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(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, 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.

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Published:

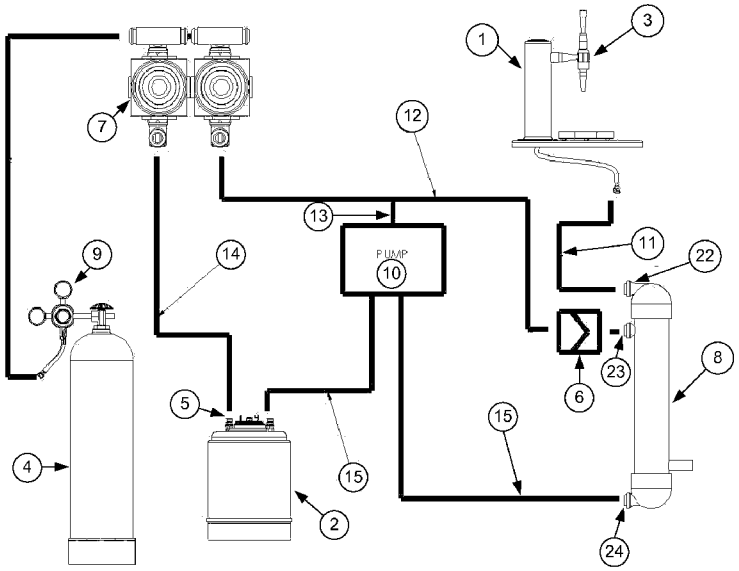
— *with international search report (Art. 21(3))*

— *with amended claims (Art. 19(1))*

(88) **Date of publication of the international search report**:
7 January 2016

(54) **Title**: CHILLED N_2 INFUSED BEVERAGE DISPENSING SYSTEM AND METHOD TO PREPARE AND DISPENSE A CHILLED N_2 INFUSED BEVERAGE

FIG. 1



(57) **Abstract**: A system and method to prepare and dispense a N_2 or N_2/CO_2 gas infused chilled beverage is provided. The beverage may be any non-carbonated liquid and in one embodiment the beverage is coffee. The dispensed N_2 or N_2/CO_2 gas infused chilled coffee has a unique appearance and enhanced flavor and aroma. The system may be provided as a self-contained unit.

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INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - B67D 1/04, 1/10;B01F 3/04 (2015.01)
CPC - B67D 1/04, 1/10; B01F 3/04
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)
IPC(8): B65D 85/73; B67D 1/04, 1/10, 1/12 (2015.01)
CPC: Y10S 261/07; B65D 85/73; B67D 1/0057, 1/0077, 1/1252, 1/04, 1/10, 1/12; USPC: 261/35, 43, 53, 102, 105; 426/477

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)
PatSeer (US, EP, WO, JP, DE, GB, CN, FR, KR, ES, AU, IN, CA, INPADOC Data); Google; Google Scholar; ProQuest; IP.com; keywords: diaphragm pump, nitrogen, carbonation, carbondioxide, pump, blast chiller, valve, check valve, chill, cool, heat, hot, coffee

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 10 2010 012 175 A1 (GEORG F) September 22, 2011; figures 1, 2; paragraphs abstract, [0003], [0004], [0043]-[0045]	23-26, 28, 29, 43, 44
Y		27, 30-42
Y	US 4,759,474 A (REGUNATHAN P et al.) July 26, 1988; figure 1; column 1, lines 10-15	31, 40
Y	US 2006/0112717 A1 (WALTON PA) June 01, 2006; figure 1; abstract; paragraph [0002]	27, 32-38, 41, 42
Y	US 5,826,432 A1 (LEDBETTER BG) October 27, 1998; figure 1; column 1, lines 20-45; column 13, lines 35-40	30, 39
A	US 4,708,827 A (MCMILLIN JR) November 24, 1987; entire document	1-44
A	US 2010/0133708 A1 (FISCHER G) June 03, 2010; entire document	1-44
A	US 2011/0041543 A1 (TACHIBANA Y et al.) February 24, 2011; entire document	1-44

☐ 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
02 September 2015 (02.09.2015)	23 SEP 2015
Name and mailing address of the ISA/ Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Authorized officer Shane Thomas PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US15/28876

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:

-***-Please See Supplemental Page-***-

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 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.:

Group I: claims 1-22; Group II: claims 23-44;

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.:

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.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/US15/28876

-***-Continued from Box No. III: Observations where unity of invention is lacking-***-

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I: claims 1-22 are directed toward a system for dispensing a cooled beverage, comprising: a beverage tank capable of being pressurized.

Group II: claims 23-44 are directed toward a system for dispensing a cooled beverage, comprising: a bag-in-box beverage container.

Group III: claims 45-48 are directed toward a system for dispensing a cooled beverage, comprising: a controlled discharge means to generate a head of foam on the discharged beverage.

The inventions listed as Groups I-III do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons.

The special technical features of Group I include a beverage tank capable of being pressurized (which is not present in Groups II, III); a liquid/ gas contactor membrane unit; a diaphragm pump; and a beverage faucet attached downstream to the liquid/gas contactor membrane unit wherein regulated pressure nitrogen gas is fed via supply lines to the liquid/gas contactor membrane unit, the diaphragm pump (which is not present in Group III) and through a secondary regulator to the beverage tank (which is not present in Groups II, III), the diaphragm pump is arranged via transfer lines to transfer beverage from the beverage tank to the liquid/gas contactor membrane unit, and the nitrogen feed supply line to the liquid/gas contactor membrane unit comprises a check valve preventing liquid flow from the liquid/gas contactor membrane unit into the pressurized gas supply line (which is not present in Group III).

The special technical features of Group II include a bag-in-box beverage container (which is not present in Groups I, III); a liquid/gas contactor membrane unit; a diaphragm pump; and a beverage faucet attached downstream to the liquid/gas contactor membrane unit wherein regulated pressure nitrogen gas is fed via supply lines to the liquid/gas contactor membrane unit and the diaphragm pump, the diaphragm pump is arranged via transfer lines to transfer beverage (which is not present in Group III) from the bag-in-box beverage container (which is not present in Groups I, III) to the liquid/gas contactor membrane unit, and the nitrogen feed supply line to the liquid/gas contactor membrane unit comprises a check valve preventing liquid flow from the liquid/gas contactor membrane unit into the pressurized gas supply line (which is not present in Group III).

The special technical features of Group III include a containment means for storage and supply of a chilled beverage; a means for contacting a chilled beverage with a gas such that the gas is dissolved and/or dispersed in the chilled beverage; a beverage dispensing means attached downstream to the liquid/gas contacting means; and a means to transfer the chilled beverage from the containment means to the gas contacting means and further to the beverage dispensing means; wherein the nitrogen feed supply line to the means for liquid/gas contacting comprises a means to prevent liquid flow from the liquid/gas contacting means into the pressurized gas supply line, and the beverage dispensing means comprises a controlled discharge means to generate a head of foam on the discharged beverage (which is not present in Groups I, II).

The common technical features of Groups I-III include a system for dispensing a cooled beverage, comprising: a beverage tank; a controlled pressurized supply of a gas comprising at least 50% by weight nitrogen; a liquid/gas contactor membrane unit; a diaphragm pump; and a beverage faucet attached downstream to the liquid/gas contactor membrane unit wherein regulated pressure nitrogen gas is fed via supply lines to the liquid/gas contactor membrane unit and the diaphragm pump; the diaphragm pump is arranged via transfer lines to transfer beverage from the beverage tank to the liquid/gas contactor membrane unit, and the nitrogen feed supply line to the liquid/gas contactor membrane unit comprises a check valve preventing liquid flow from the liquid/gas contactor membrane unit into the pressurized gas supply line.

These common technical features are obvious over US 2010/0133708 A1 (FISCHER) in view of US 4,708,827 A (MCMILLIN): a system for dispensing a cooled beverage, comprising: a beverage tank; a controlled pressurized supply of a gas comprising at least 50% by weight nitrogen (nitrogen gas is impregnated into beer (in a beverage tank) at a pressure of 5.6 bar; paragraphs [0015], claim 45); a liquid/gas contactor membrane unit (fibrous impregnator body; paragraph [0031]); a diaphragm pump (the beverage precursor product is conventionally pumped out of a tank using a diaphragm pump; paragraph [0016]); and a beverage faucet attached downstream to the liquid/gas contactor membrane unit (flow exits the impregnator via a dispensing tap; paragraph [0094]) wherein regulated pressure nitrogen gas is fed via supply lines to the liquid/gas contactor membrane unit (nitrogen enters impregnator body disposed in a mixing cell via gas inlet; paragraph [0030]), the diaphragm pump is arranged via transfer lines to transfer beverage from the beverage tank to the liquid/gas contactor membrane unit (liquid from source is pumped by the diaphragm pump into the mixing cell of the impregnator; paragraphs [0016], [0030]), and the nitrogen feed supply line to the liquid/gas contactor membrane unit comprises a check valve (29; paragraph [0096]) preventing liquid flow from the liquid/gas contactor membrane unit into the pressurized gas supply line (via stopping reverse flow; paragraph [0096]). Fischer does not disclose regulated pressure nitrogen gas is fed via supply lines to the diaphragm pump. McMillin discloses regulated pressure gas (via pressure regulator valve 24; column 4, lines 60-68) is fed via supply lines (28) to the diaphragm pump (12). In order to regulate the pressure of the gas and liquid entering the liquid/gas contactor membrane unit (Fischer, paragraph [0131]); it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Fischer's diaphragm pump and gas source to incorporate McMillin's supply line to the diaphragm pump; because, as Fischer discloses, the use of diaphragm pumps in beverage systems is conventional (Fischer, paragraph [0016]) and as McMillin discloses, this arrangement is particularly useful in providing a pneumatically powered system independent of the unpredictable water pressure from a bulk water source (McMillian, column 4, lines 35-50).

Because the common technical features are obvious over FISCHER in view of MCMILLIN, the inventions are not so linked as to form a single general inventive concept. Therefore, Groups I-III lack unity.