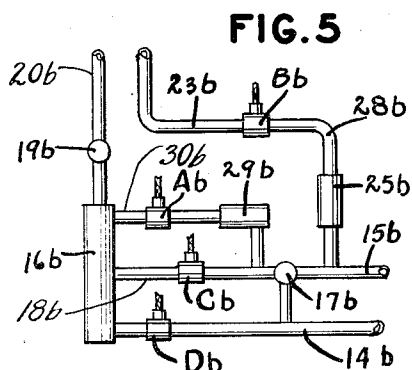
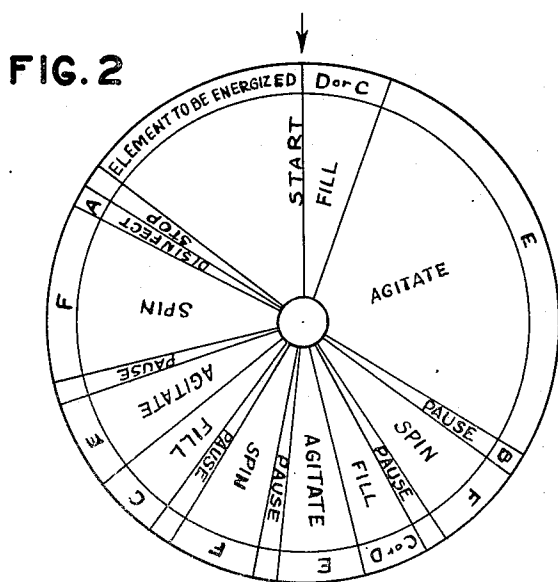
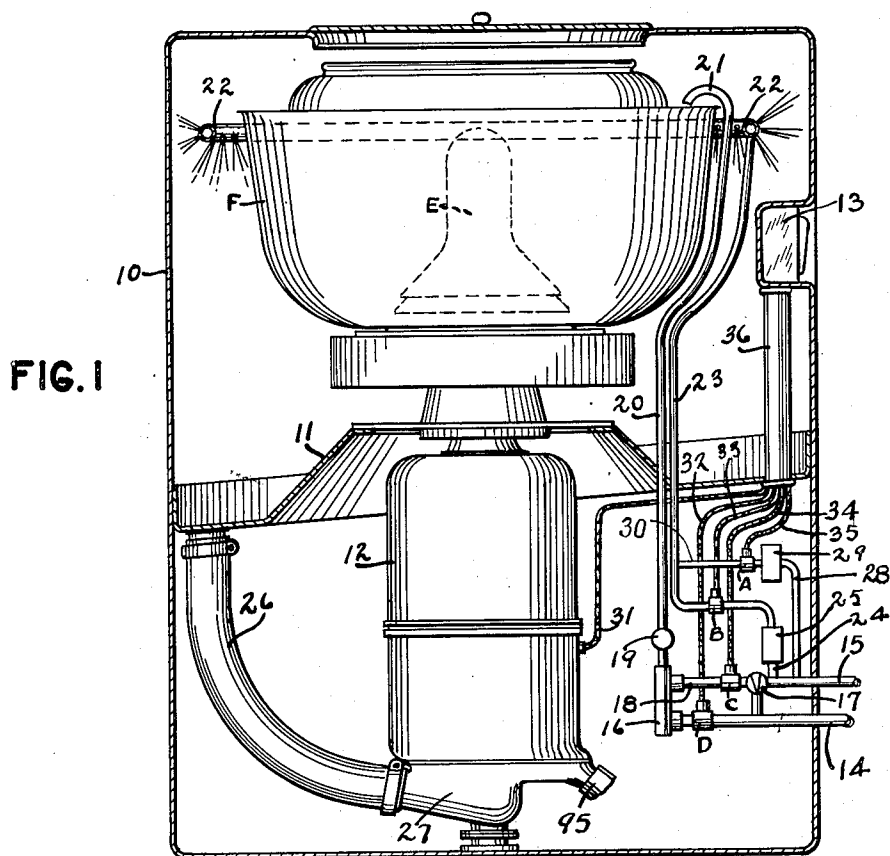


R. R. CANDOR
CLOTHES-WASHING MACHINE

2 SHEETS.--SHEET 1

Filed March 15, 1946



INVENTOR.
ROBERT R. CANNOR
BY
Spencer Hardman & Co.
Attorneys

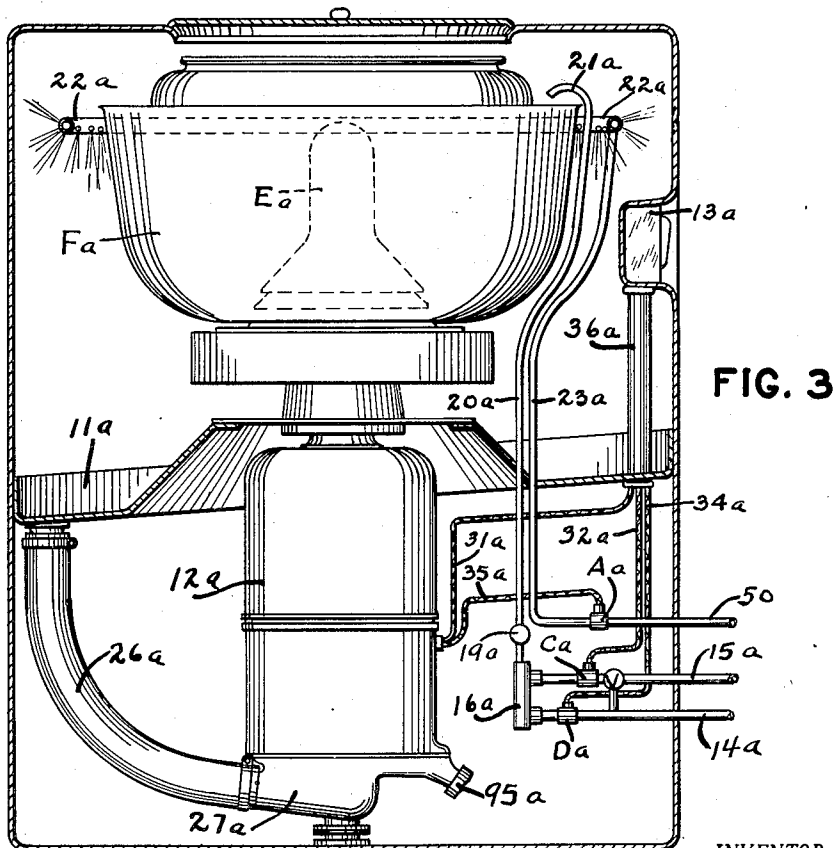
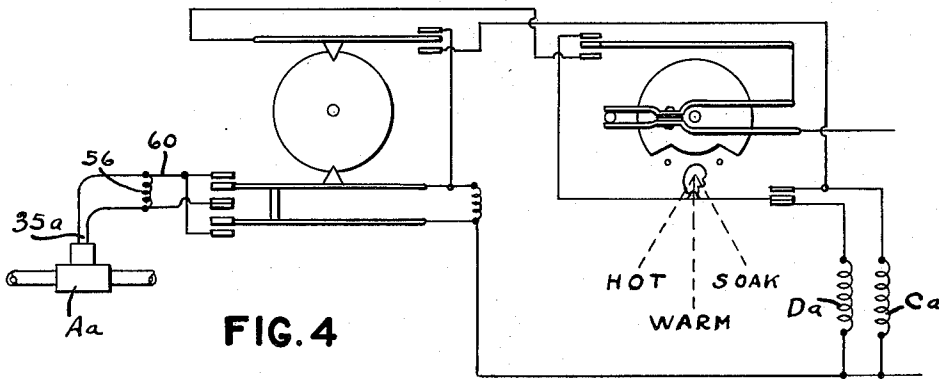
Sept. 23, 1952

R. R. CANDOR
CLOTHES-WASHING MACHINE

2,611,256

Filed March 15, 1946

2 SHEETS—SHEET 2



INVENTOR.
ROBERT R. CANDOR
BY
Spencer Hardman & Felt
Attorneys

UNITED STATES PATENT OFFICE

2,611,256

CLOTHES-WASHING MACHINE

Robert R. Candor, Oakwood, Ohio, assignor to
General Motors Corporation, Dayton, Ohio, a
corporation of Delaware

Application March 15, 1946, Serial No. 654,586

3 Claims. (Cl. 68-12)

1

This invention relates to domestic appliances and more particularly to washing machines.

An object of this invention is to provide means to prevent the centrifugal tub of a washing machine from being stalled, when too much detergent is added to the wash water.

Another object of this invention is to provide means for preventing the fouling of the liquid residue remaining in the discharge pump, or sump, after the machine has completed a washing operation.

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 form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a diagrammatic, vertical, cross-sectional view of a washing machine embodying features of my invention;

Fig. 2 is a sequence diagram for the timer in Fig. 1;

Fig. 3 is a view, somewhat similar to Fig. 1, but showing a modified form of the invention;

Fig. 4 is a wiring diagram for the machine shown in Fig. 3; and

Fig. 5 is a modification of a portion of Fig. 1.

Frequently, when a washing machine, of the centrifugal type, is operated, the motor stalls before the tub reaches top spinning speed. I have discovered that one cause for this is that when too much soap or detergent is used, the agitator whips up a large amount of suds. The suds spill over the rim of the tub and remain in contact with the outside of the tub and other rotating parts. Consequently, when rotation of the tub is started, the additional friction thus produced frequently prevents the motor from accelerating fast enough to prevent overloading of the motor and its overload protectors. This results in frequent blowing of fuses. However, according to this invention, this objection is overcome by removing the suds from around the tub just before, or during, the rotational acceleration of the tub. This is accomplished by spraying a suds curdling or removing fluid around the exterior of the tub just before, or during, the rotational acceleration of the tub.

This invention also removes another objectionable feature present in washing machines. These washing machines frequently are provided with a pump for discharging the washing fluid into stationary tubs, or sinks, which are at a higher level than the tub of the machine. This construction thus creates a sump in the machine

2

where a small amount of liquid residue remains after the pump is stopped. This residue becomes foul in a short time, if the machine remains idle for any appreciable length of time, thus creating a disagreeable odor near the machine. This is particularly noticeable when the machine is first operated after a period of idleness, when the first operation of the pump discharges the foul liquid, or blows air over the foul liquid and into the room. This objection is overcome, according to this invention, by introducing a suitable quantity of disinfectant into the liquid which is to become the heretofore mentioned residue. This disinfectant prevents the liquid residue from becoming foul.

Conveniently, the same spray means used for removing the soap suds may be used to introduce the above mentioned disinfectant into the sump. However, such disinfectant may be introduced by other means.

The embodiment of the invention now preferred is shown in the accompanying drawings and will now be more specifically described. It is to be understood, however, that such specific disclosure is not for the purpose of limiting the invention; but for the purpose of giving a disclosure in such full, clear, concise and exact terms as to enable any person skilled in this art to make, construct, and use the same. For example, a specific washing machine may be used as disclosed in the patent to Kendall Clark No. 2,366,236, patented January 2, 1945; and the timer controlling such a machine, may be any of the well known timers, which control the flow of electrical current to the various parts of the machine. Merely by way of example, the timer may be as shown in the patent to Kendall Clark 2,376,901, patented May 29, 1945.

As shown in Fig. 1, of this application, a cabinet 10 is provided with a transverse partition 11. Above this partition, and within the cabinet, is placed a centrifugal tub F, within which is provided an agitator E. These are actuated by power and transmission means within the casing 12, below the partition 11. The tub F and agitator E may be substantially as shown in Fig. 1 of Clark Patent 2,366,236, and the mechanism in casing 12 may be substantially as shown in Fig. 2 of said patent. A timer 13 may be electrically connected to the various parts of the machine, and may correspond to timer 75 broadly disclosed in Patent 2,366,236; and, if desired, may be specifically as disclosed in Patent 2,376,901. The invention is applicable, however, to many other constructions of washing machines.

Liquid supply means may be provided for the washing machine. A source of water may include a hot water pipe 14 and a cold water pipe 15. Preferably the pipe 14 is connected to the usual domestic hot water heater, which generally supplies hot soft water, and the pipe 15 preferably is connected to the domestic cold water system, and preferably a source of cold soft water. The hot water pipe 14 is connected to a common chamber 16. The pipe 14 is also connected to a thermostatic mixing valve 17, which is also supplied by the pipe 15. The mixing valve 17 discharges through the pipe 18 to the chamber 16. From thence water flows (from either pipe 14 or pipe 18) through a pressure reducing valve 19, having a constant discharge pressure, through the pipe 20 to the water supply head 21, which discharges into the interior of tub F. This much of the supply system may be substantially identical with that disclosed in Clark Patent 2,366,236.

To provide means for removing suds from around the outside of tub F, a spray head 22 is placed around the tub F. This is supplied with a suds removing fluid by means of a pipe 23, which preferably supplies water capable of curdling the suds. It is preferred to supply cold hard water through this pipe 23. In the embodiment shown in Fig. 1, the cold, soft water pipe 15 is connected by pipe 24 with a solute chamber 25, which in turn is connected to the pipe 23. A solute is placed in the chamber 25, which is capable of hardening the water, as it flows through the chamber, to a sufficient degree that it causes curdling of the suds surrounding the tub F. Merely by way of example, any solute which contains soluble magnesium or calcium salts may be used.

The water extracted in the tub F, flows down to the partition 11, and from thence through a flexible hose 26 to a pump 27. From thence the water is discharged through a hose connection 95 to stationary tubs or the like, frequently at a higher elevation than the pump 27. Within the pump 27, itself, or adjacent thereto, a sump is created, which retains a small quantity of liquid after the operation is completed. If the machine remains idle for several days, this liquid becomes foul, and objectionable. According to this invention, means are provided to supply a disinfectant, and to cause some of this disinfectant to remain in the sump, or pump, after the washing operation has been completed. To this end, the pipe 15 is provided with a connection 28 to another solute chamber 29, which is connected by pipe 30 with pipe 23. A solute is placed in chamber 29, which has disinfecting properties, and which dissolves slowly in the water passing therethrough, so that, when it is discharged through spray head 22, and flows to the pump 27, it will have sufficient disinfecting strength to prevent the water residue from becoming foul. Any slowly soluble disinfectant may be used.

The timer 13 distributes electrical energy through the cables 31, 32, 33, 34 and 35 in proper sequence, to the various parts of the machine to produce the actions shown in Fig. 2. These cables may pass, through the conduit 36, from the timer to the lower part of the cabinet. The pipe 14 is provided with a water supply solenoid means D, which supplies water at maximum temperature through the pipe 20 and head 21 to the interior of tub F. The pipe 18 is provided with another water supply solenoid means C, which supplies tepid water to the head 21 and

tub F. The discharge from chamber 25 is controlled by a spray water solenoid means B, which controls the flow of hard water to the spray head 22. The pipe 30 is provided with another spray solenoid means, which is also a disinfectant supply solenoid means, and which controls the flow of water through the chamber 29 to the spray head 22.

In the operation of the machine shown in Figs. 1 and 2, clothes and a detergent are placed in the inner basket of the tub F, and the timer 13 is placed in the start position indicated in Fig. 2. The timer 13 energizes the solenoid D or C for a predetermined length of time, which fills the tub F to the desired level by virtue of the action of the constant pressure valve 19, as more fully described in Patent 2,366,236. After the tub is filled, the timer 13 energizes the mechanism in casing 12 to cause reciprocation of the agitator E for the necessary period of time. It frequently happens that the detergent in the water produces such a quantity of suds, that the suds overflows the rim of tub F and surrounds the tub. If the volume of suds is very great, the friction thus produced upon the outer surface of the tub F, or other rotating parts, creates such a drag on the motor (22 of 2,366,236) that the motor is overloaded and a fuse is blown. However, according to this invention, at or near the end of the agitation period, the solenoid B is energized to cause the discharge of cold hard water from the spray head 22. This curdles the suds and washes them down the pipe 25 and into the pump 27, from whence they are discharged through the pipe 95. When the motor is energized to spin the tub F, the same may be accelerated through the starting period without any drag caused by surrounding suds, for a sufficient length of time to extract the greater portion of water and detergent from the clothes.

If desired, this initial washing and spinning operation may be followed by rinsing operations. Thus after a short pause, the tube is again filled and the agitator actuated to produce a first rinse. Thereafter the tube is spun for a second extraction, after which a third filling, agitation and spinning operation may take place. The cold hard water spray preferably is omitted after the first agitation heretofore described; but may be repeated if desired after every agitation period.

At the end of the last spin, the solenoid A is actuated for a short period of time which permits the flow of water through the chamber 29 and pipes 30 and 23 to the spray head 22. This water contains disinfectant, dissolved from chamber 29, and the same flows down through the pipe 23 to the pump 27, where it remains and prevents the consequent fouling of the water residue heretofore described.

While I have shown the disinfectant as being introduced by means of spray head 22, the pipe 30 may be connected to the pipe 20, and the disinfectant may be introduced into the last rinse water. In such a case the connections are as shown in Fig. 5 where all the parts are identical to Fig. 1 except as indicated by the suffix "b." Thus the pipe 30b discharges into pipe 20b, and preferably the pipe 28b is connected to pipe 23b. Under these conditions the solenoid Ab is energized for the last "fill" in lieu of solenoid C. By this construction the last rinse is also a disinfecting one. If desired the chamber 29b may contain a slowly soluble blueing compound, so that

5

the last rinse may be a blueing rinse and/or a disinfecting one.

In the modification shown in Fig. 3, the parts which are the same as in Fig. 1 are numbered with the same number, but with the suffix "a" added. In Fig. 3, however, the pipe 50 is a cold hard water pipe which is connected to the cold hard water supply in the house as distinguished from a cold soft water supply pipe 15a or the hot soft water supply 14a. If the volume of water used is not of consequence, the water flowing through the pipe 50 need not necessarily be "hard" as usually understood; but may be the usual cold water available in the residence. The disinfectant connection shown in Fig. 1 may be used or omitted, as desired. The solenoid Aa, in this instance, is controlled by the timer; but through the medium of the usual starting winding control of the motor. The solenoid valve Aa is open as long as the starting winding of the motor is energized. Fig. 4 shows how this is done, this figure corresponding to Fig. 18 of Patent 2,376,901, with the connection to the solenoid valve Aa added. It is to be understood that the usual centrifugal starting switch is placed on the motor to control the energization of the starting winding 56. This centrifugal switch is indicated at 60. As long as the motor is below top speed, the switch 60 is closed; but opens when the motor attains its normal run speed. The solenoid valve Aa is likewise energized and permits the flow of water as long as the motor runs below top speed. The remainder of the wiring diagram has the same connections, and the same operation, as described in Patent 2,376,901; and therefore such parts are neither numbered nor further described.

In the operation of the modification shown in Fig. 3, clothes, detergent and water are introduced as heretofore described with respect to Fig. 1. Whenever the motor is started, the starting winding 56 is energized, and consequently also the valve Aa. However, when the motor is energized for agitation, it accelerates very quickly, so that the solenoid valve Aa is open but a very short time, and only a very small amount of liquid is sprayed at 22a. When the motor is energized for the spin operation, the acceleration is relatively slow, and the starting winding 56 is energized for a long period of time, during the slow acceleration. During this time, cold water is sprayed from the head 22a, so that the suds, which may be surrounding the tub Fa, are quickly washed away from the tub, and the tub is allowed to accelerate without danger of overloading the motor.

While the form of embodiment of the invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, as may come within the scope of the claims which follow.

What is claimed is as follows:

1. A washing machine comprising: a rotatable tub adapted to contain articles to be washed, detergent and water; agitating means in said tub; power means selectively to agitate said agitat-

6

ing means and to rotate said tub; water supply means for said tub; a sump and pump to receive and forcibly discharge liquid centrifugally extracted from said tub during rotation thereof; a timer controlling the operation of said power means and pump sequentially to control respectively introduction of water into said tub, agitation of said agitating means, rotation of said tub with operation of said pump and to stop operation of said washing machine with a residual amount of water in said pump, and means controlled by said timer to introduce disinfectant into said residual amount of water.

2. A washing machine comprising: a rotatable tub adapted to contain articles to be washed, detergent and water; agitating means in said tub; power means selectively to agitate said agitating means and to rotate said tub; a casing enclosing said tub, agitating means and power means; suds curdling spray means to spray suds curdling liquid between said casing and tub independently of introduction of liquid in said tub; water supply means for said tub; means to treat water from said water supply means to render it a suds curdling liquid and deliver it to said spray means; a timer controlling the operation of said power means, suds curdling spray means and water supply means sequentially to control respectively filling of said tub with water, agitation of said agitating means, operation of said spray means, and rotation of said tub.

3. A washing machine comprising: a rotatable tub adapted to contain articles to be washed, detergent and water; agitating means in said tub; power means selectively to agitate said agitating means and to rotate said tub; a casing enclosing said tub, agitating means and power means; suds curdling spray means to spray suds curdling liquid between said casing and tub independently of introduction of liquid in said tub; soft water supply means for said tub; hard water supply means independent of said soft water supply means connected to said spray means; a timer controlling the operation of said power means, soft water supply means and hard water supply means sequentially to control respectively filling of said tub with soft water, agitation of said agitating means, operation of said spray means, and rotation of said tub.

ROBERT R. CANDOR.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,154,566	Frantz et al.	Apr. 18, 1939
2,298,096	Dunham	Oct. 6, 1942
2,304,454	Gudmundsen	Dec. 8, 1942
2,328,432	Dunham	Aug. 31, 1943
2,331,699	Kirby	Oct. 12, 1943
2,372,770	De Remer	Apr. 3, 1945
2,380,732	Dunham	July 31, 1945
2,425,378	Lindemann	Aug. 12, 1947