United States Patent [19]

Blackburn

[11] **3,891,123**

[45] **June 24, 1975**

[54] **AUTOMATIC FLUID DISPENSING SYSTEM**

[76] Inventor: **Donald Blackburn,** 21 Gale Ave., Apt. 436, Toronto, Ontario, Canada

[22] Filed: **Nov. 27, 1973**

[21] Appl. No.: **419,476**

Related U.S. Application Data

[63] Continuation of Ser. No. 237,373, March 23, 1972, abandoned.

[52] **U.S. Cl.** **222/64;** 68/207; 137/255; 137/571; 222/70; 222/135

[51] **Int. Cl.** **B67d 5/14**

[58] **Field of Search** ..... 137/255, 263, 571, 624.18; 68/17 R, 27, 207; 222/56, 55, 57, 64, 65, 67, 68, 70, 129, 132, 135, 136, 137, 482

[56] **References Cited**

UNITED STATES PATENTS

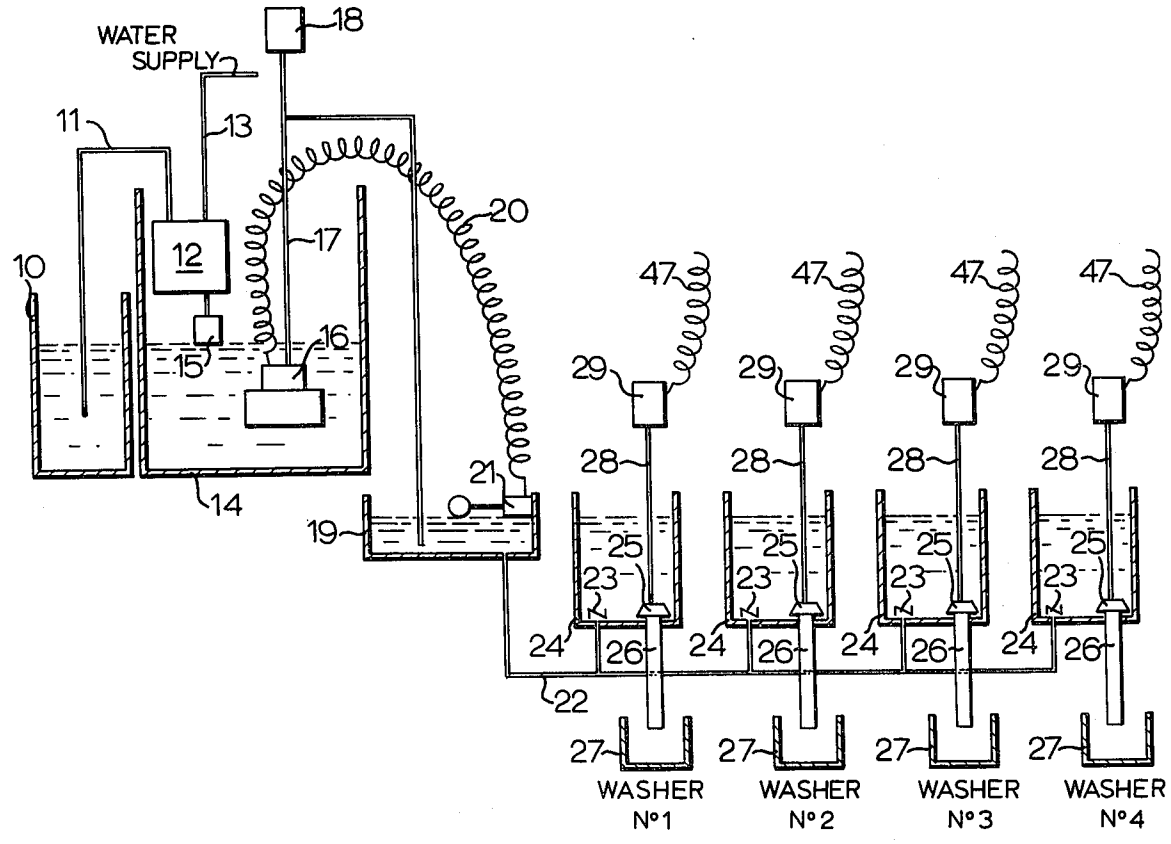
3,160,317	12/1964	Hambro	68/17 R
3,186,598	6/1965	Jonsson	222/57
3,347,416	10/1967	Hamilton	222/56
3,409,176	11/1968	Krause	222/70

Primary Examiner—Robert B. Reeves
Assistant Examiner—Larry H. Martin
Attorney, Agent, or Firm—Frank C. Leach, Jr.

[57] **ABSTRACT**

A commercial washing system with plural units is provided with a number of different fluids, usually in liquid form, operated by a timer controlled system having a dispenser for each different fluid at each machine unit. A head tank for each fluid controls the quantity of the respective fluid in the related unit dispensers. The system is very simple and avoids prior intermixture of the fluids.

10 Claims, 3 Drawing Figures



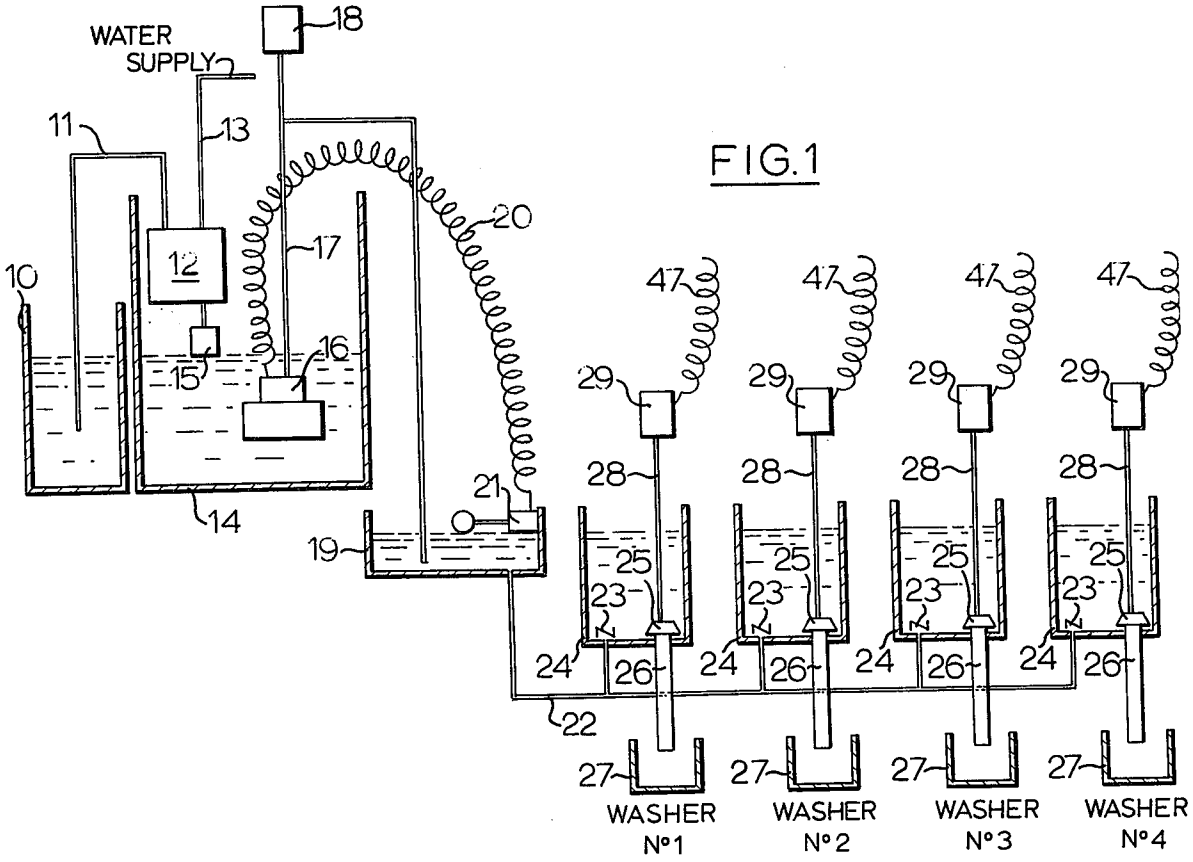


FIG. 1

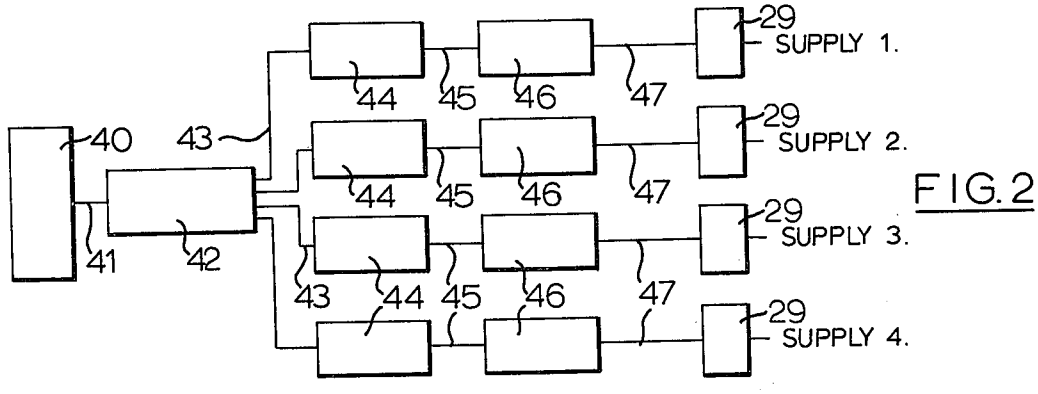


FIG. 2

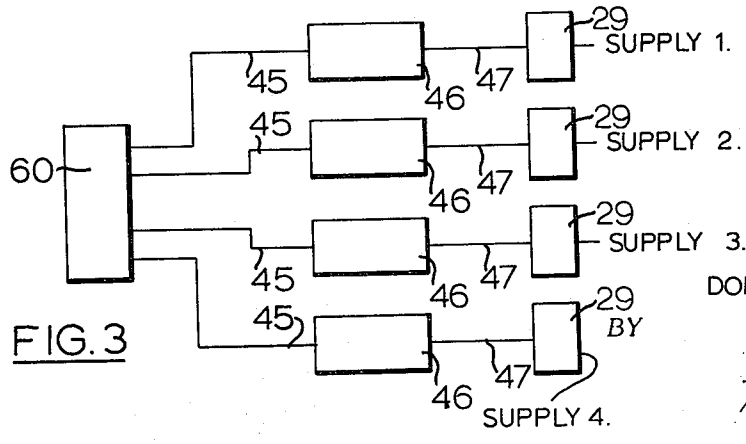


FIG. 3

INVENTOR.
DONALD BLACKBURN.

BY

Neil M. S. Johnston

AUTOMATIC FLUID DISPENSING SYSTEM

This application is a continuation of application Ser. No. 237,373, filed Mar. 23, 1972 now abandoned.

This invention is directed to a dispensing system for fluid material and, in particular, to a system for dispensing discrete quantities of selected material to a selected utilization unit such as a commercial washing machine.

In the operation of contemporary commercial and industrial laundries having a plurality of washing machine units, considerable problems arise in the addition of appropriate additives such as alkali, detergent, bleach and softener, bacteriostat and other chemical supplies.

It is common practice to utilize unit programmers to signal the need for additive, which requirement is attended to manually by washman. Such manual attendance can lead to incorrect quantities, wrong sequences, missed dosages, and unwanted spillage of supplies.

The prsent invention provides a system for dispensing desired fluid supplies in individually segregated circuits wherein each machine unit is provided with a dispensing tank for each variety of supply. The circuit for each supply includes a head tank to ensure the provision of the desired quantity of the respective supply to each machine.

The passage of each quantity of supply from each dispenser tank to its respective unit is effected by gravity flow in response to a signal from the machine programmer.

In addition to a simple dispenser system providing isolation of the various supplies, the present invention provides a control system operable by different types of controllers.

The present invention thus provides a supply metering system to supply a metered quantity of fluid material to a selected receiving station comprising: a head tank having a fluid inlet extending therefrom connected to a source of the fluid material, and inlet control means to establish, in operation, a predetermined level of fluid material within the head tank; at least one dispensing tank connected to the head tank to receive the fluid material in accordance with the level in the head tank; conduit means connecting the dispensing tank to a receiving station to transfer fluid material from the dispensing tank to the station; and admission control means to control the passage of the fluid material under gravity flow to the station.

In addition to the foregoing, there is provided a holding reservoir to which the particular supply is admitted. In the case where dilution of the supply is required, diluent supply such as water is also provided by way of a proportioning valve. The supply at appropriate strength is pumped from the holding tank to the head tank. The head level in the present preferred embodiment is controlled by a float operated valve to control the pumping of the supply from the holding tank to the head tank. The pump circuit includes provision of an anti-siphoning arrangement to ensure constant head in the head tank. Connection from the head tank to each of the dispensing tanks is by gravity flow through a check valve to ensure one-way operation and an absence of back flow.

Certain embodiments of the present invention are described, reference being made to the accompanying drawings, wherein:

FIG. **1** is a schematic sectional elevation of a dispensing system according to the present invention;

FIG. **2** is a schematic block diagram of one control circuit embodiment; and

FIG. **3** is a similar schematic for a second control circuit embodiment.

Referring to FIG. **1**, tank **10** constitutes a reservoir to receive concentrated liquid chemical or "supply." A holding tank **14** contains a proportioning mixer **12** having supply admitted thereto by connection **11** and water or other appropriate diluent liquid supplied by conduit **13.** The flow of the two fluids is controlled by the level controller **15,** which maintains a desired quantity of supply of desired concentration within the holding tank **14.**

A pump **16** in holding tank **14** delivers the fluent supply by way of pipe **17** into head tank **19.** An upward extension of pipe **17** is provided with an atmospheric relief valve **18** to permit the entry of air into the pipe **17** on cessation of pumping and, thus, preclude siphoning of the supply. The electrically driven pump **16** is energized through a connection **20** by a float actuated switch **21** in the head tank **19.**

A plurality of washer units **27** receiving the supply is each provided with a dispensing tank **24** connected to head tank **19** by way of gravity feed line **22.** At the branch entry to each tank **24** from line **22,** there is provided a check valve **23** to preclude cross-feeding between the dispensing tanks. Owing to the maintenance of a predetermined head of supply in the head tank **19,** the level of supply in each of the dispensing tanks **24** is correspondingly maintained. Each of the dispensing tanks **24** is connected by pipe **26** to the supply entry of the respective machine **27.** A valve **25,** controlled by rod **28** connected to a solenoid operator **29,** serves to release supply to the respective machine upon energization of the solenoid **29.**

In operation, with a quantity of supply at a controlled concentration available in the holding tank **14,** the pump **16** maintains the preset head level in head tank **19** to thereby control the volume of supply held in the respective dispensing tanks **24.** Energization of a respective solenoid **29** causes the supply to flow under gravity from the respective dispensing tank **24** by way of valve **25** to the machine **27** to which the pipe **26** connects.

Dispensing of supply through the control of solenoid **29** is effected by an electrical control circuit connected with a machine programmer.

Referring to FIG. **2,** this control circuit relates to a programmer of the type initiating a single signal. A programmer **40** for each washing machine serves to control a plurality of supplies such as "supply 1, " "supply 2, " etc. and uses a single output connection **41.** The mechanical output for each respective solenoid valve **29** is dealt with above in relation to FIG. **1.**

The output signals from programmer **40** are conducted by the connection **41** to a discriminating circuit. A stepping switch **42** connects the programmer **40** in sequence with a selected one of a bank of delay relays **44,** that are normally in an open circuit condition. The presence of a signal of sufficient duration in excess of the delay time constant of the selected relay **44** causes closure of the delay relay **44** resulting in energization

of a second delay relay **46** through a connection **45** and completing the circuit by a connection **47** to solenoid **29**, which is thereby energized. The duration of actuation of the solenoid **29** is normally a function of the closure time of delay relay **46**, which is held in a conducting state for a predetermined elapsed period of time, during which elapsed time the related dispenser tank **24** discharges supply to the related machine. Upon passage of the elapsed time, the second relay **46** opens and remains in this condition until a recycle signal of sufficient duration is again supplied from the programmer **40** to the delay relay **44.** The opening of the second relay **46** precludes further discharge from the dispenser **24.** The switch **42** is provided with sufficient circuits equal to the number of supply needs of the washing formula in use.

Referring to FIG. **3,** this illustrates a control system utilizing a programmer **60** having an energizing circuit for each machine receiving supply. The plural outputs of the programmer **60** are respectively connected to the supply solenoids **29** by connections **45** connected with delay relays **46** having a preset closure time, upon energization from the programmer **60.** As in the FIG. **2** embodiment, energization of a respective delay relay **46** produces actuation of the respective solenoid **29** with consequent release of supply to the related machine. Upon expiry of the relay elapsed time, the relay **46** opens and the supply cycle terminates until a further energization cycle commences. This is initiated by the programmer **60.**

Certain additional advantages accruing from the subject invention are:

Automatic dispensing of supplies can be achieved, leading to reduced operating costs by eliminating spillage, and providing closer operational control of supply quantities; a reduction in machine cycle times can be effected by the elimination of delay in administering supplies, leading to extended machine life or a greater number of operating cycles; capability of functioning with more than one type of programmer; the avoidance of mixing different chemicals or supplies before admission to the respective machine; the provision of a simple, low cost system having a minimum of component parts of readily serviceable type; and a system in which malfunction or failure permits continued operation of other machines in the system, and operation of the affected machine with an absence of only one supply constituent.

I claim:

1. A system for supplying metered quantities of a liquid to a plurality of receiving stations including:

a source of liquid including a holding reservoir;

a head tank, said head tank having an inlet connected to said holding reservoir;

inlet control means for maintaining a predetermined level of liquid in said head tank;

means to insure that said head tank fills only to the predetermined level when the liquid is supplied to said head tank irrespective of the head pressure of the liquid in said holding reservoir;

said insuring means including:

pump means to transfer liquid from said holding reservoir to said head tank;

and means to prevent siphoning of liquid from said holding reservoir to said head tank when said pump

means is inactive;

said inlet control means including means to terminate said pump means when the level in said head tank reaches the predetermined level;

a plurality of dispensing tanks;

means connecting each of said dispensing tanks to said head tank to cause the liquid in each of said dispensing tanks to be at the same level as the level of said head tank, each of said dispensing tanks having a predetermined volume of liquid therein in accordance with the size of said dispensing tank and the level of liquid therein;

separate check valve means cooperating with each of said dispensing tanks to prevent back flow of the liquid from any of said dispensing tanks while allowing said head tank to communicate therewith through said connecting means;

individual conduit means connecting each of said dispensing tanks with one of the receiving stations to allow gravity flow of the liquid from said dispensing tank to the receiving station;

separate means to control the flow of liquid through each of said individual conduit means to each of the receiving stations;

and means to activate each of said separate control means when the liquid is to be supplied to the receiving station to which said separate control means controls flow of the liquid, said activating means activating each of said separate control means for a sufficient period of time to allow the predetermined volume of liquid within said dispensing tank to flow by gravity through said individual conduit means to the receiving station to which said separate control means controls flow of the liquid from said dispensing tank.

2. The system according to claim **1** in which said activating means includes:

means to supply electrical signals when each of said separate control means is to be activated;

means to actuate each of said separate control means in response to an electrical signal from said supply means;

and said supply means supplying an electrical signal of sufficient duration to cause said actuating means to actuate said separate control means for a sufficient period of time to allow the predetermined volume within said dispensing tank to flow therefrom to the receiving station by gravity.

3. The system according to claim **1** in which

said inlet control means comprises a level sensor in said head tank connected in controlling relation with said pump means to terminate said pump means when the level in said head tank reaches the predetermined level.

4. The system according to claim **1** in which each of said dispensing tanks is open to the ambient air.

5. A system for supplying metered quantities of different liquids to a plurality of receiving stations at selected times including:

a plurality of sources of different liquids;

each of said sources of different liquids including a holding reservoir;

a plurality of head tanks;

each of said head tanks having an inlet connected to a different one of said holding reservoirs;

separate inlet control means for each of said head tanks for maintaining a predetermined level of liquid in each of said head tanks;

separate means for each of said head tanks to insure that said head tank fills only to the predetermined level when the liquid is supplied to said head tank irrespective of the head pressure of the liquid in said holding reservoir;

a plurality of dispensing tanks for each of said head tanks;

means connecting each of said head tanks to each of said plurality of dispensing tanks, each of said dispensing tanks having a predetermined volume of liquid therein as determined by the level of liquid in said connected head tank and the size of said dispensing tank;

separate check valve means for each of said dispensing tanks to prevent back flow of liquid from any of said dispensing tanks while allowing said connected head tank to communicate therewith;

individual conduit means connected to each of said dispensing tanks of each of said head tanks, said individual conduit means connecting one of said dispensing tanks of each of said head tanks to the same receiving station with each of said dispensing tanks of each one of said head tanks being connected by said individual conduit means to a different receiving station to allow gravity flow of the liquid from said dispensing tank to the receiving station;

separate means to control the flow of liquid through each of said individual conduit means to the receiving station;

and means to activate each of said separate control means for each of the receiving stations in a predetermined sequence for the same receiving station to cause the flow of a selected quantity of each of the liquids to the same receiving station at a predetermined time relative to when the first of the liquids is supplied to the same receiving station, said activating means activating each of said separate control means for a sufficient period of time to allow the predetermined volume of liquid within said dispensing tank to flow by gravity through said individual conduit means to the receiving station to which said separate control means controls flow of the liquid from said dispensing tank.

6. The system according to claim **5** in which said activating means for each of the receiving stations includes:

means to supply electrical signals at each of the time intervals when one of said separate control means for the same receiving station is to be activated;

means to actuate each of said separate control means for the same receiving station in response to an electrical signal from said supply means;

said supply means supplying an electrical signal of sufficient duration to cause said actuating means to actuate said separate control means for a sufficient period of time to allow the predetermined volume within said dispensing tank to flow therefrom to the receiving station by gravity;

and means to cause said electrical signals from said supply means to be supplied to only one of said actuating means at a time.

7. The system according to claim **6** in which:

said insuring means for each of said head tanks includes pump means to transfer the liquid from said reservoir to said connected head tank;

and said inlet control means for each of said head tanks comprises a level sensor connected in controlling relation with said pump means for said head tank to terminate the operation of said pump means when the level of the liquid in said head tank reaches the predetermined level.

8. The system according to claim **6** in which each of said actuating means includes a time delay relay to cause opening of said separate control means connected to said actuating means for a predetermined period of time sufficient to cause the predetermined volume in said dispensing tank to flow therefrom by gravity to the receiving station.

9. The system according to claim **5** in which:

said insuring means for each of said head tanks includes pump means to transfer the liquid from said reservoir to said connected head tank;

and said inlet control means for each of said head tanks comprises a level sensor connected in controlling relation with said pump means for said head tank to terminate the operation of said pump means when the level of the liquid in said head tank reaches the predetermined level.

10. The system according to claim **5** in which each of said dispensing tanks is open to the ambient air.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,891,123 Dated June 24, 1975

Inventor(s) Donald Blackburn

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

Column 1, line 23, "prsent" should read -- present --.

Claim 1, line 18, "means is inactive;" should be part of line 17.

Signed and Sealed this

second Day of September 1975

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks

FORM PO-1050 (10-69)

USCOMM-DC 60376-P69
U.S. GOVERNMENT PRINTING OFFICE : 869-930