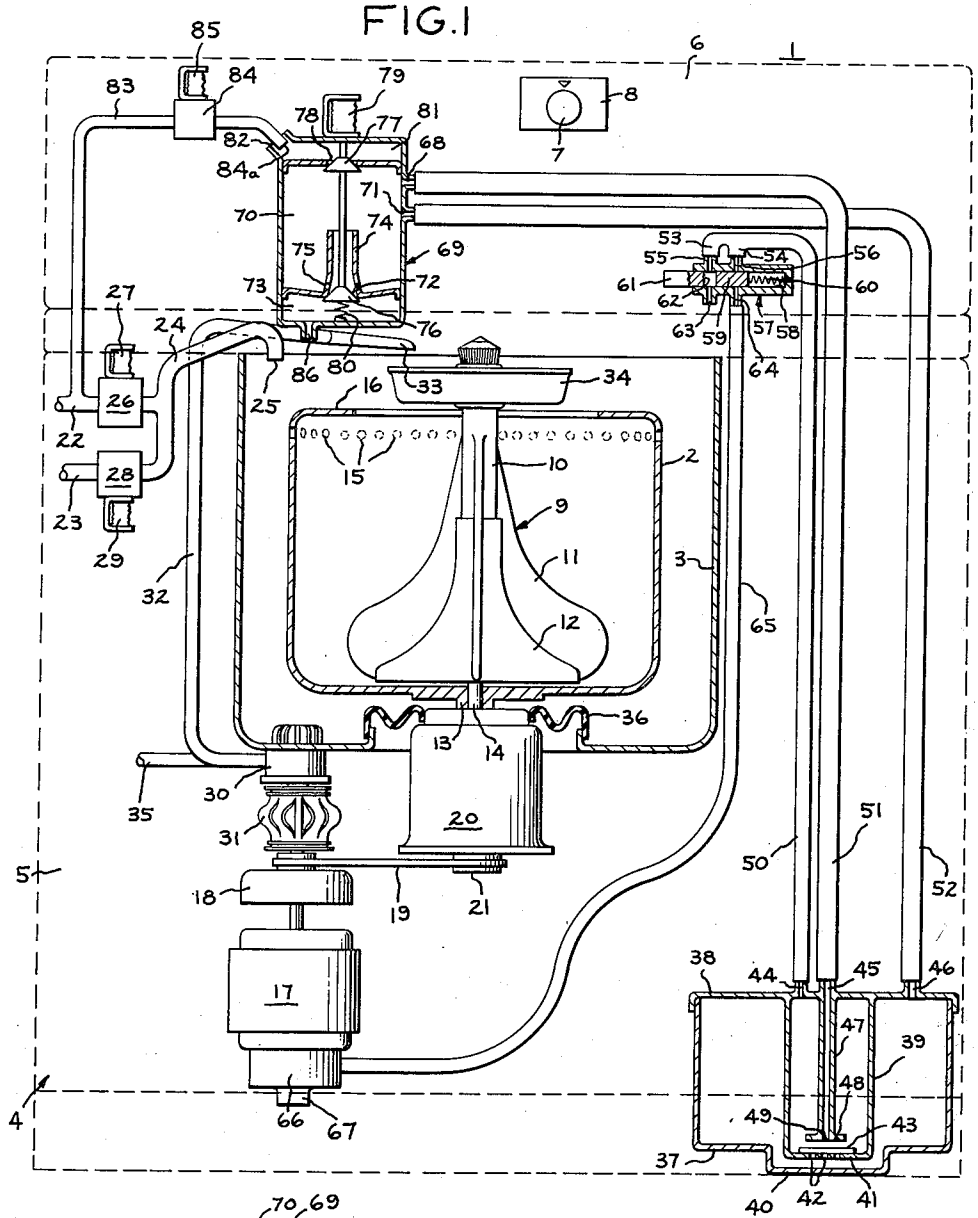
Oct. 24, 1961 J. BOCHAN 3,005,330

TREATING AGENT DISPENSER SYSTEM FOR ARTICLE-TREATING MACHINES

Filed April 28, 1960 2 Sheets-Sheet 1

FIG. 1



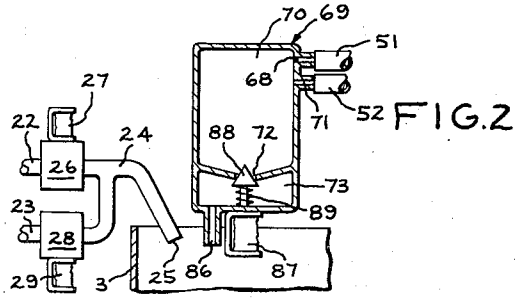


FIG. 2

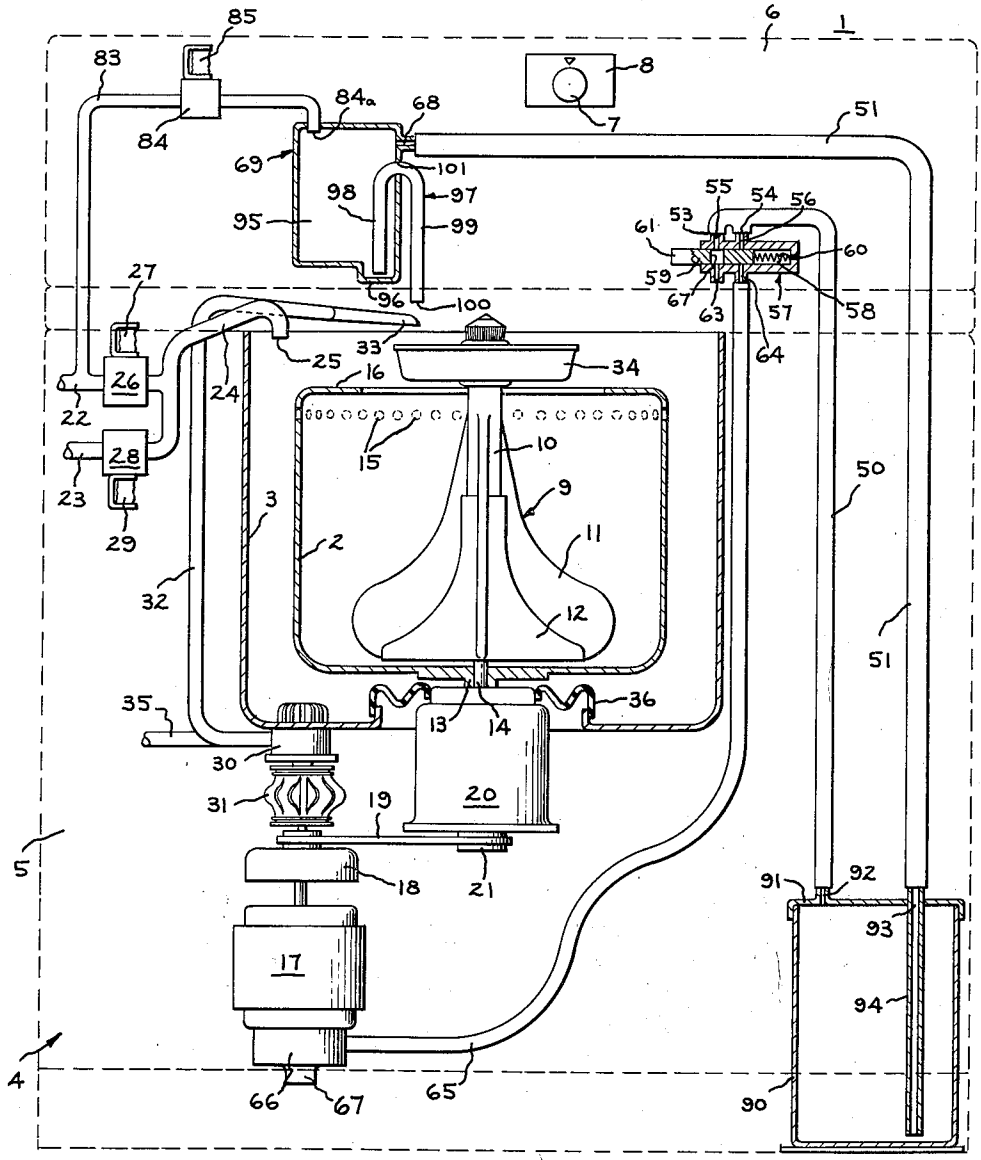
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TREATING AGENT DISPENSER SYSTEM FOR ARTICLE-TREATING MACHINES

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FIG.3



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3,005,330

TREATING AGENT DISPENSER SYSTEM FOR ARTICLE-TREATING MACHINES

John Bochan, Louisville, Ky., assignor to General Electric Company, a corporation of New York

Filed Apr. 28, 1960, Ser. No. 25,411
3 Claims. (Cl. 68—207)

This invention relates to automatic laundry machines, and more particularly to such machines where it is intended that a treating agent be automatically introduced into the receptacle holding the articles being treated at the proper time in a treating sequence.

As laundry machines for use in the home become more perfected, they are required to perform automatically an increasing number of functions which previously had to be performed manually. While this is true of all laundry machines it is particularly so in the case of automatic washing machines wherein various different treating agents such as soap, detergent, water softeners, fabric softeners, and bleach may be desired by the operator to be added at various parts of an automatic washing cycle. Thus, for instance, in a typical automatic clothes washing machine which proceeds through a sequence of operations in order to wash, rinse, and dry the clothes, the sequence may ordinarily include a washing operation, a rinsing operation in which the clothes are rinsed in clean water, and a final extraction operation in which the rinse water is removed from the clothes. Depending upon the type of machine, the action within any given operation may be slightly different: for instance, many machines include an initial extraction operation right after the washing operation, and other machines include a spray rinse during the rinsing operation in addition to the customary submersion rinse. But the general sequence of washing and rinsing, with appropriate liquid extraction steps, is used in almost all automatic washing machines. When this typical type of cycle is provided in a washing machine, the operator may desire, for instance, to inject a predetermined amount of detergent into the machine at the start of the washing operation, a predetermined amount of bleach into the machine partway through the washing operation, and a clothes softening agent into the machine at some time during the rinsing operation.

In addition to being able to inject one or more liquid treating agents automatically at the right time into the article container during a cycle, it is highly desirable that a laundry machine be able to store a substantial amount of the treating liquid so that the operator need not handle a large container each time she desires to use a certain treating agent in the machine, and need not be required to purchase smaller containers for easier handling since smaller containers of a treating agent almost invariably cost substantially more than the same agents bought in larger quantities. This requirement that a laundry machine be able to store a substantial amount of treating agent as well as dispense a desired amount at the right time brings about additional problems. For instance, while the obviously most inexpensive structure is one wherein a large storage container is positioned above a small dispenser container, and the valve is opened for a limited time to permit the introduction into the dispensing container of the desired amount, most laundry machines are not constructed so that it is practical to have a large storage container positioned high up in the machine. In addition, machines which extract liquid from clothes by high speed rotation are often sensitive to the location of a large unbalancing weight in the machine, and it has been found in general that such additional large weights in a machine which has to perform a centrifuging operation should preferably be positioned substantially below the center of gravity rather than thereabove.

It is, accordingly, an object of my invention to provide a new and improved dispenser for a liquid treating agent which may be filled before a laundry machine is set in operation and which will then introduce the treating agent automatically into the article receptacle at the appropriate time during a treating operation.

A further object of my invention is to provide storage means within an automatic laundry machine so that not only does the operator not have to wait until the appropriate time during the operation to introduce the treating agent to the machine, but further, except for occasionally filling tthe storage container, he need not handle the treating agent at all in readying the machine for its operation.

A further object of the invention is to provide a combination storage system and dispening system for liquid treating agents which is simple in construction and in operation.

A more particular object of the invention is to achieve the desired simplicity of construction and operation by effecting the movement of the treating agent from the storage container to the dispensing container by a pneumatic system.

In one aspect of my invention, I provide, in a laundry machine, a receptacle for articles to be treated. The machine also includes a storage container for a liquid clothes treating agent, which container has at least a portion sealed against the atmosphere, and appropriate means for increasing the gaseous pressure on the liquid in the sealed portion of the storage container. A conduit interconnects the storage container with a dispensing container and extends to a point adjacent the bottom of the sealed portion of the storage container so that when the gaseous pressure is increased liquid is forced from the sealed portion of the storage container through the conduit into the dispensing container. By use of appropriate means for controlling the operation of the means for increasing the gaseous pressure, I determine the amount of liquid which is passed from the storage container into the dispensing container. The dispensing container is provided with means for guiding liquid into the treating receptacle and suitable control means, which may be of the conventional well known electric solenoid type controlled by a timer, are provided for determining when the liquid will flow from the dispensing container into the receptacle.

While a separate pressure-increasing system may be used, the system briefly described above has, as one advantage the fact that, in the typical machine where an electric driving motor is utilized to operate some kind of treating means in the machine, the same motor may be utilized for providing the necessary pressure to force liquid from the storage container into the dispensing container. In this manner, the pneumatic system may be easily and effectively combined with the existing general type of structure in home laundry machines to effect the desired dispensing operation.

The features of my 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 method of operation, together with further objects and advantages thereof, may best be understood by reference to the following detailed description taken in connection with the accompany drawings.

In the drawings,

FIGURE 1 is a schematic front elevational view of a typical laundry machine, in particular a clothes washing machine in this instance, which includes my new and improved treating agent in dispensing system, the view being partially broken away and partially in section to illustrate details;

FIGURE 2 is a front elevational view of a modified

form of the dispensing container of my improved system, the view being partially in section in order to show details; and

FIGURE 3 is a schematic front elevational view of another embodiment of my invention, also incorporated for purposes of illustration in a clothes washing machine.

Referring now to FIGURE 1 of the drawings, I have shown therein in schematic form an agitator-type washing machine generally indicated by the numeral 1 having a treating receptacle assembly, in this case including a clothes basket 2 disposed within an outer imperforate tub or casing 3. Tub 3 is mounted within an appearance cabinet generally indicated in dotted outline by the numeral 4 which includes an appropriate body portion 5 enclosing the operating components of the machine and, in addition, the usual backsplasher 6 which is secured to the top of body portion 5 at the rear thereof and normally includes an appropriate dial 7 so as to select a particular desired sequence of washing operations. Dial 7 may be connected into a conventional sequence control mechanism 8 of the type generally commercially available and which is, therefore, not further described herein. At the center of basket 2 there is provided a vertical axis agitator 9 which includes a center post 10 and a plurality of radially extending vanes 11. The agitator is further provided with an outwardly and downwardly flared skirt 12 to which the vanes are joined at their lower ends.

Both the clothes basket 2 and the agitator 9 are rotatably mounted. In one conventional structure, the clothes basket 2 may be secured to a hollow shaft member 13 and the agitator may be secured to a shaft 14 which extends up within shaft 13 in rotatable relation thereto. The agitator 9 is secured to shaft 14 by any suitable means (not shown). During the cycle of operation of the machine 1, the agitator is first oscillated back and forth within the basket 2 to wash the clothes therein. Then, after a predetermined period of this washing action, the basket 2 is rotated at high speed to extract centrifugally the washing liquid and discharge it into the outer tub 3 through appropriate small openings 15 provided adjacent the top of basket 2. In one usual construction the openings 15 extend in a horizontal line around the basket adjacent the top thereof slightly below the inwardly turned flange 16 which may be provided (or some equivalent structure) to prevent the flotation of clothes over the top of the basket 2 into the outer tub 3. Following this extraction operation, a supply of clean liquid is introduced into the wash basket for rinsing the clothes as the agitator is introduced into the wash basket for rinsing the clothes as the agitator is again oscillated. Finally, the basket is once more rotated at high speed to extract the rinse water and discharge it into the outer tub.

The basket 2 and agitator 9 may be driven by any suitable means. By way of example, I have shown them as driven from a reversible motor 17 which drives the basket and agitator through a drive including a cluth 18 mounted on the motor shaft. Clutch 18 allows the motor to start without load and then picks up the load as it comes up to speed. A suitable belt 19 transmits power to transmission assembly 20 through a pulley 21. Thus, depending upon the direction of motor rotation, pulley 21 of transmission 20 is driven in opposite directions.

The transmission 20 is so arranged that it supports and drives both the shafts 13 and 14. When motor 17 is rotated in one direction the transmission causes the agitator 9 to be oscillated within basket 2 by shaft 14. Conversely, when the motor 17 is driven in the opposite direction, the transmission drives the wash basket 2 and the agitator 9 together at high speed for centrifugal extraction of liquid from the clothes. While the particular form of the drive means does not form part of the present invention, reference is made to Patent No. 2,844,225 issued on July 22, 1958 to James R. Hubbard et al. and owned by the General Electric Company, assignee of the present invention. That patent discloses in detail the structural characteristics of a transmission suitable for use in the illustrated machine.

In order to introduce washing and rinsing liquid into the assembly of basket 2 and tub 3, a pair of conduits 22 and 23 leading from, respectively, cold water and hot water sources (not shown) are provided. In the case of the cold water entering through conduit 22, the passage of the water from conduit 22 into conduit 24 and out through opening 25 into basket 3 is controlled by a valve 26 whose position in turn is controlled by a solenoid assembly partially shown by the numeral 27. As is well known in the art, when the solenoid 27 is energized valve 26 is open and cold water may flow from conduit 22 out through opening 25 into tub 3. When solenoid 27 is deenergized, the valve 26 is closed and there is no flow of cold water into the tub 3. In similar fashion, the flow of water from conduit 23 out through outlet 25 is controlled by a valve 28 which in turn is controlled by a solenoid partially shown by the numeral 29. Energization of the solenoid 29 causes hot water to flow from conduit 23 out through opening 25 and deenergization of the solenoid closes the valve.

In addition to operating transmission 20 as described, motor 17 drives a pump 30 through a flexible coupling 31 which connects the motor shaft and the pump shaft. During washing and rinsing operations of the machine, pump 30 discharges into a conduit 32 which leads to a nozzle 33 positioned above a perforated filter pan 34 secured to the agitator 9 so that liquid overflowing through openings 15 may be recirculated through the filter pan 34 in order to clean and filter the liquid during operation prior to its re-entry into basket 2. The system constantly circulates the washing liquid from tub 3 through conduit 32 and nozzle 33 back through filter pan 34 into basket 2 where it overflows through openings 15 into tub 3 to repeat the cycle. At the end of the washing and rinsing portions of the cycle, and in response to a reverse direction of rotation of motor 17 (effective to spin basket 2), pump 30 discharges into a drain conduit 35 which is adapted for discharge to a stationary tub or drain line so that the pump is effective to drain tub 3. Any suitable pump may be used for draining purposes, such as the one just now described; it is described in full detail and claimed in Patent No. 2,883,843 issued to me on April 28, 1959 and assigned to General Electric Company owner of the present invention.

It will be understood that, in the particular example of a laundry machine shown, it is contemplated that the tub 3 is rigidly secured to the cabinet 4 by any suitable means and that the driving parts of the machine, including motor 17, clutch 18, transmission 20, and the basket 2 and agitator 9, are suspended from the housing by a suitable means (not shown) so that during the high speed rotation of the basket and agitator some limited amount of gyration of the suspended system may take place in response to the presence of unbalances in the system. In order to permit this gyratory motion of basket 2 relative to tub 3, a suitable flexible boot member 36 of any desired configuration may be used to connect the moving system to the tub 3 in leak-proof relation so that water will be retained within the tub 3 and will not escape down into the lower part of the machine which contains the driving components.

As mentioned above, it is most desirable to provide a suitable means for storing and for automatically dispensing various treating agents at appropriate times during the washing cycle. Inasmuch as bleach is one of the most commonly used liquid treating agents in domestic washing machines it will be used for purposes of illustration. The use of bleach has heretofore presented substantial problems, primarily because of the corrosive nature of chlorine bleaches (the most commonly used type), and the fact that, because of this corrosive nature, any substantial amount of handling of the bleach by the operator is undesirable.

In order to store bleach in the machine, I provide a suitable relatively large vessel or container 37 which is preferably, as shown, positioned low in the machine to avoid the difficulties which are created by the provision of a substantial amount of weight and volume relatively high in the machine. Container 37 is preferably large enough to accept a full gallon of bleach since liquid bleach is commonly available at retail outlets in one gallon jugs, and is provided with a lid or cover 38 which closes the top thereof. Cover 38, in the embodiment shown, should preferably close the top of the container relatively tightly so as to prevent the escape of fumes from the bleach into the air and so as to prevent contamination of the bleach by entry of any substantial amount of air, but as will be seen further below, it is not necessary that the engagement of the container lid 38 with the bottom part 37 of the container be so tight or secure as to be able to withstand any pressure greater than atmospheric.

Depending from the lid down into the container 37 (and if so desired formed as a part of the lid) is an inner container 39 whose dimensions are such that it is capable of accepting somewhat more than the maximum amount of bleach ordinarily injected into the machine in any one operation. One and one-fourth to one and one-half cups of chlorine-type bleach are generally considered to constitute the maximum desirable amount for presently used domestic washing machines. It is therefore contemplated that inner container 39 may be provided with approximately a two-cup capacity. The inner container 39 is capable of withstanding higher pressures than atmospheric for a purpose which will be described herebelow. Preferably, and as shown, the inner container 39 is formed so that it is relatively long, extending substantially down to the bottom of the outer container 37. In fact, as shown, the outer container may be provided with a recessed portion 40 into which the bottom of the inner container 39 extends so that the bottom of the inner container is actually below the lower part of most of container 37.

In its bottom surface 41, container 39 is provided with openings 42 which are closable by a one-way check valve, schematically shown at 43, operative to close the openings 42 when the pressure in container 39 is higher than the pressure in the outer container 37 and to move away from the openings 42 when the pressure in the containers 37 and 39 is substantially equal. It will thus be seen that when there is nothing creating an excess of pressure in container 39 over the pressure in container 37, there will be a relatively free flow of liquid between the two containers and that thus liquid introduced into the container 37 by any suitable means such as a spout (not shown) will flow from the container 37 into the container 39. However, when the pressure in container 39 is increased the check valve 43 will immediately close and seal off all communication between the containers 37 and 39.

Lid 38 is provided with three openings 44, 45 and 46; openings 44 and 45 connect with the inner container 39 while opening 46 communicates with the outer container 37. Opening 44 terminates just within the lid 38, as can be seen, while to the contrary opening 45 communicates with a conduit portion 47 which extends down to a point 48 so that the communication 49 between the container 39 and opening 45 is actually adjacent the bottom of the container 39. The opening 44 is connected to a suitable hose or conduit 50 which is secured thereto in any conventional manner, such as by forming the opening 44 as a protuberance rising from lid 38 and then securing the end of conduit 50 thereover. In similar fashion, a conduit 51 is secured to opening 45 and a conduit 52 is secured to opening 46. Conduits 50, 51 and 52 may be formed of any suitable material. I contemplate that in my preferred embodiment, particularly where the treating liquid is bleach as contemplated in the immediate embodiment, the conduits 50, 51 and 52 will be flexible tubes of plastic of any well-known type resistant to the action of chlorine bleach.

Conduit 50 extends up into the backsplasher portion schematically shown by the numeral 6 and terminates in two openings 53 and 54 which are connected respectively to openings 55 and 56 formed in a valve member generally indicated at 57. Valve member 57 has a longitudinally extending inner chamber 58 within which a member 59 is positioned to slide. Member 59 is biased to the left by a relatively light spring member 60 engaging its right end, and the other end 61 of member 59 is formed as a pushbutton extending from backsplasher 6 so as to be accessible to an operator. When the operator pushes on end 61 of member 59 she overcomes the action of spring 60 and thereby moves the member 59 to the right from its position as shown (which is the position to which it is normally biased by the spring 60).

The member 59 is provided with a single opening 62 extending therethrough from top to bottom. In the normal position of member 59 opening 62 connects opening 55 with an opening 63 in the other side of the valve, and opening 63 is vented to atmosphere. Thus, with the valve 57 in the position shown, the inner container 39 is vented to atmosphere through the valve structure 57 so that there is no pressure build-up therein. However, when the member 59 is manually pushed to the right, as described, the opening 62 then lines up with opening 56 and connects it with an opening 64 in the other side of valve 57. Opening 64 is connected to a conduit 65 leading to an air compressor generally shown at 66. The air compressor 66 may, as shown, be directly connected to the motor 17 so as to be driven thereby. It will be apparent that the air compressor may be of any conventional structure as provided in many commercially available rotary air compressors.

During operation of motor 17 the air compressor takes air in through opening 67 and discharges it under pressure through the conduit 65. It will be observed that member 59, when it is in the position shown, causing opening 62 to connect openings 55 and 63, provides a barrier between openings 56 and 64 so that there is no communciation between them. Thus, with the valve member 59 in this position the passage of air from the compressor 66 is effectively prevented from travelling from conduit 65 into conduit 50 and therefore is prevented from getting into container 39. At the same time, the venting of the container 39 is insured as previously described.

However, when the operator pushes on end 61 of member 59 the opening 62 of member 59 connects openings 56 and 64 and at the same time a solid portion of the member 59 effectively cuts off communication between the openings 55 and 63. Thus, with the member 59 pushed to the right against the action of spring 60 communication is provided from conduit 65 to conduit 50 through the opening 62, and at the same time the member 39 is no longer vented because the end of opening 55 is blocked by the member 59.

The conduit 51 extends to an opening 68 provided near the top of a dispening container generally indicated by the numeral 69. Dispensing container 69 includes a chamber 70 of the appropriate dimensions so that when it receives a normal amount of the treating liquid or bleach the liquid level in it is well beneath an opening 71 which connects with the conduit 52. Chamber 69 includes an opening 72 at the bottom thereof leading from chamber 70 into a lower or discharge section 73 of the dispensing container. The opening 72 is accessible for substantial flow of liquid from chamber 70 only through a funnel 74, so that the liquid level in the container must rise above the top of the funnel before liquid can pass down at a relatively high rate into the discharge section 73. The normal liquid level for a regular charge of bleach, in addition to being well below opening 71 will also be below the top of funnel 74. For a purpose which

will appear more clearly herebelow, one or more bleed openings 75 in funnel 74 are preferably provided at the lowest point in chamber 70.

The opening 72 is normally closed by a valve member 76 which, together with a valve member 77 closing an opening 78 in the top of chamber 70, is controlled by a solenoid partially shown by the numeral 79. When solenoid 79 is energized the valve members 76 and 77 move against the action of a spring member 80 so as to free the openings 72 and 78. Above the opening 78 in dispensing container 69 is a compartment 81 which is accessible through an inlet 82 so that water may be passed from the cold water inlet 22 through a conduit 83 and then out through its end 84 into the compartment 81. The flow of water through conduit 83 is under the control of a valve schematically indicated by the numeral 84 which in turn is controlled by a solenoid member schematically shown at 85, the solenoid causing the valve 84 to open when the solenoid is energized and to close when it is deenergized. It is contemplated that, in the control of my structure, either the solenoids 79 and 85 will be energized and deenergized at the same time so that whenever water is allowed to pass into campartment 81 the valve members 76 and 77 will be moved away from openings 72 and 78, or else that the solenoids will be simultaneously energized and solenoid 79 will be deenergized slightly after solenoid 85.

With this structure, when there is bleach in the chamber 70, as will be described in connection with the operation of my invention, and solenoids 79 and 85 are energized, a small amount of bleach will initially pass through the opening 72 from bleed holes 75 into compartment 73 and thence through an outlet 86 into the tub 3. At the same time, water passing from the conduit 83 into compartment 81, and thence through opening 78 into chamber 70, rapidly fills the chamber 70 to a level above the top of funnel 74. Once this happens, substantial quantities of bleach diluted with water pass down through opening 72 and then through compartment 73 and outlet 86 into tub 3.

It will be clear that, where several dispensing chambers such as 69 are provided, each for a different treating agent, the chamber 81 may be formed to extend over all of them so that water from the single chamber 81 may be caused to flow into any one appropriate chamber 69 depending on which one has its solenoid 79 energized at any given time.

The operation of the structure of FIGURE 1 will now be described. It is to be understood, in connection with the following description, that, while bleach is normally injected into a washing machine container during the washing operation, the preferred time for so injecting the bleach is not at the beginning of the operation, but rather after a substantial part of the washing operation has already taken place. This results from the fact that if the bleach is injected at the beginning of the washing operation it has a tendency to counteract the beneficial whitening effect which is embodied in many modern detergents in the form of a fluorescent dye; consequently, in such a case, the full whitening effect of the detergent is not achieved. The result of introducing the bleach toward the end of a washing operation has been shown in laboratory tests to be visibly better than where bleach and detergent are both introduced at the beginning of a cycle.

At any time prior to the injection of bleach into the clothes receptacle, the operator causes operation of motor 17 by any suitable control means (which are not shown, being of any conventional type, and which may be included in control device 8 or made entirely separate for purposes of bleach injection only) and depresses the end 61 of member 59. Of course, the operation of motor 17 may even be tied in with the depression of member 61 so that even outside a regular cycle of operation the motor 17 operates when member 61 is moved to the right. The electrical circuitry for such an approach would be obvious and simple and is not described herein further since it forms no part of the present invention.

With motor 17 operating to cause effective operation of air compressor 66 and with the member 59 moved to the right, air under pressure passes through conduit 65 from the compressor and then through the valve structure 57 and conduit 50 into the inner container 39. The pressure within container 39 therefore rises rapidly and, as a result, forces the liquid surface in container 39 down with the liquid passing up through tube 47 and conduit 51 into chamber 70 of dispensing container 69. As can be seen, the dispensing container structure is positioned in the backsplasher of machine 1 and a suitable portion of the backsplasher may be made transparent, or some suitable visible indicia of level may be provided, so as to indicate to the operator when the desired amount of bleach has passed up through conduit 51 into chamber 70. When the bleach level within chamber 70 reaches the desired level the operator releases the member 59 which then returns to its spring biased position toward the left as shown. This returning of the member 59 to the left performs the dual function of sealing off further communication between the air compressor and inner container 39 so that there is no longer any pressure delivered by the air compressor into the container, and also of venting the inner container 39 through conduit 50 so that the pressure therein drops immediately.

The combination of the lack of communication between compressor 66 and container 39 and the venting of container 39 causes the passage of liquid through conduit 51 to cease immediately so that the level of the liquid in chamber 70 remains as desired. It will, of course, be apparent at this point that the venting of inner container 39, while highly desirable in order to prevent overshoot, is in essence a refinement in my construction and, if some overshoot is deemed permissible, this feature may be omitted.

At this point, the desired amount of liquid has been transferred from within the storage container 37 up into chamber 70 of dispensing container 69. The operator may then load the clothes into the machine, if this has not been done, and start the operation or, as is possible if the bleach was passed into container 69 after a washing operation had been started, the operation may continue. It will be understood at this point that the complete washing operation of the machine of FIGURE 1 may be controlled by a suitable control arrangement incorporated and connected to the control mechanism 8. One such typical arrangement for providing a complete automatic circuit and also automatic injection of bleach from a dispensing container at an appropriate time is described in application Serial Number 829,684 for Treating Agent Dispenser System For Washing Machines filed on July 27, 1959, by Philip H. Houser and Winston L. Shelton, now Patent No. 2,979,936 of April 18, 1961 and assigned to General Electric Company, assignee of the present invention. In fact, the circuit of the invention described in that application is applicable substantially in its entirety to the machine shown in my FIGURE 1, and is deemed to be incorporated by reference into the present application for purposes of illustration.

The washing operation thus proceeds until the time when the injection of bleach is appropriate. At this point, the control mechanism causes the solenoid members 79 and 85 both to be energized. The energization of solenoid 85 permits cold water to pass into the compartment 81 of dispensing container 69. The energization of solenoid 79 permits this water to pass into the chamber 70 and also permits the pasage of liquid from chamber 70 down into compartment 73 and thence through outlet 86 into the tub 3. The incoming water from conduit 83, when it passes into chamber 70, mixes with the bleach thereby diluting it substantially so that before any substantial amount of bleach is passed down

into compartment 73 over the top of funnel 74, the bleach has been substantially diluted. Thus, except for a very small amount which will escape through the bleed holes 75 prior to the time the level within chamber 70 rises above the top of funnel 74, no raw bleach, which is highly corrosive in nature where chlorine bleaches are used, is permitted to escape into the tub 3. This action, with the water passing into the dispensing container, mixing with the bleach, and then with the bleach and water mixed together passing out into the tub 3, continues for an appropriate period of time while solenoids 79 and 85 are energized. At the end of this period of time the two solenoids are de-energized with the result that water ceases to pass into compartment 81 and also liquid ceases to pass through the openings 78 and 72. It will, of course, be recognized that it may be preferable to delay the de-energization of solenoid 79 for a brief period of time after the de-energization of solenoid 85 so that all the liquid in chamber 70 will have time to drain out through opening 72 prior to the time it closes and after water has ceased to be introduced through opening 78.

In this manner, the bleach is injected at the correct time in diluted form so as to effect its desired function. It will be observed that in the particular embodiment shown the bleach passes into the outer tub 3 of the washing machine so that it is further diluted by mixing with the water which is overflowed from basket 2 through openings 15, and must be recirculated with that water by pump 30 through conduit 32 before it actually enters basket 2 so as to contact the clothes.

Thus, in summary, by the provision of means for increasing the pressure in the inner container 39, a very simple means of automatically pumping liquid up into the dispensing container from the storage container is provided, and further it will be seen that a simple and effective means of providing the bleach into the tub 3 is provided with the bleach already being in desirably diluted form by mixing with water.

A further desirable feature of my structure lies in the provision of the conduit 52 whose structure has been described. Should the operator for any reason inadvertently introduce an excessive quantity of bleach into the chamber 70 by depressing end 61 of member 59, the bleach, should it rise to the level of opening 71, will merely flow back through conduit 52 into container 37. This is possible because even though the inner portion 39 of the container is under pressure, the outer portion 37 is not under pressure and therefore bleach may freely flow back into it. This then represents a very substantial advantage of the structure of containers 37 and 39. A further advantage is that with a relatively small volume to be put under pressure, a much simpler and smaller air compressor 66 may be provided to force bleach from container 39 into chamber 70 than if the air pressure had to be raised in the entire outer chamber 37.

Referring now to FIGURE 2, there is shown a modification of the dispensing container structure 69 in which like parts are shown by the same numerals as used in FIGURE 1, it being understood that all parts which are not shown are identical to those in FIGURE 1. As before, container 69 is provided with a chamber 70 which has openings 68 and 71 communicating with conduits 51 and 52. In this case, instead of the solenoid 79 positioned above the container as in FIGURE 1, a solenoid 87 is positioned below the container. When the solenoid 87 is energized it pulls down a valve member 88 to uncover opening 72, and when the solenoid is de-energized a spring 89 pushes the valve member 88 up so that it closes opening 72. With this structure it will be seen that the pure bleach is discharged from the chamber 70 upon energization of the solenoid 87, and that the bleach then flows into tub 3.

It will be observed that in the modification of FIGURE 2 the compartment 81 and the flow of water used to flush the bleach out of container 69 are eliminated. This will obviously be a readily acceptable structure where a relatively free flowing liquid such as bleach is provided in such a way that even though it escapes in its pure form from container 69 it is diluted before it contacts the articles being treated, or where some other material than bleach is used and dilution of the liquid is not critical. Thus, for instance, in the structure of FIGURE 1, wherein the bleach is delivered into the outer tub and does not contact the clothes in the basket 2 until it has been diluted by the water in the outer tub and recirculated through the conduit 32, a modification such as that shown in FIGURE 2 may provide a readily feasible arrangement while eliminating the relatively small additional expense which must necessarily be incurred by the provision of the flushing arrangement of FIGURE 1.

Referring now to FIGURE 3 a third embodiment of the invention is shown in which parts which are the same as in FIGURE 1 are shown by like numerals. In the embodiment of FIGURE 3 there is provided a storage container 90 covered by a lid member 91, the two being secured together so as to be able to withstand the relatively high pressures that, in FIGURE 1, only the inner compartment 39 was required to withstand. In the lid member, there are provided two openings 92 and 93, with a tube 94 extending through opening 93 down within container 90 to a point adjacent the bottom thereof. Tube 94 is connected to conduit 51 which, as previously explained, leads to opening 68 of container 69. The opening 92 is connected to conduit 50 which leads to the valve structure 57 described in connection with FIGURE 1.

The dispensing container 69 includes a single chamber 95 in which a recess 96 is provided in one portion at the bottom thereof. A siphon member, generally indicated by the numeral 97, has its short leg 98 positioned within the chamber 95 extending down to a point adjacent the bottom thereof in the recess 96. The longer leg 99 of the siphon extends down outside the container so as to have its discharge end 100 arranged so that liquid will pass therefrom into the outer tub 3 of the washing machine. The top or curved portion 101 of the siphon passes through the wall of the container 69 at a point above the liquid level normally attained when a charge of bleach is passed from container 90 to container 69 by the operator.

When it is desired to pass bleach from storage container 90 into dispensing container 69, the motor 17 is operated and the end 61 of member 59 is pushed to the right so that the compressor will operate and there will be a passage for air to be passed through the conduit 65, the valve 57 and the conduit 50 into the container 90. Container 90 is filled with a treating agent such as bleach, and when the pressure therein above the bleach rises high enough the bleach is forced up through tube 94 and conduit 51 into the chamber 95 of container 69. It will be observed that this operation is substantially similar to the operation described in connection with FIGURE 1, the main difference being that the entire container 90 receives the pressure from compressor 66. While this simplifies the structure of container 90, it is conceivable that a somewhat stronger air compressor may be required in the light of the larger volume of air which will be present above the liquid in container 90.

It is contemplated that suitable visible indicia of the level of the liquid passing into dispensing container 69 will be provided so that the operator may cause the desired amount to pass into the container and may then release the button 61 so as to prevent further passage of liquid, at the same time causing venting of the container 90 in the aforementioned manner through opening 63 of valve 57. The liquid remains in container 69 below the level of the top 101 of siphon 97 until solenoid 85 is energized; in the case of bleach, this will preferably be during the washing operation toward the end thereof. At this point, water is then introduced into chamber 95 through

opening 84*a* and the level in the chamber rises until it reaches the top of the siphon 97 at which point the siphoning action starts with the water flowing up through leg 98 of the siphon and then down through leg 99 and out through opening 100 into the outer tub 3. It will be observed that this action will continue until the supply of water is shut off and then the mixture of bleach and water in chamber 95 will continue to flow out through the siphon until the chamber has been emptied.

In addition to the embodiments particularly described and illustrated hereabove, various other modifications of my invention will occur to those skilled in the art. For instance, it will be apparent that while, as a preferred structure, I have shown a compressor for effecting the desired pressure in the storage container, with the compressor being driven by the washing machine drive motor, it is equally possible either to provide a separate compressor and motor assembly or to provide any other desired means (such as means for heating air or another gas so as to increase its pressure) for increasing the pressure within the storage container to cause the treating agent to flow into the dispensing container when so desired. Further, it will be apparent that the dispensing system is applicable to other devices besides the particular type of laundry machine shown. For instance, it is readily conceivable that in a dryer a treating liquid such as water for dampening clothes for ironing or a freshening agent may be dispensed in the same way at a desired time. In addition, it will be apparent that the particular relative positions shown for the different components of my invention may be without such great significance in other types of laundry machines wherein the provision of the weight low in the machine is not so important.

It will thus be seen that while in accordance with the Patent Statutes I have described what at present are considered to be the preferred embodiments of my invention, various changes and modifications, including but not limited to those mentioned above, will occur to those skilled in the art and therefore may be made without departing from my invention, and it is therefore aimed 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 an article-treating machine; a receptacle assembly for articles to be treated; means for treating said articles; a drive motor for operating said treating means; air compressing means driven by said motor; a storage container for a liquid article-treating agent having at least a portion thereof substantially sealed against the atmosphere; a first conduit interconnecting said compressing means and said portion of said storage container; a dispensing container; a second conduit interconnecting said containers and extending to a point adjacent the bottom of said storage container portion, said compressing means developing sufficient pressure to force liquid from said storage container portion through said second conduit into said dispensing container; control means having first and second conditions, said control means in said first condition causing operation of said compressing means to force liquid into said dispensing container and in said second condition preventing said compressing means from forcing liquid into said dispensing container; and means for causing liquid to flow from said dispensing container down into said receptacle assembly at a predetermined time.

2. In a washing machine: a liquid receiving tub; a receptacle positioned within said tub for clothes to be washed; means extending into said receptacle for washing said clothes; a drive motor for operating said washing means; air compressing means driven by said motor; a storage container for a liquid clothes-treating agent having at least a portion thereof substantially sealed against the atmosphere; a first conduit interconnecting said compressing means and said storage container portion; a dispensing container; a second conduit interconnecting said containers and extending to a point adjacent the bottom of said storage container portion, said air compressing means developing sufficient pressure to force liquid from said storage container portion through said second conduit into said dispensing container; control means having first and second conditions, said control means in said first condition causing operation of said air compressing means to force liquid into said dispensing container and in said second condition preventing said air compressing means from forcing liquid into said dispensing container; means for guiding liquid from said dispensing container into said tub; and means controlling flow of liquid through said guiding means.

3. In an article-treating machine: a receptacle assembly for articles to be treated; means for treating said articles; a drive motor for operating said treating means; air compressing means driven by said motor; a storage container for a liquid article-treating agent having two portions, one of said portions being substantially smaller than the other and being substantially sealed against the atmosphere, means providing communication between said one portion and the other of said portions adjacent the bottom of said storage container, and valve means closing said communication means when the pressure in said one portion is higher than the pressure in said other portion and opening said communication means at other times; a first conduit interconnecting said compressing means and said one portion of said storage container; a dispensing container; a second conduit interconnecting said containers and extending to a point adjacent the bottom of said one portion of said storage container; a third conduit interconnecting said containers and extending at one end to a point adjacent the top of said dispensing container and at its other end extending into said other portion of said storage container; said air compressing means developing sufficient pressure to force liquid from said one storage container portion through said second conduit into said dispensing container; control means having first and second conditions, said control means in said first condition causing operation of said compressing means to force liquid into said dispensing container and in said second condition preventing said compressing means from forcing liquid into said dispensing container; means communicating with the bottom of said dispensing container for guiding liquid from said dispensing container into said receptacle assembly; and means controlling flow of liquid through said guiding means.

References Cited in the file of this patent

UNITED STATES PATENTS

446,050	Young	Feb. 10, 1891
1,879,101	Coleman	Sept. 27, 1932
2,520,398	Hanks	Aug. 29, 1950
2,534,014	Gayring	Dec. 10, 1950
2,899,814	Buechler	Aug. 18, 1959