(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 864 684 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
16.09.1998 Bulletin 1998/38

(51) Int. Cl.[6]: **D06F 39/02**, A47L 15/44

(21) Application number: **98200506.8**

(22) Date of filing: **17.02.1998**

(84) Designated Contracting States:
AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **07.03.1997 EP 97200693**

(71) Applicants:
- **UNILEVER N.V.**
  3000 DK Rotterdam (NL)
  Designated Contracting States:
  BE CH DE DK ES FI FR GR IT LI NL PT SE AT
- **UNILEVER PLC**
  London EC4P 4BQ (GB)
  Designated Contracting States:
  GB IE

(72) Inventor: **Seitz, Willi G.**
68219 Mannheim (DE)

(74) Representative:
Rosen Jacobson, Frans Lucas M. et al
Unilever N.V.,
Patent Division,
P.O. Box 137
3130 AC Vlaardingen (NL)

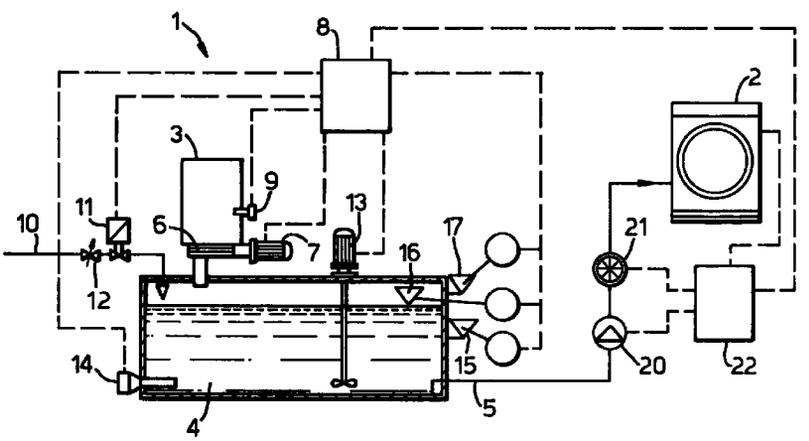
(54) System, method and control device for dosing detergent

(57) The invention relates to a system (1) for dosing detergent to a washing process comprising:

- a washing device (2) wherein the washing process takes place;
- a supply holder (3) for the detergent;
- a mixing chamber (4) for mixing the detergent with a solvent in a predetermined concentration range;
- measuring means (14) for measuring the concentration in the mixing chamber; and
- control means for controlling the supply of at least a part of the content of the mixing chamber to the washing device,

wherein the system is provided with a dose controlling unit (22) which is connected to the control means and to the washing device.

Fig.1.



EP 0 864 684 A1

Description

Field of the invention

The present invention relates to a system and a method for dosing detergent to a washing device. In particular, the invention relates to a detergent dosing system, comprising a mixing chamber for mixing the detergent with a solvent.

Background of the invention

For dosing washing powder in washing machines, use is predominantly made of dosing apparatus, such as worm or screw elements of which the amount of powder dosed per unit time is known. By driving such a worm element for a predetermined time period, a certain amount of washing powder can be added to the liquid flowing into a washing machine.

It will be self-evident that this type of dosing is not very accurate. Moreover no feed-back takes place to indicate whether washing powder has actually been dosed and fed into the washing machine. The presence of washing powder in the supply holder is generally monitored, and a signal is given off when the supply holder is empty, but interferences, for example due to clumping etc. of the washing powder which can even lead to blockage of the dosing member, are in most practical circumstances only recognized when one or a number of washing processes have produced unsatisfactory results.

Furthermore the accuracy is insufficient since the amount of washing powder present in the supply holder influences the dosed amount per turn of the worm element.

Alternatively, detergent dosing systems are known, which include a mixing chamber for mixing detergent and water and thus preparing an aqueous solution or dispersion of the detergent.

For instance, US-A-3,570,717 discloses a system for automatically preparing an aqueous dispersion of difficult-to-solubilize, solid detergent material and delivering the dispersion to one or more washing machines. Said system comprises means for separately delivering water and detergent to a mixing tank until the weight of this tank reaches a predetermined value. When this value is reached, the feed of the detergent is automatically shut-off. The system according to this document further comprises means for transfering the detergent-water mix from the mixing tank to a storage vessel, until the liquid level in the mixing tank falls below a predetermined level, whereby valves are automatically reopened for effecting the introduction of water and detergent once again into the mixing tank.

Accordingly, US-A-3,570,717 describes a system wherein only the weight of the detergent dispersion in the mixing tank is measured, there being no actual feedback of the amount of detergent fed into the one or more washing machines. As a consequence, it cannot be ensured that the correct amount of detergent is supplied to the washing machines.

It was surprisingly found that this disadvantage of the system according to US-A-3,570,717 could be overcome when applying the system of the present invention.

Definition of the invention

Accordingly, in one aspect the present invention provides a system for dosing detergent to a washing process, comprising:

- a washing device wherein the washing process takes place;
- a supply holder for detergent;
- a mixing chamber for mixing the detergent with a solvent (preferably water) in a predeterment concentration range;
- measuring means for measuring the concentration in the mixing chamber; and
- control means for supplying at least a part of the content of the mixing chamber to the washing device, wherein the system is provided with a dose controlling unit which is connected to the control means and to the washing machine.

In a second aspect, the invention provides a method for dosing a detergent to a washing process, wherein a system according to the invention is applied.

In a third aspect, the invention relates to a control device suitable for a system of the present invention.

Detailed description of the invention

According to the present invention the concentration of detergent in the mixing chamber is accurately determined whereby it is ensured that the correct amount of detergent is supplied to the washing device.

The system is preferably provided with a number of sensors for controlling the supply and the drainage of water and water with dissolved detergent respectively, in order to supply water and detergent when a low level is present and in order to set the desired concentration in the mixing chamber following a high level. In order to obtain a consistent value, the difference in level of the low level sensor and the high level sensor preferably has a value of about 10-25% of the overall content of the mixing chamber.

The dose controlling unit according to the invention is connected to the washing device, which controls a pump and is preferably connected to a flow meter for measuring the amount of fluid wherein detergent is dissolved.

The present invention furthermore provides a method and a control device.

Further advantages, characteristics and details of

the present invention will be clarified with respect to the following description of a preferred embodiment thereof with respect to the accompanying drawings in which is shown:

Figure 1 a schematic view of a preferred embodiment of the system according to the present invention;

Figure 2 a schematic block diagram of detail 22 from Figure 1; and

Figure 3A-3E respectively, graphs of the signals at the locations A-E from Figure 2.

A preferred embodiment of a system 1 according to the present invention comprises a washing machine 2, a supply holder for washing powder 3 and a mixing chamber 4 for washing powder and water which is connected by a conduit 5 to the washing machine 2.

A dosing element, such as a worm 6 for washing powder, is driven by a motor 7, which is electrically connected to a control circuit 8. Furthermore a level switch 9 is connected to the control circuit 8 for measuring the level of the washing powder in the holder 3.

Moreover a water supply conduit 10 is connected to the mixing chamber 4 wherein a closure valve 11 as well a control valve 12 are arranged, which control valve 12 can be regulated either manually or via the control circuit 8.

Further a stirrer 13 is connected to the control circuit 8 for stirring the water with washing powder in the mixing chamber 4. A concentration meter, for example a conduction meter 14, which is also connected to the control circuit 8, is for example arranged in the mixing chamber 4.

In the present preferred embodiment, a low level sensor 15, a high level sensor 16, and an overflow sensor 17 are furthermore connected to the control circuit 8. A pump 20 is arranged in the conduit 5 of the washing device 2 in the present preferred embodiment, as well as a flow meter 21, which are both connected to a dose control circuit 22 which is connected to the control circuit 8 and the washing machine 2.

The working of the above described control system will be further clarified herebelow. When the level in the mixing chamber 4 is below the value determined by the low level sensor, for example due to the fact that the mixing chamber 4 is empty, the closure valve 11, for example a magnetic valve, is opened whereafter water flows into the mixing chamber 4 until the level as given by the high level sensor 16 is reached. When the amount of water exceeds the level determined by the low level sensor, motor 7 is activated and washing powder is supplied to the mixing chamber 4.

This supply takes place until the concentration meter 14 determines that the concentration has reached the desired level.

It will be noted that the water supply should be large enough to avoid an overconcentration of detergent in the solution, i.e. that more water should flow per unit time than the proportional amount of detergent soluble in this amount of water. This sufficiently large water supply is achieved by the correct adjustment of the control valve 12.

As soon as the desired concentration is reached, the stirrer can be switched off.

The sensor 17 signals a too high water level in the mixing chamber 4 by means of an alarm, for example, associated with the control circuit 8.

If water together with solution is pumped out of the mixing chamber 4 by pump 20 after switching on of the dose control circuit 22, water and subsequently detergent, are again supplied thereto in the manner described above, as long as the low level sensor 15 signals that the water level has dropped below this low level.

Since the concentration in the mixing chamber 4, is sufficiently constant, the levels as determined by the sensors 15 and 17 are close enough to each other that the water or solution volume in the mixing chamber between these levels roughly corresponds with 10-25% of the total volume of the mixing chamber, i.e. filled to the level of the high level sensor 16.

In order to ensure that the desired amount of detergent is supplied to the washing machine 2, a dosing control circuit is associated with the washing device. A motor for pump 20 as well as an outlet for the flow meter 21 is connected to the dose control circuit 22.

The preferred embodiment shown in Figure 2 of the dose control device 22 works as follows, referring to Figs. 3A-3E. The voltage V as dosing signal in the washing device 2 starts a pulse train with a frequency f in the transformer 31 (see Fig. 3B). A pulse multiplier 32 is connected to the transformer 31 which multiplies the amount of pulses by a factor of 2 for example. A memory element 33 is connected to the multiplier 32, whereby an output of the memory element 33 is connected to a first output of a comparator 34. The flow meter 21 is furthermore connected via a calibration unit 35 to a second memory element 36. The calibration unit 35 attunes the pulses from the units 31-33 to those of the flow meter 21. As soon as a comparison of the values stored in the memory element 33 and 36 show that the desired supply value of the solution has been reached, the pump 20 is switched off since the desired amount of detergent for the washing process has been reached (see fig. 3C-3E).

The magnitude of voltage V can be dependent on the required dosage of detergent, e.g. the level of cleaning required for e.g. textile. The pulse multiplier is included in the circuit to make dosing of the solution of detergent in water less time critical, so that even if the pump doses less detergent per time unit than expected, such dosing will be executed sufficiently in the available time period.

By means of the dosing control unit 22, it can be determined whether the pump 20 realizes an insuffi-

cient fluid flow per time unit whereby it can be determined that the pump 20 is in need of maintenance.

The present invention is not limited to the above described preferred embodiments thereof; the requested rights are in first instance determined by the following claims.

Claims

1. System for dosing detergent to a washing process, comprising:

   - a washing device (2) wherein the washing process takes place;
   - a supply holder (3) for the detergent;
   - a mixing chamber (4) for mixing the detergent with a solvent in a predetermined concentration range;
   - measuring means (14) for measuring the concentration in the mixing chamber; and
   - control means for controlling the supply of at least a part of the content of the mixing chamber to the washing device,

   wherein the system is provided with a dose controlling unit (22) which is connected to the control means (8) and to the washing device (2).

2. System according to claim 1, wherein a control unit (8) forms part of the control means (8), which control unit is connected to a closure valve (11) for the supply of the solvent and to a motor (7) for driving a detergent supply element (6) from the supply holder (3).

3. System according to claim 1 or 2, wherein the mixing chamber (4) is provided with a low level sensor (15) for sensing a relatively low level of the content of the mixing chamber, which low level sensor is connected to the control unit (8).

4. System according to claim 1, 2 or 3, provided with a high level sensor (16) for sensing a relatively high fluid level in the mixing chamber, which high level sensor is connected to the control unit (8).

5. System according to any of the claims 1-4, provided with an overflow sensor (17) for sensing an excess level in the mixing chamber, which overflow sensor is connected to the control unit (8).

6. Systems according to any of the claims 1-5, provided with an adjustable valve (12) in the supply conduit for the solvent, the flow opening of the valve being adjustable.

7. System according to any of the claims 1-6, provided with a flow meter (21) in the conduit (5) between the mixing chamber (4) and the washing device (2).

8. System according claim 7 , wherein the dose controlling unit (22) is connected to a pump (20) in the conduit (5) between the mixing chamber (4) and the washing device (2) and wherein a comparator (34) makes up part of the dose controlling unit (22) for comparing the amount of detergent set through the washing device with the amount of fluid measured by the flow meter (21).

9. System according to any of the claims 1-8, wherein the dosing control unit (22) is suited for providing a signal if the pump working of the pump (20) in the conduit between the mixing chamber and the washing device is insufficient.

10. Method for dosing a detergent to a washing process, wherein a system according to any of the claims 1-9 is applied.

11. Method according to claim 10, wherein the detergent is powdery and the solvent is water.

12. Control device suitable for a system according to any of the claims 1-9 and a method according to claims 10 of 11.

Fig.1.

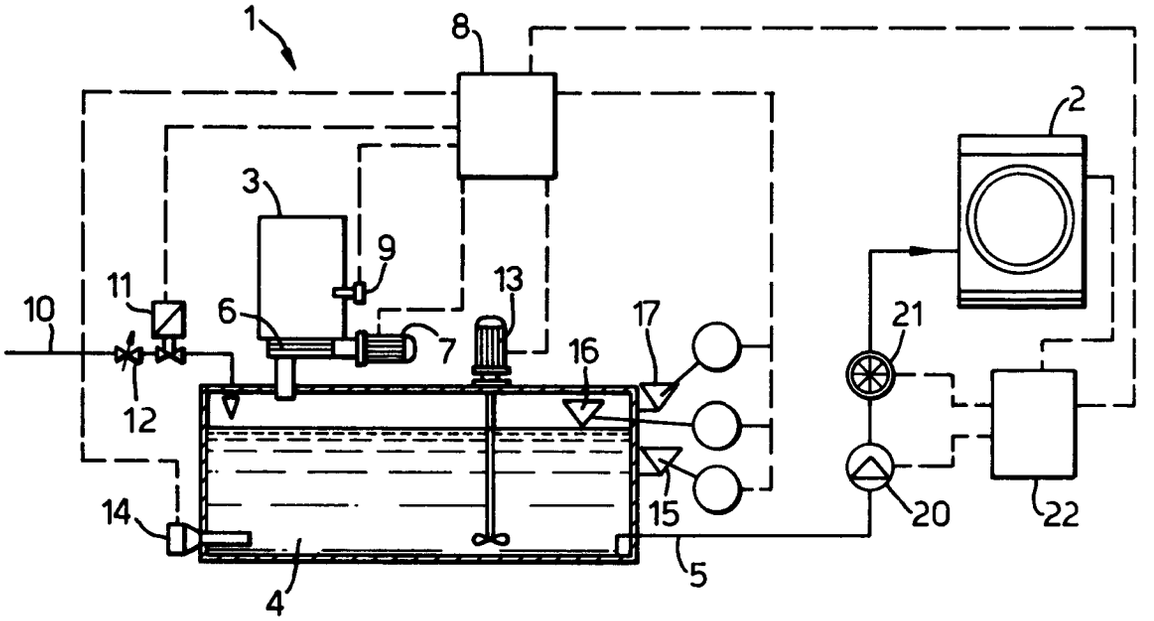
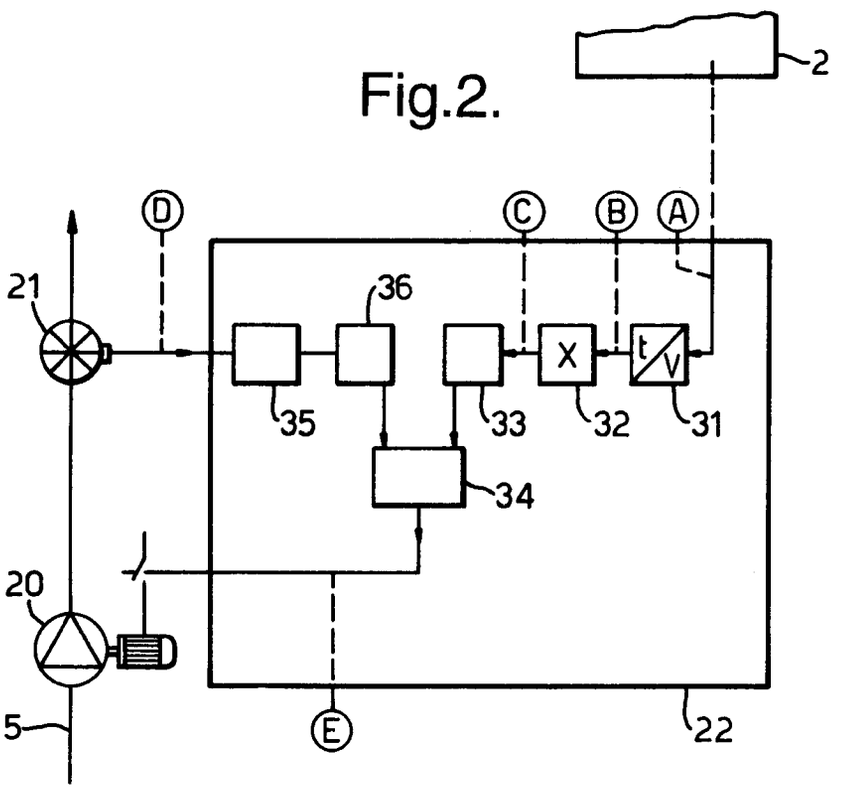

1
8
2
3
9
13
10
11
6
7
16
17
21
12
15
20
22
14
4
5

Fig.2.


2
D
C
B
A
21
36
X
t/V
35
33
32
31
34
20
5
E
22

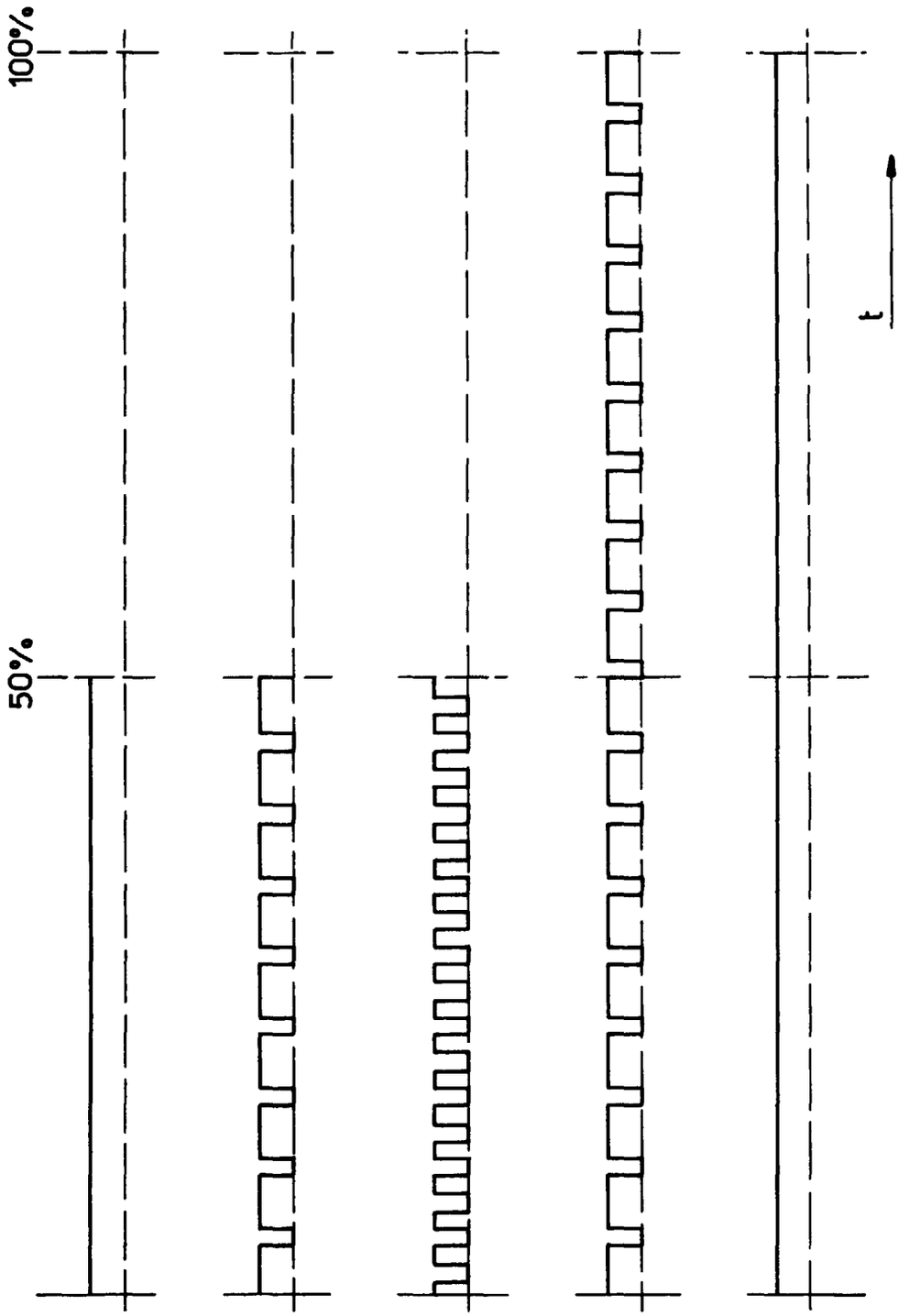


Fig.3A.

Fig.3B.

Fig.3C.

Fig.3D.

Fig.3E.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 20 0506

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	US 3 570 717 A (K.R. OLSON) 16 March 1971	1-4, 10-12	D06F39/02 A47L15/44
A	* the whole document *	6	
A	US 4 285 352 A (HOBART CORPORATION) 25 August 1981 * column 6, line 1 - line 50; figures 3A,3B *	1-4,10, 12	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

D06F
A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	25 June 1998	Courrier, G

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)