United States Patent [19]

Bochan

[11] **3,727,434**

[45] **Apr. 17, 1973**

[54] ADDITIVE DISPENSING SYSTEM

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[73] Assignee: **General Electric Company,** Louisville, Ky.

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[21] Appl. No.: **170,601**

[52] **U.S. Cl.** .....**68/17 R,** 134/93

[51] **Int. Cl.** **D06f 39/02**

[58] **Field of Search** .....68/17 R, 17 A; 134/93, 100, 101

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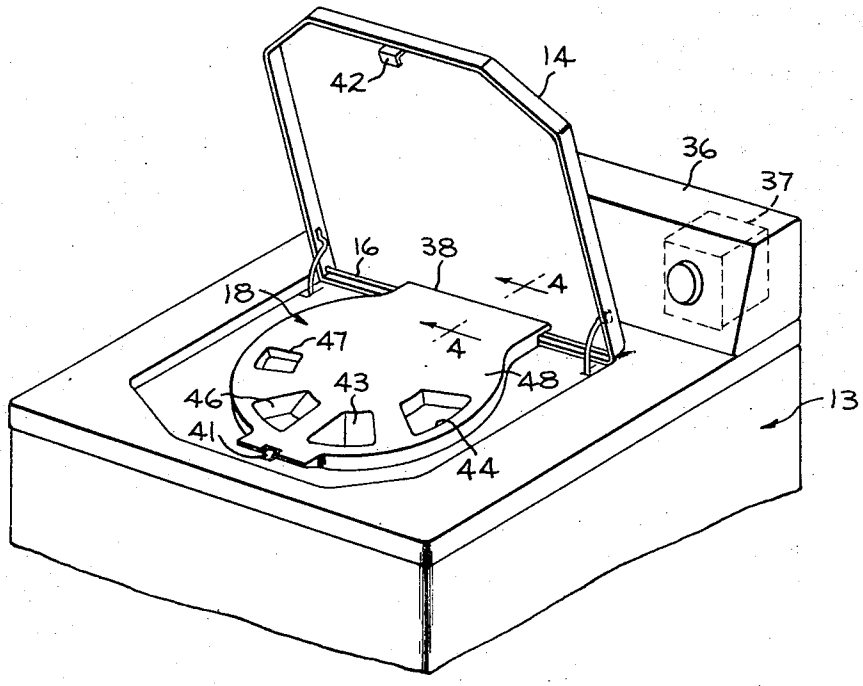
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Assistant Examiner—Philip R. Coe
Attorney—Walter E. Rule et al.

[57] **ABSTRACT**

A system for sequentially dispensing a plurality of treating agents into the wash tub of an automatic fabric washing machine at predetermined times during the washing cycle. The dispenser is hingedly mounted above the wash tub and so located that in its operative position a liquid supply means is in cooperative relationship with a plurality of liquid inlets in the dispenser. Additives to be dispensed are placed selectively by the housewife into appropriate compartments in the dispenser and are flushed therefrom by sequentially controlling the liquid supply means to direct liquid into preselected ones of the liquid inlets and appropriate compartments at predetermined times in the washing cycle of the automatic washing machine.

4 Claims, 11 Drawing Figures



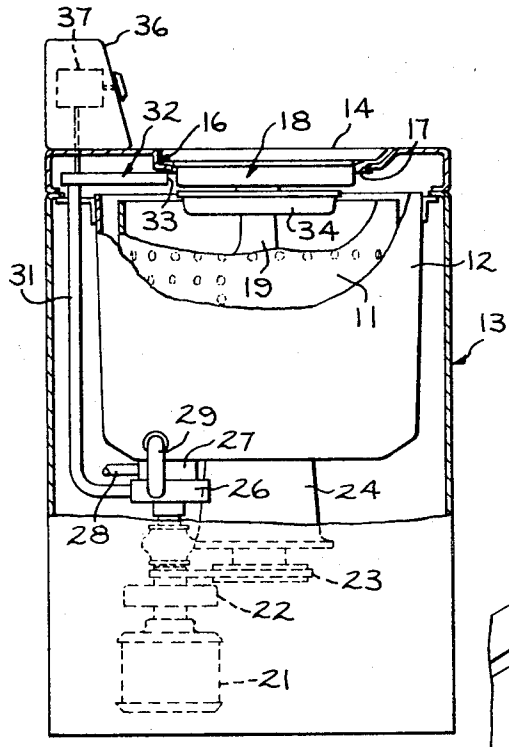


FIG. 1

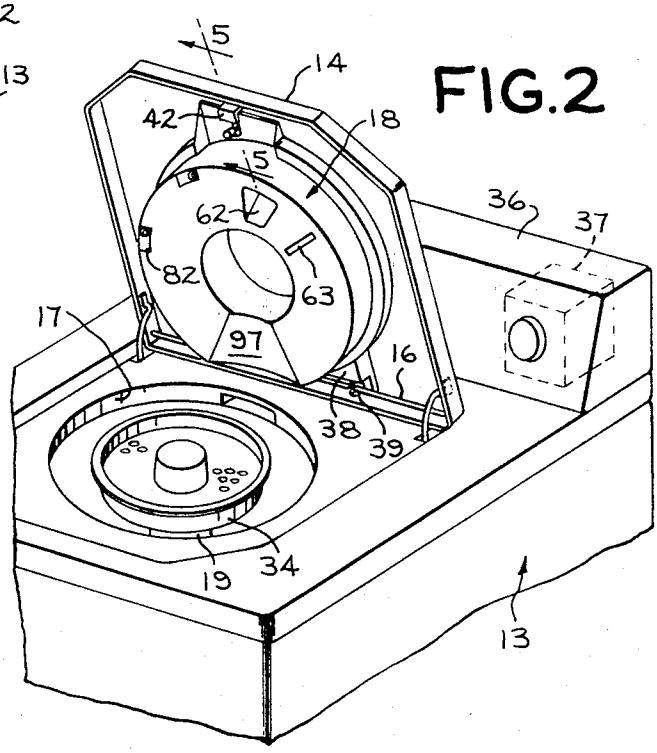


FIG. 2

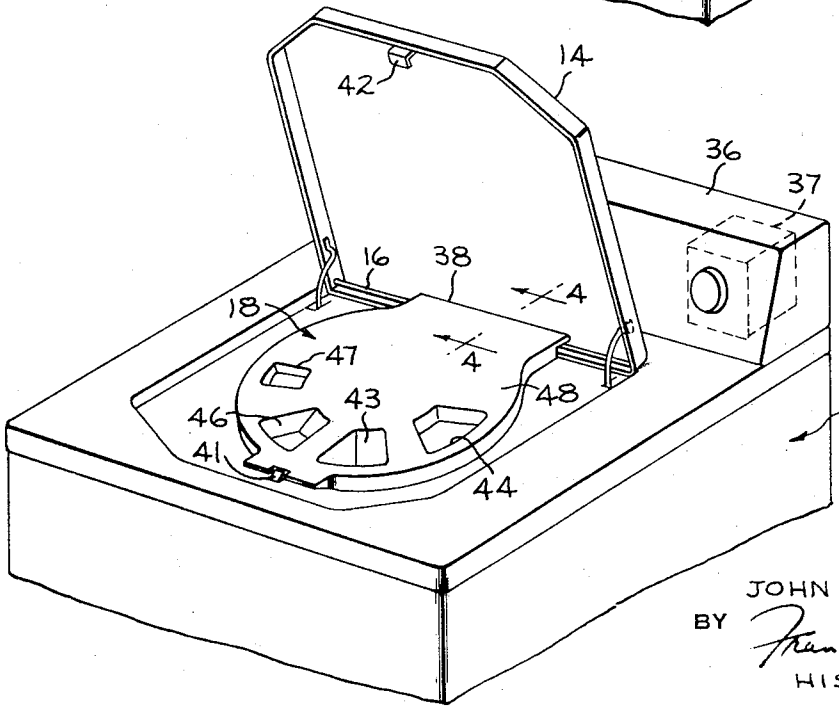


FIG. 3

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FIG. 10

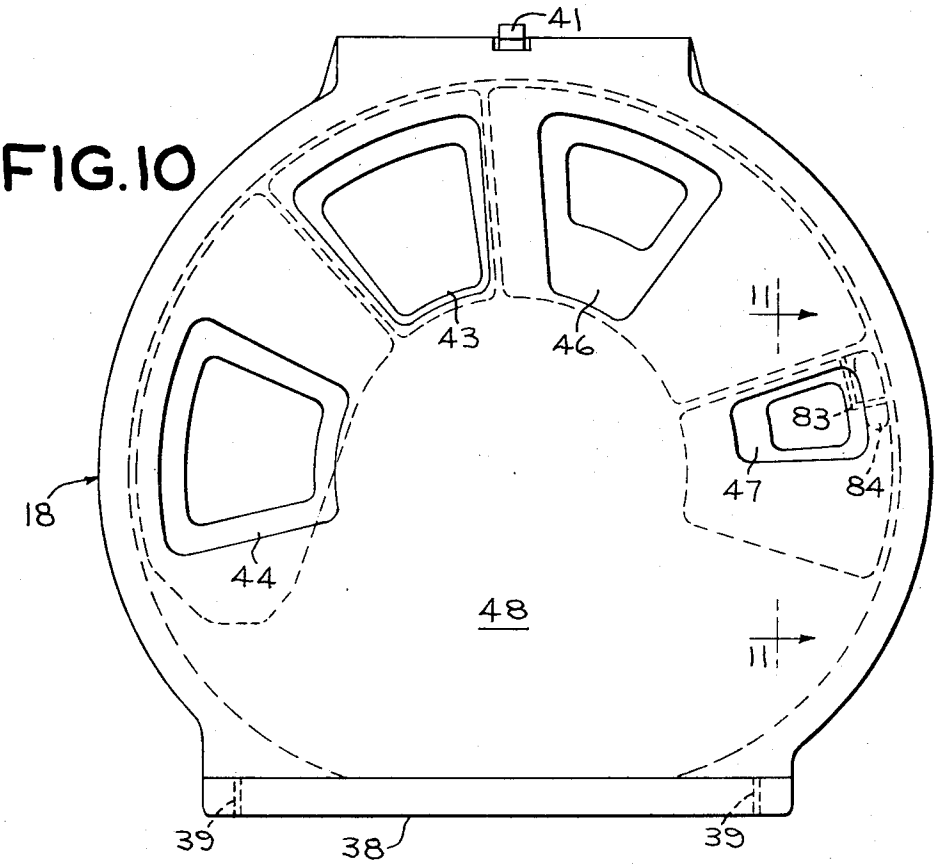


FIG. 4

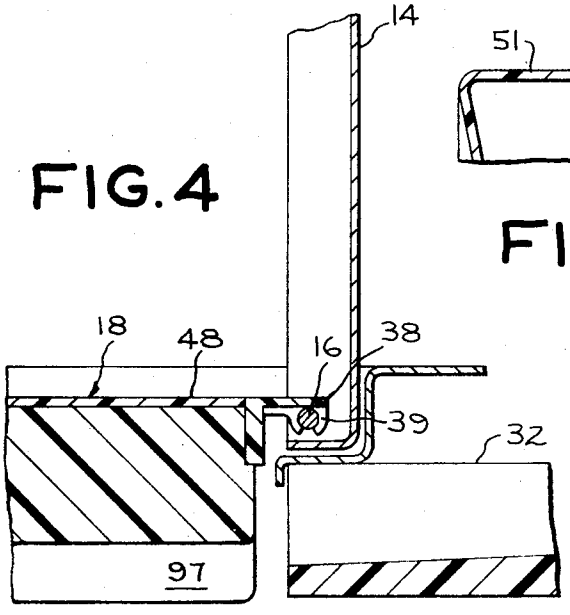
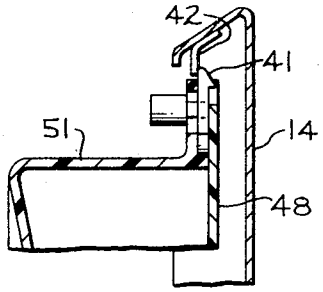


FIG. 5



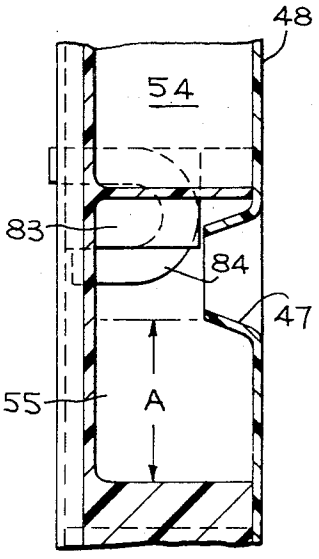


FIG. 11

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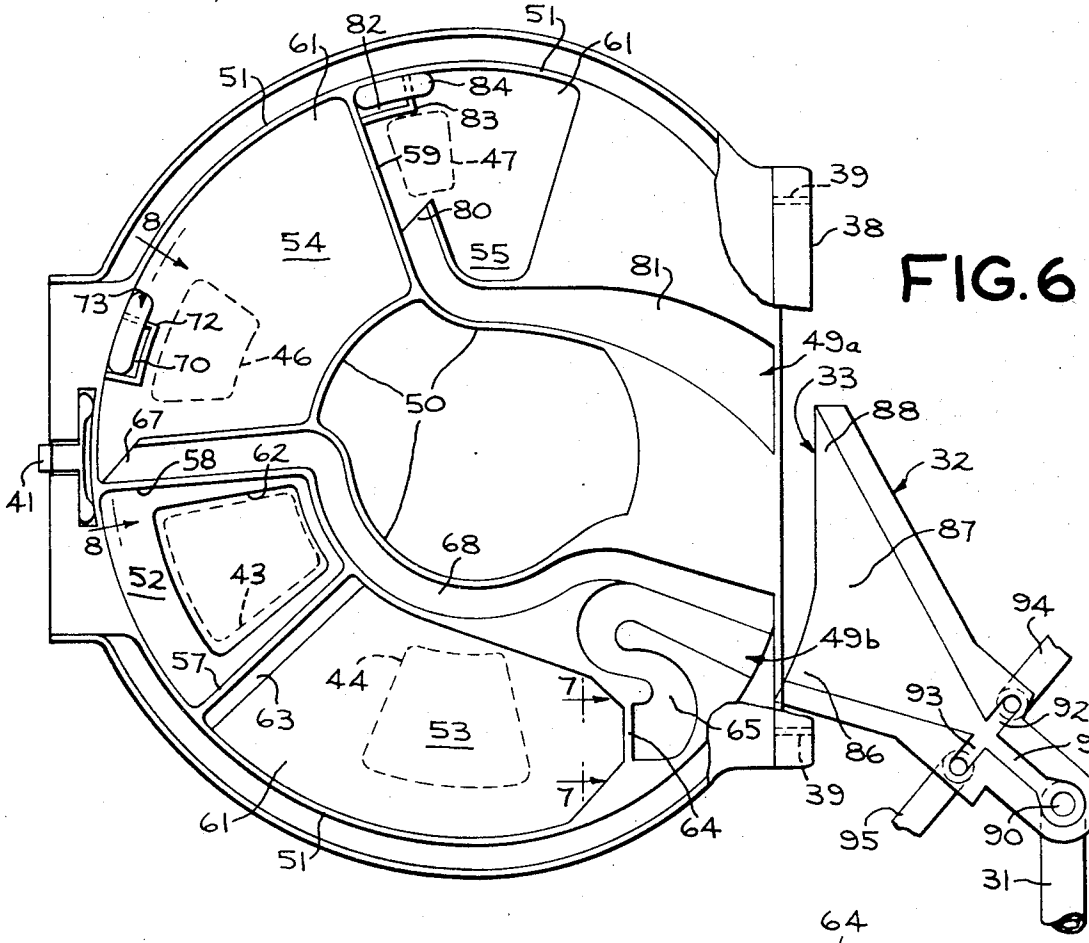


FIG.6

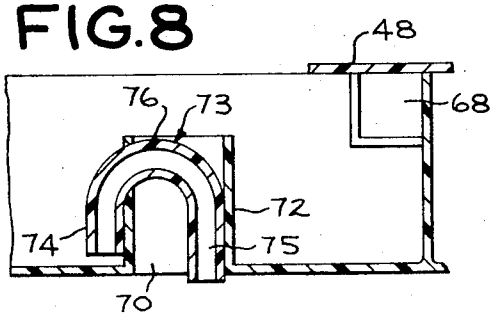


FIG.8

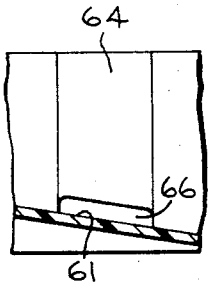


FIG.7

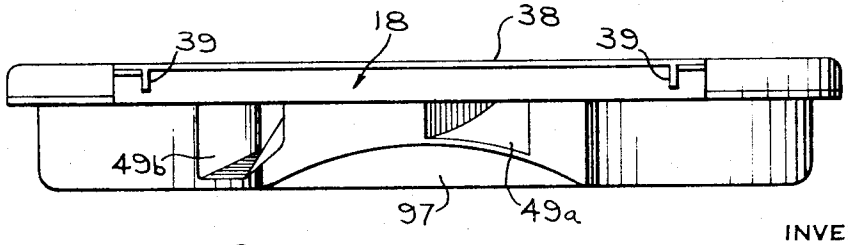


FIG.9

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ADDITIVE DISPENSING SYSTEM

BACKGROUND OF THE INVENTION

Recent automatic clothes washing machines customarily proceed through a sequence of operation in order to wash, rinse and spin dry clothes. The sequence ordinarily includes a presoak, a first liquid extraction operation, a wash operation, a second liquid extraction operation, a rinse operation, and a final extraction operation.

In order to obtain the most desirable results from these machines, it has been found advantageous to introduce certain additives into the water used for particular operations. A prewash additive is normally used in the soak operation, a soap or detergent is normally used in the washing operation and a bleach is often also used in this operation, while rinse agents are added to the rinse water.

In an automatic washing machine, it is desirable that these additives be dispensed automatically. When the dispensing of additives is automatic, the user may load the fabrics to be washed into the wash tub and place the additives in their proper compartments or containers, and the machine automatically completes the cycle of operations. Also, the best results are obtained if these various additives are dispensed with water so that additives are metered into the wash tub and evenly distributed rather than being concentrated into a few of the articles. Presently available washing machines such as the one disclosed in U.S. Pat. No. 3,320,777 by Everett D. Morey, assigned to General Electric Company, assignee of the present invention, shows an arrangement for dispensing rinse aid and bleach from two separate compartments cooperatively arranged so that a portion of the water used to fill the wash tube is directed first to the bleach compartment and then, at the proper time in the machine cycle, the stream of water is diverted to the compartment holding the rinse agent. Prior art as in U.S. Pat. No. 3,513,866 — W. A. Boothe, also assigned to General Electric Company, assignee of the present invention, shows a fluid amplifier for selectively diverting the stream of water for dispensing additives from separate compartments to the wash tube of an automatic washing machine. U.S. Pat. No. 3,044,667 — N. B. Lucas, provides a lid mounted single compartment dispenser for dry powder cleaning agent to be directed in a measured amount into the wash tub at a preselected time by mechanically opening a dispensing door. Another lid mounting dispenser of the single compartment type is shown in U.S. Pat. No. 3,127,067 — W. B. Hall, et al., in which the powder cleaning agent is flushed out of the compartment by a stream of water. It has been common practice to dispense additives only during fill operation by using the fill water stream. Prior art machines provide dispensing devices for prewash treating agents, wash agents, bleach and rinse aid agents. However, they utilize separate and independent dispensing means for adding the different agents. These arrangements increase the cost of the machine, and being separate when provided, are often placed in inaccessible areas because of the limited amount of available space in a washing machine cabinet.

Accordingly, it is an object of this invention to provide an additive dispensing system for an automatic washing machine having a plurality of storage compartments which are effective to selectively dispense presoak agents during a prewash operation, soap or detergent and bleach during a washing operation and to dispense rinse agents during a rinse operation. Another object is to provide a multi-compartment additive dispenser removably mounted on the underside of the access cover of a clothes washing machine.

Another object is to provide a multi-compartmentalized system for storing and then causing the dispensing of a plurality of additives at predetermined times in a machine cycle by sequentially directing recirculation fluid through the dispenser.

SUMMARY OF THE INVENTION

By this invention, there is provided a treating agent dispensing system in which the dispenser is hingedly mounted on the access cover above the wash tub of top-loading automatic fabric washing machines of the recirculation type that proceeds through a cycle of operations including a presoak, a first liquid extraction operation, a wash operation, a second liquid extraction operation, a rinse operation, and a final extraction operation. The dispenser is normally latched to the access cover for movement with the cover to an open position for access to the wash tub for loading fabrics therein, and unlatched for movement independent of the cover to a position over the tub for introducing treating agents into the dispenser.

The dispenser includes a plurality of compartments for storing treating agents to be dispensed selectively during the prewash, wash and rinse operations and a plurality of liquid inlets arranged to communicate with the compartments. In its operative effective position over the tub the liquid inlets are in a position to cooperate with the outlets of a liquid supply device. The liquid supply device is sequentially controlled to selectively direct recirculation liquid into preselected ones of the liquid inlets for mixing liquid with the treating agents being held in the compartments to flush the agents into the wash tub at predetermined times in a cycle of the automatic washing machine.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic front elevational view of a clothes washing machine incorporating my invention, the view being partly broken away and partly in section;

FIG. 2 is a perspective view showing the present invention in a clothes loading position;

FIG. 3 is a perspective view showing the present invention in a treating agent loading position;

FIG. 4 is a fragmentary sectional view taken along lines 4—4 of FIG. 3,

FIG. 5 is a fragmentary sectional view taken along lines 5—5 of FIG. 2;

FIG. 6 is a plan view of the dispensing system of the present invention with parts broken away;

FIG. 7 is a sectional view taken along lines 7—7 of FIG. 6;

FIG. 8 is a sectional view taken along lines 8—8 of FIG. 6;

FIG. 9 is a rear elevational view showing the inlets of the present dispenser;

FIG. 10 is a plan view of the dispenser of the present invention; and

FIG. 11 is a sectional view taken along lines 11—11 of FIG. 10.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to FIG. 1, I have shown therein a washing machine having a conventional perforated wash tub or basket 11 disposed within an outer imperforate liquid retaining tub 12. With this combination, the tubs 11 and 12 form suitable means for containing liquid and the fabrics to be washed in said liquid. The outer tub 12 is rigidly mounted within an appearance cabinet 13 which includes an access lid or cover 14 hingedly mounted on a hinge rod 16 on the top portion of the cabinet for providing access through an opening 17 to the basket 11.

Shown positioned over the tub 11 and projecting into the opening 17 is a wash water treating agent dispenser 18 which incorporates one embodiment of the dispensing system of the present invention. Preferably this is effected by removably and hingedly mounting the dispenser 18 to the underside of the access lid by suitable means to be described hereinafter in detail. At the center of the wash tub 11 there is positioned an agitator 19 for flexing clothes during a washing operation. Conventionally, the basket is mounted for rotation and the agitator is mounted for some type of oscillatory motion which will effect washing action on the clothes in the basket.

Basket 11 and agitator 19 are driven from a reversible motor 21 through a drive including a clutch 22 which through a suitable belt 23 transmits power to a transmission 24. When the motor 21 is rotated in one direction the transmission causes a slow speed oscillation of the agitator 19. Conversely, when the motor is driven in the opposite direction the transmission drives both basket and agitator at a high speed for centrifugal extraction of the liquid from the clothes. While the particular form of the drive means does not form a part of the present invention reference is made to U.S. Pat. No. 2,844,225 to James R. Hubbard et al., assigned to General Electric Company, assignee of the present invention.

In addition to operating the transmission 24 as described, motor 21 also provides a direct drive to a pump structure which includes separate pumping units 26 and 27. During the high speed operation pump 27 draws liquid from the outer tub 12 and discharges it through conduit 28. During wash or slow speed the pump 26 draws liquid in through conduit 29 and discharges through conduit 31. Conduit 31 extends up and terminates at a fluid amplifier or liquid flow diverter mechanism 32, which will hereinafter be described in detail. The diverter is fixedly mounted on the cabinet top and has its outlet end 33 arranged to cooperate selectively with suitable inlets in the dispenser 18 and the filter pan 34 in a manner that will be disclosed later in the description of the operation of the present invention.

Mounted on the cabinet 13 is a control compartment 36 in which are located control devices, including a cycle controller 37 which conducts the washing machine and the diverter 32 through cycles of operation.

By the present invention and more particularly in the embodiment shown in the drawings there is provided a dispensing system for an automatic fabric washing machine in which the user of the machine can select to store one or a combination of additives to be dispensed at preselected intervals in the cycle of an automatic washing machine. The choice of additives to be dispensed may be determined by the type of fabrics to be washed prior to the start of an automatic cycle of operation.

Referring now to FIGS. 2 and 3 of the drawing there is shown one embodiment of the invention wherein a straight portion 38 is provided with a pair of bifurcated ears 39 (FIGS. 4 and 9) formed integral with the dispenser 18. The ears 39 engage the rod 16 which has its free ends suitably journalled through the access lid 14 and into the cabinet top. Ears 39 and rod 16 form a hinge about which the dispenser may be rotated independent of the access lid 14. The bifurcated ears 39 are dimensioned to allow the removal of the dispenser from the machine when it is desirable not to dispense additives automatically or for easy cleaning of the dispenser away from the washing machine.

Diametrically opposite the portion 38 there is provided a latch member 41 which is adapted to engage a keeper or bracket 42 on the cover 14 (FIG. 5) for holding the dispenser in the latched position shown in FIG. 2. In this up or latched position the dispenser rotates with the lid 14 to an open position away from the opening 17 thereby exposing the wash tub 11 to the user for insertion of fabrics to be washed and for their removal at the end of the wash operation.

In order to provide access to the tub 11 and the fabrics therein whenever the lid is rotated to its open position, it is desirable to have the dispenser 18 rotate with the lid. To insure that the dispenser is latched to the access lid prior to rotating the lid to its open position the relationship of the machine cabinet top, access lid 14 and dispenser 18 may be designed such that the latch 41 and keeper 42 automatically engage when the access lid 14 is rotated to its closed position over the dispenser 18.

Subsequent to filling the wash tub 11 with fabrics to be washed and the determination is made to automatically dispense one or more treating agents into the machine tub the dispenser 18 may then be unlatched and rotated to the position shown in FIG. 3. In this down or effective position the dispenser is accessible to the user of the machine for selectively inserting treating agents to be automatically dispensed during the washing operation into one or all of a plurality of openings 43, 44, 46 and 47 provided in the cover member 48 of the dispenser 18. The openings 43, 44, 46 and 47 are defined by funnel-like inwardly and downwardly projecting wall portions that facilitate the introduction of treating agents therethrough. Generally a prewash or soak agent may be placed in opening 43 to be effective during the prewash or soak cycle of the wash operation, a detergent or washing agent may be placed in opening 44 and a bleach may be placed in opening 46 to be dispensed during the washing cycle of the wash operation while a rinse agent may be placed in opening 47 to be dispensed during the rinse cycle of the wash operation.

Referring now to FIG. 6, the dispenser is shown with the cover 48 removed therefrom to expose the details of construction of the present embodiment. The dispenser 18 as shown is generally an annularly-shaped segmented channel or trough defined by annular inner and outer walls 50 and 51 respectively. The outer wall 51 is generally imperforate except for inlets 49*a* and 49*b* located below portion 38 as to be in cooperative relationship with the outlet 33 of the diverter 32 when the dispenser 18 is in its effective position as shown in FIGS. 1 and 3. In the present embodiment, the dispenser 18 is divided into four annular compartments 52, 53, 54 and 55 by a series of radial walls 57, 58 and 59 which project upwardly from a bottom wall 61 to the cover 48 and extend from the inner wall 50 to the outer wall 51. The openings 43, 44, 46 and 47 in the cover 48 as shown in dotted lines in FIG. 6 communicate with the compartments 52, 53, 54 and 55 respectively so that presoak agents placed in opening 43 pass through compartment 52, detergent placed into opening 44 is stored in compartment 53, bleach placed into opening 46 is stored in compartment 54 and rinse agent placed into opening 47 is stored in compartment 55.

Unlike compartments 53, 54 and 55, compartment 52 is not designed to store a treating agent but merely provides a passageway for introducing prewash liquid treating agents directly into the tub 11 or into filter pan 34 to be effective during the first fill cycle of the machine. To this end the bottom wall portion of the compartment 52 has an opening 62 which is larger than the corresponding opening 43 in the cover 48 to facilitate easy dispensing of the prewash agent. Further, the opening is so located as to be directly over the filter pan 34, thus, if it is desired, the prewash agent may be dispensed from the filter pan as will hereafter be explained.

Detergent or soap to be dispensed from compartment 53 during the wash cycle is usually in solid, granular, or high viscosity water soluble form. The bottom wall 61 is provided with a discharge outlet or opening 63 adjacent the lower end of wall 57 and extending across substantially the entire width of the wall 57. At the opposite end of the compartment 53 from wall 57, there is provided an ingress wall 64 which has an opening 66 (FIG. 7) along the bottom wall 61. Opening 66 is connected to the inlet area 49*b* by a passageway 65. The detergent or soap powder entering the compartment 53 will arrange itself in a pile substantially across the full width of bottom wall 61. The opening 66 is so dimensioned that water entering therethrough is directed in a fan-like stream over the full width of the bottom wall. This shallow relatively high velocity discharge from opening 66 will encounter the dry power to undercut and intermix thoroughly therewith to effectively convey it along the bottom wall into outlet 63 and thence into tub 11. In practice, the flow of liquid through opening 66 continues after the powder has been evacuated, so there is no substantial residue within the chamber.

Bleach stored in compartment 54 is dispensed during the wash cycle subsequent to the dispensing of the detergent in a manner that will hereinafter be described in detail. Compartment 54 is defined by walls 50, 51, 58 and 59. Extending into compartment 54 along walls 50 and 58 is the outlet end 67 of a channel or passageway 68. Passageway 68 is located adjacent the cover 48 and connects the compartment 54 with the inlet area 49*b*. Located in the bottom wall 61 adjacent the outer wall 51 is a discharge outlet 70 through which the bleach stored in the compartment 54 is introduced into the tub 11. Bleach stored in the compartment 54 may be liquid and concentrated in form. In order to prevent liquid from draining into the tub prematurely, a wall or barrier 72 is located around the discharge outlet 70 in a manner that is effective to isolate compartment 54 from outlet 70. When the bleach is in concentrated form, the barrier allows mixing of the bleach stored in the compartment with water entering through outlet 67 and the mixture must rise above the top of barrier 72 before liquid can pass through opening 70. The flow of water entering the compartment from the passageway is metered in a manner to be described hereinafter.

Provision is made to drain the compartment 54 when the water flow from outlet 67 terminates. One embodiment shown in connection with the present invention is a siphon tube 73. The siphon 73 (FIG. 8) has its short leg 74 positioned within the chamber 54 and extending to a point adjacent the bottom wall 61. The longer leg 75 of the siphon 73 extends down outside of the barrier 72 and is positioned within the outlet 70. The top or curved portion 76 of the siphon passes through the barrier 72 at a point below which the liquid drains over the barrier.

When the mixture reaches a level that it drains over the barrier 72, it has also reached the top of the siphon at which point siphoning action starts with liquid draining through the siphon and through outlet 70. It will be observed that this action of draining through the siphon and outlet 70 will continue until the water entering the compartment 54 through outlet 67 terminates and then the mixture of bleach and water in the compartment will continue to flow out through the siphon until the chamber is emptied. While the embodiment shown herein is effective in draining the compartment, it should be understood that other methods may be employed and the specific means for draining the compartment 54 does not form a part of this invention.

Rinse agent which is dispensed during the rinse cycle is stored in compartment 55 which is defined by walls 50, 51, 59 and a wall portion 78 opposite wall 59. Extending into compartment 55 along the wall 50 and 59 is the outlet end 80 of a trough or passageway 81. The passageway 81 is located adjacent the cover 48 and connects compartment 55 with inlet area 49*a*. The provision for mixing rinse aid with water entering the compartment 55 and for draining the mixture from said compartment is similar to the arrangement provided in compartment 54. A discharge outlet 82 in the bottom wall 61 is isolated from the compartment 55 by a wall or barrier 83 and a siphon tube 84 is disposed to connect the compartment 55 with the outlet 82.

Provision is made in the present embodiment so that additives or treating agents stored in the compartments 53, 54 and 55 are retained in the dispenser 18 in the event it is inadvertently or prematurely rotated to its up position prior to the dispensing of all the additives. In compartments 54 and 55 when the contents stored therein may be in liquid form the openings 46 and 47 in the cover 48 are so located (FIGS. 6, 10 and 11) in relation to the compartment walls that a substantial re-

tention area is provided together with cover **48** to trap the contents as indicated by A in FIG. **11**. Provision is also made to prevent the contents of compartments **54** and **55** from discharging through the respective passageways **68** and **81**. The outlet ends **67** and **80** of the passageways **68** and **81** are located in the area of the compartments **54** and **55** away from the hinge end of the dispenser **18** so as to be disposed above the retention area when the dispenser is in its up position. In compartment **53** the passageway **65** between the inlet **49*b*** and the opening **66** has a U-shaped portion adjacent the opening **66** that is effective in trapping any wetted detergent from discharging through inlet **49*b***.

According to the present invention means for diverting recirculation flow into preselected ones of the dispenser inlet areas **49*a*** and **49*b*** is provided. This means may be a fluid amplifier as shown in FIG. **6**.

Referring now to FIG. **6**, there is shown an embodiment of a fluid amplifier which is capable of providing recirculating water from the tub **11** selectively to three outlet areas **86**, **87** and **88**. The fluid amplifier **32** is provided with a main inlet **90** which is connected to the hose **31**. A main passage **91** is formed in the amplifier connecting the main inlet **90** to areas **86**, **87** and **88**. The passage **91** is terminated adjacent control passages **92** and **93**. Control passages **92** and **93** are connected by hoses **94** and **95** to cams (not shown) provided in the cycle controller **37**. The cams may be actuated at predetermined times in the wash operation to selectively open and close passages **92** and **93** to atmosphere. During the prewash operation the cams are positioned to keep both passages **92** and **93** open to atmosphere, there being no transverse pressure differential across the stream of recirculation water flowing through passage **91**, the water will exit generally at area **87**. During the rinse operation the cycle control actuates a cam to close passage **92**, the transverse pressure differential across the stream of water will cause it to exit generally at area **88**. During the wash operation a cam is actuated to close passage **93**, the transverse pressure differential across the stream of water will cause it to exit generally at area **86**.

In operation during the prewash portion of the washing cycle water exiting from area **87** is directed to a recess area **97** (FIGS. **4** and **9**) which permits the water to flow under the dispenser **18** and directly into the tub **11**. The flow of water from area **87** has sufficient velocity to flow into the filter pan **34** when in use.

In dispensing soap or detergent and bleach into the tub during the wash cycle of a machine washing operation, it is desirable to dispense the soap or detergent prior to the bleach so as not to reduce the effectiveness of optical brightness that may be included in present day detergents.

During the wash operation water exiting from area **86** is directed at inlet area **49*b***. The inlet **49*b*** is proportionally divided so as to direct a major portion, for example, approximately 80 percent of the recirculation flow into passageway **65** with passageway **68** receiving the remaining relatively smaller portion of said flow.

The arrangement in the present embodiment is such that compartment **53** through passageway **65** and opening **66** receives an immediate flow of water sufficient to provide the necessary velocity to flush detergent out of compartment **53**. Concurrently, however the proportionally smaller flow of water directed into the passageway **68** is required to mix with the bleach and rises to a level above the barrier **72** and siphon tube **73** before the compartment **54** is evacuated. This combination of a large portion of water directed into compartment **53** and a relatively small flow into passageway **68** plus the necessity of first diluting the bleach causes the desired time delay between the discharge of detergent and the subsequent introduction of the bleach-water mixture into the tub **11**.

During the rinse operation water exiting from area **88** is directed into inlet **49*a***. The water entering inlet **49*a*** is transferred along passageway **81** through its outlet **80** into the compartment **55** where the rinse agent stored therein is mixed and diluted before it rises above the barrier **83** and siphon tube **84** and is introduced into the tub.

The dispensing system described herein provides a dispenser means and a liquid supply means for the dispenser that is effective during the slow speed or washing cycle of the machine operation. Additives stored in the dispenser are flushed out by the recirculation flow which is effective only after the tub is filled with water and the washing action of the machine has started. Since recirculation of the liquid in the tub is provided throughout a washing operation, that is as long as motor **21** causes oscillation of agitator **19**, complete flushing of treating agent is insured together with the cleansing of the storage compartments. Washing action of the agitator and recirculation of liquid occur during the prewash, wash and rinse cycle of the washing machine operation. By diverting the recirculation flow into a selected one of a plurality of liquid inlets in the dispenser, a treating agent may be dispensed during each of the several wash actions and their accompanying recirculating flow.

By the present invention there is provided a dispensing system for dispensing both dry, powdered treating agents and treating agents in liquid form that will automatically clean the dispenser of residue at the completion of each operation.

While in accordance with the Patent Statutes, there has been described what, at present, is considered to be the preferred embodiment of the invention, it will be obvious to those skilled in the art that various changes and modifications may be made thereto without departing from the invention, and it is intended therefore in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of this invention.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A treating agent dispenser system for a washing machine of the top loading type comprising;

a dispenser adapted to be mounted above the machine's wash tub, having a plurality of compartments for holding treating agents to be dispensed into the wash tub and a plurality of liquid inlet means arranged to communicate with said compartments;

means for hingedly mounting the dispenser above the was tub;

said dispenser including a top cover member for enclosing said compartments;

said cover having openings above each of said compartments;

said openings being so located in relation to the walls of said compartments to provide a retention enclosure to prevent spillage of said treating agents when the dispenser is raised for access to the tub prior to the completion of a dispensing operation;

liquid supply means positioned for directing liquid into said liquid inlet means; and

means for selectively diverting said liquid into preselected ones of said liquid inlet means for mixing the liquid with said treating agents to flush said agents into the wash tub at predetermined times in a cycle of said automatic washing machine.

2. A treating agent dispenser system as set forth in claim 1, wherein the washing machine is provided with an access lid above the wash tub;

means for hingedly mounting the dispenser on the access lid;

means for latching said dispenser for movement with said lid to a lid open position for access to the wash tub and for unlatching said dispenser for movement independent of said lid to a position over said tub for access to said openings for introducing treating agents through said openings.

3. A treating agent dispenser system as set forth in claim 1 wherein at least one of said compartments is provided with an outlet barrier for holding and diluting said treating agent with said liquid entering the compartment before allowing said diluted mixture to flow over said barrier and into said wash tub;

means for evacuating the mixture held in said compartments by said barrier after the liquid flow into said compartment terminates.

4. A treating agent dispenser system as set froth in claim 1 wherein at least one of said liquid inlets includes a U-shaped portion between said liquid inlet and its associated holding compartment;

said U-shaped portion being so arranged to entrap treating agent therein when said access lid is rotated to its open position prior to the automatic dispensing of said treating agent thereby averting the premature dispensing of the treating agent into said wash tub.

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