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Canadian Intellectual Property Office

CA 3053224 A1 2018/10/04

(21) 3 053 224

(12) DEMANDE DE BREVET CANADIEN
CANADIAN PATENT APPLICATION

(13) A1

(86) **Date de dépôt PCT/PCT Filing Date:** 2018/03/22
(87) **Date publication PCT/PCT Publication Date:** 2018/10/04
(85) **Entrée phase nationale/National Entry:** 2019/08/09
(86) **N° demande PCT/PCT Application No.:** EP 2018/057299
(87) **N° publication PCT/PCT Publication No.:** 2018/177882
(30) **Priorité/Priority:** 2017/03/27 (DE10 2017 106 549.0)

(51) **Cl.Int./Int.Cl.** ***C12C 3/06*** (2006.01),
C12C 11/11 (2019.01), ***C12C 5/02*** (2006.01),
C12C 7/28 (2006.01)

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(54) **Titre : PROCEDE POUR LE DOSAGE DE PELLETS DE HOUBLON DANS UN PRECURSEUR DE BIERE FERMENTE ET INSTALLATION DESTINEE A LA MISE EN OEUVRE DU PROCEDE**

(54) **Title: METHOD FOR METERING HOPS PELLETS INTO A FERMENTED BEER PRECURSOR, AND SYSTEM FOR CARRYING OUT THE METHOD**

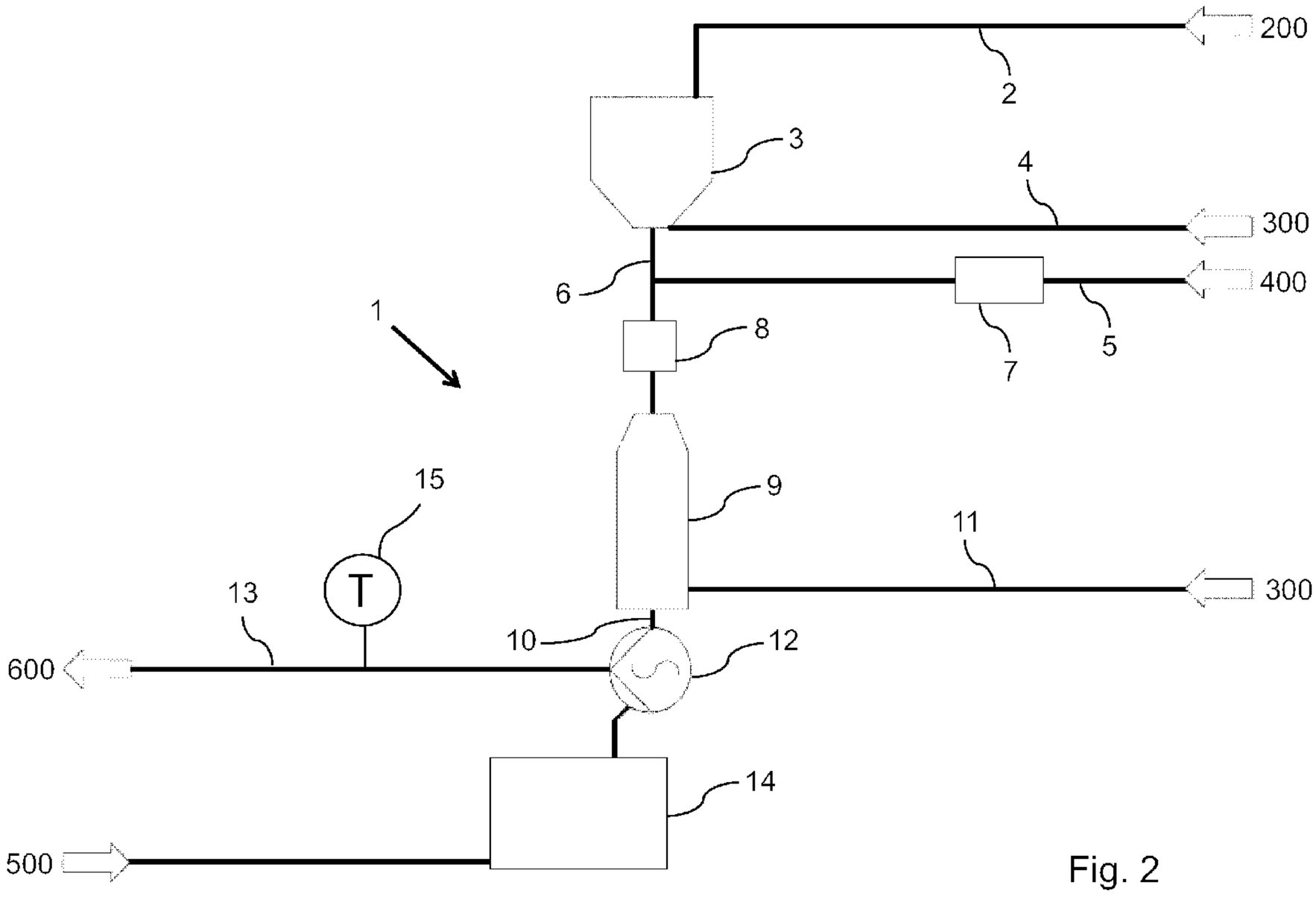

Fig. 2

(57) **Abrégé/Abstract:**
The invention relates to a method for metering hops pellets (200) into a fermented beer precursor in order to produce beer, comprising a system (1) comprising a metering system (8) and a pump (12). The method is characterized by the following steps: I. supplying hops pellets (200) into the system (1); II. metering a specified quantity of hops pellets from the metering system to the pump (12); and III. supplying the specified quantity of hops pellets (200) from II. into a beer precursor-conducting line (13) or a tank filled with beer precursor by means of the pump (12), wherein the metered hops pellets (200) are supplied into the beer precursor-conducting line (13) or into the tank filled with the beer precursor in a pelleted and/or granulated form.

ABSTRACT

The invention relates to a method for metering hops pellets (200) into a fermented beer precursor in order to produce beer, comprising a system (1) comprising a metering system (8) and a pump (12). The method is characterized by the following steps: I. supplying hops pellets (200) into the system (1); II. metering a specified quantity of hops pellets from the metering system to the pump (12); and III. supplying the specified quantity of hops pellets (200) from II. into a beer precursor-conducting line (13) or a tank filled with beer precursor by means of the pump (12), wherein the metered hops pellets (200) are supplied into the beer precursor-conducting line (13) or into the tank filled with the beer precursor in a pelleted and/or granulated form.

METHOD FOR METERING HOPS PELLETS INTO A FERMENTED BEER PRECURSOR, AND SYSTEM FOR CARRYING OUT THE METHOD

The present invention concerns a method for metering hops pellets into a fermented beer precursor, for example a green beer, and a system for carrying out the method.

At present, various possibilities for so-called cold hopping are known, wherein most production methods are limited to introducing the hops manually into the cold storage tank before filling the cold storage tank with a beer precursor.

Alternative processes, known amongst others from US 8,875,616 B2, describe an extraction of hops pellets in a separate container, whereby a hop extract is obtained which must then be returned to the beer. The hops are here dissolved only in a partial stream of beer. In addition, often grinding of the hops pellets is provided in order to increase the extraction of the aromatic constituents.

The process of so-called dry hopping is described amongst others in DE 10 2015 121 999 A1, DE 2 228 497 A and GB 2 531 054 A. In most of these processes, hopping takes place at a comparatively early stage of beer production, which is usually followed by a temperature-intensive fermentation.

The most significant of these processes is described in GB 2 531 054 A , in which the hops are added during hopping and then heated to temperatures of over 80°C.

Starting from the above-mentioned prior art, it is an object of the present invention to provide a method which allows metering of lupulin-containing hops pellets into a beer precursor in a fashion which protects the aromatics.

The present invention achieves this object by providing a method with the features of claim 1 and with a system with the features of claim 19.

The method according to the invention concerns the metering of hops pellets into a fermented beer precursor. This is a step in the production of beer, for example during cold hopping.

The method according to the invention is carried out with a plant which comprises a metering system and a pump. It comprises the following steps:

I. supplying hops pellets into the plant;
II. metering a predefined quantity of hops pellets from the metering system to the pump;
III. introducing the specified quantity of hops pellets into a line carrying beer precursor or into a tank filled with beer precursor by means of the pump.

The method according to the invention may optionally be supplemented by the following step:

IV. clarifying the beer containing the pelletized and/or granulated hops by means of the mechanical separating technique, in particular by a filtration device and/or a centrifuge.

Between step III and step IV, the beer may also be lagered and/or matured.

The metered hops pellets are introduced in pelletized and/or granulated form into the line carrying beer precursor or into the tank filled with the beer precursor.

Because the granulated and/or pelletized solid is supplied to the beer precursor in lumps with little shear force, in particular without prior extract formation, constituents such as e.g. lupulin grains are transferred intact to the liquid.

When introduced into a line carrying beer precursor, particularly advantageously the hops pellets and their constituents can be distributed evenly and rapidly in the beer precursor.

Then the flow rate of the beer precursor in the line, in particular the period of pump operation, may be matched to the metering. The minimum pump operating time t_{pump} should preferably be greater than the time t_{Dos} required for metering. Particularly preferably, $t_{Dos} \leq 0.95\ t_{pump}$.

It is also possible to add hops pellets to a tank filled with beer precursor. The term "filled" may particularly preferably also mean that the tank is partially filled, i.e. not completely filled.

It is recommended that the tank is preferably provided with one or more agitation devices so as to ensure better distribution of the added hops pellets or hops granulate.

The fermented beer precursor may in particular be green beer. A beer precursor is a beer which is not yet ready, but is an intermediate product in beer production.

The method according to the invention may thus comprise further steps, wherein however before separation of the hops from the beer precursor - and particularly preferably also during all further brewing steps - the temperature at no time exceeds a temperature of 60°C, preferably 30°C.

Further advantageous embodiments of the invention are the subject of the subclaims.

It is advantageous if, when the metered hops pellets are introduced into the liquid, at least 30 w.%, preferably at least 50 w.%, particularly preferably at least 80 w.% of the hops pellets introduced into the plant are present in pelletized and/or granulated form with a mean grain size with an equivalence diameter of at least 1 mm. More than 50%, preferably more than 80%, in particular more than 90% of the metered hops solids in granulated and/or pelletized form have the equivalence diameter of at least 1 mm. Solids in the form of granulated and/or pelletized hops pellets may be present in various grain sizes above this equivalence diameter.

Thus it is possible that the hops pellets are coarsely comminuted in the plant. This course comminution does not however form powder but a granulated solid with corresponding grain size.

The hops pellets may be introduced in dry state, or particularly preferably in a liquid, into the line carrying beer precursor or into the tank filled with beer precursor.

The clarification in step IV may preferably take place by filtration or also preferably by centrifugal clarification.

Maturation and lagering may take place between the addition of the metered hops pellets and clarification.

The pelletized and/or granulated form of the hops pellets may be retained so that the liquid serves to facilitate transport of the hops pellets in the plant.

The temperature of the beer precursor in the line carrying beer precursor or in the tank filled with the beer precursor should be less than 60°C, preferably less than 30°C. In this way, the constituents of the hops are supplied and processed particularly gently. For this, a temperature sensor may be provided in the line carrying the beer precursor or in the tank. The measurement signal from the temperature sensor can be evaluated in a control and/or analysis unit using an actual/nominal value comparison. If the temperature of the beer precursor is too high, the metering of the hops pellets may be stopped. The beer precursor may be cooled via a cooling circuit and returned to the plant. The temperature-controlled metering may in some cases prevent the occurrence of undesirable flavor changes.

The plant may advantageously comprise a first container which is arranged upstream of the metering system in the transport direction of the hops pellets.

The plant may also comprise a second container which is arranged between the metering system and the pump.

The containers allow optimized delivery, in particular a more even delivery of hops pellets.

The metering speed may advantageously be determined by controlling the pump.

Advantageously, the method is performed at a very late stage of the brewing process, namely after the main fermentation. Thus the beer product to be hopped is a previously fermented beer precursor. This late timing is relatively unusual, but it has however been found that, in particular, flavor effects can be achieved by hopping at this late stage. Any further fermentation during subsequent maturation at a temperature of below 60°C does not influence this effect.

During the method, an inert gas may be introduced into the metering system, the first and/or the second container. An undesirable contact of certain gases, e.g. oxygen, with the hops pellets may thereby advantageously be avoided.

Particularly preferably, at least the metering system or the second container may be overlaid with inert gas and thus preferably pressurized.

Following the introduction of the metered hops pellets, the plant may be cleaned, wherein the cleaning may take place with liquid or vaporous cleaning fluid. Particularly preferably, this is so-called CIP cleaning.

The cleaning may comprise the introduction of dry air after cleaning with liquid or vaporous cleaning fluid. This dries the plant.

The hops pellets may be metered by the metering system by means of at least one rotary feeder. The part of the plant comprising the rotary feeder is known as the rotary feeder sluice. The rotation speed of the rotary feeder may also be controlled via the above-mentioned control and/or analysis unit depending on the agitation speed of an agitator in the tank or depending on the throughflow of beer precursor in the line.

The precise quantity/time metering of the hops pellets is ensured by control of the rotary feeder rotation speed.

The line carrying the beer precursor may comprise a supply regulator and a throughflow meter for monitoring and adjusting the throughflow of beer precursor in the line carrying the beer precursor. The same can also be achieved in the variant with the tank filled with the beer precursor, wherein however the agitation speed of the agitator in the tank is monitored.

In the case of a tank instead of a line, the quantity of hops pellets may be determined from a fill level of the beer precursor in the tank.

The pump may be designed for gentle delivery, wherein a rotor and a stator of the pump are arranged such that the granulated and/or pelletized form of the hops pellets is retained for at least 90 w.% of all hops pellets.

The fill level of the first and/or second container is monitored by a fill level meter and/or monitor, e.g. a fill level limit switch, which allows function monitoring of the rotary feeder sluice.

In addition to the metered addition of hops pellets, wood chips may also be introduced into the beer precursor. For this, the rotary feeder may be used for metered supply. The wood chips give the beer a particular lager flavor, e.g. suggestive of oak barrels. Wood chips need not however be added to all beer types.

Advantageously, in comparison with natural hop cones with the same weight, the hops pellets may have a higher lupulin content. The alpha-lupulin content in particular may advantageously be higher. These aromatics are particularly important for the flavor qualities of the beer. An increased proportion of these aromatics with simultaneously reduced volume facilitates the supply for metering solids, and also allows better transport of the hops and lower storage costs.

The invention also comprises a plant for carrying out a method according to the invention, wherein the plant comprises

a) a first container,
b) a metering system for metering the solids,
c) a second container and
d) a pump which is connected to a line carrying a liquid, in particular a line carrying a beer precursor.

In the performance of the method, it is particularly advantageous that the pelletized and/or granulated solids remain intact.

Even when liquid is added to support the transportability of the solids, the solids are not dissolved and extracts formed, but the solids remains largely in granulated and/or pelletized form.

The pump may preferably be formed as a displacement pump with two inlets, wherein one inlet is configured for the supply of hops pellets and one inlet is configured for the supply of beer precursor, and an outlet is configured for discharging the product of the hops pellets and the beer precursor.

The invention is explained in more detail below with reference to a concrete exemplary embodiment and the attached figures. The drawings show:

Fig. 1 a diagrammatic depiction of a process of beer production; and

Fig. 2 a diagrammatic depiction of an arrangement for cold hopping of beer.

Figure 1 shows a beer production system, wherein additional optional steps may be provided. A first step in the method shown in figure 1 comprises the crushing of the malt 101.

This is followed by mashing 102. The crushed malt is then pulped for further processing.

Mashing 102 is followed by lautering 103 of the mixture. Here the mash and the beer wort are separated.

The following step is boiling 104, also called wort boiling. The malt enzymes are denatured here. Often, hops are added at this stage.

This is followed by cooling 105 of the mixture.

Then by the addition of yeast, fermentation 106 is initiated, in which the wort is converted into alcohol and carbon dioxide. The resulting mixture is often called green beer.

After fermentation 106 comes lagering and/or maturation 107 of the green beer. First, the hops pellets are added 108 at a comparatively late stage in the beer production.

After lagering and/or maturation 107 comes filtration 109 of the beer to remove protein tannins, hop components e.g. hop resins, and other green beer constituents.

Finally, the produced beer is packaged 110.

The addition of the hops pellets in step 108 may take place in a plant 1 as shown in figure 2.

The plant 1 in figure 2 has a supply line 2 for hops pellets 200.

The hops pellets 200 are introduced into a first container 3. The first container 3, or a substance transfer line 6 arranged on the first container 3, comprises a first supply line and/or a discharge line 4 for an inert gas 300. The first container 3 also comprises the substance transfer line 6 arranged on the container, and/or the supply line 4 for an inert gas 300, and/or a supply line 5 for dry air 400. The container 3 may also be regarded as a buffer container. Because of the solids

column, this allows a continuous supply of solids to a downstream solids metering plant.

The substance transfer line 6 serves for transfer of hops pellets 6 and may also be formed independently of the supply lines 4 and 5.

A drying unit 7 for the introduced air may be provided on or in the supply line 5 for dry air, in order to remove residual moisture.

The substance transfer line 6 opens into the metering system 8. This may for example be configured with a so-called rotary feeder. Alternatively or in addition to such a rotary feeder sluice, a plant may be provided comprising alternately actuated valves or sliders for solids metering.

The metering system 8 adds hops pellets in granulated and/or pelletized form into a container 9. The container 9 or a substance transfer line 10 opening onto the container may if required have a second supply line 11 for inert gas 300.

The substance transfer line 10 opens into a pump 12 which may be configured as a displacement pump. The pump 12 is arranged along a beer line 13, wherein the portion 13a of this line supplies the beer precursor to the pump 12, and the line portion 13b is connected to the pressure side of the pump and discharges the beer now provided with the added hops. A supply regulator in the controller ensures the correct quantity metering of the hops pellets 200 into the beer precursor. For this, the green beer quantity (volume/time) is determined for example in a throughflow meter 14, and serves as a command variable for the speed control of the pump 12 and of the rotary feeder sluice 8. As an alternative to this quantity-proportional metering, a time-proportional metering may also take place.

The line carrying the beer precursor also has a temperature sensor 15 which monitors the temperature of the beer precursor. If this is too high, no hopping takes place. However, cooling of the beer precursor may be initiated. To control

the individual method steps and monitor the process, a control and analysis device may be used, which is not shown but can easily be imagined.

The pump 12 is preferably configured as a displacement pump. It serves both to supply hops to the suction side and to supply beer precursor between the suction side and the pressure side of the pump. The product is discharged as hopped beer from the pressure side of the pump. Typically, a displacement pump comprises a rotor and a stator. Both the rotor and the stator in the pump concerned are designed with low shear. The pump comprises two inlets, preferably a solids inlet and a liquid inlet, and an outlet, preferably a liquid outlet. One of the two inlets may preferably be arranged between the suction and the pressure side of the pump 12.

On metering and delivery, the supplied hops pellets largely retain their pelletized form so that lupulin grains are not destroyed during metering.

The hops pellets may be added to the beer with a preferred size from 1 mm to 20 mm. This addition of hops pellets to the beer constitutes a critical point within the brewing process since here there is a risk of contamination of the foodstuff, CO_2 degasification and/or oxygen input.

With the invention outlined here, aroma sources from the hops pellets can be introduced automatically and hygienically into a volume flow, without the delivery of oxygen or the loss of CO_2.

The container 3 may be supplied manually or automatically, or it can receive a predefined quantity of the product batch. Then the container may be closed and pressurized with a gas, in particular the inert gas, and thus preloaded so that no oxygen is absorbed and no carbon dioxide is lost from the green beer.

Preferably, the second container 9 has an outlet flange which is flanged to an inlet of the pump 12, so that the hops solids can drop freely into the inlet of the pump 12.

The pump may preferably be configured as a displacement pump and particularly preferably as an eccentric screw pump or double screw spiral pump.

The container 9 may in some cases be preloaded with an inert gas in order to reduce the oxygen content in the plant or exclude this completely, and to maintain the CO_2 content of the beer. The pressure side of the pump 12 is connected to the liquid product line, for example the beer line 13b. The containers 3 and/or 9 may be equipped with sensors for level measurement, e.g. the fill level can be determined by means of ultrasound, conductivity, capacitance or by radar.

The plant 1, in particular the containers 3 and 9, may be cleaned by the introduction of the cleaning fluid, e.g. water. This can also take place using steam. The cleaning may be part of CIP cleaning. The plant is advantageously dried with dry air after cleaning. For this, the drying unit is provided which draws in and dries filtered external air.

The solids are metered into the container 9 via the metering system 8, the function of which can be monitored via level measurements.

Thus, preferably, it can be determined whether hops pellets are being delivered into the container 9. If no increase in level is detected despite delivery by the rotary feeder, for example a blockage of the rotary feeder may be output as an error message.

The metering may thus be monitored by means of the fill level.

Metering from the container 9 into the product stream may take place in that the pump 12 receives the dry solids and conveys these to the beer line 13b. To prevent wear, a small product stream is supplied to the pump inlet or - in the case of an eccentric screw pump - to the stator inlet.

Metering may also take place using moistened solids. This material however retains its granulated or pelletized form.

Preferably, the plant 1 shown in figure 2 is used for so-called cold hopping, i.e. the addition of hops to the already fermented beer precursor, known as green beer 500. By this addition of granulated or pelletized hops, the aromas contained in the hops are retained in the hopped beer 600 and thus give the beer a special aroma.

Cold hopping preferably takes place at temperatures of less than 60°C, preferably less than 30°C. In contrast to warm hopping, e.g. in a copper boiler at boiling temperature, with cold hopping fewer bitter substances and other by-products occur.

A pre-clarified beer is particularly suitable as green beer 500, to which the hops pellets are added for flavoring in the form of granulates and/or pellets, in some cases partially comminuted, i.e. they are added in a gentle fashion. After addition and after a certain action time, these lumpy hops added to the beer are removed again as solids from the beer, preferably by clarification e.g. using a centrifuge or separator.

As an alternative to the centrifuge, a filtration device may be used to clarify the beer or remove the added hops solids. Alternatively, separation may take place by natural sedimentation.

Thus the mixture of beer and hops constituents may advantageously be clarified.

The hops 200 are supplied from the supply line 2 into the beer line 13 without a grinder or solids crushing device. This achieves non-destructive metering of the hops into the beer in pelletized or granulated form, which prevents damage to aroma sources.

In the cold hopping process, these aroma sources are for example the lupulin grains which contain the aromatics and bitter substances of the hops, and are found in particular in concentrated form in hops pellets.

The plant 1 serves in particular for metering solids in liquids, wherein the structure of the solids is retained during metering. No grinding/shearing of solids occurs, so

that the dissolution or leaching of these solids only takes place in the suspension liquid, e.g. in the beer.

For better discharge of the granulated and/or pelletized solids from the container 9, it is also possible to add a liquid, in particular the same liquid into which the solids are to be metered. As an example, a device is described here in the context of metering hops pellets into beer. A quantity of beer, usually a comparatively small quantity of beer, may be added to the granulated and/or pelletized hops, whereby the substance is better discharged from the container 9 into the pump 12. Alternatively, just a residue of solids may also be discharged by rinsing.

The pelletized and/or granulated form is substantially retained, even with the addition of beer, for around 1 minute, preferably around 2 minutes, even more preferably around 5 minutes, for the purpose of transfer.

The term "granulated raw materials" in particular means raw materials which have been pressed or ground into small grains. Pellets are raw material which has been pressed into an elongate-cylindrical form. A granulate is usually a pourable solid. Pellets are usually larger than granulates.

Clarification/filtration according to step 109 may take place in a method for clarifying a flowable product, similar to that described in DE 10 2013 111 579 A1. Reference is made in full to this method for advantageous clarification of beer and other liquids using solids. Clarification should advantageously follow the method according to the invention for metering solids, or be integrated in the method according to the invention as an additional method step after the supply of solids into the fluid.

Particularly preferably, a hops granulate or hops pellets enriched with lupulin should be added.

In the enrichment process, the leaf fraction and cone spindle are removed so as to achieve lupulin enrichment.

This can be obtained from hop cones by a multistage processing. A preferred production of hops pellets comprises at least the following steps; the steps described as possible are also optional steps which may be carried out in addition to the other steps, either individually or in combination with other optional steps:

I. provision of hop cones;
II. possible removal of stems and possibly leaves;
III. drying, preferably at less than 65°C, to reduce the moisture content in the hops, preferably to less than 11% by weight or w.%, preferably less than 8 w.%;
IV. cooling to temperatures of less than -25°C;
V. crushing to produce a powder, e.g. in a hammer mill;
VI. possibly sifting to separate a leaf fraction;
VII. possibly homogenization of the powder, preferably in powder mixing devices;
VIII. pelletization in a press, preferably at temperatures below 55°C;
VIII. possibly cooling to temperatures of less than 20°C;
IX. depending on the time of use, possibly packaging of the pellets under oxygen exclusion, preferably under an inert gas atmosphere, in particular nitrogen and or carbon dioxide.

The hops pellets and/or granulates preferably used have a preferred density of more than 400 kg/m^3, in particular a density of 480 to 550 kg/^{3}. In contrast, hops in cone form, i.e. not in granulated or pelletized form, have a density of 130 to 150 kg/m^3, which may make metering of the hops more difficult.

The hops pellets preferably used may preferably comprise between 6 and 20 w.% of so-called alpha-acids.

The hops pellets preferably used may preferably comprise between 6 and 15 w.% of so-called beta-acids.

The hops pellets preferably used may preferably comprise between 0.5 to 4 ml/ 100 g of so-called essential oils.

List of Reference Signs

1	Plant
2	Supply line
3	Container
4	Supply line and/or discharge line
5	Supply line
6	Substance transfer line
7	Drying unit
8	Metering system
9	Container
10	Substance transfer line
11	Supply line
12	Pump
13	Line carrying beer precursor
14	Throughflow measurement
15	Temperature sensor
101	Crushing the malt
102	Mashing
103	Lautering
104	Boiling
105	Cooling
106	Fermenting
107	Maturing/lagering
108	Addition of hops pellets
109	Clarifying/filtering
110	Packaging
200	Hops pellets
300	Inert gas
400	Dry air

500 Green beer

600 Hopped beer

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Claims

1. A method for metering hops pellets (200) into a fermented beer precursor in order to produce beer, with a plant (1) comprising a metering system (8) and a pump (12),
wherein the method is characterized by the following steps:
I. supplying hops pellets (200) into the plant (1);
II. metering a predefined quantity of hops pellets from the metering system to the pump (12);
III. introducing the specified quantity of hops pellets (200) from II. into a line (13) carrying beer precursor or into a tank filled with beer precursor by means of the pump (12),
wherein the metered hops pellets (200) are introduced in pelletized and/or granulated form into the line (13) carrying beer precursor or into the tank filled with the beer precursor, and
wherein the temperature of the beer precursor in the line (13) carrying beer precursor or in the tank filled with the beer precursor is less than 60°C.

2. The method as claimed in claim 1, characterized in that the beer containing the pelletized and/or granulated hops is clarified by means of the mechanical separating technique, in particular by a filtration device and/or a centrifuge.

3. The method as claimed in claim 1 or 2, characterized in that when the metered hops pellets (200) are introduced into the beer precursor, at least 30 w.%, preferably at least 50 w.%, particularly preferably at least 80 w.% of the hops pellets (200) introduced into the plant (1) are present in pelletized and/or granulated form with a mean grain size of at least 1 mm.

4. The method as claimed in any of the preceding claims, characterized in that the hops pellets (200) are introduced in dry state into the line (13) carrying beer precursor or into the tank filled with beer precursor.

5. The method as claimed in any of the preceding claims 1 - 3, characterized in that the hops pellets (200) are introduced in a liquid into the line (13) carrying beer precursor or into the tank filled with beer precursor.

6. The method as claimed in any of the preceding claims, characterized in that the temperature of the beer precursor in the line (13) carrying beer precursor or in the tank filled with the beer precursor is less than 30°C.

7. The method as claimed in any of the preceding claims, characterized in that the beer precursor is a fermented beer precursor.

8. The method as claimed in any of the preceding claims, characterized in that the plant comprises a first container (3) which is arranged upstream of the metering system (8) in the transport direction of the hops pellets (200).

9. The method as claimed in any of the preceding claims, characterized in that the plant (1) comprises a second container (9) which is arranged between the metering system (8) and the pump (12).

10. The method as claimed in any of the preceding claims, characterized in that during the method, an inert gas (300) is introduced into the metering system (8), the first and/or the second container (3, 9).

11. The method as claimed in any of the preceding claims, characterized in that the hops pellets (200) are overlaid with inert gas (300) at least in the metering system (8) or in the second container (9).

12. The method as claimed in any of the preceding claims, characterized in that the method comprises a cleaning of the plant (1) following the supply of the metered hops pellets (200), wherein the cleaning takes place with one or more liquid or vaporous cleaning fluids.

13. The method as claimed in any of the preceding claims, characterized in that the cleaning comprises the introduction of dry air after cleaning with liquid or vaporous cleaning fluid.

14. The method as claimed in any of the preceding claims, characterized in that the hops pellets (200) are metered by the metering system (8) by means of at least one rotary feeder.

15. The method as claimed in any of the preceding claims, characterized in that the hops pellets (200) are metered by controlling the rotation speed of the rotary feeder, in particular depending on a mean throughflow of the beer precursor in the line carrying the beer precursor, or depending on the agitation speed of the beer precursor in the tank filled with beer precursor.

16. The method as claimed in any of the preceding claims, characterized in that the pump (12) is designed for gentle delivery, wherein a rotor and a stator of the pump (12) are arranged such that the granulated and/or pelletized form of the hops pellets is retained for at least 90 w.% of all hops pellets (200).

17. The method as claimed in any of the preceding claims, characterized in that the fill level of the first and/or second container (3, 9) is monitored by fill level meter, a pressure meter and/or a fill level limit switch.

18. The method as claimed in any of the preceding claims, characterized in that the beer precursor is a green beer (600) in a beer production process.

19. The method as claimed in any of the preceding claims, characterized in that the hops pellets (200) have a higher lupulin content than natural hop cones with the same weight.

20. A plant (1) for carrying out a method as claimed in claim 1, characterized in that the plant (1) comprises

a) a first container (3) for receiving hops pellets,

b) a metering system (8) for metering these hops pellets into

c) a second container (9), and

d) a pump (12) which is fed from the second container (9) and on the pressure side is connected to a liquid-carrying line (13b), in particular a line carrying beer precursor, or to a tank filled with a beer precursor, wherein the metering system (8) comprises a rotary feeder which is controlled such that hops pellets are metered into the beer precursor only when the beer precursor temperature is less than 60°C.

21. The plant (1) as claimed in claim 20, characterized in that the plant (1) is arranged along the line (13) carrying beer precursor or a temperature sensor (15) is arranged in the tank.

22. The plant as claimed in any of the preceding claims, characterized in that the pump (12) is formed as a displacement pump with two inlets, wherein one inlet is configured for supplying hops pellets and one inlet is configured for supplying beer precursor, and an outlet is configured for discharging the product of the hops pellets and the beer precursor.

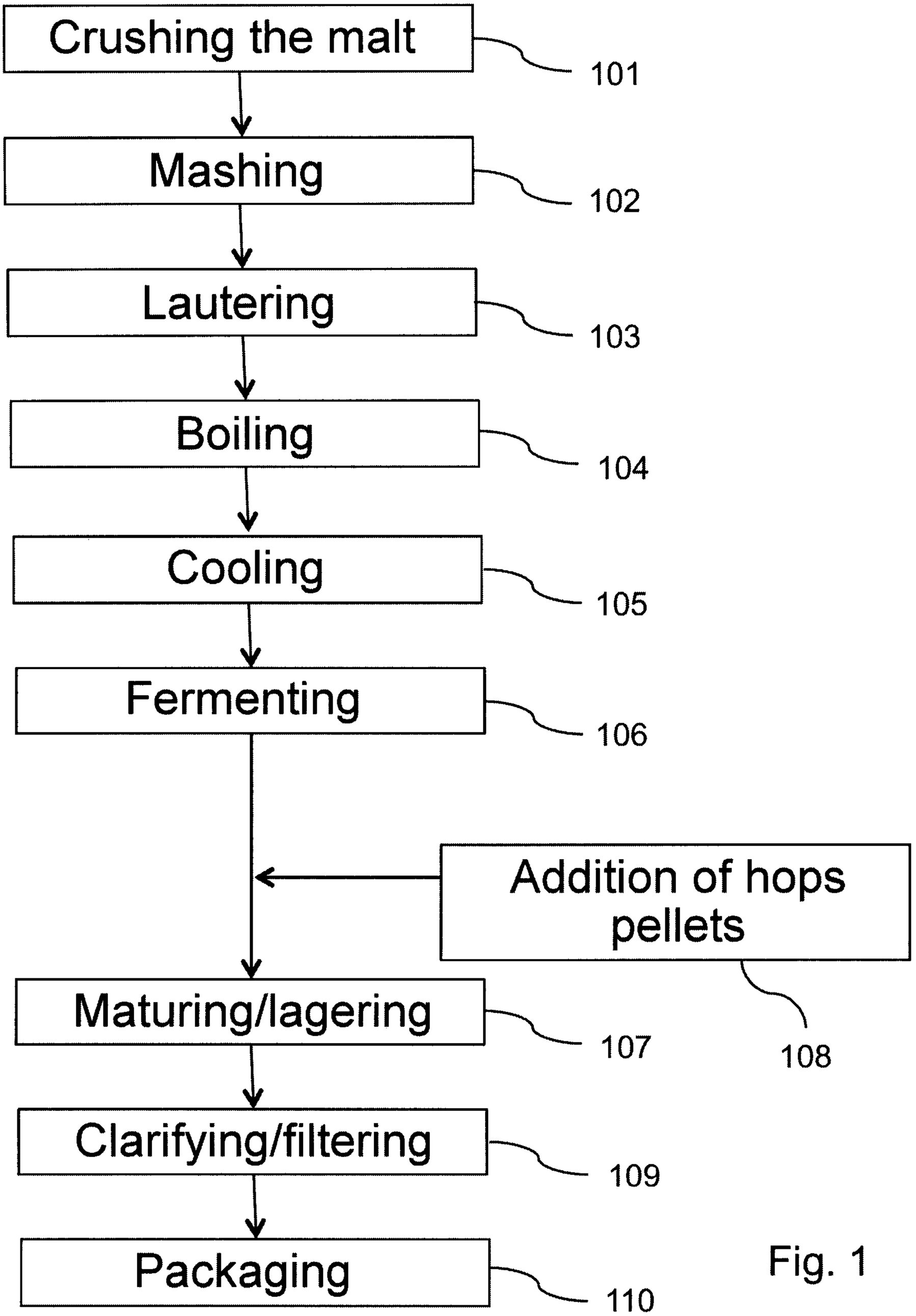
Crushing the malt
101
Mashing
102
Lautering
103
Boiling
104
Cooling
105
Fermenting
106
Addition of hops pellets
108
Maturing/lagering
107
Clarifying/filtering
109
Packaging
110

Fig. 1

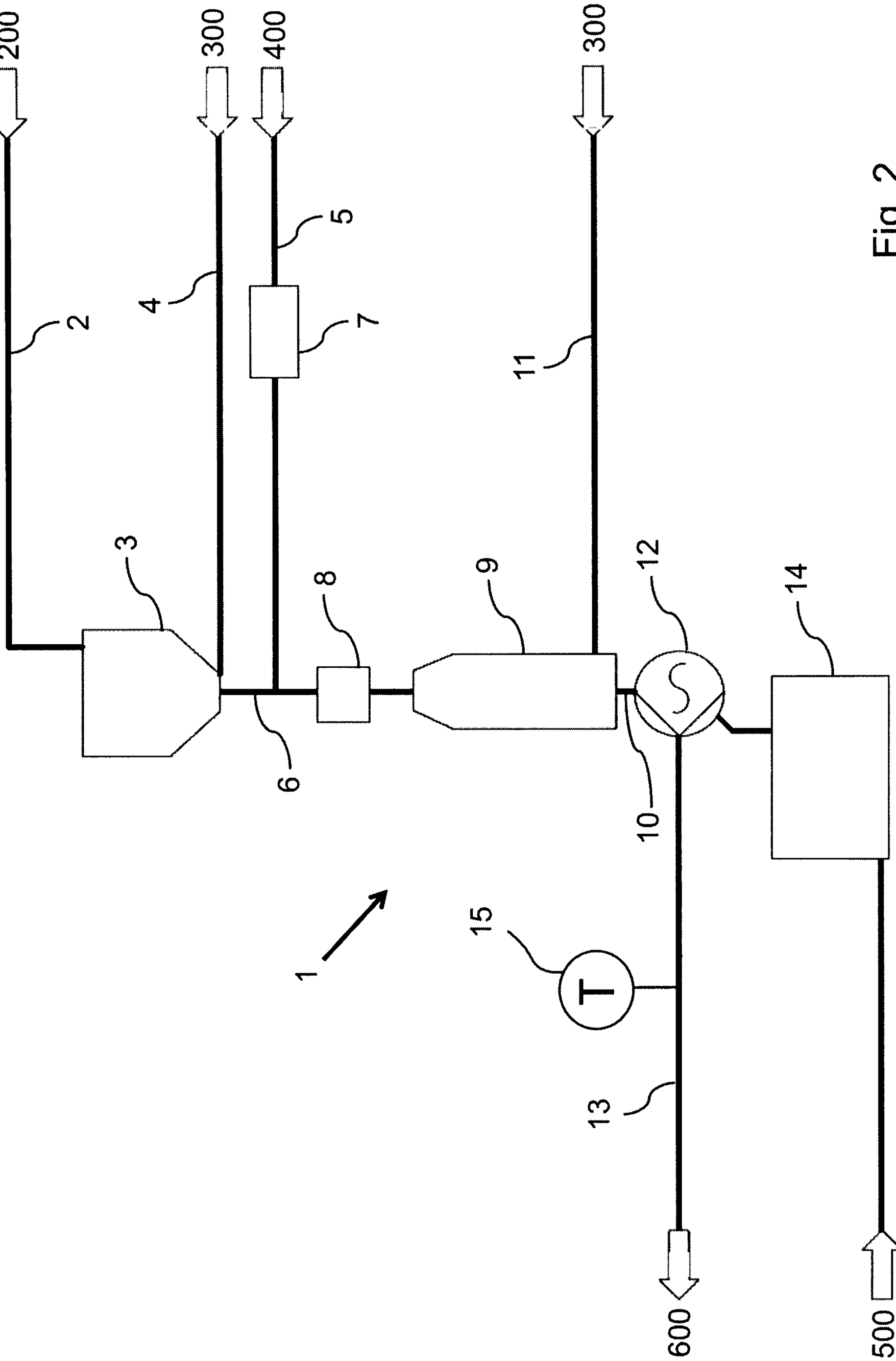

Fig. 2

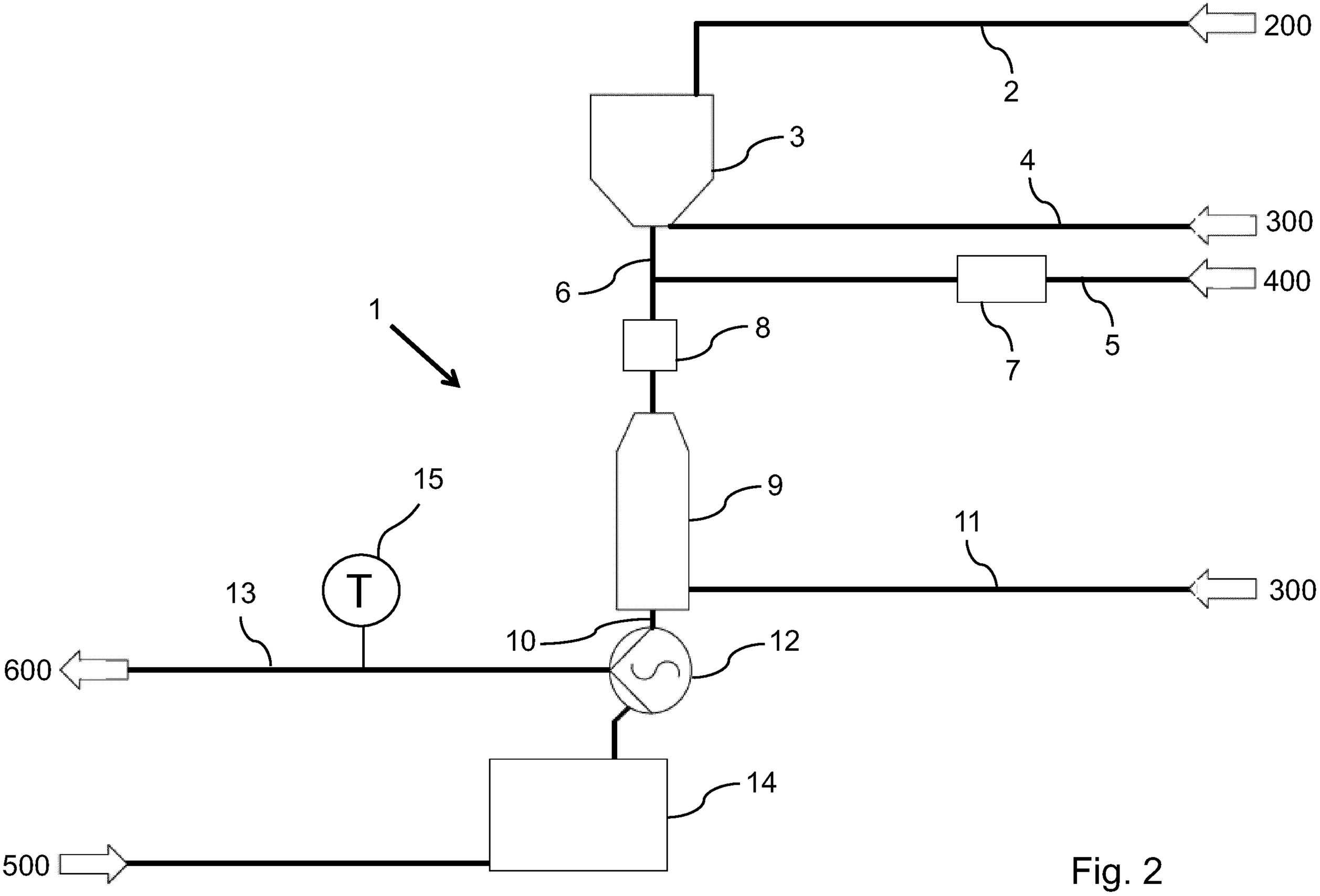

Fig. 2