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DRAIN OVERFLOW ARRANGEMENT FOR BUILT-IN WASHING MACHINE

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2 Sheets-Sheet 2

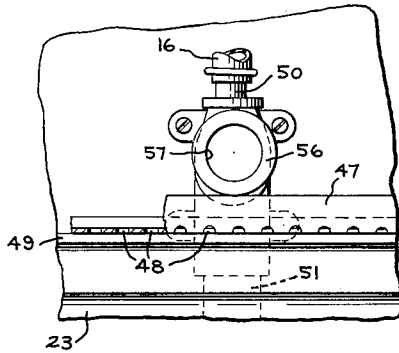


FIG. 2

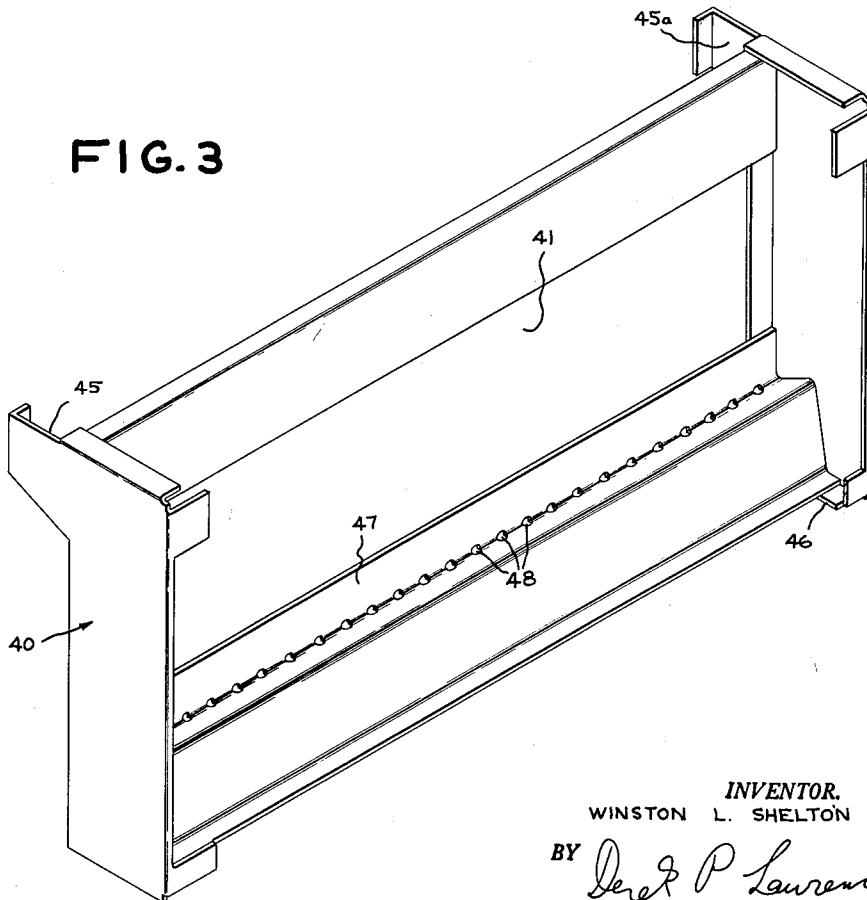


FIG. 3

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DRAIN OVERFLOW ARRANGEMENT FOR BUILT-IN WASHING MACHINE

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This invention relates to automatic clothes washing machines, and more particularly to a drain overflow arrangement for such machines.

The use of "built-in" appliances, that is, appliances which are virtually a part of the dwelling rather than being separate therefrom, is becoming more and more widespread and is, in fact, starting to find application in connection with washing machines. Making an appliance built-in provides several advantages; it does, however, have the result that, because the plumbing connections—including the drain—are normally behind the machine and actually within the wall, or between the wall and the machine, any stoppage in the drainage system into which the machine empties may not readily be noticed, and may be difficult to diagnose. Neither of these eventualities is acceptable as a practical matter; any stoppage-caused backflow should be immediately visible, should have the least harmful effect possible, and the source of trouble should be immediately evident.

It is, therefore, an object of my invention to provide, in connection with a built-in washing machine, an improved structure for causing backflow resulting from a stopped-up drainage system to appear immediately at a point where it is both visible to the user and indicates the source of trouble.

A further object of my invention is the provision of a built-in washing machine, having a sink formed in the upper surface of the cabinet which encloses the washing machine components, wherein any backflow resulting from a stopped-up drainage system will cause an initial flow into the sink so as to indicate visibly to the operator of the machine the stopped-up condition.

In one aspect of my invention, I provide a washing machine of the type intended to be built-in where the machine includes the usual washing means together with a pump for removing vitiated liquid from the washing means after an operation. The washing means and pump are substantially enclosed in a cabinet assembly formed to guide liquid away from the back of the assembly and from the operating drive components of the machine. Positioned above the first cabinet assembly are suitable control means which may, for instance, include control apparatus for the washing means. This control apparatus is enclosed by a second cabinet assembly which is positioned above the first one, preferably extending across over the back part thereof. The lower portion of the second cabinet assembly is formed as a liquid receptacle having an opening in its bottom so positioned relative to the top of the first cabinet assembly that liquid passing down through the opening then, of necessity, flows by gravity onto the first cabinet assembly top.

The drain means for the washing means includes a drain pipe which extends downwardly from above the receptacle, a suitable conduit being provided to connect the outlet of the pump to the drain pipe near the top thereof. Below the junction point of the pump outlet conduit and the drain pipe, there is a branch conduit provided extending substantially horizontally from the drain pipe and terminating in an open end positioned over the receptacle. As a result, the branch conduit provides the air break in the drain system necessary to preclude any possibility that sewage may be siphoned back through the drain system into the washing machine. In addition, the presence of the branch conduit insures that any stoppage in the drain

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pipe will result in flow of liquid back through the branch conduit. Because of the positioning of the branch conduit, this backflow will pass down into the receptacle and from the receptacle opening onto the top of the first cabinet means where it will be plainly visible to the user of the machine as an indication that there is a stoppage or blockage in the drain pipe.

The features of my invention which are believed to be novel are 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 drawings.

In the drawings,

FIGURE 1 is a side elevational view of a built-in washing machine incorporating my improved drain arrangement;

FIGURE 2 is a view along the line 2—2 in FIGURE 1; and

FIGURE 3 is a view in perspective of part of the upper cabinet structure shown in FIGURES 1 and 2.

Referring now initially to FIGURE 1 of the drawing, there is shown therein a washing machine having a cabinet generally indicated by the numeral 1 which encloses the various different components conventionally included and assembled together to provide a domestic automatic washing machine. These may include, for instance, an imperforate tub 2 rigidly secured to the cabinet 1 by any suitable means (not shown), a perforated clothes basket 3 rotatably mounted within tub 2, and an agitator mechanism 4 extending upward in basket 3.

A transmission structure 5 may be connected to basket 3 and agitator 4, and may be powered by a motor 6 through a clutch 7, a belt 8, and a pulley 9. In one conventional commercially provided drive arrangement of this type, the operation of the electric motor 6 in one direction causes the transmission 5 to oscillate the agitator 4 back and forth within basket 3 to effect a washing action on clothes in the basket when liquid is contained within the tub 2, and in the other direction of rotation the motor 6 causes transmission 5 to rotate basket 3 and agitator 4 together at high speed to centrifuge liquid out of the clothes.

The transmission 5, motor 6, clutch 7, belt 8 and pulley 9 may be included together with basket 3 and agitator 4 as part of a system resiliently suspended by any suitable means (not shown) in order to allow for the vibrations which sometime result when the basket 3 is rotated at high speed with an unbalanced load therein. It will be understood, in this connection, that many suspensions for achieving this result are known, and that many sealing means for permitting the vibrations of the moving system to occur without leakage of the liquid out between the tub 2 and transmission 5 may be provided. Therefore, the specific structures for effecting suspension and sealing are not shown in order not to obscure the invention with unnecessary details not related thereto.

Secured to the bottom of tub 2 is a pump assembly 10 which is operable by motor 6 through a flexible coupling 11 which joins the impeller (not shown) of the pump 10 to motor 6 so that the motor may drive the pump while at the same time the flexible coupling 11 accommodate the vibrations of the moving system which will cause the motor to move to some extent relative to the pump. The pump 10 has an inlet 12 connected by a conduit 13 to an opening 14 formed at the lower part of tub 2, and an outlet 15 connected by a conduit 16 to an appropriate drain system as will be further explained herebelow. It will be understood that the pump 10 is so formed that when the motor 6 rotates in the direction to cause high speed rotation of basket 3, it also causes the pump to draw liquid

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in through its inlet 12 and pass it out through its outlet 15 to the drain conduit 16. During the opposite direction of motor rotation, the pump is ineffective to drain tub 2.

The conventional structure for providing washing liquid to the tub 2 may be provided. In this connection, a mixing valve 17, supplied with hot and cold water through conduits 18 and 19 respectively, may be secured within cabinet 1 and connected through suitable conduit means 20 so as to have an outlet positioned to discharge into the tub 2. Solenoids 21 and 22 may be provided in the usual manner to control the flow of liquid from inlets 18 and 19 respectively to outlet 20. Energization of solenoid 21 causes hot water to pass from conduit 18 into outlet 20, energization of solenoid 22 causes cold water to pass from conduit 19 to the outlet 20, and energization of both solenoids causes water to be mixed in valve 17 and warm water to pass through outlet 20 into tub 2.

It will be understood that while the conventional components of one particular type of washing machine have been described, the particular arrangement of components comprising the assembly of the washing machine structure does not form the essence of the present invention and is described only for complete understanding of my invention.

The top of the washing machine cabinet 1 is formed as a lid 23 in which, in the preferred embodiment of my invention, a sink 24 is formed with a drain opening 25. The lid 23 may be pivoted about hinges 26 secured on the upstanding flange 27 of a portion 28 of the cabinet 1. When the lid 23 is opened, it will be understood that it affords ready access to the interior of basket 3 through opening 28a in portion 28 so that clothes may be inserted into the basket for a washing operation to be provided and may be removed from the basket when a washing operation is terminated. When the lid 23 is closed, as shown, the drain opening 25 communicates with the upper end 28b of a drain conduit 28c which permits vitiated liquid to drain out of sink 24 by gravity.

It will be understood that the machine is provided with a conventional control assembly, generally indicated by the numeral 29 and further mentioned herebelow, so that a complete typical cycle of operations may be provided by the electrically operated components of the machine. For instance, in one such cycle water is introduced into the tub 2 and the basket 3, and the agitator 4 is then oscillated back and forth on its axis to wash the clothes in the basket. Then, after a predetermined period of this washing action, basket 3 is rotated at high speed to extract centrifugally the washing liquid from the clothes while at the same time pump 10 discharges the liquid so extracted. Following this extraction operation, a supply of clean liquid is introduced into the tub and basket again 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.

It will be noted that the main part of the washing machine within cabinet 1 is substantially separate from an upper cabinet assembly 30 which, in modern washing machines, is conventionally provided in order to furnish a suitable and ornamental covering for the control assembly 29 of the machine. In the present case, where a sink 24 is formed in the lid of the washing machine, it is also proposed that suitable liquid supply means for the sink, such as spout 31, will be formed to extend from the assembly 30. In the usual manner, spout 31 may be controlled by manually operable valve members such as that shown at 32.

Whereas, in free-standing machines, the assembly 30 is rigidly secured to the cabinet 1 so that they form a unit as they come from the factory, a more appropriate approach in the case of built-in-washing machines is to provide the units 1 and 30 to be entirely independent of each other until they are eventually assembled together in a dwelling in the final position in which they are to be

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used. In this connection, both the main lower part of the washer and the control panel assembly 30 are secured to a template assembly 33 of a suitable sheet material such as steel. It is contemplated that, generally, the template assembly 33 will be formed so as to extend back within a wall 34 against which the built-in washing machine is positioned, being fastened to the wall in a suitable manner (not shown). The structure of the assembly 33, and the manner in which it is secured to the wall and the assemblies 1 and 30 are in turn secured to it, are fully described and claimed in application Serial No. 119,708 filed concurrently herewith by Winston L. Shelton, Donald E. Wilson and John M. Evjen jointly, and assigned to the General Electric Company, assignee of the present invention.

It will thus be understood that while the specific fastening structure is not shown in the present application, both the main cabinet part 1 and the assembly 30 are secured to the assembly 33. Assembly 33 includes a bracket 34 which forms the support both for hydraulic control apparatus generally indicated by the numeral 35 and for the electrical control apparatus 29 previously mentioned.

Assembly 35 includes connections 36 and 37 which may be joined to pipes (not shown) leading from suitable hot and cold water sources. The passage of cold water from inlet 37 to spout 31 is controlled by manually operable valve member 32. Similarly, the passage of the cold water through to conduit 19 leading to valve 17 is controlled by a manually operable valve member 38. Member 38 is accessible when an upper member 39, which forms the top surface of cabinet assembly 30, is removed. Valve members similar to members 32 and 38 control the passage of hot water from inlet 36 to faucet 31 and to conduit 18 respectively.

The assembly 30 includes a cabinet member 40 whose shape is clearly shown in FIGURE 3. Member 40, when assembly 30 is in position, substantially encloses the liquid supply apparatus 35 and the electrical control apparatus 29, the enclosure being completed in back by assembly 33 and on top by the shelf structure 39 of assembly 30. In addition, an opening 41 is conventionally provided at the front of member 40, and in the fully assembled state a decorative panel assembly 42 is secured to close the opening 41. Panel assembly 42 includes appropriate openings to permit the passage through to the front thereof of spout 31, the spout controls including valve handle 32, and the various control members 43 and 44 which are normally provided extending from assembly 29 so that an operator may manually preselect a particular desired sequence of operations in the washing machine. The upper front part of the member 40 may be provided at its ends with portions 45 and 45a which, together with the cover 39, form an enclosure for an appropriate lighting arrangement (not shown).

Member 40 also includes inwardly extending flanges 46 extending thereacross near its back at the bottom thereof; flanges 46 are intended to be seated on the upper surface 46a of the lower cabinet assembly 1, with the assemblies 1 and 30 being secured in that position to template 33 as fully described in the aforementioned joint application of Shelton, Wilson and Evjen. The lower front portion of the member 40 includes a trough 47 which, in effect, forms a receptacle extending across the front of the member at the base thereof. At the bottom of trough 47 suitable outlet openings 48 are provided. While, of course, it is conceivable that a single opening of an appropriate size may be provided, it is preferred to provide the relatively small openings 48 at the base of trough 47.

When the two assemblies 1 and 30 are positioned relative to each other as shown, and secured in that position to assembly 33, the openings 48 are directly over a lip member 49 which slants downwardly from its back to its front so that any liquid passing down through opening 48 will run down the lip 49 and then into the sink

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24 formed in the lid 23. If the sink becomes full, the liquid will then overflow over the front of the sink, and over the sides.

The drain conduit 16 from pump 10 is connected at its remote end to the top end 50 of a downwardly extending drain conduit 51. Similarly, the drain conduit 28c from sink 24 is connected at its remote end to the forwardly extending upper end 52 of a downwardly extending drain conduit 53. In the conventional manner, a junction 54 may be provided where the drain conduits 51 and 53 come together and then continue downwardly as a single conduit 55 through appropriate traps (not shown) to a sewer or septic tank system. The drain pipe 51 has, extending substantially horizontally forward therefrom, a branch conduit 56, the junction of conduit 56 and pipe 51 being below the point where drain conduit 16 comes into the pipe 51. Branch conduit 56 extends, as stated, in a generally horizontal direction forward to an open termination 57 (FIGURE 2) which is located directly over the trough 47. This position of opening 57 causes any liquid passing through it to fall into the trough with a substantial part then passing through openings 48 so as to flow down lip 49 and into the sink 24.

It will be understood that it is always desirable to have an air break in a drain pipe which is connected directly to the pump of a washing machine in order to prevent the siphoning which may, in some unusual circumstances, occur to cause sewage to be pulled back up through the pipe into the tub 2. The open end 57 of horizontally extending pipe 56 achieves this purpose. It will be understood that the flow down from conduit 16 into pipe 51 normally passes directly by the branch conduit 56 without passing thereinto, so that the liquid goes directly down through pipe 51 and does not enter the conduit 56. To increase this effect, a slight slant upwardly from the junction point of conduit 56 and pipe 51 may be provided in the conduit 56 as shown.

My improved drain arrangement provides a further very substantial advantage in that any stoppage in the drain system and any tendency of the drain system liquid to back up will cause the initial backflow to pass through the branch conduit 56 and out through its open end 57. When this occurs, the liquid then flows down into the trough 47 and, through gravity, passes out through openings 48 and flows down lip 49 into sink 24. Thus, a ready visual indication of difficulty with the drain system is provided by the presence of liquid flowing down from openings 48 into sink 24.

It will be understood that, while a built-in washing machine having a sink formed in its upper surface has been shown as the preferred structure for the use of my invention, any washer structure having a top surface which receives the liquid from the branch conduit 56 is included in the broadest scope of my invention.

It will thus 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 my 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: washing means and a pump for removing vitiated liquid from said washing means; a first cabinet assembly substantially enclosing said washing means and having a top surface with a sink formed therein; liquid supply apparatus for said machine including a faucet extending forwardly into liquid supplying relationship to said sink, and manual control means for said faucet; a second cabinet assembly positioned above said first cabinet assembly behind

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said sink, said second cabinet assembly being arranged with said faucet and said control means extending forwardly therefrom, said second cabinet assembly having its lower portion formed as a liquid receptacle with at least one opening formed in the bottom of said receptacle, said receptacle being positioned relative to said sink so that liquid passing down through said opening flows into said sink; and drain means for said sink and said washing means including a drain pipe extending downwardly from above said receptacle, conduit means connecting the outlet of said pump to said drain pipe adjacent the top of said drain pipe, and a branch conduit extending substantially horizontally from said drain pipe below the junction of said conduit means and said drain pipe, said branch conduit terminating in an open end position over said receptacle, whereby upon clogging in said drain pipe at least some of the backflow therefrom passes initially into said sink.

2. The apparatus defined in claim 1 wherein said receptacle is formed as a trough extending across the lower front portion of said second cabinet assembly, said trough having a plurality of openings spaced along its length in the bottom thereof.

3. The apparatus defined in claim 2 wherein said first cabinet assembly includes a lip member extending beneath said trough the full length thereof and slanting down toward said sink.

4. A washing machine comprising: washing means and a pump for removing vitiated liquid from said washing means; a first cabinet assembly substantially enclosing said washing means and having a top surface with a sink formed therein; liquid supply apparatus for said machine including a faucet extending forwardly into liquid supplying relationship to said sink, and manual control means for said faucet; a second cabinet assembly positioned above said first cabinet assembly behind said sink, said second cabinet assembly being arranged with said faucet and said control means extending forwardly therefrom, said second cabinet assembly having its lower portion formed as a liquid receptacle with at least one opening formed in the bottom of said receptacle, said receptacle being positioned relative to said sink so that liquid passing down through said opening flows into said sink; and drain means including a drain pipe extending downwardly from above said receptacle, conduit means connecting the outlet of said pump to said drain pipe adjacent the top of said drain pipe, a branch conduit extending substantially horizontally from said drain pipe below the junction of said conduit means and said drain pipe, said branch conduit terminating in an open end positioned over said receptacle, said sink having a drain conduit extending downwardly therefrom, and a second drain pipe connected to the bottom of said sink drain conduit and extending downwardly toward and joining said first drain pipe below said branch conduit.

5. A washing machine comprising: washing means, drive means for said washing means and a pump for removing vitiated liquid from said washing means; a first cabinet assembly substantially enclosing said washing means, drive means and pump and having a top surface formed to guide liquid by gravity away from the back of said first cabinet means and from said drive means; control apparatus for said machine, and manual control means for said apparatus; a second cabinet assembly positioned above said first cabinet assembly adjacent the back of said upper surface of said first cabinet assembly, said second cabinet assembly being arranged with said manual control means extending forwardly therefrom, said second cabinet assembly having its lower portion formed as a liquid receptacle with at least one opening formed in the bottom of said receptacle and positioned relative to said first cabinet means top surface so that liquid passing down through said opening flows onto said top surface; and drain means for said washing means including a drain pipe extending downwardly from above

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said receptacle, conduit means connecting the outlet of said pump to said drain pipe adjacent the top of said drain pipe, and a branch conduit extending substantially horizontally from said drain pipe below the junction of said conduit means and said drain pipe, said branch conduit terminating in an open end positioned over said receptacle, whereby upon clogging of said drain pipe backflow therefrom passes initially onto said top surface of said first cabinet means.

6. The apparatus defined in claim 5 wherein said branch conduit extends at a slight angle from the hori-

zontal upwardly from the junction with said drain pipe to said open end of said branch conduit.

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