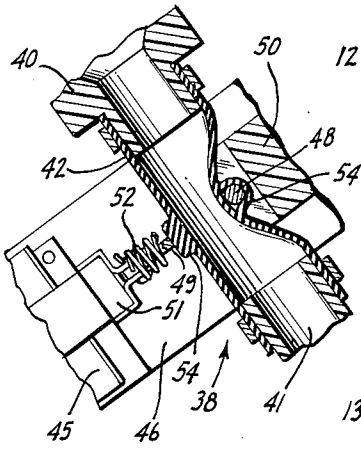
April 18, 1961 J. R. HUBBARD ET AL 2,979,931

WASHING MACHINE WITH WASHING-AID DISPENSER

Filed Feb. 5, 1959

FIG. 4.



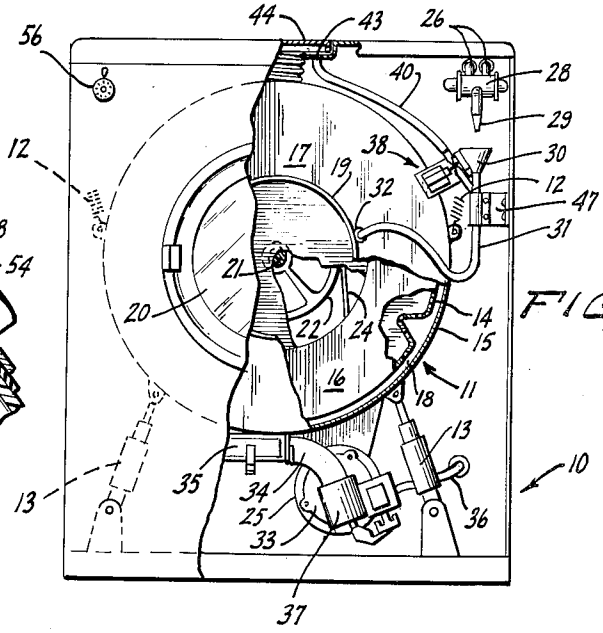


FIG. 1.

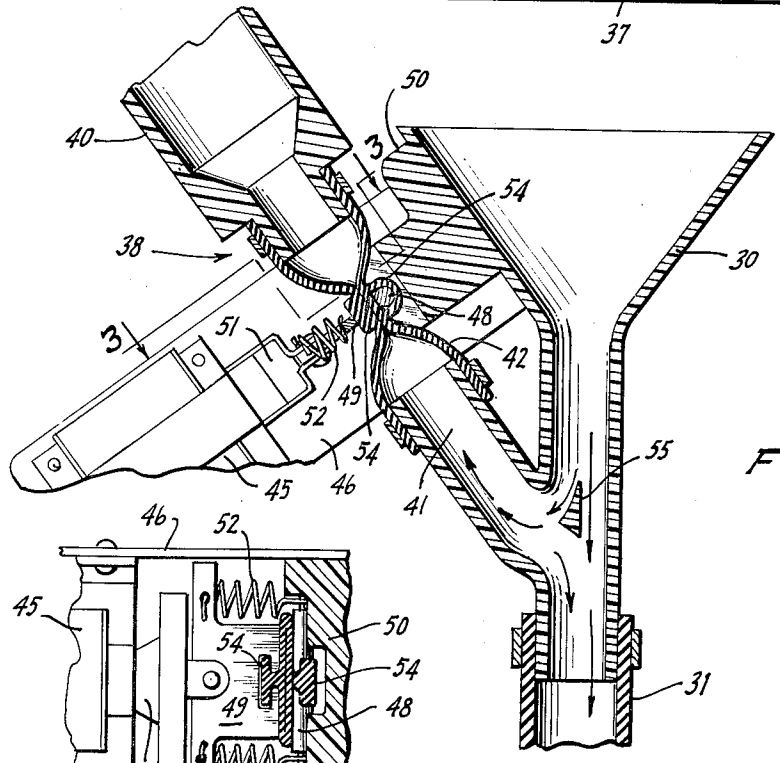


FIG. 2.

FIG. 3.

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WASHING MACHINE WITH WASHING-AID DISPENSER

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9 Claims. (Cl. 68—12)

The present invention relates to laundry apparatus and particularly to clothes washing machines of automatic type in which clothes are washed and rinsed in water within a clothes container.

A clothes washing machine of the above mentioned variety usually functions first to wash clothes in water contained in the washing container, then to extract the wash water from the clothes and container, thereafter to rinse the clothes in water freshly supplied to the container, and finally to extract the rinse water from the clothes and container. In a machine of that type, satisfactory washing of clothes requires addition of washing aids, such as detergents, bleaches and the like, and it is desirable that the washing aid be introduced automatically into the clothes container with water being delivered thereto.

It is therefore an object of this invention to provide a new and improved arrangement for use with an automatic washing machine, which arrangement is adapted to receive a quantity of washing aid and to discharge it automatically into the washing container at the proper time during operation of the machine.

It is also an object of the invention to provide a washing aid discharging arrangement in which water being supplied for delivery to the washing container, is mixed with the washing aid before the latter passes into said container.

Other objects and characteristic features of this invention have to do with the provision of a novel washing-aid dispenser arrangement whereby part of the water being fed to the washing container, is diverted from its normal path of flow, the diverted water being used for mixing with the washing aid so that the latter is properly diluted or dissolved before its admission into said container, the diverted water being also used for flushing the washing-aid storing and feeding portions of the dispenser arrangement so that the latter becomes self-cleaning.

Toward realization of the above mentioned main objects and characteristic features, the arrangement of this invention employs a washing-aid discharging arrangement in combination with the system which normally supplies water for delivery to the clothes washing container. In this respect, the means which is utilized to store the washing-aid includes a passageway having an outlet communicating with the inlet conduit of the water-supplying system. This passageway is controlled by means of a valve operated by the timer mechanism which functions to govern the operations of the machine. A flow interference element is interposed in the water inlet conduit, adjacent the outlet opening of the washing-aid passageway, to divert water from said conduit into said passageway.

The full nature of the invention and the manner in which the above noted objects and features are achieved, will be more fully understood from the following description taken in conjunction with the accompanying drawing, in which:

Figure 1 is a front view, partly in elevation and partly in section, illustrating a clothes washing machine which incorporates a preferred embodiment of the invention;

Figure 2 is an enlarged fragmentary sectional view of the washing-aid discharging arrangement, and illustrates portions of the control mechanism in one operative position;

Figure 3 is a sectional view taken substantially on line 3—3 of Figure 2; and

Figure 4 is a view similar to Figure 2 but illustrates the portions of the control mechanism in another operative position.

With more particular reference to the drawing, there is shown in Figure 1 one type of washing machine which is suitable for use with this invention. The essential elements of the illustrated machine includes cabinet structure **10** which houses a drum-and-tub assembly **11**. This drum-and-tub assembly may be and preferably is suspended by means of springs **12** and shock absorbers **13**, for example, in the manner set forth in United States Patent No. 2,642,996, issued on June 23, 1953, in the name of Oeler et al., and assigned to the assignee of the present invention. The assembly **11** comprises a perforated cylindrical tumbling drum **14** adapted to rotate about a substantially horizontal axis within a cylindrical liquid-retaining tub **15**. The front wall **16** of the drum and the front wall **17** of the tub are each provided with an opening **18** and **19**, respectively, said openings being disposed concentrically and adapted to register with the customary access door **20**.

The drum **14** is provided with a rearwardly extended axial shaft **21** which carries a pulley **22**. This pulley is actuated by means of a belt **24** which is adapted for engagement with the usual multiple speed transmission driven by a motor **25** and operable to rotate the drum at low tumbling speeds for washing and rinsing operations and at high centrifuging speed for water-extracting operations.

For washing and rinsing operations, water is fed to the drum-and-tub assembly through suitable water supply means which is adapted to supply either hot water or a mixture of hot and cold water. As shown, the water supplying means includes hot and cold water connections **26** and a solenoid valve **28** which controls the flow of water through said connections, the hot water or the mixture of hot and cold water being discharged through a common outlet **29**. From this outlet, water passes into a funnel **30** which discharges into conduit **31**, the latter leading into the tub **15** through an aperture **32** in the front wall **17** of said tub.

The water is withdrawn from the tub-and-drum assembly by function of a motor-driven drain pump **33** which communicates with a lower part of the tub **15** by means of a conduit **34** and a sediment trap **35** through which the drain water passes. Drainage of the water from the drum-and-tub assembly and out through a drain line **36**, is controlled by function of a solenoid actuated valve **37** interposed in the drainage system.

As illustrated, and in accordance with this invention, the washing machine is provided with a washing-aid dispenser which is indicated generally at **38** and which comprises a receptacle for receiving and containing washing-aid material, and a valve device for controlling the discharge of said material from said receptacle. In the illustrated embodiment, the receptacle takes the form of an elongated tubular member **40** adapted to discharge into a passageway **41** which opens into the water-supplying conduit **31** and, as best seen in Figures 2 and 4, a pliable tubular sleeve **42** is disposed between the discharge end of said receptacle member and the inlet end of said passageway. As more clearly appears in Figure 2, the passageway **41** may be and preferably is defined by the lateral branch of a generally Y-shaped element, the vertical

branch of which forms the spout portion of the funnel 30.

In using the above described dispensing arrangement, washing-aid material is introduced into the receptacle member 40 which, for that purpose and as shown in Figure 1, has an upper end 43 accessible through the customary top opening portion 44 which usually is provided for the addition of soap or the like to the washing machine. The washing-aid material introduced into the receptacle member 40 is retained therein by function of a valve structure which is adapted to control the passage of said material from said member into the conduit 31 through the passageway 41. As illustrated, the valve structure takes the form of a pinch valve which includes the hereinbefore mentioned flexible sleeve 42 and a solenoid 45. This solenoid is mounted on a support 46 suitably carried by the funnel assembly which is supported by means of a bracket 47 (Figure 1) attached to the cabinet structure.

In operation, the solenoid 45 functions to pinch the pliable sleeve 42 and, for that purpose, there is provided a pair of confronting pressure bars 48 and 49 disposed to embrace opposite sides of said sleeve and to extend transversely thereof. The pressure bar 48 is supported in fixed position by means of a mounting block 50 whereas the other pressure bar 49 is connected for movement with the reciprocating core or armature 51 of the solenoid 45.

As clearly seen in Figures 2 and 3, the bar 49 is resiliently urged by means of springs 52 in a direction toward the fixed pressure bar 48. Thus, the pressure bars act normally to pinch the sleeve 42 so as to prevent communication between the receptacle member 40 and the feeding conduit 31 through the passageway 41, when the solenoid 45 is deenergized. However, upon energization of said solenoid and as is represented in Figure 4, the pressure bar 49 is retracted against the force of the springs 52 and thus effects opening of the valve to establish communication between said member 40 and said passageway 41 and conduit 31. In order to insure adequate opening of the valve, the sleeve 42 is provided with laterally projecting tabs 54 to which the pressure bars are anchored. In this manner the side of the sleeve 42 adjacent the fixed bar 48 remains stationary while the side of said sleeve adjacent the movable bar 49 is retracted with the latter in the manner shown in Figure 4.

In particular accordance with the invention, means is provided to obtain self-cleaning of the valve, and also to insure automatic mixing of water with the washing-aid material prior to passage of said material into the washing container. For this purpose, a flow interference member 55 (see Figure 2) is disposed in the path of the inflowing water. In the illustrated preferred embodiment and as clearly appears in Figure 2, the interference element 55 is located adjacent the outlet of the passageway 41 so as to divert part of the water from its normal path of flow to the inlet conduit 31, and to direct the diverted water into the passageway 41, as is represented by the flow-arrows in said Figure 2. The water which is so diverted and directed, will gravitate back through said passageway and thence to the inlet conduit 31. This water movement creates a turbulence or churning action which is effective in thoroughly cleaning the valve. Moreover, when the valve is opened the turbulence extends into the receptacle member 40 and causes water to mix with the washing aid, the mixture flowing from said member, through the passageway 41 and conduit 31, into the washing container.

In practice, the dispenser solenoid 45, the solenoid of the water-supplying valve 28 and the solenoid of the water-draining valve 37, are operated in proper relation and sequence by function of a timer-operated control 56. This control may be and preferably is of the type which is well known in the art and, therefore, has not been shown and need not be described in detail herein. It is sufficient to say that the control operates in the usual manner to put the machine through its customary sequence of operations and also to activate the washing-aid dispenser at the desired time during said operations. However, in practice it is desirable and preferable that the timer control be such that the solenoid 45 is energized to open the washing-aid dispenser valve while water is being fed through the valve 28 and to the washing container, and that said solenoid 45 is deenergized to close the dispenser valve only when said valve 28 no longer feeds water for delivery to the washing container. This mode of operation insures adequate dilution of washing aid and makes certain that the dispenser is completely emptied so that it can receive a fresh and full supply of the washing aid every time the machine is put to use.

From the foregoing description, it will be appreciated that the present invention provides a novel arrangement capable of being readily incorporated in an automatic washing machine and also capable of automatically dispensing washing-aid material to the washing container without affecting the normal operations of the washing machine. Although the invention has been shown and described in combination with a clothes washing machine of the tumbler type, it will be recognized that the invention is not limited to that specific type of machines and is equally useful with other kinds of machines, for example, machines in which washing is accomplished by oscillatory motion of an agitator within a washing basket. Moreover, while a preferred embodiment of the novel and improved dispenser has been shown and described, it will be understood that the invention embraces such changes and modifications as may come within the scope of the subjoined claims.

What we claim is:

1. In a washing machine, water-supplying means including a conduit through which water flows to the machine, washing-aid storage means having a passageway terminating with an outlet end which is connected to an intermediate portion of said conduit and through which washing-aid is discharged into said conduit, and a flow interference member interposed in said conduit at said intermediate portion and adjacent said outlet to divert water from said conduit into said passageway through said outlet.

2. In a washing machine, water-supplying means including a conduit through which water flows to the machine, washing-aid storage means having a passageway provided with an outlet connected with said conduit to discharge washing-aid therein, a valve operable for controlling said passageway to open and close its communication with said storage means, and a flow interference member interposed in said conduit adjacent said outlet to divert water from said conduit into said passageway through said outlet.

3. In an automatic washing machine, a container adapted to receive water and articles to be washed therein, conduit means for feeding water to be delivered to said container, injector means for adding washing-aid to the water fed through said conduit means, said injector means including valve-controlled passage means communicating with said conduit means at an intermediate portion thereof, and means for diverting water passing through said conduit portion and for directing the diverted water into said passage means.

4. In an automatic washing machine, a container adapted to receive water and articles to be washed therein, means for feeding water and including a conduit for delivering water to said container, ejector means for adding washing-aid to the water delivered through said conduit and including passage means communicating with said conduit, means for diverting water from said conduit to said passage means, and a timer for governing the operation of said water feeding means and washing-aid ejecting means in predetermined sequence.

5. In a washing machine, a timer for automatically

controlling the washing operations, water-supplying means including a conduit through which water flows to the machine, washing-aid storage means having a passageway provided with an outlet connected with said conduit to discharge washing-aid therein, a valve operable for controlling said passageway to open and close its communication with said storage means, means controlled by said timer to operate said valve, and means for passing at least portion of the inflowing water into said passageway through said outlet.

6. In a washing machine, a timer for automatically controlling the washing operations, water-supplying means including a conduit through which water flows to the machine, washing-aid storage means having a passageway provided with an outlet connected with said conduit to discharge washing-aid therein, a valve operable for controlling said passageway to open and close its communication with said storage means, means controlled by said timer to operate said valve, and a flow interference member interposed in said conduit adjacent said outlet to divert water from said conduit into said passageway through said outlet.

7. In a washing machine, a timer for automatically controlling the washing operations, water-supplying means controlled by said timer to initiate and terminate the feeding of water for delivery to the machine, a conduit through which water flows from said supplying means to the machine, washing-aid storage means having a passageway through which washing-aid is discharged into said conduit, a flow interference member interposed in said conduit for diverting water from said conduit to said passageway, a pinch valve for normally closing said passageway to prevent diverted water from passing into said storage means, and a solenoid controlled by said timer to activate said pinch valve to open said passageway during water feeding operation of said water supplying means to provide for the flow of the diverted water into said storage means through said passageway.

8. In a washing machine provided with a washing container and water supplying means operable to feed water for delivery to said container, the combination comprising a conduit having an inlet for receiving water fed by said

water-supplying means and aslo having an outlet for delivering water into said container, washing-aid storage means having a downwardly directed passageway connected with said conduit at a portion intermediate of said inlet and outlet thereof, and means for cleaning said downwardly directed passageway by diverting part of the water flowing through said portion and directing the diverted water upwardly into said downwardly directed passageway, said last named means consiting of a flow interference member disposed in said intermediate portion adjacent its connection with said passageway.

9. In a washing machine provided with a washing container and with water-supplying means operable to feed water for discharge into said container, the combination comprising a conduit through which water passes from said supplying means to said container, one end portion of said conduit being constructed and disposed for receiving water fed by said water supplying means, the other end portion of said conduit being constructed and disposed to discharge water into said container, a portion of said conduit between said end portions being supported in a general vertical position so that water flows downwardly therethrough in passing through said conduit, washing-aid storage means having a downwardly directed passageway connected with said intermediate portion of said conduit and opening therein in downstream direction, and a flow interference member disposed in said intermediate portion and adjacent said outlet portion of said passageway to divert part of the water flowing downwardly in said intermediate portion and to direct the diverted water upwardly to enter said passageway through said downwardly directed outlet portion.

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