

(86) Date de dépôt PCT/PCT Filing Date: 2018/11/14

(87) Date publication PCT/PCT Publication Date: 2019/05/23

(45) Date de délivrance/Issue Date: 2023/10/03

(85) Entrée phase nationale/National Entry: 2020/04/30

(86) N° demande PCT/PCT Application No.: US 2018/060889

(87) N° publication PCT/PCT Publication No.: 2019/099434

(30) Priorité/Priority: 2017/11/14 (US62/585,639)

(51) Cl.Int./Int.Cl. *G01N 1/18* (2006.01),
A22C 21/00 (2006.01), *A23B 4/12* (2006.01),
C02F 1/72 (2006.01), *G01N 1/00* (2006.01)

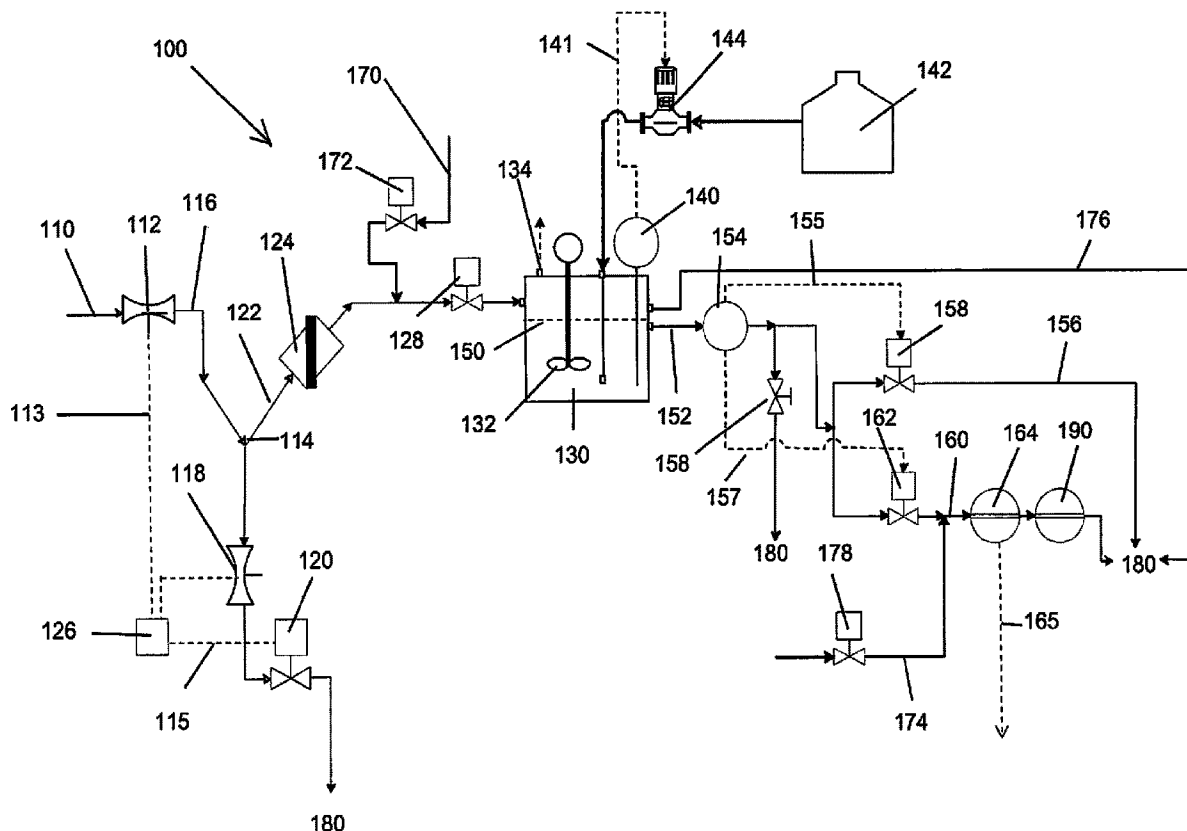
(72) Inventeur/Inventor:
LAROSE, ROBERT, US

(73) Propriétaire/Owner:
BIOSAFE SYSTEMS, LLC, US

(74) Agent: BERESKIN & PARR LLP/S.E.N.C.R.L., S.R.L.

(54) Titre : DISPOSITIF D'ECHANTILLONNAGE D'EAU DE REFROIDISSEUR

(54) Title: CHILLER WATER SAMPLING DEVICE



(57) **Abrégé/Abstract:**

A chiller water sampling device includes a pair of flow meters and a proportional valve to provide a constant flow rate of sample water containing peroxyacetic acid from a chiller to a mixing tank. Acid can be added to reduce the pH of sample water in the mixing tank to bring the pH within the operating range of a peroxyacetic acid sensor. The sensed level of peroxyacetic acid can be used to control further addition of peroxyacetic acid to the chiller.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property

Organization

International Bureau

(43) International Publication Date

23 May 2019 (23.05.2019)



(10) International Publication Number

WO 2019/099434 A1

(51) International Patent Classification:

G01N 1/18 (2006.01)

A23B 4/12 (2006.01)

G01N 1/00 (2006.01)

A22C 21/00 (2006.01)

C02F 1/72 (2006.01)

(21) International Application Number:

PCT/US2018/060889

(22) International Filing Date:

14 November 2018 (14.11.2018)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

62/585,639

14 November 2017 (14.11.2017) US

(71) Applicant: BIOSAFE SYSTEMS, LLC [US/US]; 22

Meadow Street, East Hartford, Connecticut 06108 (US).

(72) Inventor: LAROSE, Robert; BioSafe Systems LLC, 22

Meadow Street, East Hartford, Connecticut 06108 (US).

(74) Agent: SLUZAS, Alex et al.; Paul and Paul, 1717 Arch Street, Suite 3740, Philadelphia, Pennsylvania 19103 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,

(54) Title: CHILLER WATER SAMPLING DEVICE

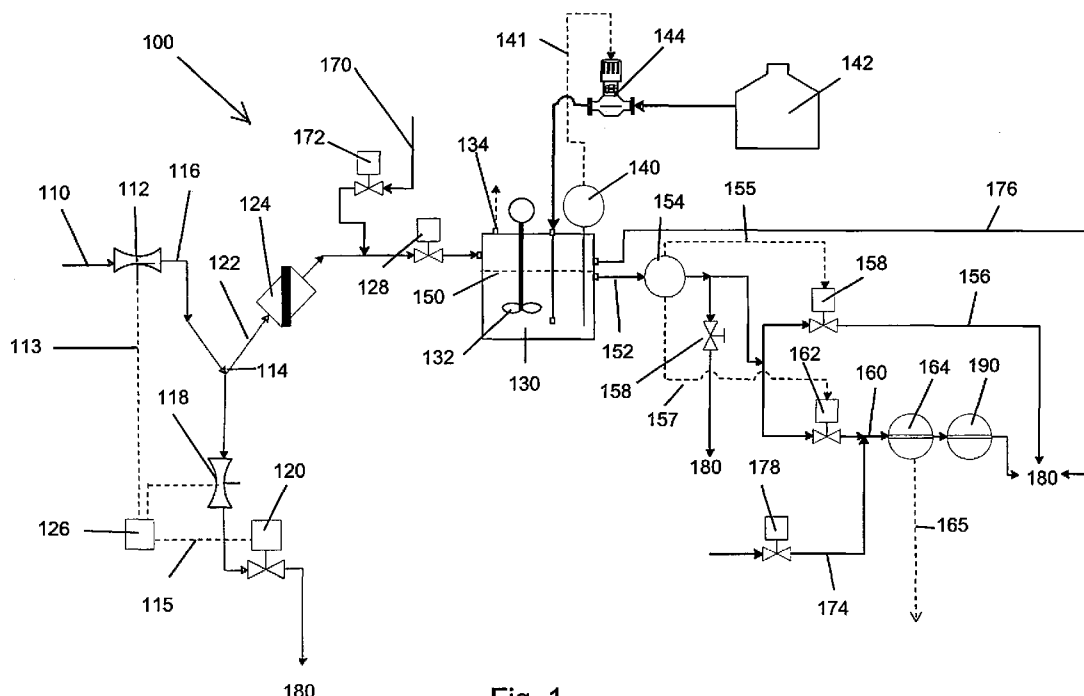


Fig. 1

(57) Abstract: A chiller water sampling device includes a pair of flow meters and a proportional valve to provide a constant flow rate of sample water containing peroxyacetic acid from a chiller to a mixing tank. Acid can be added to reduce the pH of sample water in the mixing tank to bring the pH within the operating range of a peroxyacetic acid sensor. The sensed level of peroxyacetic acid can be used to control further addition of peroxyacetic acid to the chiller.

[Continued on next page]



WO 2019/099434 A1

WO 2019/099434 A1

TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

CHILLER WATER SAMPLING DEVICE

Cross-Reference to Related Application

The present application claims the priority of U.S. Provisional Application
5 Number 62/585,639, filed November 14, 2017.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to devices for monitoring the level of biocide in
10 poultry plant chillers.

2. Brief Description of the Prior Art

Peroxyacetic acid is employed in food chillers, such as auger and drag type
poultry chillers, which are employed in processing plants to reduce the temperature of
birds which have been defeathered, eviscerated and are otherwise ready for packaging.
15 Poultry chillers are described, for example, in U.S. Patents 3,240,026; 7,281,384;
6,865,895; 9,271,509. Various methods have been
employed to reduce microbial activity in chiller water, which is typically recirculated and
cooled during recirculation. For example, U.S. Patent 4,849,237 discloses sanitizing
poultry carcasses using ozonated water at low temperatures. U.S. Patent Publication
20 2009/0208616 A1 discloses a multistage process for treating poultry processing water
with chlorine and ozone. Peroxycarboxylic acids have been used to reduce microbial
activity in poultry processing. For example, U.S. Patent 5,683,724 describes a process
for inhibiting microbial growth in aqueous food process streams using a percarboxylated
acid, such as peracetic acid. U.S. Patent 9,414,609 discloses treating poultry carcasses
25 with an equilibrium solution of peroxyacetic acid at an elevated temperature prior to
chilling. Peroxyacetic acid can be provided in the form of an equilibrium solution, or a
non-equilibrium solution, such as disclosed, for example, in U.S. Patent 10,081,784.

When peroxyacetic acid is used as an antimicrobial agent in poultry chillers,
there is a need to accurately assess the level of peroxyacetic acid to ensure efficacious
30 results.

SUMMARY OF THE INVENTION

The present invention relates to a chiller water sampling device. The device
includes a first line for fluid communication with a chiller, such that an aqueous sample
can be delivered from the chiller to the device. The device also includes a first flow
35 meter for sensing fluid flow through the first line; a diverter in fluid communication with
the first line for dividing the fluid flow from the first line into a second line and a third line;
a second flow meter for sensing fluid flow through the second line; and a first valve for

controlling fluid flow through the second line such that fluid flow from the device can be discharged through the second line.

The device also includes a second valve for controlling fluid flow through the third line and a mixing tank for receiving fluid flow from the third line, as well as an acid storage tank in fluid communication with the mixing tank, and a first metering device for controlling fluid flow from the acid storage tank to the mixing tank. A first pH sensing device for monitoring the pH of fluid in the mixing tank is also provided. The pH first sensing device generates a first signal responsive to the pH of the fluid in the mixing tank, the first signal being applied to the first metering device for controlling fluid flow from the acid storage tank to the mixing tank. A fourth line for discharging fluid from the mixing tank is also provided.

Further, a second pH sensing device for monitoring the pH of fluid flowing in the fourth line is provided, as well as a fifth line in fluid communication with the fourth line for discharging fluid from the device, and a third valve for controlling fluid flow through the fourth line. A sixth line in fluid communication with the fourth line for discharging fluid from the device is also provided, as well as a fourth valve for controlling fluid flow through the sixth line. The second pH sensing device generates a second signal for controlling operation of the fourth valve and a third signal for controlling operation of the fourth valve.

In addition, a first PAA sensing device for sensing the concentration of peroxyacetic acid in fluid flowing in the sixth line is provided, the first PAA sensing device has an operating range, and provides a signal in response to the concentration of sensed concentration of peroxyacetic acid signal.

Preferably, the device further comprises a filter in the third line for filtering non-fluid material from fluid flowing from the diverter to the second valve.

Preferably, the device further includes a seventh line for providing fluid flow to the third line, fluid flow through the seventh line being controlled by a fifth valve, the seventh line being in fluid communication with the third line between the diverter and the second valve.

Preferably, the device also includes an overflow line, the overflow line being in fluid communication with the mixing tank for discharging fluid from the device, the overflow line being positioned on the mixing tank above a predetermined fluid level in the mixing tank.

Preferably, the device also includes a second PAA sensing device for sensing the concentration of peroxyacetic acid in the sixth line.

Preferably, the device further includes an eighth line for providing fluid flow to the sixth line, the fluid flow in the eighth line being controlled by a sixth valve, the eighth line

being in fluid communication with the sixth line between the fourth valve and the first PAA sensing device. Wash water can be provided through the eighth line.

Preferably, the first flow meter generates a first flow control signal, the second flow meter generates a second flow control signal, and the first valve is a proportional valve. Preferably, the device further includes a controller for comparing the first signal and the second signal, and for generating a control signal for the proportional valve, such that the flow through the third line is maintained at a predetermined flow rate.

The present invention also provides a system for controlling the concentration of peroxyacetic acid in the contents of a chiller, the system comprising the chiller water sampling device, a source of peroxyacetic acid, a metering pump for delivering peroxyacetic acid to the chiller, and a controller for the metering pump, the controller for the metering pump being controlled by a signal from the first PAA sensing device.

Preferably, the system further comprises a unit for controlling the pH of the contents of the chiller, the unit comprising a delivery line in fluid communication with the chiller, a pH sensing device for sensing the pH of fluid in the delivery line, and a flow meter for sensing the rate of flow of fluid in the delivery line.

Preferably, in the system fluid output from the delivery line is input to the first line of the device.

Preferably, the system further comprises an alkali storage tank for storing an alkaline fluid, an alkali controller, and an alkali feed pump for delivering the alkaline fluid to the chiller, the alkali controller receiving a signal from the pH sensing device and activating the alkali feed pump when the signal from the pH sensing device meets a predetermined condition.

In one embodiment of the system of the present invention, the source of peroxyacetic acid provides equilibrium peroxyacetic acid. In another embodiment, the source of peroxyacetic acid provides nonequilibrium peroxyacetic acid.

The present invention also provides a process for controlling the concentration of peroxyacetic acid in a chiller employing the chiller water sampling device. The process includes providing a continuous sample of aqueous alkaline fluid from a chiller to the first line, controlling the first valve to provide a predetermined constant flow rate of the sample to the mixing tank, mixing the aqueous fluid provided to the mixing tank, monitoring the pH of the aqueous fluid in the mixing tank, and adding acid to the aqueous fluid in the mixing tank to reduce the pH of the aqueous fluid in the mixing tank, monitoring the pH of the aqueous fluid in the fourth line, delivering aqueous fluid in the fourth line to the sixth line when the monitored pH of the aqueous fluid in the fourth line is within the working range of the first PAA sensing device; and delivering peroxyacetic acid to the chiller in response to the signal from the third sensing device.

Preferably, the process further includes providing a second PAA sensing device for sensing the concentration of peroxyacetic acid in the sixth line, the second sensing device providing a second signal in response to the concentration of sensed concentration of peroxyacetic acid signal, and comparing the signals of the first and
5 second PAA sensing devices.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic illustration of a chiller water sampling device according to the present invention.

Fig. 2 is a schematic illustration of a system for controlling the concentration of
10 peroxyacetic acid in the contents of a chiller employing the device of Fig. 1.

DETAILED DESCRIPTION

The present invention provides a chiller water sampling device for assessing the level of peroxyacetic acid in the water of a poultry chiller, and a system employing the device for controlling the concentration of peroxyacetic acid in the chiller water, as well
15 as a method for controlling the concentration of peroxyacetic acid in the chiller water.

As used in this specification and claims, "PAA" means peroxyacetic acid (also referred to a "peracetic acid).

Referring to Figs. 1 and 2, wherein like reference numerals refer to like elements throughout the several views, the chiller water sampling device 100 of the present
20 invention includes a first line 110 for fluid communication with a chiller 300 (Fig. 2). A stream of chiller water initially flows through a first flow meter 112 for sensing fluid flow through the first line 110. The first flow meter 112 generates a responsive signal over a first flow control line 113. At the end of the first line 110 a diverter 114 such as a "Y"-fitting, and in fluid communication with the first line 110, is provided to split the stream of
25 chiller water into two streams, one of which flows into a second line 116, and a third line 122. Preferably, the "Y"-fitting permits large contaminant particles in the chiller water to flow downwards through the second line 116. There are fluctuations in the fluid flow through the first line 110, and it is desirable to provide a uniform flow rate in which the concentration of peroxyacetic acid can be sampled, the fluid flowing in the second line
30 116 passes though a second flow meter for sensing the fluid flow through the second line 116, then though a first, proportional valve 120 for controlling the fluid flow in the second line, and subsequently to a drain 180 for discharging fluid flow from the device 100. A signal provided over the first flow control line from the first flow meter 112 and a signal provided over a second flow control line 115 from the second flow meter 118 are
35 compared by a flow controller 126, which is programmed to adjust the first valve 120 such that the fluid flow though the third line 122 is maintained at a predetermined rate, such as, for example, 0.3 gal./min (1.14 liters/minute). Fluid flowing in the third line then

preferably passes through a filter 124 such as a mesh screen to strain out residual large particles. The fluid flowing in the third line 122 then passes through a second valve 128 for controlling fluid flow in the third line 122 for a purpose to be described below.

5 The chiller water flowing in the third line 122 discharges to a mixing tank 130 for receiving fluid flow from the third line 122 for the purpose of adjusting the pH of the chiller water if necessary in order that the concentration of peroxyacetic acid be accurately assessed. The mixing tank 130 is provided with a mixer or stirrer 132 as well as a vent 134.

10 The chiller water including the peroxyacetic acid can have a pH on the alkaline side. However, sensors for peroxyacetic acid typically have a limited pH operating range, such as from about 1 to 9. Thus, if the chiller water is more alkaline than the operating range of the PAA sensor being employed, the PAA measurement drops to zero.

15 Thus, a first sensing device 140 for monitoring the pH of fluid in the mixing tank 130 is provided. The first sensing device 140 generates a signal responsive to the pH of the fluid in the mixing tank 130. The signal is applied through a first pH control line 141 to a first metering device or pump 144. An acid storage tank 142 is provided in fluid communication with the mixing tank 130 through the first metering device 144, which controls fluid flow from the acid storage tank 142 to the mixing tank 130. The first
20 metering device 144 feeds acid from the acid storage tank 142 when the pH of the contents of the mixing tank 130 rise above a predetermined level, such as a pH of 8, for the purpose of lowering the pH of the contents to a level within the working range of the PAA sensor to be employed. The fluid in the mixing tank 130 is preferably maintained at a constant level 150. Should that level be exceeded, an overflow line 176 is provided
25 for discharging the overflow from the mixing tank 130 to a drain 180.

A fourth line 152 is provided for discharging fluid from the mixing tank 130. A second pH sensing device 154 monitors the pH of fluid flowing in the fourth line 152. If the pH of the fluid in the fourth line 152 exceeds a predetermined pH, such as a pH of 8, the second pH sensing device 154 generates signals which are transmitted over a
30 second pH control line 155 and a third pH control line 157, such that the fluid is discharged through a fifth line 156 in fluid communication with the fourth line 152 and a third valve 158 for controlling fluid flow through the fifth line 156 to discharge fluid from the mixing tank 130 to a drain 180. In addition, a sixth line 160 in fluid communication with the fourth line 152 is also provided, as well as a fourth valve 162 for controlling fluid
35 flow through the sixth line 160.

Depending on the sensed pH, the second sensing device 154 generates a signal which is applied over the second pH control line 155 for controlling operation of the third

valve 158 and a signal applied over the third pH control line 157 for controlling operation of the fourth valve 162. If the pH is above a predetermined value, the third valve 158 is opened and the fourth valve 162 is closed so that the chiller water is discharged to the drain 180. If the pH is below a predetermined value, the third valve 158 is closed, and
5 the fourth valve 162 is opened to permit the chiller water to flow through the sixth line 160.

A first PAA sensing device 164 is provided, and preferably a second PPA sensing device 190, for sensing the concentration of peroxyacetic acid in fluid flowing in the sixth line 160. The first PAA sensing device 164 has a predetermined operating
10 range, and provides a PAA concentration signal in response to the concentration of sensed concentration of peroxyacetic acid over a PAA signal line 165. The PAA concentration signal is employed to adjust the concentration of PAA in the chiller 300 as described below. Preferably, signals from the two PAA sensors 164, 190 are compared, and if the two signals differ by more than a predetermined amount, indicating
15 malfunction, one or both PAA can be replaced.

Preferably, the device 100 further includes a seventh line 170 for providing fluid flow, such as cleaning water, to the third line 122. The fluid flow through the seventh line is controlled by a fifth valve 172. The seventh line 170 is in fluid communication with the third line 122 between the diverter 114 and the second valve 128. In order to
20 clean the filter 124, fluid flow from the chiller 300 is stopped, the second valve 128 is closed, and the first valve 120 is opened so that cleaning water can flow through the filter 124 and out the second line 116 to the drain 180. Further, if desired, the second valve 128 can be opened so that cleaning water can flow through the mixing tank 130 and then to the fourth line 152. A fifth line 156 is provided in fluid communication with
25 the fourth line 152, with flow through the fifth line 156 being controlled by a seventh valve 168. If the third valve 158 and the fourth valve 162 are closed, and the seventh valve 168 is opened, cleaning water can flow from the fourth line 152 and can flow out the fifth line 156 to be discharged from the device 100 to a drain 180. Similarly, an eighth line 174 in fluid communication with the sixth line 160 between the fourth valve
30 162 and the first PAA sensor 164 is provided. The eighth line 174 is controlled by a sixth valve 178. In order to clean the PAA sensors 164, 190 in the sixth line 160, the fourth valve 162 can be closed, and the sixth valve 178 can be opened in order to permit cleaning water to flow through the eighth line 174, the sixth line 160 and the PAA sensors 164, 190.

35 The present invention also provides a system for controlling the concentration of peroxyacetic acid in the contents of a chiller 300. The system includes the device 100, a PAA control system 400 which includes a PAA controller 410 a source of peroxyacetic

acid, such as a PAA storage tank 402 containing an equilibrium solution of PAA, a first PAA delivery line 404 for fluid communication between the tank 402, and a PAA metering pump 406 for delivering peroxyacetic acid to the chiller 300 through a second PAA delivery line 408, and a controller 410 for the metering pump. The controller for the metering pump is preferably controlled by a signal from the first PAA sensing device 164.

The system of the present invention also provides a unit 200 for controlling the pH of the contents of the chiller 300. The unit 200 includes a pH sample delivery line 206 in fluid communication with the chiller for delivering a sample of the chiller contents to a pH control sensing device 208 for sensing the pH of fluid in the delivery line 206, and a pH sample flow meter 210 for sensing the rate of flow of fluid in the delivery line 206. Preferably, the fluid output from a pH sample discharge line 212 is input to the first line 110 of the device 100 of the present invention. An alkali storage tank 222 is employed for storing an alkaline fluid. The alkaline fluid, such as an aqueous solution of sodium hydroxide, is transferred to an alkali feed or metering pump 226 over a first alkali delivery line 224. An alkali pump controller 230 controls the operation of the alkali metering pump 226 for delivering the alkaline fluid over to the chiller 300 over a second alkali delivery line 228. The alkali controller 230 receives a signal from the pH control unit device 200 and activating the alkali feed pump 230 when the signal from the pH control unit 200 meets a predetermined condition, such as when the pH of the chiller contents drops below a predetermined level.

The source of peroxyacetic acid can provide an equilibrium solution of peroxyacetic acid. Equilibrium solutions of peroxyacetic acid can be prepared remotely from the processing plant employing the chiller, and stored until needed. Conversely, the source of peroxyacetic acid can be a device which generated peroxyacetic acid in situ and provides nonequilibrium peroxyacetic acid.

The chiller water sampling device 100 is employed to control the concentration of peroxyacetic acid in a chiller 300. A continuous sample of aqueous alkaline fluid from the chiller 300 is provided to the first line 110 of the device 100. For example, the sample can be delivered by the pH sample discharge line 212 of the pH control unit 200. The first valve 120 is controlled to provide a predetermined constant flow rate of the sample to the mixing tank 130, such as 0.3 gallons/minute (1.14 liters/minute). The aqueous fluid in the mixing tank 130 is mixed, preferably continuously using a mechanical stirring device or mixer 132. The pH of the aqueous fluid in the mixing tank 130 is monitored with the first sensing device 140, and if the pH of the aqueous fluid exceeds a predetermined value, the acid addition flow controller 126 causes acid stored in the acid storage tank 142 to be added by the first metering device 144 to the aqueous

fluid in the mixing tank 130 to reduce the pH of the aqueous fluid in the mixing tank 130. Since peroxyacetic acid sensors have a limited range of pH in which they can operate accurately, and because the pH of aqueous fluid in the chiller may exceed the operating range of the peroxyacetic acid sensor, the pH of a sample of aqueous fluid from the
5 chiller 300 must be reduced to within the operating range of the peroxyacetic acid sensor in order to accurately assess the level of peroxyacetic acid in the chiller 300. In order to protect the peroxyacetic acid devices 164, 190, the pH of the aqueous fluid leaving the mixing tank 130 in the fourth line 152 is monitored by the second sensing device 154. If the pH of the sample has been sufficiently reduced, the third valve 158 is
10 closed and the fourth valve 162 is opened, and the aqueous fluid sample in the fourth line 152 is delivered to the sixth line 160 when the monitored pH of the aqueous fluid in the fourth line is within the working range of the PAA sensing devices 164, 190. The measured level of peroxyacetic acid in the sample is then used to control the addition of peroxyacetic acid to the chiller 300. A PAA control signal is generated by the
15 PAA sensing device 164, and peroxyacetic acid is delivered to the chiller 300 in response to the signal from the first PAA sensing device.

Preferably, the second PAA sensing device is provided for sensing the concentration of peroxyacetic acid in the sixth line 160. The second PAA sensing device 190 provides a second signal in response to the concentration of sensed
20 concentration of peroxyacetic acid signal. The signals from the first PAA sensing device 164 and the second PAA sensing device 190 can be compared. If the PAA levels measured by the two devices differ by greater than a predetermined amount, indicating a defective or damaged sensor, that sensor can be replaced.

Various modifications can be made in the details of the various embodiments of
25 the apparatus and method of the present invention, all within the scope and spirit of the invention as defined by the appended claims

CLAIMS

1. A chiller water sampling device, the device including:
 - a first line for fluid communication with a chiller;
 - a first flow meter for sensing fluid flow through the first line;
 - a diverter in fluid communication with the first line for dividing the fluid flow from the first line into a second line and a third line;
 - a second flow meter for sensing fluid flow through the second line;
 - a first valve for controlling fluid flow through the second line;
 - the second line discharging fluid flow from the device;
 - a second valve for controlling fluid flow through the third line;
 - a mixing tank for receiving fluid flow from the third line;
 - an acid storage tank in fluid communication with the mixing tank;
 - a first metering device for controlling fluid flow from the acid storage tank to the mixing tank;
 - a first pH sensing device for monitoring the pH of fluid in the mixing tank, the first sensing device generating a first signal responsive to the pH of the fluid in the mixing tank, the first signal being applied to the first metering device for controlling fluid flow from the acid storage tank to the mixing tank;
 - a fourth line for discharging fluid from the mixing tank;
 - a second pH sensing device for monitoring the pH of fluid flowing in the fourth line;
 - a fifth line in fluid communication with the fourth line for discharging fluid from the device;
 - a third valve for controlling fluid flow through the fourth line;
 - a sixth line in fluid communication with the fourth line for discharging fluid from the device;
 - a fourth valve for controlling fluid flow through the sixth line;
 - the second sensing device generating a second signal for controlling operation of the fourth valve and a third signal for controlling operation of the fourth valve; and
 - a first PAA sensing device for sensing the concentration of peroxyacetic acid in fluid flowing in the sixth line, the first PAA sensing device having an operating range, and providing a signal in response to the concentration of sensed concentration of peroxyacetic acid signal.

2. A device according to claim 1 further comprising a filter in the third line for filtering non-fluid material from fluid flowing from the diverter to the second valve.
3. A device according to claim 2 further comprising a seventh line for providing fluid flow to the third line, fluid flow through the seventh line being controlled by a fifth valve, the seventh line being in fluid communication with the third line between the diverter and the second valve.
4. A device according to claim 1 further comprising an overflow line, the overflow line being in fluid communication with the mixing tank for discharging fluid from the device, the overflow line being positioned on the mixing tank above a predetermined fluid level in the mixing tank.
5. A device according to claim 1 further comprising a second PAA sensing device for sensing the concentration of peroxyacetic acid in the sixth line.
6. A device according to claim 1 further comprising an eighth line for providing fluid flow to the sixth line, the fluid flow in the eighth line being controlled by a sixth valve, the eighth line being in fluid communication with the sixth line between the fourth valve and the first PAA sensing device.
7. A device according to claim 1 wherein the first flow meter generates a first flow control signal, the second flow meter generates a second flow control signal, and the first valve is a proportional valve, the device further including a controller for comparing the first signal and the second signal, and generating a control signal for the proportional valve, such that the flow through the third line is maintained at a predetermined flow rate.
8. A system for controlling the concentration of peroxyacetic acid in the contents of a chiller, the system comprising a device according to claim 1, a source of peroxyacetic acid, a metering pump for delivering peroxyacetic acid to the chiller, and a controller for the metering pump, the controller for the metering pump being controlled by a signal from the first PAA sensing device.
9. A system according to claim 8 further comprising a unit for controlling the pH of the contents of the chiller, the unit comprising a delivery line in fluid communication with the chiller, a pH sensing device for sensing the pH of fluid in the delivery line, and a flow meter for sensing the rate of flow of fluid in the delivery line.

10. A system according to claim 9 wherein the fluid output from the delivery line is input to the first line of the device.
11. A system according to claim 9 further comprising an alkali storage tank for storing an alkaline fluid, an alkali controller, and an alkali feed pump for delivering the alkaline fluid to the chiller, the alkali controller receiving a signal from the pH sensing device and activating the alkali feed pump when the signal from the pH sensing device meets a predetermined condition.
12. A system according to claim 8 wherein the source of peroxyacetic acid provides equilibrium peroxyacetic acid.
13. A system according to claim 8 wherein the source of peroxyacetic acid provides nonequilibrium peroxyacetic acid.
14. A process for controlling the concentration of peroxyacetic acid in a chiller employing a device according to claim 1, the process comprising:
 - providing a continuous sample of aqueous alkaline fluid from a chiller to the first line,
 - controlling the first valve to provide a predetermined constant flow rate of the sample to the mixing tank;
 - mixing the aqueous fluid provided to the mixing tank;
 - monitoring the pH of the aqueous fluid in the mixing tank, and adding acid to the aqueous fluid in the mixing tank to reduce the pH of the aqueous fluid in the mixing tank;
 - monitoring the pH of the aqueous fluid in the fourth line,
 - delivering aqueous fluid in the fourth line to the sixth line when the monitored pH of the aqueous fluid in the fourth line is within the working range of the first PAA sensing device; and
 - delivering peroxyacetic acid to the chiller in response to the signal from a third sensing device.
15. A process according to claim 14, further comprising providing a second PAA sensing device for sensing the concentration of peroxyacetic acid in the sixth line, the second sensing device providing a second signal in response to the concentration of sensed concentration of peroxyacetic acid signal, and comparing the signals of the first and second PAA sensing devices.

1/2

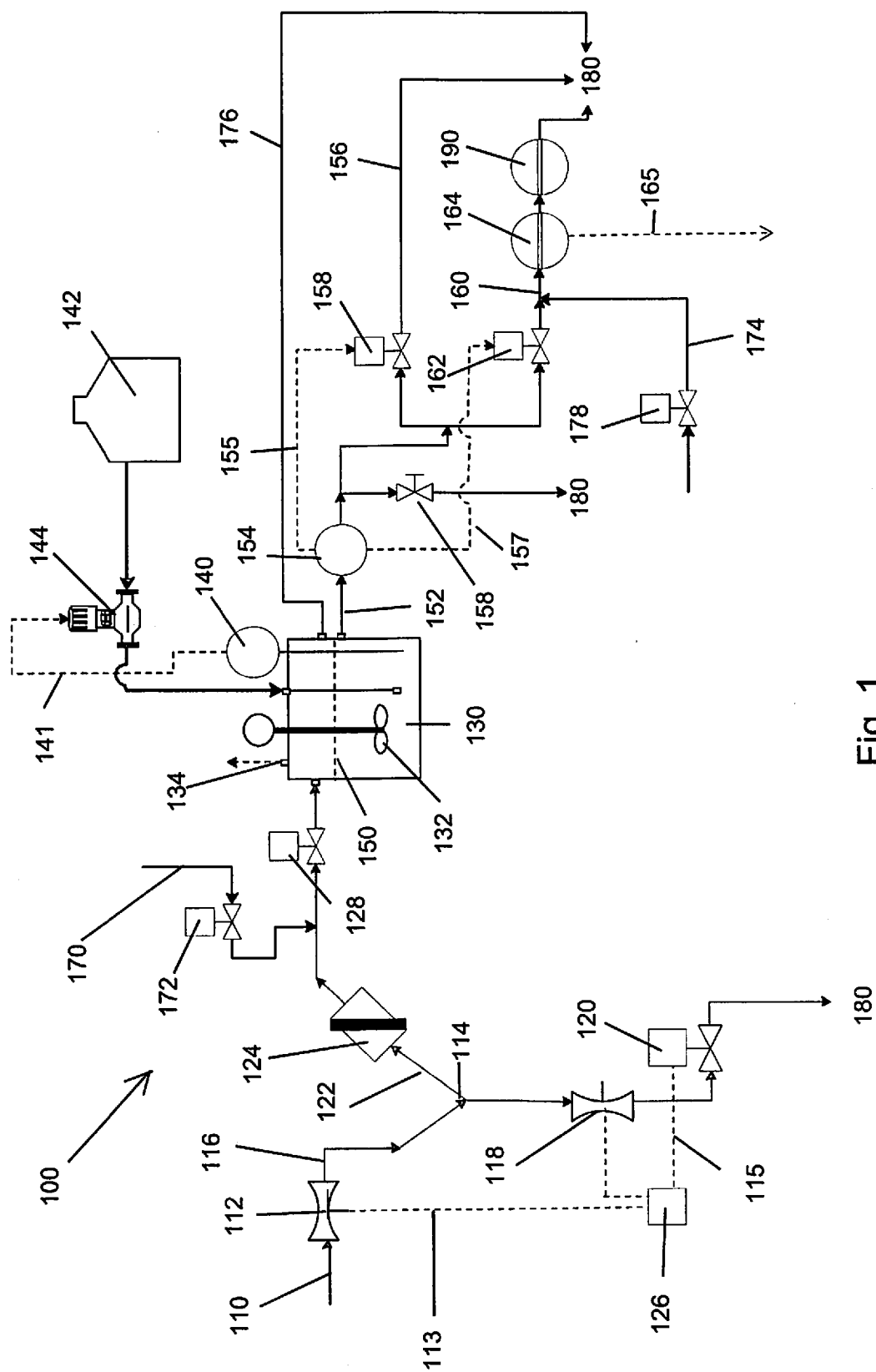


Fig. 1

2/2

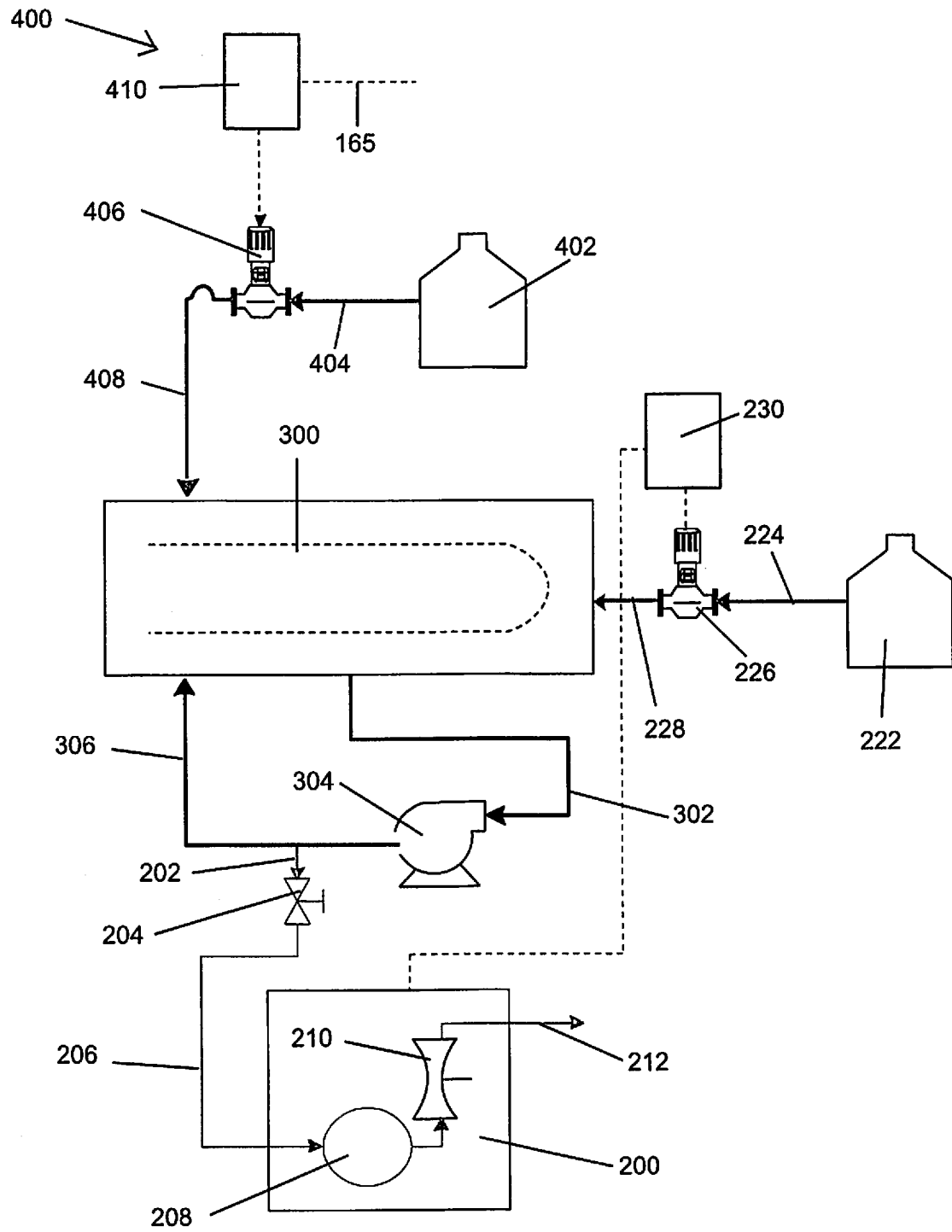


Fig. 2

