Dec. 28, 1937. E. S. STODDARD 2,103,797

CONDUIT FOR WASHING MACHINES

Original Filed March 19, 1928 2 Sheets-Sheet 1

Fig. 1

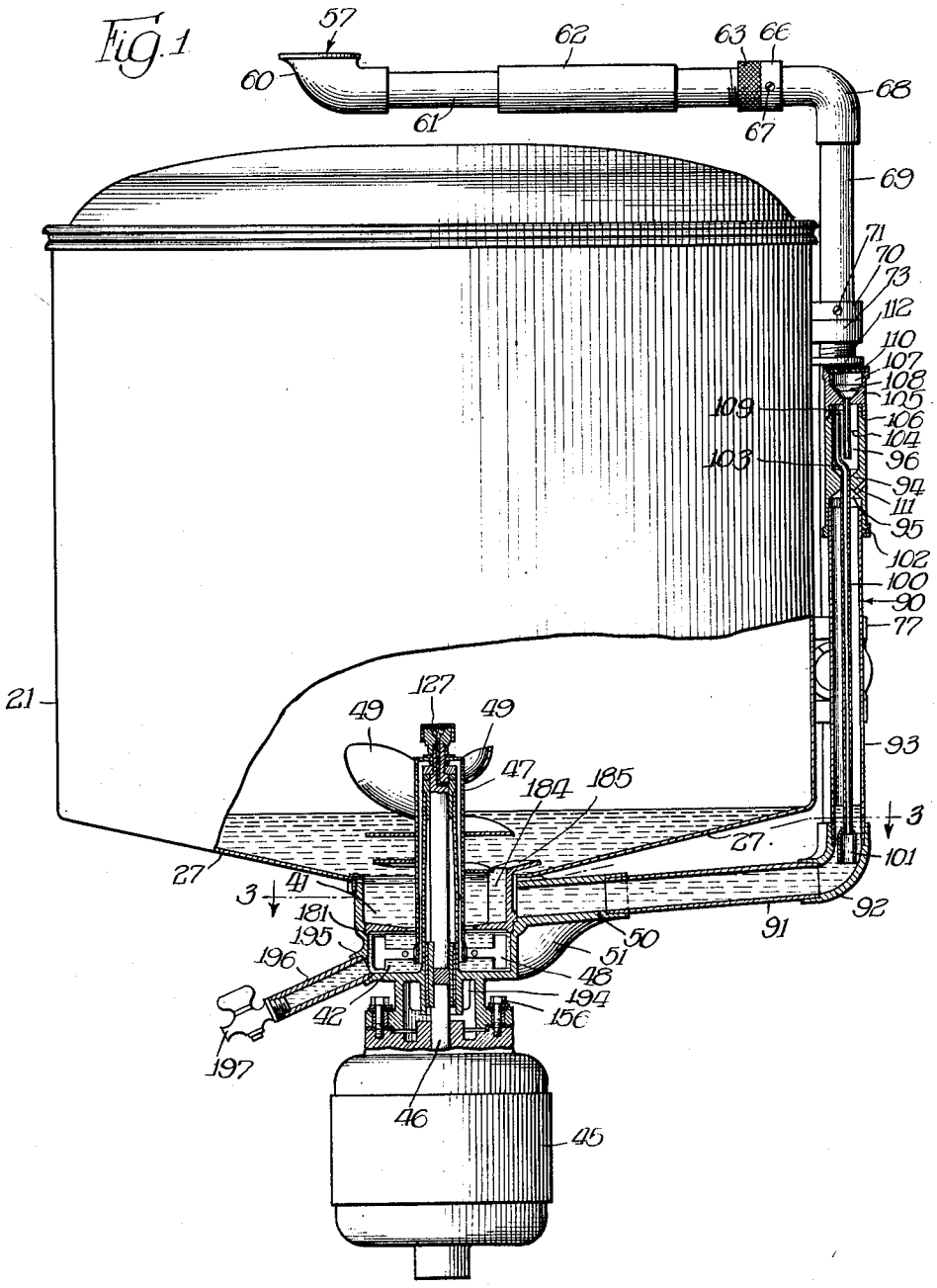

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Fig. 2

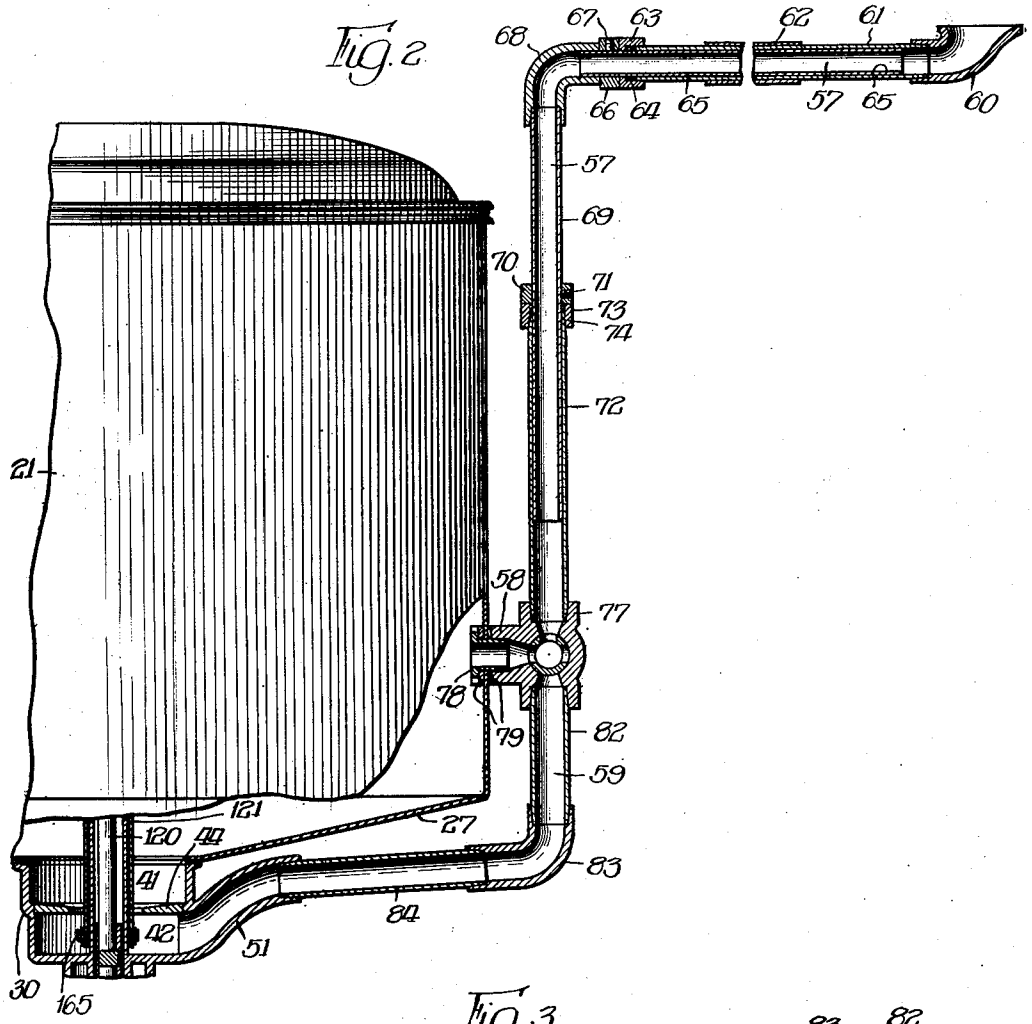
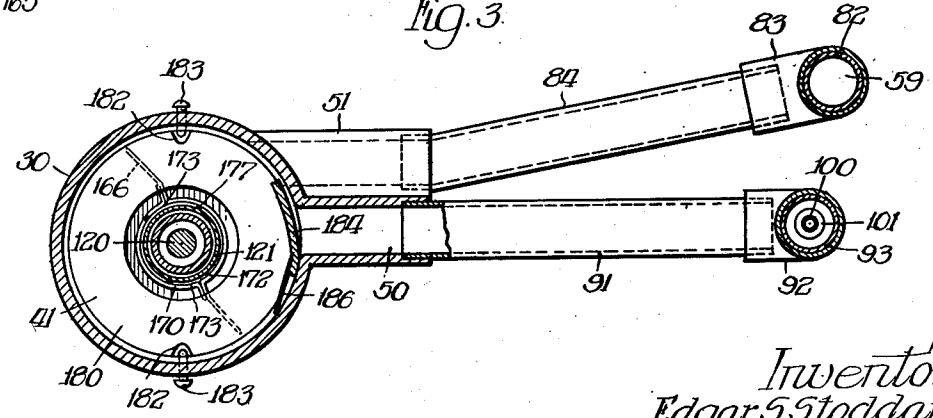


Fig. 3



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CONDUIT FOR WASHING MACHINES

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Original application March 19, 1928, Serial No. 262,652. Divided and this application April 25, 1935, Serial No. 18,085

5 Claims. (Cl. 137—78)

This invention relates to improvements in inlet-outlet conduits for washing machines, and more particularly to dishwashing machines of the portable type.

Much difficulty has been experienced with washing machines and especially with dishwashing machines of the portable type in adding the wash and rinse liquid thereto. In most machines it has been necessary to stop the machine if it is in operation and remove the cover in order to pour water into the tank. During the rinsing operation it was necessary to repeat the operation of stopping the machine, removing the cover, adding the rinsing liquid, replacing the cover and starting the machine several times to rinse the interior of the machine and the dishes therein. The rinsing, in many cases, was very laborious and had to be repeated many times due to the presence of many crevices and recesses in the machine in which dirt and grease could collect.

The amount of water placed in the machine could only be roughly estimated and the desired fixed operating level was usually not maintained. In addition there was no adequate provision made for removing the waste wash or rinse liquids from the interior of the machine.

An object of this invention is to provide a washing machine to which wash and rinse liquids can be added and from which waste liquids can be removed in a very convenient manner without removal of the cover and without stopping the machine.

Another object of this invention is to provide a domestic washing machine which can be readily moved about and which is adapted to cooperate with an ordinary household sink in obtaining a supply of wash and rinsing liquids and in discharging its waste liquids.

A further object of this invention is to provide a washing machine, the liquid level of which can be readily determined and controlled.

Still other and further objects of my invention will be pointed out or indicated hereinafter or will be apparent to one skilled in the art upon an understanding of the invention or its employment in practice.

This application is a division of my application Serial No. 262,652 filed March 19, 1928, and now Patent No. 2,023,107, granted December 3, 1935.

One embodiment of the invention is shown in the accompanying drawings, in which—

Fig. 1 is a view of a washing machine showing the inlet-outlet conduits and a sectional view through the water level indicating column;

Fig. 2 is a sectional view through the inlet-outlet conduits and also showing a means for attaching the same to a tank; and

Fig. 3 is a sectional plan view of the outlet conduit and level indicating column taken on the line 3—3 of Fig. 2.

Referring to the drawings, a washing machine in connection with which my invention can be used may consist of a tank 21 having an inwardly and downwardly sloping bottom 27 terminating in a depending journal casting 30 divided into an upper well chamber 41 and into a lower pump or ejecting chamber 42 divided from each other by the annular pump chamber cover 44. A motor 45 is suspended from the casting 30 and an impeller drive shaft 46 extends upwardly through said casting, and its chambers into the tank proper. An impeller shell 47 is attached to the drive shaft at its upper end and extends downwardly around the drive shaft into the ejecting chamber where the ejector centrifugal device 48 is attached thereto. At the upper end of the impeller shaft is the impeller 49. The well chamber 41 is in open communication with the tank 21 and the opening in the pump cover 44 is of sufficient size to allow the drive shaft and impeller shell to pass therethrough and still permit water and dirt particles contained therein, to pass from the tank 21 into the pump chamber 42.

The upper chamber 41 is provided with a tubular projection 50 which leads to a level indicating device and the lower chamber 42 is provided with a tubular projection 51 which leads to a liquid conduit.

The main conduit 57 is partly contained in a horizontal swinging arm which is adapted to extend away from the tank 21 so as to cooperate with the faucets or basin of a domestic household sink as shown upon Fig. 2 and which is also adapted to be placed over the cover 22 of the tank 21 when the machine is not being utilized as shown in Fig. 1. The main conduit 57 is also partly contained in vertical tubing which extends up along the side of the tank (see Fig. 2). Adjacent to the bottom of the tank the conduit 57 can be continued into either one of two conduits, a conduit 58 leading directly into the side of the tank slightly above the dished bottom 27 and another conduit 59 which leads into a well in the bottom of tank and cooperates with the projection 51.

The main conduit is constituted in the following manner: The funnel 60, which is preferably a casting, (see Figs. 1 and 2) is adapted to cooperate with an ordinary household sink. It can

be turned upwardly, as indicated, so as to receive the flow of liquid from a spigot or faucet or it can be turned downwardly to permit discharge of the waste liquid from the interior of the tank into the household sink. Attached to the funnel **60** is the horizontal tube **61** to which is attached the fiber handle **62** which may also be made of hard rubber, "Bakelite" or any other heat insulating material. The handle **62** is fitted over a knurled or roughened portion of the tubing **61**. To the end of the tube **61** is attached the nut **63** which is provided with a hollow portion **64** for containing suitable stuffing material. The tube **61** fits over and slides upon an inner tube **65** which is provided with a collar **66**, which may be adjusted in different positions upon the tube **65** by means of a set screw **67**. The tube **65** is rigidly set into the elbow **68**. The tube **61** is adapted to ride back and forth so as to increase or decrease the distance between the funnel **60** and the elbow **68**. The amount of friction between the tube **65** and the tube **61** can be regulated by screwing or unscrewing the nut **63** which will compress or lessen the compression upon the stuffing material in the recess **64**. If it is desired to have a fixed length between the funnel **60** and the elbow **68** the length of the tube between **60** and **68** may be adjusted by loosening the set screw **67**, and by moving the collar **66** along the tube **65** until it rests against the nut **63**. The set screw **67** is again tightened and the distance between **60** and **68** will then be set so that the funnel may cooperate with a domestic or household sink in the desired manner. When it is desired to turn the funnel **60** so that it will discharge downwardly into the basin of the sink, such may be done by means of the handle **62**. The tube **61** and the nut **63** can be turned in this manner without affecting the adjustments or the predetermined length between the funnel **60** and the elbow **68**.

The downwardly extending portion of the elbow **68** is rigidly attached to a vertical tube **69** which is provided with a collar **70** which can be set in any position along the tube **69** by means of a set screw **71**. The tube **69** slides within another tube **72**, to the upper threaded portion of which is attached the nut **73**. The nut **73** is provided with a recess **74** in which is placed a suitable stuffing material. The friction with which the tube **69** slides within the tube **72** may be regulated by tightening or loosening the nut **73**. The elbow **68** can be turned at any desired angle since the tube **69** will readily turn within the tube **72**. The length of the tube **69** above the nut **73** can also be readily regulated by loosening the set screw **71**, elevating or lowering the elbow **68**, moving the collar **70** to its new position so it will rest against the nut **73** and again tightening the set screw **71**.

The tube **72** leads to the three-way valve **77**. When wash or rinse water is being admitted to the tank **11**, the three-way valve **77** may be so adjusted as to close the connection between the conduit **57** and **59** and open the connection between the conduit **57** and the conduit **58**. When waste liquid is being removed from the tank **21** the three-way valve **77** may be so adjusted that it will open the passage between the conduit **59** and the conduit **57** and close the passage between the conduit **57** and the conduit **58**. The valve **77** is attached to the side of the tank by means of the nut **78**, the enlarged portion of which is positioned within the interior of the tank **21**. The two rubber washers **79** are firmly clamped between the three-way valve **77** and the nut **78**. The conduit **59** is contained in a vertical tube **82**, an elbow **83** and a slanting tube **84** which fits into the tubular projecting hollow portion **51** which communicates with the lower chamber of the casting **30**.

If the wash and rinse water is run into the machine while the water propelling or circulating device is not in operation, the conduit **58** may be cut out entirely and the combined conduits **57** and **59** utilized both for conducting the wash and rinse water into the bottom of the tank below the water actuating device and for conducting the wash liquids away from the bottom of the tank.

The upper chamber of the casing **30** (see Figs. 1 and 3) is connected to the column **90**. The column **90** has a slanting tube **91** leading into the tubular projecting portion **50** of the casting **30**. The tube **91** fits into the elbow **92** which in turn fits into the vertical tube **93** which extends up along the side of the tank **21**. To the upper part of the tube **93** is attached the gauge bottom **94**, each side of which is bored so as to form the chambers **95** and **96**. Through the center of the member **94** is drilled a hole between the cup-shaped openings **95** and **96** through which is passed, and to which is soldered, a pressure tube **100**. This pressure tube **100** extends downwardly into the tube **93** and terminates in a pressure bell **101** which is positioned in the lower part of the column **90** so that it will be partly submerged when the tank is properly filled. The gauge bottom **94** may be set in a fixed position upon the tube **93** by means of the set screw **102**. The upper portion of the pressure tube **100** is bent over as indicated at **103** and then extends upwardly into the reservoir chamber **96**. The cylindrical portion of the reservoir chamber **96** is provided with an indicating line **104**.

The upper portion of gauge bottom **94** is threaded and the gauge top **105** is screwed upon it. The rubber washer **106** insures an air-tight fit between the gauge top **105** and the gauge bottom **94**. The upper part of the gauge is drilled out and countersunk so as to form a gauge chamber **107**. The conical portion of this indicating chamber **107** is provided with the gauge line **108**. In the lower portion of the gauge **105** is drilled a hole in which is inserted the tube **109** which is soldered to the gauge top **105**. The tube **109** extends downwardly and under the surface of the indicating liquid in the reservoir **96**. The top of the gauge chamber is covered by a piece of celluloid or other transparent material **110**. The pressure tube **103** need not be bent as shown. The tube may be straight, if it is set off center in the gauge bottom **94** or if the tube **109** is either bent off center in the reservoir chamber **96** or set off center in the gauge top **105**.

The column **90** is connected to the upper chamber of the casting **30** so that any change of level in the tank is readily communicated to the gauge **94**. The column **90** is ordinarily filled with water up to the level of the liquid in the washing chamber of the tank **21**. This water will trap a column of air in the pressure bell **101** and in the pressure tube **100**. As the liquid level in the tank **21** rises the air which has been trapped in the bell **101** and in the tube **100** will be forced upwardly into the reservoir chamber **96**. An indicating liquid in the reservoir chamber **96** will then be forced up through the tube **109** into the gauge chamber **107**. When the liquid reaches the line **108** the proper level inside the tank **11** will have been reached.

The indicating liquid which is used should have a higher specific gravity than water and a much higher boiling point than water so that it will not readily evaporate. The indicating liquid must indicate the level of both hot water and cold water and the liquid must function practically the same without substantial expansion or evaporation between the temperatures of about 60° F. and 212° F. The liquid should have a higher specific gravity than water for the reason that slight changes in the specific gravity of the liquid in the tank 21 should not materially change the rise in the level of the indicating liquid. There is frequently a layer of suds upon the top of the water in the lower part of the column 90, that is in the elbow 92 or in the tube 93. This layer of suds is liable to materially affect the level of the liquid in the gauge chamber 107 unless a liquid of higher specific gravity than water is used. In this latter case the effect will be very small and may be neglected. As a general rule it is preferred to use liquids which are colored, or colorless liquids in which dyes can be readily dissolved, which are odorless, which have a higher boiling point than water, and which also have a substantially higher specific gravity. The liquids utilized should also be of low viscosity so that they will readily move in tubes of small diameter with slight changes in pressure. Alcohols, especially the polyhydric alcohols such as ethylene glycol have been found useful for this purpose. Some alcohols may have to be slightly diluted with water to reduce their viscosity, but the amount of water should be kept down so that there will not be any material increase in the vapor pressure of the indicating liquid. The reservoir chamber should be protected from the heat of the wash and rinse liquids in the washing chamber so as to prevent excessive changes in temperature. The exterior of the gauge bottom 94 is glass-enameled or surfaced with a reflecting material and is separated from the wall of the tank 21 by an air gap. The reservoir bottom is also insulated from the hot water in the bottom of the column 90 by the air columns inside of the tubes 93 and 100.

To adjust the column so that the level of the indicating liquid will be exactly at the line 108 when the tank contains six quarts of water the following procedure may be adopted. Six quarts of water are put into the machine which should be previously emptied of liquid. Six quarts of water will just fill the bottom of the machine including the two chambers in the cup-shaped part of the journal casting 30, and the frusto-conical bottom with communicating pipes and tubes up to the desired level. This will immerse the elevating portion of the water actuating member 49. The normal level will just be at the point where the frustoconical bottom 27 joins the cylindrical sides of the tank 21. The reservoir chamber 96 of the gauge is then filled with liquid up to the line 104. The gauge top 105 including the gauge chamber 107 is then screwed on to the threaded portion at the top of the reservoir chamber 94 with the rubber washer 106 in place. The combined gauge top and bottom 94 is then moved along the tube 93 until the level of liquid in the gauge chamber 107 is at the line 108. The set screw 102 is then tightened so that the combined gauge top and bottom will be held in fixed position upon the tube 93. The pressure in the upper part of the tube 93 in the upper portion of the chamber 107 is maintained at atmospheric pressure by means of the openings 111 and 112 respectively. The interior of the chamber 107 is preferably coated with a layer of white "Duco" or is nickel plated so that the color of the indicating liquid, which is preferably red, will be strongly contrasted against it.

It will be noted that the gauge is so arranged and positioned that the level indication will be vertically discernible to one standing at the machine and adjusting the swinging arm 60—61 or valve 77. The device is especially advantageous over the horizontal view tubular gauge glasses since it is not necessary to utilize double seals to fix the tube in position and no grease from the cleansing or rinsing liquids can come into contact with the gauge and obscure it.

The operation of the level indicator may be briefly summarized as follows: The liquid in the tank actuates an air column, which forms a manometer with a broken column in which liquid will not be lost when inverted or syphoned out when the tank is drained. When the tank 21 is drained the liquid in the lower part of the column 90 will also be drained.

The lower chamber 42 of the journal casting 30 in which the centrifugal device 48 rotates is separated from the upper chamber 41 by means of the pump cover 44. The cover 44 rests upon the shoulder 181 in the wall of upwardly facing cup of the journal casting and is held in position and kept from turning by means of set screws. The plate 44 has a large central opening which permits passage of liquids between the chambers 41 and 42. Cast integrally with this plate and projecting upwardly therefrom is the vertical cylindrical plate 184 (see Fig. 1) to which is attached a sloping horizontal plate 185. This plate is adjacent the side of the chamber 41 and the lower part of the frusto-conical portion 27 of the tank 21 and is positioned so that it will form a pocket in conjunction with the side of chamber 41 and the bottom of the tank 27. The impeller usually is intended to turn clockwise as one looks downwardly thereupon. The impeller forces an amount of water into the open space between the plates 184 and 186 and the wall of chamber 41. This water will increase the level indication in the gauge 90 so that it is possible to calibrate and operate the gauge 90 when the impeller is in motion. It is obvious, of course, that when a machine is operating a certain amount of water will have been elevated and will be in the form of a spray in the open body of the machine or it may be hanging as droplets on the side of the various racks and articles above the water level on the interior of the tank 21. This will obviously decrease the amount of water which is contained in the frusto-conical bottom 27 and the chambers 41 and 42 of the journal casting 30. In order to get the correct six quart level when the actuating device is in motion and when the machine is operating it is necessary to position some means such as that shown to increase the level which will be indicated by the gauge 90. As can be seen from Fig. 3 the portion of the plate 184 which is adapted to rest adjacent to the side of the chamber 41 forces an additional amount of liquid into the column 90. A certain amount of liquid, of course, will pass between the closely adjacent edges of the plate 184 and the side of the chamber 41. This amount of leakage can be increased by cutting grooves in the portion of the plate 184 which is closely adjacent to the side of the chamber 41 or it can be restricted by attaching a plate of sheet copper 186 (see Fig. 3) on the rear side of the plate 184 which

will closely contact with the wall of the chamber 41. By making adjustments of this character it is possible to obtain a correct indication of the amount of water in the tank while the impeller is in operation. In preferred construction it may be desirable to omit the plates 184 and 186 since they tend to accumulate dirt and food particles and they are not essential if the gauge is not to be operative when the impeller is in motion.

The lowest part of the lower chamber 42 of the journal casting 30 is provided with a tapped projection 195 (see Fig. 1). Into this tapped projection is screwed a downwardly projecting tube 196 to the end of which is attached the pet cock 197. In case it is desired to drain the pump chamber of all liquid such pet cock may be opened and the small amount of liquid left in the chamber 42, after the centrifugal pump has substantially exhausted the liquid from the interior of the machine, can be removed. Ordinarily the amount of liquid left in the interior will be less than one pint and this will be principally clean rinse water which can be left in the chamber 42 of casting 30 without harm.

In normal operation the funnel 60 is placed under a hot water faucet, the valve 77 is turned to cut off conduit 59 and open conduit 58 into tank 21 and water is permitted to run into the tank. As the tank and its chambers 41 and 42 begin to fill, the pressure in column 90 increases, placing the water level gauge in operation. The gauge will show when the proper water level in the tank has been reached and the water faucet is then shut off and the impeller 49 is placed in action. After a washing or rinsing operation, valve 77 is again turned to shut off the tube 58 and open the tube 59 through which the conduit 57 now leads to the discharge chamber 42. The motor 45 continues to run and the ejector or pump 48 forces the water outwardly through the casting 51 into the conduit 57 and upwardly through the funnel 60 where it is discharged into the sink.

It is to be understood that this description and drawings are presented for purposes of illustration only and are not to be construed so as to limit the scope of the appended claims unnecessarily. For example, the amounts of water desirable to be used will vary with such factors as the size of the tank. Specific quantities of water have been mentioned without reference to tank size for descriptive purposes. Many of the structural elements may be replaced by equivalent devices without departing from the invention.

I claim:

1. In a washing machine, a tank, a well chamber communicating with the bottom of said tank, a centrifugal pump in said chamber, an outlet conduit communicating with said chamber and cooperating with said pump to exhaust water from said well chamber, said outlet conduit having a vertical portion and a horizontal terminating portion connected thereto, and an inlet conduit directly communicating with said tank, said inlet conduit being directly connected to said outlet conduit.

2. In a washing machine, a tank, and an inlet and outlet system, comprising an outlet conduit communicating with the lower portion of the tank, means for ejecting water from the tank through the outlet conduit, an inlet conduit communicating with the tank, a vertical conduit having a lower exterior tube and an interior slidably mounted upper tube leading to a point adjacent the top of the washing machine, the inlet and outlet conduits being connected to the lower tube of said vertical conduit, a substantially horizontal conduit communicating with the interior tube of said conduit, a second horizontal conduit coaxially mounted with respect to said first mentioned horizontal conduit and having a funnel member on the end thereof.

3. In a washing machine, a tank, an outlet conduit leading from the lower portion of the tank, an inlet conduit communicating with the tank, a vertical conduit communicating with said outlet and inlet conduits, a horizontal pivotally mounted conduit communicating with the upper part of said vertical conduit, means on the outer portion of said horizontal conduit for receiving a stream of freely falling liquid when in one position and for discharging liquid when in a second position, and means for optionally closing either the inlet conduit or outlet conduit from communication with the vertical conduit.

4. In a washing machine, a tank provided with a downwardly and centrally inclining bottom having an opening in the lower portion thereof, a well chamber secured to the bottom of the tank around the opening therein, an outlet conduit communicating with said well chamber, a centrifugal pump cooperating with said outlet conduit to discharge water from the tank, an inlet conduit communicating with the tank above the bottom thereof, a vertical conduit communicating with said inlet and outlet conduits, a horizontal terminating conduit pivotally mounted to the upper portion of said vertical conduit, and a rotatable funnel member communicating with the end of said horizontal conduit.

5. In a washing machine, a tank, and a liquid conducting conduit communicating with the bottom thereof, said conduit having a vertical portion extending upwardly to a point adjacent the top of the tank, and a horizontal terminating portion communicating with the upper part of said vertical portion, said horizontal terminating portion having a fixed section attached to said vertical portion and an extensible and rotatable section telescopically arranged with respect to said fixed section.

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