June 8, 1954 D. M. STRATHEARN ET AL 2,680,448

LIQUID INLET SYSTEM FOR WASHING MACHINES

Filed July 28, 1950

3 Sheets-Sheet 1

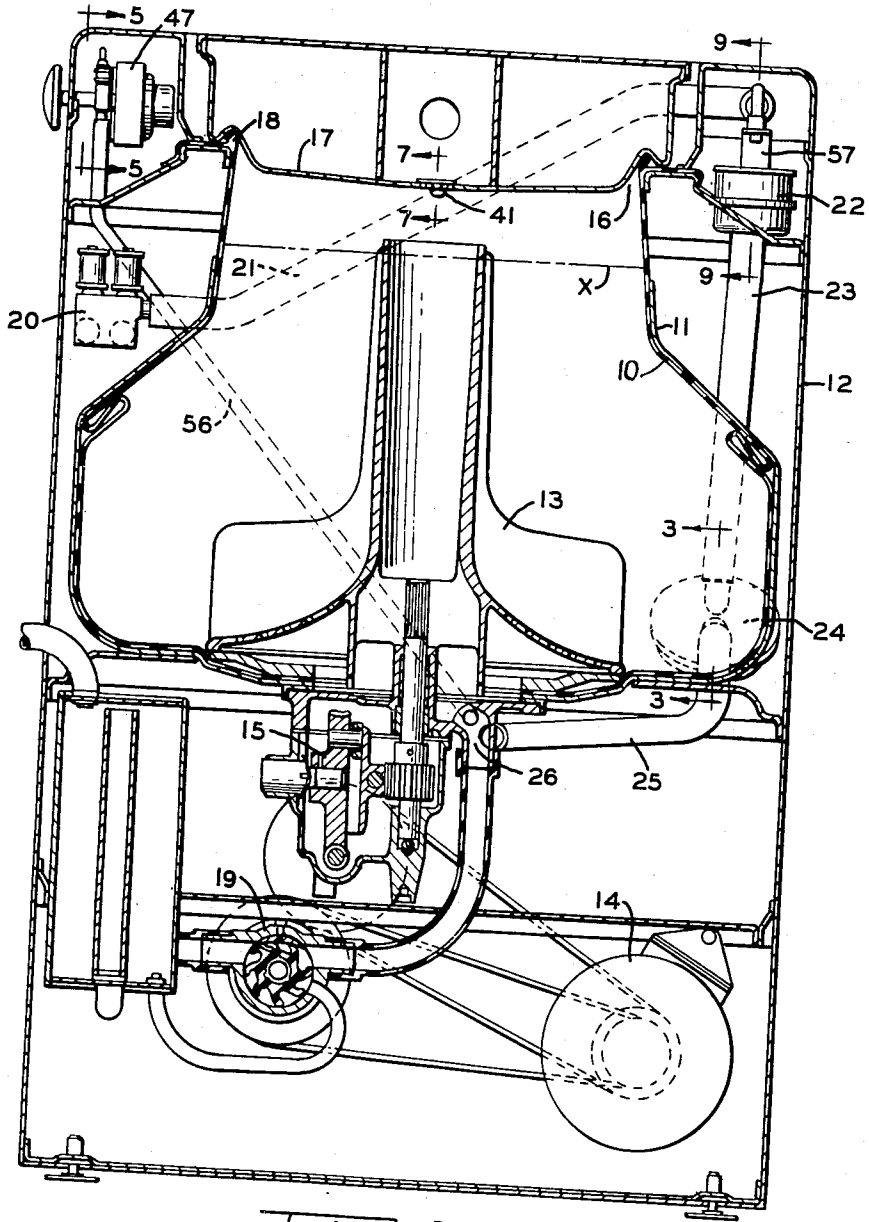


Fig. 1.

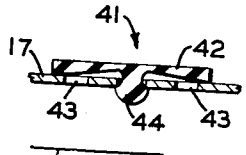


Fig. 7.

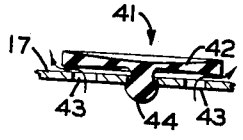


Fig. 8.

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3 Sheets-Sheet 2

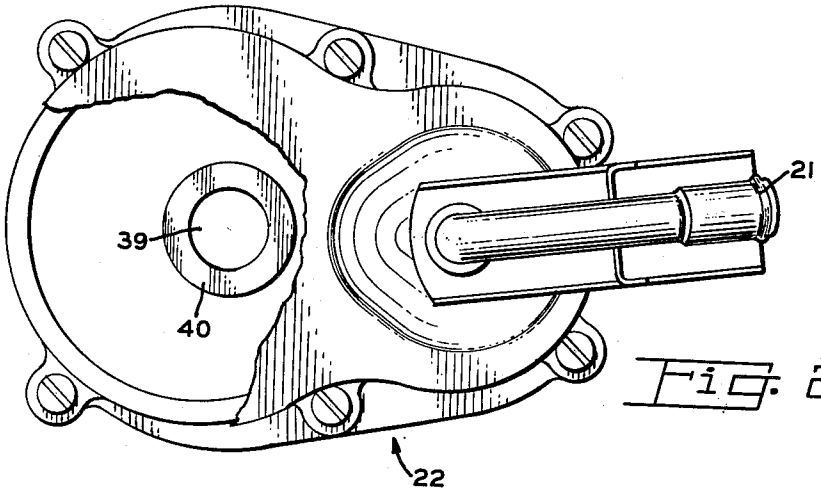


Fig. 2.

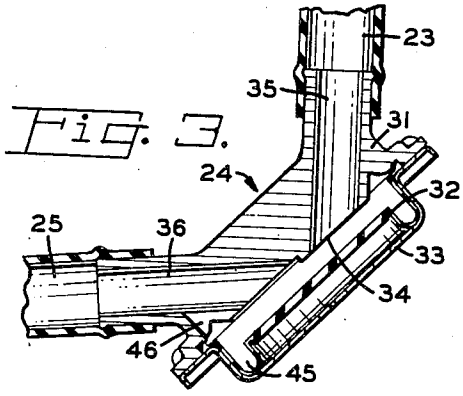


Fig. 3.

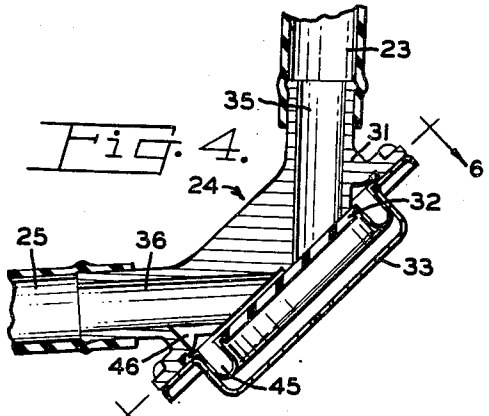


Fig. 4.

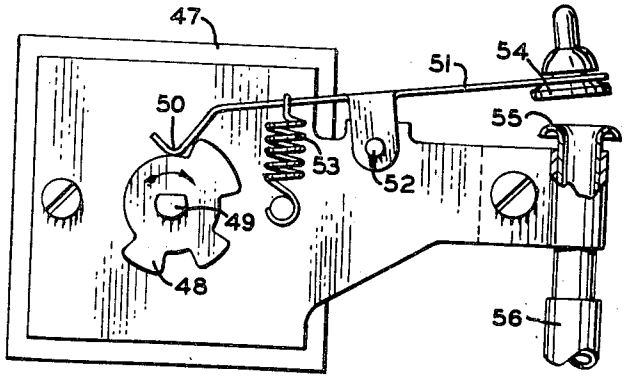


Fig. 5.

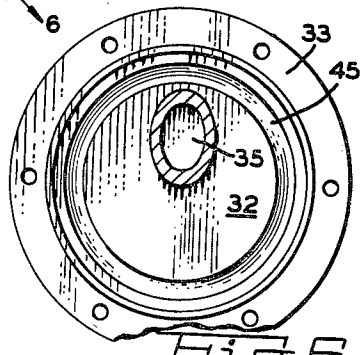


Fig. 6.

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LIQUID INLET SYSTEM FOR WASHING MACHINES

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3 Sheets-Sheet 3

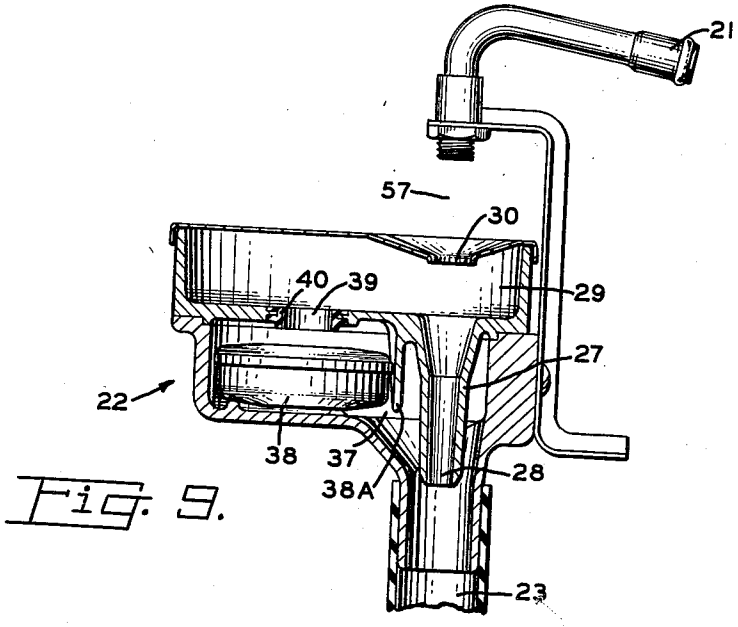


Fig. 9.

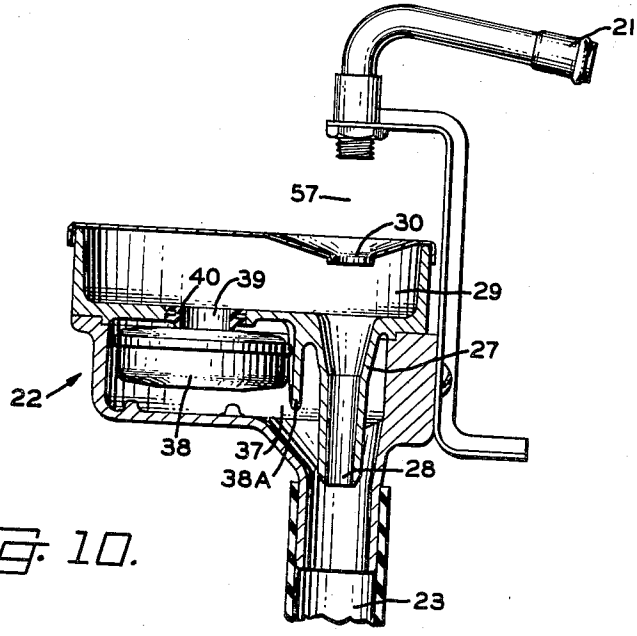


Fig. 10.

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LIQUID INLET SYSTEM FOR WASHING MACHINES

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Application July 28, 1950, Serial No. 176,376

11 Claims. (Cl. 137—218)

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This invention relates to improvements in a vacuum breaker and water inlet system for use in connection with a washing machine of the type in which a flexible bag is collapsed against the laundry to squeeze the liquid and detergent out of the same.

A machine of flexible bag type, on which this invention is particularly adapted for use, is more fully described in co-pending application Serial No. 5,619, filed January 31, 1948, now Patent No. 2,636,372 granted April 28, 1953, by Henry J. Rand inventor which discloses various automatic features and a cycle of operations suitable for the operation of such a machine.

The present invention is an improvement over the type of inlet system shown and described in co-pending application Serial No. 125,111, filed November 2, 1949, by John P. Jones et al., inventors.

Under certain pressure conditions, when air is drawn into an inlet system through an air gap by the use of a restricting nozzle, an air block is formed which prevents any further water from entering the system and results in an overflowing of water through the air gap in the system.

It is a primary object of the present invention to provide means in the inlet system to assure continuous unidirectional flow as required, regardless of pressure conditions in the inlet line.

It is a further object of the present invention to provide a liquid inlet for a washing machine whereby the flow of liquid in the supply line is limited to a direction into the container of the machine thereby preventing back flow of liquid on a reduction of pressure within said line.

It is a further object of the present invention to provide means to bleed off air block which may form in a system of the aforementioned type under certain pressure conditions.

It is a further object to provide the foregoing objects and advantages with a minimum number of additional parts and at a minimum cost of manufacture.

Other objects and advantages of the present invention will become apparent from the following more detailed description and illustration in the accompanying drawings forming a part hereof and wherein:

Figure 1 is a central sectional view through a washing machine embodying the essential features of this invention.

Figure 2 is an enlarged plan view partly in section of a combined restricting nozzle and floating check-valve.

Figures 3 and 4 are enlarged central sectional

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views of a normally closed diaphragm valve for admitting liquid into the bag, Figure 3 showing the valve in the open or liquid admitting position, and Figure 4 showing the valve in the closed position, both views taken along the line 3—3 of Figure 1.

Figure 5 is a front elevation of the vacuum release valve and its control mechanism, taken along the line 5—5 of Figure 1.

Figure 6 is a sectional view taken along the line 6—6 of Figure 4 showing the contrasting effective areas of the diaphragm in the liquid admitting valve.

Figures 7 and 8 are enlarged central sectional views through the pressure relief valve taken along the line 7—7 of Figure 1, Figure 7 showing the valve in closed or bag sealing position, and Figure 8 showing the valve in open or pressure relieving position.

Figures 9 and 10 are central sectional views through a device consisting of a restricting nozzle and floating check valve taken along the line 9—9 of Figure 1, Figure 9 showing the position of the parts at rest or under low pressure conditions and Figure 10 showing position of the parts under high pressure conditions.

Referring to the drawings, Figure 1 shows a washing machine of the type employing a flexible liquid- and air-tight bag 10 which is supported within a suitable wrapper 11 and enclosed by a suitable casing or cabinet 12. An agitator 13 is mounted for oscillation centrally of the bag 10 for causing a washing action and is driven by a suitable motor 14 through a transmission mechanism 15.

The bag 10 has an open neck 16 through which the soiled laundry and soap are introduced. A cover 17 is provided for this opening and is adapted to seal said opening on contact with a flexible lip 18 extending from the top of the bag 10.

In the present machine, liquid is introduced into the bag 10 by means of a suitable thermostatically controlled mixing valve 20 well known in the art and which is attached to suitable hot and cold liquid supply lines. The liquid from the mixing valve 20 passes through a conduit 21, through a restricting nozzle and floating check-valve 22 to be later described, into a conduit 23, through a diaphragm valve 24 also to be later described, through a conduit 25, and into an opening 26 adjacent the bottom of the bag 10 and communicating with the interior thereof. When the liquid in the bag 10 reaches a predetermined level, as indicated at "X," a suitable pressure switch (not

shown) is actuated to stop the flow of liquid from the mixing valve 20.

Referring to Figures 2, 9 and 10, the valve 22 contains a nozzle member 27 which terminates at 28. The velocity of liquid passing through nozzle 27 carries with it air from chamber 29. Atmospheric pressure is maintained in chamber 29 through opening 30. Action of the air and water after passing through opening 28 will later be described in detail.

Referring now to Figure 3, the liquid, after passing through the valve 22, enters the diaphragm valve 24 (thru conduit 23, Figure 1) which comprises a body portion 31, and a flexible circular diaphragm 32 held in place by a cover member 33. The diaphragm 32 is molded in such a manner as to be normally urged to seal the cut-off face or seat 34 of a port 35 in the valve body 31 as shown in Figure 4. The liquid from conduit 23 enters this valve through the port 35 and the pressure or weight thereof urges the diaphragm to assume the position shown in Figure 3 whereupon the liquid is then free to escape through a port 36 in the valve body and enter into the conduit 25 which communicates with the interior of the bag 10 as aforementioned.

It should be noted that the distance between the diaphragm 32 and the valve 22 should be great enough, depending upon the diameter of the conduit 23, to furnish a head of water of sufficient pressure to urge the diaphragm 32 away from the seat 34 regardless of the amount of pressure in the inlet line. This arrangement assures that the tub will fill to a normal predetermined level as aforementioned without causing the liquid to rise in the conduit 23 and overflow through the opening 30 in the valve 22.

It should also be noted that the valve 22 must be placed a sufficient distance above the normal water level in the bag to prevent overflowing under normal conditions since there is a natural tendency for the liquid to seek a level in the conduit 23 corresponding to the level in the bag 10.

It has been found through experimentation that since air and liquid both are admitted to the bag, that on stopping of the liquid flow due to actuation of the pressure switch as aforementioned, there is a natural tendency for the air which is trapped in the conduit 23 to rise in the conduit. In doing this there is also a tendency for a small amount of liquid to regurgitate in the conduit.

Referring again to Figures 9 and 10 the operation of the device will be described in detail. Liquid ejected from the nozzle 27 and air pass through outlet 28 into conduit 23 which communicates with chamber 37.

Under conditions of high pressure at outlet 28 the chamber 37 is subjected to a pressure equal that in the conduit 23. The float 38, being unsupported by air or liquid allows air separating from fluid at outlet 28 to escape through opening 39, until such time as restriction in conduit 23 raises fluid level in chamber 37, causing float 38 to rise and seal opening 39 by contact with flexible sealing ring 40. The float 38 is guided in its movement by a baffle member 38A to prevent any appreciable tilting thereof. The baffle member 38A also serves as an aid in causing air separation. Under this set of conditions the velocity of the fluid creates sufficient pressure at outlet 28 to drive the column of air and fluid through conduit 23, valve 24, conduit 25 in to bag 10, and though air and water separation continues at outlet 28, the air rising to cavitate chamber 37, the [illegible] of the air is sufficient to cause the float 38 to remain seated against sealing ring 40. When the fluid supply is cut off as aforementioned the fluid in conduit 23 is carried in part by its kinetic energy and in part by gravity to seek its level in conduit 23 with its level in tub 10. The float 38, its support being removed by the reduction in pressure, falls by gravity from seat 40 allowing air separating from fluid in conduit 23 to escape through openings 39 and 30. Air from conduit 23 may also escape through nozzle 27 when this opening is not restricted by incoming fluid.

Under conditions of very low water pressures, the water passing through the nozzle 27 carries little or no air into the system, and as a result the water passes through the system into the tub 10 due to the force of gravity alone until it reaches the predetermined level "X." In this instance, since no pressure is built up in the conduit 23 or chamber 37, there is no action imparted to the float 38, and any small amount of air, if any, which may be drawn thru nozzle 27 can easily escape through the openings 38 and 30.

Under the so-called "critical pressures," which will be divided into two groups, (1) what shall be termed "low flooding pressures," and (2) what shall be termed "high flooding pressures," the novel features of the device consisting of a restricting nozzle and floating check-valve assembly 22 are brought into play to prevent any flooding or blocking of the inlet system which has occurred in the prior devices.

The "low flooding pressures" are those at which a small amount of air is drawn through the nozzle 27 and into the conduit 23, but the pressure therein is not sufficient to cause a back up of pressure in chamber 37 or impart any movement to the float 38, thus any air which might tend to rise in the conduit 23 will separate from the water and escape as aforementioned.

It should be noted that due to the size of the conduit 23 in relation to the size of the restricted outlet 28, there is provided ample space for air and water separation and passage for the air to chamber 37 where it can be bled off to prevent air block in the conduit 23.

The "high flooding pressures" are those at which a quantity of air is drawn through the nozzle 27 and into the conduit 23, but the pressure created by the velocity of the flow from outlet 28 is not sufficient to force all of the mixture through the conduit 23 and the remainder of the system. Under this condition, the fluid seeking an avenue of escape after ejection from outlet 28 follows a path of least resistance and rises in chamber 37 causing the float to rise and seal opening 39 by contact with flexible sealing ring 40. Air separation continues to take place at outlet 28 and in conduit 23. As the air rises into chamber 37 its pressure displaces the water in the chamber forcing it downward in conduit 23. At such time as a sufficient volume of water has been displaced to leave the float 38 unsupported it drops of its own weight and permits the air in the chamber 37 to escape through opening 39. During a fill within this "flooding pressure" range the above function occurs at intervals.

It should be noted that, should the force of escaping air carry with it water, or water vapors into chamber 29, such water or vapors will be returned to the system by being retained in chamber 29 and by the cover thereon. The water will be caused to return to the system by running back through the nozzle portion 27.

Another important feature of this fill system is the incorporation of a small pressure relief valve

41 in the cover 17 which closes the opening 16 in the bag 10. This relief valve is necessary since the amount of air which is forced into the bag 10 along with the incoming liquid is proportional to the pressure in the inlet line. This relief valve 41 comprises a flexible circular pad 42 which is adapted to cover a series of openings 43 in the cover member 17 and has a spherical button 44 forming a part thereof which is forced into a hole in the cover 17 for attachment thereto. The circular pad 42 is molded in such a manner as to be normally urged to close the openings 43 to seal the interior of the bag 10 from the atmosphere as shown in Figure 7.

In the event the washing machine is installed in an area having a very high water pressure, there will be an excessive amount of air forced into the bag 10 which normally would collect in the top of the bag and exert a downward pressure on the liquid thereby causing the pressure switch to be actuated too soon and thus create a "false" water level; thus the necessity for this pressure relief valve 41 becomes readily apparent. When such a high pressure occurs, the circular pad 42 will be forced into the position shown in Figure 8, exposing the openings 43 to the atmosphere through holes in the cover member 17, the air taking a path as indicated by the arrows in Figure 8.

After the liquid has reached its pre-determined level as aforementioned, suitable means is provided as aforementioned for causing a washing action to take place in the bag 10 by oscillation of agitator 13. At the conclusion of the washing action, a squeeze drying operation is performed on the laundry in the bag. This action is accomplished by the pump 19 pumping the air and liquid from the interior of the bag 10 thereby creating a substantial vacuum therein (about 26½ inches of mercury in the vicinity of South Bend, Indiana), causing the bag to collapse around the clothes due to atmospheric pressure being exerted on the outside thereof.

It should be noted that the liquid which is in the conduit 25, the diaphragm valve 24, and the major portion of the liquid in the conduit 23, will likewise be pumped out.

Referring to Figure 6, which shows a comparison between the vacuum affected area, and the liquid pressure area of the diaphragm 32, it is disclosed that the combination of the bias of the diaphragm 32 toward closing and the slight suction of the pump 19 on the large area of the diaphragm 32 will co-operate to produce a seal between the diaphragm 32 and the seat 34 when the drying operation is being performed on the laundry. It should be noted that the port 36 in the diaphragm valve is sloped downward so that the liquid in the conduits 23 and 25 and the valve 24 will tend to drain by gravity, also the annular space 45 surrounding the diaphragm 32 is capable of being drained by its connection with the port 36 through a small bleed port 46 which permits a major portion of the liquid to be drained from the diaphragm valve. This draining of the diaphragm valve is necessary to insure that the diaphragm will return to closed position easily.

At the conclusion of the squeeze drying operation, means is provided for releasing the vacuum in the bag 10 which comprises a vacuum release valve 54, 55 which is operated automatically at the conclusion of each drying period, being actuated by an automatic timer 47, now to be described.

Referring to Figure 5 showing the vacuum release valve 54, 55, there is a cam 48, driven by a shaft 49 of the timer 47 which timer is of the general type more fully described in the patent to Hall, No. 2,313,064 dated March 9, 1943. The cam 48 is an added part for purpose of this invention and has a follower 50 which comprises one free end of a lever 51 pivoted at 52 and biased to ride the face of the cam 48 by the action of a spring 53. Mounted on the opposite free end of the lever 51 is a poppet valve 54 which is adapted to close the end of a tube 55 attached to a small conduit 56 shown in Figure 1 which leads to the opening 26 in the bottom of the bag 10 when the follower 50 rides on one of a plurality of high spots on the cam 48. These high spots correspond to the squeeze dry periods in the cycle of operations described in the aforementioned co-pending application. At the end of each of the squeeze dry periods the follower 50 is urged into a low spot on the cam 48 due to the bias of the spring 53 which causes the poppet valve 54 to be lifted from the flared end of the tube 55 thereby communicating the interior of the bag 10 with the atmosphere and breaking the vacuum therein.

The operation of the machine is as follows:

The washing operation takes place with the water in the bag 10 at the level indicated at X and the clothes inserted through the neck opening 16 with the cover 17 removed and soap added with the clothes. The cover 17 may be in place during the washing operation as the agitator 13 is oscillated.

When the first washing operation has taken place for a predetermined period of time as selected by the operator through timer 47, the pump 19 is started in rotation and draws the liquid and air from the interior of the bag 10 creating a substantial vacuum within the sealed interior of the bag 10 thereby squeezing the clothes between the agitator 13 and the bag 10 in a manner more fully described in co-pending application Serial No. 45,347 filed August 20, 1948, now abandoned, J. P. Jones inventor.

After the clothes are squeezed by the collapsed bag 10, the walls of the bag are, of course closely compacted toward the center of the machine around the agitator 13 and it then becomes necessary to inject rinsing liquid into the bag 10 for a rinsing operation. Furthermore it is necessary that the walls of the bag 10 return to their original position as soon as possible and it would be quite inconvenient if it were required that the cover 17 be removed to accomplish this purpose. It therefore becomes important to admit air along with the liquid coming into the bag 10. Such a result is accomplished by the mechanism herein provided in that the inlet valve 20 connected to water pressure supply lines admits water under pressure first to the conduit 21, then into the valve 22. An inspection of Figures 9 and 10 will show that the restriction provided increases the velocity at the outlet 28. This increase in velocity causes a reduction in pressure in the region 29 thereby drawing air into the system and forcing that air with the liquid into the conduit 23. The weight of the liquid in the conduit 23 is sufficient to open the diaphragm 32 to the position of Figure 3 which allows an unrestricted flow through the valve 24 into the conduit 25 and into the bottom of the bag 10. The fact that air as well as liquid is admitted, assures a relatively fast return of the walls of the bag 10 to their normal position as shown in Figure 1. The provision of the previously mentioned relief valve 41 in the cover 17 assures that the

pressure within the enclosed bag would not exceed a predetermined amount depending upon the pressure at which the relief valve will operate to release air through the openings 43.

With the bag 10 filled again to the predetermined level X the agitator 13 is again oscillated to more completely rinse the clothes in the liquid provided.

After the oscillation is continued for a predetermined time, pump 19 is again started in rotation to extract the liquid and air from the interior of the bag 10 to collapse same as in the previous case at the end of the washing operation.

It is to be noted that diaphragm 32 is normally biased to assume the position shown in Figure 4 which is closed position and when the suction of pump 19 acts through the conduit 25 such suction tends to more positively close and seal the diaphragm 32 into the closed position to prevent air from entering the bag 10 through the conduits 23 and 25.

Both at the end of the extraction operation following washing, and at the end of each of the two rinses as shown on cam 48, the vacuum release valve members 54, 55 are caused to separate and thereby cause air to enter through conduit 56 and into the bag 10 as will be evident on inspection of Figures 1 and 5. Conversely, during the time when pump 19 is in operation when liquid and air are being removed from the bag 10 the cam 48 is so shaped to cause the valve members 54, 55 to close and the conduit 56 to be sealed.

Apart from the result accomplished of preventing air block and causing flow of liquid into the container of a washing machine as above described it is an important feature afforded by this invention that the restriction in the supply line produced by the valve 22 with its ability to produce a reduction in pressure on flow, together with the outlet connection to the atmosphere from the chamber 37 through the outlets 39 and 30 which is above the normal level of liquid in the container assures that the flow of liquid in the conduits 23 and 25 is limited to a direction toward the container. The present construction also provides a so-called vacuum breaker feature necessary for satisfying plumbing codes with a minimum of parts. It is apparent from the above disclosure that a reduction in pressure in the conduit 21 will not cause contaminated liquid to "back up" into the supply line but instead such reduction in pressure would simply draw air through an air gap 57 between the conduit 21 and the valve 22.

It is to be appreciated from the foregoing that a primary feature of this application is the operation of a float valve unit coacting with an air and water fill line, that permits air emergence during predetermined intervals when the inlet would otherwise flood and overflow. In summary, there are four different conditions which may occur during filling of the machine. Each of these conditions must be accounted for if the mechanism is satisfactorily operated. These conditions are as follows:

Firstly, conditions of high pressure. In this particular phase (high pressure in the fill line) all openings surrounding the fill line must close to prevent "squirting" or unnecessary discharge of the fluid. Obviously high pressure in the fill line would cause water to be expelled with great force through opening 39 in the chamber if it were not controlled in some manner. Thus, during this particular phase of high pressure in the fill line the float valve is also required to close the opening which is interconnected with fill line 23.

Secondly, conditions of very low water pressure. Where low pressure exists the float unit is not operated in any way since pressure in the fill line is so low that little or no turbulence is created therein and filling is accomplished by gravitation of liquid through line 23.

Thirdly, low flooding pressure. A low flooding pressure may be characterized as one exceeding somewhat the low pressure which is above mentioned but one of sufficient velocity to cause the water level to rise in the line 23 to a point where it surrounds the opening of inlet 28. In this condition it is apparent that, the opening to 28 being closed by water, air entrapped in the fill line could not be expelled into the chamber 29. Consequently, without some egress the air bubbling through the line during this phase would cause overflowing.

During this condition of low flooding pressures the chamber 37 again comes into play. Although the line pressure is at this stage sufficient to seal the opening to 28 it is insufficient to cause the float to rise and seal the opening 39 to the atmosphere. Hence, the chamber here acts as a bypass to the fill line 23 and any air in the fill line which is unable to pass through conduit 28 easily escapes through opening 39 in the float assembly. In this manner periods of so-called "low flooding pressure" do not involve flooding and overflowing of the fill mechanism.

Fourthly, the phase of so-called "high flooding pressure." Actually this condition might be characterized as a combination of the first and third phases discussed in the foregoing. It is typified in actual performance of this invention by fluttering and bobbling of the float which can be explained as follows: At high line pressure the float is caused to rise and seal the opening 39 to eliminate "squirting." In this sense the operation parallels the first cycle. In a pressure approximating the typical low flooding conditions as recited above the fill line is sealed, yet the float is allowed to drop. This permits the escape of air through outlet 39, which air cannot be propelled through the fill opening 28. In this particular cycle the actual line pressure may fluctuate very slightly and yet cause these two conditions to rapidly alternate with consequent bobbling of the float valve as mentioned in the foregoing.

Thus, it is seen that the apparatus of my invention is designed to accommodate any one of the various series of different line pressures or any combination of them. This feature is a primary one of the instant invention, imparting to it desirable advantages of practicality and commercial worth.

Due to its ability to function properly as a gravity or forced inlet system under any pressure conditions, the present invention is considered to be useful in connection with all types of washing machines. It is not necessary that the diaphragm check valve 24 or the valve 41 be used in all applications, but they are here shown for the purpose of illustration only since the machine described is of the collapsible bag type and the valves 24 and 41 serve to seal the system from the atmosphere when a reduced pressure is created within the tub as aforementioned.

Therefore, while one embodiment of this invention is here shown and described, it is not intended that it be limited to that particular embodiment nor otherwise than by the terms of the appended claims.

We claim:

1. In a liquid inlet system for apparatus of the type having a vacuum breaker in the supply line, the combination of a container, a liquid supply line communicating with the interior of said container, a restricting nozzle within said line, a chamber communicating with said line and having an opening to the atmosphere therefrom, said line having an air gap therein above said chamber, and closure means for said opening responsive to the presence of a quantity of liquid in said chamber for closing said opening, said closure means also responsive to air in said chamber to expose said opening to the atmosphere thereby to relieve air block in said line.

2. In a liquid inlet system for apparatus of the type having a vacuum breaker in the supply line, the combination of a container, a liquid supply line communicating with the interior of said container, a restricting nozzle within said line, a chamber communicating with said line and having an opening to the atmosphere therefrom, said line having an air gap therein above said chamber, closure means for said opening responsive to the presence of a quantity of liquid in said chamber for closing said opening, said closure means also responsive to air in said chamber to expose said opening to the atmosphere thereby to relieve air block in said line, and a vent opening to the atmosphere from said container.

3. In a liquid inlet system for apparatus of the type having a vacuum breaker in the supply line, the combination of a container, a liquid supply line communicating with the interior of said container, a restricting nozzle within said line, a chamber communicating with said line and having an opening to the atmosphere therefrom, said line having an air gap therein above said chamber, closure means for said opening responsive to the presence of a quantity of liquid in said chamber for closing said opening, said closure means also responsive to air in said chamber to expose said opening to the atmosphere thereby to relieve air block in said line, a normally closed vent opening to the atmosphere from said container, and a normally closed member for said vent opening responsive to air pressure in said container to equalize the pressure therein.

4. In a liquid inlet system for washing machines, a container for fluids, a liquid supply line to said container, an air gap in said line, a nozzle within said line in alignment with and below said gap, said nozzle having an enclosed chamber adjacent thereto and in communication therewith, said chamber having an opening to the atmosphere and a closure means therefor, said closure means being responsive to variable liquid and air pressures in said line whereby to open and close said chamber to the atmosphere.

5. In a liquid inlet system for washing machines, the combination of a vessel to contain wash fluids to a predetermined level, a liquid supply line to said vessel, an air gap in said line positioned above said level, a nozzle having a chamber interconnected with said line and positioned adjacent thereto and approximately in the same plane as said nozzle, said chamber having an opening to the atmosphere, closure means for said opening comprising a float valve, said valve being responsive to variable pressure in the line whereby to open and close the chamber to the atmosphere.

6. In a liquid inlet system for washing machines, the combination of a vessel to contain wash fluids to a predetermined level, a liquid supply line to said vessel, an air gap in said line positioned above said level, a nozzle having a chamber adjacent thereto and approximately in the same plane therewith, said chamber being interconnected with said line at a point near the outlet of said nozzle, said chamber having an opening to the atmosphere, closure means for said opening comprising a float valve, said valve being responsive to variable pressures in the line whereby to open and close the chamber to the atmosphere.

7. In a liquid inlet system for clothes washing machines, the combination of a flexible container to contain wash fluids to a predetermined liquid level, means to create a vacuum in said container to squeeze dry said clothes, a liquid supply line to said container, means to close said supply line responsive to fluid pressure in said container, an air gap in said line above said level, a nozzle within said line below said gap and above said level, said nozzle having a chamber adjacent thereto, said chamber being interconnected with the line near the outlet of said nozzle, said chamber being approximately in the same plane as said nozzle, said chamber having an opening to the atmosphere, closure means in said chamber comprising a float valve to seal said opening responsive to fluid pressures in said line, and means to control the amount of pressure in said container comprising a vent, said vent being responsive to pressure in said container to open said container to the atmosphere.

8. In a washing machine having a flexible bag within which laundry is washed when said bag is in expanded position, vacuum means connected to said bag for collapsing the bag to a contracted position to squeeze dry said laundry, a liquid inlet means to said bag, said last named means including an aspirator, said aspirator admitting water and air under pressure to said bag to assure rapid return of said bag to expanded position, and means to exhaust air from said inlet means including a chamber communicating with said inlet means and having an opening to the atmosphere therefrom, closure means for said opening, said closure means exposing said opening responsive to drop in fluid and air pressure in said inlet means, whereby said air is readily exhausted from said line during filling of the bag.

9. In a washing machine having a flexible bag within which laundry is washed when said bag is in an expanded position, vacuum means connected to said bag for collapsing the bag to a contracted position to squeeze dry said laundry, a liquid inlet means to said bag, said inlet means including an inlet line and an aspirator in said line, said aspirator admitting water and air under pressure to the bag to assure rapid return thereof to expanded position, means to exhaust air from said line during filling of the bag, said last-named means including a chamber communicating with said line and having an opening to the atmosphere therefrom, closure means for said opening responsive to the presence of a quantity of liquid and air in said chamber for closing said opening on flow of liquid and air through said line, said closure means exposing said opening to the atmosphere on reduction of liquid flow through the line, whereby excess air is readily exhausted from said line during filling of the bag.

10. In a washing machine having a flexible bag within which laundry is washed in an expanded

position thereof, vacuum means connected to said bag for collapsing the bag to a contracted position to squeeze dry said laundry, an inlet line to said bag, an aspirator in said line, said aspirator admitting water and air under pressure to said bag to assure return thereof to expanded position, and means to exhaust air in the line during filling, said last-named means comprising a chamber communicating with the line near said aspirator, said chamber having an opening to the atmosphere therefrom, and closure means responsive to the pressure of a quantity of liquid and air in said chamber for closing said opening, said closure means being responsive to a reduction in pressure in said chamber to expose said opening to the atmosphere, whereby excess air in said line is readily exhausted through the opening under conditions of high pressure.

11. In a washing machine having a flexible bag within which laundry is washed in an expanded position thereof, vacuum means connected to said bag for collapsing the bag to a contracted position to squeeze dry said laundry, means to control the amount of pressure within said bag comprising a pressure responsive vent to the bag, an inlet line to said bag, an aspirator in said line, said aspirator admitting water and air under pressure to said bag to assure return thereof to expanded position, and means to exhaust air in the line during filling, said last-named means comprising a chamber communicating with the line near said aspirator, said chamber having an opening to the atmosphere therefrom, and closure means responsive to the pressure of a quantity of liquid and air in said chamber for closing said opening, said closure means being responsive to a reduction in pressure in said chamber to expose said opening to the atmosphere, whereby excess air in said line is readily exhausted through the opening under conditions of high pressure, and excess pressure in said bag is released through said vent.

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