

"Washing Machines"

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The present invention relates to washing machines, and in particular, to washing machines adapted to accommodate a filter device for filtering foreign substances (e.g. iron oxides) which may
10 be contained in water supplied to the washing machine.

Washing machines having separate washing and spin-drying tubs for respective washing of fabric articles on the one hand and for rinsing and spin-drying the fabric articles on the other hand are well known. When using washing machines of this type in
15 geographical areas where the water supply is contaminated or contains impurities, the washed articles may become discolored by iron oxide powder or other foreign matter contained in the water supply when the contaminated water is supplied to the dehydrating
tub for rinsing the washed fabric articles. Therefore, washing
20 machines intended for use in those geographic areas where the water supply is impure must be provided with a filter for filtering the water supplied to the washing and dehydrating tubs. Normally, water filters are provided structurally independently of the washing machine to accomplish such functions. However, such conventional
25 filter devices are more troublesome to the user since the filter device must be manually coupled to the washing machine via hoses or other like conduit means.

To solve the above-mentioned disadvantages, it has recently been proposed to provide a washing machine having an operator
30 control console which internally includes a filter device at its rear portion. Such a washing machine solves the disadvantages with respect to washing machines having structurally independent filter devices but is less than desirable since different operator console shapes must be provided for each different type and/or style of
35 washing machine. The requirement for producing and maintaining a

stock inventory for a variety of machine consoles of course leads to increased costs.

A principal aim of the present invention therefore is to provide a washing machine which incorporates a mounting for a filter device on its operator console and, moreover, which has a universal construction whether or not the console is provided with such a filter device so as to reduce production costs.

Some embodiments of the present invention will now be described by way of example with reference to the accompanying drawings, wherein like reference numerals throughout the various Figures denote like structural elements and wherein:

Figure 1 is a perspective view, partly in section, of a washing machine in accordance with this invention;

Figures 2 and 3 are vertical side sectional views of a filter device particularly well suited for use with the washing machine of Figure 1 and being shown coupled to a control console thereof;

Figure 4 is a perspective view of the filter device of Figures 2 and 3;

Figure 5 is a vertical sectional view of an operator control console of the washing machine in accordance with a first embodiment of the present invention;

Figure 6 is a rear view of the operation control console of Figure 5;

Figure 7 is a perspective view of a closure member which can be utilised with the first embodiment of the present invention;

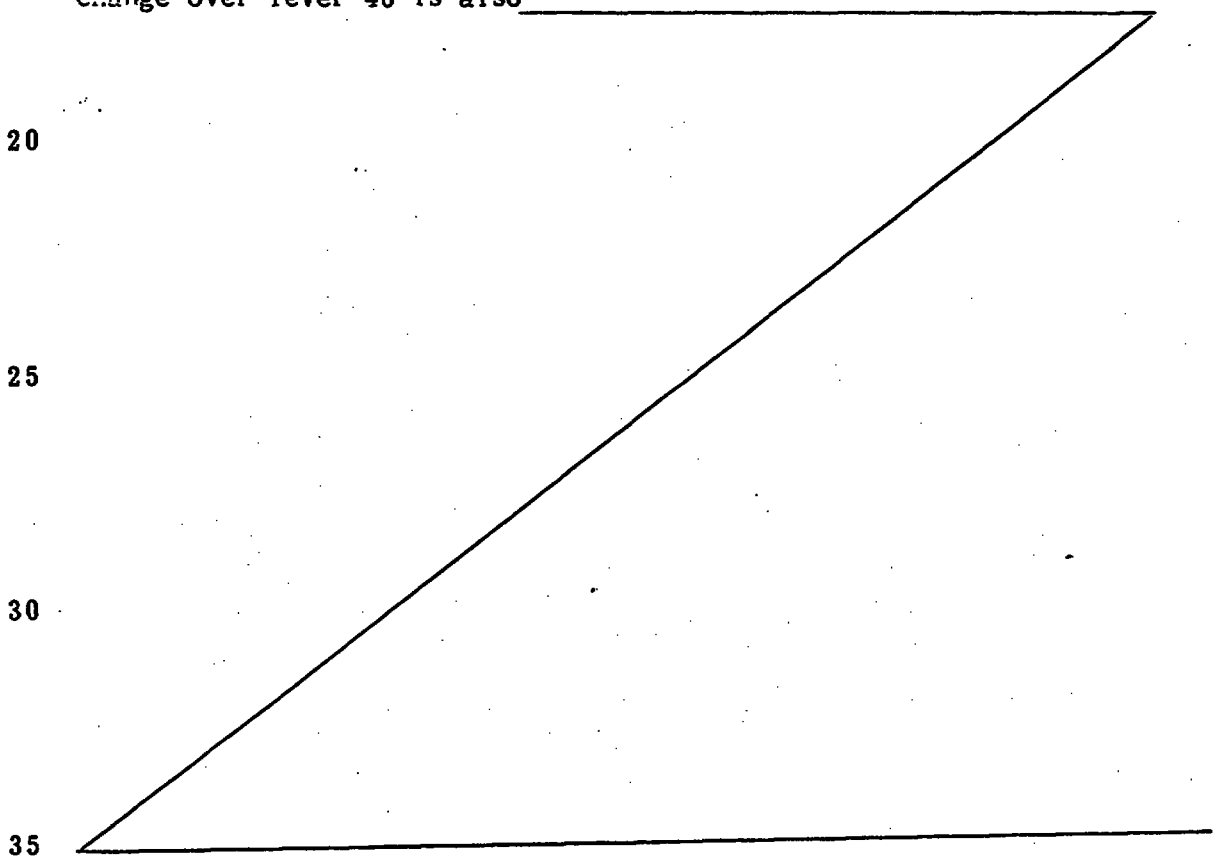
Figure 8 is a vertical side sectional view of a filter device which is somewhat similar to the filter device of Figure 2 and is shown coupled to the washing machine console;

Figure 9 is a vertical side sectional view of an operator control console of a washing machine in accordance with another embodiment of the present invention; and

Figure 10 is a rear view of the operator control console of Figure 9 in which a pipe joint member is removed from the construction.

Referring to Figure 1, an outer cabinet 12 of the washing machine is mounted on a pedestal 14 having four individual legs 16 at each corner thereof. The outer cabinet 12 houses a washing tub 18 and a separate dehydrating tub 20 in which a spin tub (not shown) is rotatably supported. An agitator 22 is rotatably mounted on the bottom of the washing tub 18 and is driven through belt 24 and pulley 26 by means of a motor 28 mounted on the pedestal 14. The spin tub (not shown) is similarly rotated by means of motor 30 which is also mounted on the pedestal 14.

The washing tub 18 and dehydrating tub 20 are covered with respective lids 32, 34 which are detachably mounted to the outer cabinet 12. An operator control console 36 upwardly extends from the top of the cabinet 12 at the rear portion of the washing machine 10. As is conventional, the front surface 35 of console 36 includes manually-operable operating buttons 38, a wash timer 40, a spin timer 42 and a water level selection knob 44. A water supply change-over lever 46 is also



provided on the slanted front surface 35 of the console 36. A water supply control device 48 (shown in broken line in Figure 1) is housed in the console 36 and is connected to the water supply tap 50 through a hose 52 or like conduit means. The water supply control device 48 is preferably a conventional water controller which regulates the water flow rate by means of a valving device (not shown) housed therein.

10 A water duct 54 is provided within cabinet 12 such that one end 54a thereof opens into the washing tub 18 while the other end 54b thereof opens into the dehydrating tub 20. A
15 partition wall 54c adjacent to the water supply change-over lever 46 is provided in the duct 54 so as to partition the duct 54 into separate supply paths to the tubs 18 and 20.

As is more clearly seen in Figures 2 and
20 3, the water supply change-over lever 46 is provided with a water guide tube 46, which is preferably downwardly tapered. When the water supply change-over lever 46 is moved toward the washing tub 18 (i.e. towards the left as viewed in
25 Figure 1) or towards the dehydrating tub 20 (i.e. towards the right as viewed in Figure 1), the bottom end of the water guide tube 56 is thereby responsively positioned on the left or right sides, respectively, of the partition wall 54c.
30 Thus, the direction in which the supply water is fed via duct 54 is selectively changed either to the washing tub 18 or the dehydrating tub 20. A filter device 60 is fixed to the rear of the operation control console 36 by means of screws or
35 other like securing elements.

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A container 62 of the filter device 60 is opened at its upper end and includes a lid member 64 pivotally mounted to the upper end of container 62 by means of hinge assembly 66. The lid member 5 64 is thus capable of opening and closing the upper open end of container 62. A tubular water inlet port 68 is integrally formed at the front wall 70 of the container 62, such that it forwardly projects from the front wall 70 as shown 10 more clearly in Figure 4. A water outlet port 72 is also integrally formed in the bottom wall 74 of the container 62, such that it projects forwardly from the front wall 70 of the container 62. The water outlet port 72 preferably extends forwardly 15 parallel to the water inlet port 68. A tubular overflow port 76 forwardly projects from the front wall 70 of the container 62 and also preferably extends forwardly parallel to the water inlet port 68 and the water outlet port 72.

20 The overflow port 76 includes a partition wall 78 disposed substantially parallel to the front wall 70 of the container 62 and projects upwardly from the bottom wall 74 of the container 62 (see Figure 3). The partition wall 78 and the 25 front wall 70 of the container 62 together define an overflow passage 80 formed so as to extend vertically within the front part of the container 47 such that the upper part of the overflow passage 80 is in fluid communication with and 30 opens upwardly within the upper interior portion 82 of the container 62.

A U-shaped water receiving wall 84 is provided near the bottom wall 74 of the container 62. The water receiving wall 84 surrounds the 35 water inlet port 68, the water outlet port 72 and

the overflow port 76 and projects from the front wall of the container 62 such that it is formed as a forwardly and downwardly inclined spout. A screw holding portion 86 is formed at the front end of the water receiving wall 84 while a lateral pair of screw holding portions 88 project from the both sides of the container 62 adjacent front wall 70. As is shown in Figures 2 and 3, a rear portion 90 of the console 36 which faces the water inlet port 68, the water outlet port 72 and the overflow port 76 of the container 62, is recessed so as to permit connection of the filter device 60 to the console 36 as will be described in greater detail below.

15 A water intake opening 92 is formed on the rear portion 90 of the operation control console 36 in correspondence to the water inlet port 68 of the container 62. A tubular intake port 94, (one end of which projects rearwardly is also formed at the rear portion 90 of the operator control console 36 in a corresponding position to the water outlet port 72 of the container 62. The other end of the tubular intake port 94 extends into the operator control console 36 and extends
25 downwardly so that it is capable of being registered with the water guide tube 56 when the latter is moved therebeneath upon manipulation of lever 46. The intake port 94 thus selectively communicates with either the washing tub 18 or the
30 dehydrating tub 20, through manipulation of the water guide tube 56 via lever 46.

A tubular auxiliary intake port 96 is formed at the rear portion 90 of the operation control console 36 in correspondence to the
35 overflow port 76 of the container 62 as is more

clearly seen by reference to Figure 3. One end 96a of the auxiliary intake port 96 projects rearwardly while the other end 96b extends into the operation control console 36 and is directed 5 downwardly so that it opens into the spin-drying tub 20. Water intake holes 98, 99 are provided at the lower part of rear portion 90 so as to direct any water which may leak from the couplings of ports 68, 72 and 76 via the water receiving wall 10 84 of the container 62 and into the washing tub 18.

A filter assembly 100 is removably housed within the container 62 as shown in Figures-2 and 3. The filter assembly 100 includes a filter 15 medium 102 which is corrugated in form.

As is conventional, the filter medium 102 is formed of porous material having a dense plurality of fine water-permeable holes.

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The filter medium 102 is supported in the container 62 by means of a base plate 104 extending along the elongated direction of the 25 filter medium 102 and which defines a tubular discharge port 93 projecting downwardly from the bottom thereof. A pair of side wall plates 108 are mounted upright on respective sides of the base plate 104 by means of respective integral 30 hinges (not shown).

The filter medium 102 is attached to the base plate 104 and side wall plates 108 by securing one to the other utilizing e.g. adhesive so that they together close the otherwise open 35 bottom and sides of the filter medium 102. When

the filter medium 102 is properly positioned within container 62, an intake chamber 110 and discharge chamber 112 is established therein. At the same time, the discharge port 106 is inserted
5 into and thus in fluid communication with the water outlet port 76 of the container 62.

The container 62 is thus adapted to be mounted on the rear portion 90 of the operation control console 36 by means of screws threadably
10 coupled through the screw holding portions 86 and 88 of the container 62 as is shown in double-dashed chain line in Figure 6. While in this mounted configuration, the water outlet port 72 of the container 62 is inserted into the intake port
15 94 of the control console 36, while the overflow port 76 is inserted into the auxiliary intake port 96 as can be seen more clearly in Figures 2 and 3. The water receiving wall 84 of the container 60 communicates with the washing tub 18 through
20 the intake holes 98, 99.

The water inlet port 68 of the container 62 and a connection port 48a of the water supply control device 48 are connected to one another by means of hose 115. One end of a hose 115 is
25 fitted onto the water inlet port 68 prior to the mounting of container 62 upon console 36. The other end of the hose 115 is introduced into the operator control console 36 through the water intake opening 92 and fitted onto the connection
30 port 48a of control device 48 thereby establishing fluid communication between the water inlet port 68 and the water supply control device 48. During the connection operation, access opening 116 defined on the rear wall 90 of the operator
35 control console 36 (as shown in dotted line in

Figure 6) enables an operator to easily connect the hose 115 to the connection port 48a of the water supply control device 48.

The access opening 116 is closed by a closing member 120 as is shown in Figure 6. The closing member 120 includes a main plate portion 122 and an auxiliary plate portion 124. The auxiliary plate portion 124 is formed on one side of the main plate portion 122 and is integrally connected thereto by means of an integral hinge 126 as is shown in Figure 7 so that the access opening 116 can be covered with the closure member 120 which is attached to the back of the operation control console 36 by means of screws 128. The auxiliary plate portion 124 also includes a pawl 130 projecting therefrom at a right angles at a side opposite to the integral-hinged 126.

When washing or rinsing operations are performed, the water change over lever 46 is positioned according to the desired operation and the water supply tap 50 is turned on. When either the washing timer knob 40 or the spin timer knob 44 is operated, the water supply control device 48 is automatically opened as is conventional. Water is then fed from the water supply and flows into the intake chamber 110 of the container 62 through the water inlet port 68. The water in chamber 110 then flows through filter medium 102 thereby filtering out impurities and enters discharge chamber 112 whereupon the filtered water flows through discharge port 106 and then on to the appropriate tub 18 or 20 depending upon the position of the water guide tube 56.

During extended periods of usage, the filter medium 102 may become so blocked that it

will need cleaning. The level of the water accumulated in the container 62 will be raised above the top edge 78a of the partition wall 78 which establishes the maximum
5 water level within the container 62. The excess water will therefore flow into the overflow passage 80, and then out from the overflow port 76 into the dehydrating tub 20 through the auxiliary intake port 96 thereby preventing overflow of
10 water from the container 62 to the exterior environment.

When the washing machine is not provided with a water filtering device 60, the access opening 116 formed on the back of the operation
15 control console 36 is closed by screwing the main plate portion 122 of the closing member 120 to the rear portion 90 as can be seen by reference to Figures 5 and 6. Further, the water intake opening 92 is also closed by auxiliary plate
20 portion 124 of the closing member 120 in such manner that the pawl 130 of the auxiliary plate portion 124 is engaged with the edge defining the water intake opening 92 at the rear of console
36. Thus, the auxiliary plate portion 124 can be
25 pivotally moved due to its integral hinge 126 so as to expose intake opening 92 and thus permit attachment of filter device 60. On the other hand, if filter device 60 is not provided, auxiliary plate portion 124 can be pivoted so that
30 pawl 130 engages the edge of opening 92 thereby closing the latter. As is specifically shown in Figure 6, the connection port 48a of the water control device 48 is arranged to register with the water guide tube 56 so that water which flows from the
35 connection port 48a is directly supplied to either

tubs 18 or 20 through the water guide tube 56 when filter device 60 is not present.

According to the above-described embodiment, the construction of the control console 36 of the washing machine is universal for those machine models provided with or lacking a filter device 60. In addition, it is relatively easy to attach the filter device 60 to the washing machine in such manner that the water outlet port 72 and overflow port 76 of the container 62 are individually inserted into the intake port 94 and auxiliary intake port 96, respectively, of the operation control console 36 when the container 62 is fitted to the rear of the control console 36. Moreover, installation of the filter device 60 is more efficient owing to the structures of the control console 36 particularly during coupling of the connection port 48a of water control device 48 and the water inlet port 68 of the container 62 with the hose 115 through water intake opening 92.

Figures 8 - 10 show another embodiment of the present invention wherein a connection pipe 200 is formed on the back of the control console 36 rather than the water intake opening 92 discussed above with respect to the embodiment of this invention shown in e.g. Figures 2 and 3. The connection pipe 200 extends from the rear wall 90 of control console 36 both outwardly and inwardly. As is shown in Figure 8, since the intake port 48a is coupled to the interior end 202 of pipe 200 by means of hose 204 during assembly of console 36, filter device 60 can be readily mounted to console 36 merely by inserting water inlet port 68 into the exterior end 206 of pipe 200 so as to establish fluid communication between control device 48 and intake chamber 110.

When the washing machine 10 is constructed without a water filter device 60 (as is shown in Figure 9) the exterior end 206 of the connection pipe 200 and the water intake port 94 are communicated to one another through a U-shaped pipe joint member 208, the ends of which are mounted onto the outer surface of the water intake port 94 and the exterior end 206 of the connection pipe 200 respectively. The water intake opening 92 of the control console 36 used in the embodiment described above with reference to Figures 2 - 3 is therefore eliminated, and thus the mounting of the filter device 60 to the washing machine 10 is rendered more easy in comparison therewith.

In summary, it will be seen that the preferred embodiments of the present invention overcome the disadvantages of the prior art and provides an improved construction for an operator control console of a washing machine which can be fitted with a water filtering device.

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CLAIMS

1. A washing machine to which a water filter device of the type including a water inlet port, a water outlet port and overflow port is adapted to be mounted, said washing machine comprising:
- outer cabinet means for supporting a washing tub to retain items to be washed and a spin-drying tub to rinse and dry the washed items;
- an operation control console for supporting the water filter device when the water filter device is attached thereto;
- water supply control means for controlling a flow rate of water into the washing machine from a water supply;
- a water intake port for permitting said water supply control means to be connected to the inlet of the water filter device when the filter device is attached to said control console;
- means defining an access opening for providing access to said water supply control means and thus permitting said water supply control means to be operatively connected to the inlet of the filter device;
- intake port means for conducting filtered water from the outlet of the water filter device into said control console means when the water filter device is attached to said operation control console; and
- auxiliary intake port means for conducting water which overflows from the overflow port of the water filter device when the water filter device is attached to said control console.
2. A washing machine according to claim 1 further including closure means for closing said access opening.
3. A washing machine according to claim 2, wherein said closure means includes an auxiliary plate to cover said water intake port when the water filter device is not attached to said operator control console means.



4. A washing machine according to claim 3, wherein said closure means also includes a main plate portion for closing said access opening and hinge means integrally connecting said auxiliary and main plates to permit said auxiliary plate to be pivoted relative to said main plate.

5. A washing machine according to claim 3, wherein said auxiliary plate includes an engagement pawl for engaging said intake port to removably lock said auxiliary plate in a covering relationship to said intake port.

6. A washing machine according to claim 2, further including flow control means for selectively directing the flow of water from said water intake port to only one of said washing tub and said spin-drying tub.

7. A washing machine according to claim 6, wherein said flow control means includes a water duct which establishes separate washing and dehydrating flow paths, said washing flow path being in fluid communication with the washing tub and said dehydrating flow path being in fluid communication with said spin-drying tub.

8. A washing machine according to claim 7, wherein said flow control means further includes water guide means for selectively directing water which flows from said water supply control means to either said washing flow path or said spin-drying flow path of said water duct.

9. A washing machine according to claim 8 wherein said flow control means further includes lever means for permitting said water guide means to be manually movable between a first position wherein water is guided to said washing flow path and a second position wherein water is guided to said spin-drying flow path.

10. A washing machine according to any of claims 1 to 7 further



comprising connecting pipe means for connecting said water supply control means to the water inlet port of said filter device.

11. A washing machine according to claim 10, further including
5 pipe joint means for establishing fluid communication between said intake pipe means and said intake port means so as to conduct water from said water supply control means to said control console means when the water filter device is not attached to said control console.
- 10 12. A washing machine according to any of claims 5 to 11 in which said water intake port is provided on the rear wall of said operation control console, one end of said water intake port projecting from the rear wall of said operation control console and the other end extending into said operation control console; and
15 further comprising, an auxiliary intake port provided on the rear wall of said operation control console, one end of said auxiliary intake port projecting from the rear wall of said operation control console and the other end extending into said operation control console, a closing member attached to the rear wall of said operation control
20 console so as to cover the access opening; and an auxiliary plate attached to the rear wall of said operation control console so as to close the water intake opening.
13. A washing machine according to claim 11, wherein said rear
25 wall includes a concave-shaped portion.
14. A washing machine according to claim 13, wherein said water intake opening, water intake port and auxiliary intake port, are arranged on said concave portion.
- 30 15. A washing machine according to claim 13, wherein said concave-shaped portion defines an intake hole at its lower portion.
16. A twin-tub washing machine capable of being provided with a
35 water filter device of the type including a water inlet port, a water

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- 16 -

outlet port and an overflow port, said washing machine comprising:

an outer cabinet;

an operation control console including a rear wall which defines a water intake opening and an access opening;

5 a water supply control device provided within said operation control console to control the rate of flow of water fed from a water supply;

10 a water intake port formed on the rear wall of said operation control console in correspondence to the water outlet port of the water filter device; and

an auxiliary intake port provided on the rear wall of said operation control console in correspondence to the overflow port of the water filter device.

15 17. A washing machine substantially as herein described with reference to the accompanying drawings.

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