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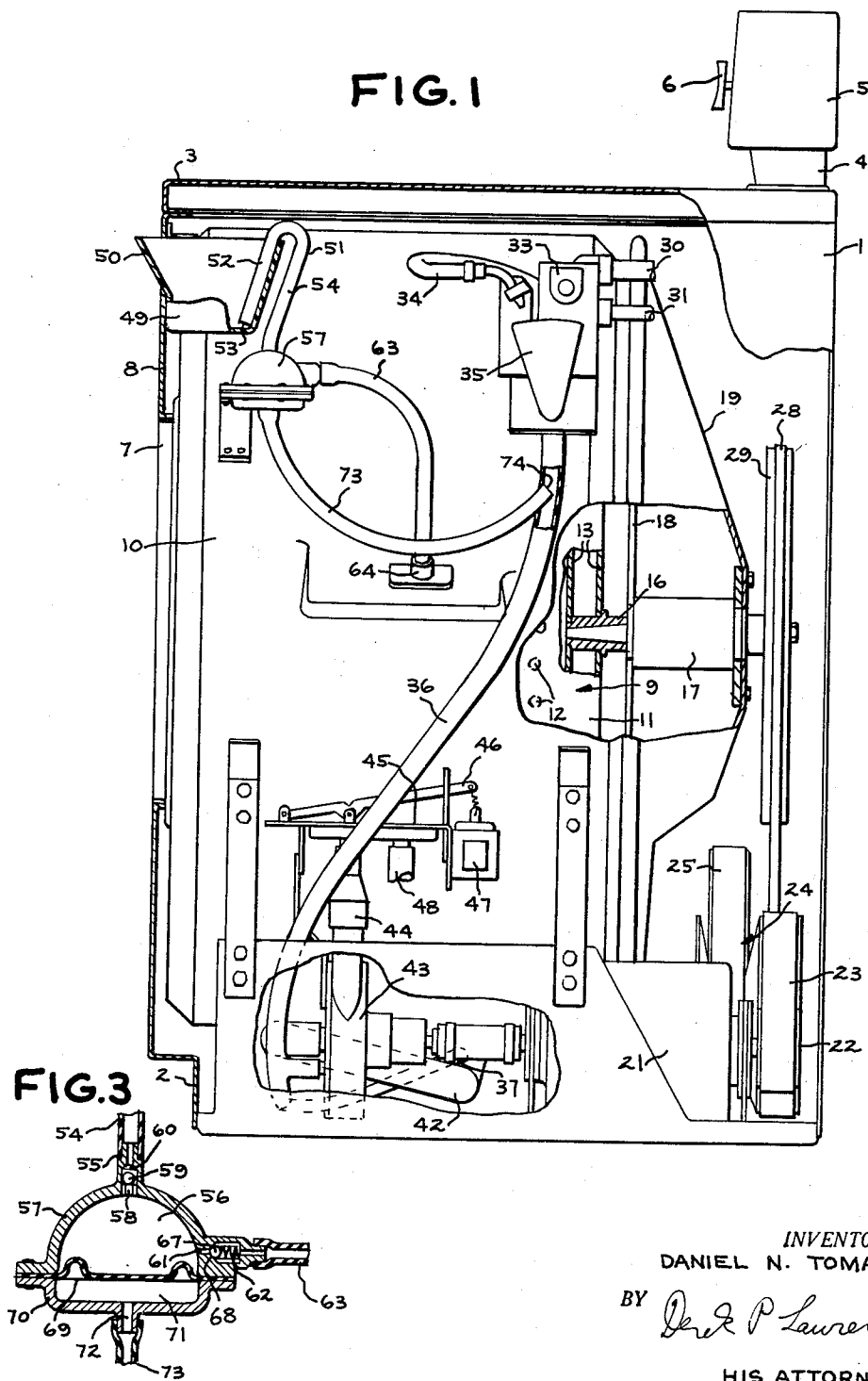
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TREATING AGENT DISPENSER FOR WASHING MACHINES

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3 Sheets-Sheet 1



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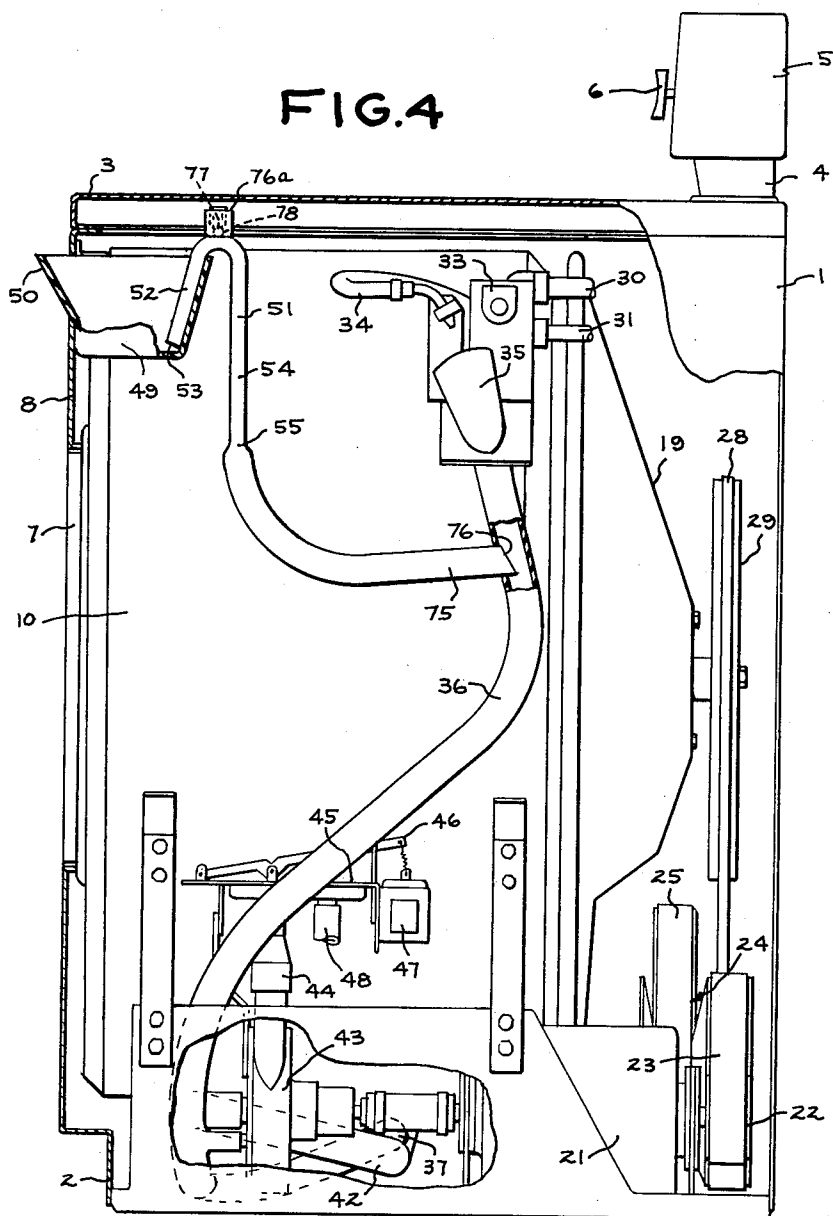
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TREATING AGENT DISPENSER FOR WASHING MACHINES

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5 Claims. (Cl. 68—207)

This invention relates to automatic clothes washing machines, and more particularly to such machines where it is intended that a treating agent be automatically added to the washing liquid at the proper time in the washing cycle.

Automatic washing machines customarily proceed through a sequence of operations in order to wash, rinse, and dry the clothes. The sequence ordinarily includes a washing operation, one or more rinsing operations in which the clothes are rinsed in clean water, and a final extraction operation in which the rinse water is removed from the clothes. Where the machine is of the combination washer-dryer type, the extraction operation may then be followed by a heat drying operation. Of course, depending upon the particular machine, variations on the above basic sequence may be provided, but the general sequence of washing, rinsing and extracting is used in almost all automatic washing machines.

As automatic washing machines have become more perfected, they have automatically performed an increasing number of functions which previously had to be performed manually. For instance, suitable dispensers for detergent, water softeners, and fabric softeners may be provided. In addition to these, it will readily occur that a suitable liquid bleach or bleaching agent is among the more important additives required by many operators for a large part of their operations. An important point as to most liquid bleaches is that, if introduced into the washing liquid at the very beginning of the cycle (that is, at about the same time as the detergent), the bleach has a tendency to counteract the beneficial whitening effect which is provided by many modern detergents in the form of a fluorescent or optical dye; when this occurs, the full optical cleaning effect of the detergent is not achieved. It has been determined that, where clothes are being washed during the introduction of the wash water, the optical dye in the detergent can complete its whitening action on the clothes by the time all the needed wash water has entered, and the bleach is then free to treat the clothes without interfering with this action. The result of this approach has been shown in the laboratory to be visibly better than where bleach and detergent are both introduced at the same time at the beginning of a cycle.

Thus, a highly desirable washing machine structure is one wherein the bleach, although introduced into the machine prior to the start of a washing cycle, is held in readiness throughout the initial part of the washing operation in a container external to the basket in which the clothes are being washed, and is then introduced.

It is consequently an object of my invention to provide an improved washing machine wherein bleach dispensing means are provided which dispense the bleach into contact with the clothes subsequent to the start of the washing operation.

A further more specific object of my invention is to provide a bleach dispenser in which the bleach is automatically caused to start to flow into the clothes container in response to the shutting off of the inlet supply of washing liquid.

In one aspect of my invention I provide a conventional washing machine of the type wherein a liquid receptacle has means in it for washing any suitable articles such as, for instance, clothes. Preferably, the machine is of the

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tumbler type wherein the means for washing the clothes is a perforated drum rotatable within the liquid receptacle, and the washing action, that is, the rotation of the drum, starts at the very beginning of the cycle during the introduction of water from supply means. The water is supplied usually through a conduit which extends into co-operative relation with the liquid receptacle so as to supply liquid thereto, with suitable inlet valve means controlling the passage of water through the conduit.

In order to provide a suitable liquid treating agent such as bleach, for instance, into the liquid receptacle, there is provided a container for the treating agent together with a siphon having its short leg positioned in the container near the bottom thereof and its long leg positioned to discharge treating agent into the receptacle. In cooperation with the water supply conduit, I provide diverter means arranged to divert a quantity of water out of the conduit and retain it as long as water is being passed through the conduit by the valve means. The diverter means is further formed so that the diverted water flows back into the conduit after the valve means shuts off the supply of water. The diverter means cooperates with the siphon in such a way as to decrease the volume of air in the siphon when there is water in the diverter means, thereby tending to raise the air pressure in the siphon. Check valve means positioned in the siphon permits passage of air out of the siphon when the pressure there tends to rise, and also prevents passage of air into the siphon. As a result, when water flows out of the diverter means back into the supply conduit, a vacuum is created in the siphon and draws on the liquid in the container, that is, it primes the siphon so that the treating agent in the container all flows through the siphon into the receptacle.

The features of the invention which are believed to be novel are set forth with particularity in the appended claims. The invention itself, however, both as to organization and as to method of operation, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawings.

In the drawings, FIGURE 1 is a side elevational view of a washing machine incorporating a first embodiment of my invention, partially in section and with certain surfaces broken away to show details;

FIGURE 2 is a rear view of the machine of FIGURE 1, with the rear panel removed to illustrate details;

FIGURE 3 is an enlarged fragmentary view in cross section of an important component of my invention as illustrated in FIGURE 1; and

FIGURE 4 is a side elevational view of a machine incorporating a second embodiment of my invention, the machine again being partially in section and with certain surfaces being broken away to show details.

Referring now to FIGURES 1 and 2, I have shown my invention in one form as applied to a domestic laundry machine. The operating elements of the machine are included within an outer cabinet structure 1 which is supported on a base and toe board assembly 2. The cabinet 1 includes a top surface 3 on which is mounted by any suitable means, such as for instance posts 4, a backsplash portion 5 designed to contain the usual control mechanism (not shown) for the machine. A suitable manually operated member 6 may conventionally extend from backsplash portion 5 so that the operator may select any desired sequence of operations. Access to the interior of the machine is provided by a door 7 which may be mounted on the front panel 8 of cabinet 1 by concealed hinges and opened by any suitable means (not shown).

Conventionally, when a load of soiled clothes is placed within the machine, the control mechanism may be used

to cause the machine to proceed through a sequence of operations. Typically, the sequence starts with concurrent introduction of water and tumbling of the clothes, the water being shut off at the appropriate level and the tumbling continuing. Then the water is drained to end the initial wash step, and one or more rinses and drains are provided, followed finally by a damp-drying, or liquid extraction, operation.

As shown in FIGURES 1 and 2, the machine is of the horizontal axis type where a cylindrical clothes basket or drum 9 is mounted for rotation on a generally horizontal axis within an outer enclosing tub structure 10 which, as will be more fully set forth herebelow, serves as a liquid receptacle. The basket 9 has a cylindrical shell or outer wall 11 with perforations 12 formed therein. The basket is closed at its rear by means of a suitable wall 13 (which may be of double thickness, as shown, for structural strength), and has a front wall (not shown), provided in the usual manner with a suitable access or loading opening. The basket is rotatably supported by a shaft 16 secured to rear wall 13 and mounted in a suitable bearing 17 supported between two spaced wall portions 18 and 19 of the tub 10. The tub 10 is conventionally provided with an opening in the front wall thereof (not shown) which is arranged relative to door 7 so that clothes may be placed into or removed from the basket, and so that the door seals the opening during operation of the machine.

Tub 10 thus forms a container for liquid during the treatment of clothes, and the basket 9 forms both a container for the clothes, and, by virtue of inwardly extending vanes or ribs 20 formed therein, a means of tumbling the clothes within tub 10.

Referring now particularly to FIGURE 2, during the operation of the machine the basket 9 is driven from an electric motor 21. The drive from the motor to the basket includes a pulley 22 which is secured to the motor shaft so as to rotate therewith and over which passes a belt 23. Belt 23 drives an adjustable sheave assembly 24 of the type which is well known for use in achieving variable output speeds from a constant input speed source. The adjustable sheave assembly in turn operates a belt 25 to cause rotation of pulleys 26 and 27. The rotation of pulley 27 is passed on through a belt 28 to a pulley 29 which is secured on the end of basket shaft 16. In this manner, the motor 21 may be driven at a constant speed, and through the adjustable sheave assembly 24, the speed imparted to pulley 29 and basket 9 may be varied so as to provide an appropriate range of speeds for the basket. For instance, for tumbling purposes during washing and rinsing operations, the basket may be rotated at a speed of approximately 47 r.p.m., while a centrifuging speed of several hundred r.p.m. may be provided to the basket for effecting centrifugal extraction of the liquid from the clothes subsequent to the completion of washing and rinsing operations.

The operation of the variable speed drive briefly described above does not form any part of the present invention, and is merely set forth to provide a substantially complete description of an operative machine. A complete detailed description of such a drive is provided, for instance, in Patent 2,950,613 issued on August 30, 1960 to John Bochan and assigned to the General Electric Company, assignee of the present invention.

Means whereby water is admitted to tub 10 during washing and rinsing operations of the machine include connections 30 and 31 through which hot and cold water is supplied from a suitable source to the machine for the operations. A valve controlled by a solenoid 32 permits passage of hot water when the solenoid is energized, and a valve controlled by an opposed solenoid 33 permits passage of cold water when the solenoid is energized. The hot and cold water valves under the control of the solenoids 32 and 33 discharge through a common conduit 34 and a suitable air gap into a funnel 35 positioned below

the outlet of conduit 34. As can best be seen in FIGURE 1, funnel 35 leads into a downwardly extending supply conduit 36, which is joined at its lower end 37 to a sump 38 formed at the bottom of tub 10 so that the wash water enters the tub from the sump beneath it.

A pressure actuated sensing device or water level control 39 may be provided to control both solenoids 32 and 33 to provide the proper water level in the machine during operation. Sensing device 39 is connected to the interior of tub 10 by a suitable line 40 which connects with the tub almost at the bottom thereof at 41 as shown. In addition to the water level control device shown, the machine may be provided with other safety devices for preventing overflow conditions from occurring. However such mechanisms do not form any part of the present invention and are not shown or further discussed herein.

Vitiated water from washing operations is discharged from the machine through the sump 38 formed at the bottom of tub 10. A suitable discharge hose 42 leads from the sump to the inlet of a pump 43 (FIGURE 1) which may, as shown, be driven directly from the motor 21. Pump 43 discharges through a conduit 44 to a valve 45 having a closure member 46 controlled by a suitable solenoid 47. When the solenoid is energized, it holds down member 46 to close the valve 45. Thus, pump 43 operates all the time during motor operation, but only when valve 45 is opened may it discharge through the valve to a conduit 48 leading to the drain (not shown). When the valve 45 is closed, the operation of the pump is without effect on the liquid in tub 10.

In order to hold a suitable quantity of liquid treating agent such as bleach to be used during a washing operation, I provide a container 49 which may be filled through a spout 50 accessible to an operator at the front of the machine. It is intended that the operator will pour through spout 50 into container 49 the quantity of treating agent which is desired to be introduced for the washing operation to follow. A siphon 51 is arranged so as to have its short leg 52 positioned within the container 49, the end 53 of the leg being positioned adjacent the bottom of the container so that, when the siphon 51 is primed, substantially the entire contents of container 49 will pass up through leg 52 and then down through the longer leg 54 of the siphon.

Referring now to FIGURE 3 in conjunction with FIGURE 1, the lower end 55 of leg 54 is connected to an interior chamber 56 formed in a member 57, the connection being made through a check valve 58. As shown, the check valve may be of any suitable type such as that wherein a ball 59 reacts to downward flow to move to a position where it does not affect the flow, but reacts to any tendency for fluid to flow up from chamber 56 by moving to its uppermost position where, in conjunction with valve seat 60, it blocks the flow.

Thus, with valve 58 open, chamber 56 forms, in effect, a continuation of siphon leg 54. Chamber 56 is connected through a passage 61 and a second check valve 62 to a conduit 63, and as shown in FIGURE 1, conduit 63 extends down and is joined at its lower end 64 to an opening 65 in the wall of tub 10. Thus, any liquid flowing down through conduit 63 passes into the tub 10 and then flows down the wall 66 of the tub to mix with any other liquids in the tub. The check valve 62 performs exactly oppositely to the check valve 58; in other words, upon a tendency for fluid to flow out from the chamber 56 through conduit 63, the ball 67 moves to a position where it does not impede flow, whereas upon a tendency for reverse flow to occur from conduit 63 into chamber 56, the ball 67 engages valve seat 68 to prevent such flow from occurring.

One wall of the chamber 56 is formed by a diaphragm member 69 which cooperates with a member 70 to form a second chamber 71, the diaphragm forming a wall common to both chambers 56 and 71. Chamber 71

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has an outlet 72 therefrom which communicates with a diverter conduit 73. As shown in FIGURE 1, conduit 73, starting at its junction with chamber 71, has a portion which extends downwardly for a substantial distance and then a portion which for a lesser distance, extends upwardly. The end 74 of conduit 73 is positioned within the conduit 36 so as to form a diverting means for some of the water passing down through the conduit 36. In other words, when either one or both of valve solenoids 32 and 33 is energized, water will flow down through conduit 36, and part of it—because of the shape of conduit 73 and its end 74—will be diverted into the conduit 73. As long as the flow of water through conduit 36 continues, this has the effect of compressing the air which is trapped within the conduit 73 by the water being diverted into the conduit. The compression of this air causes an increase in the air pressure which is transmitted through opening 72 to the chamber 71 and acts on the diaphragm 69 to push it upwardly thereby increasing the space taken up by chamber 71 and decreasing the space taken up by chamber 56. This decrease in the space taken by chamber 56 causes an increase in the pressure in that chamber. However, in response to this increase in pressure the valve 62 opens to release some of the air which was in the chamber so as to restore the pressure equilibrium. At the same time the valve 58 closes to ensure that all the air expelled from chamber 56 goes through the valve 62. Once sufficient air passes out of chamber 56 for the position of the diaphragm 69 to be stabilized, nothing further happens as long as water continues to be passed through conduit 36 as a result of the energization of one or both of valve solenoids 32 and 33. It will be understood that during this period the motor 21 is energized, with the transmission 24 providing a speed to the basket suitable to effect tumbling of clothes. Thus, provided a suitable quantity of detergent has been placed in the interior of the machine through the door opening 7 together with the clothes, a washing action proceeds to take place with the water passing through conduit 36 and entering tub 10. It has been found that the period of time taken for the appropriate amount of water to pass through the conduit 36, generally on the order of four minutes, is sufficient for the optical dye which is present in most modern detergents to take effect.

When a sufficient amount of water has been introduced for the purposes of the washing operation, the water level control 39 senses this and causes de-energization of the valve solenoids. This in turn stops water from flowing down conduit 36. When this happens, a substantial part of the water which has been diverted into conduit 73 flows back out of the conduit 73 and passes down through conduit 36. As soon as the water flows out of the conduit 73, the pressure of the air in the conduit decreases markedly, and this change in pressure is again transmitted to chamber 71.

The result this time is that the diaphragm 69 tends to decrease the space of chamber 71 and increase the space of chamber 56. This causes a vacuum in chamber 56, that is, the air pressure therewithin is less than the atmospheric air pressure which prevails above the liquid treating agent in container 59. Because of this vacuum, the valve 58 opens placing siphon 51 in communication with chamber 56 and creating as a result a partial vacuum within the siphon. This partial vacuum has the effect of priming the siphon so that flow starts up through leg 52 and down through leg 54, through the chamber 56, and into the conduit 63, passing down through that conduit and into the tub 10 so as to mix with the water in the tub. Where, as is expected to be the case generally, the treating agent is bleach, it will then proceed to have a bleaching effect upon the clothes in basket 9.

The flow of bleach through the siphon continues until the level drops below the opening 53 at the end of leg 52 of the siphon, at which time the flow ceases. It

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will be observed that the introduction of bleach is effected automatically in response to the cessation of the flow of inlet water through conduit 36. Inasmuch as the period of time during which water flows through conduit 36 is sufficient for the optical dye in most detergents to take effect, the objective in delaying the introduction of the bleach is achieved. It will thus be seen that my invention provides a structure wherein the bleach is responsive to the completion of the water-introducing operation to introduce the bleach, the bleach being held in an entirely separate container until this occurs. It will further be observed that this result is achieved without the need for mechanically timed introduction of the bleach.

Referring now to FIGURE 4, there is shown a washing machine incorporating a second embodiment of my invention. Where the parts are identical to those in FIGURE 1, like numerals are used for the sake of simplicity. As previously, a container 49 adapted to be filled through a funnel 50 is provided, together with a siphon 51 having a short leg 52 with an opening 53 and a longer leg 54 terminating in an opening 55. Also as before, the inlet water passes into the tub 10 through a conduit 36.

In this embodiment of my invention, I provide a diverter conduit 75 which has an end 76 extending into the conduit 36 so that, substantially as before, during introduction of water through conduit 36 some of it is diverted into conduit 75 by the formation of its end 76. The presence of water in conduit 75 traps air therein, as before, so that, as water continues to enter conduit 75, the air becomes more compressed in the upper part of conduit 75 and in siphon 51. To relieve this increased pressure, a check valve 76a is provided, wherein a ball 77 is positioned against a seat 78 to close the valve normally, but is moved to open position to allow air to escape when the pressure within siphon 51 increases.

When the inlet valve solenoids are de-energized, water ceases to flow in through conduit 36 and as a result the water which has been diverted into conduit 75 flows back out of conduit 75 and down conduit 36. As the water flows out, it creates a vacuum in leg 54 of the siphon 51. This vacuum closes the valve 76a and primes the siphon 51, so that the bleach in container 49 starts to flow out through the siphon, through the conduit 75 and then down through conduit 36 into tub 10. In this manner, the bleach is caused to flow in the embodiment of FIGURE 4 at the same time that it did in the embodiment of FIGURE 1, that is, after the flow of inlet water is stopped.

It will be seen from the foregoing that my invention provides a delayed action bleach dispenser for washing machines wherein bleach does not flow into contact with the clothes until the container is full of liquid, and then flows automatically in response to the shutting off of the inlet water.

While in accordance with the patent statutes I have described what at present are considered to be the preferred embodiments of my invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention, and I therefore aim in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a washing machine: a liquid receptacle; means for washing articles in said receptacle; water supply means including a supply conduit extending into cooperative relation with said receptacle to supply liquid thereto and inlet valve means controlling the passage of water through said supply conduit into said receptacle; a container for liquid treating agent; a siphon having a short leg with its end positioned adjacent the bottom of said container and a long leg with its end positioned to discharge treating agent into said receptacle; diverter means arranged to divert

and retain a quantity of water as long as water is passed through said supply conduit by said valve means, said diverter means being formed so that the diverted water therein flows back into said supply conduit when said valve means shuts off the supply of water; means responsive to water in said diverter means to decrease the volume of air in said siphon and thereby tend to raise the air pressure; and check valve means arranged in communication with said siphon to permit passage of air out of said siphon in response to a pressure increase of the air therein and to prevent passage of air into said siphon, whereby a vacuum is provided thereby to prime said siphon as water flows from said diverter means into said supply conduit.

2. The apparatus defined in claim 1 wherein said means for washing articles in said receptacle comprises a substantially cylindrical basket having a perforated outer wall and mounted for rotation on a non-vertical axis within said receptacle.

3. The apparatus defined in claim 2 wherein said diverter means comprises a conduit having a portion extending upwardly toward said responsive means, and a second portion extending upwardly to a substantially lesser extent, said second portion having its end positioned within said supply conduit so as to divert into said diverter conduit part of the water passing through said supply conduit.

4. The apparatus defined in claim 1 wherein said diverter means includes a diverter conduit having a first end within said supply conduit and a second end remote therefrom and substantially higher than said first end, and said responsive means comprises a direct connection of said second diverter conduit end to the end of the long leg of said siphon.

5. In a washing machine: a liquid receptacle; a substantially cylindrical clothes basket having a perforated outer wall mounted in said receptacle for rotation on a

substantially non-vertical axis; water supply means including a conduit extending into cooperative relation with said receptacle to supply liquid thereto, and inlet valve means controlling the passage of water through said supply conduit into said receptacle; a container for liquid treating agent; a siphon having a short leg with its end positioned adjacent the bottom of said container and a long leg with its end positioned outside said container below the bottom thereof; a diverter tube having a first portion extending substantially upwardly to its end and a second portion extending upwardly to its end to a substantially lesser extent, the end of said second portion extending into said supply conduit so as to divert and retain a quantity of water as long as water is passed through said supply conduit by said valve means, and so that the diverted water therein flows back into said supply conduit when said valve means shuts off the supply of water; means forming first and second chambers respectively in communication with said first end of said diverter conduit and with the end of said long siphon leg; a diaphragm forming a wall common to both chambers, whereby upon introduction of water into said diverter conduit the air trapped therein deforms said diaphragm to increase the pressure within said second chamber; a treating agent conduit extending down from said second chamber to said receptacle; and check valve means arranged to prevent flow of fluid into said second chamber except from the long leg of said siphon whereby when the water flows out of said diverter conduit because the supply of water has been shut off a vacuum is provided in said second chamber to prime said siphon.

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