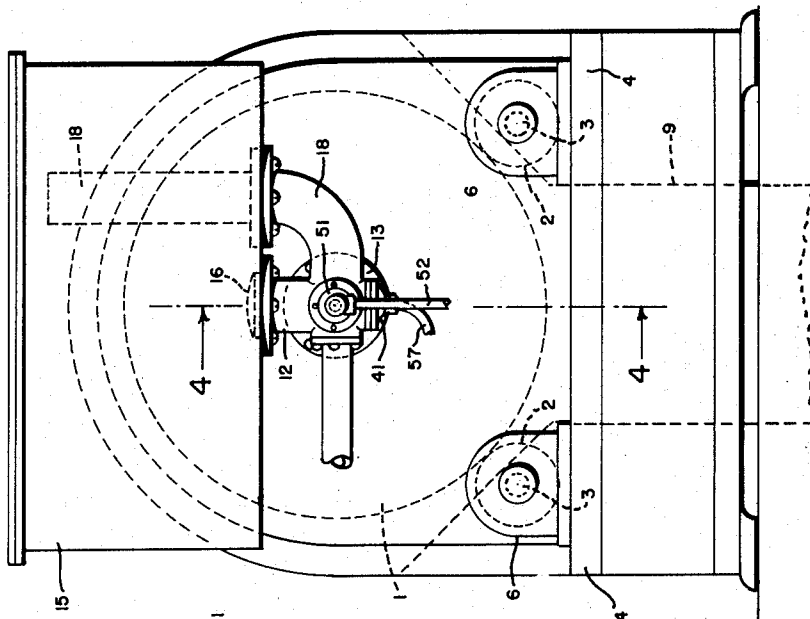
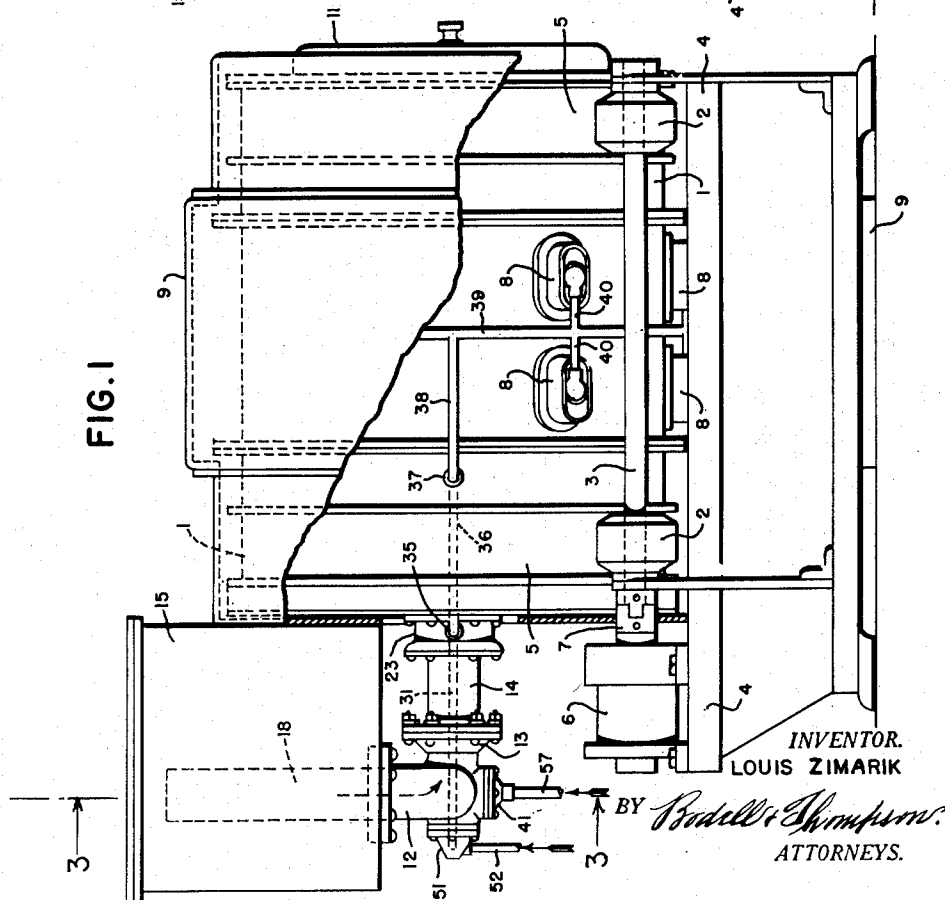


FIG. 1



INVENTOR.
LOUIS ZIMARIK

BY *Redell & Thompson*
ATTORNEYS.

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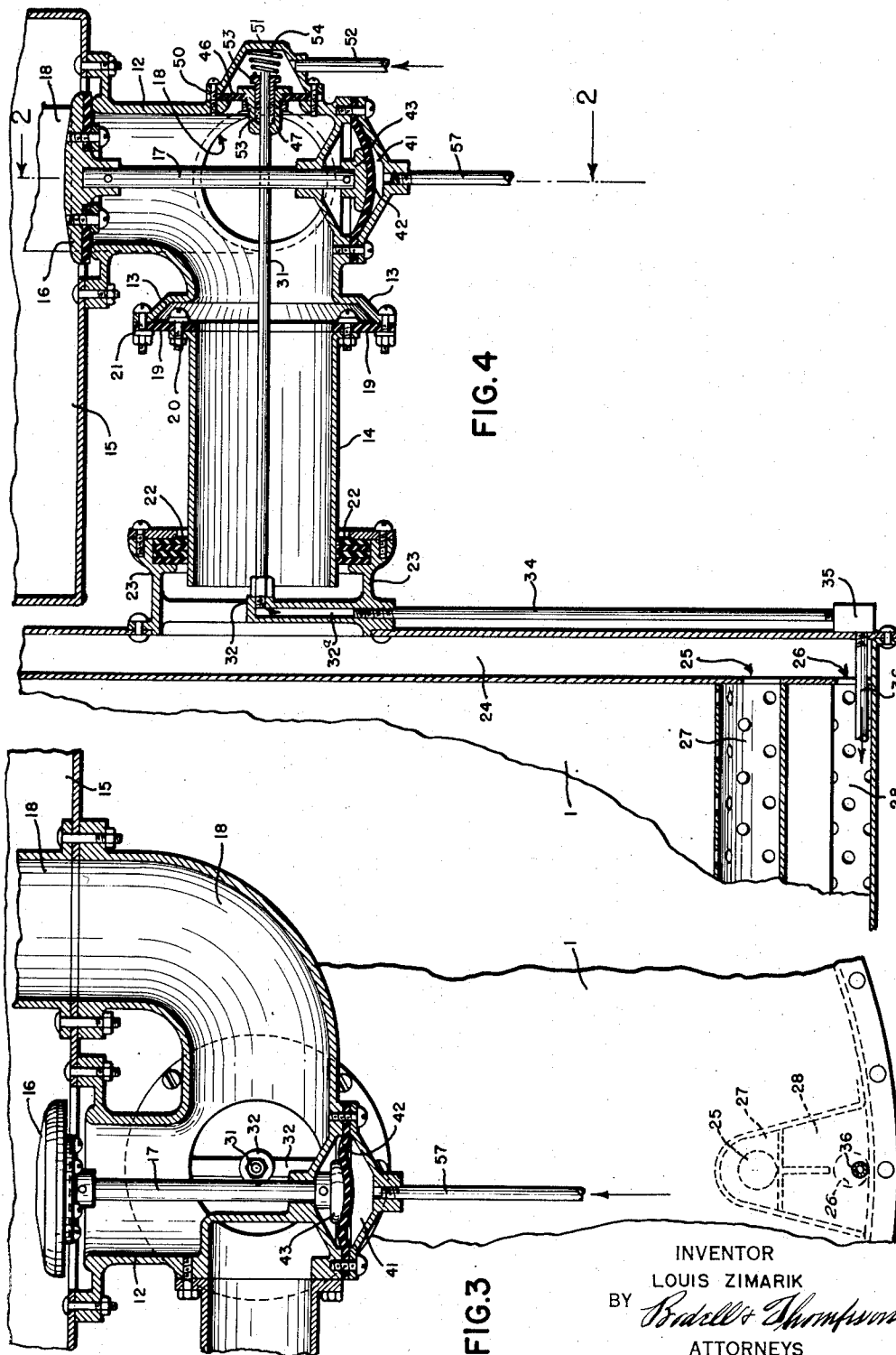


FIG. 3

FIG. 4

INVENTOR
LOUIS ZIMARIK
BY *Bridell & Thompson*
ATTORNEYS

UNITED STATES PATENT OFFICE

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FLEXIBLE CONDUIT COUPLING FOR SHELL-
LESS WASHERS AND THE LIKE

Louis Zimarik, Syracuse, N. Y., assignor to The
Prosperity Company, Inc., Syracuse, N. Y., a
corporation of New York

Application December 11, 1940, Serial No. 369,655

1 Claim. (Cl. 285—10)

This invention relates to containers for receiving a liquid in which articles are processed, treated or washed, which container is rotatable about an axis, usually a horizontal axis, as for instance, the container or washing drum of a so-called "shell-less" washer, and has for its object a simple, compact and durable conduit coupling for the liquid or fluid to be fed into the container, which conduit is arranged coaxially with the axis of rotation of the container, and so constructed as to compensate for axial misalignments during the rotation of the container, and also a simple, compact and durable coupling for a fluid under pressure, as air, also arranged coaxially with the axis of rotation, this pipe conducting the air to pressure-operated actuators or motors which operate instrumentalities associated and rotatable with the container, as for instance, peripheral dump valves for the container.

It also has for its object the relative arrangement of the fluid conduit, the air pipe and the flexible couplings.

The container is actuated or rotated by mechanism including rollers frictionally engaged with peripheral tracks on the container, and these rollers are of yielding material, as rubber, and hence distort or flatten slightly during operation, and cause shifting of the axis of rotation of the container.

The conduit coupling means forming the subject matter of this invention is constructed to compensate for the shifting of the axis, so that the liquid or fluid inlet conduit and the air pipe remain leak-proof.

The invention consists in the novel features and in the combinations and constructions hereinafter set forth and claimed.

In describing this invention, reference is had to the accompanying drawings in which like characters designate corresponding parts in all the views.

Figure 1 is a side elevation, partly in section, of a shell-less washing machine embodying this invention.

Figure 2 is an end elevation looking to the right in Figure 1.

Figure 3 is an enlarged fragmentary sectional view on line 3—3, Figure 1.

Figure 4 is an enlarged sectional view taken on line 4—4, Figure 2.

The invention is here illustrated as embodied in a shell-less laundry washing machine. By "shell-less" is meant a washing machine in which the container or washing drum is imperforate and receives all the washing fluid, and in which there is no outer casing surrounding the container or washing drum, which forms a sump for the washing fluid. In the washing machines provided with an outer casing serving as a sump,

the washing drum is perforated, so that the fluid may pass from the sump through the perforations into the washing drum and from the washing drum through the perforations back to the sump.

1 designates the container for receiving the articles to be washed or processed and the washing fluid or liquid, this being mounted to rotate about a horizontal axis. 2 designates driving rollers mounted upon shafts 3 suitably mounted on the base 4 of the machine, these driving rollers being frictionally engaged with peripheral tracks or channels 5 near opposite ends of the container. There are two shafts 3 with the rollers 2 thereon coacting with the drum on opposite sides thereof. The drum or container rests on the rollers. The shafts 3 are actuated by electric motors, as 6, mounted on the base 4 and connected through couplings 7 to the shafts 3, there being one motor for each shaft.

The control of the motors or the actuating mechanism, consisting of the motors 6, shafts 3 and rollers 2, forms no part of this invention.

The rollers are of a yielding or rubber material, and during their operation of driving the container 1, flatten slightly or distort, causing shifting of the axis of rotation of the container 1.

The container 1 is provided with pressure-operated instrumentalities, as dump valves 8, these being located in the periphery of the intermediate portion of the drum, and hence are rotatable as a unit with the drum. When the valves 8 are open, the water in the drum is dumped into a trough or shell 9 from which it flows into a drain or the like. These valves are operated by pressure-operated actuators or motors, the pressure fluid being usually compressed air. The drum is also provided with a loading and unloading door 11 at one end thereof. The construction of the drum per se and of the valves 8 forms no part of this invention.

The washing fluid, and the air for operating the valves 8, are conducted into the drum through the head thereof at a point coaxial or concentric with the axis of rotation of the container or drum 1, and as this axis of rotation shifts during the operation, coupling means is provided both in the liquid conduit and the air pipe to compensate for the shifting of the axis of rotation and maintain the joints in the conduit and the pipe leak-proof under all conditions.

The compensating coupling means will now be described.

12 designates a fixed intake conduit having a portion 13 arranged coaxially or concentric with the axis of rotation of the container 1 and spaced apart from the container. 14 designates an intermediate conduit section flexibly connected to the portion 13 and axially slidable, and flexibly coupled to the container at its other end. The

fixed conduit 12 communicates with a suitable source of supply of liquid, this being in a laundry washing machine, a source of supply of water, the source here shown being a tank 15 in which the fluid is prepared, as to temperature, quantity and ingredients, preliminary to being fed into the container 1. The flow from the tank 15 is controlled by a valve 16. The major part or body of the conduit 12 is, in this embodiment of the invention, shown at an angle to the axial line of the container 1 and the valve stem 17 extends axially through the major part or body of the conduit 12 crosswise of the axis of rotation, to the outside of the major part or body of the conduit 12, where it coacts with operating means to be hereinafter described.

18 designates a vent pipe for venting the interior of the container 1. It also serves as an overflow pipe for the tank 15. The flexible coupling between one end of the conduit section 14 and the portion 13 of the conduit 12, as here shown, consists of an annular outwardly extending flexible diaphragm 19 secured at its inner margin at 20 to the conduit 14 and at its outer margin at 21 to the aligned portion 13 of the conduit 12. The flexible and sliding coupling between the other end of the conduit 14 and the container 1, as here illustrated, consists of a laminated packing 22 suitably clamped at the outer end of a hub 23 on the adjacent end or head of the container 1, the laminations being arranged edgewise relative to the periphery of the conduit section 14, so that relative axial movement between the container and the conduit section 14 can take place during the shifting of the axis of rotation of the container 1 and the joint between the laminations of the packing 22 and the periphery of the conduit section 14 remains tight or leak-proof. As the conduit section 14 is not rotatable and the container is rotatable, this coupling or packing serves as a flexible swivel joint.

The liquid discharges from the end of the conduit section 14 through the hub into the container, and as here shown, the section 14 discharges into a header 24 which communicates through passages 25 and 26 with lengthwise passages 27 and 28 in the internal ribs in the container 1, the passages of the rib having perforate walls through which the liquid can pass during the washing operation, the filling-in operation, and during the dumping operation. This feature of the washing machine forms no part of this invention.

31 designates an air conduit arranged coaxially with the container 1 and extending axially through the conduit section 14 and through the outer wall of the conduit 12. The conduit 31 is coupled by a swivel joint at 32 to the container 1, where it communicates with a radial passage 32 in the hub 23, this passage communicating with a radial passage 34 coupled at 35 to a pipe 36 extending lengthwise of the drum and one of the ribs 29, and then outwardly at 37 to the outside of the periphery of the drum, and thence through a pipe 38 to an annular header 39 which communicates through branches 40 with pressure-operated actuators or motors for operating the valves 8. The actuators of the valves 8 form no part of this invention but is the subject mat-

ter of my application, Serial Number 343,231, filed June 29, 1940. These actuators are similar to actuator shown in Figures 3 and 4 for actuating valve 16 in supply tank 15 and comprise a diaphragm chamber 41 having a diaphragm 42 therein, the chamber on one side of the diaphragm being connected to the air supply pipe 57 and the diaphragm pressing against the head 43 on the sliding stem 17 of valve head 16 of the valve in conduit structure 12. The air pipe 31 is flexibly connected at its end remote from the container 1 or the coupling 32, the coupling here shown comprising an annular outwardly extending flexible diaphragm 46 secured at its inner margin to a cup or bushing 47 around the pipe 31 and at its outer margin at 50 to a fixed point, as one wall of the conduit 12. It is here shown as clamped between a cap 51 and the wall of the conduit 12, the pipe opening into the cap and the cap forming a chamber which is connected through a pipe 52 to a source of supply of pressure fluid or air. The coupling at the outer end of the pipe 31 also includes a resilient packing or gasket 53 surrounding the outer end of the pipe 31 and interposed between the pipe 31 and the bore of the bushing 47, the gasket being preferably pressed into position by a spring 54.

The valve 16 is actuated by a pressure-operated means similar to the means for operating the dump valves 8. The flow of air through the air pipe 57 is controlled in any suitable manner, and in washing machine operations, it is usually automatically controlled by a cycle timer.

During the rotation of the drum, the diaphragm 19 and the coupling, including the packing 22, maintains a tight or leak-proof connection during the shifting of the axis of the container 1 and permits a relative axial or endwise movement of the conduit 14 and the drum, as well as a universal joint action. Also, during the rotation of the drum, the flexible coupling including the diaphragm 46 compensates for the misalignments of the container and the pipe 31 during the shifting of the axis of rotation and also permits endwise movement of the pipe 31 while maintaining the leak-proof swivel joint at 32.

What I claim is:

In a machine which includes a container movable about an axis and having associated and rotatable therewith a pressure operated instrumentality, the container having an axial hub, the combination of a fluid inlet construction for the container comprising a fixed conduit having a portion arranged coaxially with the container and spaced axially from said hub, and aligned therewith, a conduit between said portion and the hub and connected to both to have a flexible joint action and to one to have a sliding action, an inlet pipe for a pressure fluid for operating said instrumentality, said inlet pipe being arranged coaxially with the container and extending axially through said conduit and conduit portion and connected at one end to have a swivelling action and at its other end to have a universal joint action, and also an axial movement, the fixed conduit being provided with a chamber for connection to a source of pressure fluid, said chamber communicating with the outer end of said pipe.

LOUIS ZIMARIK.