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

(11) EP 1 059 059 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
13.12.2000 Bulletin 2000/50

(51) Int Cl.[7]: **A47L 15/44**

(21) Application number: **00830111.1**

(22) Date of filing: **17.02.2000**

(84) Designated Contracting States:
AT BE CH CY 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: **08.06.1999 IT RM990368**

(71) Applicant: **Injecta S.R.L.**
00016 Monterotondo Scalo, Roma (IT)

(72) Inventor: **Quintarelli, Mauro c/o Injecta S.r.L.**
00016 Roma (IT)

(54) **A device for proportionally metering a liquid detergent for industrial and professional dish washers**

(57) A device for metering a liquid detergent for a dish washer (DW), particularly an industrial or professional dish washer, including in combination: (a) a line for feeding wash water (P1, P2), constituting a water inlet into the dish washer; (b) liquid detergent pumping means (4) to let in (8, 9) a liquid detergent into the wash water, including in combination: (i) fluid throughput sensing means (1), intended to be inserted into said line for feeding wash water; (ij) programmable data processing and control means (3) for controlling (7) said liquid detergent pumping means (4) programmed for controlling said liquid detergent pumping means (4) to let in (9) a liquid detergent into the wash water in a manner proportional to the throughput of the water inlet into the dish washer, and (iij) signal transfer means for communicating (7) fluid throughput data sensed (5, 6) by said fluid throughput sensing means (1) to said programmable data processing and control means (3) for controlling said liquid detergent pumping means (4).

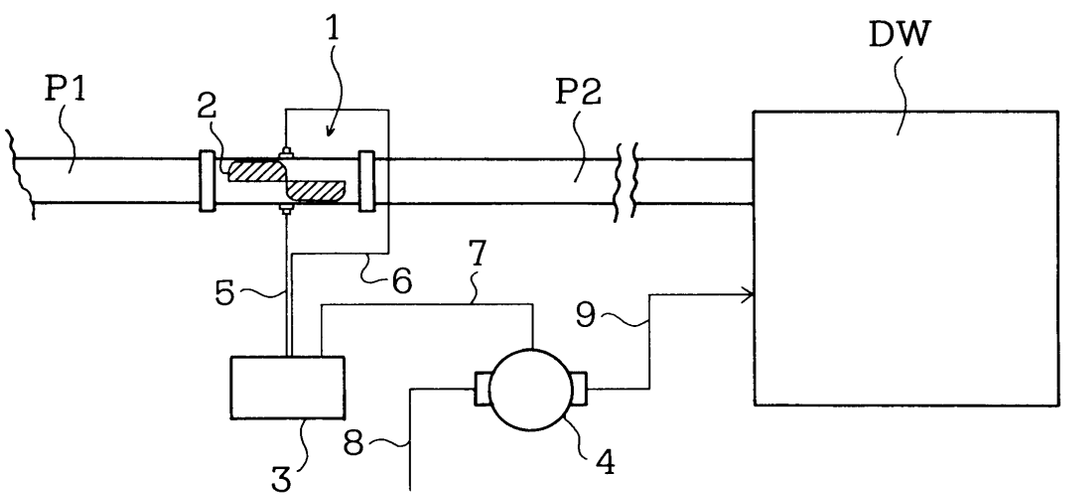

FIG. 1

EP 1 059 059 A2

Description

Technical Field

[0001] This invention relates to the field of dish washers, particularly, but not exclusively, of industrial and professional dish washers.

[0002] More specifically, this invention relates to systems for dispensing a liquid detergent for dish washers.

Background of the Invention

[0003] Most industrial and professional dish washers are presently equipped with an automatic dispenser of a liquid detergent, which is generally a strongly caustic alkaline mixture, which imposes the utilization of an automatic dispenser, customarily realized by a peristaltic pump.

[0004] The automatic dispensers wherewith dish washers are equipped at present are installed under the care of the firms providing the detergent and left in use commodate, i.e. provider firms remain the owners of the dispensers. Therefore, the installation is carried out in a second time relative to the first installation of the dish washer.

[0005] It may happen that a turnover takes place of the providers of the detergent automatic dispensers on the part of users and/or owners of dish washers, whereby a multiplicity of installations is carried out in time on the same dish washer.

[0006] This type of operation has the drawback that the installation of the dispenser requires an enabling and/or electric power supply on the part of the dish washer for one to be able to let in the detergent at the right moment, such as that of the rinse stage of the dish washer and/or of the initial dish washer tank loading stage.

[0007] Moreover, it involves the drawback of a potential tampering of the scheme of the electric circuit of the dish washer, in that it is necessary to connect oneself to some points of the same, generally a solenoid valve of the dish washer.

[0008] It is the object of this invention that of providing a device for metering a liquid detergent that overcomes such drawbacks.

[0009] Such an object is achieved according to this invention by a metering device which operates a proportional control, i.e. according to the control scheme:

$$y = K_p e$$

where y is an output variable, e is an input variable and K_p is a constant transfer function.

[0010] In fact, with- a proportional control one turns out to be free from the time basis control enable electric hardware.

[0011] It is known in the art the principle of proportional control, and, particularly, the use of throughput sensors for the realization thereof.

[0012] However, the concept of using such a principle to the objects of this invention has never been envisaged heretofore.

[0013] For instance, U.S. Patent No. 5,014,211, to Turner et *al.,* is a system for automatically delivering viscous liquid chemicals to a number of destinations, e.g. industrial washing machines. Such a system has a set of metering pumps which pump respective viscous chemicals into a manifold, and a distribution pipe wherethrough the chemicals are dispensed to the single destinations. The viscous chemicals are diluted in water in the manifold, and thereafter the so obtained water-diluted chemicals are transferred through the distribution pipe to a specific destination. A flowmeter is used to calibrate all the metering pumps. As water passes through the manifold, a pump controller, in functional relationship with the flowmeter, based on signals sent from the latter thereto, computes the volume throughput of the water flow through the manifold. Moreover, a flowmeter sensing value arrives to the pump controller from a conductivity cell, which value represents the value of the concentration of a water-diluted chemical, as a function of how much it differs from the value of the conductivity of plain water. So, the pump controller calibrates the pumps based on the values of the water throughput and of the conductivity of the water-diluted chemical.

[0014] Therefore, U.S. Patent No. 5,014,211 makes use of a volume throughput sensor, and operates a proportional control, but in a spirit completely different from that of this invention, because it operates to the object of diluting chemicals which is easier to provide, but difficult to use in the viscous state. So U.S. Patent No. 5,014,211 does not teach anything relevant to the object of this invention.

Subject of the Invention

[0015] Therefore, it is the subject of this invention a device for metering a liquid detergent for a dish washer, particularly an industrial or professional dish washer, which dish washer includes:

(a) a line for feeding wash water, constituting a water inlet into the dish washer;
(b) liquid detergent pumping means to let in a liquid detergent into the wash water,

characterized in that it includes in combination:

(i) fluid throughput sensing means, intended to be inserted into said line for feeding wash water;
(ii) programmable data processing and control means for controlling said liquid detergent pumping means programmed for controlling said liquid detergent pumping means to let in a liquid detergent into the wash water in a manner proportional to the

throughput of the water inlet into the dish washer, and

(iii) signal transfer means for communicating fluid throughput data sensed by said fluid throughput sensing means to said programmable data processing and control means for controlling said liquid detergent pumping means.

[0016] According to a particularly preferred embodiment of this invention, in said device for metering a liquid detergent for a dish washer, said programmable data processing and control means for controlling said liquid detergent pumping means include an *embedded-control* VLSI integrated microcontroller.

[0017] It is envisaged that in said a device for metering a liquid detergent for a dish washer, said fluid throughput sensing means include a turbine volumetric sensor.

Brief Description of the Drawing

[0018] This invention will be fully understood based on the following detailed description, only given as a matter of example, absolutely not of restriction, of embodiments thereof, with reference to the drawing annexed hereto, the sole FIGURE 1 whereof shows a scheme of a dish washer connected with the water supply with a device according to this invention inserted therein.

Detailed Description of Preferred Embodiments

[0019] As shown in FIGURE 1, the liquid detergent proportional metering device of this invention is intended to be inserted into the line for feeding wash water **P1**, **P2** of a dish washer **DW**, particularly an industrial or professional dish washer, whereof it constitutes the water inlet. The dish washer is equipped with means, such as for instance a peristaltic pump, for pumping a liquid detergent **4** fed from a line of a liquid detergent **8** which they let into the wash water inside the dish washer through an inlet line **9**.

[0020] The device according to this invention includes fluid throughput sensing means **1**, intended to be inserted into the wash water inlet line **P1**, **P2**. In FIGURE 1 with reference character **P1** the tract of the line for feeding wash water has been indicated that is upstream of fluid throughput sensing means **1** relative to the dish washer, and with reference character **P2** the tract of the line for feeding wash water has been indicated that is upstream of fluid throughput sensing means **1** relative to the dish washer, i.e. in direct connection with the dish washer itself. Sensing means **1** have sensed value output means **5, 6,** for transmitting the throughput sensed value carried out thereby, i.e. of data of value of instantaneous throughput of the stream of the wash water inlet.

[0021] The sensed value output means **5, 6** end in programmable data processing and control means **3**, realized by a control circuit, programmed for controlling the aforesaid liquid detergent pumping means **4**, through a control signal line **7**, to let in the liquid detergent into the wash water in a manner proportional to the throughput of the water inlet into the dish washer, whereof they take the data through the sensed value transmission means **5, 6** themselves.

[0022] According to an embodiment of this invention, the fluid throughput sensing means include a turbine volumetric sensor having a rotor **2** which, when is traversed by the wash water inlet stream, rotates at a speed proportional to the throughput of the stream itself. The rotation speed is sensed by means known in the art, such as for instance a pulse counter optic or magnetic sensor, and rendered in signals put in sensed value transmission lines **5, 6** (sensed value transmission means) and brought therethrough to programmable data processing and control means **3**.

[0023] According to a particularly preferred embodiment of this invention, the programmable data processing and control means for controlling said liquid detergent pumping means include an embedded-*control* very large scale integrated (VLSI) microcontroller, such as for instance 8-bit microcontroller PIC16C62 by Microchip Technology Inc., United States of America, with a backing electrically erasable programmable read-only memory (E^2PROM), such as for instance model 24LC04B, by Microchip Technology Inc. too.

[0024] This invention has been described and illustrated with reference to specific embodiments thereof, but it is to be understood that additions, variations and/or omissions can be made thereto, without so departing from the scope of protection thereof, as defined by the appended claims.

Claims

1. A device for metering a liquid detergent for a dish washer (DW), particularly an industrial or professional dish washer, which dish washer includes:

(a) line for feeding wash water (P1, P2), constituting a water inlet into the dish washer;
(b) liquid detergent pumping means (4) to let in (8, 9) a liquid detergent into the wash water,

characterized in that it includes in combination:

(i) fluid throughput sensing means (1), intended to be inserted into said line for feeding wash water;
(ii) programmable data processing and control means (3) for controlling (7) said liquid detergent pumping means (4) programmed for controlling said liquid detergent pumping means (4) to let in (9) a liquid detergent into the wash wa-

ter in a manner proportional to the throughput of the water inlet into the dish washer, and
(iii) signal transfer means for communicating (7) fluid throughput data sensed (5, 6) by said fluid throughput sensing means (1) to said programmable data processing and control means (3) for controlling said liquid detergent pumping means (4).

2. A device for metering a liquid detergent for a dish washer (DW), particularly an industrial or professional dish washer, according to Claim 1, wherein said programmable data processing and control means (3) for controlling said liquid detergent pumping means (4) include an *embedded-control* VLSI integrated microcontroller.

3. A device for metering a liquid detergent for a dish washer (DW), particularly an industrial or professional dish washer, according to Claim 1 or Claim 2, wherein
said fluid throughput sensing means (1) include a turbine volumetric sensor (2).

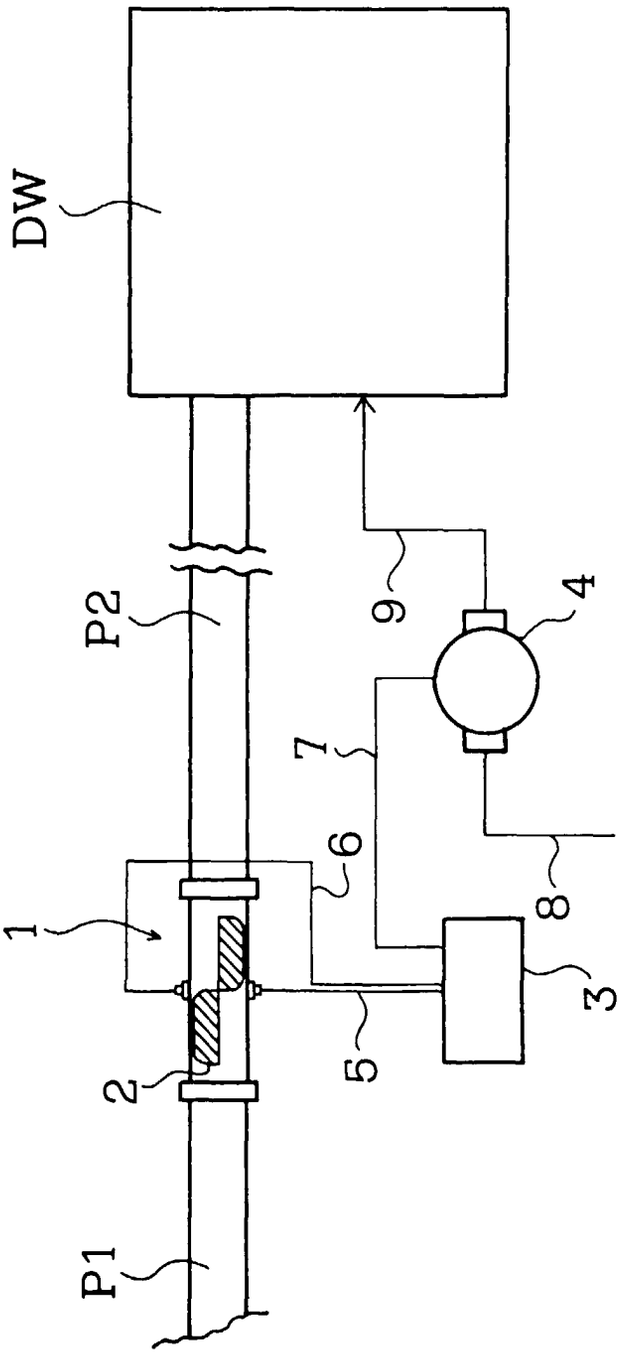

FIG. 1