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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
23 December 2015 (23.12.2015)

WIPO | PCT

(10) International Publication Number
WO 2015/192254 A1

(51) International Patent Classification:
B08B 9/032 (2006.01) *B08B 9/08* (2006.01)

(21) International Application Number:
PCT/CH2014/000082

(22) International Filing Date:
17 June 2014 (17.06.2014)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant: **TETRA LAVAL HOLDINGS & FINANCE SA** [CH/CH]; Av. Général-Guisan 70, CH-1009 Pully (CH).

(72) Inventor: **EGGLER, Thomas**; Weissensteinweg 1, CH-4852 Rothrist (CH).

(74) Agent: **E. BLUM & CO. AG**; Vorderberg 11, 8044 Zürich (CH).

(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, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, 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, 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, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: CLEANING-IN-PLACE METHOD AND DEVICE

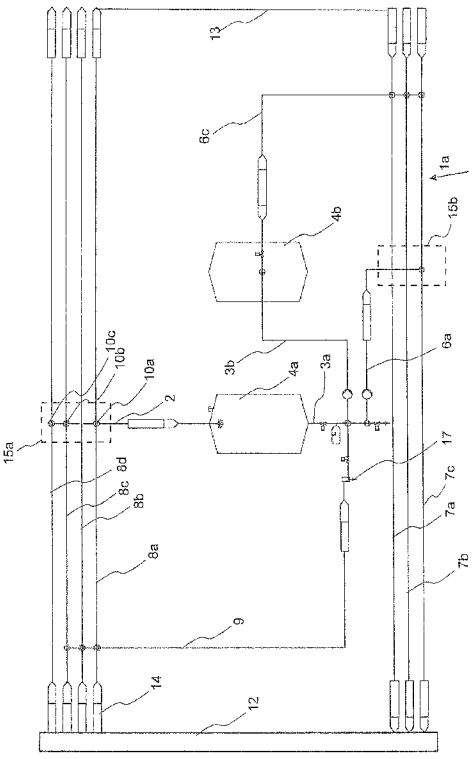

Fig. 2

(57) Abstract: The invention relates to a method for cleaning-in-place of a liquid food processing plant (la) comprising at least one storage tank (4a) for storing liquid food, at least a product inlet pipe for feeding the liquid food into the storage tank (4a) and at least a product outlet pipe for delivering the liquid food to a consumer (4b) from the storage tank (4a), further comprising an inlet service pipe (2) and an outlet service pipe (3a) which connect the storage tank (2) with a cleaning-in- place installation (12) adapted to deliver a plurality of cleaning fluids. The method comprises the steps of connecting the inlet service pipe (2) to a plurality of CIP outlet pipes (8a-8d) of the cleaning-in-place installation (12) and the outlet service pipe (3a) to a plurality of CIP inlet pipes (7a-7c) of the cleaning-in-place installation (12), and cleaning the inlet service pipe (2), the storage tank (4a) and the outlet service pipe (3a) by circulating at least one cleaning fluid from the cleaning-in-place installation (12) through the inlet service pipe (2), the storage tank (4a), the outlet service pipe (3a) and back into the cleaning-in-place installation (12). Only the inlet service pipe (2) is used for guiding one or more cleaning fluids into the storage tank (4a).

WO 2015/192254 A1

Published:

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

Cleaning-in-place method and device

Technical Field

The invention relates to a method for cleaning-in-place of a liquid food processing plant and a liquid food processing plant cleanable by said method.

Background

The concept of cleaning-in-place (CIP) is known. It relates to cleaning the interior surfaces of pipes, tanks, process equipment, filters, etc. without disassembly of the processing plant. This procedure has emerged from the necessity of reducing production costs and is particularly important in case of processing plants in the food industry, which have by nature high requirements with respect to sterility.

Available solutions propose the usage of a CIP-block, which is an installation for providing different kind of cleaning fluids. The CIP-block is connected to the processing plant via a plurality of pipes for each type of cleaning fluid. A subset of these pipes is formed by inlet pipes which are connected to tanks of the processing plant used for storing and/or delivering a liquid food, e.g. a beverage. The cleaning fluid is delivered into the tanks during a cleaning process. A second subset is formed by outlet pipes which extract the cleaning fluid from the tank after the cleaning process and feed it back into the CIP-block. Each inlet pipe is attributed to a certain outlet pipe, such that a certain cleaning fluid always flows through a particular inlet pipe and is always fed back into the CIP-block via a particular outlet pipe. Thus, for each type of cleaning fluid there is a predefined circuit consisting of the CIP-block, an inlet

pipe, the storage tank to be cleaned and the attributed outlet pipe.

A disadvantage of this solution is the fact that the inlet and outlet pipes are only used comparatively seldom and are not cleaned. However, this is desirable, particularly for the inlet pipes, because many contaminants can develop and accumulate inside the pipes during their idle time.

Another disadvantage is the relatively complicated pipe system resulting from the multitude of potentially required cleaning fluids. This leads to increased maintenance effort and higher costs for the processing plant.

Disclosure of the Invention

Hence, it is a general objective of the present invention to provide a method for cleaning-in-place a liquid food processing plant which improves the cleaning quality by improving sterility and which reduces costs and maintenance effort. Another objective is to provide a liquid food processing plant which implements the method according to the invention.

According to a first aspect these objectives are reached by a method for cleaning-in-place of a liquid food processing plant. The liquid food processing plant comprises at least one storage tank for storing liquid food, at least a product inlet pipe for feeding the liquid food into the storage tank and at least a product outlet pipe for delivering the liquid food to a consumer from the storage tank. Furthermore, an inlet service pipe and an outlet service pipe are provided in the liquid food processing plant, which connect the storage tank with a cleaning-in-place installation adapted to deliver a plurality of cleaning fluids. The method comprises the steps of:

a) connecting the inlet service pipe to a plurality of outlet pipes of the cleaning-in-place installation and the outlet service pipe to a plurality of inlet pipes of the cleaning-in-place installation, and

b) cleaning the inlet service pipe, the storage tank and the outlet service pipe by circulating at least one cleaning fluid from the cleaning-in-place installation through the inlet service pipe, the storage tank, the outlet service pipe and back into the cleaning-in-place installation.

Only the inlet service pipe is used for guiding one or more cleaning fluids into the storage tank.

In a second aspect a liquid food processing plant is provided, comprising at least one storage tank for storing liquid food, at least a product inlet pipe for feeding the liquid food into the storage tank and at least a product outlet pipe for delivering the liquid food to a consumer out of the storage tank, further comprising one inlet service pipe which is in fluid communication with the storage tank and with CIP outlet pipes of a cleaning-in-place installation adapted to deliver a plurality of cleaning fluids.

Preferably the liquid food processing plant is cleanable by the method according to the invention.

The liquid food processing plant is preferably used as a beverage mixing plant or as a pasteurization plant.

Now, in order to implement these and still further objects of the invention, which will become more readily apparent as the description proceeds, the liquid food processing plant is manifested by the feature that one outlet service pipe is provided, which is in fluid communication with the storage tank and with the cleaning-in-place installation.

In another embodiment a bypass service pipe is provided in order to direct the at least one cleaning fluid to the consumer.

In another embodiment the inlet service pipe is connected to each CIP outlet pipe of the cleaning-in-place installation by means of a valve for each connection and the outlet service pipe is connected to CIP return pipes of the cleaning-in-place installation by means of a valve for each connection.

In yet another embodiment the liquid food processing plant further comprises an inlet adapter module for connecting the inlet service pipe to the outlet pipes of the cleaning-in-place installation and/or an outlet adapter module for connecting the outlet service pipe to the CIP return pipes of the cleaning-in-place installation.

Brief Description of the Drawings

The invention will be better understood and objects other than those set forth above will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings, wherein:

Fig. 1 shows a simplified schematic of a liquid food processing plant according to the prior art, and

Fig. 2 shows a simplified schematic of a liquid food processing plant with pipe cleaning according to the invention.

Detailed description

In the following the terms "inlet" and "outlet" in connection with a device are understood as referring to the flow direction of a fluid with respect to that device; e.g. an inlet pipe of the device has a flowing direction into that device. The term "fluid" is understood to comprise liquid or gaseous materials.

Fig. 1 shows a simplified schematic of a liquid food processing plant 1, in the following called

plant 1, according to the prior art with no pipe cleaning. The plant 1 comprises a storage tank 4a connected on its inlet side with CIP outlet pipes 8a, 8b, 8c, 8d for cleaning the storage tank 4a. Each CIP outlet pipe 8a-8d is connected to the storage tank 4a by means of a corresponding inlet service pipe 2a, 2b. For reasons of clarity only two inlet service pipes 2a, 2b are shown here, but it is understood that all CIP outlet pipes 8a-8d are connected to the storage tank 4a via an attributed inlet service pipe. Furthermore product inlet pipes are not shown for clarity reasons. In this example the CIP outlet pipes 8a-8d comprise a CO_2-supply pipe 8a, a water supply pipe 8b, a cleaning fluid pipe 8c and a sterile air supply pipe 8d. Of course, additional or alternative CIP outlet pipes carrying other fluid materials are conceivable. On its outlet side the storage tank 4a comprises an outlet service pipe 3a which connects the storage tank 4a to outlet return pipes, of which only the outlet return pipe 7 carrying cleaning fluid is shown here.

Throughout the description it is assumed that connections between pipes are implemented via double-seat valves 10 (denoted in the figures by two concentric circles), unless otherwise stated. Double-seat valves are commonly known by the skilled person and will not be described here. The signs marked with 17 in the figures refer to a drain of the respective pipe.

The outlet service pipe 3a is furthermore also connected directly to the CIP outlet pipes via first bypass pipes 9a-9c. Finally, the outlet service pipe 3a is connected to a consumer 4b on the inlet side of the latter, via a product outlet pipe 3b. The consumer 4b may e.g. be a filler or other known devices or tanks used for further processing the liquid food delivered to them from the storage tank 4a. The consumer 4b is connected on its outlet side to the CIP return pipes, here the CIP return pipe 7, via a consumer outlet service pipe 6b. The latter is also connected directly to the CIP outlet pipes 8a-8d

via second bypass pipes 5a, 5b. Again, only two second bypass pipes are shown for reasons of clarity. The CIP outlet pipes are part of a cleaning-in-place installation (CIP, not shown) which provides cleaning fluids to the CIP outlet pipes. The return pipe(s) 7 guides the fluid(s) back into the cleaning-in-place installation, in the following called CIP. Such a CIP is known and will not be described here in more detail.

In the following the function of a cleaning process is explained for a plant 1 according to the prior art for the example of cleaning fluid and sterile air (CIP outlet pipes 8c, 8d). In a normal cleaning step cleaning fluid is supplied from the CIP via the cleaning fluid supply pipe 8c into the inlet service pipe 2a, further into the storage tank 4a, which is cleaned by the cleaning fluid, out of the storage tank 4a and into the return pipe 7 via the outlet service pipe 3a and an intermediary pipe 6a.

The outlet service pipe 3a may also be used to transport a liquid food product into the consumer via the product outlet pipe 3b. This may also be the case for a plant 1a according to the invention and described below in connection with Fig. 2. The product outlet pipe 3b may also be cleaned by supplying cleaning fluid through the first bypass pipe 9c. Prior to this step residual product located in the product outlet pipe 3b may be pushed back into the storage tank by pressing air or CO_2 through the respective second bypass pipe (here pipe 5b as an example). After cleaning the product outlet pipe 3b and the consumer 4b the cleaning fluid is returned to the CIP via the consumer outlet service pipe 6b and the return pipe 7.

Obviously, the inlet service pipes 2a, 2b are only used relatively seldom, e.g. the inlet service pipe 2a is only used when cleaning fluid is transported therethrough and the inlet service pipe 2b only when sterile air has to be inserted into the storage tank 4a.

Because of the resulting long idle time of the inlet service pipes 2a, 2b the pipes may be subject to an accumulation of contaminants. For example, residual water may still be present in such a pipe and remain there for a long period of time. When water is supplied through that pipe the next time, it mixes with the "old" water and inserted into the storage tank 4a. This is obviously undesired because the contaminants are flushed into the storage tank 4a. Therefore, as known in the liquid food industry, an as much as possible continuous circulation of the fluids in service pipes has to be provided in order to minimize the contaminant accumulation in these pipes. This is particularly important in the liquid food industry and in the food industry in general, in order to ensure an as much as possible aseptic state of components coming into contact with a food product. Thus, in order to achieve a reduction of contaminants in the pipes it is possible to provide each service inlet pipe 2a, 2b with an own recirculation (feedback) pipe circuit which is able to feed the respective fluid back into the CIP or any other source during the idle time of the respective pipe. However, this complicates the construction of a plant 1 and increases the costs and maintenance. The term "idle" or "idle time" in connection with this document refers to a period of time a pipe is not actively used for cleaning a circuit or a tank or for transporting a liquid product.

In order to improve a degree of sterility of a plant 1, a modified plant 1a according to the invention is shown in Fig. 2. Elements of the modified plant 1a which are equivalent to elements of the plant 1 are denoted by the same reference numerals.

Fig. 2 shows a schematized CIP 12 connected to a single inlet service pipe 2 via CIP outlet pipes 8a-8d. The connection is, as mentioned, carried out by double-seat valves 10a-10c, each of which can switch the contents of the respective CIP outlet pipe into the inlet

service pipe 2 or into a bypass service pipe, of which only one pipe 13 is shown here for clarity reasons. Its purpose will be described later. The inlet service pipe 2 is connected to the storage tank 4a which is connected to the return pipes 7a-7c via the outlet service pipe 3a and the intermediary pipe 6a. Like in case of the plant 1 the storage tank 4a is also connected to the consumer 4b via the outlet service pipe 3a and the product outlet pipe 3b. The consumer 4b is connected to the return pipes 7a-7c via a bidirectional consumer outlet service pipe 6c. A single first bypass pipe 9 is used for the direct connection of the CIP outlet pipes 8a-8d to the outlet service pipe 3a. In the following it will be described how a cleaning procedure may be carried out by using the example of Fig. 1 with a cleaning by cleaning fluid and sterile air. The cleaning fluid is pumped from the CIP into the CIP outlet pipe 8c and then into the storage tank 4a which is thereby cleaned. This is done by switching the corresponding valve 10b to direct the cleaning liquid into the inlet service pipe 2 and switching all other valves 10a, 10c to recirculate the respective contents (sterile air, etc.) via the feedback pipe 13 into the respective CIP return pipes 7a-7c and back into the CIP. Subsequently the cleaning liquid flows out into the return pipe 7c via the outlet service pipe 3a and the intermediary pipe 6a. In a next step, sterile air is directed into the same single inlet service pipe 2 by switching the valve 10c accordingly (as mentioned above for the cleaning fluid). In other words a chosen cleaning fluid is switched into the inlet service pipe by switching a valve of the corresponding outlet pipe of the cleaning-in-place installation to an opened state with respect to a passage of the cleaning fluid into the inlet service pipe and switching valves of the other outlet pipes of the cleaning-in-place installation to a closed state with respect to a passage of the cleaning fluid into the inlet service pipe.

Thus, when comparing the above procedure with the procedure used in connection with Fig. 1, it is obvious that the single inlet service pipe 2 is used twice as often in the solution according to the invention, e.g. when considering a repeated cleaning procedure with the two components sterile air and cleaning fluid. The more fluids are circulated through the storage tank 4a the more dramatic is the usage difference between the two solutions. Thus, the inlet service pipe 2 is cleaned much more often in a plant according to the solution of the invention, thus reducing the undesired idle time of the pipe 2. Obviously, fewer components are required and no complicated feedback circuits have to be considered for recirculating each cleaning fluid.

Advantageously multiple cleaning operations are carried out by sequentially switching the at least one cleaning fluid into the inlet service pipe 2. For example a first cleaning process with a first cleaning fluid is carried out. Subsequently a second cleaning process with a second cleaning fluid is carried out. Finally a flushing procedure of residual cleaning fluid present in the storage tank is carried out with sterile water. All cleaning fluids and the sterile water travel through the inlet service pipe.

In one embodiment the plant 1a may comprise multiple storage tanks 4a, e.g. either for storing the same product to be delivered to different consumers 4b or each containing different products which are mixed in a further processing step.

In this constellation it is possible to clean at least two storage tanks simultaneously with e.g. different cleaning fluids by directing a respective cleaning fluid for each of the storage tanks 4a into their respective inlet service pipe by switching the respective valve of the corresponding CIP outlet pipe to an opened state and switching valves of the other outlet pipes of the cleaning-in-place installation to a closed state.

In case the at least two storage tanks are simultaneously cleaned with a same cleaning fluid, the cleaning fluid may be directed into the storage tank with the shortest connection to the cleaning-in-place installation via its inlet service pipe and it is directed into subsequent tanks optionally via their respective inlet service pipes or via the first bypass pipe 9 and their respective outlet service pipes. This makes it possible to design the cleaning process in such a way that pressure conditions of the specific plant 1a are taken into account, i.e. if the pressure in the CIP outlet pipe carrying the cleaning fluid to be used is too low downstream of the inlet service pipe of the first storage tank to be cleaned, it is possible to use the first bypass pipe 9 to input the cleaning fluid into the second storage tank via its outlet service pipe. Otherwise this can be done as described above via the respective inlet service pipe. As explained above in connection with the inlet service pipe 2, in this case it is also taken advantage of the usage of a single first bypass pipe 9 in terms of sterility and idle time.

The product outlet pipe 3b is cleaned by first pushing a residual product located in the product outlet pipe 3b back into the storage tank 4a by means of gas, particularly air, particularly sterile air, originating from one of the CIP outlet pipes 8a-8d, in this case e.g. pipe 8d, via a feedback pipe 13 and a bidirectional consumer outlet service pipe 6c and subsequently feeding the at least one cleaning fluid directly into the product outlet pipe 3b via the first bypass pipe 9 connected at one end to the CIP outlet pipes 8a-8d of the cleaning-in-place installation 12 and at the other end to the product outlet pipe 3b and subsequently returning the cleaning fluid to the cleaning-in-place installation 12 via one of the CIP return pipes 7a-7c of the cleaning-in-place installation 12. By using a bidirectional pipe 6c

it is possible to do without the pipes 5a, 5b and thus the complexity of the plant 1a is further reduced.

In this embodiment of Fig. 2 the liquid food processing plant 1a further comprises an inlet adapter module 15a for connecting the inlet service pipe 2 to the CIP outlet pipes 8a-8d of the cleaning-in-place installation 12 and an outlet adapter module 15b for connecting the outlet service pipe 3a to the CIP return pipes 7a-7c of the cleaning-in-place installation 12.

The inlet adapter module 15a comprises an inlet adapter pipe and a first valve array arranged along the inlet adapter pipe. Each valve of the first valve array connects a corresponding CIP outlet pipe 8a-8d of the cleaning-in-place installation 12 to the inlet service pipe 2. The outlet adapter module 15b comprises an outlet adapter pipe and a second valve array arranged along the outlet adapter pipe. Each valve of the second valve array connects a corresponding CIP return pipe 7a-7c of the cleaning-in-place device 12 to the outlet service pipe 3a. The valves of the first and second valve array are preferably double-seat valves.

The inlet adapter module 15a and/or the outlet adapter module 15b is/are replaceable by an inlet adapter module and/or an outlet adapter module with a different number of valves of the corresponding valve array. By providing a replaceable inlet and/or an outlet adapter module 15a, 15b it is possible to integrate the plant 1a with different types of CIP installations. Furthermore it is possible to adapt the plant 1a to a CIP installation with a different number of CIP outlet pipes for providing more or less types of cleaning fluids.

While there are shown and described presently preferred embodiments of the invention, it is to be distinctly understood that the invention is not limited thereto but may otherwise variously be embodied and practised within the scope of the following claims. Therefore, terms like "preferred" or "in particular" or "par-

ticularly" or "advantageously" or the like signify optional and exemplary embodiments only.

5

Claims

1. Method for cleaning-in-place of a liquid food processing plant (1a) comprising at least one storage tank (4a) for storing liquid food, at least a product inlet pipe for feeding the liquid food into the storage tank (4a) and at least a product outlet pipe for delivering the liquid food to a consumer (4b) from the storage tank (4a), further comprising an inlet service pipe (2) and an outlet service pipe (3a) which connect the storage tank (2) with a cleaning-in-place installation (12) adapted to deliver a plurality of cleaning fluids, wherein the method comprises the steps of:

a) connecting the inlet service pipe (2) to a plurality of CIP outlet pipes (8a-8d) of the cleaning-in-place installation (12) and the outlet service pipe (3a) to a plurality of CIP return pipes (7a-7c) of the cleaning-in-place installation (12), and

b) cleaning the inlet service pipe (2), the storage tank (4a) and the outlet service pipe (3a) by circulating at least one cleaning fluid from the cleaning-in-place installation (12) through the inlet service pipe (2), the storage tank (4a), the outlet service pipe (3a) and back into the cleaning-in-place installation (12),

wherein only the inlet service pipe (2) is used for guiding one or more cleaning fluids into the storage tank (4a).

2. Method according to claim 1, wherein a chosen cleaning fluid is switched into the inlet service pipe (2) by switching a valve (10b) of the corresponding CIP outlet pipe (8c) of the cleaning-in-place installation (12) to an opened state with respect to a passage of the cleaning fluid into the inlet service pipe (2) and switching valves (10a, 10c) of the other CIP outlet pipes (8a, 8b, 8d) of the cleaning-in-place installation (12)

to a closed state with respect to a passage of the cleaning fluid into the inlet service pipe (2).

3. Method according to claim 1 or 2, wherein multiple cleaning operations are carried out by sequentially switching the at least one cleaning fluid into the inlet service pipe (2).

4. Method according to one of the preceding claims, wherein at least two storage tanks are simultaneously cleaned by directing a respective cleaning fluid for each of the storage tanks into their respective inlet service pipe by switching the respective valve of the corresponding CIP outlet pipe of the cleaning-in-place installation (12) to an opened state and switching valves of the other CIP outlet pipes of the cleaning-in-place installation (12) to a closed state.

5. Method according to one of the preceding claims, wherein, in case at least two storage tanks are simultaneously cleaned with a same cleaning fluid, the cleaning fluid is directed into the tank with the shortest connection to the cleaning-in-place installation (12) via its inlet service pipe and it is directed into subsequent tanks optionally via their respective inlet service pipes or via a first bypass pipe (9) connected at one end to the CIP outlet pipes (8a-8d) of the cleaning-in-place installation (12) and at the other end to the product outlet pipe (3b) and their respective outlet service pipes.

6. Method according to one of the claims 1 to 4, wherein at least one product outlet pipe (3b) is cleaned by first pushing a residual product located in the product outlet pipe (3b) back into the storage tank (4a) by means of gas, particularly air, particularly sterile air, originating from one of the CIP outlet pipes

(8a-8d), via a feedback pipe (13) and a bidirectional consumer outlet service pipe (6c) and subsequently feeding the at least one cleaning fluid directly into the product outlet pipe (3b) via a first bypass pipe (9) connected at one end to the CIP outlet pipes (8a-8d) of the cleaning-in-place installation (12) and at the other end to the product outlet pipe (3b) and returning the cleaning fluid to the cleaning-in-place installation (12) via one of the CIP inlet pipes (7a-7c) of the cleaning-in-place installation (12).

7. Liquid food processing plant (1a), particularly cleanable by the method according to one of the claims 1 to 6, comprising at least one storage tank (4a) for storing liquid food, at least a product inlet pipe for feeding the liquid food into the storage tank (4a) and at least a product outlet pipe for delivering the liquid food to a consumer (4b) out of the storage tank (4a), further comprising one inlet service pipe (2) which is in fluid communication with the storage tank (4a) and with CIP outlet pipes (8a-8d) of a cleaning-in-place installation (12) adapted to deliver a plurality of cleaning fluids.

8. Liquid food processing plant according to claim 7, further comprising one outlet service pipe (3a) which is in fluid communication with the storage tank (4a) and with CIP return pipes (7a-7c) of the cleaning-in-place installation (12).

9. Liquid food processing plant according to one of the claims 7 or 8, wherein a bypass service pipe (13) is provided in order to direct the at least one cleaning fluid to the consumer (4b).

10. Liquid food processing plant according to one of the claims 7 to 9, wherein the inlet service pipe

(2) is connected to each CIP outlet pipe (8a-8d) of the cleaning-in-place installation (12) by means of a valve for each connection and the outlet service pipe (3a) is connected to each CIP return pipe (7a-7c) of the cleaning-in-place installation (12) by means of a valve for each connection, particularly wherein the valves are double-seat valves.

11. Liquid food processing plant according to one of the preceding claims, further comprising an inlet adapter module (15a) for connecting the inlet service pipe (2) to the CIP outlet pipes (8a-8d) of the cleaning-in-place installation (12) and/or further comprising an outlet adapter module (15b) for connecting the outlet service pipe (3a) to the CIP return pipes (7a-7c) of the cleaning-in-place installation (12).

12. Liquid food processing plant according to claim 11, wherein the inlet adapter module (15a) comprises an inlet adapter pipe and a first valve array arranged along the inlet adapter pipe, wherein each valve of the first valve array connects a corresponding CIP outlet pipe (8a-8d) of the cleaning-in-place installation (12) to the inlet service pipe (2), particularly wherein the valves of the first valve array are double-seat valves.

13. Liquid food processing plant according to claim 11 or 12, wherein the outlet adapter module (15b) comprises an outlet adapter pipe and a second valve array arranged along the outlet adapter pipe, wherein each valve of the second valve array connects a corresponding CIP return pipe (7a-7c) of the cleaning-in-place device (12) to the outlet service pipe (3a), particularly wherein the valves of the second valve array are double-seat valves.

14. Liquid food processing plant according to one of the claims 11 to 13, wherein the inlet adapter module (15a) and/or the outlet adapter module (15b) is/are replaceable by an inlet adapter module and/or an outlet adapter module with a different number of valves of the corresponding valve array.

15. Use of the liquid food processing plant according to one of the claims 7 to 14 as a beverage mixing plant or as a pasteurization plant.

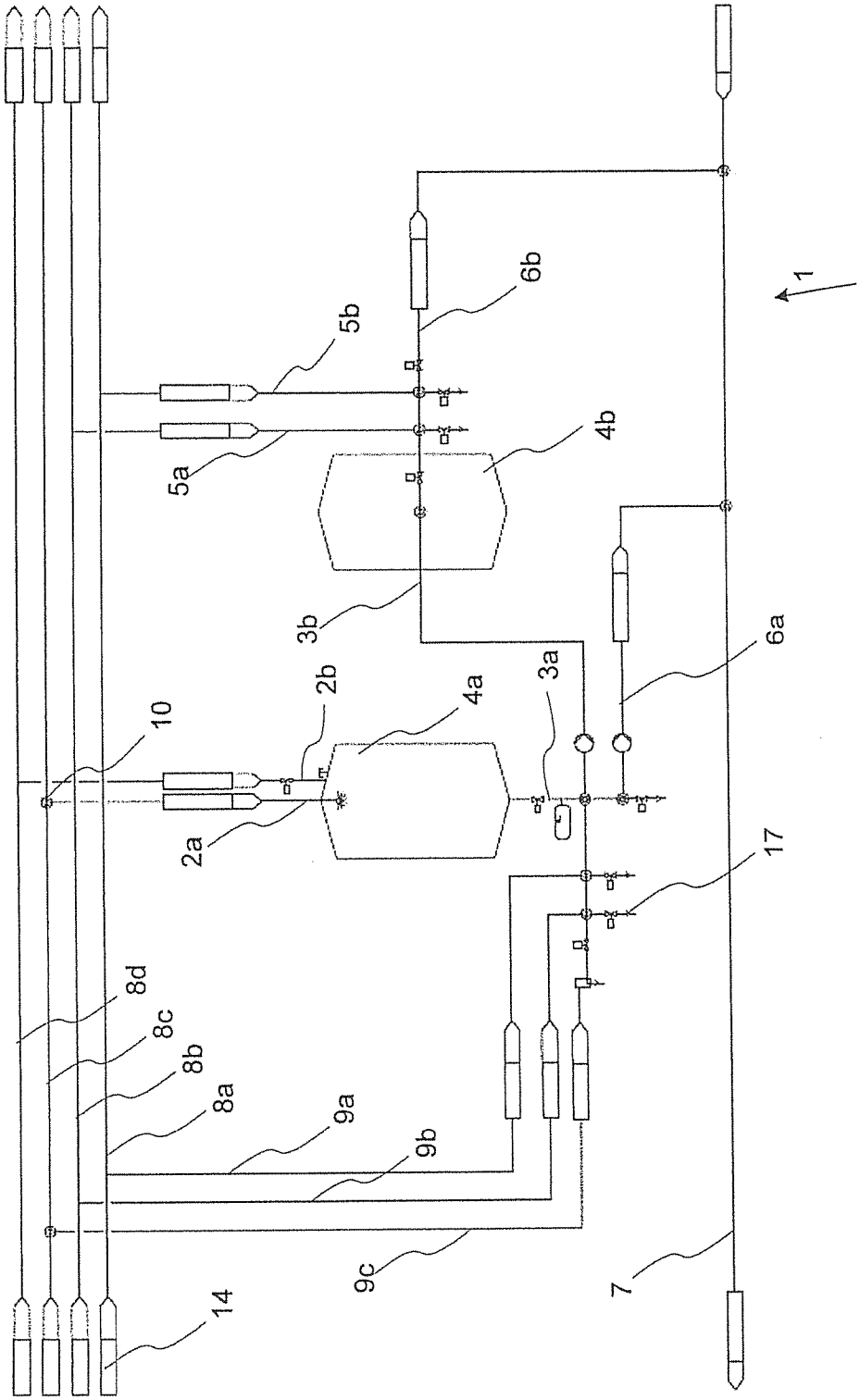

Fig. 1

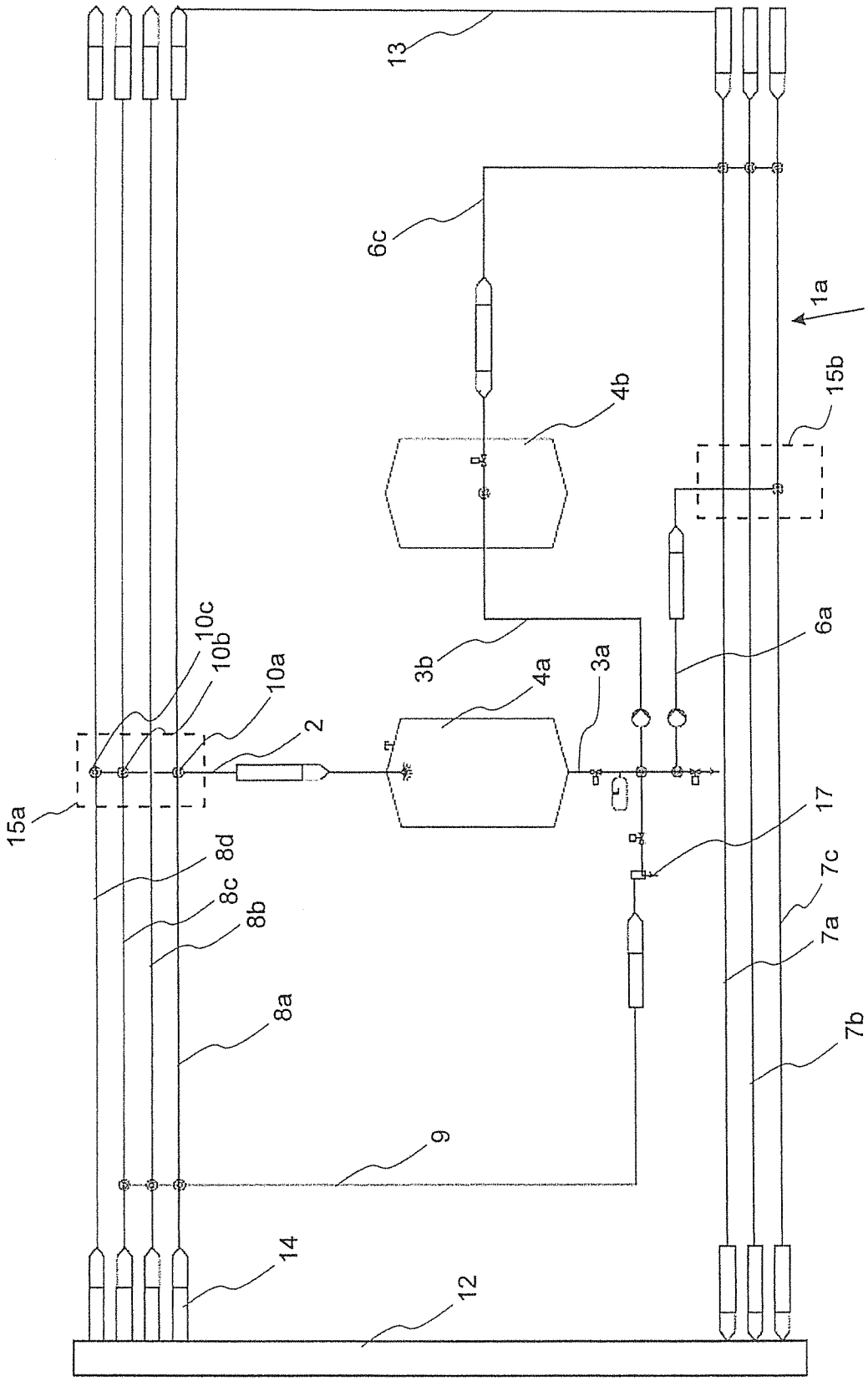
13
6c
1a
4b
15b
10c
10b
10a
2
3b
4a
3a
6a
15a
17
8d
8c
8b
7c
7a
8a
9
7b
14
12

Fig. 2

INTERNATIONAL SEARCH REPORT

International application No
PCT/CH2014/000082

A. CLASSIFICATION OF SUBJECT MATTER
INV. B08B9/032 B08B9/08
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B08B B67C A01J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2011/009546 A1 (KHS GMBH [DE]; KATZENBAECHER HANS-JUERGEN [DE]; BIDINGER ANNE [DE]; BR) 27 January 2011 (2011-01-27) the whole document -----	1-5, 7-10,15
X	EP 2 527 050 A1 (SKAANEMEJERIER AB [SE]) 28 November 2012 (2012-11-28) paragraphs [0001], [0006], [0011]; figures 4,5 paragraph [0040] - paragraph [0052] -----	1-5,7,8, 10,15

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
29 August 2014	11/12/2014

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Kosicki, Tobias

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CH2014/000082

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-5, 7-10, 15

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-5, 7-10, 15

   A method for cleaning in place of a liquid food processing plant, a liquid food processing plant and the use of a liquid food processing plant.

   ---

2. claim: 6

   A method for cleaning in place of a liquid food processing plant whereby one product outlet pipe (3b) is cleaned by first pushing a residual product located in the product outlet pipe (3b) by means of a gas back into the storage tank (4a) and then cleaning this pipe (3b) via a first bypass pipe (9) (claim 6).

   ---

3. claims: 11-14

   A liquid food processing plant (claims 11-14 when dependent on claims 7-10) further comprising an inlet adapter module (15a) and/or an outlet adapter module (15b) (claim 11).

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/CH2014/000082

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2011009546 A1	27-01-2011	DE 102009034693 A1	17-03-2011
		EP 2456576 A1	30-05-2012
		US 2012000492 A1	05-01-2012
		WO 2011009546 A1	27-01-2011
EP 2527050 A1	28-11-2012	EP 2527050 A1	28-11-2012
		WO 2012160185 A2	29-11-2012