United States Patent [19]

Menk

[11] **3,785,181**

[45] **Jan. 15, 1974**

[54] **CLOTHES WASHER HAVING A SIPHON-ACTUATED FLOOD CONTROL ARRANGEMENT**

[75] Inventor: **Melvin A. Menk,** Dayton, Ohio

[73] Assignee: **General Motors Corporation,** Detroit, Mich.

[22] Filed: **May 10, 1972**

[21] Appl. No.: **252,107**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 89,826, Nov. 16, 1970, abandoned.

[52] **U.S. Cl.** **68/208**

[51] **Int. Cl.** **D06f 39/08**

[58] **Field of Search** 68/208

[56] **References Cited**

UNITED STATES PATENTS

3,604,225	9/1971	Douglas	68/208
2,986,913	6/1961	Condit et al.	68/208 X

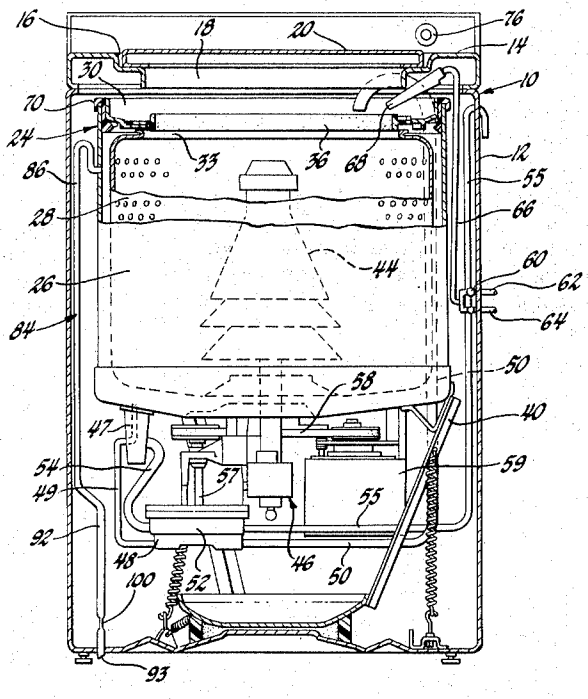
Primary Examiner—William I. Price

Attorney—F. M. Ritchie

[57] **ABSTRACT**

A recirculating-type domestic clothes washer has an open top water container for containing water and washing agent in which clothes are washed. A perforate spin basket is inside the water container and includes an agitator which is driven by a prime mover means beneath the water container. Water is supplied from a conduit having its terminus in an upper portion of the water container. A fluid control system prevents water from overflowing the water container in order to prevent contamination of the water supply in the upper part of the water container and the prime mover means beneath the water container. The fluid control incorporates a siphon having one portion connected to the water container at its predetermined fill level and another portion adapted for communication with a remote drain and having a bight portion at a level limiting the uppermost level of water in the water container.

3 Claims, 2 Drawing Figures



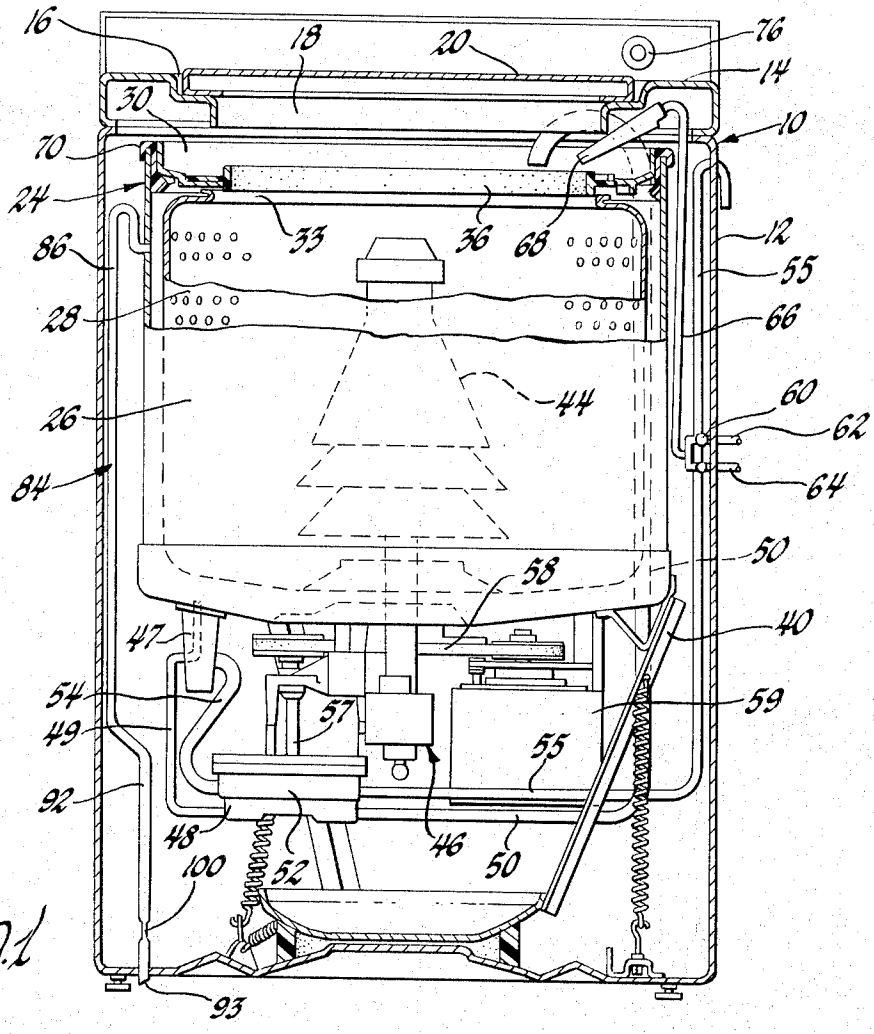

16
18
20
76
14
30
10
70
24
33
36
68
12
86
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66
44
60
26
62
84
64
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47
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59
49
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50
100
52
93

Fig. 1

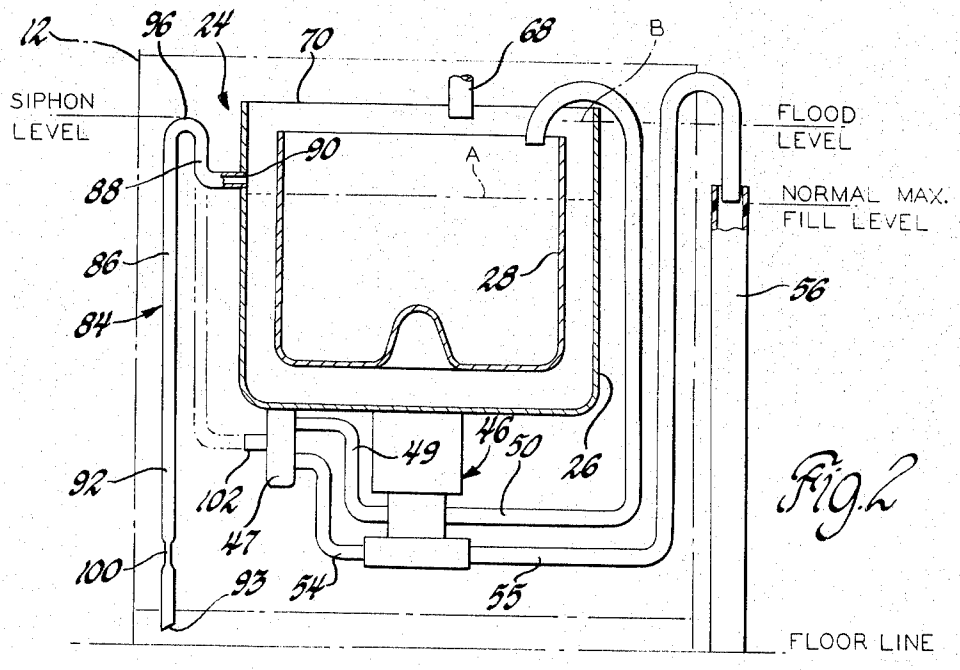

12
96
24
70
68
B
SIPHON LEVEL
FLOOD LEVEL
90
A
88
NORMAL MAX. FILL LEVEL
86
28
56
84
46
49
50
26
92
102
47
100
93
54
55
FLOOR LINE

Fig. 2

CLOTHES WASHER HAVING A SIPHON-ACTUATED FLOOD CONTROL ARRANGEMENT

This is a continuation-in-part of my copending application Ser. No. 89,826, filed Nov. 16, 1970, now abandoned.

This invention relates to a clothes washing machine and, more particularly, to a flood control system therefore.

A serious concern in the design of clothes washers is the possibility of flooding. Flooding, in this context, means the water overfilling of the tub and water container. Such flooding can occur because a timer sticks and fails to advance out of the fill position. A pressure switch may fail in the case of pressure fill machines. A washer may fail to pump out a previous fill of wash water befoe a subsequent fill is initiated. This could occur if: a pump is blocked; there is a suds-lock in the water handling system; a drain hose is kinked or blocked; or the user manually skips the pump-out portion of a cycle when moving to a fill cycle. Probably most serious in the way of malfunctions is a water valve which fails to shut off. This invention is directed to a simple siphon arrangement for protecting the clothes washer and its surroundings in the event any of the foregoing malfunctions occur.

Accordingly, it is an object of this invention to provide a clothes washer with a siphon arrangement for controlling flooding therein.

Another object of this invention is the provision of a flood control arrangment which protects from flooding both the water supply means and the prime mover means.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of the present invention is clearly shown.

IN THE DRAWINGS:

FIG. 1 is a sectional view of a domestic clothes washer provided with the flood control arrangement of this invention; and

FIG. 2 is a schematic representation of the invention.

In accordance with this invention and with reference to FIG. 1, a domestic clothes washer is shown generally at **10.** The washer includes a box-like sheet metal casing **12** having a top wall **14.** The top wall has a recessed portion **16** including an access opening **18** which is exposed when the access door **10** is open.

Casing **12** is shown to enclose a nested tub assembly **24.** The assembly includes an open-top, imperforate wall container **26** and a perforate wall spin basket **28.** Perforations are coextensive with the cylindrical side wall of the spin basket. An annular plastic subtop **30** is sealingly clamped to the open top of the water container **26.** The subtop circumscribes the open top of the water container and extends over a rim **33** forming the top opening of the spin basket **28** to define an access collar **36** between the access opening **18** of the cabinet and the top opening of the spin basket.

The tub assembly **24** is mounted on a suspension system shown generally at **40** and more fully taught in U.S. Pat. No. 3,493,118 granted Feb. 3, 1970. The tub assembly includes an agitator **44** which with the spin basket **28** is connected to a drive mechanism shown generally at **46.** The drive mechanism may be of a roller-

drive type taught more fully in U.S. Pat. No. 3,087,321 granted Apr. 30, 1963. In general, mechanism **46** may be operated in one manner to vertically reciprocate or oscillate the agitator **44** for washing clothes in the tub assembly. When the mechanism is operated in another manner, the spin basket **28** is rotated with respect to the water container **26** for centrifuging washing fluid from the clothes in the spin basket. For additional details on the construction of the tub assembly **24,** reference may be had to copending application Ser. No. 55,813, filed July 17, 1970, now U.S. Pat. No. 3,663,975, and commonly assigned with this application.

A conventional water recirculation system will now be described. The water container **26** includes a bottom outlet or sump **47** in addition to the open top access opening **36.** A recirculating pump **48** withdraws washing water or liquid from the water container **26** through the bottom outlet **47** and by means of recirculating conduits or hoses **49** and **50** returns the washing liquid to the water container. The purpose of recirculation is to remove lint and other sediment or particulate matter from the recirculating washing liquid.

A conventional drain system for the clothes washer includes a drain pump **52** for pumping washing liquid from the water container **26** thorugh its bottom outlet **47** and by means of drain conduits or hoses **54** and **55** to a remote drain or standpipe **56.**

Both the recirculation pump **48** and the drain pump **52** are operated by a common reversible power shaft **57.** The shaft is driven by a belt takeoff **58** from a reversible motor **59** of drive mechanism **46.** When the drive mechanism is operating in a manner to reciprocate the agitator **44,** the power shaft **57** is rotated in a direction to cause the recirculation pump **48** to recirculate washing liquid. When the drive mechamism **46** is operating in a manner to rotate the spin basket in a centrifuging operation, the power shaft **57** is reversed to cause the drain pump **52** to pump the washing liquid to drain.

The fill system for the clothes washer **10** comprises a combination valve **60** adapted for connection with a hot water line **62** and a cold water line **64.** The valve **60** is adapted to supply either hot, cold, or mixed temperature water to a supply conduit **66** leading to an outlet **68** overlying the opening **36** in the subtop at a level beneath the highest overflow edge of the open top **70** of the water container **26.** The peripheral fill system described in the aforementioned copending application is also suitable for use with this invention.

The clothes washer **10** may be controlled in an automatic cycle by means of a conventional timer **76.**

The timer is connected to the valve **60** to govern a predetermined clothes washing cycle including periods of wash water fill and rinse water fill. The timer is also connected to the drive mechanism **46** to selectively reciprocate the agitator **44** after periods of wash fill and rinse fill, respectively, for agitating articles to be washed while water is recirculated by pump **48.** The timer connection with the drive mechanism **46** also effects a spinning of the spin basket **28** to centrifuge wash water and rinse water from the tube assembly **24.** During spinning, pump **52** operates in accordance with the timed cycle to pump centrifuged water from outlet sump **47** on the bottom of the water container through hoses **54, 55** to remove the centrifuged water to drain **56.**

In the event that water is supplied to the tub assembly **24** to the point where it overflows the open top **70** of the water container **26** (stuck valve **60** or kinked hose **55**), the overflow would submerge the end of the water supply outlet **68** and, running down the outside of the water container **26,** could fall on the drive mechanism **46.** This situation could result in a contamination of the water supply and a contamination of the drive mechanism by shorting the drive motor **59.** This invention is directed to a flood control system to prevent the occurrence of this situation.

Turning now to the schematic view of FIG. **2,** tub assembly **24** is shown provided with the siphon-actuated flood control arrangment of this invention. The flood control system **84** comprises an imperforate tube member **86** separate from the recirculation and drain systems and formed into a siphon having a suction leg **88** in communication with portion **90** of the water container **26** at a position at the normal maximum fill level A supplied by the water supply valve **60.** A drain leg **92** is adapted to communication with a remote floor drain at a position below the connection of the suction leg **88** at **90** with the water container. The tube **86** has a bight portion with its highest point **96** positioned at the flood level B which is predetermined by design to be at a level below the open top **70** of the water container and the lowest point of the water supply nozzle **68.**

In operation where any malfunction results in a water fill raising through the flood level B which coincides with the highest point **96** of the siphon tube **86,** a siphoning action will be initiated to reduce the level of water in the water container **26** to the level of the connection **90** of the suction leg to the water container. The siphon tube may direct the water away from the clothes washer thus protecting the washer from major damage. The diameter of tube **86** and the siphon inlet **90** or the siphon outlet **93** may be selected for the rate of drain and the controlled minimum water level in the tub during a flooding period. Siphoning will stop if water flowing through tube **86** cavitates. Thus, tube diameters selected should be such that the tube will flow full of water once siphoning starts. As an alternative to selecting a proper tube diameter, the drain leg **92** may include a flow restrictor **100** therein to prevent the tube from cavitating and breaking the siphon. Preferably, a suction leg is connected to the water container sufficiently high that the amount of potential flooding at floor level is minimized.

If a connection **102** of the suction leg **88** is made to the drain outlet **47,** the water container **26** normally will be completely emptied. This is undesirable. But even with this connection, complete emptying of the water container may be prevented by placing a small hole (0.090–0.100 inch diameter) in drain leg **92** 3 to 4 inches below the bight portion **96** of the tube. Then, and with siphoning flow sufficiently restricted, water level will drop in water container **26** to the level of the hole at which point air will be sucked into the tube through the hole and siphoning will stop due to cavitation. The outlet **90,** however, is preferred in that siphoning is not affected greatly by over-sudsing and clothes load sizes and fill levels.

This invention allows for simple modifications within the flood control system. Some of these are: (a) maximum water level in the tub without overflow; (b) fastener drainage at the tub through selection of tube size; (c) variable water level limits in the water container during flooding; and (d) choice of the tube connection with the water container along the side and bottom thereof. Splashing within the tub assembly also does not create an inadvertent actuation of the siphoning action.

While the embodiment of the present invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted.

I claim:

1. In a washing machine having an automatically controlled cycle including washing and rinsing operations, an open-top container for retaining water therein for articles to be washed, said container having a bottom sump, first pump means connected to said open-top and said bottom sump and operable in accordance with said automatically controlled cycle for recirculating liquid to said container, second pump means connected to said bottom sump and operable in accordance with said automatically controlled cycle for removing liquid from said container to a drain, prime mover means underneath said container for effecting the washing of articles in said container and for operating selectively said first and second pump means, water supply means including a conduit extending to an overlying position within an upper portion of said container below the open top thereof, said water supply means adapted by said automatically controlled cycle to supply water to said container at a predetermined fill level below the overlying position of said water supply means, a flood control system for said washing machine to prevent the overflow of water from said container during said washing and rinsing operations and thus the contamination of said water supply means and said prime mover means by said overflow of water, said flood control system comprising a tube member separate from said first and second pump means and formed into a siphon having a suction leg in communication with a lower portion of said container at said predetermined fill level and a drain leg adapted for communication with a remote drain at a position below the level of communication of said suction leg with said container, said tube member having a bight portion with its highest point positioned at a flood level above said predetermined fill level and below the overlying position of said water supply means, thereby to drain said container by siphoning to lower the level of water therein to said predetermined fill level whenever a malfunction of said automatically controlled cycle effects a supply of water to said container at said flood level, said drain leg including flow restrictor means to prevent the tube member from cavitating and breaking the siphon when said container is draining by siphoning.

2. In a washing machine having an automatically controlled cycle including washing and rinsing operations, an open-top container for retaining water therein for articles to be washed, said container having a bottom sump, first pump means connected to said open-top and said bottom sump and operable in accordance with said automatically controlled cycle for recirculating liquid to said container, second pump means connected to said bottom sump and operable in accordance with said automatically controlled cycle for removing liquid from said container to a drain, prime mover means underneath said container for effecting the washing of articles in said container and for operating selectively said first and second pump means, water supply means incuding a conduit extending to an overlying position

within an upper portion of said container below the open top thereof, said water supply means adapted by said automatically controlled cycle to supply water to said container at a predetermined fill level below the overlying position of said water supply means, a flood control system for said washing machine to prevent the overflow of water from the open top of said container during said washing and rinsing operations and, thus, the contamination of said water supply means and said prime mover means by said overflow of water, said flood control system comprisng an imperforate tube member separate from said first and second pump means and formed into a siphon having a suction leg in communication with said container along the side thereof at a level both below the overlying position of said water supply means and the open top of said container and a drain leg adapted for communication with a remote drain at a position below the level of communication of said suction leg with said container, said tube member having a bight portion with its highest point positioned at a flood level above said predetermined fill level and both below the overlying position of said water supply means and the open top of said container, thereby to drain said container to the level of communication of said suction leg with said container whenever a malfunction of said automatically controlled cycle effects a supply of water to said container at said flood level and before the supply of water effected by said malfunction overflows from the open-top of said container.

3. In a washing machine having an automatically controlled cycle including washing and rinsing operations, an open-top container for retaining water therein for articles to be washed, said container having a bottom sump, first pump means connected to said open-top and said bottom sump and operable in accordance with said automatically controlled cycle for recirculating liquid to said container, second pump means connected to said bottom sump and operable in accordance with said automatically controlled cycle for removing liquid from said container to a drain, prime mover means underneath said container for effecting the washing of articles in said container and for operating selectively said first and second pump means, water supply means including a conduit extending to an overlying position within an upper portion of said container below the open top thereof, said water supply means adapted by said automatically controlled cycle to supply water to said container at a predetermined fill level below the overlying position of said water supply means, a flood control system for said washing machine to prevent the overflow of water from said container during said washing and rinsing operations and, thus, the contamination of said water supply means and said prime mover means by said overflow of water, said flood control system comprising an imperforate tube member separate from said first and second pump means and formed into a siphon having a suction leg in communication with said container at a level below the over-lying position of said water supply means and a drain leg adapted for communication with a remote drain at a position below the level of communication of said suction leg with said container, said tube member having a bight portion with its highest point positioned at a flood level above said predetermined fill level and below the overlying position of said water supply means, thereby to drain said container to the level of communication of said suction leg with said container whenever a malfunction of said automatically controlled cyle effects a supply of water to said container at said flood level, said drain leg of said imperforate tube member including a flow restrictor therein to prevent the tube member from cavitating and breaking the siphon.

* * * * *

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,785,181 Dated January 15, 1974

Inventor(s) Melvin A. Menk

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

Column 1,

lines 8 - 9,	"therefore"	should read	--	therefor --;
line 17,	"befoe"	" "	--	before --;
line 50,	"10"	" "	--	20 --.

Column 2, line 26

"thorugh"	should read	--	through --.

Column 3,

line 21,	"to"	should read	--	for --;
lines 65-66,	"fastener"	" "	--	faster --.

Column 4,

line 1, delete "the";

line 67,	"incuding"	should read	--	including --.

Signed and sealed this 1st day of October 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents