

Sept. 20, 1971

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3,605,455

WATER ADMISSION MEANS

Filed Nov. 14, 1968

FIG. 1

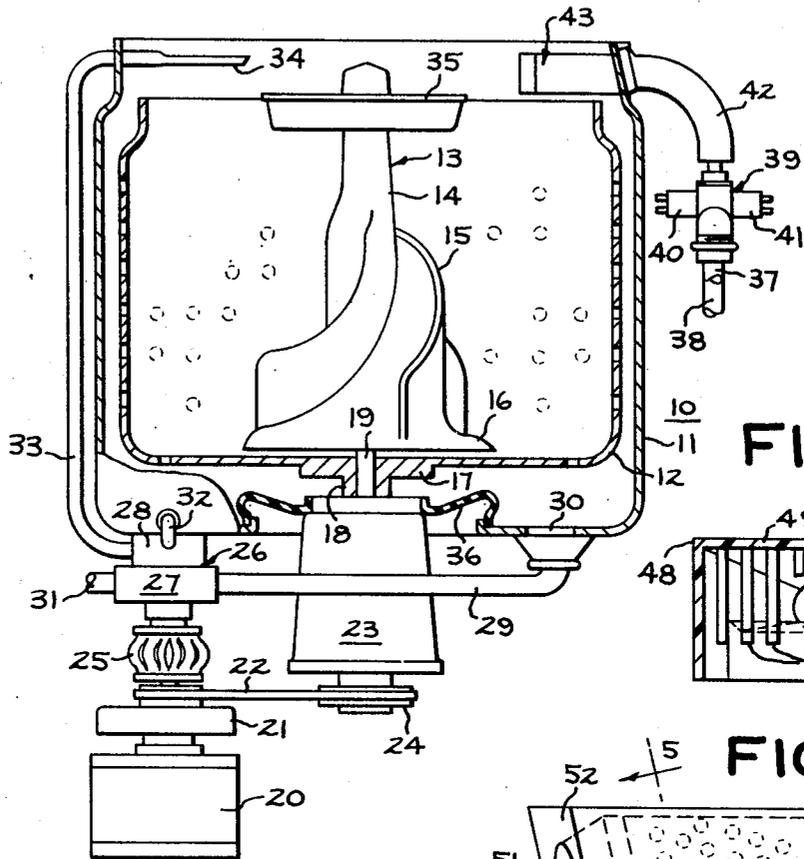


FIG. 5

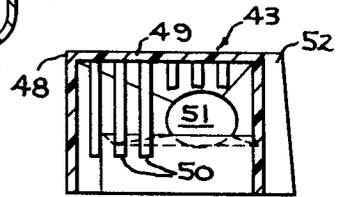


FIG. 3

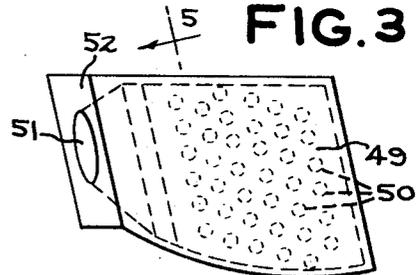


FIG. 4

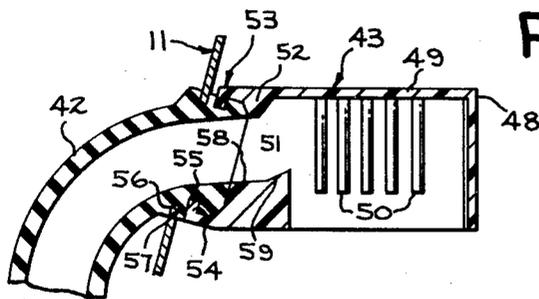


FIG. 6

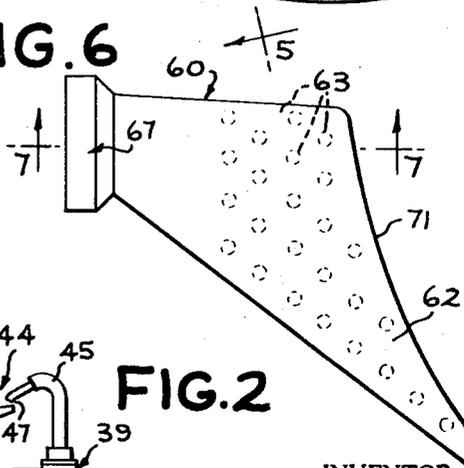


FIG. 2

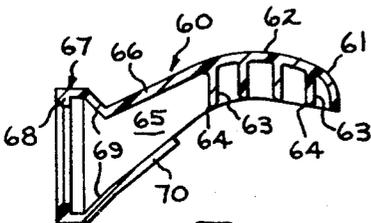
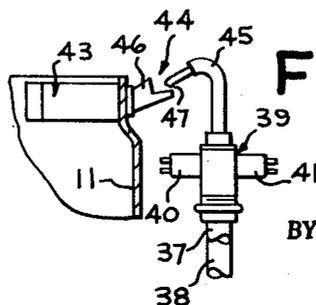


FIG. 7

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3,605,455

WATER ADMISSION MEANS
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U.S. Cl. 68—207

9 Claims

ABSTRACT OF THE DISCLOSURE

Water admission means particularly adapted for use in an automatic clothes washer is provided comprising a downwardly opening cup-shaped member having an upwardly directed inlet to direct a stream of water into the cup-shaped member. A plurality of projections depend from the cup-shaped member into the stream of water to break up and spread out the flow of water as it discharges into the washing basket.

BACKGROUND OF THE INVENTION

This invention relates generally to clothes washing machines, and more particularly to an improved water admission means for such machines.

Automatic clothes washers normally include a nozzle positioned to introduce water into a washing basket wherein fabrics are washed and rinsed. Many manufacturers prefer to have the inlet water for such machines enter the top of the washing basket as this prevents air from being trapped in the fabrics as the water rises in the basket. Also, as such baskets are rotatably mounted, it is difficult to provide an inlet for introducing water directly into the basket from the bottom or sides thereof. Despite long known desirability of introducing water from a nozzle positioned above the washing basket, prior art machines employing inlet nozzles have not been completely satisfactory due to splashing caused by high velocity inlet water discharging downwardly from the nozzle into the basket. The problem of the variance of domestic water pressure has complicated the problem of designing a non-splash nozzle, as such water pressure varies not only to a substantial degree from installation to installation, but also from time to time at any particular installation. To control splash, it is necessary to control the trajectory of the stream of inlet water so as to project adequately into the basket at minimum pressure and yet not strike the agitator structure with high force at maximum pressure. The stream should be gentle, regardless of the pressure to prevent excess splashing at any pressure. This is particularly true in machines designed to have a filter or an auxiliary wash basket mounted in the center of the main basket. Such machines are often designed for the inlet stream to strike such attachments under all normal supply pressures and there should not be excess splashing at any pressure.

It is therefore an object of my invention to provide a new and improved water admission means for an automatic clothes washer.

Another object is to provide such means which will emit a gentle stream of liquid into the wash basket of an automatic clothes washer.

A further object is to provide admission means which will break up and spread out the flow of inlet water to an automatic clothes washer while providing a controlled inlet trajectory despite large variations of the inlet pressure.

SUMMARY OF THE INVENTION

Briefly stated, in accordance with one aspect of the present invention, there is provided an admission means for admitting liquid from a source of liquid under pres-

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sure to a container, comprising a generally cup-shaped member opening toward the container. A plurality of projections extend into the cup-shaped member from at least one portion thereof. Means are provided to direct a stream of fluid from the source into the cup-shaped member toward the projections. By this arrangement, the stream of fluid is broken up and spread out as it is discharged into the container.

BRIEF DESCRIPTION OF THE DRAWING

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention, it is believed the invention will be better understood from the following description of the preferred embodiments taken in connection with the accompanying drawing, in which:

FIG. 1 is a partial, schematic, elevational view of a clothes washing machine including one embodiment of the present invention;

FIG. 2 is a fragmentary view showing an alternate arrangement of a portion of the machine of FIG. 1 employing said one embodiment of my invention;

FIG. 3 is a plan view of the admission means of the embodiment shown in FIGS. 1 and 2;

FIG. 4 is a sectional view of the embodiment of FIG. 1;

FIG. 5 is a view taken along line 5—5 of FIG. 3;

FIG. 6 is a plan view of an alternate embodiment of my device; and

FIG. 7 is a view taken along line 7—7 of FIG. 6.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawing, and initially to FIG. 1 thereof, there is illustrated an agitator-type vertical axis automatic clothes washer 10. The washer 10 normally includes a suitable appearance and protective outer cabinet which, in the interest of clarity, has been omitted from the drawing. The washer may include a rigidly mounted imperforate tub 11 having a perforate washing basket or container 12 rotatably supported therein for washing and rinsing clothes therein and for centrifugally extracting liquid therefrom. At the center of basket 12 there is provided an agitator 13 which includes a center post 14 having a plurality of curved water circulating vanes 15 joined at their lower end to form an outwardly flared skirt 16. Normally a resilient gasket (not shown) is provided between the upper edge of tub 11 and the appearance cabinet to prevent moisture from escaping into the space between the tub and cabinet.

Both the washing basket 12 and the agitator 13 are rotatably mounted. The basket is mounted on a flange 17 of a hub 18 and the agitator 13 is mounted on a shaft 19 which extends upwardly through the hub 18 and through the center post 14 and is secured to the agitator so as to drive it. During one possible cycle of operation of the washer 10, liquid is introduced into the tub 11 and basket 12, and the agitator is oscillated back and forth around its axis to wash the clothes within the basket. After a predetermined period of this washing action, basket 12 is rotated at high speed to centrifugally extract the washing liquid from the fabrics. Following this extraction operation, a supply of clean liquid is introduced into the basket for rinsing the fabrics and the agitator is again oscillated. Finally, the basket is once more rotated at high speed to extract the rinse liquid.

The basket 12 and agitator 13 may be driven by any suitable means. By way of example, I have shown them as driven from a reversible motor 20 through a drive mechanism including a clutch 21 mounted on the motor shaft. A suitable belt 22 transmits power from clutch 21 to a transmission assembly 23 through a pulley 24. Thus, depending upon the direction of motor rotation, the pulley 24 of

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transmission 23 is driven in opposite directions. The transmission 23 is so arranged that it supports and drives both the agitator drive shaft 19 and the basket mounting hub 18. When motor 20 is rotated in one direction, the transmission causes agitator 18 to oscillate and, when motor 20 is driven in the opposite direction, the transmission rotates the washing basket 12 and agitator 13 together at high speed for centrifugal fluid extraction. While the specific type of transmission used does not form a part of the present invention, reference is made to U.S. Pat. No. 2,844,225 issued July 22, 1958 to James R. Hubbard et al. and assigned to the assignee of the instant 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 described, motor 20 also provides a direct drive through a flexible coupling 25 to a pump structure 26 which includes two separate pumping units 27 and 28 which are operated simultaneously in the same direction by motor 20. Pump unit 27 has an inlet connected by conduit 29 to an opening 30 formed in the lowermost part of tub 11 and an outlet connected by a conduit 31 to a suitable drain (not shown). Pump 28 has an inlet connected by a conduit 32 to the interior of tub 11 and an outlet connected by conduit 33 to a nozzle 34 positioned to discharge into a suitable perforate bottomed filter pan 35 removably secured to the top portion of agitator 13. With this structure, when the motor is operating so as to provide agitation, pump unit 28 draws liquid in through conduit 32 from tub 11 and discharges it through conduit 33 into filter pan 35, and then down through the small openings provided in the bottom of the filter pan back into the basket. Conversely, when the motor is reversed so as to rotate the basket 12 and agitator 13 together at high speed to centrifugally extract fluid from fabrics in the basket, pump unit 27 will draw liquid in from opening 30 through conduit 29 and discharge it through conduit 31 to drain. Each of the pump units is substantially inoperative in the direction of rotation in which it is not used.

In order to accommodate any vibrational movement which may occur between transmission 23 and tub 11, which also represents vibrational movement between basket 12 and tub 11, without any danger of fluid leakage between them, the stationary tub 11 is joined to the upper part of transmission 23 by a flexible boot member 36. A member of this type is described and claimed in U.S. Pat. No. 2,959,966 issued Nov. 15, 1960 to John Bochan and assigned to the assignee of the instant invention.

Hot and cold water may be supplied to the machine through conduits 37 and 38 which are adapted to be connected respectively to sources of hot and cold water (not shown). Conduits 37 and 38 extend into a conventional mixing valve structure 39 having solenoids 40 and 41 and being connected to a hose 42. In a conventional manner selective or concurrent energization of solenoids 40 and 41 will provide the passage of hot, cold or warm water from the mixing valve 39 through the hose 42. Hose 42 communicates with admission means 43 to discharge water into basket 12 so that when one or both of solenoids 40 and 41 are energized, water enters basket 12 and tub 11.

As is increasingly required by plumbing codes, a vacuum break 44 of the type shown in FIG. 2 may be used in place of hose 42. Vacuum break 44, shown in schematic form, essentially comprises an inlet 45, an outlet 46 disposed beneath inlet 45, and an opening 47 to the atmosphere or machine interior between inlet 45 and outlet 46 whereby suds and liquid within the vicinity of nozzle 43 on the interior of the tub will not be drawn through nozzle 43 into the household water supply.

It will be understood that, while the description of the machine thus far excludes a substantial amount of detail

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relating to the drive, and does not show all the valves and particular controls normally provided on modern domestic washing machines, the elimination and simplification of those items is primarily for the purpose of permitting a clear explanation of the inventive concept set forth below. It will be recognized that the omitted details are conventional items included in virtually all domestic washing machines, whose structure and positioning is well known to those skilled in the art.

In such machines it is advantageous for the stream of fluid admitted to basket 12 to be gentle and of a predetermined trajectory, regardless of wide variations in the pressure of the stream entering the nozzle. Admission means constructed in accordance with the present invention will provide these results.

Referring now, more particularly, to FIGS. 3-5 wherein one embodiment of my device is illustrated, it will be seen that admission means 43 comprises an inverted cup-shaped member 48 opening downwardly toward washing basket or container 12. Cup-shaped member 48 may be molded or otherwise suitable formed from any of a wide variety of materials such as metal, plastic, nylon, synthetic rubber or the like. Extending from a wall or portion 49 of cup-shaped member 48 and depending therefrom are a plurality of individual, spaced-apart, finger-like, elongated projections 50 of substantially constant circular cross section.

Directional inlet means 51 are provided integral with a separate portion 52 of cup-shaped member 48. Connection means 53 comprising an annular tab 54 is provided integral with portion 52. Tab 54 is seen to cooperate with a first groove 55 on hose 42. Hose 42 additionally has a second groove 56 which cooperates with an opening 57 in tub 11 for supporting the hose 42 and for sealing connection with the tub. A conduit means 58 is provided within inlet 51 to admit fluid substantially horizontally from hose 42. Downstream from conduit means 58 is provided a ramp means 59 to subsequently direct the fluid upwardly toward portion 49 and toward projections 50. Upon striking projections 50, the fluid stream is caused to break up and spread out within the cup-shaped member 48 and to thereby discharge downwardly into basket 12 with a substantial decrease in velocity from that experienced at inlet 51. The resulting discharge stream is gentle and thereby eliminates excess splash.

With low water inlet pressure the upwardly directed stream of water from ramp 59 will contact only an initial number of projections 50 whereby it will be broken up and discharged gently to basket 12. With increasing water pressure, an increasing number of projections 50 will be contacted by the inlet stream from ramp 59 whereby a more complete breaking up and spreading out of the inlet flow is achieved, and again the liquid passing through from the admission means drops gently into basket 12.

Referring now to FIGS. 6 and 7, it will be seen that my admission means may be adapted to a variety of configurations to provide the desired inlet trajectory. Whereas the means of FIGS. 3-5 is designed to discharge substantially downwardly, the embodiment of FIGS. 6 and 7 may be used to provide a discharge trajectory somewhat inclined from the vertical.

In particular, admission means 60 of FIGS. 6 and 7 comprises an inverted cup-shaped member 61 opening downwardly. Extending from an upwardly arched portion 62 of cup-shaped member 61 and depending therefrom are a plurality of projections or pins 63 of substantially constant circular cross section. As pins 63 extend downwardly to a position substantially even with the bottom edge of cup-shaped member 61, the ends 64 of pins 63 have been rounded slightly to prevent snagging of any fabrics which may come in contact with the pins.

Directional inlet means 65 are provided integral with a separate portion 66 of cup-shaped member 61. Connection means 67 comprising an annular tab 68 are provided integral with portion 66. In a similar manner to admission

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means 43 of FIGS. 3-5, means 60 may connect with a hose or other means (not shown) having a groove for cooperating with tab 68. A conduit means 69 is provided within inlet 65 to admit fluid substantially horizontally. Downstream from conduit means 69 is provided a ramp means 70 to subsequently direct the fluid upwardly toward portion 62 and toward projections 63. The higher the inlet fluid pressure, the greater the number of projections 63 that the fluid will come into contact with, thereby the greater the tendency of my device to break up and spread out the flow. As will particularly be seen in FIG. 6, the projection bearing portion 62 of nozzle 60 is extended significantly downstream of inlet 65 along a peripheral line 71 defining a circle coaxial with basket 12 and agitator 13. Due to the upwardly arched nature and extended configuration of portion 62, the stream is caused to discharge a predetermined trajectory somewhat inclined from the vertical. The discharge trajectory will remain substantially constant despite variations in inlet water pressure as the higher the inlet pressure, the greater number of deflecting projections 63 encountered by the fluid flow.

An additional feature of my device is its incorporation of aeration as an aid in breaking up and slowing down the inlet flow. Air is caused to circulate through the flow of water in the cup-shaped portion of my invention due to the fact that the flow area of the cup-shaped portion is much larger than the flow area of the inlet means, whereby the inlet flow is of insufficient size to fill the cup-shaped area. Air is thereby caused to be present adjacent the turbulent water flow and to be mixed therewith. Aeration may also be augmented by using my device in connection with a vacuum break, as previously described, whereby air is drawn into the inlet means from the vacuum break with the water flow and thereby enters directly into the turbulent mixing action caused by the projections.

As was previously mentioned, admission means of the type involved herein are particularly useful with an automatic clothes washing machine wherein it is desirable to admit a gentle stream of water on a desired trajectory into a washing basket regardless of wide variations in water pressure. From the foregoing description it should now be apparent that the present invention, by breaking up and spreading out the flow of inlet water thereby provides a gentle discharge stream. By providing an arrangement of projections whereby an increasing number of such projections will be contacted by inlet fluid of increasing pressure, my device assures a gentle flow and substantially constant discharge trajectory regardless of variations in inlet pressure.

As will be apparent, the inlet portions as well as the projections and other elements of the aforescribed constructions need not be made integral with the cup-shaped members, but may be manufactured as separate elements of a variety of suitable materials appropriately secured together in operable fashion. Furthermore, the specific shape and configuration of the projections may be varied within the scope of the invention. This is to say that certain aspects of the invention are not limited to the particular details of construction of the examples illustrated, and it is contemplated that various other modifications or applications will occur to those skilled in the art. It is therefore intended that the appended claims shall cover such modifications and applications as do not depart from the true spirit and scope of the invention.

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

1. Means for admitting fluid from a source of fluid pressure into a container, comprising:

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a cup-shaped member opening toward the container; a plurality of individual, spaced-apart, finger-like, elongated projections extending into said cup-shaped member from at least one portion thereof; and means to direct a stream of fluid from the source into said cup-shaped member and toward said projections; whereby said stream of fluid is broken up and spread out as it is discharged into the container.

2. The invention of claim 1 wherein said means to direct a stream of fluid comprises an inlet means which also directs the stream toward said portion from which said projections extend.

3. The invention of claim 2 wherein said inlet means comprises a directional inlet opening in a separate portion of said cup-shaped member.

4. The invention of claim 3 wherein said cup-shaped member opens downwardly, said inlet opening is situated lower than said portion from which said projections extend, and said inlet opening is upwardly directed.

5. The invention of claim 2 wherein said projections comprise pins of substantially uniform cross section and are integrally formed with said cup-shaped member.

6. Admission means for admitting fluid from a source of fluid under pressure into a container comprising: an inverted cup-shaped member opening downwardly toward the container;

an upwardly directed inlet extending through one wall of said cup-shaped member to direct a stream of fluid from the source into said cup-shaped member; and a plurality of individual, spaced-apart, fingerlike, elongated projections depending from said cup-shaped member into said stream of fluid flowing from said inlet;

whereby said stream of fluid is broken up and spread out as it is discharged downwardly into said container.

7. The invention of claim 6 wherein said inlet includes connection means adapted to connect said inlet to the source of fluid, conduit means to admit fluid substantially horizontally from said source, and ramp means to subsequently direct the fluid upwardly.

8. The invention of claim 7 wherein said inlet and said projections are formed integrally with said cup-shaped member.

9. In an automatic clothes washing machine having a basket for washing and rinsing clothes therein, and conduit means adapted for connection to a source of water, water admission means comprising:

an inverted cup-shaped member opening downwardly into the basket;

an upwardly directed inlet to direct a stream of fluid from the source into said cup-shaped member;

said inlet being formed integrally with said cup-shaped member and connected to said conduit means; and a plurality of individual, spaced-apart, finger-like, elongated projections formed integrally with and depending from said cup-shaped member into said stream of fluid flowing from said inlet;

whereby said stream of fluid is broken up and spread out as it is discharged downwardly into said container.

References Cited

UNITED STATES PATENTS

2,871,871	2/1959	Conlee	137-216
3,347,250	10/1967	Martiniak	68-207X

WILLIAM I. PRICE, Primary Examiner

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,605,455 Dated September 20, 1971

Inventor(s) Eugene G. Olthuis

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Claim 1, line 67 after "fluid" insert - under -

Claim 7, line 40 change "mean" to - means -

Signed and sealed this 29th day of February 1972.

(SEAL)

Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents