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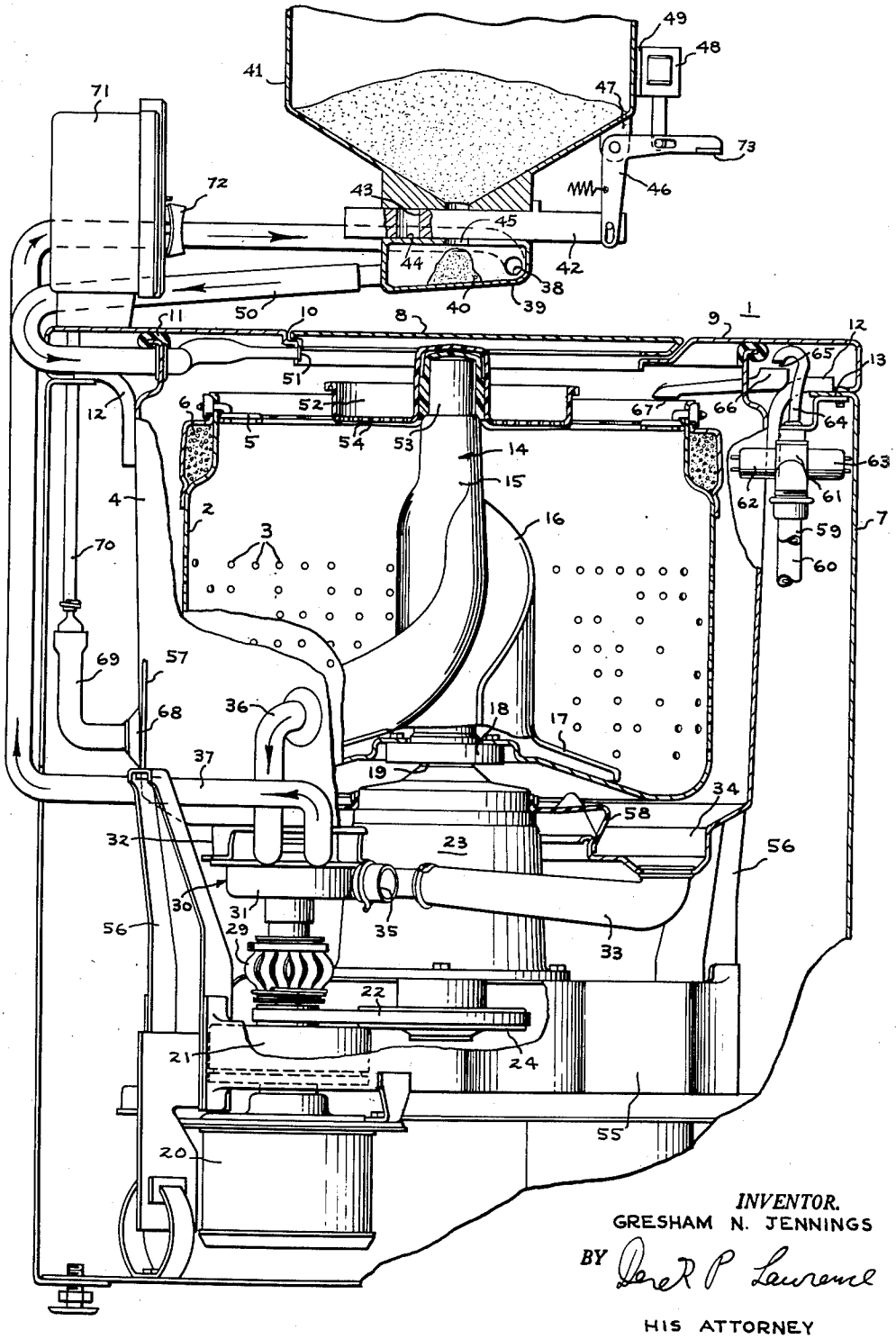

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WASHING MACHINE WITH STORAGE AND DISPENSING SYSTEM FOR GRANULAR TREATING AGENTS

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This invention relates to automatic clothes washing machines, and more particularly to an arrangement for such machines which recirculate water whereby granular treating agent may be stored and introduced into the machine as desired.

It is an object of my invention to provide a washing machine having an improved dispensing system for granular treating agents whereby such agents may be stored and introduced into the machine without the necessity for any particular positioning of the storage means relative to the washing parts of the machine.

A more particular object of my invention is to provide such a washing machine, wherein a stream of washing liquid is continually recirculated from the means containing the wash liquid back over the clothes, the recirculation system being utilized for the introduction of granular treating agent.

In one aspect of my invention, I provide a washing machine wherein liquid and clothes to be washed are contained within conventional container means, and means for flexing clothes in the container are also provided in the usual manner. Suitable pumping means are provided to cause liquid to be guided from the container means through conduit means and back into contact with the clothes in the container means. Within the conduit means is included a chamber arranged to receive granular treating agent from a storage receptacle within which a substantial quantity of the treating agent may be provided. Suitable and conventional means for selectively feeding the treating agent from the chamber to the receptacle and sealing them from each other are provided. In this manner, a desired quantity of granular treating agent may be introduced into the chamber prior to a washing operation. Then, when the washing operation starts and the pumping means causes the liquid to pass through the conduit means, the granular treating agent will be dissolved and carried into contact with the clothes by the recirculating flow of liquid. It will be understood that the term "granular" is intended to include all the various shapes of particles, including for instance grains, powders, beads and flakes, which commercially provided treating agents assume.

The subject matter which I regard as my invention is particularly pointed out and distinctly claimed in the concluding portion of this specification. The invention itself, however, both as to its organization and method of operation, may best be understood by reference to the following description taken in conjunction with the accompanying drawing.

In the drawing, the single FIGURE is a side elevational view of a clothes washing machine including my invention, the view being partially broken away and partially in section to illustrate details.

Referring now to the drawing, I have shown therein an agitator-type clothes washing machine 1 having a conventional basket or clothes-receiving receptacle 2 provided over its side and bottom walls with perforations 3 and disposed within an outer imperforate tub or casing 4, the basket 2 and casing 4 forming together container means for containing liquid and clothes to be washed: the liquid retaining function is performed by the imperforate tub 4 while the clothes containing function is provided by the perforated basket 2. Basket 2 may be provided with a

suitable clothes retaining member 5 for preventing clothes from being floated over the top of the basket, and with a balance ring 6 to help steady the basket when it is rotated at high speed within the tub 4.

Tub 4 is rigidly mounted within an appearance cabinet 7 which is arranged so as to substantially enclose all the washing parts of the machine. The cabinet 7 includes a cover 8 hingedly mounted in the top portion 9 of the cabinet for providing access to an opening 10 to the basket 2. As shown, a gasket 11 may be provided so as to form a seal between the top of tub 4 and portion 9 of the cabinet thereby to prevent escape of moisture and moist air into the cabinet around the tub. The rigid mounting of tub 4 within cabinet 7 may be effected by any suitable means. As a typical example of one such means I have provided strap members 12, each of which is secured at one end to an inturned flange 13 of the cabinet and at its other end to the outside of tub 4. At the center of basket 2 there is positioned a vertical axis agitator, generally indicated by the numeral 14, which includes a center post 15 and a plurality of curved water circulating vanes 16 joined at their lower ends by an outwardly flared skirt 17. The agitator 14 represents a means for causing appropriate circulation of liquid within the tub 4 and this in turn causes flexing of clothes contained in basket 2 so that a washing action is performed on them.

Both the clothes basket 2 and the agitator 14 are rotatably mounted. The basket is mounted on a flange 18 of a rotatable hub 19, and the agitator 14 is mounted on a shaft (not shown) which extends upwardly through the hub 19 and through the center post 15 and is secured to the agitator so as to drive it. During the cycle of operation of machine 1, water is introduced into the tub 4 and basket 2, and the agitator 14 is then oscillated back and forth on its axis, that is, in a horizontal plane within the basket, to wash the clothes therein. Then after a predetermined period of this washing action, basket 2 is rotated at high speed to extract centrifugally the washing liquid from the clothes and discharge it to drain. Following this extraction operation, a supply of clean liquid is introduced into the basket for rinsing the clothes and the agitator is again oscillated. Finally, the basket is once more rotated at high speed to extract the rinse water.

The basket 2 and agitator 14 may be driven through any suitable means as the specific transmission means is not a feature of the present invention. By way of example, I have shown them as driven from a reversible motor 20 through a drive including a clutch 21 mounted on the motor shaft. The clutch may be of the conventional type which allows motor 20 to start without a load and then accept the load as it comes up to speed. A suitable belt 22 transmits power to a transmission assembly 23 through a pulley 24. Thus, depending upon the direction of motor rotation, the pulley 24 and transmission 23 are driven in opposite directions. The transmission 23 is so arranged that it supports and drives both the agitator drive shaft and basket mounting hub 19. When motor 20 is rotated in one direction the transmission causes agitator 14 to oscillate in a substantially horizontal plane within the basket 2. Conversely, when motor 20 is driven in the opposite direction, the transmission rotates the wash basket 2 and agitator 14 together at high speed for centrifugal extraction. While the specific type of drive mechanism used does not form part of the invention, reference is made to Patent 2,844,225 issued to James R. Hubbard et al. on July 22, 1958, and owned by the General Electric Company, assignee of the present invention. That patent discloses in detail the structural characteristics of a transmission assembly suitable for use in the illustrated machine.

In addition to operating the transmission 23, as de-

scribed, motor 20 also provides a direct drive through a flexible coupling 29 to a pump structure, generally indicated at 30, and which may include two separate pumping units 31 and 32 both operated simultaneously in the same direction by motor 20. Pump 31 has an inlet which is connected by a conduit 33 to an opening 34 formed at the lowermost point of tub 4. Pump 31 also has an outlet which is connected by a conduit 35 to a suitable drain (not shown).

The pump 32 has an inlet connected by a conduit 36 to the interior of tub 4 and an outlet connected to a conduit 37. Conduit 37, in turn, has an outlet 38 leading to a chamber 39 adapted to receive a quantity of granular treating agent (such as detergent), generally indicated at 40, from a storage receptacle 41. As shown, the storage receptacle 41 and chamber 39 may be positioned outside the washing machine and remote therefrom, if so desired, in order to afford a suitable amount of volume to the storage container 41. Alternatively, if the cabinet 7 is sufficiently large and the washing components sufficiently small, it is equally possible to provide the receptacle 41 and chamber 39 anywhere within the cabinet 7.

As shown, the receptacle 41 is preferably positioned directly above the chamber 39 so that the force of gravity assists in the discharge of the granular treating agent when it is desired to provide a quantity of granular treating agent 40 within the chamber 39. The selection of whether granular treating agent is discharged from receptacle 41 into chamber 39, or whether the receptacle and chamber are sealed from each other may be made by any suitable standard mechanism.

As an example of such a mechanism, there is shown a slide member 42, positioned at the bottom of receptacle 41, which has an opening 43 formed therethrough. The bottom 44 of the receptacle has an opening 45; normally the openings 43 and 45 are in the positions shown so that member 42 seals opening 45 and no treating agent can pass from receptacle 41 down into chamber 39. Member 42 is movable by any suitable means; as shown, a linkage 46 may be provided pivotally secured on pin 47 and movable by a solenoid 48 secured on a bracket 49 to receptacle 41. When solenoid 48 is energized, it pulls link 46 to the right causing openings 43 and 45 to become aligned. Treating agent then passed by gravity down into chamber 39, the quantity depending upon the length of time the openings are aligned. When solenoid 48 is de-energized, appropriate biasing means (not shown) return member 42 to the position shown, thereby stopping passage of treating agent into chamber 39. Of course, where the treating agent has a tendency to pack, appropriate stirring means (not shown) may be provided for keeping the treating agent loose enough to flow through openings 43 and 45. Typically, the stirring means would be controlled with solenoid 48 so as to be operative at the same time.

From chamber 39, another conduit section 50 is provided which leads from the chamber back down to a nozzle 51 positioned to discharge into a filter pan 52 secured on the top portion 53 of agitator 14 so as to be movable therewith. Filter pan 52 includes suitable small openings 54 in its bottom so that liquid passing thereinto from nozzle 51 then flows down through the openings 54 to join the liquid and clothes within basket 2. In this manner, the filter pan 52, with its small openings 54, causes lint which is separated from the clothes during the washing operation to be filtered out of the water and thus prevents it from being redeposited on the clothes. This type of structure is more fully described and claimed in Patent 2,481,979 issued to Russell H. Colley on September 13, 1949 and assigned to General Electric Company, owner of the present invention.

The pumps 31 and 32 are formed so that in the spin direction of rotation the pump 31 draws in liquid from opening 34 through conduit 33, and then discharges it through conduit 35 to drain. In the other direction of rotation, the pump 32 draws in liquid through conduit 36 and discharges it through conduit 37, chamber 39 and conduit 50, each of the pumps being substantially inoperative in the direction of rotation in which it is not used.

Continuing with the description so that the invention may be observed in a complete operative washing machine, the motor 20, clutch 21, transmission 23, basket 2 and agitator 14 form a suspended washing and centrifuging system which is supported by the stationary structure of the machine (which includes tub 4) so as to permit isolation of vibrations from the stationary structure; it will be understood that such vibrations occur primarily as a result of high speed spinning of basket 2 and the load of clothes therein as mentioned above. One suitable suspension construction which may be used includes a bracket member 55 with transmission 23 mounted on top thereof and motor 20 mounted to the underside thereof. The bracket member in turn is secured to upwardly extending rigid members 56, and each of the two upwardly extending members 56 is connected to a cable 57 supported from the top of the machine. While only a portion of the suspension system is shown in the drawing, such a vibration isolating system is fully described and claimed in Patent No. 2,987,190 issued on June 6, 1961, to John Bochan and assigned to General Electric Company, assignee of the present invention.

In order to accommodate the movement which occurs between the basket 2, which forms a part of the moving system, and the tub 4, which is secured to the stationary cabinet 7, tub 4 is joined to the upper part of transmission 23 by a suitable flexible boot member 58. Boot 58 may be of any suitable configuration, many of which are known in the art, to permit relative motion of the parts to which it is joined without leakage therebetween.

Completing now the description of the machine as illustrated in FIGURE 1, hot and cold water may be supplied to the machine through conduits 59 and 60 which are adapted to be connected respectively to sources of hot and cold water (not shown). Conduits 59 and 60 extend into a conventional mixing valve structure 61 having solenoids 62 and 63 so that energization of solenoid 62 permits passage of hot water through the valve to a hose 64, energization of solenoid 63 permits passage of cold water through the valve to hose 64, and energization of both solenoids permits mixing of hot and cold water in the valve and passage of warm water into outlet 64. From the conduit 64, the water passes through a suitable air gap 65 into a receiving member 66 which discharges through an outlet 67 into the basket 2. The air gap 65 makes it impossible for water to be siphoned from the machine to contaminate the incoming water supply. Such air gaps as that shown at 65 are almost always required by municipal codes or by law for appliances such as washing machine 1, since otherwise it would be possible for an entire municipal water supply to be contaminated from a single appliance.

It will be seen from the foregoing description of the water supply that when one or both of the solenoids 62 and 63 are energized, water enters into basket 2 and tub 4. The level to which the water rises in the basket and tub may be controlled by any suitable means. One typical means of doing this is to provide an opening 68 in the side of tub 4 adjacent the bottom thereof, the opening 68 being connected through a conduit 69 and a tube 70 to a conventional pressure sensitive device (not shown) which may be positioned within the backsplasher 71 of machine 1. In the conventional manner, as the water rises in basket 2 and tub 4, it exerts increasing pressure on the column of air trapped in tube 70, and at a predetermined pressure level the column of air then trips the pressure sensitive mechanism to shut off whichever of solenoids 62 and 63 may be energized. The backsplasher 71 may have suitable manual controls, such as

that shown at 72, extending therefrom so that the particular type of cycle, including washing and spin speeds, water temperatures, the water level within the tub 4 and basket 2, and other variables generally provided in modern washing machines, may be controlled to effect the washing of different types of fabrics.

During a washing operation, one or both of the solenoids 62 and 63 is energized to cause water to be introduced from the supply system, passing through the air gap 65 and then into the basket 2 and tub 4 until an appropriate level is reached therein. At that time the level control, which has been stated may be of the conventional type, de-energizes the inlet valve solenoids and energizes motor 20 in the direction to cause agitation by operation of agitator 16 within basket 2. This also causes circulation of liquid from the tub 4 through pump 32 in the direction shown by the arrows. It will be understood that, prior to this time, treating agent will have been introduced into chamber 39 by energization of the solenoid 48 (by any suitable manual control, such as that shown at 73) so that a quantity of treating agent 40 is positioned as shown within the chamber 39. When the pump 32 starts the recirculatory action through conduit 36, 37, and 50 indicated by the arrows, the liquid passes through chamber 39 dissolving the treating agent and thus carrying it in solution to be ejected through nozzle 51 and passed through filter pan 52 into basket 2 so as to contact the clothes.

It will readily be seen that there is a forced flow of liquid through chamber 39 which acts to dissolve the granular treating agent 40. This permits the treating agent receptacle and chamber to be positioned at any desired point, either within the machine or, as shown, at a point removed from the machine. This is of prime importance inasmuch as granular soaps and detergents are the most popular type presently available, and because of the difficulty of causing such detergents to flow or be passed properly into the wash basket in their dry state, excepting when they are positioned directly over the wash basket; such a location is most inconvenient for virtually every other purpose.

It can further be seen that, because of the fact that recirculation of the liquid is provided throughout a washing operation, that is, as long as motor 20 causes oscillation of agitator 14, complete solution of the treating agent 40 within chamber 39 is insured together with the cleansing of the chamber. This is a most important feature inasmuch as, to some extent, some granular treating agents are relatively slow to dissolve fully and the continued recirculation of liquid eliminates any difficulty in this area.

It will be understood that at the end of any desired period of washing, selected manually by member 72, the motor 20 will reverse itself. As explained, this causes spinning of the basket 2 within tub 4 so as to extract liquid from the clothes. At this time the pump 31 becomes effective to drain the tub, with the pump 32 doing nothing more than pulling air in through nozzle 51. A rinsing operation, substantially similar to the washing operation, may then be provided, with a subsequent and final spin being provided to damp-dry the clothes.

It can be seen that the treating agent dispenser may be included as an integral part of the machine, dependent entirely upon the functioning of the machine and completely separate from the source of liquid supply, thereby satisfying the requirement that there be no possibility that the source of supply may be contaminated by use of the appliance.

It will be understood that while in accordance with the patent statutes I have described what at present is considered to be the preferred embodiment 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 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. A washing machine comprising: container means for containing liquid and clothes to be washed; means for flexing clothes in said container; pumping means; conduit means connected with said pumping means for providing liquid from said container means through said pumping means and back into contact with the clothes in said container means; said conduit means including a chamber for receiving granular treating agents; a storage receptacle for granular treating agents; and means for selectively feeding treating agent to said chamber from said receptacle or sealing said chamber from said receptacle; said storage receptacle being positioned directly over said chamber thereby to utilize gravity as at least part of the force moving treating agent from said receptacle to said chamber.

2. The apparatus defined in claim 1 wherein common drive means are provided for said clothes flexing means and said pumping means.

3. A washing machine comprising: container means for containing liquid and clothes to be washed comprising a rotatable basket for containing the clothes and an imperforate tub about said basket for containing liquid; means within said basket for flexing the clothes therein; pumping means; conduit means connected with said pumping means for guiding liquid from said tub through said pumping means and back into said basket; said conduit means including a chamber for receiving granular treating agent; a storage receptacle for granular treating agents; and means for selectively feeding treating agent to said chamber from said receptacle or sealing said chamber from said receptacle; said storage receptacle being positioned directly over said chamber thereby to utilize gravity as at least part of the force moving treating agent from said receptacle to said chamber.

4. A washing machine comprising: container means for containing liquid and clothes to be washed comprising an inner basket for containing clothes and an outer imperforate tub about said basket for containing liquid; an agitator extending vertically upwardly within said basket for washing clothes therein; a filter pan secured on the top of said agitator; pumping means; conduit means connected with said pumping means for guiding liquid from said tub through said pumping means and back into said basket through said filter pan; said conduit means including a chamber for receiving granular treating agent; a storage receptacle for granular treating agents; and means for selectively feeding treating agent to said chamber from said receptacle or sealing said chamber from said receptacle; said storage receptacle being positioned directly over said chamber thereby to utilize gravity as at least part of the force moving treating agent from said receptacle to said chamber.

5. The apparatus defined in claim 3 wherein said basket is perforated over a substantial part of its side and bottom walls.

6. A washing machine comprising: a casing; container means within said receptacle for containing liquid and clothes to be washed; means for flexing clothes in said container means; pumping means within said casing; conduit means connected with said pumping means for guiding liquid from said container means through said pumping means and back into contact with the clothes in said container means, said conduit means including a portion extending outside said casing; said conduit portion including a chamber for receiving granular treating agents; a storage receptacle for granular treating agents positioned directly above said chamber; and means for selectively feeding treating agents to said chamber from said receptacle or sealing said chamber from said receptacle.

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