Feb. 23, 1954 E. F. RAUSCHER 2,669,932

PUMP AND VALVE ASSEMBLY

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FIG. 1.

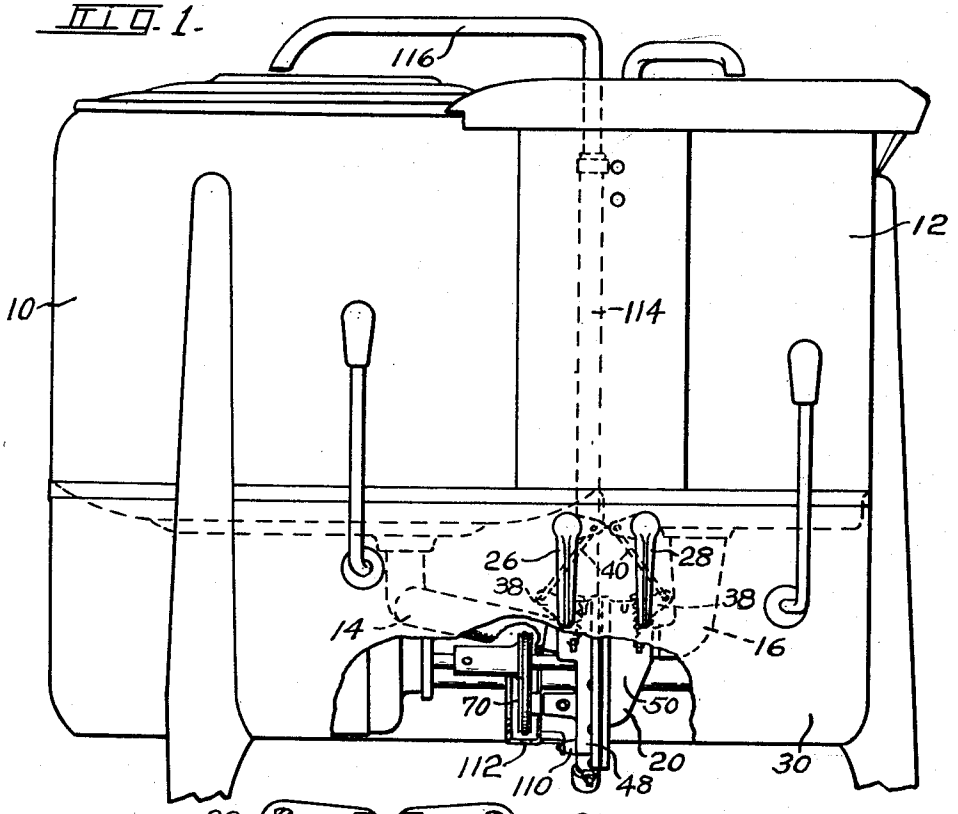
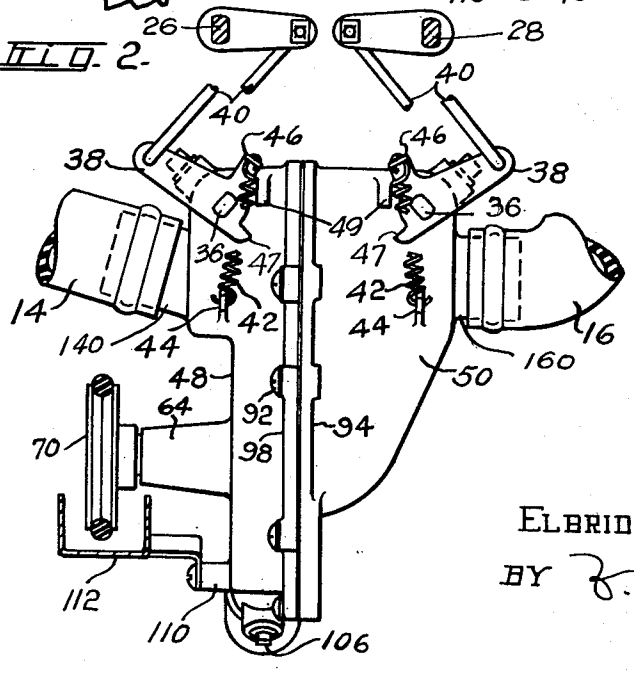


FIG. 2.



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FIG. 3.

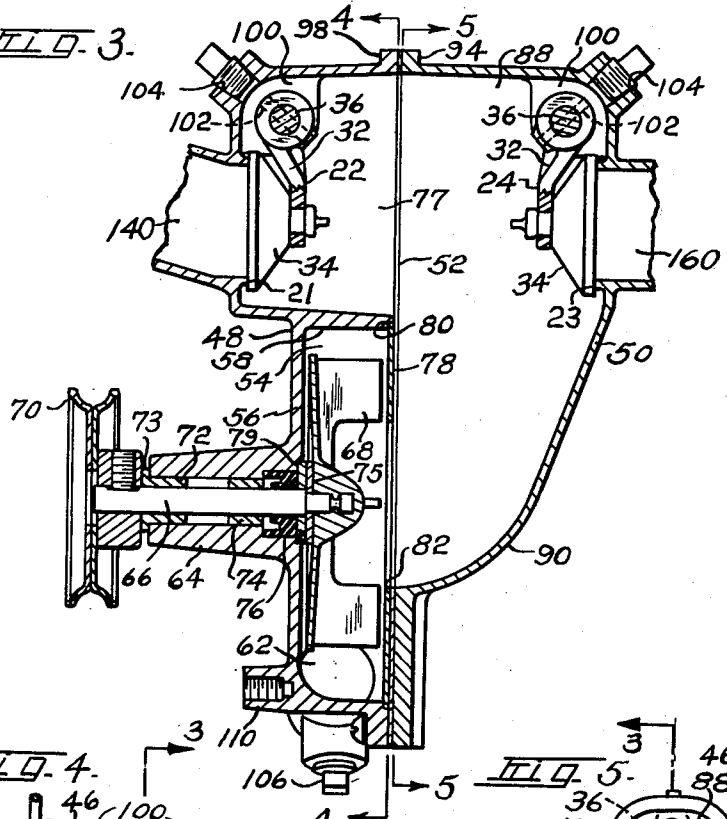


FIG. 4.

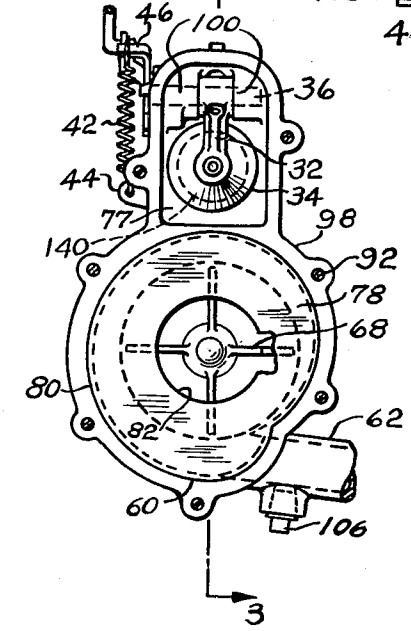
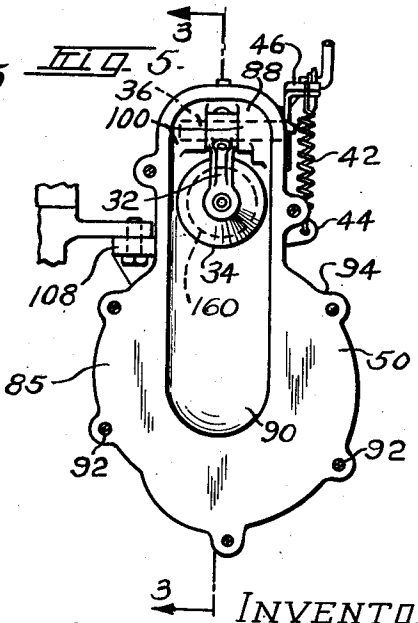


FIG. 5.



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PUMP AND VALVE ASSEMBLY

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Application September 22, 1951, Serial No. 247,869

3 Claims. (Cl. 103—2)

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This invention relates to a centrifugal pump and valve assembly, particularly adapted for use in centrifugal extractor type two-tub washing machines.

In washing machines of the type referred to, it is customary to provide a centrifugal pump for rapidly removing water from the wash tub and the centrifugal extractor tub, discharging the same either into the wash tub for re-use when taken from the extractor tub, or delivering the same to the drain. Since it is desirable, whenever the extractor is in operation, that the pump be effective to immediately remove centrifuged liquid, it has been the practice to provide a permanently open passage from the centrifuge tub, and operate the centrifugal pump at all times, so that any liquid from the extractor tank will be immediately disposed of. While the extractor passage is permanently open, the connection to the wash tub is provided with a valve. With the permanently open passage to the extractor tub, there is always a possibility of wash water from the wash tub flowing into the extractor tub, should the pump fail to remove the drain water fast enough. It is sometimes desirable to use the extractor tub for rinsing prior to extraction, and in order to hold rinse water in the tub, the outlet side of the pump has been provided with a valve. Such valve, when closed, subjects the pump to back pressure.

The present invention is directed to a pump and valve assembly wherein the inlet connections to the pump from either tub may be closed when the machine is operating under conditions which do not require a pumping operation. The arrangement is such that the pump impeller may thus continually rotate without subjection to back pressure when it is desired to retain water in the centrifuge tub.

The invention further has to do with the provision of a unitary pump and inlet valve construction, whereby integral pump, inlet and valve chambers are provided by a pair of casing members which may be readily and economically cast.

The above and other novel features of the invention will appear more fully hereinafter from the following detailed description when taken in conjunction with the accompanying drawings. It is expressly understood that the drawings are employed for purposes of illustration only and are not designed as a definition of the limits of the invention, reference being had for this purpose to the appended claims.

In the drawings, wherein like reference characters indicate like parts:

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Figure 1 is a side elevation of a washing machine to which the pump and valve assembly is adapted, parts being broken away to show the pump;

Figure 2 is an enlarged side elevation of the pump and valve chamber;

Figure 3 is a sectional view through the pump and valve assembly, and through the axis of the impeller and taken substantially on planes indicated by the lines 3—3 of Figures 4 and 5;

Figure 4 is a sectional view taken on the line 4—4 of Figure 3; and

Figure 5 is a sectional view taken on the line 5—5 of Figure 3.

In Figure 1, there is shown a washing machine having a wash tub 10 and centrifugal extractor tub 12 arranged side by side in a manner well understood in the art. The wash tub is adapted to drain through a conduit 14 into the valve chamber of the unitary pump and valve construction referred to, and the extractor tub 12 is likewise adapted to drain into the valve chamber of such unit through the conduit 16, such unitary valve chamber and pump construction being generally indicated as at 20.

Referring to Figures 2 and 3, there is shown, in conjunction with the conduit nipples 140 and 160, valves 22 and 24, which are adapted to be manually controlled by manual lever-actuated rock shafts 26 and 28 mounted upon the skirt 30 of the washing machine (see Figure 1). Each of such valves 22 and 24 comprises an arm 32, a resilient rubber valve member 34 carried by the arm, and a transverse rock shaft 36 whereby the arm and valve member 34 may be moved from a seated position as shown to a wide open position where the valve member 34 is moved to a position out of the path of flow of water entering the valve chamber from either conduit nipple 140 or 160. The rock shafts 36 are each provided with an external lever 38 exteriorly of the pump and valve casing, and linkage 40 is adapted to connect each lever to the respective control levers 26 and 28. An over-center spring 42 tensioned between a casing lug 44 and an arm 46 on the lever 38, serves to hold the valve tightly closed or in a wide open position as limited by engagement of the ear 47 with the lug 49.

The pump and valve casing comprises two casing members 48 and 50 which are secured together along a plane 52 to form the unitary construction. The member 48 is provided with a cup-like impeller recess 54 having a back wall 56 and a surrounding involute wall 58, such wall increasing in radius to a low point 60 wherein there is provided a tangential discharge outlet conduit

62. The back wall 56 is provided with a bearing boss 64 in which is journaled a pump shaft 66 having an impeller 68 rigidly attached thereto and arranged within the recess 54 at one end, and a drive pulley 70 secured to the shaft at the other end. Such shaft is journaled upon spaced bearings 72 and 74, and a seal 76 is provided adjacent the impeller end. The bearing 72 has a thrust shoulder 73. A thrust washer 75 of irregular contour for keying is seated in a shoulder recess 79 of similar contour located behind the impeller 68.

The upper portion of the casing member is provided with a valve chamber or pocket 77, of greater depth than the impeller recess and of a width sufficient to receive the valve 22. The casing has formed as a part thereof the inlet conduit 14, terminating in an integral valve seat 21.

The recess formed by the involute wall 56 is closed by a cover plate 78 adapted to lie substantially in the plane 52, such plate being seated in a shoulder groove 80 extending around the periphery of the involute wall 56. Such plate is provided with a central circular opening or orifice 82 aligned with the axis of the impeller 68.

The casing member 50 comprises a closure plate portion 85 having in general the contour of the wall of impeller recess 54, and a valve chamber pocket 88 radially disposed with respect to the cover plate portion, such pocket, however, extending to the central region of the cover plate as is indicated at 90 in order to provide a duct leading to the orifice 82 of the cover plate 78. The valve pocket 88 and the valve pocket 77 have walls of similar contour so that the members 48 and 50, when joined together, form a combined valve chamber, duct, and centrifugal pump. The casing members 48 and 50 are secured together by a series of bolts 92 arranged in marginal flanges 94 and 98 in the respective members 48 and 50. The member 50 is provided with an integral inlet conduit 16, terminating in a valve seat 23.

Each of the pockets 77 and 88 is provided with corner bosses 100 in which the rock shafts 36 are journaled, and the rock shaft and valve lever arms may be keyed together by a transverse pin 102, access to which may be gained through a plug aperture 104 arranged in alignment with such pin when the valve is in closed position. The discharge outlet for the centrifugal pump 62 is preferably provided with a drain plug 106. The casing member 50 may be provided with a bracket 108 by which the pump and valve assembly is secured to an adjacent transmission or other supporting structure, and the casing member 48 is provided with a boss 110 to which may be secured a channel-like guard member 112 arranged in proximity to the pulley and belt driving the pump impeller.

The discharge outlet 62 of the pump is connected to an upwardly extending pipe 114 leading to a swinging conduit 116 adapted to be swung from a position over the tub 10 to a position overhanging adjacent set tubs or a sink which will act as a drain.

It will be seen from the foregoing description that the pump impeller may be continuously driven, and that by closing both valves 22 and 24, the impeller will scavenge the pump chamber and thereafter rotate free of back pressure. If it is desired to drain the wash tub 10, the valve 22 may be opened, whereupon the pump immediately acts to discharge water draining into the pipe 114 to the swinging conduit 116. Similarly, if it is desired to remove water from the extractor tub, the valve 24 may be opened for this purpose, whereupon the pump effects discharge of such water through the conduit 114. With both valves closed, any residue of water in the outlet pipe 114 will be prevented from flowing backward into the pump impeller by reason of rotation of the impeller, without creating any substantial back pressure.

It will be apparent from a consideration of the casing members comprising the assemblage that such members are readily adapted for die casting, utilizing relatively simple molds requiring a minimum amount of the coring, and that by reason of such construction, the entire assembly can be produced economically.

In practice, because of the relatively narrow inlet 90 leading to the pump chamber, the pump chamber closure plate 82 may be eliminated without seriously impairing the pump output, thus simplifying the assembly of the two-part casing.

Although a single embodiment of the invention has been illustrated and described, it is to be understood that the invention is not limited thereto. As various changes in the construction and arrangement may be made without departing from the spirit of the invention, as will be apparent to those skilled in the art, reference will be had to the appended claims for a definition of the limits of the invention.

What is claimed is:

1. In a combination centrifugal pump and valve structure for two-tub centrifugal extractor type washing machines, a casing comprising opposed members joined together substantially on a dividing plane, one of said members having a pump impeller recess having a rear wall facing said dividing plane and having an involute wall extending from said plane to said rear wall, bearings in said rear wall, and a pump impeller journaled in said bearings on an axis normal to said dividing plane, an integral discharge outlet conduit extending tangentially from said recess, said one member having a valve chamber radially disposed with respect to said recess on a side of said recess away from said outlet conduit and of a depth greater than the depth of said recess, a portion of said involute wall in part dividing said recess from said chamber, an integral inlet conduit leading to said valve chamber, and terminating in a valve seat within said chamber, and valve means comprising a rock shaft, valve arm, and valve member journaled in the valve chamber portion of said casing member for movement of said valve member into and out of seating engagement with said valve seat, and the other casing member comprising a pump recess closure plate portion of a contour adapted to cover said recess, said plate portion having a pump inlet duct extending axially away from the recess and radially beyond the plate portion, said inlet duct forming a valve chamber complemental to the valve chamber of the first-named member, said plate portion being centrally and radially open to said inlet duct, said other casing member having an integral inlet conduit leading into the valve chamber portion thereof and terminating in a valve seat, and valve means mounted within said last-named valve chamber portion for engaging said seat.

2. In a combination centrifugal pump and valve structure for two-tub centrifugal extractor type washing machines, a casing comprising opposed members joined together substantially on a dividing plane, one of said members having

a pump impeller recess having a rear wall facing said dividing plane and having an involute wall extending from said plane to said rear wall, said wall having a marginal shoulder inwardly spaced from said dividing plane, bearings in said rear wall, and a pump impeller journaled in said bearings on an axis normal to said dividing plane, an integral discharge outlet conduit extending tangentially from said recess, said one member having a valve chamber radially disposed with respect to said recess on a side of said recess away from said outlet conduit and of a depth greater than the depth of said recess, a portion of said involute wall in part dividing said recess from said chamber, an integral inlet conduit leading to said valve chamber, and terminating in a valve seat within said chamber, and valve means comprising a rock shaft, valve arm, and valve member journaled in the valve chamber portion of said casing member for movement of said valve member into and out of seating engagement with said valve seat, and the other casing member comprising a pump recess closure plate portion of a contour adapted to cover said recess, said plate portion having a pump inlet duct extending axially away from the recess and radially beyond the plate portion, said inlet duct forming a valve chamber complemental to the valve chamber of the first-named member, said plate portion being centrally and radially open to said inlet duct, and a flat plate having a central orifice and of a configuration and thickness adapted to seat in said marginal shoulder and held in place by the closure plate portion of said other casing member, said other casing member having an integral inlet conduit leading into the valve chamber portion thereof and terminating in a valve seat, and valve means mounted within said last-named valve chamber portion for engaging said seat.

3. In a combination centrifugal pump and valve structure for two-tub centrifugal extractor type washing machines, a casing comprising opposed members joined together substantially on a dividing plane, one of said members having a pump impeller recess having a rear wall facing said dividing plane and having a curved wall normal to said plane, said wall having a marginal shoulder inwardly spaced from said dividing plane, and a pump impeller journaled in said recess on an axis normal to said dividing plane, an integral discharge outlet conduit extending tangentially from said recess, said one member having a valve chamber forming portion radially disposed with respect to said recess and of a depth greater than the depth of said recess, an integral inlet conduit leading to said valve chamber, and the other casing member comprising a pump recess closure plate portion of a contour adapted to cover said recess, said plate portion having a pump inlet duct extending axially away from the recess and radially beyond the plate portion, said inlet duct forming a valve chamber portion complemental to the valve chamber portion of the first-named member, said plate portion being centrally and radially open to said inlet duct, and a flat plate having a central orifice and of a configuration and thickness adapted to seat in said marginal shoulder and held in place by the closure plate portion of said other casing member, said other casing member having an integral inlet conduit leading into the valve chamber portion thereof, and valve means mounted within the valve chamber formed by said members and adapted to cooperate in valving relation with at least one of said inlet ducts.

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