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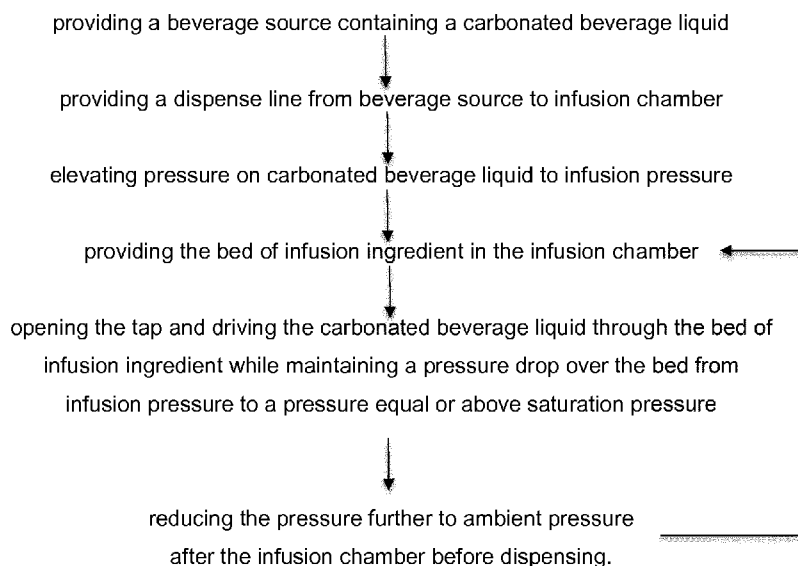


FIG 1

(57) Abstract: Method and apparatus for continuous dispensing a carbonated beverage, comprising: - providing a beverage source containing a carbonated beverage, - providing a dispense line disposing the beverage source in communication with an infusion chamber arranged in a dispensing tap, - elevating the pressure in the dispense line to an infusion pressure of at least 4 bar, - providing a bed of infusion ingredient in the infusion chamber, switching on the carbonated beverage liquid flow and driving the carbonated beverage liquid through the bed of infusion ingredient, while maintaining a pressure drop over the bed from infusion pressure to a pressure equal or above saturation pressure, - reducing the pressure further to ambient pressure after the infusion chamber.



METHOD FOR INFUSING CARBONATED BEVERAGE LIQUID WITH INGREDIENTS AND FOR DISPENSING IT.

5 TECHNICAL FIELD

The present disclosure generally relates to a dispensing apparatus for a carbonated beverage liquid and more particularly relates to a dispensing apparatus for infusing solid ingredients with a carbonated beverage liquid and a method thereof.

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BACKGROUND

Introducing flavor components in beverage products is a common practice, also in carbonated beverages such as beer.

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It is also common practice, to achieve taste characteristics and/or visual appeal, to introduce carbon-dioxide in the beverage. Notably, carbon-dioxide gas is used in restaurants and bars to pressurize draft beverage lines, such as in a keg.

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One general approach for flavoring such carbonated beverages is to mix a concentrate of the flavored component that completely dissolves or is completely dispersed in the beverage. The mixing process, generally, involves use of some blending device which agitates/stirs the beverage liquid. However, when mixing a concentrate in a carbonated liquid, sometimes there is a problem of "break-out" of carbon-dioxide gas. Further, for carbonated beverages such as beer, the mixing process may lead to excessive foaming of the beer (due to agitation), which may result in not only a loss of carbon-dioxide gas but also of proteins which are important to the taste and feel of the beer. Such loss cannot be compensated by just replenishing carbon-dioxide gas in the beer.

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Another generally preferred approach is infusing desired flavors into the carbonated beverages. Infusion is the process of extracting chemical compounds or flavors from plant material in a solvent such as water, oil or alcohol, by allowing the material to remain suspended in the solvent over time. Infusion systems are known for imparting new and interesting flavor profiles to beverages such as beer. Various ingredients, having desirable aromatic, visual, and/or taste components are used as infusing ingredients to augment beverage characteristics. It has been found that infusing of the

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flavor ingredients may help to overcome the drawbacks of mixing the ingredient with the carbonated beverage.

However, a general problem when infusing flavors into carbonated beverages is control of foam generation in the infusion apparatus.

Attempts have been made for enhancing foam control. In general, it is commonly known now that a suitable combination of pressure and temperature can mitigate foam generation. An example thereof is WO201669066, addressing the issue of temperature control and pouring pressure during the infusion process and disclosing an infusion apparatus that prevents the liquid from rising above the foaming temperature throughout the infusion process by using a heat exchanger that is in thermal contact with the liquid during the infusion process and also in thermal contact with a cooling system. The document also proposes to pressurize the inside of the infusion chamber, thereby facilitating the dispensing of the infused liquid at pressure.

Further, since recently a clear trend can be seen towards personalization in beverage and food consumption in general, and for carbonated beverages such as beer in particular, increasingly consumers desire to individually flavor their glass of beer at the point of sale. Infusion dispensing taps have been described addressing that need for example by implementing in the tap a portafilter containing an infusion ingredient and driving beer at high pressure through the portafilter before dispensing it. For each consumption the portafilter can be filled with a selection of infusion ingredients depending on what the consumer desires. See for example <http://www.cambridgeconsultants.com/media/press-releases/beer-gets-barista-touch-2>.

At the point of sale however, speed of service is important and it was found that upon pouring glasses at sufficient speed, consequently using sufficient pressure over a portafilter, foam generation is difficult to control. It was namely found that massive breakout of carbon dioxide from the carbonated beer occurs inside the portafilter, which results in an excessive foam head and flat tasting beer.

In addition, conventional infusion method and systems for carbonated beverages are typically not suited for being implemented in existing dispensing lines in bars and restaurants. Particularly, most other systems described in the state of the art employ a batch process, wherein carbonated liquid is introduced into a pressure chamber filled

with infusion ingredients and left to infuse for a predetermined residence time in the order of minutes, after which the infused liquid can be dispensed. The drawback of this method is that the infusion is not on demand since there is a waiting time of several minutes between preparation and dispense of the liquid. Additionally, a batch system has a fixed volume, while it is desirable to have a flexible dispense volume.

Therefore, it is an object of the present invention to provide a carbonated beverage dispensing method and system enabling infusing flavors from an infusing ingredient into a carbonated beverage in a flexible and efficient way in order to address the request of each individual consumer, while being capable of delivering service under normal or high pouring speed conditions and meeting service quality standards with respect to foam and visual appearance.

It is in particular an object of the present invention to provide a carbonated beverage infusion method and system adapted for in-line continuous dispensing.

It is also an object of the present invention to provide a carbonated beverage infusion method and system adapted for being implementing in existing dispensing lines at the point of sale.

SUMMARY

The present invention is directed to a method for dispensing a carbonated beverage liquid, comprising:

- providing a beverage source containing a carbonated beverage liquid,
- providing a dispense line disposing the beverage source in fluid communication with an infusion chamber configured for holding an infusion ingredient,
- elevating the pressure in the dispense line to an infusion pressure
- providing the bed of infusion ingredient in the infusion chamber, subsequently allowing the carbonated beverage liquid to enter the infusion chamber by switching on the carbonated beverage liquid,
- reducing the pressure further to ambient pressure after the infusion chamber,

characterized in that the infusion chamber is configured for holding a bed of said infusion ingredient and adapted for in-line continuous dispensing, and in that the carbonated beverage liquid is driven through the bed while maintaining a pressure

drop over the bed from infusion pressure to a pressure equal or above saturation pressure of the carbonated liquid.

Particularly, the bed of infusion ingredient is held by a portafilter.

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In an embodiment, the carbonated beverage liquid is a malt-based carbonated beverage, in particular beer.

In addition, the present invention is directed to a dispensing apparatus adapted for performing a method in accordance with the present invention.

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BRIEF DESCRIPTION OF THE DRAWINGS

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FIG. 1 is a block diagram of a method in accordance with one embodiment of the present invention.

FIG. 2 is a schematic of a dispensing apparatus adapted for performing a method in accordance with the present invention.

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DETAILED DESCRIPTION

In a first embodiment, the present invention provides a method for dispensing a carbonated beverage liquid, and illustrated in the form of a flowchart in FIG. 1. The method comprises the following steps of:

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- providing a beverage source containing a carbonated beverage liquid,
- providing a dispense line disposing the beverage source in fluid communication with an infusion chamber arranged in a dispensing tap, the infusion chamber containing a filter adapted for holding an infusion ingredient,
- elevating the pressure in the dispense line to an infusion pressure,
- providing the infusion ingredient in the filter, subsequently allowing the carbonated beverage liquid to enter the infusion chamber by switching on the carbonated beverage liquid flow and driving the carbonated beverage liquid through the filter, while maintaining a pressure drop over the filter from infusion pressure to a pressure equal or above saturation pressure,
- reducing the pressure on the infused beverage to ambient pressure after the infusion chamber.

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It was found that by infusing and dispensing a carbonated beverage using a two-step pressure drop, namely a first drop from infusion pressure to a pressure equal or higher than saturation pressure, and subsequently a second drop to ambient pressure before dispensing, foam generation may be controlled accurately, even at high pouring speed. Without being bound by any theory, it is believed that excess foam creation is caused by the high number of nucleation sites in the infusion ingredient. It was found that surprisingly, the two-step pressure drop suppresses nucleation and/or suppresses development of foam from nucleation to excess foam.

Saturation pressure is the minimum pressure necessary to maintain the CO₂ gas dissolved in the carbonated beverage. The saturation pressure depends on two aspects: CO₂ content and temperature. CO₂ contents for beer typically vary from approx. 4 grams per liter up to 7 grams per liter. At 20°C these carbonization grades result in saturation pressures of 1.4 to 3.2 bars respectively.

Dispensing any carbonated beverage source below this pressure will unavoidably lead to a loss of CO₂ gas, i.e., a loss of sparkling behaviour of the carbonated beverage. Furthermore, arising of bubbles in the carbonated beverage hose (which is soon at ambient temperature) will lead to dispensing difficulties (sputtering/splashing).

In regular stainless steel kegs, dispensing should not take place above the saturation pressure either. Dispensing above the saturation pressure will inevitably lead to over-carbonization, a pick-up of CO₂ gas by the carbonated beverage, which negatively affects taste. Therefore, in embodiment in accordance with the present invention, the pressure in the carbonated beverage source may be substantially around saturation pressure, for example in case of beer around 1,5 bar.

In embodiments of the present invention, infusion pressure may be at least 4 bar, at least 5 bar, or at least 6 bar. Suitable pressures are selected depending on the pressure drop caused by the bed of ingredients and the filter mesh inside the portafilter.

The pressure drop over the filter may be less than 4,5 bar, less than 3 bar, less than 2 bar, or less than 1bar. For example, in case saturation pressure is 3 bar and infusion pressure 4 bar, then the pressure drop over the filter should be less than 1 bar. In case saturation pressure of the carbonated beverage is 1,5 bar and infusion pressure 6 bar, then the pressure drop over the filter should be less than 4,5 bar.

The second pressure drop after the portafilter may be constituted by a pressure reducing means such as a pressure compensator or a section of small bore tubing, reducing the pressure in the infused beverage liquid. Important is that, since the pressure prevailing after the tap is below the saturation pressure (as low as ambient pressure at the dispense opening), the pressure reduction in the second drop is achieved in a gentle manner in order to avoid nucleation of excess foam.

Thus, at the bars and restaurants, even with high volume of serving drinks, a dispensing method and apparatus of the present disclosure may be used to customize the flavor of carbonated beverage liquid to satisfy a consumer's taste, while keeping excess foam creation under control. The user thus has the option to create beverages satisfy the palate of the consumer.

The beverage liquid to be dispensed may be of any type of carbonated beverage liquids, such as wine, cider, hard liquor (e.g., distilled beverage, spirit, liquor, hard alcohol, etc.), soft drinks (e.g., cola, soda, pop, tonic, seltzer), iced tea, soda water, preferably a malt-based carbonated beverage, more preferably a fermented malt-based carbonated beverage, and most preferably a beer.

From the above, it is clear that the pressure in the carbonated beverage source, e.g. the keg, is preferably substantially saturation pressure and the pressure in the carbonated beverage is elevated in the dispense line or in the infusion chamber, but not in the source.

The pressure in the dispense line may be elevated by any kind of pump as conventionally used for dispensing carbonated beverage from a keg or cask. In a preferred embodiment, a gas driven or electrical carbonated beverage pump, e.g. a beer pump is used, e.g. Flojet G56 by Xylem Inc.

In addition, and as illustrated in FIG.2, the present invention is directed to a dispensing apparatus adapted for performing a method in accordance with the above embodiments.

Such apparatus may comprise a beverage source containing the carbonated beverage liquid, the beverage source capable of being pressurized; a dispense line disposing the beverage source in fluid communication with a dispensing tap; a

dispensing valve to open and close the flow of carbonated liquid into the infusion chamber; an infusion chamber fluidly connected to the dispense line downstream the beverage source and configured to assist an infusion process between the carbonated beverage liquid and a solid ingredient.

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Further, the apparatus includes a pressure regulator or a set of primary and secondary regulators for controlling the pressure of the carbon dioxide coming from the carbon dioxide source, before it is fed to the carbonated beverage source and to the gas-driven beverage pump.

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Further, the beverage source may be in the form of any pressurized tank constructed of a material suitable for contact with beverages for human consumption. Materials of construction may include but not limited to stainless steel or a plastic. In one example, the beverage source is in the form of a keg cylinder closed at both ends, with the cylinder formed from a food-grade material, such as food-grade stainless steel.

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Further, the dispensing valve may be in the form of a plunger-type or plug-type beer tap with a manual tap handle, which are all well-known in the state of the art.

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In some examples, the dispensing apparatus may further include a refrigeration unit to chill the liquid to a temperature below the ambient temperature.

Further, the dispensing apparatus may include a beverage pump to elevate the pressure in the dispensing line to infusion pressure. Beverage pumps are conventionally employed in industry for the pumping of beer, soda and other beverages, especially because such pumps are compatible with carbonated as well as non-carbonated liquids. It may be understood that other type of pumps may be employed which are adapted for pumping liquids intended for human consumption.

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Alternatively to switching the carbonated beverage liquid flow on and off by opening and closing the dispense valve, switching on and off the beer pump may be also be used in which case a dispense valve may no longer be required.

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The beverage source may be connected with some pressurizing device, such as a compressed air cylinder or a compressor. The pressurizing device may be configured

to pressurize the liquid, in the beverage source, to flow from the beverage source to the dispensing tap, and additionally also for driving the beverage pump.

Preferably, the pressurizing device may include a carbon-dioxide source, typically in the form of a cylinder or a tank which is filled with liquefied carbon-dioxide gas at a high pressure. The carbon dioxide source may be used for pressurizing the carbonated beverage source and keeping the beverage at saturation pressure, and additionally also for driving the beverage pump, as depicted in FIG 2.

It should be clear that the infusion chamber is an in-line infusion chamber, i.e. adapted for in-line continuous dispensing wherein carbonated beverage continuously enters the infusion chamber and leaves it via the bed of infusion ingredient. The infusion chamber is not adapted for holding a batch of liquid in a closed cavity.

The infusion chamber may be configured to infuse an infusing ingredient, preferably but not limited to a solid flavoring ingredient with the liquid and thereby desorb flavor components therein. In order to infuse the liquid, the infusion chamber provides an arrangement to place ingredients inside thereof and thereby come in contact with the liquid.

The infusion chamber may be removably disposed from the dispense line to place or replace a bed of infusing ingredient therein, and further for cleaning purposes. In preferred embodiments, a removable and/or replaceable filter may be provided in the infusion chamber acting as a holding means for the infusing material when the infusion chamber is drained of the liquid.

These filters may be made from a variety of materials, such as a metal or plastic perforated screen or mesh or a micron filter and further be produced in a variety of shapes, sizes, and porosity and still achieve the desired filtering and containing effect. It may also be contemplated that a single filter, or multiple filters, could be used in a variety of possible configurations.

Preferably, the bed of infusion ingredient is held by a portafilter carrying the infusion ingredient within its basket. Therefore, a dispensing apparatus in accordance with the present invention may comprise a grouphead (or group head) for receiving the removable portafilter (or group handle). The grouphead contains many holes that

attempt to distribute the pressurised carbonated beverage evenly over the surface of the grinds in the portafilter basket and thereby achieve an even cross sectional flow.

5 A portafilter is usually made of brass for better heat retention, and is attached by a plastic or wooden handle. The portafilter forms a seal with dispense tap's gasket, and directs carbonated beverage at infusion pressure through the bed of infusion ingredient.

10 Further, in some examples, the infusion chamber may be surrounded by a thermoelectric unit configured to control a temperature of the liquid during infusion, as required by the infusion process, mostly based on the type and properties of the infusing ingredient and the liquid. Alternatively, the group head may comprise cooling channels for recirculating a coolant, which in turn may be chilled by the refrigeration unit.

15 It may be understood that a variety of infusing ingredients may be used in order to infuse the liquid. For example, infusing ingredient can be a plant (such as mint), a flower (such as hops), a fruit (such as an orange, banana, cherry, blueberry, raspberry, or cranberry), a vegetable (such as a pepper or pumpkin), a bean (such as a vanilla or coffee), a nut or legume (such as a pistachio or peanut), a seed (such as cardamom), a wood (such as oak or oak soaked in a distilled spirit), a spice (such as cinnamon or pepper), an herb (such as lavender or rosemary), a root (such as ginger), an extract, a syrup (such as maple syrup), chocolate, candy, or any other type of flavoring item (such as an oil, resin, gel, or powder). Most typically, infusion
20 imparts a new or enhanced flavor to the liquid, although the infusion could be done for other purposes, such as for imparting vitamins, boosters, or remedies for medicinal or health-related reasons to the liquid. These infusing ingredients may come in different forms, such as powders, liquids, solids, pastes, or particulates.

CLAIMS:

1. A method for dispensing a carbonated beverage liquid, comprising:

- providing a beverage source containing a carbonated beverage liquid,
- providing a dispense line disposing the beverage source in fluid communication with an infusion chamber configured for holding an infusion ingredient,
- elevating the pressure in the dispense line to an infusion pressure,
- providing the bed of infusion ingredient in the infusion chamber, subsequently allowing the carbonated beverage liquid to enter the infusion chamber by switching on the carbonated beverage liquid flow,
- reducing the pressure further to ambient pressure after the infusion chamber,

characterized in that the infusion chamber is adapted for in-line continuous dispensing and for holding a bed of said infusion ingredient, and in that the carbonated beverage liquid is driven through the bed of infusion ingredient while maintaining a pressure drop over the bed from infusion pressure to a pressure equal or above saturation pressure.

2. The method according to claim 1, wherein the bed of infusion ingredient is held by a removable filter.

3. The method according to claim 2, wherein the bed of infusion ingredient is held by a portafilter.

4. The method according to claim 1, wherein the infusion pressure is at least 5 bar.

5. The method according to any of claims 1 to 3, wherein the pressure drop over the bed of infusion ingredient is less than 3 bar.

6. The method according to claim 1, wherein switching on the carbonated beverage liquid flow is done by opening a dispense valve.

7. The method according to claim 1, wherein the pressure in the dispense line is elevated in the dispensing line by means of a gas driven or electrically driven beverage pump.

8. The method according to claim 7, wherein switching on the carbonated beverage liquid flow is done by switching on the beverage pump.
9. The method according to any of the above claims, wherein the carbonated beverage liquid is a malt-based carbonated beverage.
10. A dispensing apparatus adapted for performing a method in accordance with any of the above claims.

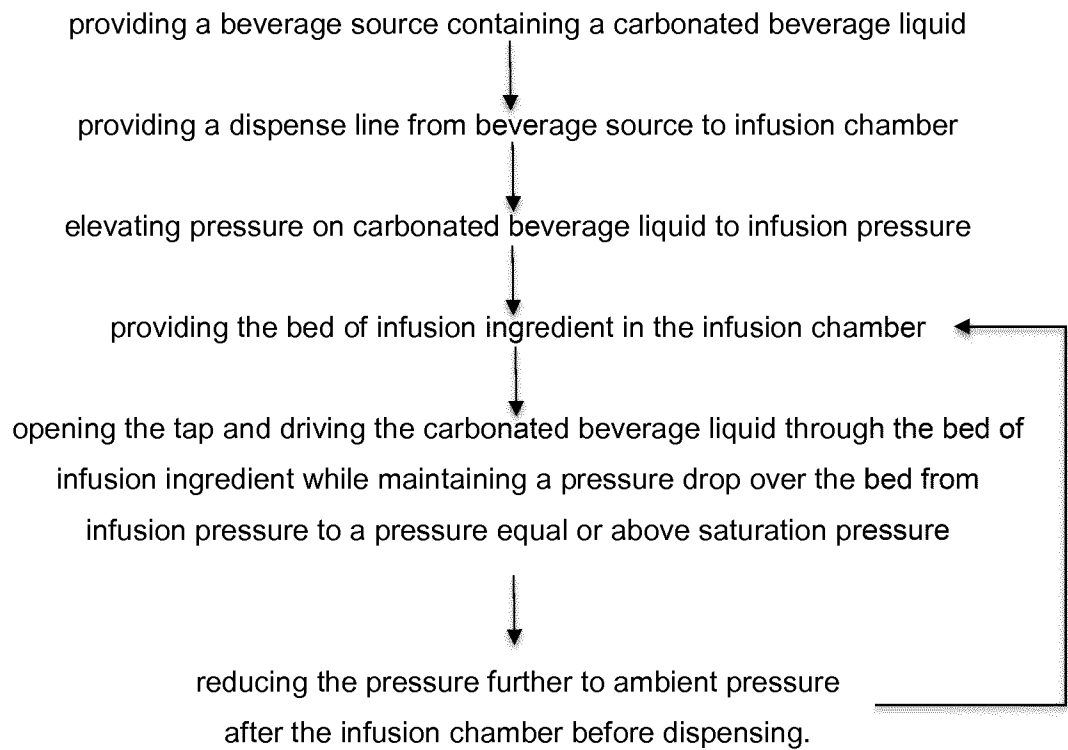


FIG 1

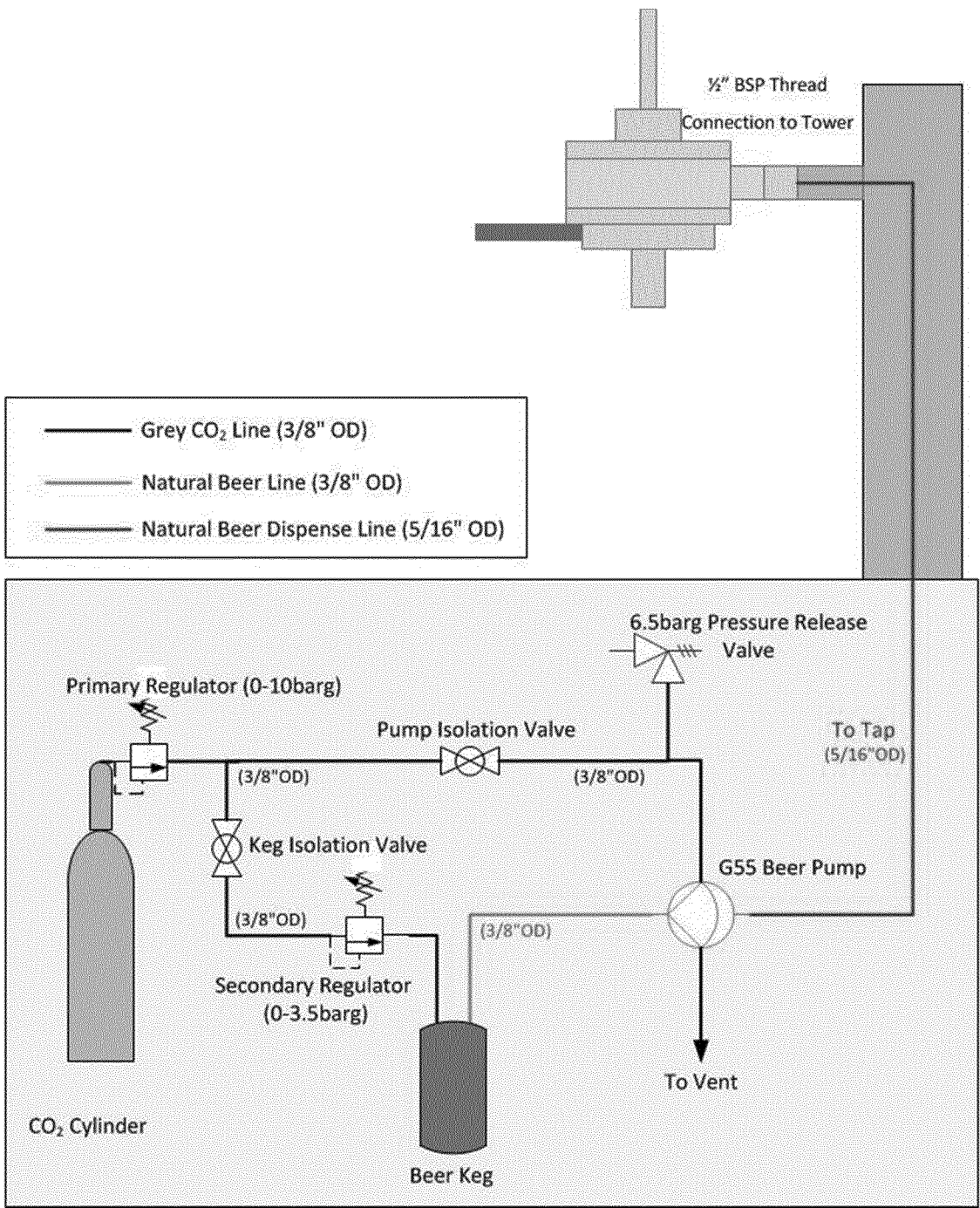


FIG 2

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2018/057788

A. CLASSIFICATION OF SUBJECT MATTER

INV. B67D1/04 C12C5/02
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)

B67D A47J C12C

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.
A	WO 2016/069066 A1 (FUSION TOWER LLC [US]) 6 May 2016 (2016-05-06) page 7, line 1 - line 34 page 14, line 22 - page 15, line 2 page 16, line 27 - page 17, line 16 page 23, line 26 - line 33 page 25, line 15 - line 18 -----	1-10
A	WO 2008/140331 A1 (LITTLE ENGINEERING LTD C [NZ]; LITTLE CHRISTOPHER JOHN [NZ]) 20 November 2008 (2008-11-20) page 9, line 1 - page 11, line 5 -----	1-10
A	EP 2 915 776 A2 (ANDALE REPETITION ENGINEERING PTY LTD [AU]) 9 September 2015 (2015-09-09) paragraph [0024] - paragraph [0036] -----	1,10



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 2016069066	A1	06-05-2016	CA 2964753 A1	06-05-2016
			JP 2017533868 A	16-11-2017
			US 2017305731 A1	26-10-2017
			WO 2016069066 A1	06-05-2016

WO 2008140331	A1	20-11-2008	AU 2008251141 A1	20-11-2008
			NZ 555085 A	28-09-2007
			US 2010221404 A1	02-09-2010
			WO 2008140331 A1	20-11-2008

EP 2915776	A2	09-09-2015	AU 2015201068 A1	17-09-2015
			EP 2915776 A2	09-09-2015
			US 2015247110 A1	03-09-2015
